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# Revisiting conservation limits for Atlantic salmon : a new risk based definition

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## Abstract

The North Atlantic Salmon Conservation Organisation recommends a fixed escapement strategy for population management, including freshwater fisheries regulation. It is based on a benchmark reference point, i.e. a conservation limit (CL), defined as the spawning stock size that maximizes the long term average of potential catch. This widely applied international recommendation implicitly considers that ensuring conservation is equivalent to maximizing exploitation potential. Although these two management objectives are not necessarily incompatible, they must be separated and prioritized because maximizing catches can be conflicting with conservation. We propose a new CL definition based on the premise that conservation should aim at avoiding, i.e. controlling the risk of, low recruitment. We demonstrate the applications of this definition by means of a case study on the salmon populations (18) of Brittany (France). For each population, the CL is derived from river-specific stock-recruitment (SR) relationships, relating the number of eggs produced by pre-spawning females (stock) to the abundance of the resulting young-of-the-year juveniles (recruitment). A hierarchical SR model, based on a Beverton-Holt type relationship with a mixture of lognormal process errors, is used for the joint analysis of all populations. Relying on the Bayesian framework for statistical inference, the risk associated to the CLs fully integrates the major sources of uncertainty: recruitment stochasticity, measurement errors of the stock and the recruitment, estimation of the SR relationship.

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