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## A bayesian hierarchical modelling approach to unravel the demographic response of Atlantic salmon populations to multiple stressors

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FROM FISHERIES RESEARCH TO MANAGEMENT:  
THINK AND ACT LOCALLY AND GLOBALLY

QUÉBEC  
2014



144<sup>e</sup> RÉUNION ANNUELLE, 17 au 21 AOÛT  
ANNUAL MEETING, AUGUST 17-21 2014



AMERICAN FISHERIES SOCIETY

## Th-2104B-5

### A Bayesian Hierarchical Modelling Approach to Unravel the Demographic Response of Atlantic Salmon Populations to Multiple Stressors

Thursday, August 21, 2014: 9:40 AM

2104B (Centre des congrès de Québec // Québec City Convention Centre)

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Integrated life cycle models are key tools for an ecosystem approach to fish population dynamics and stock assessment. They allow analysing ecological processes underlying the spatio-temporal variability of different life stages, together with the integration of multiple interacting sources of environmental and anthropogenic stressors along the life cycle.

We developed a life cycle model for Atlantic salmon. The model captures the population dynamics of eight stocks of the eastern Atlantic Ocean over the past 42 years. The Bayesian Hierarchical Modelling structure provides a tool for separating out signals at different temporal (e.g., year, decades) and spatial (e.g., specific or shared by all the 8 stocks) scales in demographic traits. It improves the capability to identify responses to key influential stressors associated with different scales.

Results show that the survival during the first months at sea and the proportion of salmon returning to freshwater after one year at sea exhibit common trends shared, supporting a response to broad scale ecosystem changes. The survival has decreased over the time series and supports the hypothesis of a synchronous collapse of marine survival with ecosystem changes observed in the North Atlantic in the early 1990s. Simultaneously, the proportion of early maturing salmon has increased.

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#### Meeting Information

**When:**

August 17 - 21, 2014

**Where:**

Québec City, Canada