# Assessing the future and potential for adaptation of Atlantic salmon facing climate change in Southern Europe

Etienne Prévost, C. Piou, Julien Papaix

Conference on European Climate Change Adaptation
Research and Practice

**ID Nº:** [256]

**Title:** **ASSESSING THE FUTURE AND POTENTIAL FOR ADAPTATION OF ATLANTIC SALMON FACING CLIMATE CHANGE IN SOUTHERN EUROPE**

**Authors:** Etienne Prévost[1]; Cyril Piou[2]; Julien Papaïx[3]

**Institutions:** [1]INRA, UMR INRA/UPPA Ecobiop, Aquapôle, 64310 Saint-Pée-sur-Nivelle, France; [2]CIRAD, Département BIOS, UMR CBGP, Montpellier; [3]INRA, CNRS, CEFE, Montpellier

Atlantic salmon (*Salmo salar*) is a relevant and challenging case for addressing Climate Change (CC) adaptation issues. It is a poikiltherm and cold water species. Living alternatively in freshwater - where reproduction and juvenile recruitment takes place - and at sea - where it undertakes long range migrations - it is potentially influenced by both terrestrial and marine consequences of CC. It is a heritage and emblematic species too, that has been suffering from the pressure of human activities. It is the target of a fishery exploitation which regulation shall have to adapt to the consequences of CC. This exploitation is selective (bigger and older fish are selectively harvested) and the selectivity can be adjusted by means of simple regulatory measures such as size limits and/or temporal windows. Overall, this places A. salmon among the species potentially strongly impacted by CC.

In terms of public policy, A. salmon is the subject of many management actions aiming at its conservation. There is a strong demand, expressed by a diversity of local to international bodies (local management committees, national ministries, international organizations such as the North Atlantic Salmon Conservation Organization), for assessing the consequences of CC for this species relative to the conflicting objectives of both conservation and exploitation. This cannot be achieved by means of real world experiments. But virtual experiments by simulation techniques can be used and further allow to explore the potential of management strategies fostering the adaptation of A. salmon to CC.

To this end, we have developed an individual based eco-genetic model (Ibasam: Individual Based Atlantic Salmon Model) that represents the combined dynamics of the ecology, evolution and management (including exploitation). This model is mechanistic, stochastic and integrative. It includes various processes by which environmental factors in relation that to CC have an effect on individuals at different stages of the life cycle. It summarizes a vast corpus of knowledge and is currently parametrized in order to mimic a virtual population located at the Southern edge of the species distribution range.

First sets of virtual experiments have shown that over the next 3 decades : (i) CC in freshwater alone should not lead to extinction of southernmost populations of A. Salmon in Europe; (ii) a reduction in oceanic growth due to CC would be a significant threat for population persistence, especially if interacting with increased amplitude in river flow regimes; (iii) CC would lead to significant changes in the demographic structure of population by shortening the life-cycle; (iv) in contrast to CC, which triggers mainly plastic responses, selective fisheries exploitation leads to significant genetic evolution. We discuss these results with regards to the potential of developing intentionally selective exploitation strategies for promote the adaptation of A. Salmon populations to CC.

**Presenter**

**Name:** Etienne Prévost

**Email:** eprevost@st-pee.inra.fr