USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003OK16B

Title: Algal-nutrient dynamics in fresh waters: direct and indirect effects of zooplankton grazing and nutrient remineralization

Project Type: Research

Focus Categories: Nutrients, Non Point Pollution, Surface Water

Keywords: nutrient-algal ecology, zooplankton, grazing, nutrient cycling, nutrient supply, water quality, freshwater reservoirs

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Matching Funds: $51759.00

Congressional District: 4th

Principal Investigators: Hambright, K. David

Abstract: Although nutrients in freshwater lakes are ultimately from the watershed and atmosphere, most primary productivity is maintained by planktonic nutrient regeneration (remineralization). Few comparative studies are available, but it is believed that regeneration efficiency decreases with increasing trophy (i.e., oligotrogphic systems should be based on efficient regeneration, while eutrophic systems are likely more inefficient, relying on inputs from the watershed). Previous research in my lab has documented that this paradigm may not be supported in reality, as I found that in eutrophic Lake Kinneret, planktonic regeneration of nitrogen and phosphorous could be as high or higher than 100 times the annual external nutrient load. These results bring into question the propensity for limnologists and freshwater resource managers to focus on external loads and in-lake concentrations of nutrients with respect to algal abundances. Rather, it is logical that not only productivity, but algal abundances and species composition in lakes and reservoirs may be regulated through nutrient regeneration by planktonic consumers (mainly crustacean and protest zooplankton).
The objective of this proposed research is to examine the role and magnitude of planktonic consumer-driven nutrient regeneration in mesotrophic Lake Texoma. Using laboratory mesocosm experiments

based on consumer-food encounter rate models, I will quantify grazing rates and nutrient remineralization rates by both macro and micro zooplankton assemblages.
Data generated from these experiments will further our understanding of algal nutrient ecology in lakes and reservoirs by providing a first step in a detailed analysis of planktonic grazing and nutrient regeneration and thereby enable lake managers to more informatively design and implement management measures, including, but not limited to, food web manipulation and runoff regulation.
