



Captive breeding unhelpful for fish conservation

Breeding fish in captivity, using wild fish parents, is a widely used management practice that aims to restore wild populations of endangered species. A study has shown that fish populations bred using this approach have less genetic variation than wild fish populations. Furthermore, fish bred in captivity may be less well adapted to survival in the wild and exhibit more aggressive behaviour.

Breeding endangered species in captivity is a widely used strategy to boost population numbers. One such endangered species is the Atlantic Salmon (*Salmo salar*). Atlantic Salmon spend their juvenile phase in freshwater rivers before migrating out to sea, where they feed and grow. Their life cycle is completed when they return to the freshwater rivers of their youth to deposit eggs. Salmon population numbers are decreasing, with over-fishing and pollution cited as possible causes of the decline.

Captive breeding programmes have been introduced to restore population numbers. 'Supportive breeding' is an approach to captive breeding which uses wild parents and returns offspring into the wild at an early stage of development. This approach is an alternative to more traditional approaches which use captive-bred parents and return fish to the wild at a later stage of development. The main concern with captive breeding programmes is that the fish produced have different genetic, physiological and behavioural characteristics than wild populations; this can cause difficulties when attempting to preserve wild populations. Conservationists hoped that supportive breeding would overcome this problem.

A new study has compared genetic and physical characteristics of wild salmon, with those bred in a supportive breeding programme. The findings suggest that the 'supportive' approach did not maintain diversity at the genotype level, despite the use of wild parents. A limited gene pool restricts a species' chance of survival against threats such as disease. In addition, offspring produced using this approach may be less adapted for swimming in open water as their bodies were generally smaller, with shorter fins.

Despite being bred in captivity for only a short time, juvenile fish released from the programme had altered behaviour patterns. When faced with wild salmon or other fish species (in this case, the rainbow trout), captive-bred fish displayed more aggressive behaviours. Overtly aggressive behaviour may make these fish more conspicuous and prone to attack from other fish predators. This has been observed in other studies and suggests that captive-bred fish are not suitable for release in the wild, even if they are only in captivity for a short time.

In their current form, breeding programmes do not ensure preservation of the genetic diversity of wild populations, even when 'supportive' methods are used. To improve these programmes, future work should focus on gaining a more complete understanding of wild salmon genetics. In addition, frequently refreshing the wild parents brought into the supportive programme could help maintain genetic diversity levels. This in turn could produce beneficial traits in offspring that could increase survival and prevent extinction.

Source: Blanchet, S., Paez, D.J., Bernatchez, L., Dodson, J.J. (2008). An integrated comparison of captive-bred and wild Atlantic salmon (*Salmo salar*): Implications for supportive breeding programs. *Biological Conservation*. 141: 1989-1999.

Contact: blanchet@cict.fr

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