

Simulation of increased N deposition to small mountain lakes, Snowy Range, Wyoming.

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Abstract. N deposition may be a driver of ecosystem and community change in western mountain lakes. We conducted enclosure experiments in two mountain lakes (Snowy Range, WY) to test whether subtle increases in nitrogen alter algal production and community composition. Three nutrient treatments were added to 500 L plastic mesocosms that were approximately 1.5 m deep and included the lake sediments. Nitrogen and phosphorus treatments received approximately 1 mg NO₃-N and 0.1 mg/L PO₄-P, respectively. Combined N and P treatments received both additions; control enclosures received none. Contrary to the P-limitation paradigm, N and N+P (but not P-alone) caused higher phytoplankton and epilithic algal biomass and productivity, shifts in taxonomic composition, reduced water clarity, and increased ammonium concentration, dissolved oxygen, alkalinity, and pH. Nitrate, but not phosphate, was depleted in approximately 2 weeks. Phytoplankton and epilithic algae both approximately doubled in biomass in response to N-alone and tripled to quadrupled in response to N+P. In contrast, other studies of shallow, oligotrophic systems have shown that benthic algae out-compete phytoplankton for nutrients.