STEP-WISE SHIFT FROM CYCLOTELLOID- TO ARAPHID-DOMINATED DIATOM COMMUNITY IN CASTLE LAKE, SISKIYOU COUNTY, CALIFORNIA AND POTENTIAL CAUSES

Briana E. Johnson[1], Paula J. Noble[1], Wendy Trowbridge[2], Sudeep Chandra[2], Alan C. Heyvaert[3]
[1]Department of Geological Sciences & Engineering, University of Nevada, Reno
[2]Department of Natural Resources and Environmental Science, University of Nevada, Reno
[3]Division of Hydrologic Sciences, Desert Research Institute, Reno, Nevada

Analysis of monitoring data and a 20-cm long sediment core from Castle Lake indicates that there has been a stepwise shift from a cyclotelloid-dominated community to one with an increasing component of araphid pennates over the past 45 years. Castle Lake is a meso-oligotrophic glacial lake located on the eastern slope of the Klamath Mountains, near Mount Shasta in Northern California. It has been an experimental lake for fish stocking since the 1800's, and became a limnological research station in 1959. Two-cm thick slices of the core were processed, 500 diatom valves per sample were counted, and are reported as percent biovolume to complement the monitoring data. The base of the core is dominated by *Cyclotella occelata-rossii-tripartita* complex (15%), *Discostella stelligera-pseudostelligera* group (12%), and *Aulacoseira* spp. (13%). Overall, phytoplankton comprise ~50% of the biovolume. The dominant periphyton groups in the base of the core are *Staurosirella pinnata*, *Pinnularia*, *Encyonema*, and *Navicula* spp. The lower 14 cm show variations in periphyton abundance, however, cyclotelloid counts remain fairly constant. A change to araphid dominant phytoplankton begins 6 cm below the top with increases in *Fragilaria tenera* and *Asterionella formosa*, which are negligible in the lower core. *A. formosa* reaches its highest abundance in the uppermost sample (6% total; 22% of phytoplankton fraction), and *F. tenera* (5% in top) is a significant component in the 2-4 cm and 4-6 cm samples. In the top sample, *D. stelligera* grp. is reduced to ~4%, and *C. bodanica* and *C. ocellata* complex are each 1%. The top sample increases in *S. pinnata* (21%). The core has not yet been dated, thus monitoring data is used to determine the timing of shifts. Phytoplankton data from 1967-1984 show that *C. ocellata* complex had fallen below 0.1%, and that *F. tenera* was the dominant phytoplankton, except for 1975-1977 when *F. crotonensis* and *A. formosa* dominated. *A. formosa* shows inter-annual variation from 0-46%, with highest frequencies in the mid 1970's. The 1996 monitoring data shows a different flora dominated by *C. bodanica* (79%), *A. formosa* (17%), and F. tenera (5%). Possible explanations for diatom shifts include cultural eutrophication (including atmospheric N deposition), cascading trophic effects, and climate effects. Disturbances to the trophic community through fish stocking may explain the loss of *C. ocellata* complex > 45 years ago. Profound lake changes such as reduced lake clarity and reorganization in the zooplankton have been noted starting in 1989. This includes increases in *Daphnia*, *Bosmina* and *Cyclopoid* biomass. The mean size of fish stocked in the lake during the past ~20 years has varied widely. Interestingly, there are no significant changes in shallow primary productivity, stratification, nor spring air temperatures. A strong correlation exists with mean air temperature in August. The significance of this last correlation will be explored in the context of climate and community

effects. Follow-up work will include more precise determination of the timing of the various diatom shifts in core, especially the loss of *C. ocellata* complex and the more recent shift to *C. bodanica* and *A. formosa*.

POSTER PRESENTATION