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

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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

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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 Sopt75%: 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 incorporate 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

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Over the last decades, exploited fish population 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