

Science for Environment Policy

Can managed introductions boost threatened populations?

Supplementing declining salmon populations with fish from other, genetically distinct populations may not be the best method of conservation, according to a recent study. The researchers found that for certain salmon populations in France such introductions resulted in offspring with lower body weight and length, possibly worsening their decline.

Some previous studies have found that translocating animals from one population to another can lead to 'hybrid vigour', as increased genetic diversity gives the offspring an enhanced ability to survive and reproduce. Conversely, in some cases, introducing new individuals can instead lead to 'outbreeding depression', where the offspring suffer lower survival or reproduction. This effect is more likely if the two populations are more genetically different. An extreme example of this is the offspring of the horse and a donkey, the mule, which is completely unable to reproduce.

To study the effects of translocations on both the genetic make-up and physical traits of individuals within a small population, researchers studied a wild population of Atlantic salmon in the Sélune River, France, over 21 years. Between 1989 and 1997, juveniles bred from adult salmon from two genetically distinct populations in the Aulne and Gave d'Oloron rivers were introduced to Sélune to boost the salmon population to support the local recreational fishing industry. While supplementation with Aulne fish occurred on yearly basis except for 1995 during this period, fish from the Gave d'Oloron river were only used once in 1996.

In particular, the researchers were interested in changes to the physical and behavioural characteristics and to the degree of hybridisation over the course of the study period. To examine this, the researchers used weights and sizes of 907 salmon, caught by anglers between 1989 and 2009. Scale samples allowed the researchers to conduct a genetic analysis to examine whether interbreeding between local and supplemented fish led to a change in the genetic signature of the population. They found that the yearly release of Aulne fish in the Sélune led to a rapid change which persisted long after the end of the supplementation. In addition, genetic mixing from the Gave fish was also detected even though they were used only once.

The genetic markers also allowed the researchers to sort the salmon into four groups: one with the local genetic signature, one corresponding to each of the source populations and a group containing 'hybrid' fish, i.e. those with parents from two different source populations. This revealed their different physical and behavioural characteristics.

For instance, fish with Aulne genetic background contained fewer fish that had spent multiple winters at sea, whereas the Gave group contained significantly more. Aulne fish that had spent only a single winter at sea also had smaller body weight and length than Sélune fish, at least during the first decade of the study period. Physical differences in body weight and length disappeared during the second half of the study period, possibly due to adaptation to local conditions.

Notably, the researchers also found that out of the fish that spent multiple winters at sea, the hybrids were smaller than the non-hybrids. This pattern suggests outbreeding depression, which could further contribute to population decline. These results contrast with the view that translocations mainly bring positive genetic effects to endangered populations and suggest that translocations of individuals should be cautiously considered and the consequences monitored in the long term.



25 June 2015
Issue 418

[Subscribe](#) to free
weekly News Alert

Source: Cam, S., Perrier, C., Besnard, A-L., Bernatchez, L., & Evanno, G. (2015). Genetic and phenotypic changes in an Atlantic salmon population supplemented with non-local individuals: a longitudinal study over 21 years. *Proceedings of the Royal Society B*. 282: 20142765. DOI: 10.1098/rspb.2014.2765.

Contact:
sablecam15@gmail.com

Read more about:
[Biodiversity](#), [Water](#)

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "[Science for Environment Policy](#)": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.