

Research may have found new mussel genus

By the CUJ

MISSION – Research conducted by the Confederated Tribes of the Umatilla Indian Reservation has led to the discovery that some freshwater mussels in the Western United States are genetically different and may actually be a separate genus.

A research paper entitled “Three Deeply Divided Lineages of the Freshwater Mussel Genus Anodonta in Western North America” was recently published in a scientific journal called Conservation Genetics. Authors included Jayne Brim-Box, a biologist working on the Tribes’ Freshwater Mussel Research and Restoration Project, and David Wolf, a mussel technician in the Tribes’ Fisheries Program. Another CTUIR employee, Donna Nez, a fisheries technician, provided field assistance during the research. Additionally, David Close, a fisheries biologist, and Gary James, manager of the CTUIR Fisheries Program, were instrumental in establishing the Project.

“This knowledge is a big step forward in understanding these mussels and how best to manage and restore them to our waterways,” said Karen Mock, the Utah State University professor who led the research work. “Scientifically, it is big news that will impact many states in the western U.S. and how they manage mussels.”

Freshwater mussels are a native component of North American aquatic ecosystems, but little is known about them.

“They have not been well studied, but likely are very important functional members of the ecosystems,” said Mock. “They also have cultural value as one of

the ‘first foods.’”

Freshwater mussels have declined dramatically over the last century, probably due to sedimentation, channel modifications, water diversion for agriculture, and losses of host fish, Mock said.

Mock said researchers don’t know much about what mussels eat, what kinds of habitats and fish hosts they require, and in some cases even what they should be called.

“This makes it very tough to know how their populations are changing, what factors might be contributing to their decline, how their presence might benefit a stream and other species,” Mock said.

Research conducted since 2003 in the Tribes’ Freshwater Mussel Research and Restoration Project has been trying to answer some of those questions.

“The Umatilla Tribes have taken a keen interest in conserving these animals and has become a national leader in research on freshwater mussels,” Mock said.

The Project involved sampling of mussel densities at nearly 80 locations in the Umatilla and John Day rivers – some 36 locations in the Umatilla, 30 in the Middle Fork John Day and more than two dozen others in seven tributaries – North Fork and South Fork Umatilla rivers, Shimmiehorn, North Fork Meacham, Iskuulpa, Owsley and Ryan creeks. Surveyors snorkeled, collecting mussels in designated areas for a set amount of time. At each location, mussels were collected, identified by species, measured for length, and a tiny bit of tissue was sampled for genetic analysis before the mussels were returned to the river.

Mussels lifecycle includes unique fertilization, attachment to host fish

The life cycle of freshwater **mussels** is intriguing. Most live burrowed in sand and gravel at the bottom of rivers and streams. Only a few are adapted to the quiet water and muddy depths of lakes, ponds and reservoirs.

Unlike most animals, which must travel in search of food, their food drifts to them, mainly tiny plants and animals called plankton suspended in the water. By drawing water inside their shells through a siphon, their gills filter out food and take in oxygen.

The unusual life cycle for freshwater **mussels** begins when eggs held inside the female are fertilized by sperm drawn inside her while siphoning water. For most species, if a male of her kind isn’t nearby upstream, she can’t reproduce. For a few, this is not a problem because they seem to be able to fertilize themselves.

Once fertilized, the eggs develop into a larval stage inside the female before they are released into the water to begin a parasitic stage. With little time to waste, the youngsters – called glochidia – must attach themselves to a host fish or perish.

For some **mussels**, the host is limited to only a few fish species, which means their status is linked to the health of certain fish populations. No one knows for sure, but it appears this parasitic stage can last anywhere from 10 days to several months, Brim-Box said. At some point, the larvae transform into young **mussels** that drop off the fish to begin a live in the stream bottom.

Mussels do not have eyes, so their methods of attracting host fish are even more remarkable. Some species have modified their mantles into lures resembling fishes, insects or other food items, which often pulsate in swimming-like motions, according to G. Thomas Watters, who writes about **mussels** for Conchologists of America. Other species have been known to display a fish-like lure played out in the water on a strand of mucus up to eight feet long.

Threats to the long-term survival of **mussels**, according to the National Parks Service, includes degradation of habitat (sediment loading, erosion, pollutants from improper agricultural, forestry and mining practices); channelization, dredging and bridge construction; traffic (large vessels or domestic animal crossings); dams or other barriers to fish migration; over harvest and illegal collecting; and competition from non-native species such as the zebra **mussel** and Asian clam.

Mussels have important functions in aquatic environments, the National Park Service says.

“They are a link in the food chain and help to maintain water quality. Because they are long-lived and particularly sensitive to changes in water quality, **mussels** are important indicators of aquatic ecosystem health. The disappearance of **mussels** from a river or lake often signals that other aquatic species are at risk.”



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