



# LEGACY FUND RESTORATION EVALUATION REPORT

Technical Panel Findings and Recommendations—2023



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## Technical Panel Findings and Recommendations—2023

### REPORT TO THE MINNESOTA LEGISLATURE

Senate Environment and Natural Resources Finance Committee

Senate Environment and Natural Resources Policy and Legacy Finance Committee

House Environment and Natural Resources Finance and Policy Committee

House Legacy Finance Committee

Lessard-Sams Outdoor Heritage Council

Clean Water Council

Parks and Trails Legacy Advisory Committee

Submitted by the Department of Natural Resources and the Board of Water and Soil Resources

### Legislative Charge

Parks and Trails Fund: M.S. 85.53, Subd. 5

Outdoor Heritage Fund: M.S. 97A.056, Subd. 10

Clean Water Fund: M.S. 114D.50, Subd. 6

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Minnesota DNR/BWSR

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Contents

Executive Summary ..... 4

Projects Evaluated ..... 5

2023 Evaluations Summary ..... 6

Restoration Evaluation Panel Recommendations .... 8

Improving Future Restorations .....18



When Minnesotans passed the Clean Water, Land and Legacy Amendment in 2008, they did so with high expectations. As projects have moved forward throughout the state, so too have efforts to ensure that the projects are meeting those expectations.

This report summarizes annual work to evaluate Legacy Fund restorations. This effort is intended to support project partners in maximizing the impact of Minnesotan's investment. The Department of Natural Resources (DNR), Board of Water and Soil Resources (BWSR) (agencies), and the restoration evaluation panel (panel), continue to work together to improve restorations throughout the state. The panel is composed of experts from state and other resource agencies and academic institutions.

This report summarizes evaluations of 28 projects done in 2023, and panel recommendations based on 275 evaluations conducted since 2012. Projects evaluated in 2023 are largely on track to meet stated goals and utilizing current science. However, the panel did identify areas for improvement including:

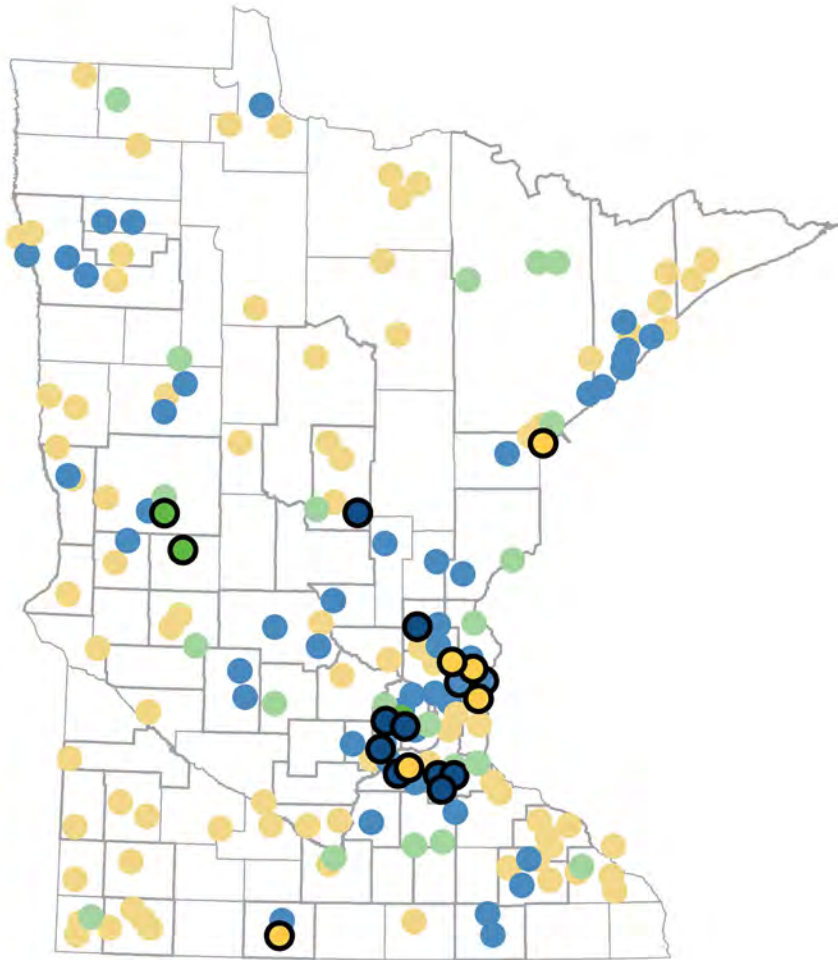
- Implementation of common carp barriers
- Alum treatment approach
- Detailed restoration project documentation

New and ongoing recommendations from the panel are presented in the Recommendations section. These recommendations are promoted by program staff through reports, presentations, and targeted trainings.

# PROJECTS EVALUATED

## PROJECTS EVALUATED IN 2023

*Dots may represent more than one project site. Circled dots represent projects evaluated in 2023; plain dots represent projects evaluated in previous years. Project evaluations from 2023 are available in Appendix A Program Process and Project Evaluations.*



# 2023 EVALUATIONS SUMMARY



## EVALUATED PROJECTS

Projects were completed using three Legacy Funds:

- Clean Water Fund (CWF)
- Outdoor Heritage Fund (OHF)
- Parks and Trails Fund (PTF)

	CWF	OHF	PTF	All Funds
Project sites in evaluation program pool	453	8,610	1,437	7,145
Project sites evaluated in 2023	15	10	3	21
Project sites evaluated to date 2012 - 2023	107	131	37	275

## STATUTE CHARGE

As statute directs, projects are evaluated relative to the law, current science and stated goals. Statute also directs the panel to determine any problems with the implementation and provide recommendations on improving future restorations. Detailed project evaluations are provided in Appendix A Program Process and Project Evaluations.

## STATED GOALS

Most projects evaluated to date (77%) were on track to meet or exceed their stated goals. Ongoing monitoring and maintenance are generally required for these projects to provide habitat and other benefits into the future.

Projects goals include:

- Restoring coastal marsh and open water habitat for multiple benefits
- Restore and protect critical nesting habitat for Common Tern and stopover habitat for Piping Plover
- Create spawning habitat for northern pike

- Use barriers to control migration of common carp, reduce populations and limit ecological impacts
- Suppress invasive brush to enhance woodland habitat
- Remove trees and control nonnative grasses to support a native-dominated prairie reconstruction
- Restoring sand-gravel hill prairie
- Reduce internal phosphorus loading and attain state water quality standards for lakes

## CURRENT SCIENCE

Most projects evaluated to date (84%) utilized best practices within the range of current science. However, the panel identified opportunities to improve the use of current science. These opportunities for improvement include:

- Incorporating new and current design guidance for carp barriers
- Selecting and utilizing appropriate measures to plan and monitor alum treatments

## PROBLEMS WITH IMPLEMENTATION

Restoration projects take place in dynamic and complex landscapes. Most projects to date (74%) were implemented without problems. While not all problems can be predicted or prevented, the panel identified situations where problems arose that could be avoided in the future. Problems with implementation include:

- Lack of site-specific restoration plans
- Use of novel carp barrier designs without prior field testing
- Applying only partial dose for alum treatments



# RESTORATION EVALUATION PANEL RECOMMENDATIONS

A critical component of restoration evaluations is identifying issues and providing guidance to project managers to improve future restorations..

Statute directs the panel to determine  
*...any problems with the implementation of restorations, and if necessary, recommendations on improving restorations.*

The emphasis of reporting is also directed in statute

*...the report shall be focused on improving future restorations.*

## NEW RECOMMENDATIONS

- Improved Alum Treatment Approach
- Improved Implementation of Common Carp Barriers





# ONGOING PANEL RECOMMENDATIONS



## **Improved Project Teams**

More comprehensive project teams should be used to improve ecological outcomes.

## **Improved Documentation**

Documentation is critical for planning, tracking, and achieving successful restorations.

## **Improved Restoration Training**

Continued development and implementation of training is essential to promote science-based practices.

## **Improved Design Criteria for Lakeshore Projects**

Utilize minimum design criteria to mimic shoreline's natural structure and vegetation.

## **Improved Planning for Stream Projects**

Detailed project planning and consistent implementation of will produce the best outcomes in stream restoration.

## **Improved Vegetation for Stream Projects**

Well established vegetation is critical for the long-term success of stream projects.

## **Improved Project Review by Technical Experts**

Utilize technical experts in the review and planning of complex projects.

## **Phased Approach for Buckthorn Management**

A phased approach to buckthorn management that incorporates the timing and sequencing of actions is needed to achieve effective, long-term control.

## **Improved Seed Selection and Implementation**

Guidance during early planning for seed mix selection and implementation is needed to support more consistent planting success.

## **Climate Change Contingency Planning**

Contingency plans for variable weather conditions are an important part of restoration planning in a changing climate, especially for native vegetation establishment.

## **Details regarding Ongoing Panel Recommendations are available here:**

[dnr.state.mn.us/legacy/restoration-evaluation.html](http://dnr.state.mn.us/legacy/restoration-evaluation.html)

# NEW PANEL RECOMMENDATIONS



## IMPROVED IMPLEMENTATION OF COMMON CARP BARRIERS

Carp barriers can be an effective conservation practice when paired with other carp management actions, informed by integrated pest management plans, and when site-specific, field-tested designs are used. Barriers can be a critical component of carp management but are not likely to reduce population levels when used alone. There are alternative strategies to barriers that may help reduce carp recruitment, such as predator fish enhancement via

stocking and aeration to prevent winter kills of predator fish. In many cases, increasing mortality of adult carp (e.g. removal, drawdown) will be necessary to achieve desired outcomes.

The panel identified instances of older carp barrier designs that were unsuccessful due to clogging and enabling carp passage during high water. Experts at the University of Minnesota can help guide specific designs.

### ROLE OF PROJECT MANAGERS/ PARTNERS

- Prepare and use integrated pest management plans informed by data on migration, population size, and age-structure to guide carp management
- Tie carp management actions to specific and measurable goals. Typically, management goals are based on reduction in carp biomass below 100 kg/ha (Bajer et al 2009) leading to increased water clarity and reduced total phosphorus
- Engage experts on appropriate planning and design of carp barriers
- Plan for regular maintenance of barriers

### ROLE OF FUNDING ORGANIZATIONS

- Establish criteria to evaluate carp barrier proposals that considers design, placement, and integration with comprehensive carp management plans to ensure performance of completed projects

### ROLE OF STATE AGENCIES

- Provide technical expertise on fisheries considerations of barriers to balance carp control and native fish passage needs

### ADDITIONAL LINKS

Bajer, Sullivan, & Sorensen. Effects of a rapidly increasing population of common carp on vegetative cover and waterfowl in a recently restored Midwestern shallow lake. *Hydrobiologia* (2009). <https://doi.org/10.1007/s10750-009-9844-3>

AIS Detectors, Carp Management and Lake Restoration Webinar: <https://www.youtube.com/watch?v=nNbtwNphxuw&t=16s>



# WHAT'S WORKING IN MINNESOTA

## MARTIN AND TYPO LAKES — ANOKA CONSERVATION DISTRICT

Anoka Conservation District's (ACD) long-term, comprehensive approach to carp management is supporting restoration of Martin and Typo Lakes. ACD installed well-designed, strategically placed barriers in Martin and Typo Lakes based on knowledge of carp populations and movement. The project is benefited by partnership between ACD and DNR Fisheries, who provide technical expertise on when barrier grates should

be in place to block carp or removed for native fish passage. ACD uses barriers that block migration and spawning routes in combination with active harvesting to reduce carp and their impacts on the lakes. ACD's monitoring program shows progress toward goals for carp populations and water quality. Carp biomass has been reduced by 40% in Typo Lake and 30% in Martin Lake through removals and preventing access to spawning and overwintering habitat. Over the last five years, Martin Lake's average total phosphorus has improved to near the state impairment standard.



## THE CONCERN WITH CARP

Common carp are a non-native species that can thrive in impaired waters and reduce water quality by stirring up sediments and uprooting aquatic plants when feeding. This source of increased internal nutrient loading is important for managers to address in lake restorations.

# NEW PANEL RECOMMENDATIONS

## IMPROVED ALUM TREATMENT APPROACH

Aluminum sulfate (alum) treatments are an in-lake restoration method used to sequester Phosphorus (P) and have been funded by Clean Water Fund grants. Alum treatments are an approach that can support restoration goals but should not be viewed as a complete solution to lake impairments. These treatments support water quality goals when paired with other watershed and lake management efforts. An integrated lake management approach can maximize the benefits of an alum treatment and support desired outcomes for lake conditions.

The panel identified greater success in alum projects that 1) are done in lakes suitable for in-lake restoration (see Huser et al 2016), 2) collect information to assess the effectiveness and longevity of applied alum and, 3) continue comprehensive lake and watershed improvements after treatment.

State-funded alum treatments should:

- Incorporate specific goals and pre and post measures to evaluate performance and inform future management

- Be durable. Longevity of alum treatments can vary widely and relevant factors should be considered prior to treatment (e.g., lake-specific characteristics, carp populations, continued external P loading, dosing needs)
- Be applied in split doses when needed to avoid biological impacts or support optimal treatment outcomes. Split dose treatments may be difficult to achieve within the grant window without advance planning

### ROLE OF PROJECT MANAGERS/ PARTNERS

- Consider an integrated lake management approach to guide alum treatment planning
- Develop specific goals and track measures to evaluate the success and longevity of alum treatments. Best practice measures include: pre- and post-treatment hypolimnetic P, pre- and post-sediment P release rates, and sediment cores of aluminum bound P

### ROLE OF FUNDING ORGANIZATIONS

- Refine grant requirements to best fit current science on alum treatments and limit problems with implementation

### ROLE OF STATE AGENCIES

- Establish a better understanding on the use of alum in Minnesota by reviewing outcomes of completed treatments

### ADDITIONAL LINKS

Huser, Egemose, Harper et al. Longevity and effectiveness of aluminum addition to reduce sediment phosphorus release and restore lake water quality. *Water Research* (2016). <https://doi.org/10.1016/j.watres.2015.06.051>

Minnesota State Review of Internal Phosphorus Load Control: <https://www.pca.state.mn.us/sites/default/files/wq-s1-98.pdf>

Watershed Health Assessment Framework: Lakes: Explore Watershed Lakes: Minnesota Department of Natural Resources ([state.mn.us](http://state.mn.us))



## INTEGRATED LAKE MANAGEMENT

Integrated Lake Management is a holistic approach focused on effective, long-term solutions to lake management. The approach parallels Integrated Pest Management, which is widely used to manage pests and address complex problems effectively. An integrated management approach considers all potential management options, relevant social/ecological factors, and requires a thorough understanding of the system to be restored. For lakes, it is important to consider the external and internal factors influencing the ecosystem to make sure all problems are addressed. Alum treatments are an effective tool to address internal stressors on water quality but do not mitigate continued external nutrient loading. The DNR Watershed Health Assessment Framework for lakes is a useful tool to assess lake health and begin planning lake restoration and management.

States like Wisconsin require a Lake Management Plan to fund alum treatments. These plans are valuable in prioritizing activities and ensuring implemented actions have the most impact. Additionally, the stakeholder engagement involved with integrated lake management planning can build shared expectations and avoid issues with common outcomes of lake restoration, like increased aquatic plant growth.

# PANEL RECOMMENDATIONS

## IMPROVED DOCUMENTATION

Improved Documentation was recommended in the first Restoration Evaluation Report in 2012. Documentation is an essential component through all stages of a restoration project, from planning to implementation and post-project monitoring. Each project funded by the Legacy Amendment is charged with documenting their work in a restoration plan. The panel has noted challenges with evaluating some projects when essential documentation like specific project goals, existing site conditions, or site-specific restoration plans are not available. The Restoration Evaluation Program evaluates projects based on stated goals, use of current science, and problems with implementation. Project documentation should be sufficient to evaluate these categories.

Well-documented projects provide opportunity to:

- Assess successes and challenges to inform future projects
- Support consistency and long-term management when staff turnover occurs
- Identify long-term project maintenance needs

### ROLE OF PROJECT MANAGERS/ PARTNERS

- Create site-specific restoration plans for Legacy Funded projects, even when sites are within a larger public land network or park system directed by broader, long-term plans

### ROLE OF FUNDING ORGANIZATIONS

- Emphasize requirements related to documentation and restoration planning

Learn more about the Improved Documentation recommendation on our website: <https://www.dnr.state.mn.us/legacy/restoration-evaluation.html>



Hans Johnson, Minnesota Land Trust



# WHAT'S WORKING IN MINNESOTA

## ST LOUIS RIVER ESTUARY — INTERSTATE ISLAND

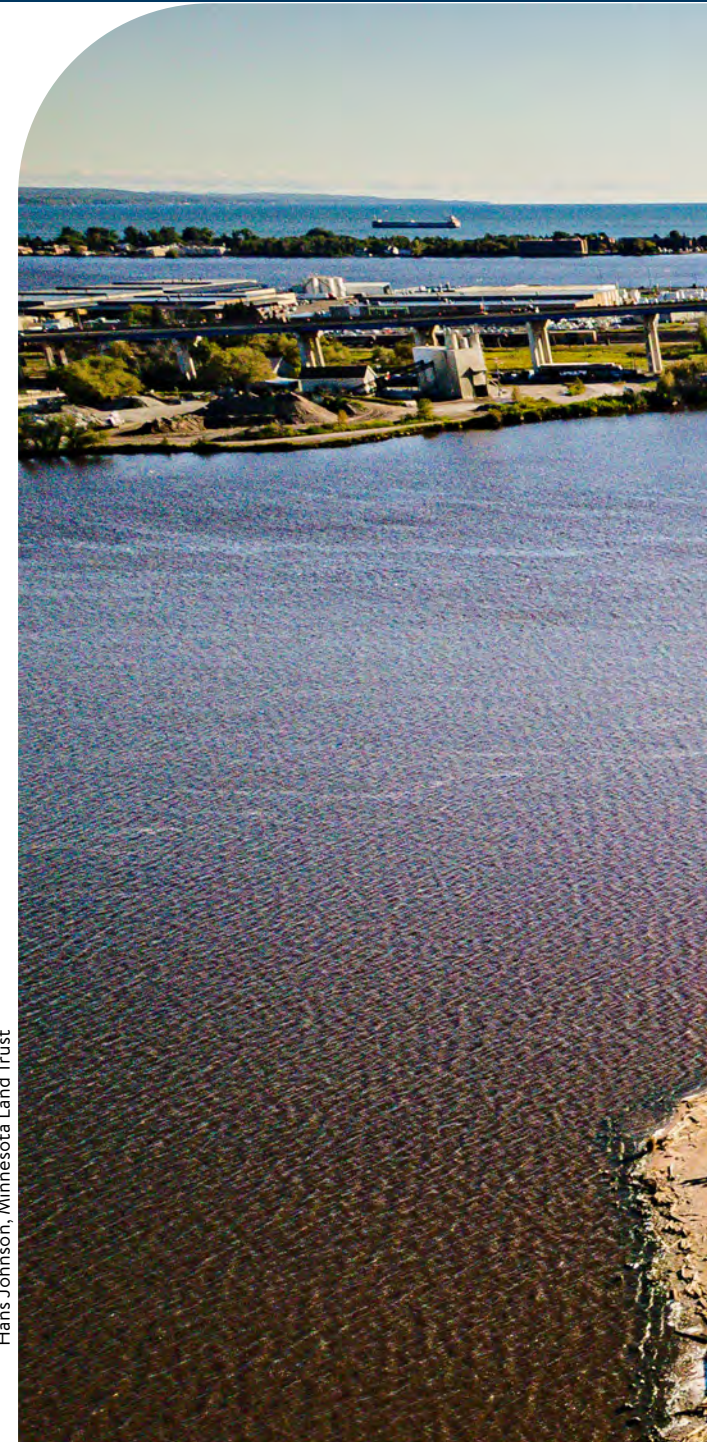
Interstate Island Wildlife Management Area is an artificial island created in the St. Louis River from dredged materials in the mid-1930s. The island hosts a nesting colony of Common Terns, a state listed threatened species, and provides important habitat for many other bird species. Since it was inhabited by the terns in 1989, the island size has decreased due to rising water levels and wind and wave

erosion. These changes to the island led to a decline in habitat quality and increased competition. Partners recognized the need for restoration on the island to support conservation of the Common Tern and other bird species.

This project exemplifies recommended practices from the restoration evaluation panel including comprehensive project teams, technical review and documentation. Minnesota Land Trust and Minnesota DNR, in coordination with U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers and Wisconsin Department of Natural Resources, initiated a project to restore the island by expanding its size and adding elevation to increase resiliency to future climate conditions. This comprehensive project team was key in navigating multiple jurisdictions and priorities for the island. Engineering expertise was used to design and implement the complex marine construction to restore the island. Biologists were consulted on habitat specifications for wildlife, including bare ground for Common Tern nesting and vegetation for shorebirds. Detailed documentation and monitoring of this project are supporting Common Tern conservation and improving habitat within the St. Louis River Area of Concern.



Hans Johnson, Minnesota Land Trust



Hans Johnson, Minnesota Land Trust





# IMPROVING FUTURE RESTORATIONS

Maximizing the benefits of Legacy Funded restorations requires evaluating projects to learn what's working, engaging experts to promote current science, and communicating recommendations so they can be implemented.



## EVALUATING PROJECTS

In 2023, we evaluated 28 projects. In addition to visiting wetland and prairie-savanna project sites, two lake restoration methods – alum treatments and carp barriers – were reviewed for the first time by the program. Combining these evaluations with previously completed site visits provides a broader view of the implementation of Legacy Funds, the benefits they are providing, and opportunities to maximize the benefits of the funds for Minnesotans.

## ENGAGING EXPERTS

A goal of the Legacy Fund Restoration Evaluation Program is to facilitate the technical exchange between restoration experts and practitioners. This begins in the field with state or contracted site assessors and project managers discussing implemented restoration practices and shared experience on the ground. Program staff and site assessors then draft site evaluation reports. These reports are presented to the panel annually by site assessors and program staff to discuss challenges and successes across Legacy Funded restoration projects. This technical exchange forms the recommendations for the Annual Report and future communications to stakeholders.

PROGRAM ACTIVITIES  
**2012-2023**

**275**

PROJECTS EVALUATED  
(ALL HABITAT TYPES)

**267**

EXPERTS  
ENGAGED

## COMMUNICATING WITH STAKEHOLDERS

For panel recommendations to make a difference, they need to be communicated to the stakeholders engaged in planning, funding, and implementing restorations in the state.

One way our program is meeting this goal is collaborating with the University of Minnesota Extension on a four part webinar series focused on climate change planning and adaptation for restorations. Restoration experts were invited to share applied experiences on topics including climate change contingency planning and seed selection and implementation, that were 2022 evaluation panel recommendations for improvement.

MORE THAN  
**5,000**  
STAKEHOLDERS  
REACHED

## ADDITIONAL RESOURCES

### RESTORATION EVALUATION PROGRAM WEBSITE

<https://www.dnr.state.mn.us/legacy/restoration-evaluation.html>

### APPENDIX A PROGRAM PROCESS AND PROJECT EVALUATIONS

<leg.state.mn.us/edocs/edocs?oclcnumber=823766285>





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