

Report on sediment core from Mirror Lake, Waupaca County, WI
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A sediment core was taken from the deepest area (13m) of the lake in 1977. The total length of the core was 100 cm. Analyses performed on the core were: sediment dating, algal pigments, organic matter, calcium carbonate, and diatom community. The diatom analysis was performed by David Farris for his Master of Science degree from the University of Michigan.

The dating analysis indicates that the time period covered by the core is approximately 1200 years. Analysis of the geochemistry and diatom community indicated that during this time the lake has experienced significant water level fluctuations primarily as a result of climate variability. Since the area was settled in the mid-1800s water levels appear to be more stable. The greatest change in the lake ecosystem occurred about 1950 which was when storm sewers began discharging into the lake. These sewers delivered more nutrients to the lake, especially phosphorus. The result was an increase in algal productivity, and increase in the lake's sedimentation rate, and an increase in phosphorus deposition. The changes induced by the storm sewers were greater than the lake had experienced in the previous 1200 years.

The diatom community indicated that during the last 1000 years there were 3 major shifts in the diatom flora signaling significant changes in the lake's ecosystem. The first two zones resulted from changes in the lake level, while the third zone was the result of human settlement altering the mixing regime of the lake and increasing nutrient input to the lake. Prior to the establishment of the city of Waupaca the landscape may have been mostly prairie which resulted in more wind energy impacting the lake and thus the lake experienced greater mixing. With the establishment of the city, trees were more prevalent and less wind energy reached the lake resulting in greater stagnation in the lake. In the late 1970s, one of the management actions was to add an aeration system to artificially mix the lake in the spring and fall. This was done mostly to reduce the occurrence of winter fish kills. The diatom community confirms results from the algal pigment analysis that indicates that with the introduction of storm sewers to the lake around 1950, more nutrients entered the lake and the greatest change to the lake's ecosystem occurred during the last 50 years.