Salmon are recolonising newly reconnected zones in the rivers of the Adour basin

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Researchers from INRA, Laval University in Quebec, CIRAD and the Université de Pau et des Pays de l'Adour have studied the impact of constructing passes that allow salmon to cross hydroelectric dams and recolonise newly reconnected zones in the Adour basin. Using population genetics tools, they have shown that the sources of this recolonisation are very probably the sectors downstream of these passes and that little genetic diversity is lost during recolonisation of the newly available zones. These results suggest a strong potential for the evolution of these newly formed populations.

Restoration of the free circulation of migrating fish

Restoring and maintaining the connectivity of aquatic habitats are major concerns in rivers affected by the construction of numerous hydroelectric dams. Indeed, migrating species such as the Atlantic salmon - which are born in a river, migrate to the sea to grow and then move back up the river to reproduce - are threatened in particular by the presence of constructions that prevent their free circulation. Several methods can restore this good circulation, such as the dismantling of dams or the construction of passes that allow fish to travel through them. Installations of this type have been introduced during recent decades at several dams in the Adour basin. As a result, salmon have been able to return to, and reproduce in, both previously colonised and newly reconnected zones.

Genetics to monitor the recolonisation of migrating fish

The scientists used genetic markers to determine the origins of individuals recolonising newly reconnected zones. They collected fragments of gills from nearly 1000 young salmon at different points downstream and upstream of recently built dams, in order to analyse their DNA. The results showed that salmon from the Nive, Nivelle and Gaves rivers were genetically different. Based on these findings, the researchers were able to show that the salmon which were spontaneously recolonising recently reconnected zones in the Adour basin very probably originated from relatively local areas situated immediately downstream of the obstacles.

Sustainability of the new populations

The authors of this work also observed that the level of genetic diversity among the salmon sampled upstream of the dams did not display any marked reduction by comparison with the salmon sampled downstream. These results suggest that the fish passes are not selective and are sufficiently effective to ensure that there is no artificial reduction in the genetic diversity of salmon in upstream zones. As for the sustainability of this recolonisation, maintaining a high level of genetic diversity is essential to ensuring adequate evolutionary potential within these new populations. Demographic monitoring operations are also being carried out in order to determine the productivity of the new populations and the sustainability or not of this recolonisation. Because the best zones for salmon production are found in cold and fast-running waters located upstream in the rivers, it is reasonable to assume that recolonisation of these zones following the construction of passes or the removal of dams will enable long-term restoration of the productivity of salmon populations. The findings of this study are therefore very encouraging, as

it testifies to the efficiency of adapting or dismantling certain obstacles in order to facilitate or restore the free circulation of migrating fish, which is essential to their life cycle.

More information: Perrier, C., Le Gentil, J., Ravigné, V., Gaudin, P. & Salvado, J.-C. (2014). Origins and genetic diversity among Atlantic salmon recolonizing upstream areas of a large South European river following restoration of connectivity and stocking, *Conservation Genetics*, 1–15. DOI: 10.1007/s10592-014-0602-3

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