Know Your River – Dee

Salmon & Sea Trout Catchment Summary

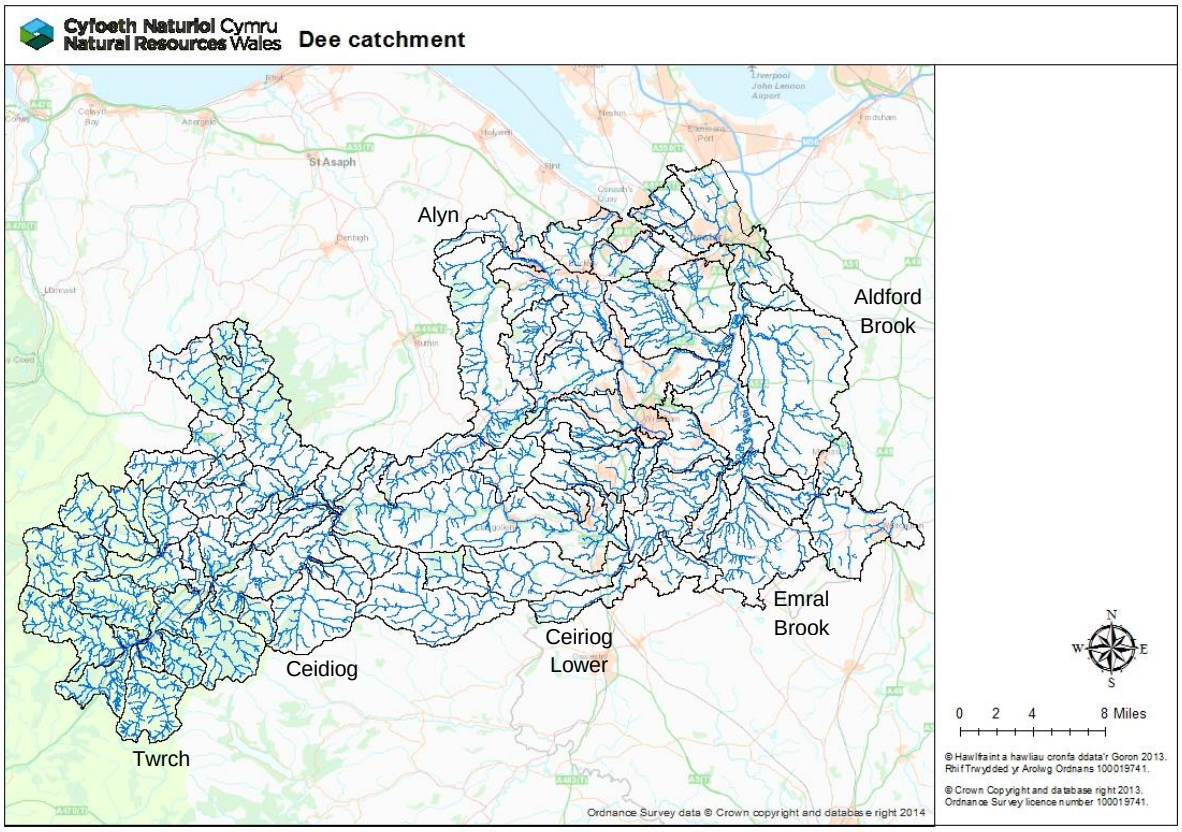
Introduction

This report describes the status of the salmon and sea trout populations in the Dee catchment. 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 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 principal salmon rivers where, in the past, Salmon Action Plans have been produced, and/or, in SAC rivers, where condition assessments have been undertaken under the Habitats Directive. In addition, the status of various fish species in all our rivers is reported as part of Water Framework Directive (WFD) assessments. This report refers to these commitments. Its purpose is to provide, for our customers, an informative and useful summary of stock status and remedial work planned - specifically for anglers, fishery and land owners; as well as other partners.



Catchment

The River Dee rises in the Cambrian Mountains close to Llyn Tegid (Bala Lake) and flows some 160 km before entering the Irish Sea in Liverpool Bay (Fig 1). The catchment is largely rural, supporting mixed beef and sheep farming on high ground and intensive dairy farming in the lowlands of the Cheshire Plain and North Shropshire. Commercial and industrial developments are mainly concentrated around the estuary as well as the urban centres of Wrexham, Ruabon and Chester.

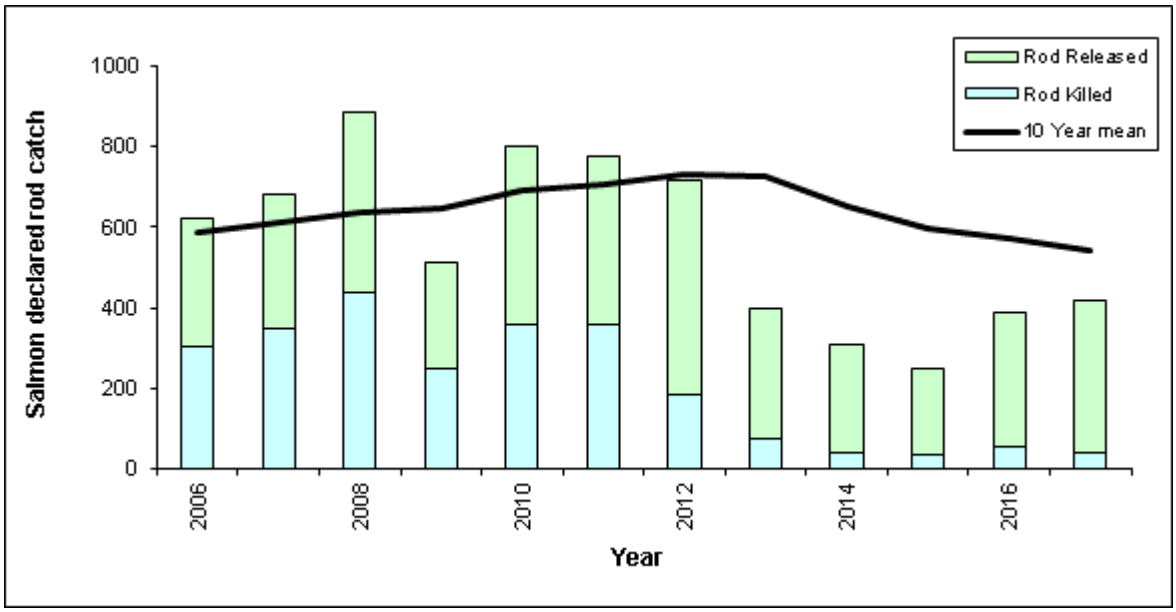
The Dee is one of the most regulated rivers in the Europe, with flows controlled from the headwater reservoirs Llyn Celyn and Llyn Brenig, as well as Llyn Tegid (a natural lake). Together these secure a yield of around 13.5 cumecs of which 9.3 cumecs is allocated for licenced abstraction close to Chester - most of which is used for potable supply. The remaining 4.2 cumecs forms a statutory minimum flow over Chester Weir which is maintained in all but the most severe drought conditions. In addition, a further 119 cumec days of storage is available in most years for special release and is utilised for fishery, recreation and water quality purposes.

Water quality problems - mainly as a result of industrial and sewage pollution, tend to be confined to the catchment from the Wrexham area downstream. In addition, some of the upper catchment tributaries, particularly in the south-western region are susceptible to acidification because of base poor geology.

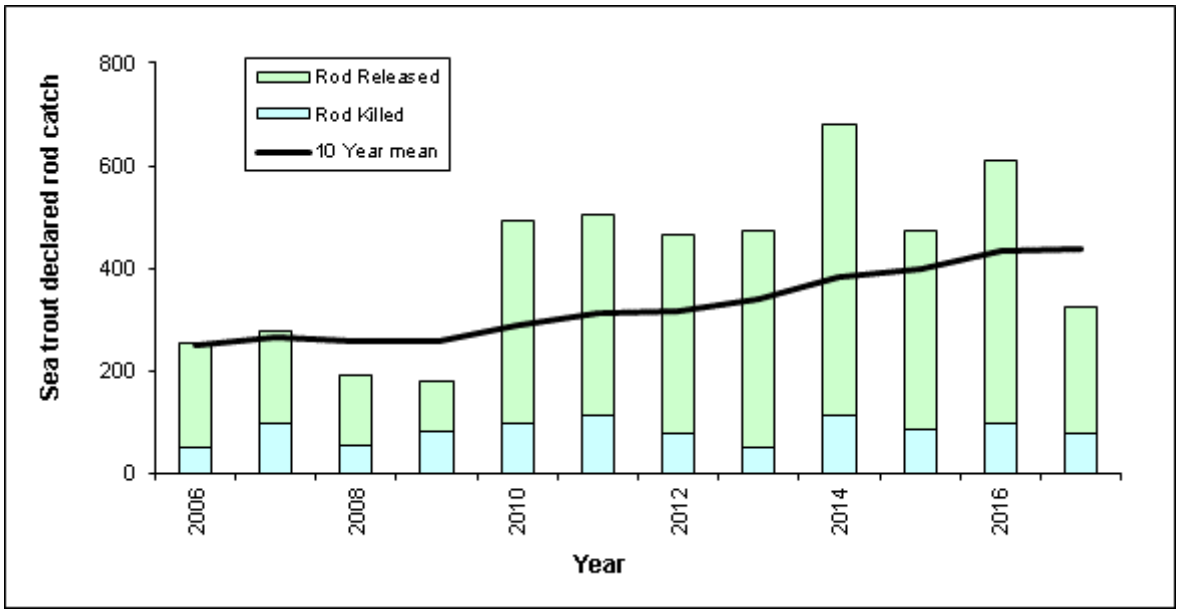
Rod catches

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

Salmon rod catch – has improved slightly but is still low compared to the 10-year average. The release rate in 2017 was 91%. This is an excellent result and needs to be maintained.



Sea trout rod catch – has declined compared with last year and is now below the 10-year average. The release rate in 2017 was 77%. This has decreased from last year and needs to improve.

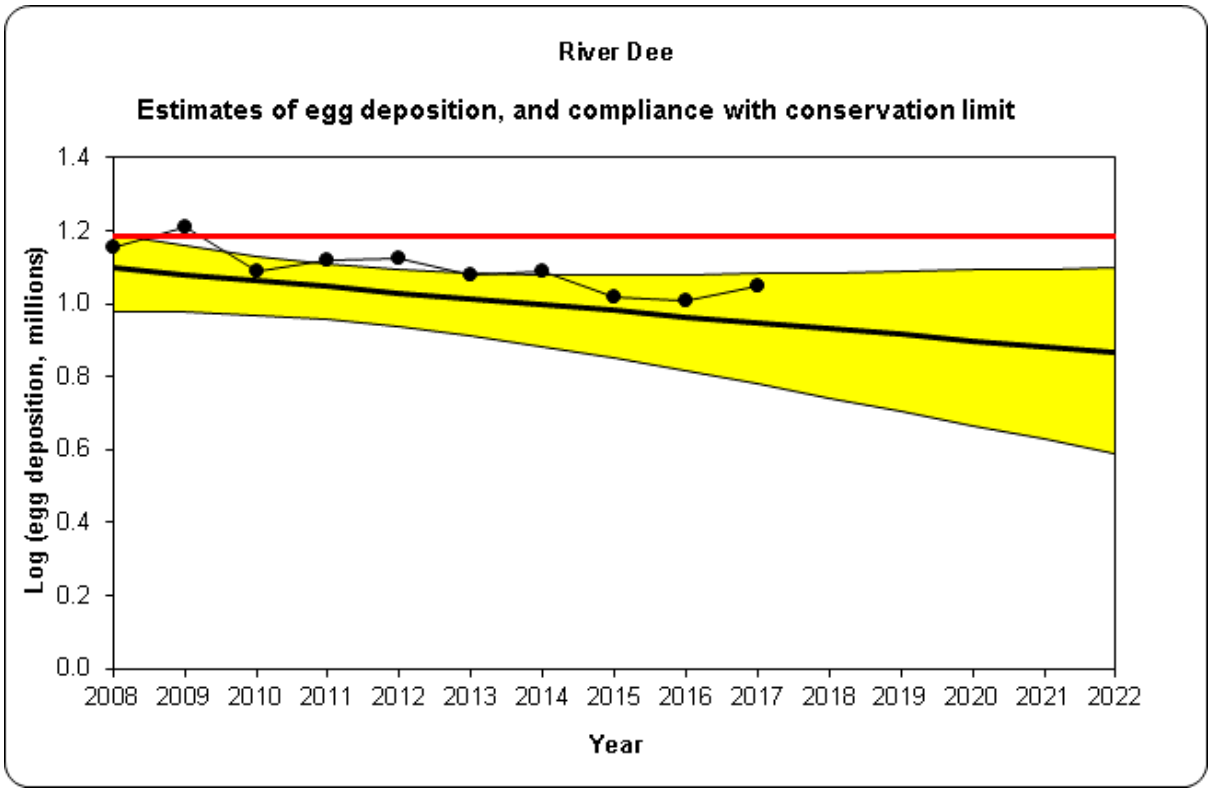


Stock status

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.



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 (2007-2016).

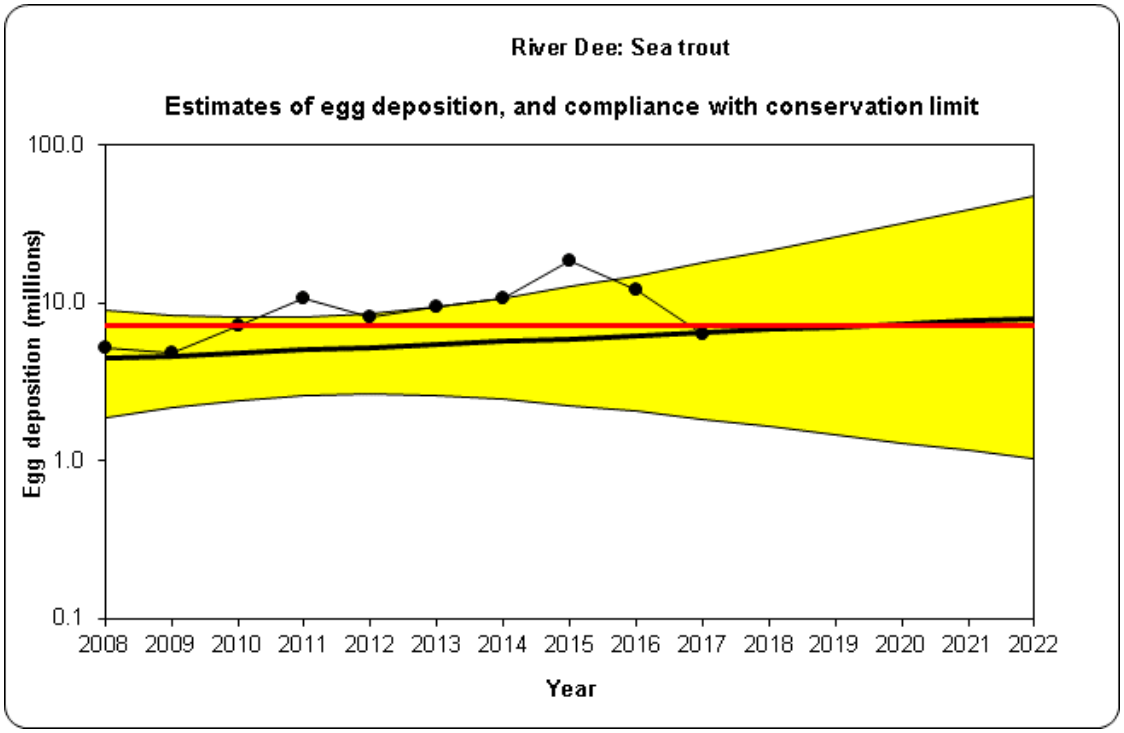
- Current number of eggs being deposited puts stocks **at risk**
- In 5 years' time the predicted status of salmon stocks will be **at risk**
- Based on current data, and the projection of the graph, the stocks of salmon on the Dee will continue to **decline** **(uncertain)**

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 stocks in the catchment?

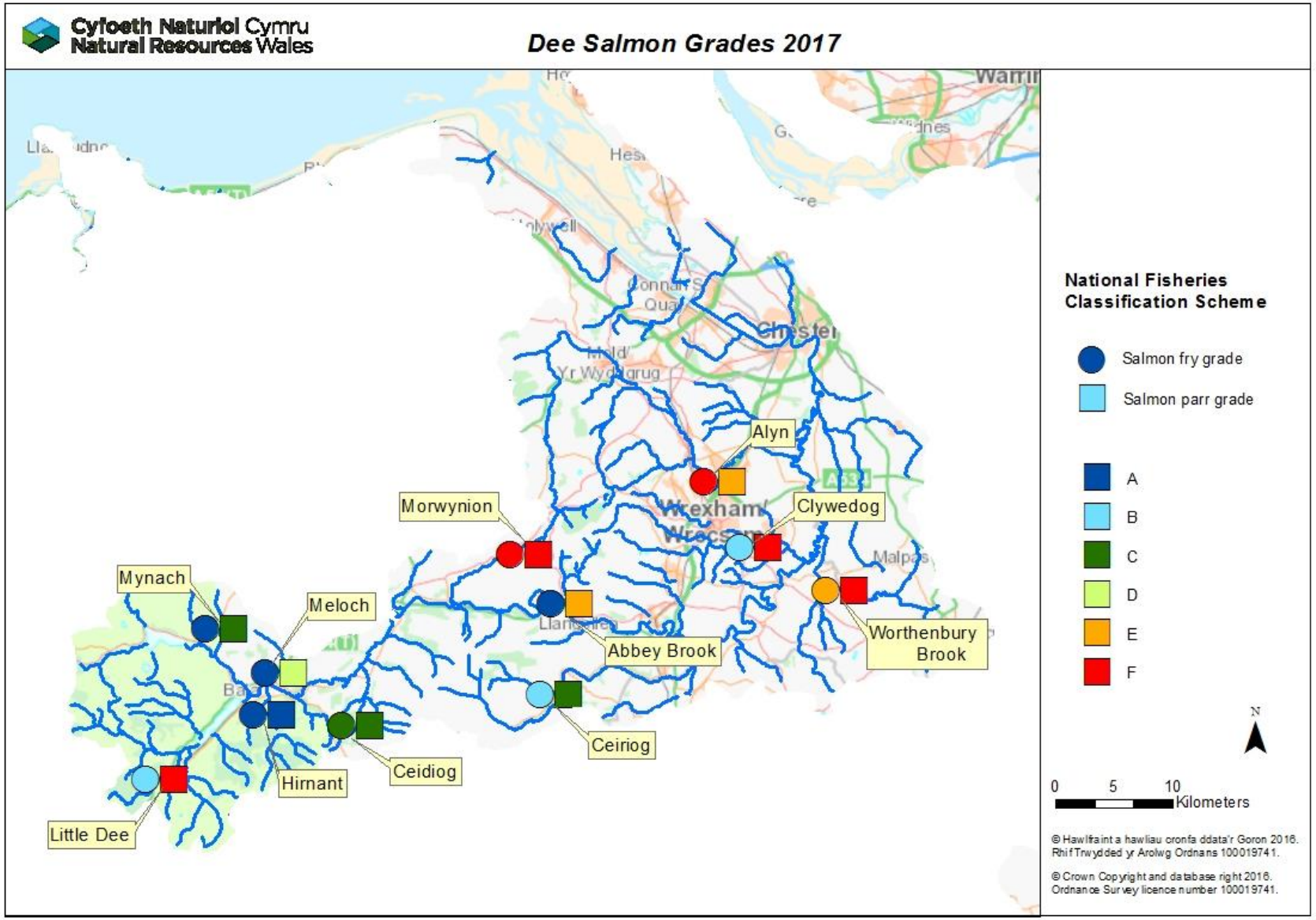
The red line represents the number of eggs required to be deposited to sustain a healthy sea trout stock. The black trend line and its confidence limits (the yellow band) is fitted to the most recent 10-year series of egg deposition estimates (2007-2016).

- Current number of eggs being deposited puts stocks **probably at risk**
- In 5 years' time the predicted status of salmon stocks will be **probably not at risk**
- Based on current data, and the projection of the graph, sea trout stocks will continue to **improve** **(uncertain)**

Juvenile Monitoring

The following map shows the results of the 2015 juvenile salmonid population surveys. They display the National Fish Classification (NFC) grades which have been developed to evaluate and compare the results of fish population surveys in a consistent manner. The NFC 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 NFC.

GRADE	Description	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


Cyfoeth Naturiol Cymru
Natural Resources Wales
Dee Salmon Grades 2017
Alyn
Morwynion
Clywedog
Mynach
Meloch
Abbey Brook
Worthenbury Brook
Ceiriog
Ceidiog
Hirnant
Little Dee
Wrexham
Chester
National Fisheries Classification Scheme
Salmon fry grade
Salmon parr grade
A
B
C
D
E
F
N
0 5 10
Kilometers
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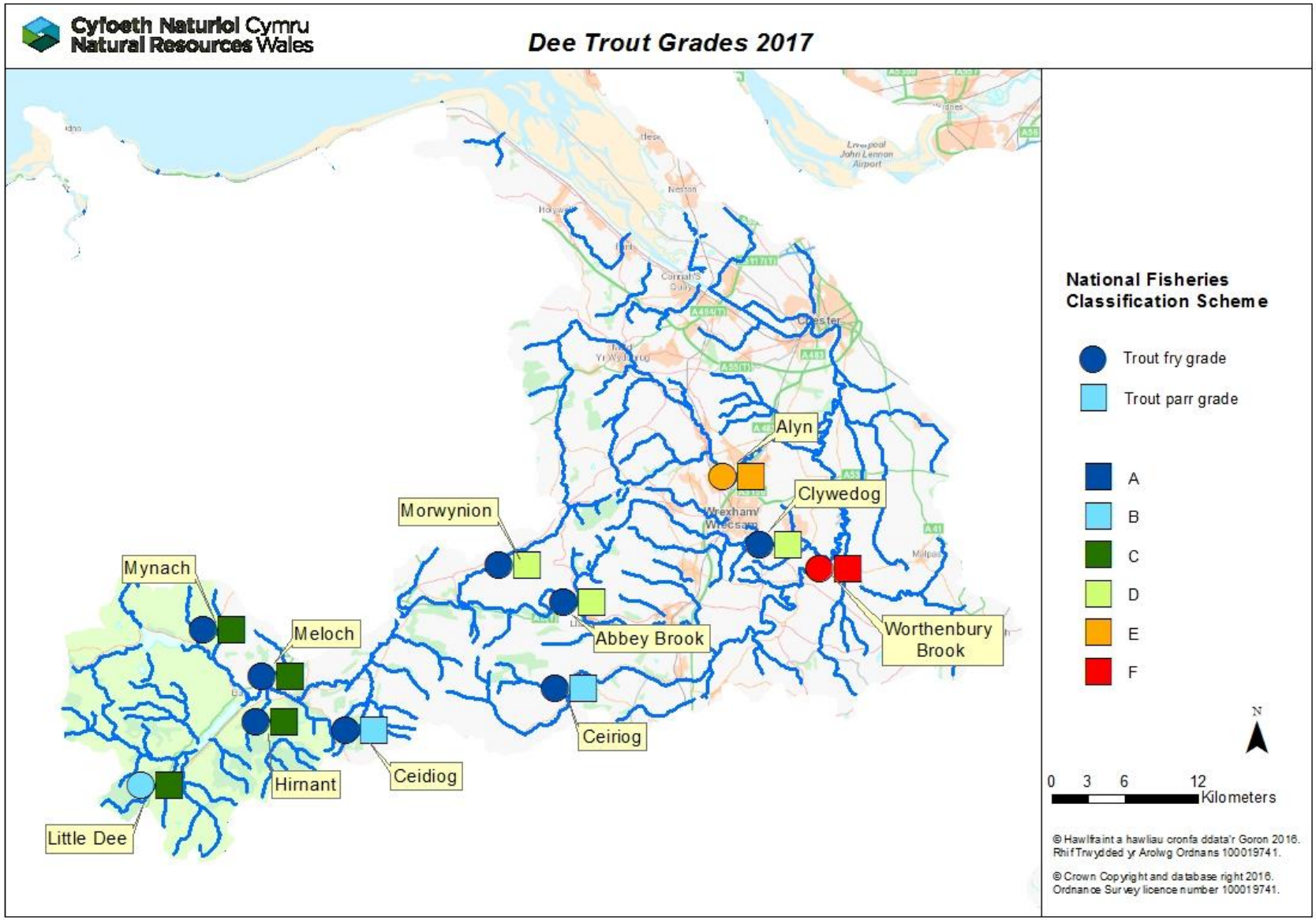
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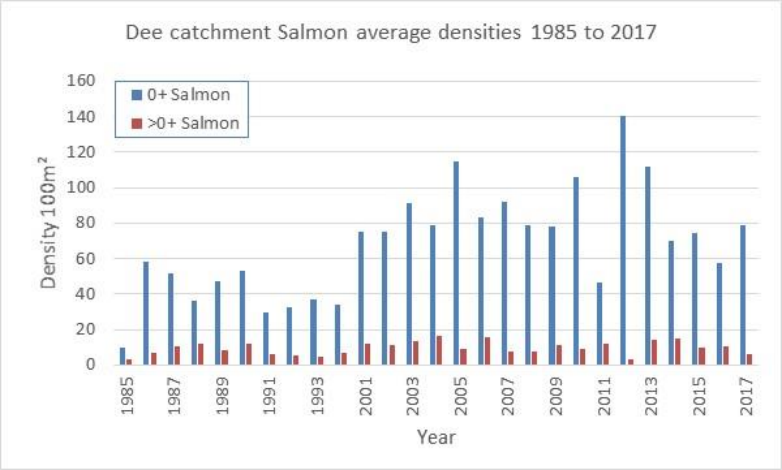
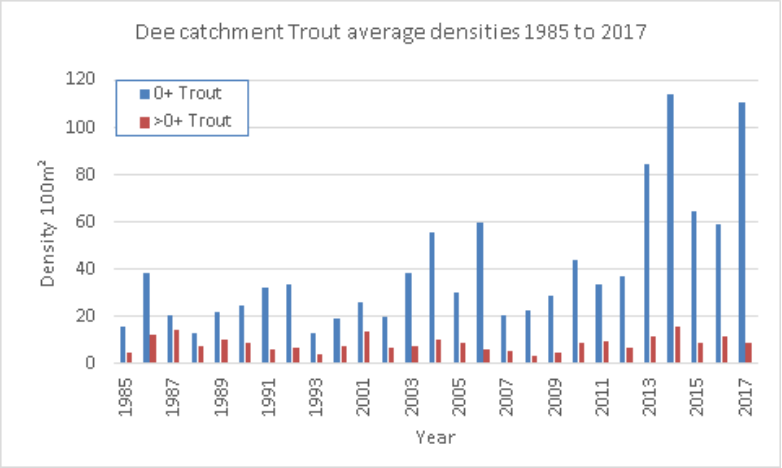
Catchment Population Trends

The graphs below show a simple comparison of average salmon and trout densities across the Dee catchment since surveying began in 1985. NB – the data shown here are only from fully quantitative surveys of sites in the current Welsh monitoring programme, not every site in the programme was done every year, and no surveys were done from 1995 to 2000. The Alyn, Clywedog and Worthenbury are not included in this analysis, as they are minor salmonid spawning rivers.

The salmon fry densities on the Dee catchment have improved by 36% in 2017 compared to 2016, however 2016 was a reasonably poor year on several of the Dee tributaries. There is still a noticeable difference between densities on the upper and lower river which can be seen on the maps above (upper-good, lower-poor). This relates to the change in stock composition, more multi sea winter fish, which spawn higher up the catchment, and less grilse which would predominantly spawn in the lower tributaries. The salmon rod catch had improved in 2016 which links directly to the increase in salmon fry recruitment in 2017. Salmon parr densities have declined on the catchment which reflects the poor recruitment year in 2016.



Juvenile brown trout densities are currently very positive on the Dee catchment. This links directly to the sea trout rod catch that has improved since 2010. Historically around 250 sea trout were caught each season. From 2010 to 2016 the average number had improved to around 500 sea trout per season. This is a 100% improvement, and this is mirrored in the juvenile data. Sea trout rod catch has declined in 2017 to 325 fish.



The following table shows a simple comparison of the catchment average density of juvenile salmon and trout from 2017, and compares this to 2016 and a 5-year average. NB – The five year average has been set from 2011 to 2015 as 2016 was a poor year. These densities are calculated from semi-quantitative surveys of sites within the monitoring programme, and as such, numbers are not directly comparable to those given in the graphs above which are based on fully quantitative estimates only.

	0+ Salmon	>0+ Salmon	0+ Trout	>0+ Trout
2017 average density	78.4	6.0	110.5	9.0
2016 average density	57.6	10.4	58.8	11.8
Percentage difference to 2016	**36%**	**-42%**	**88%**	**-24%**
5-yr average (2011-15)	88.7	10.8	67.0	10.4
Percentage difference to 5-yr average	**-12%**	**-44%**	**65%**	**-14%**

Salmon fry have improved compared to 2016, however this density is lower than the 10-year average. Salmon parr densities have declined. This can be explained by the poor spawning year in 2016. Trout fry were excellent compared to 2016 and the 10-year average. Trout parr densities had declined slightly compared to 2016, however they were just below the 10 year average.