

Kelt Reconditioning

○ Tribal efforts to increase wild steelhead populations

▲ MICHAEL HAMILTON

AT THE TURN of the 20th century, huge numbers of wild steelhead returned from the sea to spawn in tributaries of the Columbia and Snake rivers. But current populations of wild steelhead, *Oncorhynchus mykiss*, have dwindled to a fraction of their historic levels. Today several runs of steelhead in the Columbia River Basin are threatened, and listed for protection under the 1973 Endangered Species Act (ESA).

Causes for these declines include a host of environmental and human-induced factors. Federal dams were built for flood control and irrigation. Stocks were overharvested. Access to spawning tributaries has been blocked. Clear-cutting caused soil erosion. Towns and settlements were built atop gravel beds where steelhead had laid their eggs for millennia. In truth, historic steelhead migrations have long since been consigned to history books, and live on only in the oral traditions of local Native American tribes. However, sometimes history has a way of informing the future before a species reaches its tipping point and vanishes.

► The Yakama Nation captures post-spawn wild steelhead and keeps them in yurt-shaped holding tanks while they recover and gain weight for next year's spawning cycle.

Photo | Michael Hamilton



Men in “Kelts”

Outside the Yakama Nation Fish Hatchery in Prosser, Washington, Joe Blodgett stands ready over a table filled with syringes, glass test tubes, forceps, and measuring tape that best resembles a field triage station.

“Kelt is the term biologists use to describe a post-spawned steelhead,” says the fish biologist and hatchery manager. “Steelhead are iteroparous. This means they can spawn repeatedly, one, two, or even three times.” An hour before, several adult steelhead were captured at the hatchery after they spawned upstream in the Yakima River, a tributary of the Columbia River. Time is critical. “Let’s go. Bring me the first fish,” shouts Blodgett.

Since 1999, the Columbia River Inter-Tribal Fish Commission (CRITFC) that consists of the Yakama and Colville tribes in Washington State, the Nez Perce in Idaho, and the Warm Springs Tribe in Oregon, have collaborated on strategies to bolster repeat spawning kelts in the lower Columbia River in order to increase wild steelhead survival.

The Yakamas were first to begin kelt reconditioning in 2000. Today, not many kelts are left in the Columbia. It is estimated that only about 2 percent of Columbia River steelhead successfully spawn twice. Of the millions that embark on the outward migration every year, only a few thousand ever make it back to ensure that the species survives another cycle.

Blodgett says that the kelt reconditioning program is trying to capitalize on the steelhead’s inherent iteroparity. “We capture kelts in the spring. They float downstream like giant smolts from their spawning redds. We intercept them at the hatchery and select the strongest for reconditioning.”

Often kelts arrive exhausted, bruised, and battered from spawning. Without intervention, almost all of them will die, says Blodgett, and not survive their long migration to the sea, let alone a return trip back up the Columbia.

“There’s probably no way they have the energy to navigate over eight dams on the Columbia to get home,” says Blodgett. “So we remove them from the river and select the healthy ones for reconditioning. We want to give these fish another chance to spawn naturally.”



Photo: Michael Hamilton

▶ **After spawning**, steelhead are weak, and most do not survive the downstream trip to the ocean, let alone a second upstream spawning migration.

Apprehension builds as an assistant prepares to gently net one of the captured kelts from a portable holding cart and place the fish on the table in front of Blodgett. Too late, Blodgett warns, “Watch out for the splash!”

Everyone laughs as the adult steelhead sends a spray that drenches the assistant. Tensions ease. Moving quickly over the fish like an ER doc would examine a patient, Blodgett calls out length and weight. He scans for a PIT tag, and inserts a new one if needed. Takes a scale sample. Injects the fish with an antibiotic. Inspects the gills for parasitic copepods. All in less than 90 seconds. Pausing in between inspecting each fish, Blodgett explains the importance of PIT tags.

PIT stands for passive integrated transponder. It is a harmless implant into the fish. It’s about the size of a grain of rice, and can store up to 34 billion different codes.

The tag also has a tiny antenna that allows researchers to collect its coded information with a data scanner from a distance of 2 feet.

Fish implanted with PIT tags can be monitored easily and repeatedly when they migrate downstream and when they return to spawn because all of the dams on the Columbia and Snake rivers have PIT tag scanners on the fish ladders that can identify a specific fish, smolt, or adult. “The PIT tags are like your Social Security number,” says Blodgett. “It’s a 14-digit code. We can track fish as they move downstream and estimate the size of runs, for both steelhead and salmon, as they return.”

After each analysis, the kelts are carefully deposited into one of four large tanks that resemble circular covered yurts. The adults live in 57-

degree, freshly circulated well water. They are closely examined and treated for disease, and monitored for growth and gonad development. They are fed a three-stage diet beginning with krill, then krill and pellets, and finally only pellets about five weeks before their fall release. After six to eight months of reconditioning, the kelts are released into the Yakima River coincident with the peak of upstream pre-spawn steelhead migration. Blodgett says that kelts in good condition, and those with bright coloration at the time of collection, are more likely to survive after reconditioning.

“When we release them they are bright, strong, healthy fish. They look like they are fresh from the salt,” he says. “There is simply no downside and no risk to kelt reconditioning. We give these fish another shot at spawning naturally, with the goal of increasing the survival and potential repeat spawning rates of wild steelhead.”

Steelhead populations in the Yakima River may well be responding to kelt reconditioning. Wild steelhead counts at Prosser Dam have exceeded 6,000 fish every year since 2009. This compares to an annual average of fewer than 2,000 fish from 1983 to 2008.

From 2001 to 2011 a total of 9,738 kelts migrating downstream were captured at the Prosser hatchery. On average, according to Bill Bosch, senior data analyst for the Yakama Nation, this represented about 27 percent of each annual wild steelhead return. “Annual survival to release ranged from 2 to 62 percent and averaged 38 percent over the course of the study, with surviving

Photo | Michael Hamilton



➤ **Reconditioned wild steelhead** are released back into the river bright and healthy for repeat attempts at spawning.

reconditioned kelts showing increases in fork length, weight, and Fulton's K condition factor."

Another Model

The Yakama Nation's success has led the Nez Perce Tribe in Idaho to start a similar kelt reconditioning program. "We have two models," says Scott Everett, manager of the Nez Perce Tribes Kelt Reconditioning Program. "We are working with both hatchery and wild steelhead."

Everett says the hatchery model involves collecting approximately 200 kelts annually at the Dworshak National Fish Hatchery on the Clearwater River, a major tributary of the Columbia River. The hatchery steelhead are artificially spawned by injecting low-pressure air into the abdomen of the fish to gently expel the eggs. This allows the eggs and milt (semen) to be collected and later combined.

More importantly, "air spawning," keeps the fish alive with a chance to spawn again. In the traditional artificial spawning process the eggs are surgically removed and the fish dies.

"In essence we are experimenting on a few hatchery fish to make sure we don't make costly mistakes with wild stock during kelt reconditioning. It's allowed us to move forward much more quickly," says Everett. By studying the diets of the hatchery fish as well as measuring the dosage of antibiotics administered to fight parasitic diseases, Everett says they are better able to understand how to improve kelt reconditioning techniques on wild steelhead.

The second model of the Nez Perce program closely mirrors the Yakamas'. Snake River B-run female wild steelhead are collected as they migrate through Lower Granite Dam on the Snake River. The B-run is a strain of summer steelhead that travel up the Snake River and enter the Clearwater

and Salmon rivers to spawn. Lower Granite is the most upstream dam in the Snake River system. It has a fish ladder to aid upstream migration of salmon and steelhead, and removable spillway weirs that improve passage for juvenile fish migrating downstream.

"We collect the kelts at the juvenile bypass in the spring as they head downstream toward the ocean. We look at their condition and decide if they are candidates for reconditioning," explains Everett. "We truck the kelts we keep to the Dworshak National Fish Hatchery. Like the Yakamas, we apply metabolic and reproductive endocrinology for each kelt before placing them in large circular tanks with anti-jumping curtains."

Based on an estimate of about 3,000 wild B-run adult female steelhead at Lower Granite, Everett says the tribe hopes to get an additional 200 wild B-run females to return to Lower Granite Dam. "The scale is fairly small, but we are also reconditioning hatchery B-run females, which should be available for harvest. The numbers have changed a bit since the original analysis was completed, so the 3,000 is a little off, but that is what we are working with right now." Since initiating their kelt reconditioning program in 2007, Everett says they have documented a 6 percent increase in the number of wild B-run adult steelhead returning to Lower Granite Dam.

Promising Future

It's somewhat ironic that funding to continue the kelt reconditioning program comes from the agency that manages what many claim was the major reason for the demise of wild fish runs in the Columbia River Basin: hydroelectric dams.

"We allocate approximately \$2.5 million annually that is dedicated to research, capital improvements, and

program analysis," says the Bonneville Power Administration's Kevin Wingert. The Bonneville Power Administration (BPA) is a federal nonprofit agency based in the Pacific Northwest. Although BPA is part of the U.S. Department of Energy, it is self-funding and covers its costs by selling its products and services to consumers in eight western states. BPA markets wholesale electrical power from 31 federal hydro projects on the Columbia River and its tributaries that make up the Columbia River Basin. The dams are operated by the U.S. Army Corps of Engineers and Bureau of Reclamation.

BPA, along with the U.S. Army Corps of Engineers and Bureau of Reclamation, have worked together to regulate flows in the Columbia to improve downstream and upstream fish migrations over the major dams.

Wingert says that steelhead kelt reconditioning is a good example of how the BPA is striving to protect and rebuild fish and wildlife populations affected by hydroelectric power development in the Columbia River Basin. "The portion of monies for kelt reconditioning comes from the Columbia Basin Fish Accords agreement, signed in 2008 by the BPA, U.S. Army Corps of Engineers, Bureau of Reclamation, and the four tribes."

Dr. Dave Fast, senior biologist with the Yakama Nation, who has over 35 years of field experience in wild fish recovery, says the Columbia Basin Fish Accords have resulted in improved fish passage over dams, estuary habitat restoration, and innovative programs like steelhead kelt reconditioning.

"The future looks very promising," he says. "Any contribution of wild fish we get is a plus. Given adequate collection opportunities, the empirical results we have observed demonstrate that the potential steelhead kelt reconditioning will provide recovery benefits for imperiled wild steelhead populations in the Columbia River Basin." Funding for steelhead kelt reconditioning is guaranteed through 2018. 🐟

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Michael Hamilton is a former broadcast journalist. His awards include Associated Press and United Press International Reporter of the Year. He was nominated for two television Emmy Awards, and received three Edward R. Murrow Awards for Excellence in Broadcasting. He has been writing outdoor and travel freelance articles for a decade.