Fertilizers boost declining B.C. fish populations

Fry grow up to 95-per-cent bigger in streams treated with nutrients, fisheries biologists say

By RANDY SHORE, Vancouver SunFebruary 14, 2011

Young steelhead and salmon grew dramatically in streams seeded with sacks of slow-release fertilizer, a method that shows real promise to help rebuild collapsed spawning populations, according to B.C. biologists.

Photograph by: Ric Ernst, PNG files

VANCOUVER - Young steelhead and salmon grew dramatically in streams seeded with sacks of slow-release fertilizer, a method that shows real promise to help rebuild collapsed spawning populations, according to B.C. biologists.

The method has proven effective at improving steelhead growth and survival in Vancouver Island streams in programs dating back to 1989.

Steelhead fry in treated areas are typically about 95-per-cent larger than those in untreated streams, while coho fry are about 40-per-cent bigger. Fish counts in the Keogh River found a 50-per-cent increase in the number of coho that survived the freshwater stage of life.

Fisheries biologists are using fertilizers to replace the nutrients that would be added to the stream naturally by the rotting carcasses of fish that die after spawning, said Kevin Pellett of the B.C. Conservation Foundation. Enhancement programs are operating in 15 watersheds and 28 rivers on the Island and southwestern B.C.

When spawners fail to return, die and rot due to overfishing or ecological conditions, the entire food chain of the stream, from algae and insects to fish fry, goes into decline.

The fertilizers are designed to stimulate growth of certain algaes that in turn cause the populations of insects such as mayfly and stonefly to thrive. Juvenile salmon and steelhead fry feed on those insects.

“When you fertilize a stream it really stimulates algae growth,” said Pellett. “It’s the brown slime that we are really after because the key insects prefer the brown diatomaceous algae.”

Steelhead fry growing downstream from the fertilizer caches are bigger and typically 75- to 250-per-cent heavier than those upstream, which would not be expected to benefit from the improved food supply, according to the most recent data. Larger, more robust fish are more likely to survive and return as spawning adults.

“When those fish go into key overwintering periods, that’s where you see a lot of mortality,” Pellett said.

“The bigger those fish are, the more of them will survive.”

The first application of fertilizer is timed to benefit the tiny steelhead and coho fry that hatch and emerge from the stream bed gravel in the early spring.

Since the first stream enhancement programs started in 1989, a variety of fertilizers and delivery systems have been employed, including liquid fertilizers and fish meal.

“We’ve since switched to a new product called Crystal Green,” he said.

Crystal Green is a slow-release agricultural fertilizer comprised of nitrogen and phosphate recovered from municipal waste water using a technology invented by civil engineers at the University of B.C. The Vancouver-based manufacturer, Ostara, is

harvesting a waste material called struvite for the fertilizer from the sewage stream in suburban Portland.

“This is not a panacea, but it is a good tool to increase productivity and it may increase the rate of rebuilding [spawning populations] if we see an increase in the ocean survival,” according to Greg Wilson of the Ministry of Natural Resource Operations.

“[Struvite] is one of the most cost-effective techniques that we have to help out populations,” said Wilson. “Using recycled phosphorus really reduces the carbon footprint of the project, because fertilizer is quite energy intensive to make.”

Testing on Crystal Green showed the material is extraordinarily pure with few measurable contaminants or metals.

“It’s the cleanest fertilizer we’ve ever worked with,” said Wilson.

Metro Vancouver is running a pilot project at the Lulu Island sewage treatment facility to produce its own version of the fertilizer to be used in the Seymour River, Wilson said.

Crystal Green Pellets are dropped into the stream in burlap sacks, which decay over time. That simple system eliminates the need for expensive liquid fertilizer delivery systems that require maintenance and that are prone to vandalism.

The concept of fertilizing fish habitat dates back thousands of years to China, where carp ponds were fertilized with human feces, Wilson explained.

More recently, the federal and provincial governments have partnered with conservation organizations since the 1990s to fertilize a number of lakes in B.C. with the aim of improving trout and kokanee salmon populations.

Nutrient additions to the Allouette Reservoir in 1999 generated a 12-fold increase in the resident kokanee population and sparked the first adult sockeye returns to the reservoir since 1928, he said.

That unexpected result gives fisheries biologists hope that this approach could help B.C.’s collapsed salmon spawning populations recover enough to become self-sufficient again.

Steelhead and coho in the test streams benefit from two seasons of enhanced growth, the first as tiny fry and the second as a smolt ready to begin its adult life.

Pellett says hatchery data show that the larger salmon smolts are when they leave freshwater for salt water, the more adult spawners return. Fertilizer-based enhancement programs are sending bigger smolts to sea and more smolts overall.

“The more smolts we send out the more adults we get back,” he said.

As spawning populations grow, the rotting carcasses of dead spawners are expected to regain their position as the natural source of elemental nutrients in spawning streams.

“We are starting to see critical mass developing in the steelhead and coho populations on Vancouver Island,” Pellett said.

The Vancouver Island fertilizer enhancement programs are run by the B.C. Conservation Foundation with support from the province, Living Rivers — Georgia Basin Vancouver Island, Habitat Conservation Trust Foundation and a handful of other conservation organizations.

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