

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Cataloging the response of the pool level in Devils Hole to earthquakes

Discipline: Natural
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: University of Colorado, Boulder
Effective Dates: 6/1/2011 - 12/31/2012
Funding Amount: \$30,799

Investigators and Agency Representative:

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Project Abstract: Devils Hole, a subaqueous cavern in Death Valley National Park in southern Nevada, is home to the endangered Devils Hole pupfish. The water level in Devils Hole responds to seismic waves from earthquakes around the world and to crustal strains produced by earthquakes in California and Nevada. These water level fluctuations vary in size and duration. For example, the magnitude 7.3 Landers earthquake in 1992 caused a water level change of 20 to 30 cm that took several weeks to recover. The 7.9 magnitude Denali, Alaska earthquake on November 3, 2002 produced waves greater than six feet, but only lasted for minutes. On April 2, 2010, two video cameras that were set up to view pupfish spawning captured dramatic footage of the water level changes produced by a 7.2 magnitude earthquake centered in Baja California, Mexico. The video shows disturbance to the sediment and algae on the shallow rock shelf that is critical to pupfish feeding and spawning.

Water level data in Devils Hole have been recorded continuously by the float mechanics based Stevens Chart Recorder since 1989 and at 15 minute intervals by an electronic data logger since 1992. These data present a unique opportunity for studying basic mechanisms controlling Devils Hole hydrologic response to earthquakes.

Understanding the cause of short and long term changes in water level at Devils Hole is important in distinguishing natural processes from anthropogenic activities that affect the changes in water levels. Ultimately, new knowledge on the frequency and magnitude of these natural disturbances to pupfish habitat will contribute to a better understanding of the long term survival of the endangered Devils Hole pupfish.

Objective

In order to understand the underlying mechanism of hydrologic response to earthquakes, it is necessary to first identify the patterns and trends in earthquakes that have produced water level changes at Devils Hole. The objective of this study is to create a catalog of earthquakes that have produced abrupt water level changes at Devils Hole. The catalog will then be used to evaluate patterns in earthquake type, size, and epicenter distance from Devils Hole and their corresponding hydrologic responses.

Outcomes with Completion Dates:

1. First Progress Report due December 31, 2011.
2. Earthquake Catalog & Completion Report due by December 31, 2012.

Keywords: Devils Hole pupfish, water level fluctuations, earthquakes, Devils Hole, Death Valley National Park, University of Colorado at Boulder