



**HAL**  
open science

## Identifying wild vs stocking components in fish recruitment despite the absence of identification data: an application to Atlantic salmon 0+ juveniles

Etienne Prévost, G.J.R. Dauphin

### ► To cite this version:

Etienne Prévost, G.J.R. Dauphin. Identifying wild vs stocking components in fish recruitment despite the absence of identification data: an application to Atlantic salmon 0+ juveniles. 144. Annual Meeting of the American Fisheries Society, Aug 2014, Québec, Canada. 616 p. hal-02739978

**HAL Id: hal-02739978**

**<https://hal.inrae.fr/hal-02739978>**

Submitted on 2 Jun 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

indicating that other environmental predictors should be explored and recovery actions will likely be focused on other threats

#### W-302B-12 Re-Evaluating Stock Recruitment Relationship for Atlantic Salmon in Quebec

Mélanie Dionne, Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs du Québec and Guillaume Dauphin\*, Fisheries and Oceans, GuillaumeDauphin@dfo-mpogcca

Since the early 2000s, management of Atlantic salmon in the Québec province has been based on biological reference points obtained from individual stock-recruitment relationships. Models were built using a frequentist approach and using abundance data from six index rivers between 1972 and 1990. A single density dependence relationship was then developed for each river and conservation limits were defined as  $S_{opt75\%}$ : the number of spawners necessary for an optimal sustainable exploitation, with 75% probability. In this study, we incorporate 6 additional index rivers from Québec as well as an additional 15 cohorts. Using these 12 index rivers with dataset covering the 1972 to 2005 time period, a hierarchical Bayesian model was developed to obtain updated stock recruitment relationships. The new model also incorporates some environmental covariables which are related to the stock recruitment parameters. By doing so we are then able to estimate stock recruitment parameters for data-poor rivers across the province for which only environmental information is available.

#### W-302B-13 Identifying Wild Vs Stocking Components in Fish Recruitment Despite the Absence of Identification Data: An Application to Atlantic Salmon 0+ Juveniles

Etienne Prévost, INRA and Guillaume Dauphin\*, Fisheries and Oceans

Over the last decades, exploited fish populations have been declining significantly due to environmental changes, overexploitation and human activities. This has been reflected in the decline or collapse of numerous stocks. Alongside with fisheries regulations and habitat restoration, stock enhancement is a recurrent management tool used to inverse these trends. These enhancement programs are costly so measuring their impact is key although they are often poorly monitored.

During the course of an enhancement programme, stocking intensity may have been varied, intentionally or not, according to spatio-temporal units, wild production fluctuates in space and time too. The objective of this study is to propose an approach which takes advantage of these spatio-temporal variations of stocking vs wild recruitment for estimating their relative contribution from abundance data when no identification of the wild and stocked fish are available. We use Bayesian hierarchical modelling as a template for taking into account the spatio-temporal structure, while explicitly acknowledging that the abundance data issue from a mixture of fish of wild and hatchery origins. We illustrate our approach by means of a case study on 0+ juvenile of Atlantic salmon (*Salmo salar*) densities in the Allier catchment, France.

Not unlike similar stock enhancement projects in salmonids, the Allier stocking program lacks identification data for monitoring the fish that are released in the catchment separately from their wild counterparts. However, abundance data are available at the 0+ juvenile stage in early fall. A Bayesian hierarchical model was developed for estimating 0+ juvenile densities at two spatial scales over the 37 years of the study period, while assessing the relative contribution of wild reproduction, stocked eggs and stocked 0+ juvenile to the total 0+ juvenile production was evaluated.