Nutrient Limitation of Algal Biomass in Streams of the Sacramento Mountains, New Mexico

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Anthropogenic activities often alter the chemistry and overall quality of freshwater ecosystems. Algae are good indicators of ecosystem health because they respond quickly to influxes of nutrients. In this study, we used algal biomass and nutrient limitation experiments to assess the water quality in streams of the Sacramento Mountains of New Mexico. We sampled 7 sites monthly from May to September 2011, with the exception of June (n = 27) for both periphyton (attached algae) and phytoplankton. Phytoplankton algal biomass was significantly related to phosphorus in the water column; while there were no relationships between periphyton biomass and nutrients. The experiments indicate that periphyton from sites dominated by rocky substrates were phosphorus limited. Sites with an abundance of macrophytes had periphyton that was nitrogen limited or nitrogen-phosphorus co-limited; whereas periphyton at sites dominated by sediment substrates experienced no nutrient limitation. This suggests sediment attached algae acquire essential nutrients directly from the sediment. Our biological assessment of the streams in the Sacramento Mountains of New Mexico suggests that nutrient limitation varies with substrate type and availability of nutrients. Addition of nitrogen and/or phosphorus may increase periphyton biomass in the streams of the Sacramento Mountains. Our findings may serve as a platform for future research and as a foundation for land management practices and long-term monitoring efforts.