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 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 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 cu.mecs of which 9.3 cu.mecs is allocated for licenced abstraction close to Chester - most of which is used for potable supply. The remaining 4.2 cu.mecs forms a statutory minimum flow over Chester Weir which is maintained in all but the most severe drought conditions. In addition, a further 119 cu.mecs 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 declined since 2012. The release rate in 2015 was 86%. This is excellent and must continue. The North Wales average is 65%.

Sea trout rod catch – has improved since 2009. The release rate in 2015 was 82%. This is excellent and long may it continue. The North Wales average is 72%.
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.

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.

- 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 and future trends the stocks of salmon will continue to decline
Conservation of Sea Trout

Our approach to assessing sea trout stock performance is still under development. It is based on catch trends in the last three years compared with those in the previous ten. The assessment gives an early warning about potential problems and assists with considering whether any further management actions are required. It provides an indication of changes in fishery performance, though this is not always a reflection of stock performance.

Catch Per License Day (CPLD) is the average number of fish caught for each day fished on the river and as such accounts for the variability in the amount of fishing effort between years. These statistics can be a better guide than simply looking at the total catch.

- The latest 10-year trend in CPLD on the Dee is improving
- Average CPLD for the most recent 3-year period is in the upper (>80%) of the range of CPLD figures reported in the previous 10-years.
- Combining the above measures, the Dee is classified as “not at risk”; i.e. the fishery appears to be performing well – indicating a healthy adult stock
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.

<table>
<thead>
<tr>
<th>GRADE</th>
<th>Description</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
<td>In the top 20% for a fishery of this type</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
<td>In the top 40% for a fishery of this type</td>
</tr>
<tr>
<td>C</td>
<td>Fair</td>
<td>In the middle 20% for a fishery of this type</td>
</tr>
<tr>
<td>D</td>
<td>Fair</td>
<td>In the bottom 40% for a fishery of this type</td>
</tr>
<tr>
<td>E</td>
<td>Poor</td>
<td>In the bottom 20% for a fishery of this type</td>
</tr>
<tr>
<td>F</td>
<td>Fishless</td>
<td>No fish of this type present</td>
</tr>
</tbody>
</table>
Juvenile monitoring
Juvenile monitoring
Juvenile Trend Analysis

Trends in the population data for juvenile salmon and trout were assessed using a Bayesian statistical model. The data was analysed using a linear model which fits a straight line to the data in order to determine whether a trend (upwards or downwards) is present in fish numbers over the timeframe. The statistical significance of the trend is denoted by the P value, \( P > 0.975 \) indicates a statistically significant upward trend, and \( P < 0.025 \) indicates a statistically significant downwards trend. This can also be considered as percentage chance, e.g. a 97.5% chance of an upward trend, or just a 2.5% chance of an upward trend (which is a statistically significant downwards trend).

Data was analysed for the period 2006 to 2015 for comparison against Salmon/Sea Trout conservation data. The figures below display trends in juvenile fish numbers over this period (note log scale).

Salmon fry

- Salmon fry densities on the Dee have shown a decline since 2006.
- This trend is not statistically significant (\( P = 0.6 \)).
- This decline is being reflected across the UK. The 2013/14 seasons have seen some of the poorest salmon runs on record. This is believed to be due to sea survival. Poor feeding grounds have led to a large decline in the grilse run. The majority of returning salmon are now multi-sea winter fish.
Salmon parr

Salmon parr densities on the Dee have shown a decline since 2006.

This trend is not statistically significant ($P = 0.59$).

This follows the trend set by the Salmon fry data.

Trout fry

Trout fry densities on the Dee have shown an improvement since 2006.

This trend is not statistically significant ($P = 0.13$).

Results for trout fry have continued to be improve across the Dee catchment. These improvements are reflected in the Sea Trout catches since 2010 on the Dee. Improved Sea Trout catches are occurring throughout North Wales. Favourable local marine conditions are believed to be linked to these improvements.
- Trout parr densities on the Dee have shown an **improvement** since 2006.
- This trend is **not statistically significant** \((P = 0.04)\).
- The improvement in Trout parr links directly to the increase in Trout fry numbers.
### Fisheries Actions - Dee

<table>
<thead>
<tr>
<th>Site</th>
<th>Action</th>
<th>Benefits</th>
<th>Lead</th>
<th>Partner(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Barriers in Wales to be addressed:</strong></td>
<td>• Improved knowledge of barriers to improve access for fish, including salmon and trout to spawning areas upstream.</td>
<td>NRW</td>
<td>WDT</td>
</tr>
<tr>
<td></td>
<td>• Himant (SH949357) – easement at partial barrier (investigation). Alternative Mitigation Action</td>
<td>• Improved access to spawning areas and habitat upstream.</td>
<td>NRW</td>
<td>WDT</td>
</tr>
<tr>
<td></td>
<td>• Investigation of other barriers to improve fish passage</td>
<td>• Improved fish numbers and increased diversity of fish populations - increased resilience.</td>
<td>NRW</td>
<td>WDT</td>
</tr>
<tr>
<td></td>
<td>• Investigation and design of eel passes at Hydrometry weirs on: Ceiriog, Alyn, Dee</td>
<td>• Information on operation of sluices will on fish movements will inform operation and improved fish passage.</td>
<td>NRW</td>
<td>WDT</td>
</tr>
<tr>
<td></td>
<td>• Investigation of fish movements at Salas sluices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Habitat improvements:</strong></td>
<td>More natural river system, reduced siltation, increased flow diversity, improved spawning gravels and juvenile habitat. Improved fish numbers.</td>
<td>NRW  &amp; WDT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Financed by Alternative Mitigation funds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dee</td>
<td>• In-stream habitat work - generating increased spawning areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• In-stream habitat work - restoring and maximising available habitat for juvenile fish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Upper Dee tributaries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Water Framework Directive:</strong></td>
<td>• Waterbodies protected and improved</td>
<td>NRW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>We will continue work to ensure no deterioration, monitor the status of the environment and investigate causes of failures. Together with our partners we will look to put in place measures that protect and improve the status of the water environment.</td>
<td>• WFD waterbodies achieving Good Status/Potential including Terrig, Trefnant Brook, Camddwr among others</td>
<td>NRW</td>
<td></td>
</tr>
<tr>
<td>Dee</td>
<td><strong>DCWW investigations in 3 water bodies (Llyn Tegid, Pulford Brook, Worthenbury Brook - Upper)</strong></td>
<td>Understand how water company assets contribute to the failure to achieve good ecological status and what measures are needed to achieve good ecological status.</td>
<td>DCWW</td>
<td>NRW</td>
</tr>
</tbody>
</table>

[Dee](#)
## Fisheries Actions - Dee

<table>
<thead>
<tr>
<th>Site</th>
<th>Action</th>
<th>Benefits</th>
<th>Lead</th>
<th>Partner(s)</th>
<th>Timescales for delivery</th>
</tr>
</thead>
</table>
| Dee  | Barriers in Wales to be addressed:  
- Hirnant (SH949357) – easement at partial barrier (investigation). Alternative Mitigation Action  
- Investigation of other barriers to improve fish passage  
- Investigation and design of eel passes at Hydrometry weirs on: Ceiriog, Alyn, Dee  
- Investigation of fish movements at Bala sluices  
- Improved knowledge of barriers to improve access for fish, including salmon and trout to spawning areas upstream.  
- Improved access to spawning areas and habitat upstream.  
- Improved fish numbers and increased diversity of fish populations - increased resilience.  
- Information on operation of sluices will on fish movements will inform operation and improved fish passage. | NRW, WDT | 2016-2020 |
| Dee  | Habitat improvements:  
- Financed by Alternative Mitigation funds  
- In-stream habitat work - generating increased spawning areas  
- In-stream habitat work - restoring and maximising available habitat for juvenile fish  
- Upper Dee tributaries  
- More natural river system, reduced siltation, increased flow diversity, improved spawning gravels and juvenile habitat. Improved fish numbers. | NRW & WDT | 2016-2020 |
| Dee  | Water Framework Directive:  
- We will continue work to ensure no deterioration, monitor the status of the environment and investigate causes of failures. Together with our partners we will look to put in place measures that protect and improve the status of the water environment.  
- Waterbodies protected and improved  
- WFD waterbodies achieving Good Status/Potential including Terrig, Trefnant Brook, Camddwr among others | NRW, EA, Wildlife Trusts, Local Authorities, Landowners, DCWW, UU, Dee Valley Water | Ongoing |
| Dee  | DCWW investigations in 3 water bodies (Llyn Tegid, Pulford Brook, Worthenbury Brook - Upper)  
- Understand how water company assets contribute to the failure to achieve good ecological status and what measures are needed to achieve good ecological status. | DCWW, NRW | 2020 |
<table>
<thead>
<tr>
<th>Site</th>
<th>Action</th>
<th>Benefits</th>
<th>Lead</th>
<th>Partner(s)</th>
<th>Timescales for delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dee</td>
<td>Middle Dee Catchment Partnership: Current projects include Diffuse rural pollution Worthenbury, Wych and Aldford Brooks, riparian habitat improvements on Afon Ceiriog, River Alyn Habitat and Diffuse Rural Pollution project.</td>
<td>Positive and sustained outcomes for the River Dee (Chester Weir to Ceiriog) and its tributaries are planned and delivered, with better understanding, local collaboration and transparent decision</td>
<td>WDT</td>
<td>NRW EA Natural England Local Authorities Landowners DCWW, UU, Dee Valley Water Wildlife Trusts Woodland Trust Wales Reaseheath College</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Dee</td>
<td>Tidal Dee Catchment Partnership:</td>
<td>Positive and sustained outcomes for the Dee estuary and its tributaries are planned and delivered, with better understanding, local collaboration and transparent decision</td>
<td>Cheshire Wildlife Trust</td>
<td>NRW EA Natural England Wildlife Trusts Local Authorities Landowners DCWW RSPB</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Catchment Advisors in freshwater Dee catchment: (one upper and one middle) to target measures, advice and incentive schemes for landowners and managers to help improve water quality and reduce water treatment costs</td>
<td>Numerous, including improved water quality for fish</td>
<td>United Utilities</td>
<td>Dee Valley Water, Welsh Dee Trust</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
### Fisheries Actions - Dee

<table>
<thead>
<tr>
<th>Site</th>
<th>Action</th>
<th>Benefits</th>
<th>Lead</th>
<th>Partner(s)</th>
<th>Timescales for delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dee</td>
<td>Alyn and Chwiler Living Landscape project:</td>
<td>Improved rivers and river corridors for wildlife and local people</td>
<td>North Wales Wildlife Trust</td>
<td>NRW Clwydian Range &amp; Dee Valley AONB Flintshire &amp; Denbighshire Local Authorities North East Wales Wildlife British Association of Shooting &amp; Conservation</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Dee</td>
<td>Water Companies - AMP programme/Eel regulations:</td>
<td>Improved screening, protecting fish populations from entrainment and removal from the river system</td>
<td>DCWW United Utilities Dee Valley Water</td>
<td>NRW</td>
<td>2020</td>
</tr>
<tr>
<td>Dee</td>
<td>Enforcement: Action to reduce illegal activity on information provided and investigations</td>
<td>Reduced illegal activity, more fish remain in the system.</td>
<td>NRW</td>
<td>Stakeholders North Wales Police</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

**Abbreviations**

- NRW – Natural Resources Wales
- WDT – Welsh Dee Trust
- DCWW – Dwr Cymru Welsh Water
- UU – United Utilities
- EA – Environment Agency
- RSPB – Royal Society for the Protection of Birds
- AONB – Area of Outstanding Natural Beauty