

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Native fisheries ecological and contaminants assessment in Glacier National Park

Type of Project: Research and Education

Discipline: Natural Resources

Funding Agency: National Park Service

Other Partners/Cooperators: University of Montana, Flathead Lake Biological Station

Effective Dates: 4/1/2010 - 12/31/2011

Funding Amount: \$5,000

Investigators and Agency Representative:

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Project Abstract: The student intern funded under this agreement will assist the NPS and UM staff in collecting and summarizing field data to support the following project. The student will not be individually responsible for producing the work products listed, but will work in the field to support the data collection efforts of the project team to meet the objectives of the project.

Objectives and Rationale:

1) Evaluate the status of native fish (focus on ESA listed bull trout and Species of Concern westslope cutthroat trout) in park lakes and streams. Every five years the park conducts standardized gill net surveys on a group of park lakes (8) to determine the status and trends of native fish populations in these waters. In addition, the park is in the process of developing long-term native fish population monitoring strategy for streams consisting of population estimates in index streams to monitor the abundance of native fish in flowing waters. We will use this portion of the project to conduct survey work for native fish trends in park lakes, identify streams suitable for native fish sampling, and evaluate the feasibility of using specific stream reaches in a long-term monitoring strategy.

2) Determine contaminant levels (mercury and selenium) in fish populations in Glacier National Park. Recent studies have identified elevated levels of mercury in park fish, and additional testing is needed to understand potential ecosystem effects and set baseline levels to monitor future changes. This objective provides an opportunity for university students to participate in hands-on field sampling of fish populations, including sample collection for metals analysis. The broader implications of the study include airborne transport of contaminants to protected areas, as well as developing baseline data on metals levels in park waters for long-term monitoring in the face of extractive resource development threats adjacent to the park.

Scope of Work:

The research and monitoring projects will be directed cooperatively by Glacier National Park (GNP) Fisheries Biologist Chris Downs and Dr. Heiko Langner with the Environmental Biogeochemical Laboratory at the University of Montana (UM).

During the summer of 2010 park fisheries staff will cooperate with University of Montana staff to sample approximately 10 streams and 8 park lakes to determine the status and trends of native and non-native fish species in these waters and collect tissue samples for metals analysis. Baseline data is needed on native fish populations to evaluate their responses to stressors such as non-native species, potential resource development on the park's borders, and climate change. We conducted a pilot study in 2009 to begin to identify streams that would serve as good long-term index monitoring sites for native fish abundance (Downs, in prep). In 2010 we plan to revisit the most promising of the 2009 sites, and also evaluate new streams and stream reaches for their value as indicators of long-term population change. Our data will complement other contemporary data collection efforts aimed at assessing the distribution of native salmonids in the N. Fk. Flathead River drainage.

Population estimates will be conducted in representative reaches of native fish habitat using standardized depletion estimate protocols (Zippin 1958). Biological data including length and weight will be collected to characterize fish growth conditions across the study streams. Presence of amphibians will be noted and assessed on a relative scale (abundant, rare, absent). Fish population data will be compared over time to develop estimates of population level trends in streams.

Recent survey work (Fredenberg 2002, Meeuwig 2008) used a long-term gill net data set to demonstrate the replacement of bull trout by lake trout in four lakes on the west side of the park. Continuation of this data collection effort expanded to additional waters will be critical for the park in evaluation of the expanding impacts of non-native salmonids and climate change have on native aquatic ecosystems. Gill nets will be set in the same locations, using the same net mesh sizes, and at similar times as was done in previous surveys. Data will be compared with earlier surveys to determine trends in fish species composition in lakes.

Fish tissues will also be collected from a subset of these waters (5) for metals analysis. Recent studies have documented the presence of elevated levels of mercury in fish tissue from Glacier National Park and this study expands on that work (Downs and Stafford 2009). Airborne transport has been determined to be a primary mechanism for the movement of contaminants into park waters (Landers et al. 2007), but other threats including potential Canadian coal and coal-bed methane development in the North Fork of the Flathead River drainage also threaten park waters. Previous work has focused on human health risks associated with eating contaminated fish (primarily lake trout and lake whitefish). This research project will sample a broader suite of fish species (i.e. suckers, mountain whitefish, burbot, northern pikeminnow, cutthroat trout) for both mercury and selenium levels to assess risks to humans and wildlife through consumption of contaminated fish, as well as establish a data baseline that we can use to monitor future change. Funding for laboratory costs for sample analysis has already been secured through CESU funding, and additional funding is necessary to conduct the field sampling.

Outcomes with Completion Dates:

The primary product from the student under this agreement will be technical field assistance necessary to collect the data and samples to contribute to the completion of the project. The larger project will produce multiple products and will be the responsibility of the project team:

- 1) Analysis of native fish population trends in park lakes.
- 2) Population estimates to be used in long-term monitoring of both resident and migratory native fish populations in the park.
- 3) Chemical analysis for Hg and Se concentrations in fish tissue and evaluation of risk associated with the consumption from park lakes as it pertains to both people and wildlife.
- 4) A final report detailing the results of the project.

Keywords: lakes, airborne contaminants, risk, fish species, student intern, Glacier National Park, University of Montana,