

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Environmental Stewardship through Discovery: A Molecular ATBI for Yellowstone Lake, a Centennial Challenge Project

Discipline: Natural Resources

Type of Project: Research/Education

Funding Agency: National Park Service

Other Partners/Cooperators: Montana State University

Effective Dates: 8/1/2008 - 7/1/2011

Funding Amount: \$381,000

Investigators and Agency Representative:

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Project Abstract: This Molecular All-Taxa Biodiversity Inventory (MATBI) is a large scale, interdisciplinary study of the complexity of life in Yellowstone Lake. A main focus of the study is to understand the effect of environmental selection factors on genetic diversity. To perform the study, an interdisciplinary team is conducting research in an integrated way—from geophysics to geochemistry and biological diversity. Researchers take a series of cold-water lake samples at different locations and depths. This is followed by the launch of a Remote Operating Vehicle (ROV)—a submersible vehicle controlled by researchers in the boat. The ROV collects water and living samples from the geothermal vents and from the zone where hot and cold water are intermixing. Once the samples are collected, they must be analyzed to determine the identification of the microorganisms in the samples. Both prokaryotic and eukaryotic organisms will be identified through genetic analysis. The results, together with the geochemical analysis of the sample sites, will be used to construct a complete environmental profile of the lake, including creation of a “tree of life” that shows the evolutionary relatedness among lake organisms. Specific objectives are: (1) Add 18S ribosomal gene sequencing to identify species in the Eucarya domain, (2) connect the Yellowstone MATBI with the national ATBI database, the Encyclopedia of Life database, Genbank, and the Greater Yellowstone Science Learning Center (GYSLC) website, (3) conduct geochemical analysis of water samples associated with sampling locations, and (4) hire a temporary or contract Conservation biologist to complete species and ecological function descriptions

Outcomes with Completion Dates:

- 1) August 2008 - 2008 Project Plan including schedule and tasks
- 2) 31 December 2008 - 2008 Annual Progress Report
- 3) 15 July 2009 - 2009 Progress Report
- 4) 31 October 2010 - Draft Final Report submitted for review; draft information products for the GYSLC website; draft article for Yellowstone Science
- 5) 31 December 2010 - Final Report Completed; information products for GYSLC complete; article for Yellowstone Science complete

Keywords: Molecular All-Taxa Biodiversity Inventory, genetic analysis, Yellowstone Lake, Greater Yellowstone Science Learning Center, Yellowstone National Park, Montana State University, USGS, MSU Thermal Biology Institute