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Can Conservation Stocking Enhance Juvenile Emigrant Production in Wild Atlantic Salmon?

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Abstract

Conservation stocking is frequently used by fishery managers to stabilize or increase production of depleted fish stocks. However, in the case of salmonids the benefits are increasingly questioned and generally poorly quantified. We investigated the effects of ova stocking on freshwater emigrant production in a declining Scottish population of “spring” Atlantic Salmon *Salmo salar*. The stocking program was designed to minimize risks, maximize expected benefits, and bypass population bottlenecks between the ova and fry stages. Long-term data (33 cohorts over 42 years, including 8 years of stocking) on numbers of ova and juvenile emigrant production were used to investigate whether the ova–emigrant stock–recruitment relationship differed between conditions of natural spawning and stocking. We considered Ricker and Beverton–Holt models that included terms for the effects of stocking, intercohort competition, and changes in trap efficiency on emigrant production. The “best model” was considered to be that with the lowest corrected Akaike information criterion (AIC_c). The strength of evidence for competing models was provided by smooth AIC_c weights. There was strong support for intercohort competition whereby large cohorts reduced survival rates of subsequent cohorts. There was little support for a stocking effect, and the best model did not include stocking. Changes in juvenile emigrant production could have been detected with 80% power if those changes had increased by an average of around 24% over the eight stocked years, indicating relatively high power to detect stocking effects. Although focused on a particular river system and set of ova stocking protocols, this study suggests that stocking fails to increase Atlantic Salmon production where wild fish populations and suitable habitat remain.

Fisheries enhancement is often seen as a useful tool in the management of marine (Leber 2013; Lorenzen et al. 2013), diadromous (Morita et al. 2006; Naish et al. 2008; Paquet et al. 2011), and freshwater fish species. Enhancement can

take a wide variety of forms with a similarly broad range of objectives, from the delivery of improved commercial catches (Morita et al. 2006; Lorenzen et al. 2013) to the conservation of local fish stocks. In recent years adjustments have been

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