Investigating environmental determinants of the smolt migration in a wild population of Atlantic salmon (Salmo salar)

Edel Lheureux, Mathieu Buoro, Etienne Prévost

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Edel Lheureux, Buoro Mathieu, Prévost Etienne

Université de Pau et des pays de l'Adour, INRAE

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Abstract: Understanding the phenology of smolt migration, i.e. the timing of smolt leaving freshwater to enter the ocean, is important to better forecast the future of Atlantic salmon (*Salmo salar*) populations facing climate change. Smolting is a critical part of the life cycle of Atlantic salmon but it can be costly and hazardous. While migration to seawater can increase the fitness of individuals via higher growth conditions and fecundity, it comes with physiological costs and higher mortality risks. The phenology of migration is an adaptive process which can help to reduce the overall cost of migration by synchronizing favourable conditions in rivers and at sea.

Many studies investigated proximate factors influencing the timing of smolt migration and emphasized long term phenological change. However, interpreting phenological changes and investigating potential proximate factors influencing the timing of migration is challenging because our observations result from multiple dynamics processes (smoltification, migration decision, actual departure) and the observation process itself (capture/detection). Indeed, both biological and observation processes can be controlled by multiple and sometimes confounding factors (water discharge) that can affect our understanding of the observed changes in phenology.

My PhD project aims to explicitly disentangle these processes, identify the factors involved and explore the potential consequences of climate change and extreme climatic events on the phenology of migration. To do so, we will develop a model representing explicitly both the biological processes and the observation process in a unique framework using a long-term mark-recapture program of A. salmon juveniles in the Scorff river (France).