



**APWA MINNESOTA CHAPTER  
PUBLIC WORKS ENVIRONMENTAL STEWARDSHIP AWARD  
NOMINATION FORM**

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**Submission Deadline: October 1, 2022**

**All nomination and supporting data are to be submitted in electronic PDF format to Sarah at [sarah.lloyd@bolton-menk.com](mailto:sarah.lloyd@bolton-menk.com) with a maximum file size of 3.0 MEGS.**

**Group or Program Nominated:**

Managing Agency: \_\_\_\_\_  
Contact Person: \_\_\_\_\_  
Email: \_\_\_\_\_  
Agency Address: \_\_\_\_\_  
Agency Phone Number: \_\_\_\_\_

Name of Person Making Nomination: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Email: \_\_\_\_\_

**Criteria for Nomination**

- Project must be substantially completed by October 31, 2022 or by October 31 2023.
- A sustained effort that demonstrates a commitment by the group, individual or organization to environmental conservation or protection.
- Benefits to the community and to the environment.
- Consideration of Public Works values, including cost effectiveness and long-term operation and maintenance.
- Evidence of a sustained commitment to conservation.

**Reasons for Nomination** Describe the group or program with the aspects and features that fulfilled any of the applicable criteria listed. (Include description on a separate page.)



# PINE RIVER'S ROCK RIFFLE

APWA-MN Chapter | Project of the Year Nomination

## Dam Removal and Rock Rapids Installation

October 2022

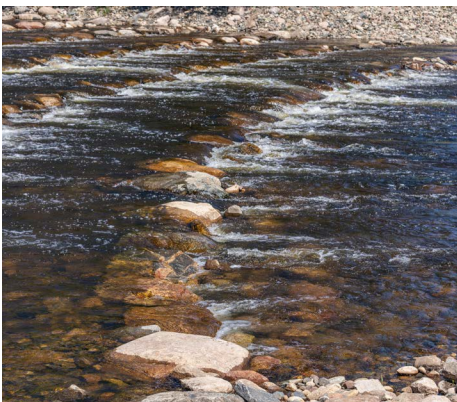
## CITY OF PINE RIVER



## Project Overview

The Pine River dam was built in 1910. The dam was approximately 200 feet long and 13 feet high and created a reservoir upstream including the 500-acre Norway Lake. Electricity was generated at the dam until 1946. Trunk Highway 84 was built on the dam embankment. The highway included a concrete bridge to span the spillways of the dam. The dam was classed as high-hazard and was also a significant fish barrier. The project purpose was to remove the high hazard dam and install a rock riffle in its place.

The dam was removed and replaced with a rock-arch rapids in 2022 by the City of Pine River. Replacing the high hazard dam with a rock riffle enhanced fish passage, biological connectivity, habitat, safety, aesthetics, fishing, and recreational access to the river. The riffle pools and channels enhanced recreational opportunities for wading, fishing, paddling, and other water-based fun. This work restored fish passage and connectivity between the Whitefish Chain of Lakes and reconnected 134 lakes (11,338 acres) and 80 miles of river and stream corridors benefiting fish, mussels, and many game and non-game animal species.



## Commitment to Environmental Conservation or Protection

The Corps of Engineers declared the dam to be high hazard in 1978, due to potential for breaching. The dam was renovated in 1983 with new slide gates and riprap for overtopping protection. In 2014, DNR Dam Safety staff analyzed hydraulics and concurred with the high hazard classification, since 45 structures were at risk in a 500-year flood event with a dam failure.

In 2013 and 2014, the City of Pine River, MnDOT, and Minnesota Department of Natural Resources (MN DNR) Dam Safety and Fisheries staff worked collaboratively to develop dam and roadway concepts for city consideration. The city explored alternatives to reduce the hazard including: dam repair, dam rehabilitation with more capacity, dam replacement with more capacity, dam replacement with rock riffle,

and dam removal. MnDOT planned to remove the roadway from the dam by constructing a new bridge immediately downstream. MN DNR Fisheries completed a draft concept of a rock riffle as well as a gated spillway with fishway.

The city sought a concept that would maintain the reservoir, preserve and increase recreational functions, and have lower capital and long-term maintenance costs. As funding, constructability, and ecological benefits became more clear, the City of Pine River selected removing the dam and replacing it with rock riffle as its preferred alternative.

In 2018, the City of Pine River applied for and received funding through the Lessard-Sams Outdoor Heritage Council (\$2.2 million), sponsored by the Clean Water Land & Legacy Amendment, and the MN DNR Dam Safety Program (\$200 thousand), for the removal of the dam and the replacement with rock riffle. The dam was removed and replaced with a rock rapids in 2022, with a total cost of \$2.5 million.



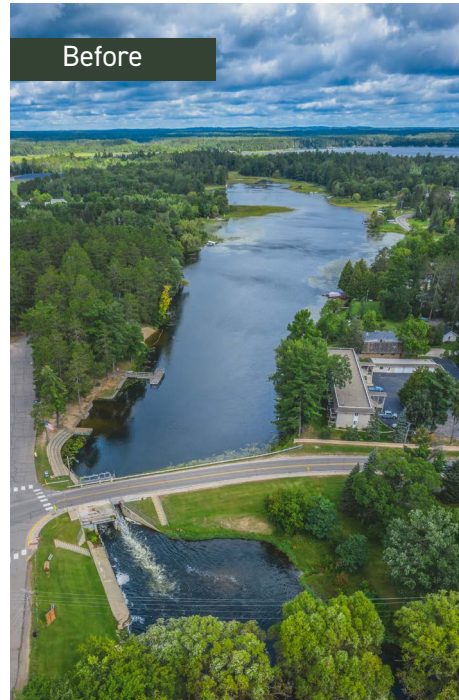
Completion Date: June 30, 2022

## Benefits to the Community and Environment

The City of Pine River lead this project with assistance and support from the MN DNR (Ecological and Water Resources, Dam Safety, Fish and Wildlife); Minnesota Department of Transportation; Cass County and the Lessard Sams Outdoor Heritage Council. The project also received support from the community. Public use and community support has been high following the completion of construction, although some have voiced concerns about the increased noise level of the water flowing through the riffle.

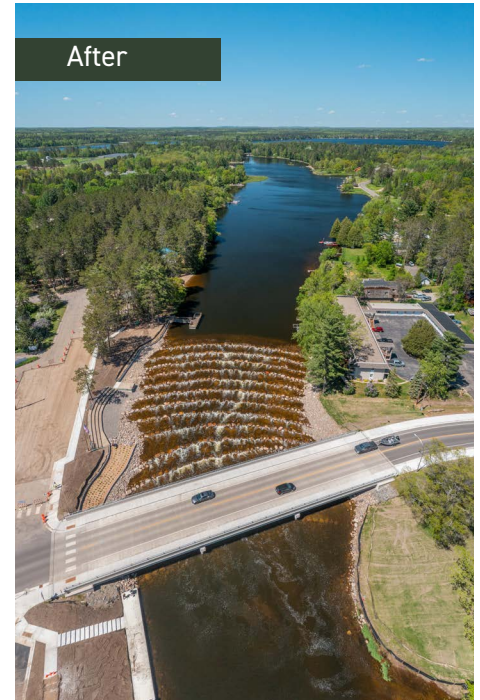
The Norway Lake Dam was a fish barrier for 112 years (1910 - 2022) and created a significant fragmentation of aquatic habitat. Removal of the dam and replacement with a rock-arch rapids has restored fish passage and connectivity between the Whitefish Chain of Lakes and the 149 square mile watershed above the dam. This reconnected watershed includes 134 lakes with surface areas totaling 11,338 acres and 80 miles of rivers and streams. Twenty-seven lakes exceed 100 acres, with the largest Pine Mountain Lake, having 1,622 acres. Removing the dam and reconnecting these high quality, diverse habitats and stream corridors benefits fish, mussels and many game and non-game animal species.

Fish species that will benefit include walleye, northern pike, largemouth bass, white sucker, shorthead and greater redhorse, hornyhead chub, and rock bass. Additionally, there are many species of fish (northern sunfish, silver redhorse) and mussels (sand shiner, black sandshell) that are found



south of the dam, but have not made their way upstream. The dam removal would potentially allow for the upstream migration of these species, increasing biodiversity.

Riffle habitat has been constructed in a 325-foot length of boulder-arch rapids. Northern sunfish, silver redhorse, sand shiner and black sandshell (mussel) are present below the dam but have not been found upstream of the Pine River Dam. Northern sunfish (state special concern) are found downstream of the dam but have not been found upstream. Restoring fish passage enables northern sunfish to expand their range in the watershed. Pugnose shiner (threatened), least darter (special concern), and hornyhead chub (species of greatest conservation need) are found in the Pine River system both upstream and downstream of the rock riffle. Populations of these fish will benefit from the reestablished connectivity between the middle and upper reaches of the Pine River and the associated lakes and streams of the watershed. Black sandshell mussel (special



concern) were found below the dam prior to the project but not upstream. Upstream fish passage may allow black sandshells to expand upstream as larval mussels are carried upstream by bluegill and largemouth bass hosts.

Blandings turtle (threatened) have been found in the area around the City of Pine River and any turtles moving along the river will now be able to move through the rock riffle instead of crossing the dam and road as required before the project.



## Consideration of Public Works Values: Cost Effectiveness + Long-Term Operation and Maintenance

Operation of the gates on the dam required a big effort from public works staff including checking water levels and adjusting the gate openings (including multiple times each day and night during floods) to pass flow to maintain the upstream Norway Lake water level within a tight range of about 6 inches above and below the normal water level. Although Public Works will also maintain the rock riffle, the efforts are much less. The rock riffle incorporates natural channel features which are sustainable and don't typically require significant maintenance. Work may include debris removal and inspection and maintenance of native plantings.

## Evidence of Sustained Commitment to Conservation

The city has been working cooperatively since 2013 with the MN DNR, MnDOT, and others to find solutions that not only improve safety and transportation, but also improve fish passage and the overall health of the river system.

From studying fish, we realize a rock rapids provides important habitat for many species of fish. The rock riffle recreates a rare environment that many fish can use for spawning and are able to swim through easily.

Owen Baird, Fisheries Specialist  
Minnesota DNR



With coordination from multiple stakeholders in the project, the rock riffle project overcame hurdles and accomplished each goal we set to achieve. This project impacted the community by improving the recreational area environment for residents to enjoy.

Mike Hansen, Public Works Director  
City of Pine River