Salmon shall be hot in 2030, and so what ? Developing an individual-based model of Salmo salar to assess population dynamics under scenarios of climate change

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SALMON SHALL BE HOT IN 2030, AND SO WHAT? DEVELOPING AN INDIVIDUAL-BASED MODEL OF *SALMO SALAR* TO ASSESS POPULATION DYNAMICS UNDER SCENARIOS OF CLIMATE CHANGE

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Abstract:
Anadromous fish species such as Atlantic salmon, *Salmo salar*, are supposed to be influenced by climate change both in their river life history phase and their ocean one. In the river phase, increase of temperatures should speed up life history decisions such as maturation and smoltification through enhanced growth conditions. However, in the southern limit of its biogeographical distribution, decrease in precipitations in summer and general increase in environmental variance might create periodic limiting conditions for the growth of juveniles in river. Smolt size, and thereby ocean survival, are dependent on these growth processes and life history decisions in river. Additionally, growth conditions at sea determine the decisions of individuals to return as grilse (1 sea winter) or latter. The grilse vs. multi sea winter ratio is of particular interest for fisheries. Mature male parr proportion of a population is a second important indicator to look at for population structure changes as it should impact on the size of the anadromous fraction of the population.

Within this context, the objective of this work is to develop a cohesive model structure based on individual decisions and heritability of characters to analyze the probable dynamics of *S. salar* population under scenarios of climate change in small rivers of France. In a first part, the model structure is described with the underlying hypothesis of behaviour and heritability of characters. The second part presents the method of parameterization and a typical population dynamic with the tuned model. Finally, some preliminary results of scenarios of temperature increase in a typical French salmon river are presented.