

Know Your River – Dee

Salmon & Sea Trout Catchment Summary

Introduction

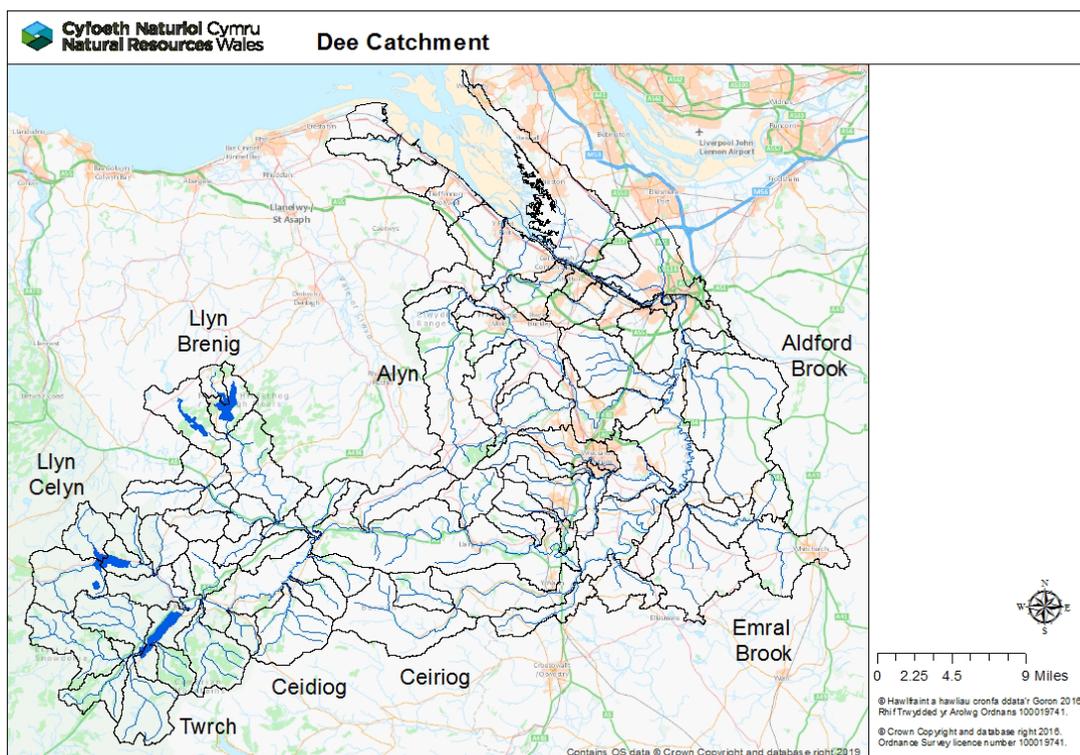
This report describes the status of the salmon and sea trout populations in the Dee catchment. Bringing together data from rod catches, stock assessments and juvenile monitoring, it will describe the factors limiting the populations and set out the challenges faced in the catchment.

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.

For cross border rivers (Wales/England) Natural Resources Wales is the regulator for all waters in Wales and the Environment Agency for all waters in England. Any regulatory controls on fishing can only be undertaken by the appropriate regulator. However there is an overarching principal agreement for an integrated catchment outcome (same controls within a catchment) for the regulation and management of migratory salmonids. In practice, NRW takes the lead for the regulation and management of migratory salmonids for the River Dee and of all watercourses draining or flowing, directly or indirectly, into it.



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. 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.

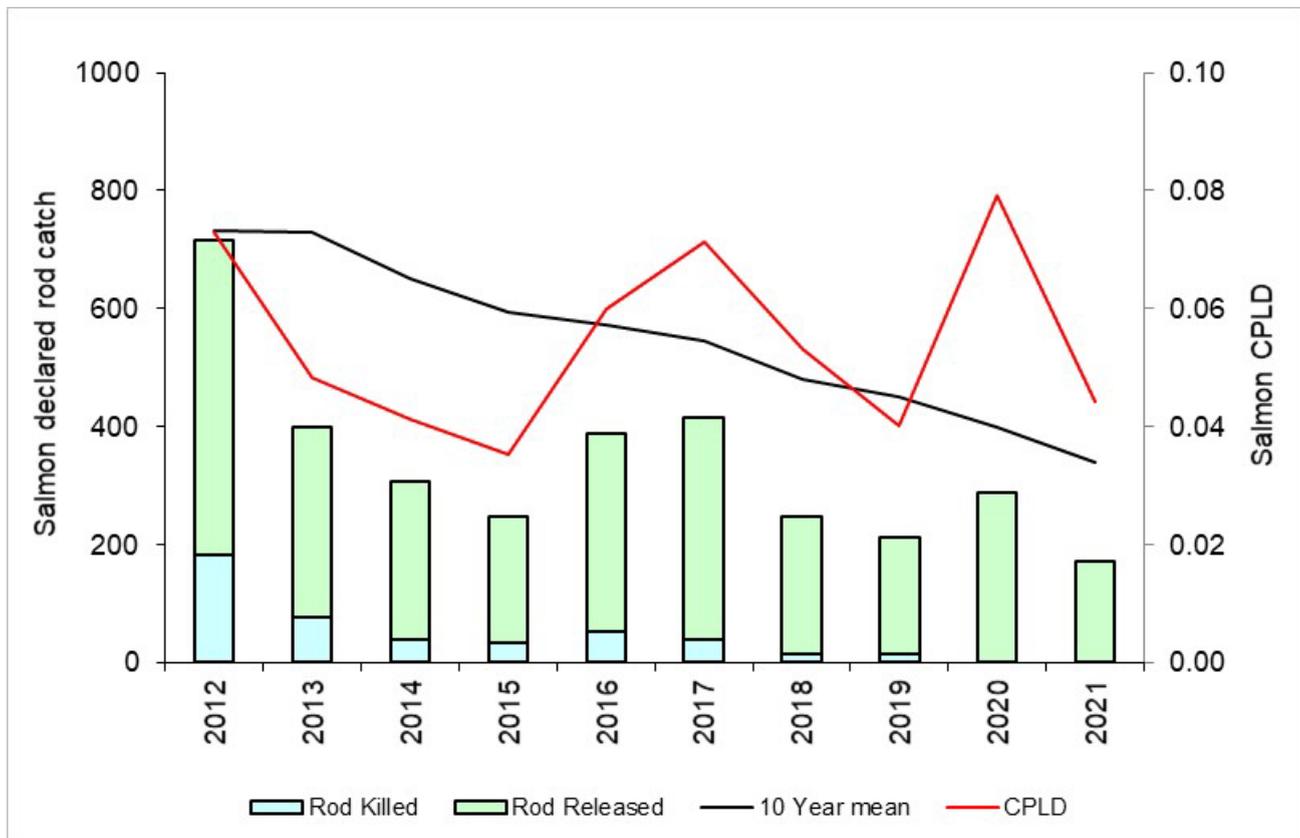
Water quality problems - mainly as a result of industrial and sewage pollution, tend to be confined to the catchment from the Wrexham area downstream. In addition, some of the upper catchment tributaries, particularly in the south-western region are susceptible to acidification because of base poor geology.

Rod Catches

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

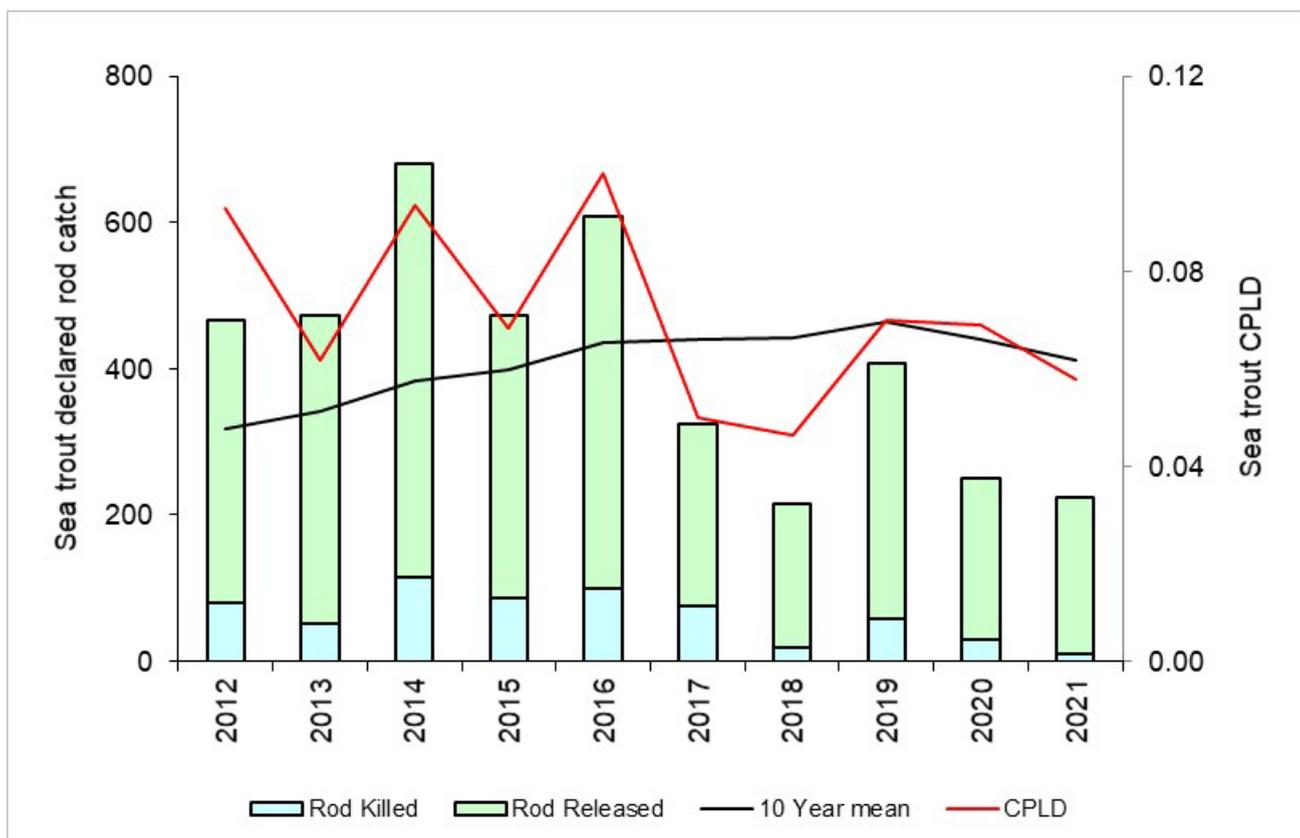
Salmon Rod Catch

Year	Caught	Rod Killed	Rod Released	10 Year mean	Percentage released	Catch per license day
2021	170	0	170	338.9	100	0.044
2020	287	0	287	451.0	100	0.080
2019	211	13	198	399.7	94	0.040
2018	248	14	234	480.9	94	0.053
2017	416	39	377	544.6	91	0.071
2016	388	53	335	571.3	86	0.060
2015	248	34	214	594.6	86	0.035
2014	307	38	269	651.0	88	0.041
2013	398	75	323	728.3	81	0.048
2012	716	183	533	730.6	74	0.073



Sea Trout Rod Catch

Year	Caught	Rod Killed	Rod Released	10 Year mean	Percentage released	Catch per license day
2021	223	10	213	412.2	96	0.058
2020	250	30	220	440.5	88	0.071
2019	407	57	350	464.8	86	0.070
2018	216	19	197	442.2	91	0.046
2017	325	76	249	439.8	77	0.050
2016	609	99	510	434.9	84	0.100
2015	472	86	386	399.3	82	0.068
2014	681	114	567	382.4	83	0.094
2013	472	51	421	340.8	89	0.062
2012	467	79	388	318.5	83	0.093

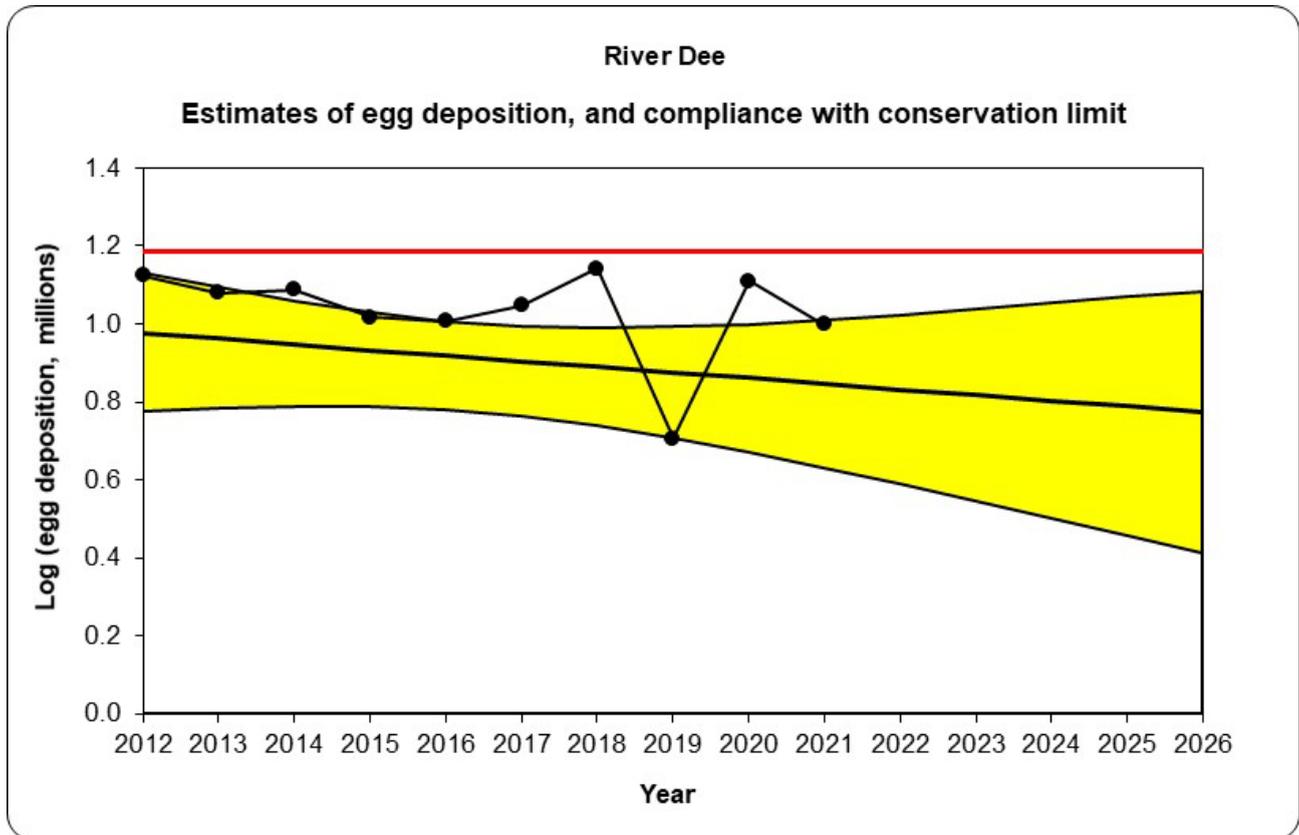


Stock Status

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 ten-year series of egg deposition estimates (2012-2021).

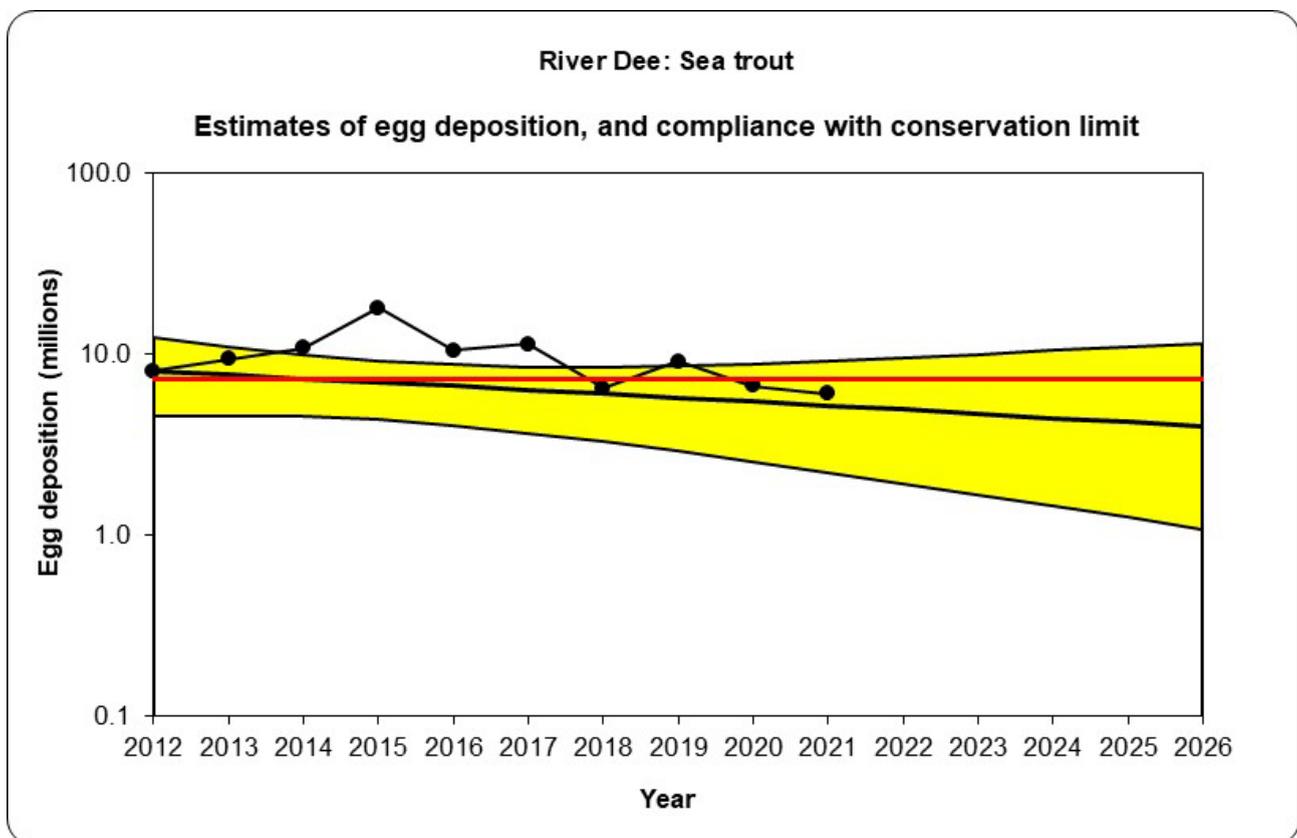
- Current number of eggs being deposited puts stocks **at risk**
- In five years' time the predicted status of salmon stocks will be **at risk**
- Based on current data, and the projection of the graph, the stocks of salmon on the Dee will continue to **decline (uncertain trend)**

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: [Technical case for fishing controls to protect salmon and sea trout](#)).



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 ten-year series of egg deposition estimates (2012-2021).

- Current number of eggs being deposited puts stocks **probably at risk**
- In five 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 Dee will continue to **decline (uncertain trend)**

Juvenile Salmonid Monitoring Programme

In 2022 the temporal (annual) programme consisted of thirteen sites on the Dee, one site was not completed due to access issues. The temporal data is used to look at trends in juvenile salmon and trout densities, giving an indication of how successful spawning has been across the whole catchment.

Salmon and Trout Classifications

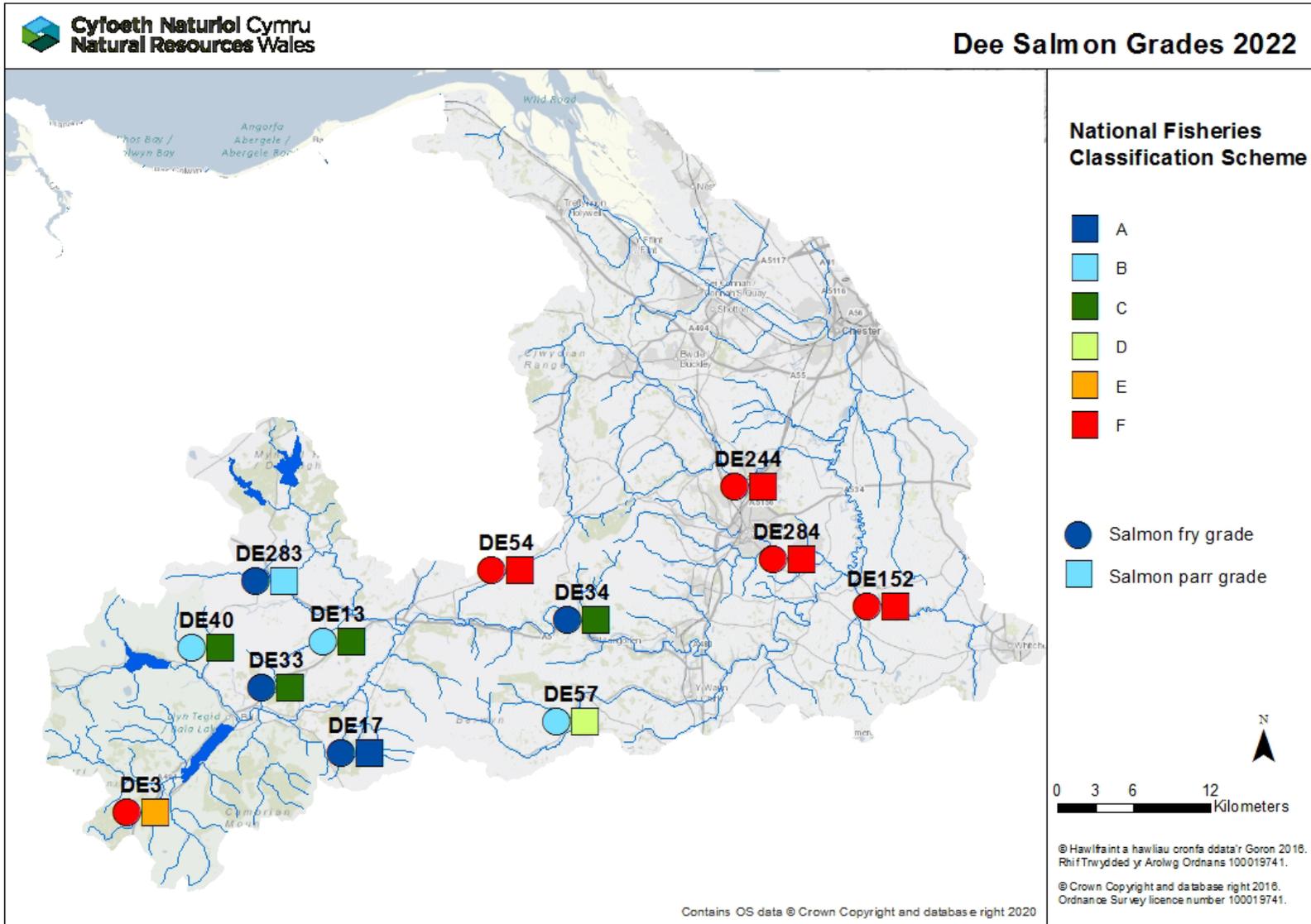
The following tables/maps show the results of the routine juvenile temporal salmonid population surveys from 2022 on the Dee.

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.

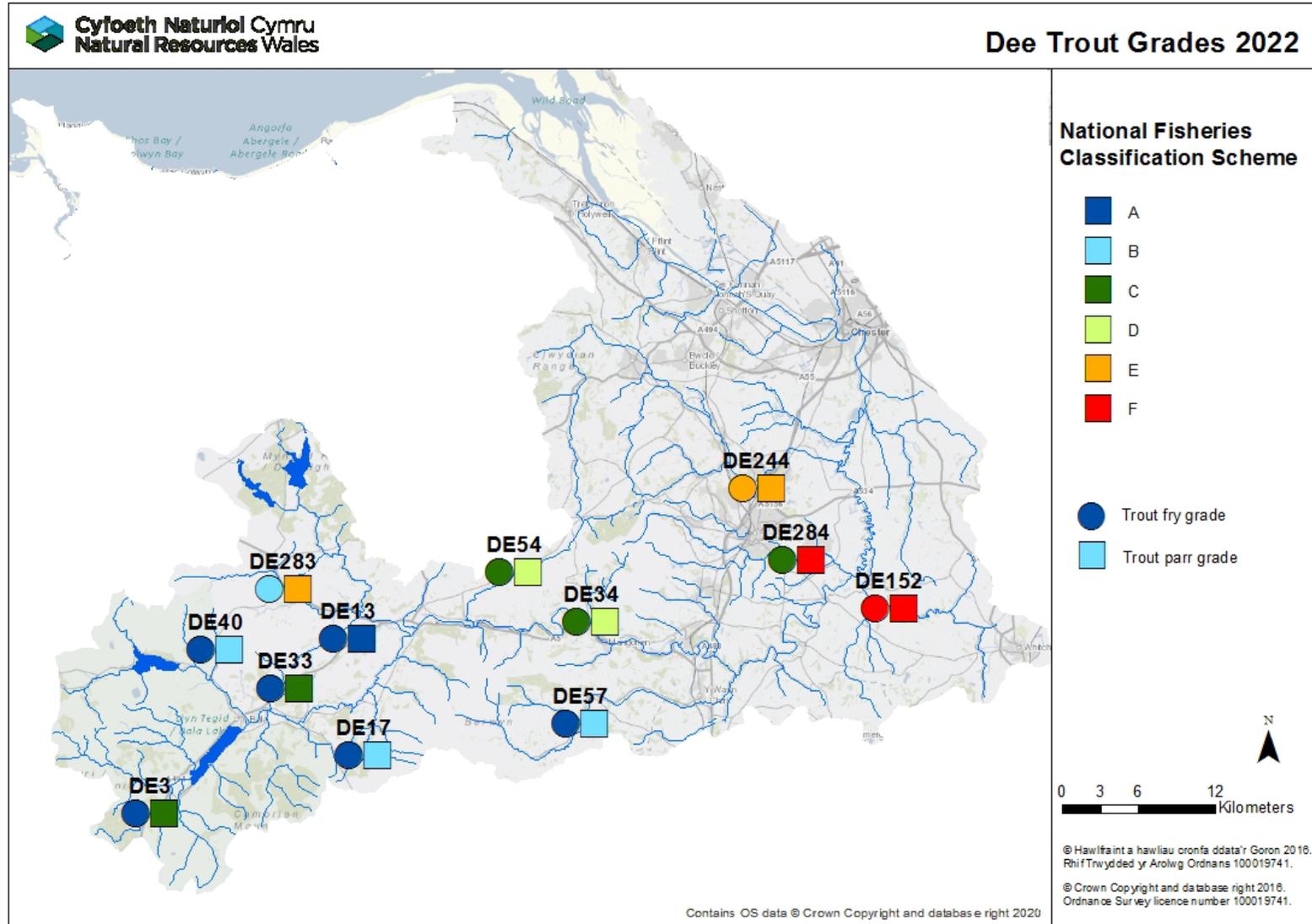
Grade	Descriptor	Interpretation
A	Excellent	In the top 20% for a fishery of this type
B	Good	In the top 40% for a fishery of this type
C	Fair	In the middle 20% for a fishery of this type
D	Fair	In the bottom 40% for a fishery of this type
E	Poor	In the bottom 20% for a fishery of this type
F	Fishless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

Catchment	Site code	Year	Salmon fry grade	Salmon parr grade	Trout fry grade	Trout parr grade
Little Dee	3	2022	F	E	A	C
Merddwr	13	2022	B	C	A	A
Ceidiog	17	2022	A	A	A	B
Meloch	33	2022	A	C	A	C
Abbey Brook	34	2022	A	C	C	D
Mynach	40	2022	B	C	A	B
Morwynion	54	2022	F	F	C	D
Ceiriog	57	2022	B	D	A	B
Worthenbury Brook	152	2022	F	F	F	F
Alyn	244	2022	F	F	E	E
Ceirw	283	2022	A	B	B	E
Clywedog	284	2022	F	F	C	F

Map of Juvenile Salmon Results



Map of Juvenile Trout Results



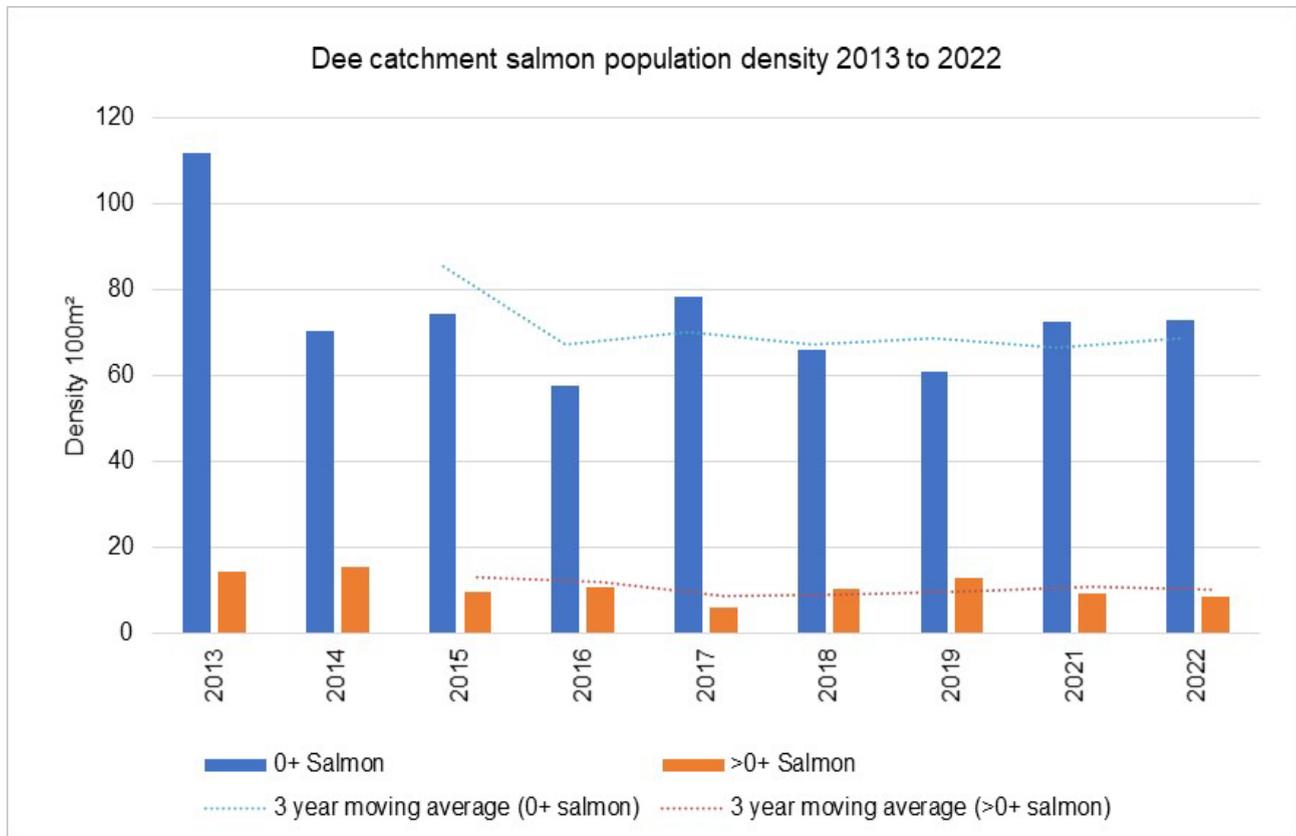
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Catchment Population Trends

The tables/graphs below show a simple comparison of average salmon and trout densities across the temporal sites on the Dee catchment since 2012. NB – covid restrictions cancelled all surveys in 2020. NA stands for not applicable.

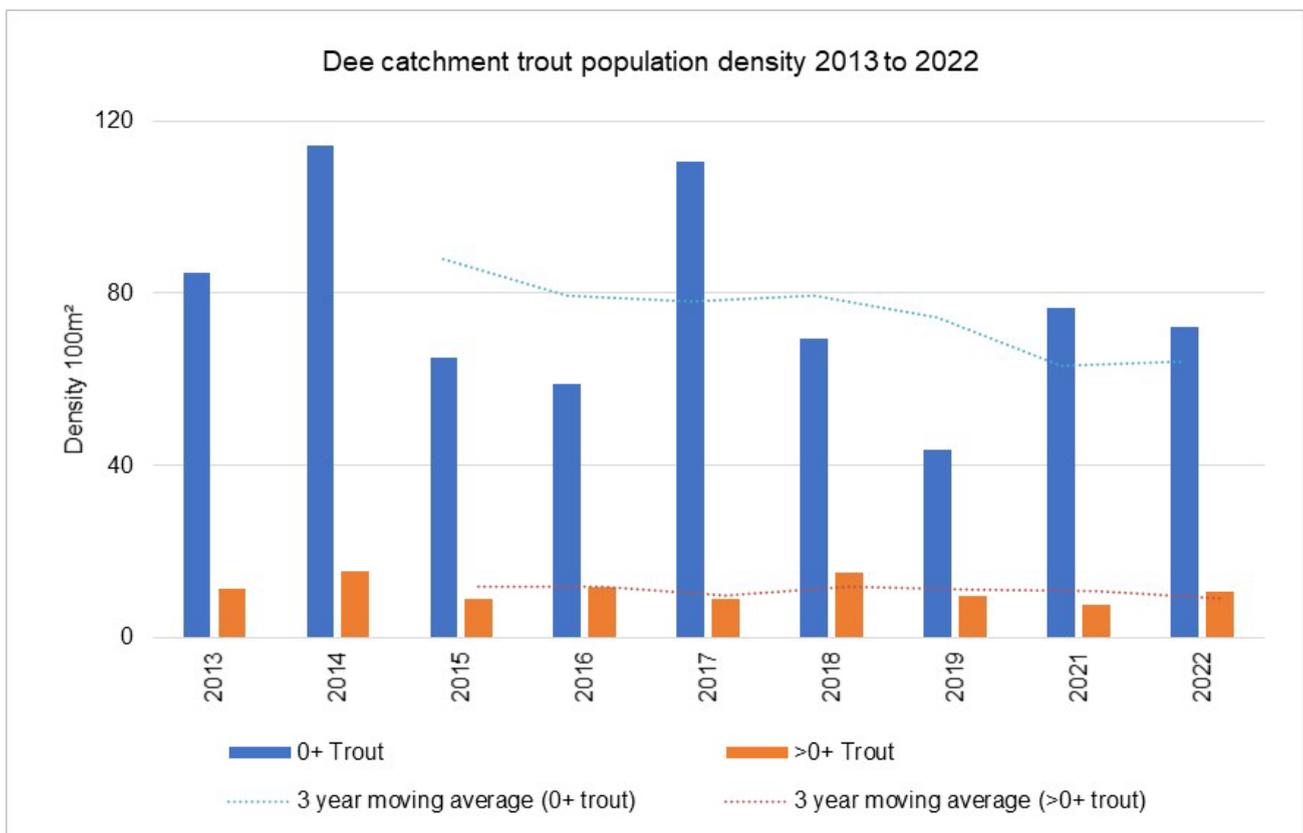
Salmon population trend

Year	0+ Salmon	3-year average (0+ salmon)	>0+ salmon	3-year average (>0+ salmon)
2022	72.8	68.7	8.4	10.1
2021	72.3	66.4	9.1	10.7
2019	60.9	68.5	12.7	9.7
2018	66.0	67.4	10.4	8.9
2017	78.4	70.1	6.0	8.7
2016	57.6	67.3	10.4	11.7
2015	74.2	85.4	9.5	13.0
2014	70.1	NA	15.3	NA
2013	111.8	NA	14.2	NA



Trout population trend

Year	0+ Trout	3-year average (0+ trout)	>0+ Trout	3-year average (>0+ trout)
2022	72.1	64.1	10.8	9.4
2021	76.7	63.3	7.7	10.8
2019	43.6	74.5	9.6	11.2
2018	69.5	79.6	15.2	12.0
2017	110.5	78.1	9.0	9.9
2016	58.8	79.3	11.8	12.1
2015	64.9	88.0	8.9	12.0
2014	114.2	NA	15.5	NA
2013	84.8	NA	11.4	NA



Dee Fisheries Action Table

Planned actions	Benefits	Lead	Partner(s)	Timescale for delivery
<p>LIFEDeeRiver:</p> <p>Remove constraints to fish migration</p> <p>Restore or improve riverine processes</p> <p>Improve agricultural and forestry practices</p> <p>Initiate FWPM conservation</p> <p>Build long-term stakeholder relationships</p>	<p>In 2022</p> <p>1 fish pass was built to improve passage on the Nant Gwryd (Ceiriog)</p> <p>18km of riverside fencing installed with either solar powered or mains fed drinking troughs provided to exclude livestock from the watercourse</p> <p>10,200 trees planted</p> <p>2,630t of gravel placed in-river below reservoirs (Afon Tryweryn, Afon Alwen and Afon Brenig)</p> <p>550t boulders introduced (Nant Gwryd and Afon Alwen)</p> <p>200m of bankside revetment installed</p> <p>Engagement with 30,000+ individuals through social media, specialist articles and press releases and attendance at the Royal Welsh Show</p> <p>Over 25 farm visits carried out with farm report completed following the visit and on-farm interventions (new guttering, improved drainage) installed.</p> <p>FWPM collection and surveys carried out.</p>	<p>NRW / CNC</p>	<p>Environment Agency</p> <p>Snowdonia National Park Authority</p> <p>Dwr Cymru</p>	<p>2019 - 2024</p>

Planned actions	Benefits	Lead	Partner(s)	Timescale for delivery
Alyn habitat improvement – fencing, provision of drinking troughs, gravel management and soft revetment	Riparian and in-river habitat improvement – stabilisation of banks, increased cover and cooling; protection of spawning areas			2022-23
Alternative mitigation - habitat improvements: Investigation and delivery of improvements to habitat (riparian and/or instream) and/or fish passage over barriers.	Improved river function, through more naturalised systems, increased flow diversity, improved spawning and juvenile habitat and gravels. Improved numbers of fish and more resilient populations. and improved	Welsh Dee Trust		2022-2024
Habitat improvements: We will investigate where there is opportunity to improve habitat for fish through improving access over barriers, restoration of riparian and instream habitat, including control of invasive species.	More natural river system, reduced siltation, increased flow diversity, improved spawning gravels and juvenile habitat. Improved fish numbers.	NRW		On-going
Enforcement: Action to reduce illegal activity on information provided and investigations.	Reduce illegal activity, more fish remain in the system.	NRW	Stakeholders North Wales Police	On-going

Planned actions	Benefits	Lead	Partner(s)	Timescale for delivery
<p>Water Framework Directive: We will continue to work to ensure no deterioration, monitor the status of the environment and investigate the 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.</p>	<p>Waterbodies protected and improved WFD waterbodies achieving Good Status/Potential.</p>	<p>NRW</p>	<p>NRW Wildlife trusts Local authorities Landowner DCWW</p>	<p>On-going</p>
<p>Fish passage - Upper Dee</p> <p>Investigate salmonid fish passage around NRW owned and operated assets in the Bala area to gain a better understanding of delays and losses associated with operation and structures.</p> <p>Understand and improve fish passage (upward migration of adult salmonids and downward migration of smolts).</p> <p>Investigate and delivery of adaptive management measures eg changes to flow regime, operation of sluice gates to provide positive benefits to fish passage.</p>	<p>Reduced delays at structures will reduce predation of adult and juvenile salmonids, benefit overall stocks, increasing spawning success, and juvenile production.</p>	<p>NRW</p>	<p>External Steering group including Welsh Dee Trust, Dwr Cymru Welsh Water, Canolfan Tryweryn</p>	<p>Ongoing since 2014</p>