Lake Research That Isn't All Wet

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Sergio Sañudo-Wilhelmy, left, and Douglas Capone received a National Science Foundation grant to study the nutrient cycle of three lakes in California and Nevada. Photo credit Taylor Foust.

(PhysOrg.com) -- The federal government may not have been able to save California from massive budget cuts, but at least a stimulus research grant will help scientists understand the biology of western lakes.

USC College biologists Douglas Capone and Sergio Sañudo-Wilhelmy will use $535,000 from the National Science Foundation to study the nutrient cycle of three lakes in California and Nevada.

As world authorities on the nitrogen cycle and trace metals, respectively, Capone and Sañudo-Wilhelmy hope to pinpoint how a lesser-known metal — molybdenum — affects a lake's productivity.

The project is relevant to anyone who has ever water-skied, fished or

swum in algae-choked waters.

An excess of nutrients leads to eutrophication, the term for unchecked plant growth in a body of water. The plants consume all oxygen in the water, killing fish while creating thick mats of vegetation.

The opposite problem, a dearth of nutrients, also may limit the fish and game that live off a lake.

Nitrates and phosphates from human activities often drive the nutrient cycle. But in remote lakes with few sources of natural or artificial nutrients, trace metals such as molybdenum may be the limiting factors, Capone said.

In such places, small variations in metal inflows could cause big changes in a lake's biology.

"By understanding these subtleties, you may be able to prevent eutrophication," Capone said.

His team's overall goal, he added, is "to understand controlling factors in the primary productivity of each of these [lake] systems."

The three lakes are nutrient-poor Castle Lake, near Mt. Shasta in Northern California; Lake Tahoe, which used to be nutrient-poor but has begun to change with increased runoff from human activities; and Walker Lake in Nevada, a nutrient-rich lake on the verge of eutrophication.

Expected to last two years, the project will test the researchers' hypothesis that molybdenum is a key factor in the uptake of nitrates and nitrogen fixation by algae in these lakes.

Nitrogen-fixing microbes obtain their nitrogen directly from the air. They are able to live in nutrient-starved waters, but they need key trace metals. Capone and Sañudo-Wilhelmy believe that molybdenum is as important to nitrogen fixation in lakes as iron is for the same process in areas of the open ocean.

The project, funded by a grant from the American Recovery and Reinvestment Act, will create full-time positions for a laboratory technician and a graduate student. Another two technicians and five graduate students will spend part of their time on the project.

Provided by USC College