

# Fish finders

Wyoming is first in West to use environmental DNA test to locate rare sturgeon chub in large rivers

By Sara DiRienzo

**C**ODY — Most animals leave behind a trace of themselves that can be tracked. A rattlesnake sheds its skin in the grass; a mule deer leaves hoofprints along a game trail. But what does a fish leave behind? And how do you know if it swam beneath the surface of a rushing river — especially if it's a rare minnow? It's a puzzle Wyoming Game and Fish Department fisheries biologists are working to solve by using environmental DNA to detect rare sturgeon chub.

If you spend your whole life in Wyoming, you might never see a sturgeon chub. Anglers can't fish for them, and only a few turn up in surveys. Even fish biologists struggle to catch them — a process that takes many hours and many hands. The sturgeon chub adds to the challenge by residing in the bottoms of the fastest parts of rivers, too.

These elusive fish once occupied the Bighorn, North Platte and Powder river basins and were historically widespread throughout the Missouri and lower Mississippi River drainages from Montana to Louisiana. And now, studying their presence in the Bighorn River is important to guide future management.

Wyoming designates this nongame minnow as a Species of Greatest Conservation Need, which means their numbers are low or declining, and keeping them around is important for the diversity of Wyoming's wildlife. In 2016, sturgeon chub were petitioned for listing under the Endangered Species Act due to habitat changes; but, this detection research could help keep them off the list and under state management.

"Our goal is to find out if and where we still have sturgeon chub in the Bighorn River," said Cody Regional Fish Biologist Joe Skorupski. "Before beginning this

A handful of sturgeon chub flop around in a net after they were collected from the Bighorn River during a trawling sampling in 2017. (Photo by Joe Skorupski/WGFD)



Bill Bradshaw, Nick Hogberg, Mark Komoroski and Adam Pennington, Wyoming Game and Fish Department biologists and technicians, sein for sturgeon chub on the Powder River. They sampled directly above an eDNA collection site to learn if the chub are present. (Photo by Joe Skorupski/WGFD)

new study, the last time they were found was in 2001 when two individuals were captured next to each other. After that, we haven't seen them at all."

The test for environmental DNA — known as eDNA — works by sampling the water and testing for the presence of the sturgeon chub DNA marker. A marker is created by collecting tissue samples from the species and comparing that to the DNA found in the water. Skorupski and other members of the Cody fisheries crew collect water samples and send them to the U.S. Fish and Wildlife National Genomics Center for Wildlife and Fish Conservation at the Rocky Mountain Research Station in Missoula, Montana.

"The lab has never used eDNA techniques in a large river system setting before, so this is new," said Skorupski. "The method has been successful in small or medium river systems."

The Bighorn River study is in the middle of a tiered approach. The first was a trial to see if a DNA marker could be developed and its accuracy tested. In the summer of 2017, Game and Fish and the Genomic Lab developed the marker and tested it in the Powder River drainage. The marker was proven, so



A sturgeon chub collected from the Bighorn River during 2017 trawling efforts is measured at 105 mm, which is considered large for the species. (Photo by Joe Skorupski/WGFD)

the project moved on to phase two: a caged fish study in the Bighorn River to test the accuracy of detecting DNA downstream of fish.

For this test, sturgeon chub were collected from the Powder River and transported to the Bighorn River. Biologists took measurements of the fish and placed them in minnow traps anchored to the streambed where fish might live naturally. After 24 hours, eDNA samples were collected at the traps and then 50 meters, 100 meters, 250 meters, 500 meters and 1 kilometer downstream of

the caged fish. The water only holds eDNA for 7-21 days, depending on the conditions.

"We got our results back in the spring and they were promising," said Skorupski. "We know we can get positive detection readings from sturgeon chub, but we are continuing the study conservatively to see what we can find."

Cody biologists are currently in the third phase of the study on the Bighorn. To bolster eDNA validity, biologists also searched for the minnow by trawling the lower Bighorn in 2017, a fish sampling technique where a net is pulled through the water using a boat, scraping along the bottom of the river. And, they found sturgeon chub. The discovery was used to validate eDNA. If the sampling of this section is shown to be representative of the population, biologists will expand the sampling throughout the whole 97-mile stretch.

If successful, eDNA methodology might not only help sturgeon chub in the near future, but could be another tool to help fisheries biologists study rare and small fish species in large river systems for years to come. Game and Fish funded the study through a state wildlife grant for \$42,032.50.



Frank Stetler, a Wyoming Game and Fish Department nongame biologist, surveys one of the state's many grasslands for birds in an effort to create a population model. (Photo provided by Frank Stetler/WGFD)

# Biologists survey birds in Wyoming's grasslands

The Wyoming Game and Fish Department is creating a model of bird populations in some of Wyoming's most fragile habitat. The data will help to guide conservation efforts in the future.

By Rene Schell

**S**TATEWIDE — Every spring and summer for the last five years, nongame biologists with the Wyoming Game and Fish Department have visited grasslands across the state in search of some elusive grassland birds. Biologists seek out mountain plover, upland sandpiper, long-billed curlew and burrowing owl, and record where these birds are located.

These grassland birds are considered Species of Greatest Conservation Need, a designation by Game and Fish. This means the birds are

in need of conservation action based on their rarity, the severity of threats they face and current trends in their populations. Using surveys to fill data gaps on these species will enable Game and Fish to determine population parameters, identify risks and concerns and apply timely actions to address issues and avoid potential listings under the Endangered Species Act. This enables Game and Fish to proactively address issues rather than waiting for a species to be petitioned for listing.

These grasslands or prairies where the birds reside are vast areas where there is too little water for trees to grow, so instead the land is

covered in grasses and grass-like plants growing close to the soil. These habitats are particularly fragile because of water scarcity and invasive plant species, like cheatgrass, that can outcompete native plants. It is no wonder that biologists list some of the birds that rely on these habitats for reproduction as being of special concern. Grassland bird species like the mountain plover nest on the ground, hiding their young in the sea of grasses and wildflowers.

Each survey for grassland birds occurs around sunrise or sunset on secondary roads within key habitat. Biologists drive these routes and stop every quarter to half mile for several

They look and listen for three to six minutes at each stop, depending on the species. Routes are run one to three times each year and timed to match with the birds' courtship, nesting and brood rearing stages.



Wyoming Game and Fish Terrestrial Habitat Coordinator Jill Randall marks results of a bird survey. (Photo by Anika Mahoney/WGFD)

miles along each road. At each stop, they exit their vehicle with data sheets, a pencil, binoculars and their good listening skills in search of these birds. For some especially secretive species, they play recordings of the birds to lure them into calling or moving, making them detectable. Biologists take great care to only use this tactic when necessary as it can be stressful for birds if they think another bird is encroaching on their territory.

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## Meet the birds

Each spring and summer, nongame biologists with the Wyoming Game and Fish Department survey four grassland bird species designated as Species of Greatest Conservation Need. Little is known about population trends for these birds, so an effort to model their numbers and where they live is underway.



(WGFD photo)

**Burrowing owl** — These small owls face severe threats to their population, mostly because they are habitat specialists that place their nests and raise their young in existing burrows. In Wyoming, they are closely tied to prairie dog colonies, so threats to prairie dogs are also threats to burrowing owls. Additionally, they prey primarily on insects and rodents for food, so pest control can reduce their food supply and poison the owls. Loss and degradation of habitat is also a concern.



(Adobe Stock photo)

**Long-billed curlew** — Although these birds can be found across the state, they are patchily dispersed. As a result, it requires a targeted effort to collect enough information to estimate their numbers. Long-billed curlew experienced steep declines that coincided with the use of pesticides and the loss of grasslands to other land uses. It is believed these birds may be making a comeback, but changes in land use and the introduction of nonnative species could still negatively affect them.



(WGFD photo)

**Upland sandpiper** — Because these birds are considered uncommon across the state, a targeted effort must be made to collect information about their population size. Similar to long-billed curlew, this species experienced large declines in population as native grasslands were lost in the 1800s and 1900s.



(WGFD photo)

**Mountain plover** — These birds are widespread in Wyoming, but they are uncommon and sparse on the landscape. They have had historical decreases in population, but that trend appears to have slowed in the last 15 years. Mountain plover are sensitive to habitat loss and invasive plant species.

nesting and brood rearing stages. Each year biologists survey more than 1,300 sites, and all four targeted species have been detected within those locations.

This winter, data from the last five years will be modeled for the first time in an attempt to generate statewide estimates of occupancy and abundance and to work toward removing the Species of Greatest Conservation Need status for each species. Results of this project will help guide management decisions, address conservation concerns and direct conservation

actions in Wyoming.

Fortunately, Wyoming grasslands remain more intact than in other parts of the Great Plains, and the efforts of land managers and private landowners will be critical to the survival of the species that rely on them. Read the "Growing Grassland Birds," publication — found with information on nongame birds and mammals on the Game and Fish website — to learn more about grassland birds.

— Rene Schell is the Game and Fish public information specialist in the Lander region.



Joe Skorupski, Wyoming Game and Fish Department fisheries biologist, moves a boat into position as he and a crew prepare to electrofish a section of the Bighorn River near Thermopolis. (WGFD photo)

# October fish surveys monitor trout abundance in Bighorn River

Efforts to track trout populations help guide management decisions that benefit anglers and fish

By Tara Hodges

On a crisp, mid-October morning, Wyoming Game and Fish Department crews surveyed a 4-mile stretch of the Bighorn River near Thermopolis to monitor trout populations at the popular fishery. The task is part of an ongoing trout population monitoring effort conducted by Game and Fish. These surveys, conducted annually in October, help fisheries managers estimate trout populations and make informed decisions about fish management.

“Routine monitoring and population surveys allow Game and Fish to keep a finger

on the pulse of wild and stocked trout populations,” said Joe Skorupski, Game and Fish Cody region fisheries biologist.

The information gained from the monitoring efforts helps fisheries managers make informed decisions that benefit anglers and fish.

On the Bighorn River, Skorupski and crews conduct population estimates using a mark-and-recapture method. Over multiple days, Game and Fish crews electrofish a stretch of the river from Wedding of the Waters to the Eighth Street Bridge in Thermopolis. The boats used during the effort are equipped with electrical anodes suspended from booms at the front. An electrical pulse,

which temporarily stuns the fish, is sent into the water causing the fish to float. Workers standing ready in the front of the boat then net the fish.

Captured fish are weighed and measured, marked by clipping a small piece of fin and released. To determine trout abundance for a given year, the ratio of marked to unmarked fish is analyzed using a robust model which compares all fish captured over the multiple-day effort.

“Data collected through monitoring efforts sheds light not only on trends in population abundance, but also the overall condition of fish, species composition patterns and size-structure of the population, which

can give us an indication of recruitment of wild-spawned fish, year-to-year survival and fish growth,” Skorupski said.

Biologists use multiple strategies to manage the fishery with a target objective of 1,000 fish greater than 12 inches per river mile. This includes requesting flushing flows to improve spawning habitat and stocking of hatchery-raised fish. Biologists mark stocked fish by removing the adipose fin — ensuring stocked fish can be distinguished from wild-spawned fish during monitoring efforts. Information gained during monitoring is used to detect changes in fish populations over time, decipher why changes have occurred and ultimately help biologists determine if the population is meeting management objectives or target population size.

“We have collected data consistently on the Bighorn for many years, which helps to tell the story of the fishery,” Skorupski said. “Why a population changes is generally complex and not always linked to a single factor with a simple solution.”

A dramatic decline in the trout population was observed in 2017 when extreme high water conditions reduced winter survival and natural recruitment of fish over a three-year period. Continued monitoring, along with marking stocked fish, helped biologists understand the population’s response during this recent decline.

“After 2017, survival of wild and stocked fish improved and growth rates were off the charts, demonstrating a rebound in the population,” Skorupski said. “Although minimal management actions were taken, the continued monitoring effort allowed the story to be told, even when much of the cause of the decline was due to mother nature. Ultimately, this data helps us see the big picture and long-term trends in the fishery and consider management decisions that benefit fish populations and anglers.”

— Tara Hodges is the Game and Fish public information specialist in the Cody region.

Members of the Game and Fish fisheries crew compare three rainbow trout captured during recent monitoring efforts along the Bighorn River: a wild trout hatched in 2019 (top), a hatchery-reared trout stocked in 2019 (middle) and a hatchery-reared trout stocked in 2018 (bottom). Growth of approximately one inch per month was documented during recent surveys. (WGFD photo)



Jason Burckhardt, fisheries biologist, measures a rainbow trout from the Bighorn River. Biologists document lengths and weights of captured fish to determine fish condition and the size structure of the population. (WGFD photo)

