USING LAKE HISTORIES IN NATURAL RESOURCE MANAGEMENT: RECONSTRUCTION OF NUTRIENT LEVELS, SECCHI DEPTH, AND ALGAL BLOOM HISTORIES IN BIG ROUND LAKE, WISCONSIN, USA.

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Applied paleolimnology is useful for elucidating a lake's ecological history so that appropriate management or restoration goals may be set. Big Round Lake is a 411 hectare lake in northwestern Wisconsin (north central United States). In recent years the mean summer Secchi depth in Big Round Lake has been 2 meters, and the lake has experienced periodic cyanobacterial blooms. To determine whether the degraded conditions were due to recent disturbances, or if they were long-standing conditions, we retrieved a sediment core from the deepest area of the lake. The lake sediments dated from roughly 1850 to 2006. Bulk sediment accumulation rates and accumulation rates of geochemical variables were calculated using ^{210}Pb and the CRS model. The mean mass sedimentation rate was one of the lowest of 51 Wisconsin lakes for which we have determined mean sedimentation rates over the last 150 years. We analyzed the diatom community and found that the general composition has changed little over the past 150 years. *Aulacoseira ambigua*, *A. granulata*, small *Staurosira* spp., and *Pseudostaurosira brevistriata* were the most abundant diatoms in the core. There has been a slight increase in planktonic diatoms since the mid-1960s, possibly indicating a phosphorus increase. We used diatoms for a weighted average model of historical water clarity. The estimated mean Secchi depth for the past 150 years varied between 2.0 and 2.3 meters, which is very similar to the mean summer Secchi depth measured in recent years. We analyzed the sediments for other algal microfossils. Akinetes of the cyanobacteria *Anabaena* and *Aphanizomenon* were found throughout the core, and indicated the occurrence of algal blooms in Big Round Lake prior to European settlement in the region. *Aphanizomenon* was more common than *Anabaena* before 1940, and decreased relative to *Anabaena* starting in 1960, possibly indicating an increase in phosphorus levels. *Anabaena* has decreased since 1990, which may indicate a shift in dominance to *Microcystis*, which does not form akinetes. The increase in planktonic diatoms and decrease in *Aphanizomenon* since 1960 likely reflects increased phosphorus levels. Recent degraded conditions in the lake are likely not new to the lake, and reduced Secchi depths associated with cyanobacterial blooms have probably occurred long before European settlement in the region.