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Long-term Plankton and Nutrient Changes in Prairie Lakes

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ABSTRACT

Plankton and nutrient chemistry data are presented from six lakes, Pickerel, Enemy Swim, Cochrane, Hendricks, Oak and Bitter, sampled during two time periods, 1970-1979, and 1990-1997. In addition, data from Lakes Roy, East Oakwood, and Tetonkaha, sampled between 1988 and 1994, are compared. All of the data bases presented include samples taken from spring, early summer and late summer seasons of the lakes. The lakes range from saline to fresh and from eutrophic to hypertrophic, as determined by depth and the ability of winds to resuspend nutrient rich sediments back into the water column.

The combined data base for phytoplankton genera includes 837 samples from 1970-1979 and 677 samples from 1988-1997. The data base for zooplankton genera includes 851 samples from 1970-1979 and 685 samples from 1988-1997. The data base for physical and chemical variables varies in number. Physical variables include temperature, water transparency (secchi depth), station depth, and electrical conductivity. Chemical variables include Chlorophyll α, nitrate-nitrogen, ammonia-nitrogen, total nitrogen, soluble reactive phosphorus, total phosphorus, silica, iron, manganese and major cations and anions.

Several of the lakes show decreases in both water transparency, and total phosphorus levels, and two of the lakes show decreases in total nitrogen between the 1970's and the 1990's. Differences in methodology might account for measured changes in the phosphorus levels. Decreases in the larger zooplankters between the decades, especially *Daphnia* spp. may influence the water transparency. Phytoplankton genera show random changes within lakes. In Lake Cochrane, erosional events in the 1970's and and artificial drains both into and out of the lake in the 1990's may have influenced the phytoplankton composition and abundance. Severe winterkill during the 1970's influenced the changes in phytoplankton abundances in Lakes Hendricks and Oak. Extreme water level changes influenced Bitter Lake in the 1990's resulting in greatly lowered conductivities and a phytoplankton change from an *Anacystis*-dominated saline lake assemblage to an *Aphanizomenon*-dominated assemblage including freshwater taxa not previously recorded from Bitter Lake.

Most variables tested show great similarity between decades, indicating current stability of the prairie lake ecosystem. However, as inputs into the lake create sediments and increase shallowness, lakes that are currently eutrophic may come in danger of hypertrophy from sediment resuspension.

The complete paper will be published in the 2003 *Proceedings.*