Carnelian-Marine-St. Croix projects tackle Goose Lake phosphorus load

CLEAN WATER LAND & LEGACY AMENDMENT

A $108,430 Clean Water Fund grant BWSR awarded to the CMSCWD in 2015 backed the iron-enhanced filter project. Part of a Watershed-Based Implementation Fund grant BWSR awarded to the Lower St. Croix Partnership supported a related wetland restoration. WBIF grants are funded by the Clean Water Fund.

SCANDIA — The Carnelian-Marine-St. Croix Watershed District's (CMSCWD) work with one landowner on two Clean Water Fund grant-supported projects targeting nutrient-impaired Goose Lake has resulted in phosphorus reductions that contribute to improvements in water quality and water clarity.

"It's just a really nice, natural-environment lake with a solid biotic community. And so if we can get the water-quality component addressed, then it will remain a great asset for the community and the folks who live and visit up here," said CMSCWD Administrator Mike Isensee.

A 76-acre lake with a small public water access, Goose Lake in Scandia attracts anglers and duck hunters.

The projects — an iron-enhanced sand filter and a wetland restoration — were installed across the road from the public access on Ellen St. Sauver's farm.

"I'm getting older, and you want to leave something for the next generation. I was from a farm. My father was from a farm. My husband was. So it's just nice to carry on the tradition," St. Sauver said. "It's nice to do something positive."

The $231,350 iron-enhanced sand filter was completed in fall 2019. It filters water from about 50 acres of agricultural land before it reaches the lake. A $108,430 Clean Water Fund grant the Minnesota Board of Water and Soil Resources (BWSR) awarded to the CMSCWD in 2015 is in play. A $76,000 U.S. Environmental Protection Agency grant from the Minnesota Pollution Control Agency plus a $46,920 local match covered the balance.

The $58,000 wetland restoration finished in December 2022. It excavated phosphorus-enriched soils that were leaching phosphorus into the lake. The project drew $10,000 in Watershed-Based Implementation Funding (WBIF) — which is funded by the Clean Water Fund — from a WBIF grant BWSR awarded to the Lower St. Croix Partnership. The CMSCWD covered the balance.

Together, the iron-enhanced sand filter and wetland restoration keep an estimated 37 pounds of phosphorus out of the lake annually. One pound of phosphorus can produce 500 pounds of algae.

Goose Lake was listed as impaired for aquatic recreation in 2002 because of excessive phosphorus. That impairment, coupled with its recreational value, made the lake a

From left: *Clean Water Funds from BWSR are in play in the Carnelian-Marine-St. Croix Watershed District's Goose Lake phosphorous reduction project. The lake is impaired for nutrients. Landowner Ellen St. Sauver of Scandia looked over Goose Lake water quality monitoring results with CMSCWD Administrator Mike Isensee in November 2019. Farm manager Brandon Murray, left, and project manager and engineer Carl Almer of Emmons & Oliver Resources looked on. Grasses and forbes planted as part of the iron-enhanced sand filter project flourished with that year's wet growing season.* **Photo Credits:** Ann Wessel, BWSR



Left: *Isensee checked on the iron-enhanced sand filter project across the road from Goose Lake.* **Middle:** *Drainage from about 50 acres of agricultural land upstream flows across the iron-enhanced filter.* **Right:** *Almer checked on the project.*

priority for the watershed.

"The district has been working to get those water bodies off the impaired waters list," Isensee said. "We have three that have been removed, and we're hoping that this will be our fourth."

Jellum's Lake (AKA Big Marine Lake), South Twin Lake and Hay Lake were delisted in 2022. All three had been impaired for aquatic recreation because of excessive nutrients.

Data from 2022 show an improving trend in the average readings of total phosphorus entering Goose Lake. Secchi disk readings (a measure of water clarity) and Chlorophyll-a readings (a measure of how much algae is growing) remained constant.

Drought conditions over the past three years reduced water flow from the wetland to the lake. Monitoring will continue, to more accurately measure performance during non-drought years and to determine if maintenance is required.

The watershed district is responsible for long-term maintenance of the iron-enhanced sand filter and wetland.

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"With projects like this, the biggest challenge is finding a willing landowner," Isensee said.

"It takes a lot of time to foster that relationship and help the landowner understand what it is that you would like to do and why you're doing it. More importantly for the landowner (is) how it's going to impact their property," he said. "You're really asking landowners to voluntarily give you land in order to improve the water quality."

Isensee's predecessor, Jim Shaver, had worked with Ellen St. Sauver on agricultural conservation practices. Throughout the Goose Lake watershed, the CMSCWD had been working with landowners on water-quality improvement projects for 10-plus years.

"The iron-enhanced sand filter was probably the largest load reduction that we were able to achieve on the lake," Isensee said.

After the iron-enhanced sand filter was installed and treating the water flowing from the ag land, monitoring in 2020 showed that the wetland — a 0.40-acre site that had absorbed decades worth of livestock and ag land runoff — was contributing phosphorus to the lake.

The Washington Conservation District's soil core sampling and chemical evaluation revealed a 2-foot-deep layer where phosphorus levels were higher than average for a wetland. Those phosphorus-enriched soils were leaching soluble reactive phosphorus — which is five times more bio-available than particulate phosphorus, making it a significant contributor of phosphorus to the lake.

The findings led to the second project: The contractor, Peterson Companies of Chisago City, dewatered the wetland, excavated the phosphorus-rich layer, spread it on farm fields, and then re-established the wetland in 2022. The Washington Conservation District restored the vegetation and worked on narrow-leaf cattail control in 2023.

"I'm hoping that this will do it for Goose Lake and the water quality will be wonderful," St. Sauver said.

Next, the Carnelian-Marine-St. Croix Watershed District in 2025 plans to evaluate Goose Lake's internal phosphorus-loading along with its fishery, plant community and internal lake chemistry to determine what — if any — type of internal lake treatment to pursue.