

Catchment

The Dwyfor catchment is divided into two main rivers, the Afon Dwyfawr and the Afon Dwyfach. The Dwyfawr subcatchment is mountainous. It rises in Cwm Pennant and has one main tributary, the Afon Cwm Ystradllyn (also known as the Afon Henwy). The Cwm Pennant streams in the upper reaches of the Dwyfawr are acidic. They drain unafforested mountains of base-poor Ordovician rocks overlain by acidic, often waterlogged soils with low buffering capacity. The Afon Dwyfach has a moorland catchment and is less acidic.

Naturally elevated levels of zinc are characteristic in the catchment. This is evidenced by the presence of disused zinc mines dotted throughout the area. Disused copper mines and slate quarries are also found. Current industries in the catchment include a sand and gravel quarry and a cement works.

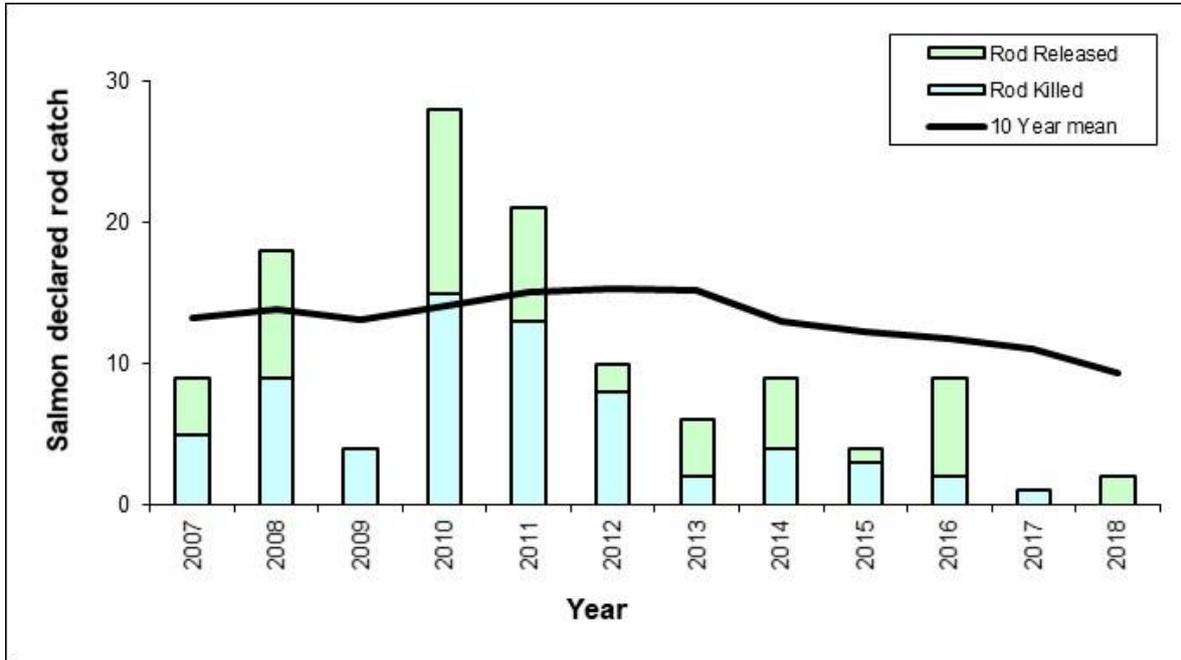
There is a major water abstraction scheme in the catchment, involving Llyn Ystradllyn and the Afon Dwyfawr, known as the Garndolbenmaen scheme. Under this scheme Welsh Water/D_r Cymru are licenced to abstract a combined total of 5 million m³ of water per calendar year from Llyn Cwmystradllyn and the Afon Dwyfawr at Dolbenmaen. Welsh Water/D_r Cymru are required to maintain a uniform continuous compensation water discharge of 3010 m³ per day for the general benefit of riparian river interests. Freshet releases must be made for fisheries management and angling purposes.

A high proportion of the Dwyfor catchment is available for spawning. However impassable waterfalls in the upper reaches of some of the tributaries of the Dwyfawr restrict salmonid access.

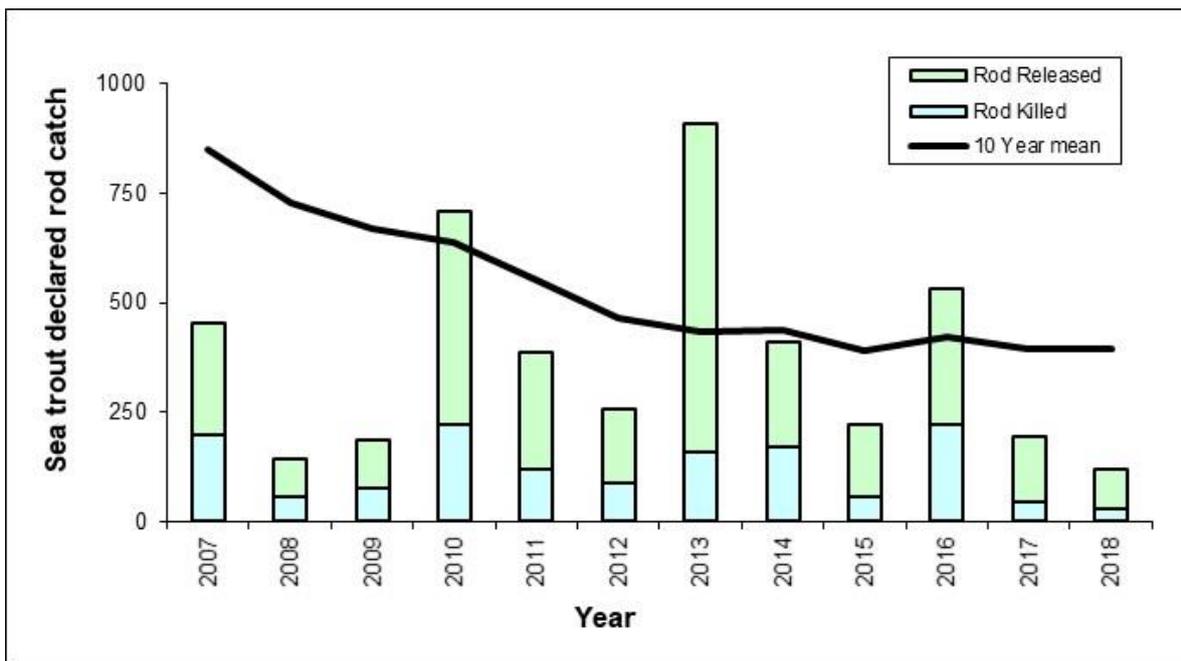
Rod catches

The following graphs show the total declared rod catches of salmon and sea trout on the Dwyfor.

Salmon rod catch – was once again poor in 2018, and considerably lower than it’s been in the last 10 years. The release rate however was 100%, and this needs to continue with such poor stock levels.



Sea trout rod catch – declined again in 2018 and is well below the 10 year average. The release rate has remained at 76% and this needs to improve with declining stocks.

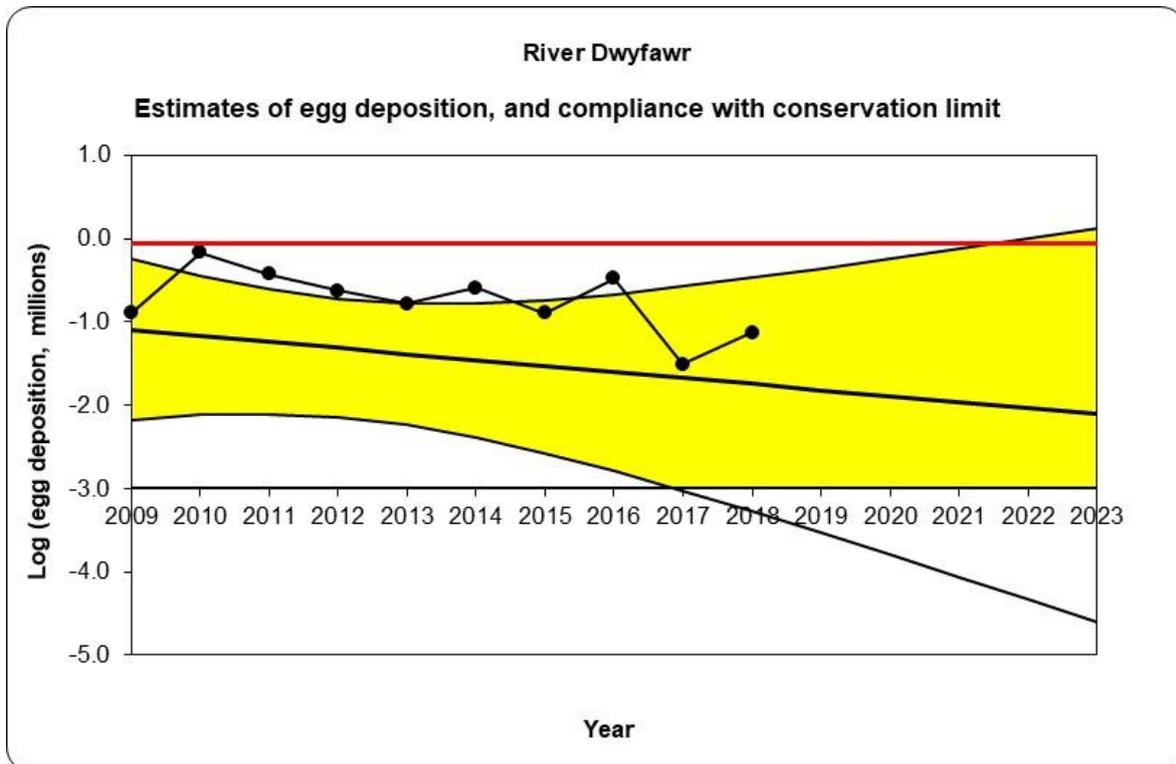


Stock status

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 conservation limit 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.



Are enough salmon eggs being deposited to conserve salmon 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 (2009 - 2018).

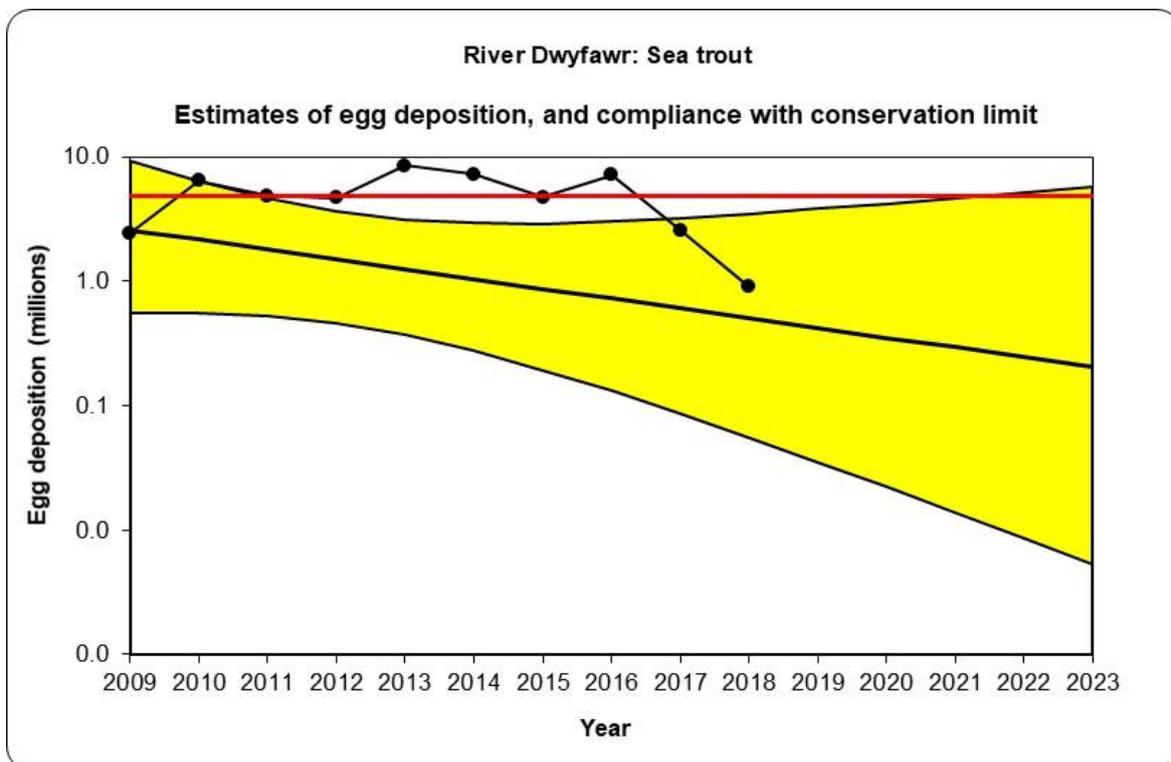
- Current number of eggs being deposited puts stocks **at risk**
- In 5 years' time the predicted status of salmon stocks will be **probably at risk**
- Based on current data, and the projection of the graph, the stocks of salmon on the Dwyfor will continue to **decline (uncertain trend)**

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: <http://naturalresourceswales.gov.uk/media/682258/technical-case-structure-final.pdf>)



Are enough sea trout eggs being deposited to conserve salmon 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 (2009-2018).

- 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 sea trout on the Dwyfor will continue to **decline (uncertain trend)**

Salmon and Trout Classifications

The following maps show the results of the routine juvenile salmonid population surveys from 2018 on the Dwyfor.

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



Five-minute fry surveys

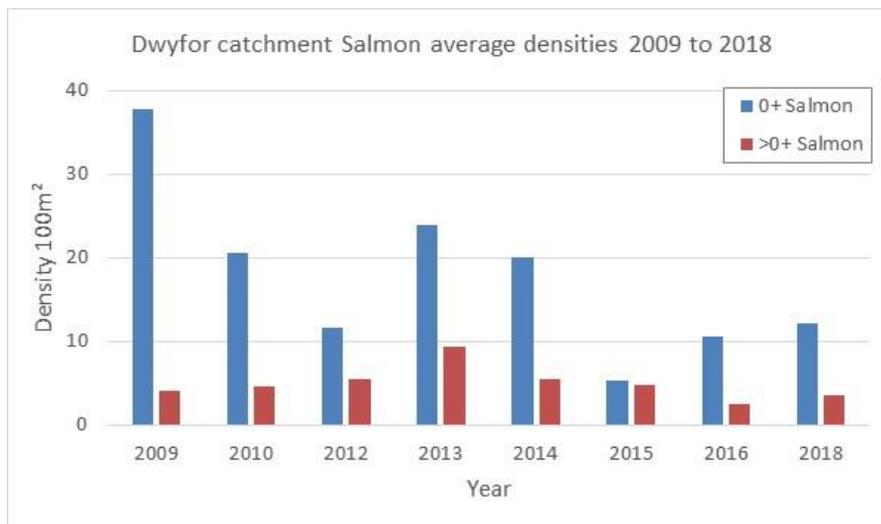
Two five-minute fry survey was carried out on the main river. The results are based on how many salmon fry were caught during the five-minute survey. The classification scheme is based on historic data from North Wales.



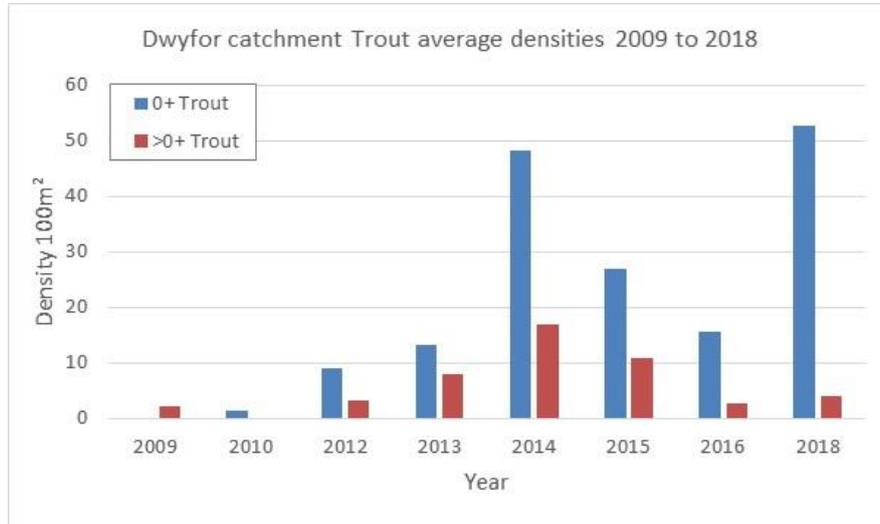
Catchment Population Trends

The graphs below show a simple comparison of average salmon and trout densities for the temporal site on the Dwyfor catchment. This is based upon one site which has only been sampled since 2009. Prior to this, the annual site was on a small tributary that was not representative of the Dwyfor catchment. The site was not surveyed in 2011 due to programme changes, and 2017 due to high flows.

Salmon fry and parr densities have fluctuated year on year but the overall picture is declining. This follows the trend for salmon rod catch on the Dwyfor.



Brown trout fry and parr densities on the Dwyfor catchment have historically followed the trends of the rod catch. 2018 does not follow this trend as the rod catch was quite poor compared to the ten year mean (2018 – 195, 10 year mean – 395), however trout fry densities were excellent. Trout parr densities were poor at the temporal site, however the spatial surveys showed that many tributaries were performing excellently.



The following table shows a simple comparison of the temporal average density of juvenile salmon and trout from 2018, and compares this against the 2016 average density, and the 5-year average (2011 – 2015). 2016 has not been included in the 5-year average as it was a poor recruitment year across the UK.

	0+ Salmon	>0+ Salmon	0+ Trout	>0+ Trout
2018 average density	12.1	3.6	52.7	4.0
2016 average density	10.6	2.4	15.5	2.7
Percentage difference to 2016	15%	50%	240%	44%
5-yr average (2011-15)	15.2	6.3	24.3	9.7
Percentage difference to 5-yr average	-20%	-43%	117%	-59%

The variation in salmon fry density compared to 2016 and the five year average is minimal. Densities at this site are low. Salmon parr density is down compared to the five-year average which relates to the poor rod catch and fry densities. As stated earlier, the trout fry densities on the Dwyfor catchment are excellent in 2018. Trout parr densities are down at this site compared to the five year average, but have been excellent on many of the Dwyfor tributaries.