

MEMORANDUM

TO: RPBCWD Board of Managers

FROM: Joshua Maxwell – Water Resources Coordinator

DATE: February 24, 2022

RE: UMN Proposal to Research Managing water quality and invasive macrophytes to promote healthy native aquatic plant communities.

Principal Investigator:	Raymond M. Newman, Fisheries, Wildlife, and Conservation Biology, University of Minnesota, St. Paul, MN 55108
Co-Principle Investigators:	William R. Herb, St. Anthony Falls Laboratory, University of Minnesota and Amit K. Pradhananga, Center for Changing Landscapes, University of Minnesota
Project Partners:	UMN-St. Paul, USGS, WRI, 9-Mile Creek WD, MNDNR, WIDNR, UW-Stout, TRPD, Rice Creek WD, Metropolitan Council, RPBCWD

Project Funding –

Federal Funds/USGS/WRI AIS Competitive Grant Funds	\$249,988
Matching Partner Contributions	\$251,831
RPBCWD Contribution 2022	\$49,326
RPBCWD Contribution 2023	\$50,353
Total Project Cost	\$501,819

STAFF REQUEST

Staff is seeking Board concurrence on continuing to partner with the UMN on aquatic plant management and authorization to work with legal counsel to develop the necessary agreements to be brought back to the Board.

Research Need:

Aquatic macrophytes are often limited by water clarity, particularly in impaired lakes, and improvements in water quality via reductions in external and internal loading often result in expansion of submersed macrophytes. In many instances, however, invasive aquatic plants are present and increase at the expense of native plants. Invasive macrophytes usually can persist in poorer water clarity conditions than native plants and although there are a variety of methods to effectively control invasives, restoring native plant communities is difficult without further water quality enhancements. Thus management agencies attempting to meet water quality standards and nutrient, clarity and biological criteria, have a difficult time balancing water quality improvements with invasive plant impacts. The investigation will use a combination of field assessments of water quality and aquatic plants in managed lakes, within-lake water quality modeling and an across basin water quality and management response to assess best practices to enhance native macrophyte communities while improving water quality to meet water quality standards. The research will assess current practices used by western Wisconsin and Twin Cities Metro Watershed Districts and agencies to determine which practices appear to be most effective and cost effective. Research results will inform our basic understanding of the interlinkage of water quality and native and invasive macrophytes and provide recommendations for effective and attainable actions that can be used to address water quality and invasive plant management across the Upper Mississippi Basin.

Overall UMN Research Objectives/Priorities:

1. Improved understanding of the impacts of invasive aquatic plants on lakes in the Upper Mississippi Basin and their relationship to water quality.
2. Identify lake characteristics (nutrients, water quality, plant communities and management) that influence establishment, expansion and impacts of invasive aquatic plants in these systems and how management of invasives and water quality can be used to improve water resources in similar lakes throughout the Upper Mississippi Region.
 - a. Assess the response of native and invasive aquatic macrophytes to management interventions, reduced nutrient loading and associated water quality improvements and the effects of invasive macrophyte management on native plants and water quality.
 - b. Model the response of water quality (nutrients, algae and clarity) and aquatic macrophytes with a 1-D shallow lake and 2-D deep lake (CE-QUAL-W2), compare results and determine best approaches to model and assess response to management actions.
3. Provide a social and economic assessment to determine the effort and expenditures of water management organizations to improve water quality, manage invasive aquatic plants and restore native macrophyte communities and identify technical, organizational and programmatic constraints to the implementation of best practices.
 - a. Assess current practices used by a subset of western Wisconsin Lake Districts, Associations or cities, and Twin Cities Metro Watershed Districts and agencies to determine which practices appear to be most effective and cost effective.
 - b. Assess local and state management unit (e.g., watershed district, watershed management organization) capacity for integrated water and invasive species

management to identify technical, organizational and programmatic constraints to implementation of best practices (e.g., alum treatment) aimed at enhancing water quality and native vegetation while containing invasive plants.

Overall, the proposed research will provide information and tools to increase the relative effectiveness of various approaches to manage AIS and water quality.

RPBCWD Specific Objectives & Benefits:

1. Continue efforts to restore native plants and control invasives in Lakes Riley, Susan and Staring.
2. Assess response of native and invasive macrophytes to herbicide treatments to control curlyleaf pondweed and Eurasian watermilfoil in Lakes Riley, Susan, and Staring and to water clarity improvements via alum treatments in Riley (2016 and 2021) and Susan (proposed in near future). Integrate these results into a larger USGS study to assess the response of native and invasive plants to water quality improvements.
 - a. **Involves intensive aquatic vegetation monitoring including Point Intercept Surveys, Turion Surveys, Seedbank Analysis Surveys that will add to Districts knowledge of aquatic plant communities in the included waterbodies.**
 - b. **Many of these surveys would need to be completed by the District regardless of approval of the UMN proposal.**
 - c. **Staff lack capacity to complete surveys on lakes in this study when combined with normal monitoring work and aquatic plant related surveys on other District lakes.**
 - d. **Part of a multistate and multilocal partner study in addition to continuing the ongoing relationship with the UMN.**
 - e. **Professional publications in scientific journals and planned presentations at conferences will expand the awareness of the District and build on its reputation of being a leader in the field of water resources.**
3. Recommend and assess further approaches to enhance establishment and growth of native macrophytes while controlling or preventing development of nuisance populations of curlyleaf pondweed and Eurasian watermilfoil including use of alum treatments to improve water clarity and stocking or transplanting if natural recruitment does not occur and the emergent bank is depleted.
4. Using RPBCWD data and data from the literature and other metro lakes, determine plant community target criteria for quality plant communities in the metro for shallow and deeper lakes. These criteria may range from whole-lake or sampling point species richness, to occurrence or abundance of invasives and indicator species or IBI scores.
5. Apply these approaches and the restoration criteria to lakes in the RPBCWD and make management recommendations.