

APPLIED ISSUES

Early effects of the strategies of creating a genetic refuge and direct translocation for conserving and restoring populations of native brown trout

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SUMMARY

1. The conservation of salmonid inter- and intra-specific diversity is a well-known challenge, and general management guidelines and conservation processes are available. However, research demonstrating the outcomes of practical conservation actions is largely lacking.

2. We monitored the spatiotemporal genetic and demographic evolution of a native Mediterranean brown trout population in a river in the French Alps to assess the efficacy and early effects of genetic refuge (i.e. cessation of stocking) and wild trout translocation strategies. We also studied the use of angling as a tool to limit the introgression of the wild standing population.

3. We found that the rate of non-native alleles in wild populations was age dependent, underpinning the importance of using age profiles in the design of genetic conservation studies.

4. Genetic refuge and direct translocation of wild trout resulted in a rapid and significant decrease in the percentages of non-native alleles. Moreover, the genetic refuge strategy resulted in a significant reduction in the number of pure non-native individuals, without changing trout densities, whilst direct translocations resulted in the establishment of dense, self-sustaining native trout populations. Direct translocations changed the distribution of genotype categories and increased densities up to 55-fold in 3 years. Our results also showed that angling resulted in a selective pressure on non-native trout introduced at fry stage, whereas non-native trout issued from natural recruitment were not affected.

5. Our study provides insights for improving the efficacy of practical conservation policies and can be used in other native freshwater fish conservation plans. Proactive measures such as direct translocation need to be implemented together with passive approaches such as genetic refuge policies. Before implementing such actions, accurate genetic and demographic studies at small geographical scales are essential to ensure that no self-sustaining population of non-native fish is present. To obtain rapid colonisation, we recommend introducing fish along whole river sections rather than concentrating on a few river stretches. Angling pressure can be used as an additional tool to improve restoration.

Keywords: brown trout, conservation in practice, genetic refuge, native salmonids, translocation