Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Spawning Stream Origins of Cutthroat Trout Determined by Chemistry of Bone

Discipline: Natural
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: Montana State University
Effective Dates: 7/1/2013 – 6/30/2016
Funding Amount: $103,049

Investigators and Agency Representative:
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Project Abstract: Yellowstone Lake and its numerous tributary streams form the core of the remaining natural habitat for genetically pure Yellowstone cutthroat trout *Oncorhynchus clarkii bouvieri.* However, this unique subspecies has declined dramatically in the Yellowstone Lake ecosystem over the past two decades from a combination of drought, nonindigenous parasites, and especially, the invasion of predacious Lake trout *Salvelinus namaycush.* Large-scale, intensive netting efforts have targeted lake trout removal from the lake ecosystem, and current telemetry studies are helping to identify key spawning areas such that lake trout removal efforts can become even more efficient and effective.

This study will use new techniques for reconstructing fish movement patterns through the chemical isotope analysis of fish otoliths (ear stones) to identify which spawning tributaries are producing cutthroat trout that are persisting in the lake. Cutthroat trout otoliths have been routinely collected during annual gillnet surveys in the lake, offering a unique opportunity to reconstruct which spawning tributaries have most contributed to cutthroat trout recruitment in the present and how this has changed over time with heavy predation by lake trout and during droughts which may have reduced spawning success in some tributaries. Study results will increase our ability to develop effective management strategies and potential restoration efforts for the preservation of this unique subspecies.

Additionally, this study will use otolith isotope analysis as another potential way of identifying where lake trout spawn and rear. This technique matches strontium isotope ratios in lake and stream tributary waters to those incorporated in the otolith during spawning and rearing. Thus, analysis of lake trout otoliths offers the potential to identify which portions of the lake that lake trout spawn but also where they rear during their entire life cycle. In contrast, traditional telemetry methods for determining movement patterns are confined to adult fish large enough for transmitter implantation, and movement patterns in smaller fish cannot be detected.

Outcomes with Completion Dates:
Draft Final Report - June 30, 2015
Final Report – June 30, 2016

Keywords: cutthroat trout, spawning streams, bone chemistry, Yellowstone Lake, Yellowstone National Park, Montana State University