



# the River

News from Tweed Fisheries Management: The River Tweed Commission & The Tweed Foundation

## How many is enough?

***With the continuing decrease in the numbers of adult Salmon returning from the sea due to reduced marine survival, an important management question for the Tweed is whether nursery areas for juvenile Salmon continue to be at capacity and at what point there will not be enough adult Salmon to replenish juvenile stocks. The Tweed Foundation continues to investigate these questions through its juvenile, smolt and adult monitoring programme.***

### Juveniles

The Tweed Foundation has been monitoring juvenile Salmon stocks since the early 1990s using different electro-fishing techniques, which gives us a baseline of data from a period of higher adult abundance in the 1990s and 2000s, to the recent period of lower abundance (2014 onwards). Our results show that there is no general change in the numbers of Fry (first year Salmon) over this period, which is a good indication that the river continues to be at capacity overall.

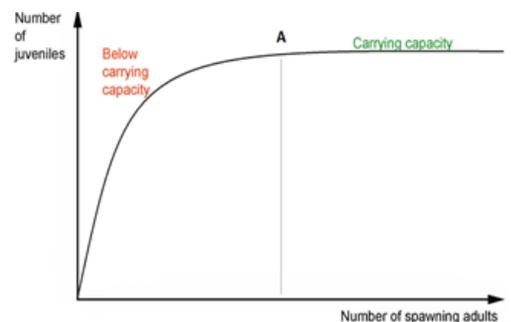
We also have a categorisation system that places our results into five categories ranging from 'Very Low' through to 'Very High'. Numbers of Fry in the principle tributaries of the Tweed system, including the Leader, Gala, Teviot, Till, Whiteadder and Upper Tweed are generally in the top two categories of results, which reflects the high quality of habitat in these areas and adequate numbers of spawning Salmon.



A typical basket of juvenile Salmon from a monitoring site of around 100 m<sup>2</sup>

### The theory of carrying capacity

Intuitively, it might be thought that there is a direct (straight line) relationship between adult and juvenile numbers. For example, the high numbers of adult Salmon that returned in 2010 would then be expected to produce a bumper number of recruits the following year. This is not the case, as there is a point, for a certain number of adult fish (A), when the numbers of offspring that can survive are limited by the environment that they live in and it therefore cannot hold any more. This is the carrying capacity of the river.



As an average-sized female Salmon of 60cm can hold around 5,500 eggs and and 100cm fish around 20,000 eggs, only a relatively small number of breeding fish are needed to maintain stocks of juvenile Salmon. This helps to explain why juvenile stocks continue to remain stable while adult numbers have declined.

**More questions?** Feedback on this Newsletter, and suggestions for future topics are very welcome

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### Smolts

With the installation of the Gala Smolt trap in 2017, we have now started monitoring this stage of the life cycle, which can be considered ‘the final product’ from the river. Our initial estimate for Smolt production from the Gala Water in 2017 is 25-30,000 fish. This equates to approximately 12 Smolts produced per 100m<sup>2</sup> of water upstream of the counter, which is extremely productive relative to other rivers in Scotland. With a longer data series, we will gain a better understanding of the natural variation in numbers and how this relates to the numbers of fish counted through the Gala fish counter.

A tub full of Smolts that were caught in the Gala fish trap before return to the river to continue their journey downstream



### Egg deposition for the Gala Water compared to target levels



### Adult counts using fish counters

The Tweed Foundation now has three adult fish counters in operation on the Ettrick, Gala and Whiteadder. Numbers of counted fish are converted to estimated numbers of deposited eggs, which can then be compared to target levels. Estimated egg deposition for the Gala (2008-2017) and Ettrick counters (1998-2009) have so far exceeded target deposition rates, which is shown for the Gala Water in the graph opposite. It is important to remember that egg deposition is related to both numbers and size of fish rather than just using numbers as it is possible to have fewer fish, but if they are larger, then egg deposition can be just the same as for a bigger number of smaller fish.

### Putting it all together

The evidence shows us that, so far, juvenile stocks of Salmon in the Tweed system have held up, despite the recent decrease in adult numbers. Precisely defining the number of adults below which numbers of juveniles will begin to drop is a much harder question to accurately answer. Certainly for the foreseeable future, we will rely on juvenile, smolt and adult data gathered from the Gala Water to answer this question, along with our electro-fishing monitoring to provide a broader picture of Tweed Salmon stocks.

Produced by the River Tweed Fisheries Management team

Websites: [rivertweed.org.uk](http://rivertweed.org.uk) [rtc.org.uk](http://rtc.org.uk) [tweedfoundation.org.uk](http://tweedfoundation.org.uk) [www.facebook.com/TheTweedFoundation](http://www.facebook.com/TheTweedFoundation)

