Spatial and Temporal Variability in the Productivity of Stromatolites, Great Salt Lake, Utah

Ashley Nielson[1] and David Naftz[1]
U.S. Geological Survey-Utah Water Science Center, Salt Lake City, UT 84119

Abstract. Shallow areas of Great Salt Lake (GSL) contain an abundance of stromatolites. Stromatolites are unique benthic sedimentary structures formed by the biogenic precipitation of carbonates by microorganisms, specifically cyanobacteria. Stromatolites in GSL appear to serve important ecological functions, such as anchor points for brine fly larvae and as a potential nutrient source for brine shrimp. To better understand pelagic and benthic productivity of stromatolites in GSL, chlorophyll a, a surrogate for algal biomass, was sampled monthly from stromatolites and the water column at five sites along the north and west shoreline of Antelope Island from May to September 2005. Sampling from these five sites allowed for an examination of the spatial and temporal variability in algal biomass. Pelagic (water column) and benthic (stromatolites) chlorophyll values were then compared to assess the role of stromatolites on ecosystem level processes such as nutrient cycling and food web dynamics. On June 16, water column chlorophyll a concentrations of 0.05 mg/L showed no spatial variability while stromatolite chlorophyll a values fluctuated from 0.0003 mg/L to 0.0010 mg/L between sampling sites. Chlorophyll a concentrations varied from 0.010 mg/L to 0.047 mg/L in the water column and from 0.008 mg/L to 0.0014 mg/L in the stromatolites over the sampling period suggesting temporal variability in algal biomass. Stromatolite chlorophyll a concentrations were greater in June, while concentrations in July and August were dominated by the water column, suggesting that the primary source of production within the lake shifts over time. Water temperature, light levels, water levels, nutrients, chemical fluxes, and other chemical and physical ecosystem processes may all have significant effects on stromatolite productivity in Great Salt Lake.

[1] U.S. Geological Survey-Utah Water Science Center
2329 West Orton Circle
Salt Lake City, UT 84119
Phone: 435-908-5030
Fax: 801-908-5001
anielson@usgs.gov