

FROM AGRICULTURE TO CONSERVATION EASEMENT - LAKE RESPONSE TO LANDUSE CHANGE

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The Bass Lake Preserve was acquired by the Geauga Park District, Geauga County, Ohio through the Trust for Public Land in 2003. The Preserve includes a 65 hectare lake and approximately 245 hectares of surrounding land. Ninety percent of the current shoreline is reforested or has extensive wetland vegetation. We conducted an assessment of Bass Lake to determine current conditions, assess over 60 years of basin-wide change in land-use practices, and determine lake response to these changes using sediment diatom assemblages. A 95cm sediment core was collected from the deepest point in Bass Lake and sub-sectioned it into 1 cm intervals. Loss-on-ignition (LOI) analysis was conducted on all samples to determine organic carbon content. Select intervals were analyzed for fossil diatom assemblages based on organic carbon fluctuations. Dates were determined by Pb²¹⁰ analysis on subsamples from a companion core. Correspondence analysis was conducted to identify changes in diatom assemblages, and diatom-inferred total phosphorous concentrations were reconstructed using a locally developed phosphorus inference model from 30 regional lakes in Northeast Ohio and Northwest Pennsylvania. Black and white aerial photos, color orthophotos, Landsat imagery, and Geauga County historic records were incorporated into land-use analysis using ERDAS and ArcGIS. Written historical records were also used to determine possible human impacts and compared with LOI carbon analysis, diatom analysis, and GIS analysis of 20th century land-use changes. Evidence of early damming and dredging with recent eutrophication from development is seen in the carbon and diatom record. Diatom assemblages shift from low-pH, low-TP species such as *Eunotia incisa* to higher-pH, higher-TP including small *Stephanodiscus* species. GIS results show a transition from heavy agricultural use in the watershed during the 1950's to considerable reforestation post-1960's and increased development over the past decade. Diatom data indicate that basin reforestation has little affect in lake phosphorus levels or sedimentation rates, and a return to pre- or early settlement lake conditions does not occur even though vegetative buffers have been in place for more than 40 years. Current land use policies and practices, including landscape fragmentation, aging septic systems, increased upstream residential development, as well as phosphorus reservoirs in lake sediments, reduce the effectiveness of protected shoreline and conservation easements surrounding Bass Lake.

ORAL Presentation