FEASIBILITY STUDY FOR USING DIATOM ASSEMBLAGES FROM A SMALL DILUTE SUBALPINE LAKE AS AN INDICATOR OF PAST MEGADROUGHTS IN THE SIERRA NEVADA.

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A 112cm sediment core segment from Fallen Leaf Lake is analyzed to test the potential for using the lake's diatom record as a proxy for paleohydrographic variability in the Lake Tahoe watershed, Northern California. Fallen Leaf Lake is a small, deep dilute oligotrophic system that fills the steep-sided Glen Alpine glacial valley. Its deep southern sub-basin is separated from the shallower northern sub-basin by a series of morrainal ridges that could have potentially partitioned the lake during past lowstands. A previously documented lowstand 36-50m below current lake level serves as an independent calibration point with which to test the diatom sensitivity. This lowstand is interpreted to represent the Medieval Climate Anomaly (MCA), which has been documented to have prolonged drought effects throughout the Great Basin and Sierra Nevada during the 12th and 13th centuries. The MCA is manifested in Fallen Leaf Lake as a series of large submerged trees with drowning ages of 700 cal yr BP. The upper section of a 9.5m core taken in 111m water depth in the southern depocenter is analyzed. Preliminary ^{14}C dates from plant macrofossils collected down-core suggest that the lowstand (circa 950-700 cal yr BP) is preserved somewhere between 50-70 cm. Samples of 0.5 cm thickness were taken every 4cm, and identifications were made to the lowest taxonomic level resolvable by 1000x light microscopy.

Diatom assemblages are dominated by phytoplankton, primarily centrics (*Discostella*, *Aulacosira subarctica*, and *Cyclotella rossii-ocellata* complex,) and lesser amounts of araphid pennates (*Asterionella formosa*, *Fragilaria tenera*, *Tabellaria fenestrata*). Other significant components include several shallower tychoplantonic fragilariods (*Pseudosaurosira brevistrata, Staurosirella pinnata*, and *Staurosira construens*), several low-mantled *Aulacoseira* species (eg. *A. humilis*), and small monoraphids (*Karayevia*, *Psammothidium*, *Rossithidium*), and *Nitzschia* (*N. frustulum, N. gracilis*). Initial counts of 500+ valves were conducted on 10 samples concentrating across the 50-70cm interval, and indicate several changes that may indicate a measure of lowstands or flooding given further investigation. Sample 53 stands apart from those above and below in several ways, including lower numbers of *A. formosa* and *Discostella*, and higher numbers of *C. bodanica* and the larger ocellate variant of the *C. rossi-ocellata* complex. Changes in *Discostella* abundance may be of interest because it presently is not living in the lake, but is washed in from higher in the watershed during spring runoff. The % of low-mantled *Aulacoseria* is markedly higher in the 53 to 69 cm interval than above and below, and may correspond to increased input from marshy habitats established during lowstands. Additionally, small monoraphids (primarily *Psammothidium* and *Rossithidium* species) and shallower water fragilariods (*Staurosira* and *Staurosirella*) increase in both abundance and diversity from approximately 57 to 65 cm depth, which could signal a decrease in planktonic species coincident with the MCA. Additional work will establish planktonic to benthic ratios of counted diatom species and tie these results to a three-dimensional model of the morphometry of FLL currently under development that will help delineate the extent of shallow benthic habitats during lowstands.

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