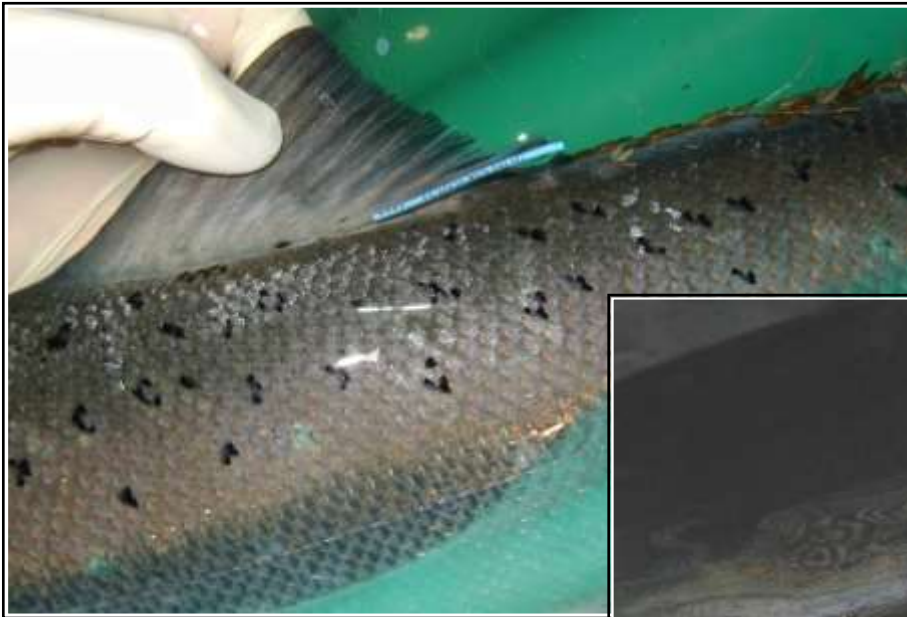


# DEE STOCK ASSESSMENT PROGRAMME ANGLER REPORT 2017

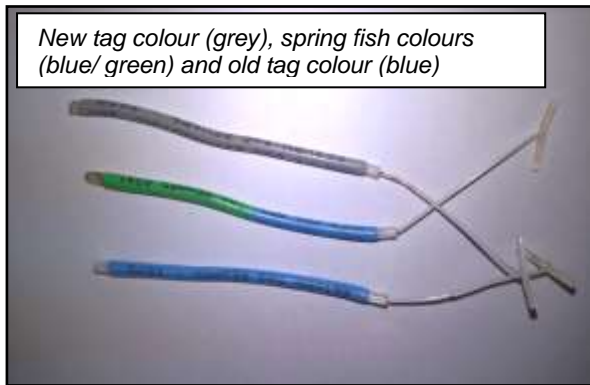


**Cyfoeth Naturiol Cymru**  
**Natural Resources Wales**

*Front cover: Electrofishing for juvenile salmonids on the main Dee at Gwerclas*



*New tag colour (grey), spring fish colours (blue/ green) and old tag colour (blue)*



*Photos: Floy tagged salmon and VI (Visible Implant) tagged sea trout.*

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## 1. Introduction

This report summarises provisional findings of the Dee Stock Assessment Programme (DSAP) and related work for 2017, and is one of a series of annual reports produced by Natural Resources Wales (NRW) and predecessor organisations.

**Byelaw proposals:** Foremost in the minds of many anglers (and net fishermen) at this time, will be the launch by NRW in 2017 of formal consultations on Net Limitation Orders and netting and angling byelaw proposals for salmon and sea trout on rivers across Wales.

The byelaw consultations were divided into two categories: (i) for all Wales rivers - excluding the cross-border rivers Wye and Dee (and Severn where the Environment Agency take the lead on fisheries management), and (ii) for the cross-border rivers Wye and Dee.

The consultation on the 'all Wales rivers' proposals opened on the 22<sup>nd</sup> August and closed on 14<sup>th</sup> November 2017.

The consultation on the 'cross-border rivers' proposals opened on the 13<sup>th</sup> November and closed on 5<sup>th</sup> February 2018. (The start of this consultation was aligned with similar byelaw proposals being developed by the Environment Agency in England).

A single Technical Case was produced as the evidence base to support both proposals, and the details of this, the byelaw proposals themselves, and wider consultation processes can be found at:

<http://naturalresourceswales.gov.uk/guidance-and-advice/environmental-topics/consultations/our-own-consultations-closed/?lang=en>

Needless-to-say, the proposals were contentious, and particularly so for salmon, as they call for mandatory catch-and-release (and associated method changes) across Wales in response to widespread failure of individual river stocks against their Conservation Limits.

The purpose of this note is not to go into the debate on the rights and wrongs of these proposals but to update fishermen on where we are with them.

For the 'all Wales rivers' proposals: responses were made to correspondence received as part of the consultation process and amendments to the proposals considered in view of issues raised in that correspondence. Amended proposals (mainly modifications to some of the proposed changes in fishing methods) were recommended to NRW's Board at their public meeting in Bangor on the on 18<sup>th</sup> January 2018. The Board approved the amended byelaw proposals and, on that basis, an application has recently been submitted to Welsh Government for their decision. Details of papers submitted at the Board meeting can be found at:

<http://naturalresourceswales.gov.uk/about-us/our-chair-board-and-management-team/board-meeting-agendas-minutes-and-papers/18-january-2018-board-meeting/?lang=en>

For the 'cross-border rivers' (Wye and Dee) the consultation period has ended but we are still in the process of responding to correspondence and considering the issues raised. The process for those byelaws will be the same as that described above for the 'all Wales rivers'.

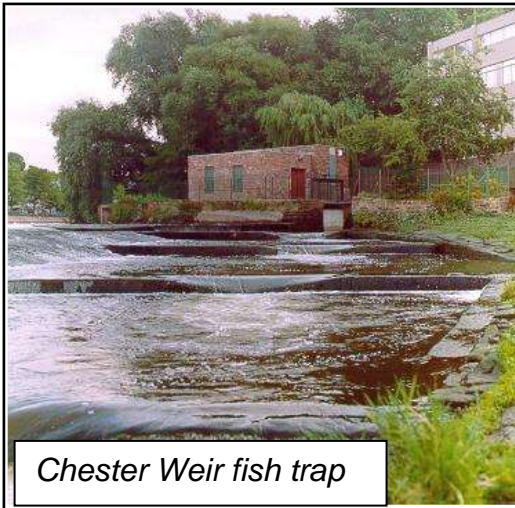
In both cases, the final decision on whether to implement these byelaws or not, or what form they should take, will rest with Welsh Government. Once we have a decision from Welsh Government, we will publicise it as soon as practicably possible. At that time, we will also set out what the decision means for each river so that there is clarity for all.

Until that decision is made, the existing byelaws remain in place. However, stocks - particularly salmon stocks - remain vulnerable (including salmon stocks on the Dee, as set out below) and so we continue to call for all salmon to be returned to the river, and that anglers use only methods that give released fish the best chance of survival.

## **2. Trapping and tagging at Chester Weir**

Trapping and tagging of adult salmon and sea trout at Chester Weir has been carried out since 1991 to (i) estimate the total run of fish returning each year and (ii) collect information on their biology (e.g. age, size, sex, general condition). Combining this information allows individual generations of fish to be followed through time and is used to help improve our understanding of the factors affecting survival and abundance and inform our management in the widest sense (local, national and international).

Very few rivers have facilities (counters or traps) to estimate the numbers of salmon or sea trout returning each year. Out of more than 60 principal salmon and sea trout rivers in England and Wales (E&W), only 10 currently provide run estimates for salmon of which just 5 produce the same estimates for sea trout. Among these rivers, only four - (the so called 'Index Rivers': Tyne, Tamar, Dee and Lune) also collect biological information via trapping or fishery based sampling programmes (of which the Dee is the longest running).



*Chester Weir fish trap*

Trapping at Chester Weir is carried out throughout the year (January - December) but not continuously. When the trap is not being fished (around 40% of the time) it becomes an 'open channel' through which fish can freely pass. For this reason, and because fish are able to cross the weir and bypass the trap in high flows and on big (~9m) tides, the trap is a partial one. Tagging and recapture estimates (below) indicate that, on average, 20-30% of the run is trapped at Chester.

Virtually all salmon and the majority of sea trout captured at Chester Weir are tagged using Floy and VI (Visible Implant) tags, respectively (see photos on inside front cover). In both cases, run estimates require a second catch from which the ratio of tagged to untagged fish can be obtained. For salmon, this relies on anglers reporting the tagged and untagged fish they catch in the same year they were tagged. In the case of sea trout, however, (where, unlike salmon, multiple spawners are common) the second catch takes place back at Chester Weir trap one year after tagging. In both instances, the ratio of tagged to untagged fish in the second catch is used to raise the total number tagged to obtain a run estimate. For example, if 1,000 salmon were tagged at Chester Trap, and 1 in 5 of the salmon caught by anglers were tagged, then it is assumed that 1/5th of the run has been tagged - producing a run estimate at Chester of 5,000 fish.

A £7 cash reward is offered to encourage anglers to report any tagged salmon they catch. This reward is increased to £14 for anglers who returned a logbook in the previous season. The reason for this is that records of tagged and untagged salmon submitted by logbook anglers are considered the most reliable - simply because of the effort required to maintain a detailed record of each fishing visit. Hence, only the catch and recapture details from logbook anglers are used to generate salmon run estimates.

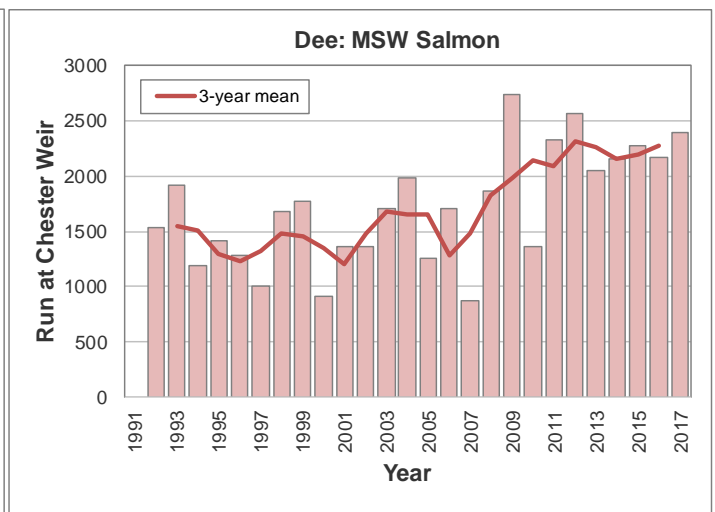
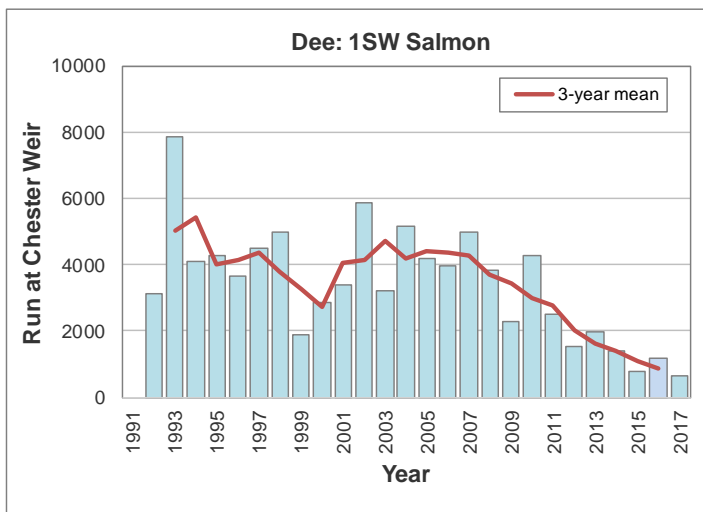
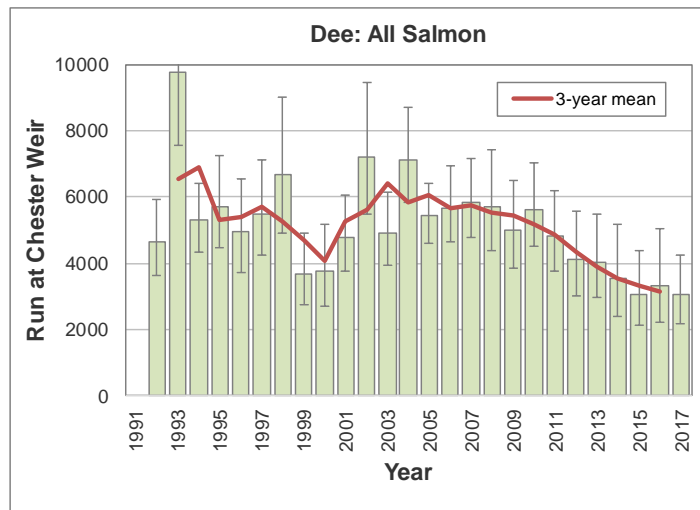
The run of salmon entering the Dee after the end of the angling season (on average less than 10% of the total) is derived from the trap catch and an estimate of trap efficiency from the in-season period.

### **3. Dee Salmon in 2017**

**Run size and composition:** Provisional results indicate a run of 3,043 salmon (fish of all sea ages) at Chester in 2017 - the lowest run to date (Fig. 1). The corresponding trap catch in 2017 was 545 fish.

As described in previous reports, the decline in the salmon run on the Dee is being driven by a marked fall in the return of 1-sea winter (1SW) fish or grilse - particularly evident since 2010. There is no sign of a reversal in this trend as the estimated return of grilse to the Dee in 2017 (like the run as a whole) was also the lowest to date at 652 fish.

**Fig. 1 Annual run estimates for salmon at Chester Weir, 1992-2017**  
(error bars indicate 95% confidence intervals)



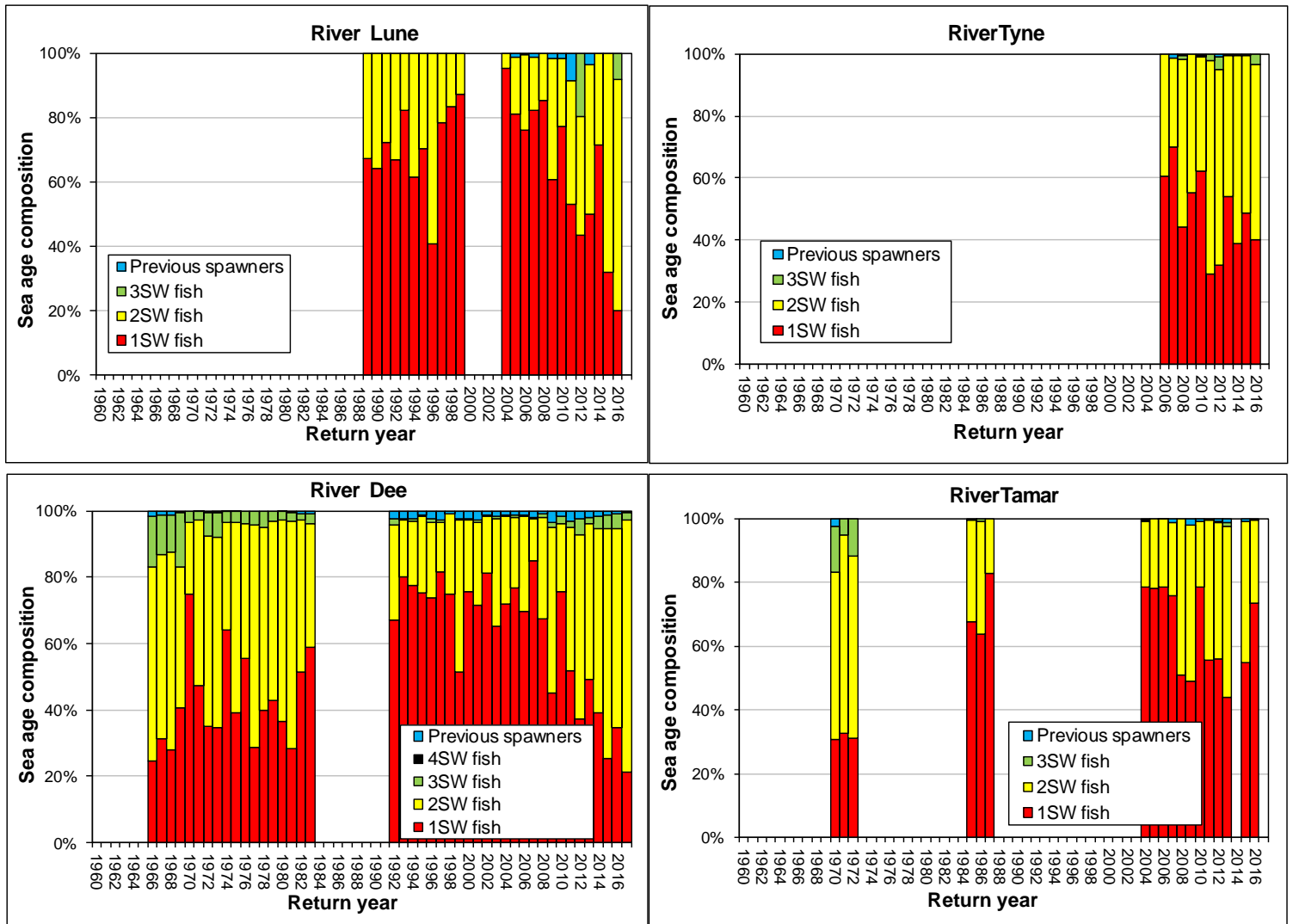
A decade ago, the average number of salmon of all sea ages returning to the Dee was around 5,500 fish and grilse made up 75% of that return - or around 4,000 fish. In 2017, the grilse return comprised just over 20% of a much smaller run total.

The more welcome news is that, in contrast to the decline in grilse numbers, there has been an upturn in the abundance of multi-sea winter (MSW) salmon returning to the Dee in recent years. The estimated run of 2,305 MSW fish at Chester in 2017 (mainly 2-sea winter fish) was the second highest to date (maximum 2,501 fish in 2009), with 8 of the last 9 years recording MSW returns of over 2,000 fish (a threshold not crossed prior to 2009 all the way back to the first full year of trapping at Chester in 1992).

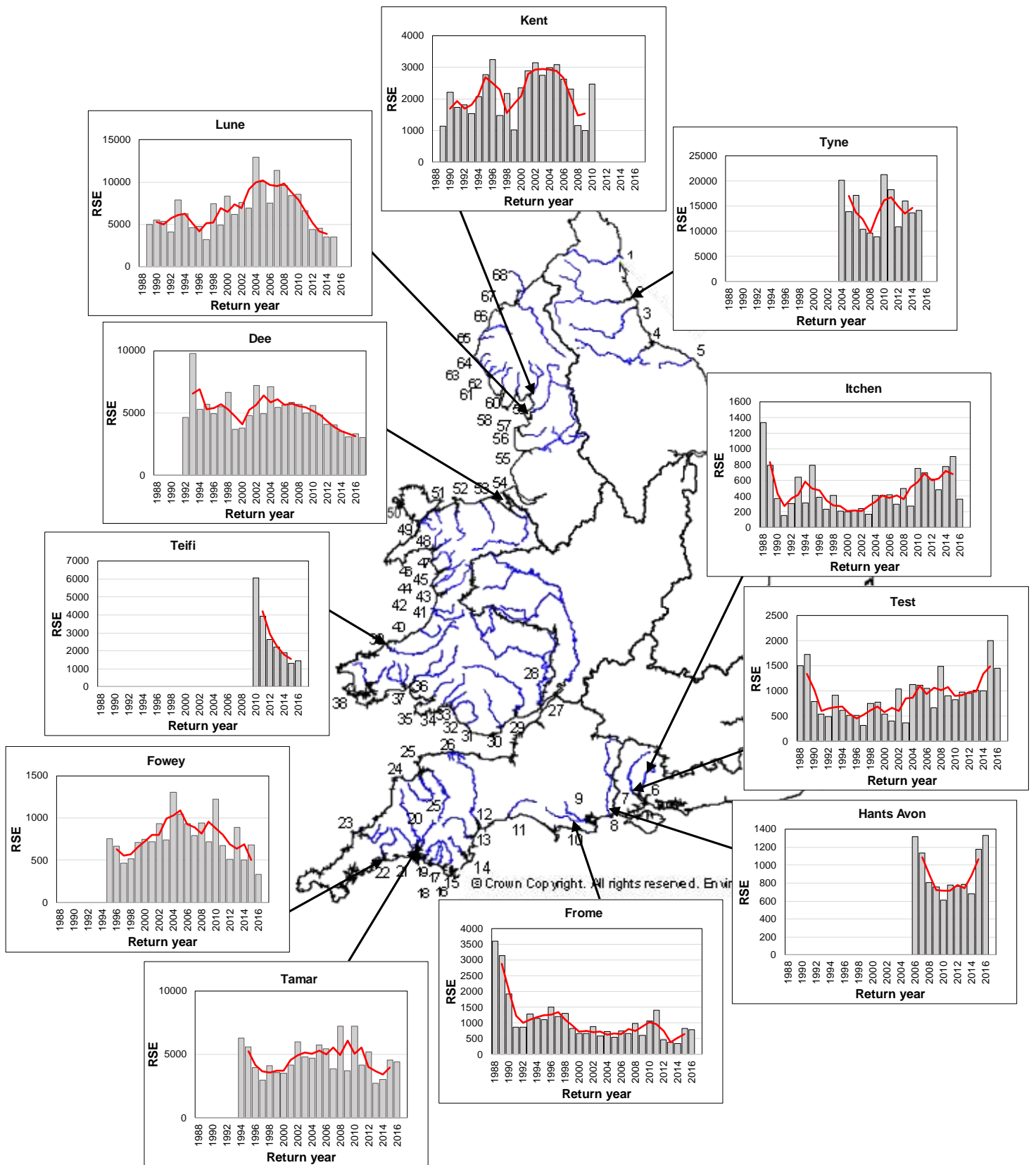
The Dee is not alone in experiencing a marked reduction in the overall abundance of returning salmon in recent years associated with a decline in grilse numbers.

Fig. 2 for example, shows the sea age composition of salmon stocks on the four index rivers (Tyne, Tamar, Dee and Lune) and strongly suggests a common pattern of decline in the proportion of 1SW salmon returning in the last decade or so. The long-term data set from the Dee indicates that this may be part of a cyclical pattern - with the contribution of 1SW salmon in the last few years appearing similar to that 50 years ago when around 80% of the return was made up of MSW salmon.

**Fig. 2 Sea age composition of salmon on the Index Rivers, 1960-2017**



**Fig. 3 Returning Stock Estimates (RSEs) for salmon from the 'counted' rivers in E&W, 1988-2017 (red line shows 3-year running mean)**





Others have commented on the long-term cyclical changes in abundance of grilse and multi-sea winter salmon evident from historic data sets and have linked these to similar cyclical processes affecting environmental conditions in the North Atlantic. See, for example, the recent video produced by the Tweed Foundation:

<https://www.youtube.com/watch?v=5Djuymzxpt4>

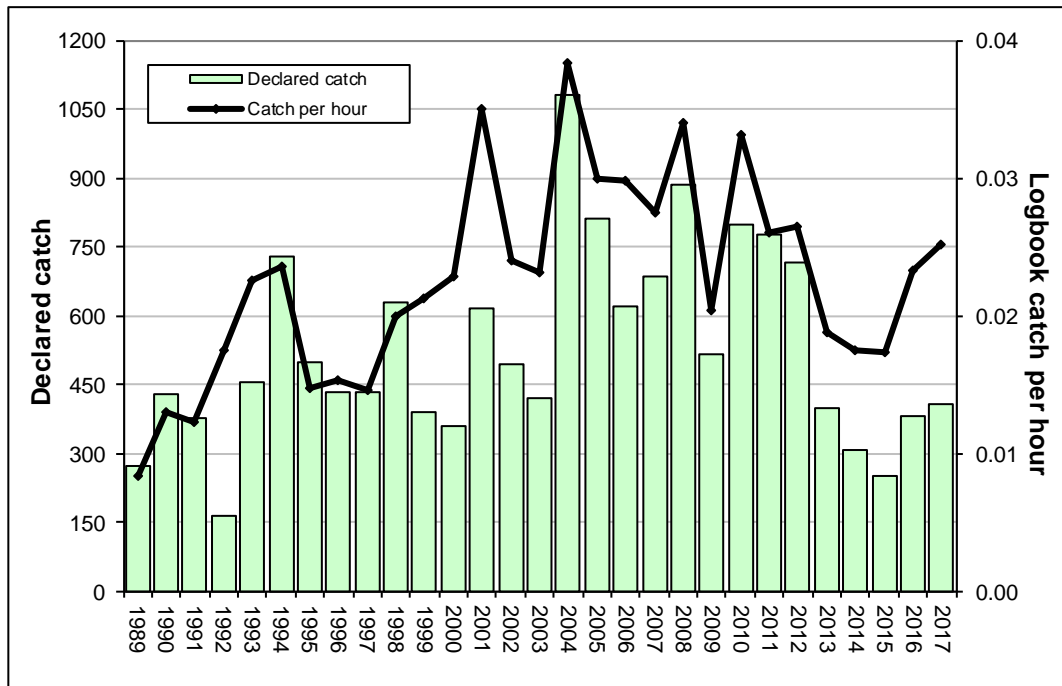
While we may be experiencing the trough of such a cycle now we cannot be certain that this is the case. Factors such as global warming - not so evident or potentially damaging 50 years ago may also be at play. The precautionary response is to take steps now to protect stocks and not to be complacent and expect a natural recovery which may take a decade or more to be realised, if at all.

What is apparent, is that the recent marked decline in salmon returns seen on the Dee is mirrored on many of our counted rivers (Fig. 3). For example, rivers such as the Fowey, Teifi and Lune have, like the Dee, all experienced their poorest salmon returns on record in the last few years - with no obvious signs of recovery. The southern chalk rivers appear to be the notable exception to this picture - exhibiting different patterns of salmon abundance (Fig. 3).

Rod catches also follow these trends. Catches on counted rivers are highly correlated with count records. This provides some assurance that, despite their weaknesses, catch data are mirroring a real and widespread decline in the numbers of salmon returning to our rivers.

**Rod catch:** Licence returns to date indicate a declared rod catch on the Dee of 408 salmon. While this represents an improvement on the 388 fish reported in 2016, it is still some way below the long-term average catch of 533 fish (Fig. 4). Of the 408 fish caught in 2017, 369 or 90.4% were released by anglers - the highest catch-and-release rate to date.

**Fig. 4 Declared salmon rod catch and logbook catch effort, 1989-2017**



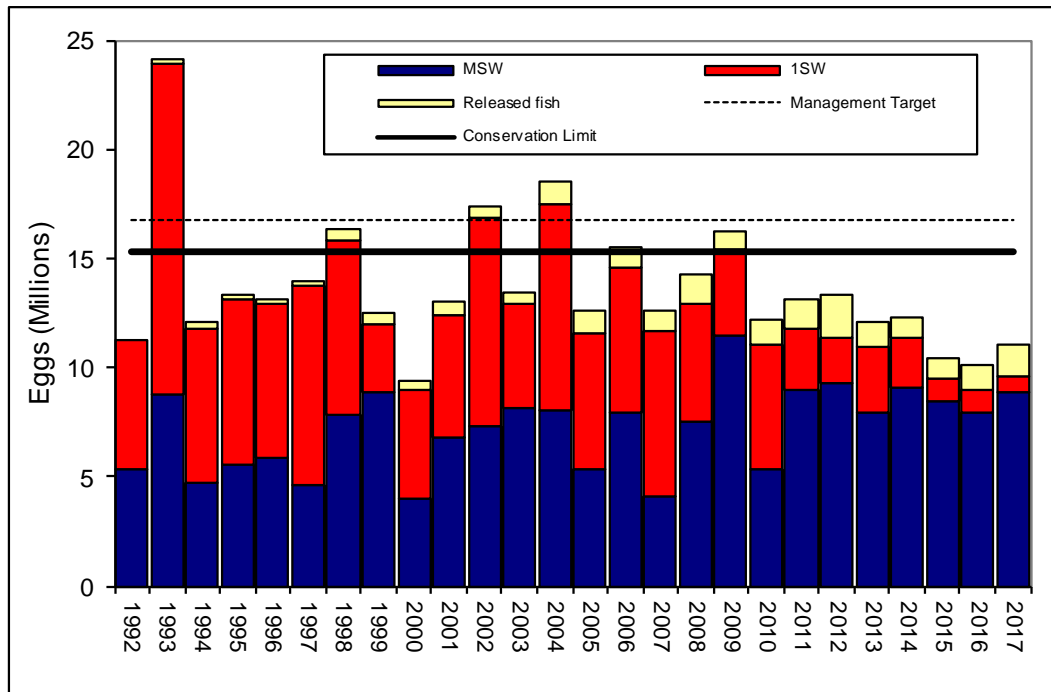
**Spawning escapement:** Estimates of the numbers of spawning salmon and the eggs they deposit are based on the run at Chester Weir minus losses to the rod fishery and other sources of mortality. Estimates also take account of the sex ratio of returning fish sampled at Chester (as judged from external appearance - the ratio is usually close to 1:1) and their average size (which relates to their likely egg contribution).

The provisional estimate of egg deposition on the Dee in 2017 is 11.03 million eggs produced by ~2,700 spawners. Of these, Around 330 spawners were estimated to have been rod-released fish contributing 1.39 million eggs. For the eighth year running, egg deposition was below the Conservation Limit for the Dee of 15.3 million eggs and well short of the associated Management Target of ~17 million eggs (Fig. 5).

The 'Management Objective' for all salmon rivers in Wales (and England) is that stocks should meet or exceed their Conservation Limit 80% of the time, or 4 years out of 5, in the long term.

To assess whether this Management Objective is being met, a trend based statistical compliance procedure is applied to egg deposition estimates from the last 10 years. This procedure tests whether a stock is formally passing ('not at risk') or failing ('at risk') its Conservation Limit, or has some intermediate status ('probably not at risk' or 'probably at risk').

**Fig. 5 Salmon egg deposition 1992-2017**



The Management Target provides an indication of the average number of spawners required (expressed as eggs or adults) to ensure compliance with the Management Objective.

The Management Target is a 'target' reference point (i.e. something to 'aim at') whereas the Conservation Limit is a 'limit' reference point (a lower threshold below which stocks become increasingly vulnerable and which we want to avoid). Statistical compliance procedures ensure there is a high probability (in our case an 80% probability) that stocks classified as healthy are indeed above their Conservation Limit.

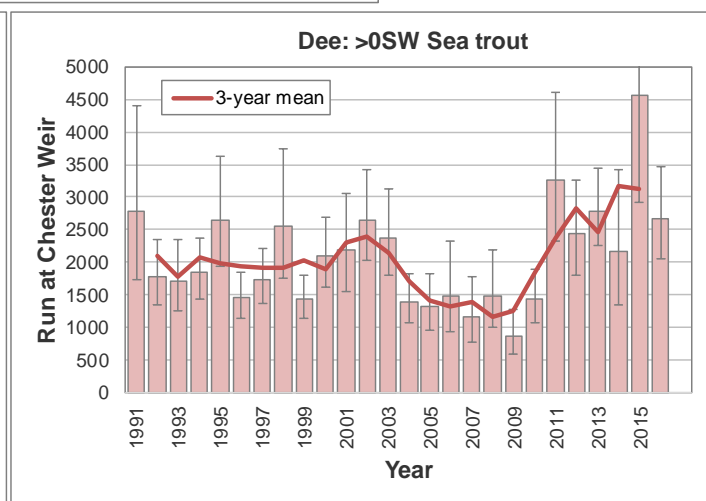
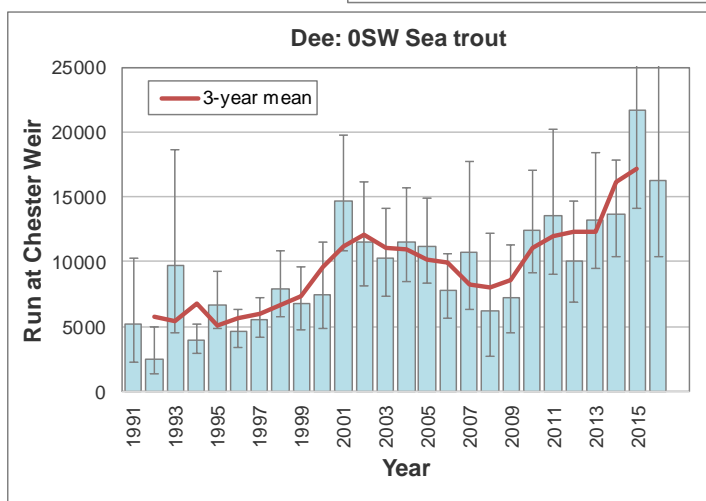
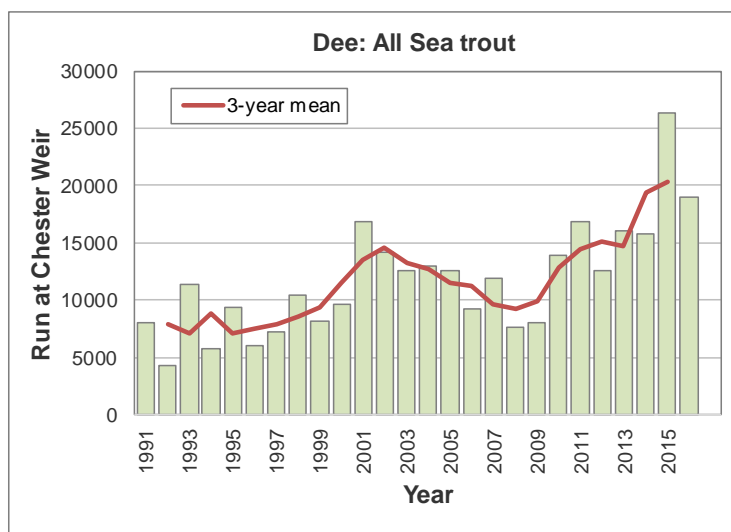
This terminology and the associated assessment procedures - in place in E&W since the early 1990s - are in line with the now long-standing recommendations of ICES (International Council for the Exploration of the Sea) and NASCO (North Atlantic Salmon Conservation Organisation). Conservation Limits are applied in a similar way by other jurisdictions (e.g. in Ireland and Scotland), with similar management consequences for failing stocks.

Conservation Limit compliance assessment in Wales in 2016 classified virtually all river stocks of salmon as either 'at risk' or 'probably at risk', with most exhibiting a declining trend over the last decade. The byelaw proposals discussed at the start of this report have been promoted as one means of protecting those failing stocks. The Dee salmon stock was assessed as being in the worst risk category in 2016 (i.e. 'at risk') and is likely to remain so in 2017.

#### 4. Dee Sea Trout in 2016

**Run size:** As described in Section 2, run estimates for sea trout on the Dee rely on the recapture of tagged fish back at Chester trap in the year after tagging - and so are 12 months behind those of salmon.

**Fig. 6 Annual run estimates for sea trout at Chester Weir, 1991-2016**  
(error bars indicate 95% confidence intervals)

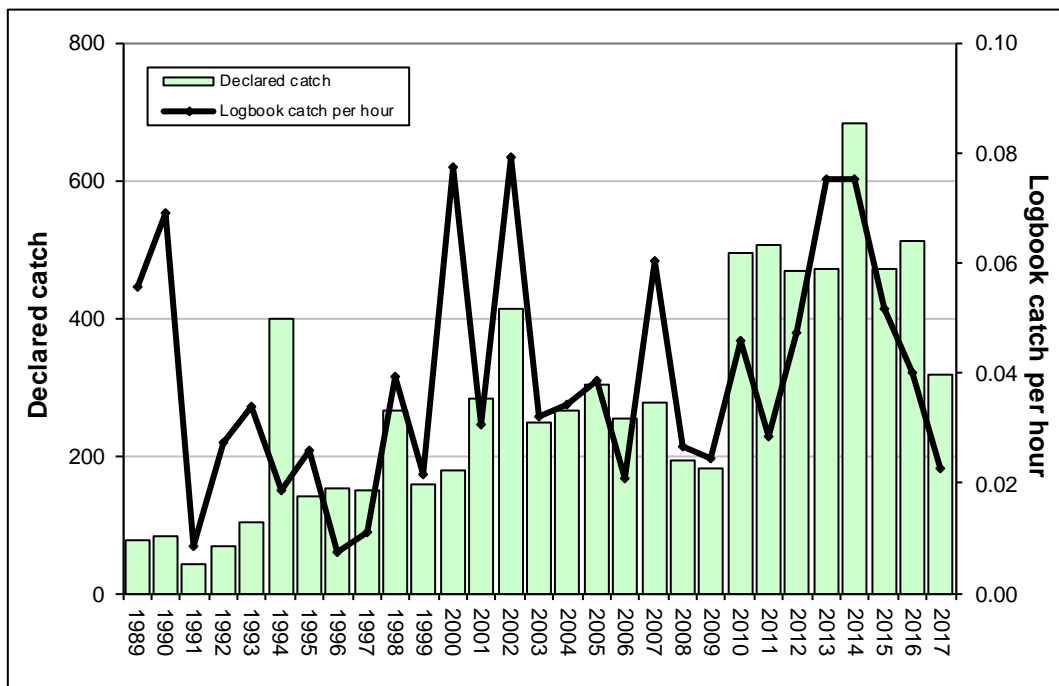


Separate run estimates are obtained for whiting (0SW) sea trout (i.e. fish which spend only a few months at sea and weigh around 1lb or less on their return) and older (>0SW) fish. The provisional estimate for whiting in 2016 was the second highest to date at 16,309, and follows a peak run of 21,732 fish in 2015. Numbers of older sea trout were down to 2,670 fish in 2016, but remained above the long-term average of ~2,000 fish (Fig. 6).

In 2017, a total of 1,954 0SW and 411>0SW sea trout were captured at Chester trap. The catch of 0SW sea trout was similar to last year's total (2,067 fish), but numbers of >0SW sea trout were down by around 25% on 2016 (total catch 551 fish). This suggests the run estimates for these sea age groups in 2017 may be reduced on 2016 - particularly so for >0SW fish (although, this follows a series of exceptionally good years for sea trout on the Dee).

**Rod catch:** Provisional sea trout rod catch figures for the Dee in 2017 stand at 317 fish - the lowest catch in eight years but still above the long-term average catch of ~280 fish (Fig. 7).

**Fig. 7 Declared sea trout rod catch and logbook catch effort, 1989-2017**



In 2017, a new method was introduced in Wales to evaluate the status of sea trout stocks. This derives Conservation Limits for individual river stocks and assess compliance using approaches similar and in some aspects identical to those used in salmon (for further details see the byelaws Technical Case at: <http://naturalresourceswales.gov.uk/guidance-and-advice/environmental-topics/consultations/our-own-consultations-closed/?lang=en>)

Using these approaches the status of the Dee sea trout stock was classified as 'not at risk' in 2016.

### 5. Developments: Alternative Mitigation Project

The second phase of the Tryweryn gravel trap project was constructed in November 2017. This work has created an additional 250m reach of good quality spawning gravels previously inaccessible to salmon. A large number of boulders and approx. 200 tonnes of gravel were used in the construction.

Adult salmon have already been seen utilising this area having pushed up the Tryweryn after a spate on the 7th of December. Some large MSW fish were observed and five salmon redds were created on the new spawning area - which will also serve as good juvenile rearing habitat.



*Newly created area for salmon spawning and rearing on the upper Tryweryn*



*Lighter patch of gravel indicating recently cut salmon redd*



*River Ceiriog salmon parr  
from electric fishing survey*



*22 pound spring salmon  
at Chester trap*