



WHAT'S UP

DOWN THERE?

By regularly monitoring fish populations, FWP crews gather information essential for managing and conserving Montana's world-renowned sport fisheries and imperiled native species.

BY PAUL QUENEAU

While working for more than three decades as a Montana Fish, Wildlife and Parks fisheries biologist, Ladd Knotek has hiked hundreds of miles along mountain streams looking like one of the Ghostbusters.

That's because he often wears a 30-pound boxy metal backpack covered in cords, dials, switches, and amperage charts perfect for zapping slimy green things—in this case, fish. And the critters are just stunned, not killed.

Called an electrofisher, the device is one of several ways FWP crews assess fish populations across the state to guide management and help ensure the future of Montana's world-renowned trout, walleye, and other sport fisheries.

As its name implies, the electrofisher delivers a fish-stunning zap of electricity piped down a 6-foot yellow wand that biologists dip into stretches of key

ALL CHARGED UP TO SURVEY Decked out in his "Ghostbuster" outfit (actually an electrofishing unit), FWP biologist Ladd Knotek stuns trout in a tributary of Fish Creek northwest of Missoula. Crew members capture the temporarily immobilized fish for analysis before releasing them back to the water.

PHOTO BY PAUL N. QUENEAU

fish-spawning tributaries across Montana each year. “There’s really no effective way to collect the consistent juvenile fish information we need in small streams without electrofishing,” says Knotek, who is based in Missoula. “People get freaked out by the idea, but we take extreme care not to injure the fish.”

I joined him and three other crew members last August as they surveyed Fish Creek, a popular trout stream that flows into the Clark Fork River west of Missoula. After a 6-mile hike, the sampling crew members pulled on waders and then Knotek made some adjustments on the electrofishing device. The others headed 50 yards downstream, waded in, and readied their nets as Knotek lowered a metal shocking hoop at the end of the wand into the water.

Seconds later, the netters spotted a flash of silver in the current, and with one skillful scoop, a 2-inch bull trout, temporarily catatonic from the electric current, was transferred into a water-filled bucket. In minutes the crew gathered a total of two dozen tiny bull trout and westslope cutthroat trout.

BABY BULLS

The bull trout is a federally threatened species and a Montana “species of greatest conservation need.” FWP carefully monitors the spawning success of these fish in key streams to identify problems that might put the imperiled species at further risk. “Fish



Knotek’s crew added a few drops of a sedative then began identifying and measuring each specimen. Fortunately, none were non-native brook trout. Brookies swim in other Clark Fork tributaries and will readily spawn with bull trout, a close cousin. The hybrid offspring are sterile, which has harmed many populations of bull trout already stressed by heat, drought, and egg-smothering silt that washes in from growing road systems and other development.

Before returning each baby bull to the water, crew members took a tiny fin clip they later sent to FWP fish geneticist Ryan Kovach. Kovach oversees the University of Montana-based FWP Conservation Genetics Lab, which analyzes thousands of fish DNA samples for the department every year.

“I can send the lab a fin clip, and just by analyzing its DNA, Ryan can tell me with 99 percent certainty which tributary of which river it came from,” Knotek says.

“Bull trout have high site fidelity, meaning they spawn in specific tributaries. When we collect samples from juveniles like these in Fish Creek, we can later see if there is enough genetic diversity for the population to remain viable.”

Knotek is one of a long line of FWP fisheries biologists and technicians who have schlepped fish-finding gear into the mountains. Tom Weaver, a fish technician in FWP’s Kalispell office, recently retired after conducting bull trout surveys for an astonishing 44 years. “I’m not sure anyone on earth has walked as many miles to survey bull trout or counted as many bull trout

LITTLE INDICATOR A bull trout fingerling is measured as part of an FWP stream survey. The department also monitors fish populations on rivers, lakes, and reservoirs to see if numbers are rising, falling, or staying stable.

redds as Tom,” says FWP Fisheries Division chief Eileen Ryce, who recently honored Weaver with a career achievement award.

SURVEYING THE UNSEEN

The challenge of surveying fish populations, even for those as experienced as Weaver and Knotek, is that the subjects are underwater. Unlike wildlife counters who can at least see the animals they are trying to tally—no easy task itself—fish surveyors have to count a quarry that remains largely invisible.

Though backpack electrofishing units work well in small streams, biologists need larger boat-mounted versions to sample fish populations in rivers. Fisheries crews monitor the same sections of popular sport-fishing rivers like the Madison, Missouri, and Gallatin at the same time each fall and spring. Employing a technique called mark-recapture, they mark each fish that they stun and net by clipping off a tiny piece of fin. A few weeks later, they return to that same stretch, electrofish again, and count the proportion of marked fish to unmarked fish. When run through statistical models, done these days with the aid of computers, those numbers give biologists a population estimate, reported as the number of fish per mile.

ACTING WITH INFO

Without these and other surveys, says Ryce, FWP could not effectively manage and conserve the state’s fish populations. “We need to

be able to see if a population is trending down or up,” she says. “If down, then we try to figure out why. Maybe it’s due to problems with spawning tributaries, or disease, or overfishing, or just a cyclical drop. But we can’t address problems if we don’t know what’s going on.”

Information showing a population increase is equally important. “That alerts us to things like better water quality or improved spawning conditions, and then we can look into what’s driving those and other factors when we make our management decisions,” Ryce says.

Fish surveys recently provided a warning signal that brown and rainbow trout in southwestern Montana’s legendary Big Hole, Beaverhead, and Ruby rivers were in trouble. All recorded their lowest fish counts in more than 30 years of FWP monitoring.

“That was a big red flag telling us we really need to zoom in closer to see what’s driving these declines,” says Eric Roberts, chief of the FWP Fish Management Bureau.

To help unravel the mystery of what’s ailing

“Creel surveys provide a great check and balance to all the other data gathering we do.”

southwestern Montana trout populations, FWP is working with the Cooperative Fisheries Research Unit at Montana State University. Over the next several years, a trio of senior graduate students will study browns and rainbows in the rivers to try to figure out what’s killing them and how to solve the problem. Those applied solutions would then be documented in future trout population surveys so FWP biologists could see if they worked.

Some of the information the researchers will analyze will come from creel surveys, another way FWP monitors fish populations. During the surveys—named for the wicker baskets that trout anglers once carried to hold their catch—FWP fisheries technicians ask anglers at popular river launches, boat ramps, and other locations how many and what species of fish they caught, how many hours they spent fishing, and if they saw evidence

of fish disease or abnormalities.

“Creel surveys provide a great check and balance to all the other data we gather,” Roberts says. “And they really get at what we’re doing when we manage a fishery, which is to improve angling satisfaction. During our creel surveys, we hear those opinions directly from anglers.”

NETTING GOOD NEWS

Though fish population surveys can turn up bad news, many show the opposite. Just 20 miles north of the Big Hole and nestled high in the Anaconda-Pintlers, Georgetown Lake holds stocked rainbow and brook trout as well as kokanee salmon. In 2015, FWP added Gerrard rainbow trout to the mix, a strain famous for growing especially big.

Recent surveys have turned up the largest rainbows the lake has ever pro-

NET RESULTS Another fish survey tool is gillnetting, used in lakes and reservoirs. Here, surveyors untangle kokanee from nets set at Holter Reservoir. Survey teams record weight, age, and species for each net, which they place in the same spots during the same time each fall.



PHOTOS: PAUL N. QUENEAU

“Fish Creek is the biggest bull trout stronghold west of Missoula, pretty much the crème de la crème.”

Creek is the biggest bull trout stronghold west of Missoula, pretty much the crème de la crème,” Knotek says.

The westslope, which has been petitioned for federal listing, is another high-priority species for FWP. Both bulls and westslopes need cold, clean water to spawn, which the three main forks and several other tributaries of Fish Creek steadily provide.

With the catch-bucket filled with fish,

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EVEN BIGGER 'BOWS Fish surveys show the success of adding Gerrard rainbows to Georgetown Lake. “With fish surveys, we can see if management actions like adding new strains of stocked fish end up improving the fishery or not,” says Eileen Ryce, head of the FWP Fisheries Division.

duced—as well as the biggest kokanees seen in decades, something that surprised biologists. Creel surveys bore that out, as did photos of happy anglers holding massive fish that showed up on Facebook, Instagram, and other social media.

At Georgetown, FWP fisheries crews employ a survey technique used on Montana’s major fishing lakes and reservoirs. Because electroshocking only works on narrow waters like rivers and streams where key habitat is identifiable and can be targeted, bigger waters like Georgetown need to be surveyed with 125-foot-long gillnets. The nets are set at the same locations and depths each year to collect a sample of fish. Crews record fish species, size, abundance, and health while also looking for

unexpected species such as northern pike that would indicate an illegal introduction.

FWP also seines lake and reservoir shallows in summer to see how well newly hatched fish are faring. Crews set long nets in waist-deep waters, then walk them in to capture young-of-the-year fish. They sort through the catch, counting the number of each species and measuring each fish. This helps gauge the reproductive success of the year’s adult game fish as well as minnows and other forage species.

Fisheries biologists use that information to understand what might happen in the future as the fish grow and mature. For instance, high numbers of forage fish this year could increase the growth and number

of game species in the next few years. But it could also decrease catch rates, because the walleye and trout are already full of food when anglers’ baits and lures drift past.

Fall netting is another way FWP gives fish populations an annual checkup. This past October, I joined FWP Fish Habitat Bureau chief Adam Strainer and fisheries technicians Chris Hurley and Ashton Mohar on Holter Reservoir for the last of three days during which they set 15 nets across the Missouri River impoundment north of Helena. The nets nab rainbow trout, walleye, yellow perch, white sucker, longnose sucker, ling (burbot), and kokanee. “We keep track of weights, ages, and how many we get of each, which we compare to records from the past

FROM LEFT: JORDAN LEIFER, JESSE LEE VARNADO

“Shoreline seining helps us gauge the reproductive success of the year’s game fish as well as perch, minnows, crappie, and other forage species.”

30 years,” Hurley said.

The crew was hoping to see at least four to six rainbows or walleye per net, the goal in the reservoir’s fisheries management plan. They surpassed the goal and also captured far more kokanee than usual as well as massive numbers of perch. One net yielded a monster walleye that sent the crew members into a special operation. They



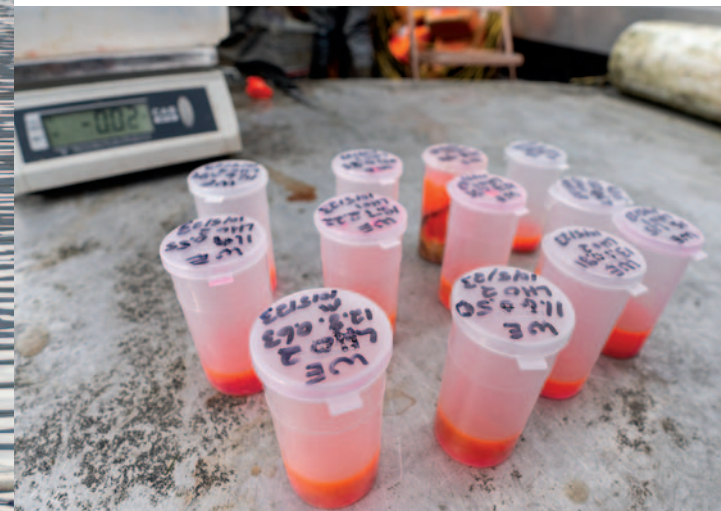
SEIN APPROACH FWP biologist Cody Nigel pulls in a seining net at Fresno Reservoir. Crews use the fine-mesh nets in shallows during summer to see how newly hatched game and forage fish are faring.

quickly recorded its length and weight—nearly 14 pounds, just 4 shy of the state record caught in Holter in 2021—then clipped a spine off its dorsal fin, to be analyzed later to determine the fish’s age, and inserted a tiny yellow tag into the base of the fin. In short order, they had the 31-inch trophy back in the water.

“We know how much anglers value catch-

ing these larger fish, so we make a special effort to keep them alive during our surveys,” Hurley said. The other collected fish of average size aren’t so fortunate. They end up “giving their lives for science,” as Strainer puts it, an unfortunate byproduct of the survey technique, though not one that meaningfully affects populations.

After the nets were gathered, the crew



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PHOTOS BY PAUL N. QUENEAU

HOLTER HAUL Clockwise from above left: FWP fisheries technician Chris Hurley, FWP Fish Habitat Bureau chief Adam Strainer, and technician Ashton Mohar prepare to check survey nets at Holter Reservoir; weighing a kokanee; a big burbot (ling); sorting fish by species; walleye stomach contents (died with a pink preservative); pulling in a nice walleye; releasing a walleye that weighed nearly 14 pounds (though most fish surveyed with gill nets “give their lives for science,” as Strainer says, FWP crews try to return trophy fish to the water); a major haul of yellow perch, most of them from the 2019 and '20 age classes, or generations of fish. The fall 2023 survey indicated strong numbers of walleye, kokanee, rainbow trout, and perch, all surpassing management plan goals.



weighed and measured each fish and, from the inner ear of each kokanee and rainbow, carved out a small stonelike structure called an otolith they later examined under a microscope to determine each fish's age. They also checked the stomach contents of walleye and burbot. Considering the profusion of perch in the nets, it was no surprise that the bellies of the two large predator species were stuffed.

By day's end, Hurley said it was clear that Holter's fishery remains in great shape, "though anglers may need to work harder next summer to tempt walleye already full of perch."

That's another benefit of fish surveys: If anglers aren't catching fish, they can always blame their bad luck on the abundant forage fish documented in survey nets. 🐟



NIGHT AND DAY Above: After-hours electrofishing on the Missouri River gives biologists information they need to manage the river's world-renowned rainbow trout fishery (below).



PHOTOS: CHRIS MCGOWAN

How fisheries and aquatic system monitoring drive FWP fisheries management

Ladd Knotek, FWP fisheries biologist in Missoula, has been counting fish and studying trout streams since the mid-1990s. He says gathering solid scientific information on fish populations and aquatic systems is essential for deciding how best to conserve, recover, and improve fisheries. It also strengthens the credibility of FWP management decisions. "Without accurate data, we're just another opinion out there," Knotek says.

When asked for specifics on how population and aquatic system monitoring helps resident and nonresident anglers in the Treasure State, Knotek rattles off one benefit after another:

▶ "When the FWP Commission considers altering fishing regulations, they often incorporate the biological considerations that FWP fish surveys and other field data provide."

▶ "One of our jobs is to comment on proposed land management activities overseen by other agencies or private groups. We can't provide credible suggestions regarding activities that could damage a nearby trout spawning tributary if we don't back up our opinion with solid data."

▶ "One way we get funding for important stream restoration projects is to show that they will address what are called 'limiting factors' for fish or aquatic systems. We identify those factors, such as degraded spawning conditions or the rise of invasive non-native fish species, by constantly monitoring fish populations."

▶ "Similarly, recent significant land acquisitions, such as Fish Creek State Park and Wildlife Management Area and Marshall Creek Wildlife Management Area, happened thanks to millions of dollars of funding from outside sources like The Nature Conservancy. A major reason that FWP was able to compete against similar acquisition proposals in other states was by showing data on the enormous fish and wildlife values those properties contained, like key spawning habitat for federally threatened bull trout."

▶ "The public wants to know if their fisheries license dollars and other contributions are being spent effectively and prudently. A major way we demonstrate that is with fish population monitoring, which shows clearly whether a problem was fixed or if we need to try another approach and then monitor again to see if the new solution worked."



Above: 2015 Yellowstone River oil leak; below: whirling disease



▶ "Fish monitoring is also how we determine the extent of damage to fisheries from accidents like the Yellowstone River oil leak in 2015 or from disease outbreaks like we had with whirling disease in the Madison River during the late 1990s, or when we see an invasive species like brook trout start to displace native westslope cutthroat. There's simply no way of knowing how big the problem is unless you are constantly surveying the waters and seeing how the fish and the entire aquatic system are doing." ■



“Without accurate data, we're just another opinion out there.”



The Clark Fork River's Alberton Gorge near Fish Creek State Park and WMA.

CLOCKWISE FROM TOP: RIGHT: PAUL N. QUENEAU; PAUL N. QUENEAU; SHUTTERSTOCK; WHIRLING DISEASE INITIATIVE; MTN NEWS