RACEWAYS TO THE RESCUE

The surprising story of how FWP fish hatcheries help Montana conserve native populations and restore federally listed species.

By Paul Queneau

When it comes to antlers, local genetics can be easy to spot. Certain areas produce wide- or spindly antlered whitetail bucks, while other areas are more likely to grow bucks with narrow or heavy racks.

Genetic differences in trout species are usually not so obvious.

Matt Boyer has spent 13 years working to conserve the genetic diversity of westslope cutthroat trout in northwestern Montana, first as a Montana Fish, Wildlife & Parks fisheries biologist and now as the department's Fisheries Science Program supervisor. To the casual observer, individual westslope do not differ much in appearance. But Boyer says populations of these fish can actually be more genetically divergent from one drainage to the next than dog breeds are to one another, more distinct even than a Chihuahua is to a Labrador retriever.

In other words, looks can be deceiving.

The same can be said of Montana's hatcheries that focus on native fish conservation. On the surface they resemble concrete fish farms. Yet the work inside these unassuming facilities aims to safeguard and support the future of wild native fish populations across the state, including one imperiled species almost entirely dependent on hatcheries for its survival.

"A TROUT WAS A TROUT"

The main reason few people know how hatcheries contribute to fish conservation is because, for the first half of the 20th century, stocking in some cases actually harmed native populations. Starting in the early 20th century, employees of the Montana Department of Fish and Game, as the agency was known then, delivered by horseback milk cans filled with live fish to high mountain lakes with the aim of creating new sport fisheries. The fish came from hatcheries and were typically the breeds easiest to obtain at the time, usually non-native rainbows. "A trout was a trout in the early part of the 1900s, and the state was stocking whatever fish were available," says Boyer.

Stocked rainbows migrated into nearby streams and rivers and began interbreeding with native cutthroat trout, producing hybrid "cutt-bows" and diluting genetically pure populations. Stocked brown trout, lake trout, brook trout, and kokanee often outcompeted cutthroat and other natives already struggling from the effects of dams, stream dewatering, and pollution. In some cases the results were catastrophic. Pure westslope cutthroat are now limited to less than 10 percent of their historic range in Montana, in large part because of hybridization.

By the latter half of the 20th century, FWP started to recognize that many native fish species were in trouble, and that in many cases willy-nilly stocking was to blame. Biologists and hatchery managers gradually reassessed how they might alter fish-rearing tactics while still helping sustain sport fisheries that had become extremely popular with generations of anglers. "It really was an evolution of fishery management," says Boyer. "As we developed a greater understanding of native species and genetic adaptations and their conservation value, we developed a new appreciation."

Since the early 1980s, seven of FWP's twelve hatcheries have begun raising native species in addition to non-native fish. Rose Creek Hatchery near Bigfork and Yellowstone River Trout Hatchery near Big Timber now produce partially developed ("eyed") Arctic grayling eggs for planting in remote streamside incubators of the Big Hole and Ruby Rivers. Murray Springs Trout Hatchery near Eureka grows native redband trout for stocking in northwestern Montana streams.

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PROUD PAPA FWP fish culturist Toby Tabor shows westslope cutthroat fingerlings raised as wild source stock at the Sekokini Springs Hatchery near West Glacier. "The most satisfying part of my job is when all the fruits of our labor come to fruition," Tabor says. "You're putting out native wild westslope cutthroat trout for anglers of future generations to catch. It's good to be part of that."

The Miles City Fish Hatchery produces sauger and pallid sturgeon for eastern Montana native fish restoration projects. Plans are under way to study the feasibility of raising native burbot and western pearlshell mussels, Montana's only coldwater mussel and a state species of concern.

According to Eileen Ryce, supervisor of the FWP Hatchery Program, even hatcheries that don't produce native fish help in conservation efforts. Some have visitor centers and displays where schoolkids learn about native species. "And all hatcheries create angler opportunities that in turn generate license dollars that can be used for native fish conservation," Ryce says. "Another conservation value of our non-native hatcheries is that they create angler opportunities that lessen pressure on sensitive native populations."

FUTURE FISHERIES Fresh Yellowstone cutthroat eggs at Yellowstone River Trout Hatchery will hatch into trout for stocking in high mountain lakes in the Beartooths.

> "Our new focus is on quality rather than quantity."

MAKING HATCHERIES WILDER

Native fish don't like to be reared in hatcheries any more than bighorn sheep like to be raised in pens. "Hatcheries were originally designed for efficiency and ease of operation," says Ryce. "Now we're trying to adapt hatchery operations and rearing units to help 'wilder' fish survive better in the facilities." Hatchery crews do that by reducing stress on the fish, finding more natural diets, and moving young fish out from hatcheries as soon as possible. This work has challenged hatchery staff to think in new ways.

"Westslope cutthroat trout are by far the most difficult fish I've ever had to raise," says Mark Kornick, manager of FWP's Flathead Lake Salmon and Rose Creek Hatcheries. "They just don't tolerate hatchery situations like other species do." Kornick has spent his career working to see the world through the eyes of fish and developing new ways to keep hatchery fish as healthy and wild as possible. For example, he and other FWP hatchery managers have reduced the number of fish they put in each raceway and installed privacy covers to keep trout from panicking when a human looms overhead.

Today, state hatcheries that focus on native species raise a fraction of the fish they once produced. Having once cranked out tens of millions of trout every year, Washoe Park Trout Hatchery near Anaconda, Montana's oldest state hatchery, now provides a modest 1.5 million westslope cutthroat for stocking recreational sport fisheries and restoration projects. "You can't just throw food at westslope cutthroat and expect them to prosper," says Angela Smith, hatchery manager. "We're constantly reevaluating the way we spawn them, the way and what we feed them, how we handle them—every part of our whole program. These fish are a challenge."

One of Washoe Park's key responsibilities is managing a broodstock of pure westslope cutthroat trout using a mixture of genetics taken from 14 creeks in the Flathead and Clark Fork drainages. ("Broodstock" are adult fish that produce eggs for propagation. Some are kept in the hatchery, while others are spawned in the wild.) The strain has proved tough and adaptable, though it still requires more care to raise

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Protecting wild stocks from disease

Essential to protecting native fish populations is FWP's Fish Health Lab in Great Falls. Various viruses, bacterial kidney disease, and other maladies can weaken or even devastate wild populations. Before fish from a state hatchery can be stocked, fish health coordinator Ken Staigmiller tests a sample of fish and certifies the batch as disease-free. He also tests and certifies as disease-free wild spawner fish when eggs are collected for use in hatcheries. At least once a year, state, federal, and private hatcheries in Montana are inspected for fish pathogens.

Under Montana's strict disease regulations—meant to protect the state's renowned and valuable fisheries—when Staigmiller detects dangerous diseases or pathogens in a hatchery, the facility is immediately quarantined and the infected fish destroyed. The hatchery must be disinfected and then inspected and certified as disease-free before fish can again be stocked from the facility.

Fish health coordinator Ken Staigmiller takes tissue samples from a non-native carp.

The biggest risk in spreading disease comes from moving fish from one place to another, whether it's transporting hatchery rainbows to a kid's fishing pond or putting native westslope cutthroat into a conservation hatchery. "We do our best to reduce the risk of moving pathogens," says Staigmiller. "Whenever possible we need to test those fish to make sure we aren't putting native populations at risk." ■

TOP TO BOTTOM: CAROLYN BROWN; ERIC ROBERTS/MONTANA FWP

NATIVE NURSERIES Top: Sekokini Springs Hatchery manager Scott Relyea explains how he and his team work with FWP biologists to raise trout from eggs taken from streams containing purebred westslope cutthroat that are as geographically close as possible to the South Fork Flathead drainage lakes that FWP wants to stock. Above: At the Washoe Park Trout Hatchery, hatchery manager Angela Smith and fish culture specialist Taylor Lipscomb show how simple tank covers help protect westslope cutthroat trout from excess stress, increasing the odds that the fish will survive in the wild. Right: Fish culturist Toby Tabor and Scott Relyea ready westslope cutthroat trout for stocking.

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than domestic rainbow trout.

Kornick says that when he began raising fish, a hatchery's value was based on how many it could produce at the lowest possible cost. "Now we're measured by how many high-quality fish we produce to meet both management and conservation objectives." In the long run, that approach not only helps native populations but also saves money. "Let's say you stock 100,000 weakling trout and maybe 1,000 survive, but if you put out 50,000 healthy native fish that are genetically adapted to that environment, maybe 10,000 will survive," Kornick says. "So it costs you a little more per fish to raise those 50,000 natives, but you're getting a lot bigger return for your buck."

According to Ryce, FWP hatcheries are shifting emphasis from how well fish perform in the hatchery to how well they survive in the wild. "Our new focus is on quality rather than quantity," she says.

A LEGAL FISH INTRODUCTION Larry Timchak, president of Flathead Valley Trout Unlimited, helps FWP biologists release native westslope cutthroat trout into Smith Lake near Whitefish in early November 2015. The trout were raised at the Sekokini Springs Hatchery near West Glacier. Trout Unlimited works closely with FWP on native trout hatchery projects across western Montana.

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RESTORING THE SOUTH FORK

Robb Leary recalls the raised eyebrows he got from fellow fisheries biologists 35 years ago when he told them he was taking courses in genetics. "Genetics wasn't a part of fisheries management back then—definitely not in hatcheries or even in wild or native fish conservation," Leary says. His title is now FWP fish conservation geneticist, and his specialty has become a linchpin of native fish management.

Leary helped discover the DNA variation among westslope populations in separate drainages (remember the Chihuahua and Labrador retriever analogy?). That revelation underscored how important it was that FWP's conservation work didn't inadvertently dilute, replace, or otherwise damage native gene pools.

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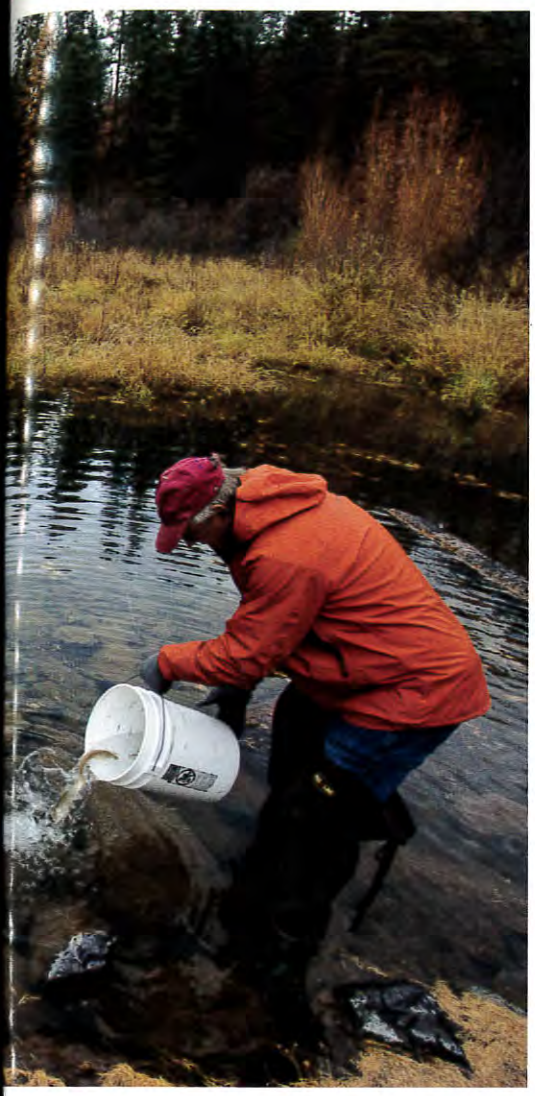
One of Montana's most important bastions for westslope cutthroat trout is the South Fork of the Flathead. Cordoned off since 1953 by Hungry Horse Dam, the river gives rise to what may be the best watershed left in the Lower 48 to protect a large, diverse network of pure westslope cutthroat trout streams. It currently hosts half of Montana's range for genetically pure and interconnected populations of the species.

Unfortunately, 21 of the high mountain lakes in the watershed were long ago planted with rainbows and Yellowstone cutthroat to provide fishing opportunities. For nearly a decade FWP crews have worked to replace those non-natives with pure-strain westslope cutthroat. The goal: to preserve the South Fork Flathead drainage as a stronghold for Montana's state fish.

The native trout are produced at Sekokini Springs Hatchery near West Glacier. Rather than use the generalist broodstock raised at Washoe Park, hatchery manager Scott Relyea and his team are working with biologists to raise trout from eggs taken from "nearest neighbor" streams. These waters contain purebred westslope cutthroat and are as geographically close as possible to the South Fork Flathead drainage lakes that FWP wants to stock. "The theory is that these trout will be better adapted to the local environment," Relyea says.

To make sure the cutthroat trout fry don't become accustomed to hatchery life, they are whisked away to the release lakes, typically by helicopter, just two months or less from the time they hatch. "We work really hard to minimize human contact and human interaction with the fish here," Relyea says. "We cover the tanks, create shaded areas, and provide a variety of flow speeds. The idea is to create conditions as similar to a real stream as we can while still being able to keep the tanks clean."

Relyea's team has recently begun a pilot study to raise a type of zooplankton that



could be a natural food for the westslope cutthroat fry while in the hatchery before the tiny fish are stocked. Currently the trout are fed commercial meal that doesn't resemble wild foods. "The idea is that when we stock them into the lake, they'll have seen zooplankton before and will know it's good to eat," Relyea says.

PREVENTING EXTINCTION

Five hundred miles southwest of Sekokini Springs, an FWP hatchery is leading an urgent effort to save one of North America's largest and rarest freshwater fish—the pallid sturgeon. The prehistoric species, which existed when T. rex roamed the region, can live 50 or more years, grow six feet long, and weigh more than 75 pounds.

Listed as endangered in 1990, Montana's estimated 150 or so remaining pallid sturgeon are confined to the lower Missouri River above and below Fort Peck Reservoir, and the lower Yellowstone River below Intake Dam downstream from Glendive. The fish can't successfully reproduce mainly because dams block upstream movement to historic spawning waters. Each year biologists capture a few remaining wild adult pallid sturgeon, transport them to FWP's Miles City Fish Hatchery and a federal hatchery in North Dakota to be stripped of eggs and milt before being returned to the wild. The sturgeon eggs are incubated and the young fish reared according to stringent propagation and genetics management guidelines that a multidisciplinary group representing state, federal, university, and tribal interests developed.

When the young fish reach three to seven inches long, biologists mark them with tags before release into the Missouri and Yellowstone Rivers. The young hatchery-reared sturgeon are surviving, but they likely won't have any better success reproducing naturally than their parents did. FWP officials have for years worked to find ways for spawning sturgeon to bypass Intake Dam and have urged the U.S. Army Corps of Engineers to adjust water flows below Fort Peck Dam to mimic natural water regimes that create better sturgeon habitat. Until those changes take place, the Miles City hatchery remains the pallid sturgeon's last hope in Montana.

Who'd have thought that the salvation of this ancient fish—not to mention wild cutthroat and other native species in watersheds across Montana—could come from facilities best known for their role in stocking large reservoirs and helping anglers fill their livewells with fat rainbow trout and walleyes?

Like I said, looks can be deceiving.

HANGING ON Above: One of Montana's roughly 150 remaining adult pallid sturgeon, an endangered species, is captured for transport to the Miles City Fish Hatchery to be stripped of eggs before release back to the wild. The eggs are incubated (above right) according to strict guidelines. Below: Once they reach three to seven inches long, the juvenile pallids are released into the Yellowstone and Missouri Rivers, where they currently are surviving but are unable to reproduce because dams block upstream passage.

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