

A smarter, fitter fish

by Daan Mes

Atlantic salmon were once found in all major rivers along the European Atlantic coast but in the past 200 years, salmon populations have declined greatly due to dam construction, overfishing, pollution and destruction of spawning habitat. After a huge population collapse in the late 19th century, salmon in Europe have faced another 65% decline since the 1970s.

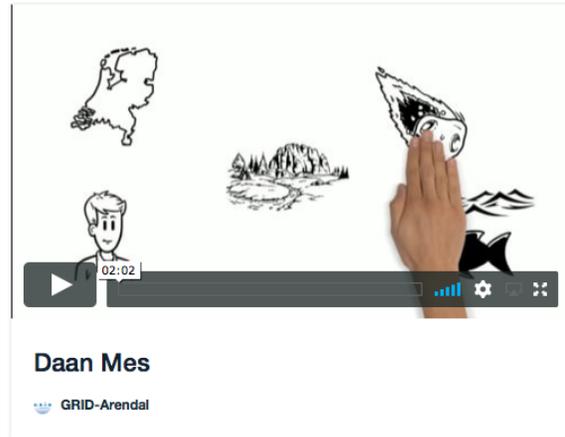
Some of the healthiest wild Atlantic salmon populations in the world are now found in Norway. But even there, the number of salmon has dwindled by more than half since 1983 and the majority of surviving populations are in bad shape. To ensure the survival of these threatened wild salmon populations, millions of hatchery-reared young salmon are released or “stocked” in Norwegian rivers every year. This is done by collecting wild parents from local rivers, fertilizing their eggs and rearing the young fish in hatcheries. The young salmon are then released into the rivers to boost local salmon stocks.

The advantage of stocking as a fish management strategy is that the young salmon are protected from predation and starvation at their most vulnerable phase. Therefore, more eggs will successfully grow into young salmon compared to when eggs are naturally fertilized in a river. However, when fish are reared in the safety of a hatchery, they do not adequately learn how to fend for themselves after release into the wild and they struggle to avoid predators and find food once they are in the rivers.

For example, hatcheries provide the fish with pelleted feed which differs in shape, size and movement from the bugs and flies that the juvenile salmon would naturally eat in the river. After release, hatchery-reared salmon are often observed with empty stomachs or with stomachs filled with small rocks which have a similar size as the pellets that are being fed in hatcheries. As a result, stocked fish generally have much lower survival rates than their wild counterparts.

This is where my PhD research comes in. I have considerable ethical and financial concerns when it comes to producing millions of fish every year, knowing that they have a reduced chance to survive after release compared to their truly wild counterparts. Therefore, I investigate innovative ways to rear a smarter, fitter fish that can contribute optimally to successful restocking programs. One strategy that I use is rearing fish in “enriched environments”: fish tanks that contain structures such as stones and plants that the fish will also encounter in the wild. After a period in these enriched tanks, I compared the fish’s brain development, feeding behaviour and post-release survival to that of fish that were reared in conventional hatchery tanks. We found that fish reared in the enriched environment have a 50% higher survival rate in the wild compared to fish reared in traditional hatchery conditions, demonstrating that the rearing environment plays an important role in preparing fish for life in the wild.

As fish enthusiasts, scientists and conservationists we are responsible for preserving healthy salmon populations for generations to come. When we use stocking as a conservation strategy, it is important to find a balance between producing a sufficient quantity of fish while ensuring that these fish are of good quality for stocking programs. My goal is to shed more light on how to balance this trade-off and to help produce fit fish that can ensure the future existence of wild Atlantic salmon in Europe.



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