



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: MN3381

Title: Eutrophication and Remediation in Context: High-Resolution Study

Focus Categories: Sediments, None

Keywords: Anoxia, Geochemistry, varved lake sediments, human impact, Eutrophication

Start Date: 03/01/2001

End Date: 02/28/2002

Federal Funds: \$22,993

Non-Federal Matching Funds: \$23,000

Congressional District: 5

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Abstract

Lake McCarrons, Ramsey County, Minnesota, is an alkaline, eutrophic urban lake whose bottom waters become anoxic soon after ice-out and frequently remain anoxic through the winter. A remediation effort in the form of a chambered wetland and detention pond complex to reduce phosphorous loading was undertaken in 1985. Results were encouraging during the first three years after construction, but since then little reduction in nutrient input has been seen.

The present study proposes to produce an annual-resolution, 200-year record of lake water quality variability from a 1-2 meter sediment core from the deepest part of the basin. Previous core results show that the sediments are annually laminated with thick layers, especially above the putative settlement horizon. In addition to the new short core, samples additional to those already analyzed will be taken from a 4.1-meter core taken in 1999, which represents >2000 years of sedimentation. The study will comprise a detailed sedimentology of the cores, along with geochemical and stable isotopic measurements of individual (annual) layers.

Initial results from the 4.1-meter core indicate that Lake McCarrons was experiencing eutrophication long before human impacts to the lake system; given these data, lake managers and agencies will be better able to target realistic goals for the lake water quality and remediation effort. Sediment studies are uniquely suited to provide long-term records unattainable through monitoring or modeling, and in lakes worldwide could provide the context of natural variability for the effects of human impacts to the system.