

# GUARD DUTY

Hornyhead chubs fiercely defend their nests during breeding seasons, but Wyoming's isolated population of these little fish is getting some help to ensure they are here to stay.

Story by Robin Kepple  
Photos by Tamara Rodgers

A male hornyhead chub guards his carefully assembled nest of pebbles and patiently waits for females to stop over the nest to breed. A native species, hornyhead chub are found in only two rivers within Wyoming and need near-perfect water conditions to spawn effectively.



Like the common image of a Viking warrior, the male hornyhead chub goes into battle bearing impressive horns on its head. These small fish have a red spot behind their eyes, adding to their formidable appearance. As devoted fathers, these fish will use their horn-covered heads to guard their nests from egg-thieving rivals — sometimes inflicting some gnarly wounds.

A bit of research will show that Viking warriors didn't really wear horned helmets. Likewise, the horns on a hornyhead chub aren't true horns. They're actually bony projections called tubercles that develop on males during the breeding season so they can better protect their nests. Some males develop so many

tubercles that the top of their heads appear white.

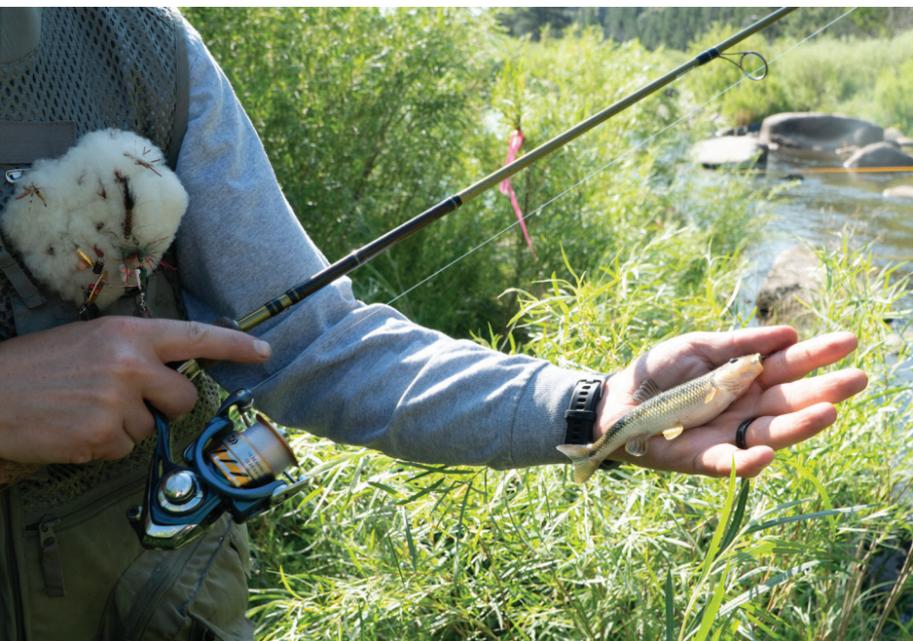
Male hornyhead chubs build a nest by clearing a depression and stacking pebbles with their mouth. The male resembles a construction worker using a piece of heavy equipment as he picks up a pebble or small rock in his mouth and carries it back to the nest site. Once there, he drops it into place, sometimes even taking time to rearrange it until it's perfectly positioned. The nest can be up to three feet across and eight inches high, and a male may spawn over the gravel nest with several females. Other small fish species, such as the common shiner, will take advantage of the clean gravel and well-guarded nest to sneak in and lay their own eggs. These "nest associates" thereby ensure that their offspring are protected by the unknowing hornyhead.

"This shows how hornyhead chubs are an important part of our native fish populations and their behaviors benefit other species as well," said Steve Gale, Wyoming Game and Fish Department fisheries biologist for the Laramie Region. "They represent a unique part of our native fish assemblage, and we work to conserve them and keep them on the landscape."

Hornyhead chub are a member of the Cyprinidae family, which includes minnows and carp — some of which are the same species that sneakily leave their eggs to be protected by their unsuspecting family members. Adult hornyhead chub are generally 4 to 7 inches long in Wyoming and can grow longer in other areas of their range. They are a visual feeder and eat during daylight hours with younger fish eating aquatic insect larvae, while adults eat aquatic insects and smaller fish.

Wyoming's population of hornyhead chubs has survived since the last ice age, making them a glacial relict that is geographically isolated from other hornyhead chub populations in the United States. Southeast Wyoming is on the western periphery of the hornyhead chub's range, and the species is found here only in the Laramie and North Laramie rivers as they pass through the Laramie Mountains. Populations are no longer found in surrounding states, including Nebraska, Kansas and Colorado. In the U.S., the species can be found in the Upper Midwest, including

An angler holds an average-sized female hornyhead chub caught with a worm. Hornyhead chub typically feed during the day and feast on aquatic insects and smaller fish.



Del Lobb, right, and technician Alex Wooding use a fiberglass tape to gauge the Laramie River's width. As instream flow biologist for the Wyoming Game and Fish Department, Lobb calculates the river's average width by measuring and recording several spots along the river. River flow studies in an inhabited river such as the Laramie can help biologists determine ideal conditions for hornyhead chub.



From left to right, Christina Barrineau, Chance Kirkeeng, Keaton Weber and Spensor Hill of the Wyoming Game and Fish Department sort, count and later release, captured fish from the Laramie River. Together with fisheries biologist Steve Gale, they surveyed the samples to determine the population size and spawning success of hornyhead chub in the area.



A male hornyhead chub sports fashionable tubercles on its head and a red dot behind both eyes. Hornyhead chub can grow up to 7 inches long in Wyoming with an average length of 4-5 inches. This male falls within the average size, but still has room to grow.



Alex Wooding, a technician with Game and Fish, releases a harmless green dye in the North Laramie River as part of a flow study. The dye's speed is timed at a distance determined by the river's width. The North Laramie River was a transplant site for hornyhead chub collected from a sampled population of the Laramie River. Efforts to increase populations in the North Laramie are continuing after the debilitating Arapaho wildfire of 2012.

drainages from New York through the Great Lakes and the Mississippi River basin, into the Dakotas and south to the lower Kentucky River. They are common in much of their range and are even used as baitfish in several states.

Wyoming's small population, fragmented distributions and limited dispersal make its population especially susceptible to common stressors such as wildfires, predation by nonnative fish species and increased sedimentation in rivers and streams.

Surveys on the Laramie River below Wheatland Reservoir #3 from 2004 through 2009 showed that streams capable of supporting hornyhead chubs were those with stable banks and were relatively free of disturbance from road crossings or grazing animals. Areas downstream of diversions contained fewer hornyhead chubs due to lower and less reliable water flows and shallower, warmer water. River banks in these areas were generally less stable, resulting in higher levels of silt.

In 2009, Game and Fish funded a study through Colorado State University to better understand hornyhead chub ecology and habitat preferences. The study showed that low water flows can harm hornyhead chub populations and recommended the support of hornyhead chubs by maintaining base flow levels to provide water that is relatively cool, clear and silt free.

"River flows can help determine habitat quantity and quality for hornyhead chub," said Del Lobb, instream flow biologist for Game and Fish. In 2018, Lobb collected data to study the effect of river levels on hornyhead chub habitat. He focused on spawning-habitat and studied the depth, velocity and substrate in and around hornyhead chub nests. He visited the same sites again this summer and will compare data to see if nest sites have changed.

"During the spring spawning and summer rearing season, it's important to have the right depth and velocity of water at the right water temperatures," Lobb said. "It has to be deep enough for the male to build the nest and swift enough to keep the nest free of silt, but not so swift that the nest is knocked down. These studies will give us the numbers we need to identify the flow range that provides the best conditions for hornyhead chub spawning."

In 2012, the hornyhead chub population in the North Laramie River was impacted by the Arapaho Fire and the resulting debris. To help the population recover, biologists transplanted more than 200 hornyhead chub from the Laramie River to the North Laramie River in October 2014. Another 200 fish were transplanted the following summer. In 2016 and 2017, biologists conducted follow-up sampling at both transplant sites in the Laramie River. Results show hornyhead chub survived and successfully reproduced within the study area. This month, biologists



Del Lobb, Game and Fish instream flow biologist, records water surface evaluations of the Laramie and North Laramie rivers using an autolevel along the river's bank. As part of a complicated flow survey, the data collected helps biologists recognize the relationship between flow and habitat for chubs and rainbow trout.

will transplant additional hornyhead chubs from the Laramie River to the North Laramie River to continue to bolster that population.

"This study helped us take what we learned from the CSU project on habitat needs to predict streams that could serve as refuge sites," Gale said. "The 2012 fire highlighted the potential for one environmental event to impact this species in Wyoming since they are only present in two rivers in the state. If we have populations in other sites, we could use the fish from these populations to repopulate the Laramie or North Laramie rivers if we have another event like the Arapaho Fire."

The students looked at predicted sites and recommended some potential streams within their historical native range where hornyhead chubs could be moved to help maintain populations in Wyoming. Taking the information provided by the CSU study, the University of Wyoming Cooperative Research Unit launched a two-year study in 2015 to guide conservation actions, which included examining sites that could potentially support hornyhead chub.

Overall, Wyoming's population of hornyhead chub is doing fairly well, thanks to the fact that most are found on private land and the landowners have been willing to work with Game and Fish to allow studies on the species. "We're reestablishing them in the North Laramie River and hope to establish them in new places to help the population," Gale said. "We're working to get the North Laramie River population to prefire abundance but we're not quite there yet."

— Robin Kepple is the information and education specialist for the Laramie region and a regular contributor to Wyoming Wildlife.



A male and female hornyhead chub spawn in a colorful pebble nest in the Laramie River. After fertilizing the eggs, the male will retrieve and cover them with more pebbles effectively growing the nest. Chub commonly share their nests with other small fish species such as the common shiner which appreciates the clean gravel and protection of the hornyhead chub.

## Gaining knowledge

By Alex Wooding

In 2018, the Wyoming Game and Fish Department studied the hornyhead chub to understand how these little fish select habitat and what makes an area suitable for their nests. Researchers developed rigorous survey protocols to learn which water depths and velocities hornyhead chub prefer, the types of substrate they use to build nests and the size and locations of the nests. It took a determined focus, strong legs and some sweat in order to access these fish and better understand them.

Getting to the rivers to study hornyhead chub was a challenge in itself. The study sites were in remote areas of the Laramie and North Laramie rivers, so accessing them required researchers to trek down steep canyon switchbacks and scramble across boulders. To top it off, this was usually done while carrying 50 pounds or more of survey equipment.

The study focused on physical habitat characteristics preferred by hornyhead chubs. As is true with a lot of wildlife research, studying reproduction was integral to getting a better understanding about the species' life history. Because of this, finding breeding hornyheads would enhance the effort. Thanks to regional fisheries biologists Steve Gale and Bobby Compton, a site with breeding hornyhead chubs was found in the Laramie River. In June 2018, researchers located more than 10 nests and observed spawning behavior over several of them — providing an opportunity to learn more about nests the fish were actively using.

Researchers measured the nests and documented the water depth and velocity upstream and to the left and right of each one. They counted pebbles to better understand the average size of gravel the fish used. The information will help in developing habitat suitability criteria for hornyhead chub that can then be applied to other models.

The observations and survey data collected from the Laramie and North Laramie rivers will enable Game and Fish to better protect and enhance habitats for this rare native species in Wyoming.