Biologists use Arctic char to combat invasive shrimp population

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There's something new biting beneath the surface of Dillon Reservoir. Normally found only in Arctic waters, the Arctic char, a species of trout, is thriving in Summit County, and may hold the key to turning Dillon Reservoir into an angler's paradise.

The Arctic char is the centerpiece to a multi-pronged research initiative led by Brett Johnson, a fisheries biology professor at Colorado State University's Warner College of Natural Resources. Johnson is developing bioenergetics models to improve the aquatic ecosystem production of Dillon Reservoir and enhance the lake as a fishing destination. Fishing had a $1.3 billion economic impact in Colorado in 2012, so scientists and the community are hopeful that the study will boost tourism revenue as well as fish and fishery diversity.

As Denver's largest single water supply source, Dillon Reservoir is held to strict nutrient standards, which are counterproductive to growing large fish. Furthermore, havoc was inflicted by a tiny troublemaker: shrimp. Mysis diluviana, the opossum shrimp, was introduced into Dillon Reservoir in 1970 as a food source to fatten up trout and salmon in the lake. But the nocturnal mini-crustaceans eluded the trout's daytime feeding patterns and began devouring all of the zooplankton – leaving salmon and trout hungry and small.

The CSU research project is focused on a comprehensive study of the lake's ecosystem with a goal of restoring balance.

Colorado Parks and Wildlife began stocking cold-water, shrimp-eating Arctic char as a way to combat the Mysis population and boost the diversity of fishing opportunities. Arctic char are prized by fishermen around the world as a beautiful, good-fighting sportfish that can grow to more than 20 pounds in the depths of cold freshwater lakes. Dillon Reservoir is the only public fishery destination in the lower 48 states outside of Maine where anglers can have a chance to land the challenging Arctic char.

"In order to develop a sustainable and thriving fishery, we have been taking a comprehensive look at the dynamics of the lake's food web: What is living there, who is eating what, how much are they eating, and what is the potential," said Johnson. "By doing a deep investigation, we can come up with a science-based formula for optimal reservoir management that will make Dillon Reservoir an exciting fishing destination."

Johnson is a professor in CSU's Department of Fish, Wildlife, and Conservation Biology, and began working on Dillon Reservoir in 2010 with teams of graduate and undergraduate students in collaboration with Colorado Parks and Wildlife. He has multiple projects monitoring and evaluating Arctic char population and growth, the Mysis population, and overall aquatic ecosystem health and carrying capacity. Johnson's team is also conducting surveys with fishermen to determine the potential economic impact of the fisheries project to the communities of Dillon, Frisco, and Silverthorne.

CSU fishery biology master's student Devin Olsen has been conducting his thesis research on Dillon's Arctic char population, and has been collecting and analyzing health and dietary data for the past three years. Olsen has spent months on the water in all seasons to monitor the fish's caloric intake, age, growth rate, and biometrics, and has analyzed his findings to produce recommendations for future management options.

"You don't just dump fish in the water and walk away – there is a lot of science that goes into understanding the ecology of the lake and the optimal biological balance needed to have a thriving fishery," said Olsen, who is also a competitive fly fisherman with Fly Fishing Team U.S.A. "We are already seeing that the Arctic char are reproducing naturally and are growing well, so it is exciting to see a strong and healthy future for the reservoir."

The Dillon Reservoir research received private funding from lifelong scientist Douglas Silver. Silver actively recreates in Summit County and wanted to find a meaningful way to give back to the community and benefit its natural environment. His interest turned to answering the question of why there was not better fishing at Dillon Reservoir, and so he reached out to Colorado Parks and Wildlife and was connected to CSU as a leading research university.

"I am an observational scientist, and I wanted to give back to the place that I have enjoyed so much," said Silver. "This research project gives me purpose and is the best thing I have ever done - a marvelous experience. Brett, Devin and their team are superb scientists, and it is rewarding to know that their work will have a positive impact on many people's lives."

Provided by Colorado State University

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