High nitrate concentrations in U.S. Rockies' high elevation lakes caused by melting glaciers

October 12 2010, By Jasmine Saros

Melting glaciers in the American West are releasing chemicals that cause ecosystem changes in alpine lakes, including large quantities of nitrogen that reduces biodiversity, according to an international research team led by University of Maine paleoecologist Jasmine Saros.

The study, funded by a $500,000 grant from the National Science Foundation, determined that glaciers in alpine watersheds are the largest geomorphic and biogeographic influences of nitrate concentrations in high-elevation lake ecosystems.

Nitrogen is a key limiting nutrient in alpine lake ecosystems that can dramatically affect ecosystem productivity and species diversity.

The researchers from UMaine, Miami University, the U.S. Geological Survey, University of Nebraska-Lincoln and the University of Alberta studied the ecosystems of 26 high-elevation lakes in the northern and central U.S. Rocky Mountains where atmospheric nitrogen deposition is low and where alpine glaciers have receded substantially during the 20th century. Twelve of the lakes were fed by melt from glaciers and snow, the rest by snowpack melt water alone.

Those lakes fed by melting glaciers and snow had up to 100 times higher nitrate concentrations and lower algal biomass than those fed solely by snowpack. In those lakes affected by glacial melt, sediment diatom

assemblages had less taxonomic richness compared to the diversity present throughout the past century.

However, the water columns in the glacier and snowpack-fed lakes were more transparent, altering the depths reached by ultraviolet and photosynthetically active radiation, which also has the potential to change diatom communities.

Given predictions that alpine glaciers will disappear form the U.S. Rockies by 2030, these observations raise serious questions concerning the future biogeochemical and ecological trajectories of hundreds of lake ecosystems within this vast region, according to the researchers, writing in the journal *Environmental Science & Technology*.

Provided by University of Maine