Juvenile salmon stocks in the Dee 2019

The national assessment of salmon stock health (conservation status) in Scottish rivers is based on the number of adult fish caught by anglers and those passing through fish counters. Stocks can be assigned to 3 categories based on the number of fish recorded over a 5-year period. The Dee is currently a Category 1 river, which is the highest, and indicates that enough adult fish are successfully spawning to meet the egg requirement of the river (see appendix).

This is not the whole story, however, because it does not include information on juvenile fish. Consequently, in 2018 the National Electrofishing Programme for Scotland (NEPS) was created to assess the number of juvenile fish in relation to a benchmark value (the number of fish that would be expected, on average, if the site was in a good state or "healthy").

Each year – though not in 2020 because of Coronavirus – individual Fishery Boards and Trusts are provided with a geographically spread-out list of 30 locations in their catchment to electrofish. The sites are chosen by a computer programme to give a broad and unbiased view of juvenile salmon across the whole catchment.

The results are from these surveys are then sent to Marine Science Scotland to analyse and determine the juvenile assessment. Salmon fry and parr are given a grade based on how the number of fish caught each year relates to the number you would expect in a "healthy" river.

Grades for each life stage were assigned using the following rules:

- **Category 1**: The number of fish exceeds the benchmark
- **Category 2**: Given the variability in the data the number of fish caught was not too far from the benchmark
- **Category 3**: Despite the variability in the data the number of fish caught was much smaller than the benchmark

2019 juvenile salmon catchment-wide results

When looking across all 30 sites within the Dee catchment, the number of fry caught fell well short of the benchmark and was given a grade of 3 (a change from 2018 when it was assigned a 2). To be assigned a grade 2 the red bar should fully overlap the blue dot (**Figure 1**).
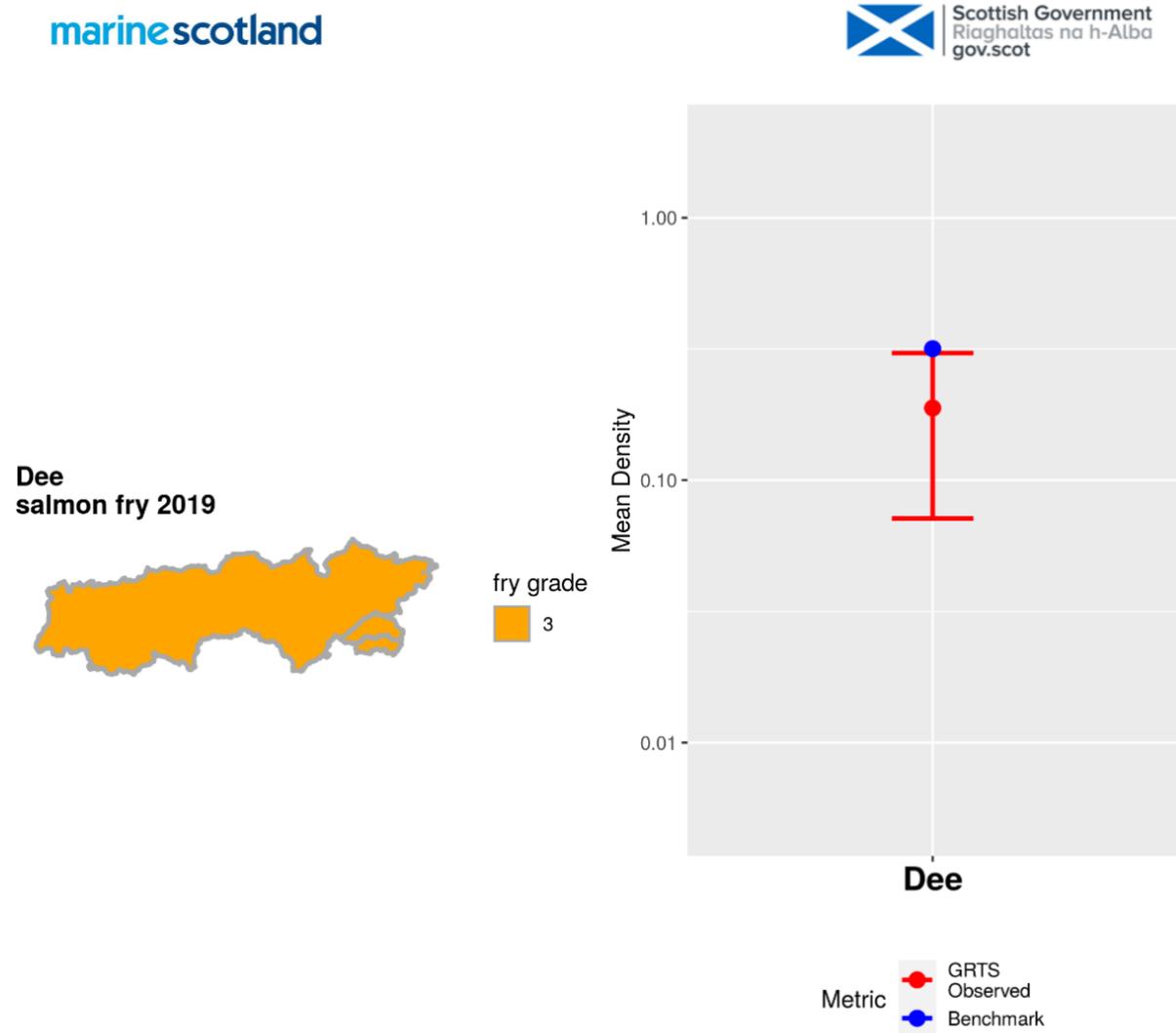
Figure 1: Dee fry grade for 2019. The blue dot is the benchmark value and the red dot is the average value of what we caught. The red lines indicate the confidence we have in that value based about the variability in the numbers of fish caught (scale is number of fish per m^2).

The number of parr was much better and was very close to meeting the benchmark value (**Figure 2**) – consequently it was assigned a grade 2 (a change from 2018 when it was assigned a 3).
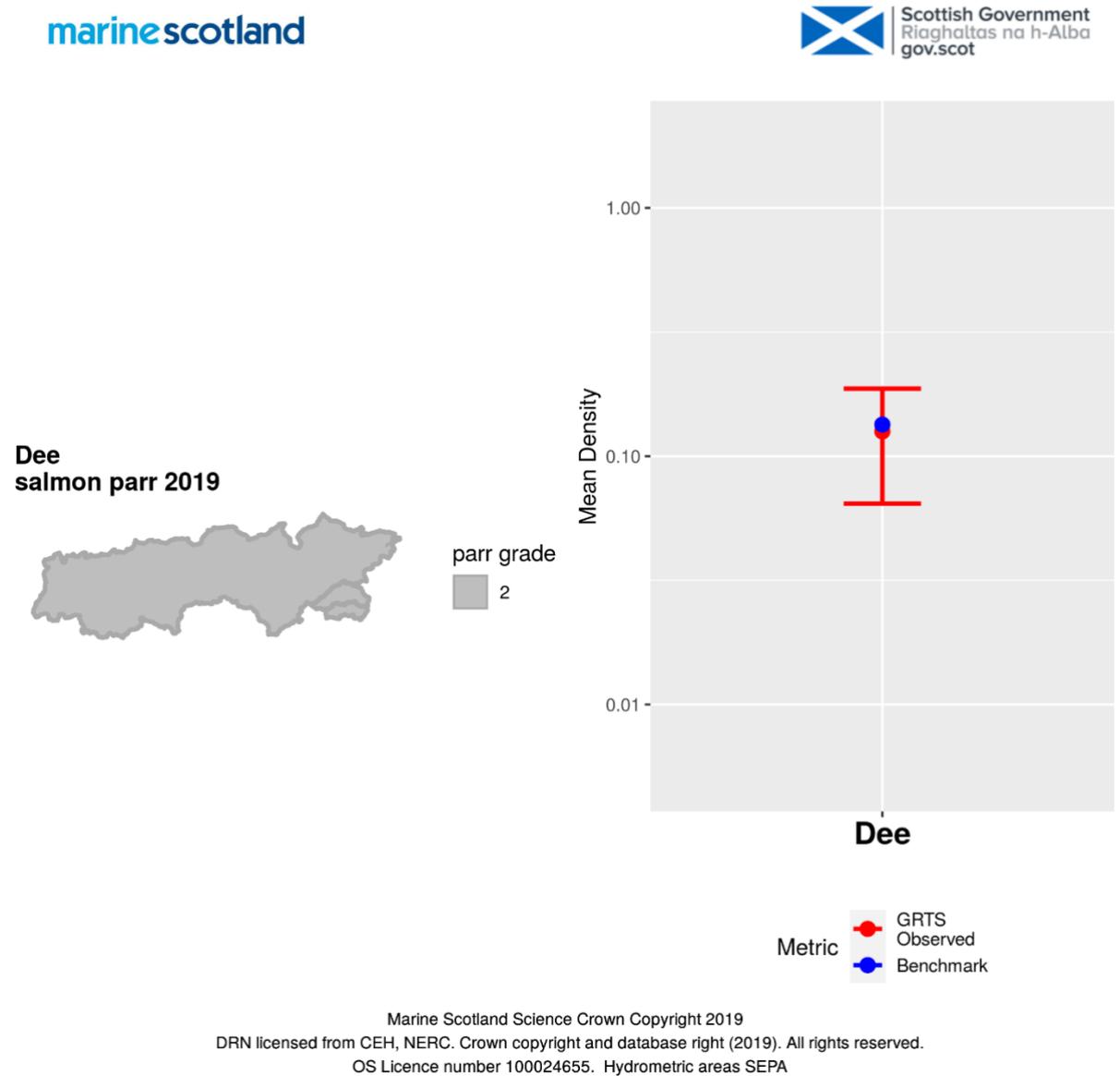
Figure 2: Dee parr grade for 2019. The blue dot is the benchmark value and the red dot is the average value of what we caught. The red lines indicate the confidence we have in that value based about the variability in the numbers of fish caught (scale is number of fish per m^2).
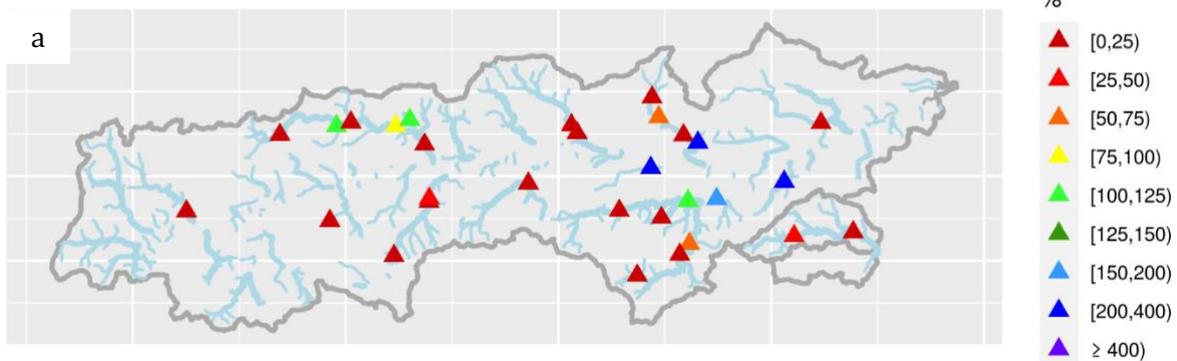
2019 juvenile salmon individual site results

Looking more closely at the fish caught at individual sites it is clear that the number of fry caught at the majority of locations was well below the benchmark though there were a number of sites that met and exceeded it (**Figure 3a**).

The number of parr caught met or exceeded the benchmark in around half of the sites though there were still many locations with very poor catches (**Figure 3b**).

Figure 3: Maps showing electrofishing locations within the Dee catchment and the numbers of a) fry and b) parr as a percentage of the benchmark value; red-orange = below, yellow-blue = met or exceeded predicted benchmark value.

NEPS has been designed to sample different sites across the whole catchment a different number of times over multiple years and therefore enabling a picture of stock health across the whole catchment. Consequently, poor catches of fish at one site in one particular year does not necessarily mean that this site – and therefore tributary – is poor for salmon. The repeated sampling over many years will account for individual variability.

To look at the stock health of individual tributaries more sites would need to be surveyed to get that level of detail. The River Dee Trust have been consistently surveying sites in the upper catchment since 2013. This work demonstrates that juvenile numbers can vary both within a tributary but also over multiple years. In 2019 salmon fry and parr numbers were fairly typical and mirrored the pattern seen in NEPS – fry numbers were a little lower than average and parr were above average. Read the report here: http://www.riverdee.org.uk/f/articles/UDRS-Electrofishing-2019.pdf

Appendix

The conservation status of salmon stocks is assessed on a river by river basis and is defined by the probability of the stock meeting its conservation limit over a five-year period. The River Dee is a category 1 as the likelihood of the salmon stock contributing enough eggs to populate the available habitat was greater than 80% over the past 5 years.

The assessment for the River Dee SAC is Grade 1.

Average chance of the conservation limit being met of 88% during 2015-2019
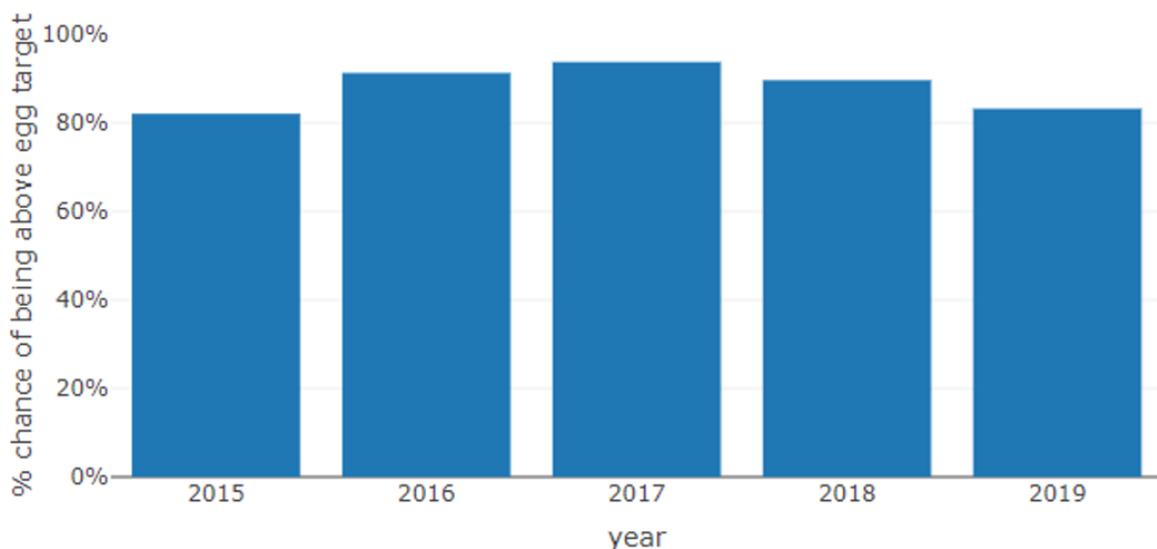
The chance that the salmon stock reached its target during each of the last 5 years. Grade 1 is awarded where the 5 year average is over 80%; Grade 2 = 60-80%; Grade 3 less than 60%.

Watch a short video on how rivers are assessed and categories assigned here: https://www.youtube.com/watch?v=ptXrKufauXo&feature=youtu.be

Further reading

You can investigate the 2018 and 2019 data for the Dee and all other catchments within NEPS using this online app: https://scotland.shinyapps.io/sg-national-electrofishing-programme-scotland/.

Find out more about NEPS for the whole of Scotland in 2019 here: https://data.marine.gov.scot/dataset/national-electrofishing-programme-scotland-neps-2019

The river grading (taking into account adult catches and fish counter records) and supporting data from the past 5 years can be seen here: https://www.gov.scot/publications/salmon-fishing-proposed-river-gradings-for-2021-season/

Rather than a simple pass or fail, stocks are allocated to one of three grades, each with its own recommended management actions:

Category	Probability of Meeting Conservation Limit	Advice
1	At least 80%	Exploitation is sustainable therefore no additional management action is currently required. This recognises the effectiveness of existing non-statutory local management interventions.
2	60-80%	Management action is necessary to reduce exploitation: catch and release should be promoted strongly in the first instance. The need for mandatory catch and release will be reviewed annually.
3	Less than 60%	Exploitation is unsustainable therefore management action, including mandatory catch and release (all methods), is required to reduce exploitation. .

Data and plots in this report derived from:

I A Malcolm, K J Millidine, F L Jackson, R S Glover and R J Fryer. (2020). The National Electrofishing Programme for Scotland (NEPS) 2019. Scottish Marine and Freshwater Science Vol 11 No 9. Crown Copyright 2020