Wild salmon discovery

FALL CREEK, Ore. (AP) — The forest is cloaked in mist, a chilling gray that drifts through the mossy tangle of limbs. It is barely dawn, but Ronald Yechout is wide awake, recounting the day he stumbled across the Fall Creek salmon massacre.

"Here," says Yechout, striding across a narrow bridge. One day in November 1998, Yechout stopped at Fall Creek while elk-hunting to admire the annual return of coho salmon from the ocean. "The river was full of fish, absolutely crawling with them," he says.

Yechout (pronounced YEK-it) was delighted. But then he heard thunks and thwacks coming from the nearby fish hatchery. Walking over, he found hatchery workers with baseball bats, clubbing thousands of salmon to death.

What's going on? he asked.

The answer puzzled him, then outraged him, then launched him on a crusade that, three years later, has helped throw the Northwest's salmon-recovery effort into turmoil.

Along this creek in the Oregon woods, scientists tried to create a salmon that equaled the wild fish made by nature — and then, deciding they had failed, they set about erasing their mistake with bats.

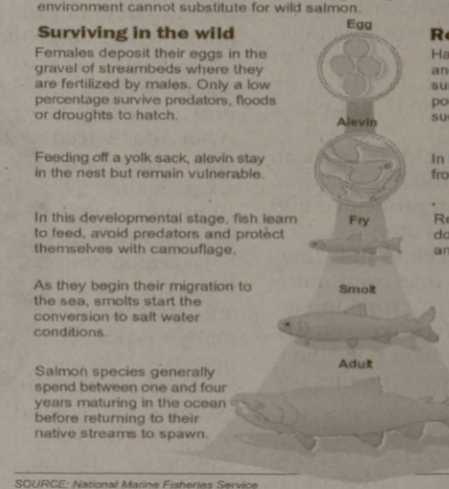
Killing salmon to protect salmon? Yechout, standing by a creek now bereft of fish, thinks there is no way to save a species.

In the 1800s, when industrial society arrived in the Pacific Northwest, the salmon began to disappear. Traps and nets intercepted millions of fish. Dams blocked rivers. Log drives scoured streambeds clean of fish eggs.

Nobody wished ill for the fish. The five species of Pacific salmon and their cousin, the steelhead, were a vital part of the economy.

Two paths to salmon survival

Hatcheries have helped stabilize the salmon population and account for about 25 percent of all young salmon entering the North Pacific. But biologists agree that fish produced in the controlled hatchery environment cannot substitute for wild salmon.



Surviving in the wild

Females deposit their eggs in the gravel of streambeds where they are fertilized by males. Only a low percentage survive predators, floods or droughts to hatch.

Feeding off a yolk sack, alevin stay in the nest but remain vulnerable.

In this developmental stage, fish learn to feed, avoid predators and protect themselves with camouflage.

As they begin their migration to the sea, smolts start the conversion to salt water conditions.

Salmon species generally spend between one and four years maturing in the ocean before returning to their native streams to spawn.

Reared in hatcheries

Hatchery workers harvest and unite eggs and sperm from selected fish. Yields and survival rates are often higher, but the gene pool is smaller, with a smaller range of traits such as homing instinct or disease resistance.

In the hatchery, alevin thrive without threat from predators and environmental variables.

Responding to both genetics and domestication, fry rise to the surface anticipating food when they see a human.

Release usually occurs at this stage. Unlike wild fish, hatchery fish tend not to stagger their migrations. Thus the group is more vulnerable to environmental threats.

Hatchery salmon are not yet self-sustaining. In one study, for every 100 fish of wild parents, only 16 were produced by the same number of hatchery fish spawning in streams.

SOURCE: National Marine Fisheries Service

GMOs

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incorporated into the plant are injected into Agrobacterium, which is then added to plant tissue. Then the Agrobacterium integrates the genes into the DNA of the plant.

The gene gun method is not as commonly used. A very small particle of gold is coated with the beneficial genes. Then the particles are blasted into plant tissue, where some attach to plant DNA and eventually fuse.

Private companies have spent billions of dollars developing these biotechnologies. Rathore said these companies own the rights to these seeds, which means farmers can only use genetically modified seeds for one season; they must buy new seed every year. This poses a problem for poorer countries that cannot afford the new technology.

But much research is being done to help developing countries. At A&M, research using traditional plant breeding methods and genetic modification of crops is being carried out to benefit places like Sub-Saharan Africa, India and Pakistan. Students from other countries are taking knowledge from A&M back to their home countries.

Rathore said a project in Switzerland to genetically modify rice has the potential to greatly benefit millions of people. Swiss researchers modified genes in rice to increase levels of beta-carotene, which produces vitamin A.

With the rise of biotechnology and genetically modified crops, some question whether traditional methods to improve crop yields will sustain.

"Traditional methods still have a big role and will continue to play a role. Biotechnology will never replace them," Rathore said.

In fact, Norman Borlaug, the father of the Green Revolution and recipient of the Nobel Peace Prize in 1970 for his efforts to improve agriculture in India and Pakistan, is a strong supporter for biotechnology. Much of Borlaug's contributions have included plant-breeding methods to produce drought-resistant wheat.

Researchers continue to improve agriculture through biotechnology and traditional plant breeding methods on the hope that all people will benefit.

Stelly said nature is full of good things that have not been harnessed, and biotechnology has much to offer. Rathore said consumers who are educated and told about the benefits would not be afraid of the technology.

Stelly said he once heard at a biotechnology conference that "the person who has food on their plate has many problems. The person who has no food on their plate has only one problem."