



How River Flow Affects Rod Catches of Atlantic Salmon



The River Don. Photograph © David Hay.

Flows and catches

River flows affect rod catches of Atlantic salmon (*Salmo salar* L.) in several ways. High flows cause salmon in estuaries or coastal waters to enter rivers where they become exploitable by anglers. High flows also cause salmon already in the rivers to become more active — a condition that appears to increase their catchability. Both factors result in smaller rod catches when flows are low. Salmon anglers are aware of this and tend to fish harder when flows are high. This bias exaggerates the general tendency for catches to be greater at higher river flows.

Although random, year-to-year variations in river flow add noise to the catch data, they do not affect the general long-term patterns (i.e. trends). Indeed, as shown in two previous pamphlets in this series: *The Changing Abundance of Spring Salmon* and *Catches of Summer and*

Autumn Salmon in Scotland, the catch trends provide useful information about long-term changes in abundance. However when attempting to interpret a particular year's rod catch, the effect of flow must be taken into account. Thus, instead of asking whether the most recent year's rod catch was relatively large or small, fishery managers might ask whether the rod catch was higher or lower than expected, given the river conditions that prevailed.

In order to begin to answer these questions, Fisheries Research Services and the University of Aberdeen, carried out the following study, with support from the Atlantic Salmon Trust.

Collaborative research

The monthly rod catches (March-September) for seven Scottish rivers (Helmsdale, Ness, Spey, Deveron, Dee, Tay and Tweed) were compared to the monthly flows at gauging stations on the same rivers (data supplied by the Scottish Environmental Protection Agency). More specifically, the year-to-year variation in the rod catches about the long-term trend for each of the rivers, in each of the months, was compared to the year-to-year variation in the flow for that particular river and month.

In more than half of the comparisons (26 out of 49) river flow explained a significant proportion of the year-to-year variation in the rod catch (Table 1).

Table 1. Significant relationships between monthly flow and monthly rod catch (indicated by a tick).

	Mar	Apr	May	Jun	Jul	Aug	Sep
Helmsdale			✓		✓	✓	✓
Ness	✓						
Spey				✓		✓	
Deveron	✓	✓	✓	✓	✓	✓	✓
Dee	✓	✓	✓	✓	✓	✓	
Tay						✓	
Tweed	✓	✓			✓	✓	✓



Variation among rivers and months

Interestingly, the relationship observed differs between rivers and months. In some cases, the catch increases linearly with the flow across the full range of conditions (Fig. 1).

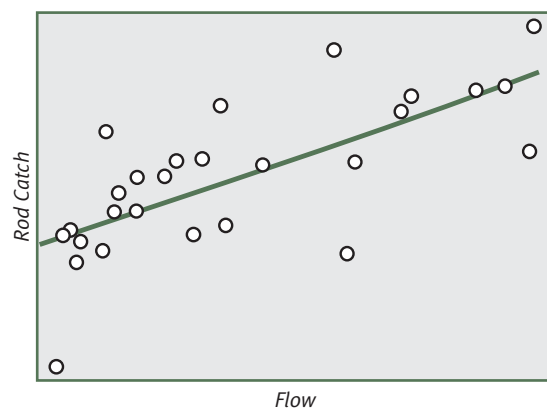


Figure 1. The relationship between year-to-year variation in flow and year-to-year variation in rod catch on the Dee in July.

In others, catches increase initially before dropping off at high flows (Fig 2). This relationship probably occurs where the highest flows make angling increasingly difficult and ineffective.

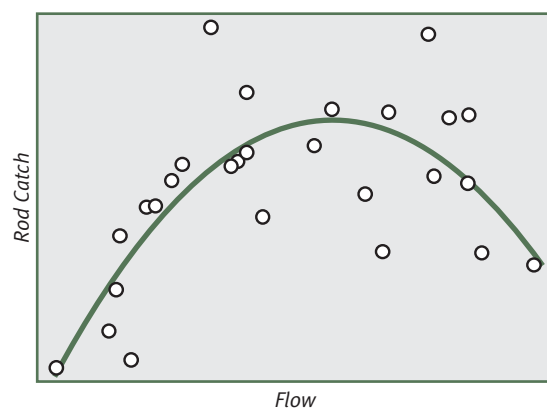


Figure 2. The relationship between year-to-year variation in flow and year-to-year variation in rod catch on the Spey in June.

Differences between months

Of all the months examined, the largest number of significant relationships (six out of a possible seven) occurred in August. This probably reflects the fact that, although flows in August are typically quite low, in wet years they can be very high. A wide range of flow conditions increases the chances that a relationship with catch will be detected.

Differences between rivers

Of all the rivers examined, the Deveron and the Dee showed the largest number of significant relationships (seven and six out of a possible seven, respectively). This finding suggests that in these catchments flow exerts a particularly strong influence on catches. Again, this may be because flow for every month tends to vary particularly markedly between years in these systems.

This study was restricted to monthly comparisons because the rod catch data are aggregated by month. Even if no monthly relationship can be detected, changes in flow may well affect rod catches at the hourly, daily or weekly scales.

Summary

- In about 50% of the tested cases, the monthly rod catch could be related to the monthly river flow.
- In general, larger catches occur in years when flow is higher, although in some cases, catches are reduced at the highest flows.
- The relationships are more consistently evident in particular rivers and particular months.
- The relationships are river and month specific.