

Abstract BES/GfÖ/NecoV joint Annual meeting 2017

Title:

Understanding the effects of environmental variability on the run timing of juvenile Atlantic salmon (*Salmo salar* L.) migrating from upland tributaries

Abstract body:

Atlantic salmon (*Salmo salar* L.) typically spend between 1 and 4 years in fresh water, before migrating to sea. In many smaller tributary streams juvenile fish migrate in both the autumn (parr) and spring (smolts). Fish migrating in the autumn over-winter in the main river before migrating to sea the following year. Although there are strong seasonal patterns in the timing of migration, there is also considerable year to year variability that is thought to reflect environmental variability (e.g. river temperature) in the freshwater environment. While a number of studies have investigated temporal variability in migration run timing, they have often confounded environmental effects with those of day of year (DoY) to which they are correlated. This study separates these effects using survival modelling approaches where the response variable (migrating fish) incorporates the date of observation. Models were fitted to data from two unique long term (28 and 51 years) fish trapping sites on the Aberdeenshire Dee, Scotland. Discharge, de-trended water temperature, year, lunar phase, and cloud cover were considered as potential explanatory variables. Preliminary results suggest that discharge had the strongest effect on migration time, followed by water temperature, lunar phase and cloud cover. Migration rate increased rapidly with discharge in the spring, but decreased in the autumn. River temperature decreased emigration rates in the spring where they deviated from seasonal expectations (i.e. were either lower or higher than expected given the DoY), however, cooler temperatures in the autumn increased migration rates. Migration rates decreased where the moon was more exposed. The effects of cloud cover were smaller and less clear. Given the apparent importance of discharge as a cue for migration, it is suggested that river managers consider the potential implications of anthropogenic changes to flow regimes, maintaining natural seasonal variability where possible.