



# Sweeney Lake Water Quality Improvement Project Final Report

## Section 319

## Executive summary

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### Problem

The Sweeney Lake Water Quality Improvement Project implemented a suite of practices aimed at “flipping” the lake from a eutrophic, algae dominated system, to a healthy, clear water system that can fully support aquatic recreation and a balanced ecosystem for aquatic biota.

Sweeney Lake is a 67-acre lake in the City of Golden Valley, MN with a maximum depth of 25 feet and an average depth of 12 feet. The lake provides recreational value for fishing, boating, and swimming; and it harbors a variety of panfish, a limited game fishery, and an average plant community. The lake is the receiving waterbody of a 2,400-acre fully developed watershed. Nearly all of the flow to the lake enters through the Sweeney Branch of Bassett Creek. The creek flows from the south and through Schaper Pond which is immediately upstream of Sweeney Lake. The creek exits the lake through a natural outlet to the north. Sweeney Lake was added to the 303(d) list of impaired waters in 2004 due to excess phosphorus. A TMDL was completed and approved by EPA in 2011 and identified the need to reduce internal phosphorus loading by 32% or 175 pounds per summer season. Another 99 pounds of total phosphorus was to be from Schaper Pond flows.

Despite numerous best management practices installed or implemented in its watershed over the years, water quality in Sweeney Lake had not improved significantly. Regular monitoring between 1985 and 2018 indicates that total phosphorus concentrations exceeded the state standard of 40 ug/L 74% of the time. Further, the lake had a history of Harmful Algae Blooms, negatively impacting the lake’s recreational usability.

One specific project implemented to improve Sweeney Lake water quality was the BCWMC 2015 Schaper Pond Diversion Project in Schaper Pond, immediately upstream of Sweeney Lake. The project diverted water, via a 380-foot floating water baffle, within the pond along a longer flow path, allowing water to remain in the pond for a longer period of time, providing for a greater amount of sediment, phosphorus, and other suspended solids to settle out before flowing into Sweeney Lake. Unfortunately, post project monitoring indicated that phosphorus levels leaving the pond were still elevated. Upon further study, it was determined that a large population of common carp in the pond (estimated at 368 kg/hectare; nearly four times the recommended threshold for carp management) was likely responsible for the elevated phosphorus levels in Schaper Pond.

### Project Components

This project included a variety of practices:

**Curly-leaf Pondweed Treatment** - In May 2020, approximately 5.6 acres of curly-leaf pondweed (CLP), an invasive aquatic plant, was treated with an herbicide in various locations around the lake. The treatment was performed with the goal of reducing the chances of significant CLP growth after the alum treatment.

**Alum Treatment** - The first phase alum treatment was completed in late October/early November 2020 with 37,700 gallons of alum and 18,000 gallons of sodium aluminate applied to Sweeney Lake in the north and south basins. The second and final phase of alum treatment was completed in fall 2022 with 24,030 gallons alum and 11,920 gallons sodium aluminate.

**Carp Removal** – During the summer 2020, carp were removed from Sweeney Lake and Schaper Pond using baited box nets resulting in 452 carp removed from Sweeney Lake, dropping the population to 68 kg/ha; and 152 carp removed from Schaper Pond, dropping the population to 75 kg/ha.

### Plan Context and Partners

This project is listed in the [Capital Improvement Program \(CIP\)](#) of the Bassett Creek Watershed Management Plan. The project was implemented by the Bassett Creek Watershed Management Commission (BCWMC) with partners including the City of Golden Valley, MPCA, and lakeshore residents.

Lakeshore residents aided in water quality improvements by agreeing to remove several lake aerators that had been running year-round for decades. A study in 2018 confirmed that the aeration system was only resuspending phosphorus within the water column. The removal of the aeration system likely had a significant impact on water quality, particularly when combined with the implementation of this project.

## Results

Current data and 10-year trends show that the most recent summer concentrations are consistently meeting MPCA standards, with a significantly improving trend in the past 10 years. The average total phosphorus concentration in Sweeney Lake has dropped from 58 µg/L (thru 2006) to an average of 34 µg/L during the past ten years. Average chlorophyll-a concentrations has dropped from 20 µg/L (thru 2006) to an average of 15.7 µg/L during the past ten years. Average Secchi disc transparencies have improved from 1.46 meters (thru 2006) to an average of 1.61 meters during the past ten years.

The lake is slated to be removed from the 303(d) impaired waters list in 2024.

## Work Plan Review

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### Objective 1: Perform in-lake alum treatment in Sweeney Lake

#### Task A: Communicate with lake residents and other stakeholders

Throughout the project, we maintained a [project website](#) updated with latest information including activity on lake related to the project, especially with regards to the timing of alum treatment; posted materials, presentations, maps, and fact sheets. We also communicated regularly with Sweeney Lake Association President for further dissemination of information and communicated with several individual homeowners about various project components.

In early 2020, we mailed 450 letters to lakeshore owners and nearby residents with brief overview of project and "save the date" for public open house in April that was held virtually.

In May 2020, we mailed letters to lakeshore residents regarding upcoming herbicide treatment of curly-leaf pondweed and their ability to opt out of treatment along their property

#### Task B: Survey and treat curly-leaf pondweed in Sweeney Lake

In March – May 2020/ we coordinated with an herbicide subcontractor, monitored water temperatures, performed pre-treatment plant survey, and obtained an herbicide treatment permit from MDNR. The actual herbicide treatment was completed in May 2020.

#### Task C: Engineer and perform in-lake alum treatment

In 2020, we prepared bid and contract documents; communicated with alum treatment sub-contractor and obtained a permit and discussed with MnDNR fisheries. Tasks related to the alum treatment also included coordination with the city, homeowners association, and contractor for lake access, site preparation, and planning. We held a pretreatment meeting and performed water monitoring and treatment oversight. The contractor (SOLitude Lake Management) completed first phase alum treatment October 28th - November 5th with 37,700 gallons of alum and 18,000 gallons of sodium aluminate applied in the lake's north and south basins. Water quality and temperature were measured regularly to confirm that neutral pH was maintained throughout the application.

In fall 2022, phase 2 of the alum treatment was completed. Work included advertising for bids, preparing Notice of Award and Form of Agreement for signatures, and communicating with chosen contractor regarding aluminum dosing rates/lake bathymetry. Again, we coordinated with the city and the homeowners association and posted signage at lake access points regarding upcoming alum treatment. We also performed pH monitoring and contractor oversight of alum treatment. The treatment was performed on October 16 - 22 and included addition of 24,030 gallons of alum and 11,920 gallons of sodium aluminate.

#### Task D: Perform post treatment monitoring

Monitoring on the lake was performed after the 2020 alum treatment July – Sept 2021. We performed QA/QC and summarized results including data compilation, analysis and summary. Final results were presented to the BCWMC Board of Commissioners in January 2023.

### Objective 2: Control carp biomass in Schaper Pond and Sweeney Lake

#### Task A: Design and permitting of carp removal activities

In preparing for carp removal activities, we prepared a work scope, schedule, budget, and contract for the chosen contractor: Carp Solutions. We also arranged for lake access and communicated with lakeshore residents and Golden Valley staff.

#### Task B: Implementation of carp removal and control options for Schaper Pond and Sweeney Lake

During the summer of 2020, carp surveys and removal efforts were underway, including electrofishing and marking carp caught in Sweeney Lake and Schaper Pond, installing the PIT antenna between Schaper Pond and Sweeney Lake, installing box netting in Sweeney Lake, and completing multiple rounds of carp removal activities. Results included 452 carp removed from Sweeney Lake, dropping the population to 68 kg/ha; and 152 carp removed from Schaper Pond, dropping the population to 75 kg/ha. :

### Objective 3: Manage project

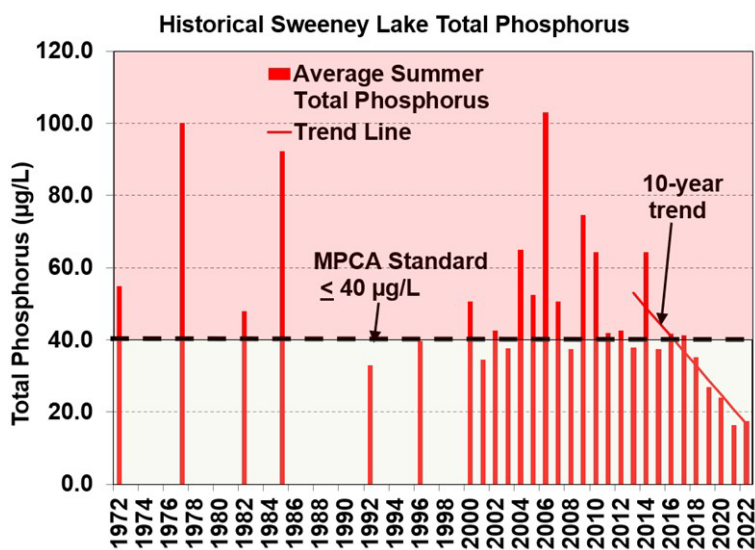
#### Task A: Manage project and perform grant reporting

The project was managed by BCWMC staff and engineers including monitoring the project budget, coordinating and communicating with partners, keeping BCWMC commissioners updated on project, and developing and submitting quarterly invoices, interim grant reports, and updated budget spreadsheets.

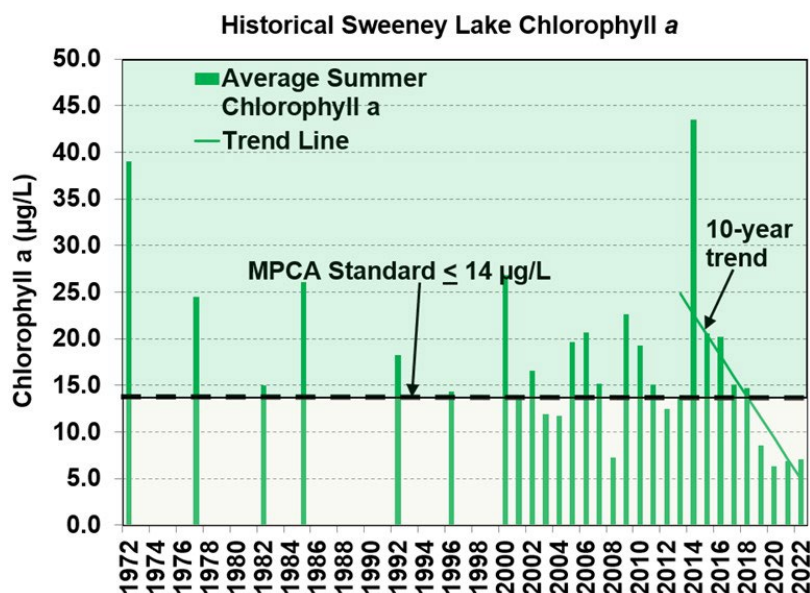
## Grant Results

**Water Quality Measurements:** During 2022, the BCWMC continued post-alum treatment monitoring of Sweeney Lake to compare water quality with the State standards and to gauge the success of the Sweeney Lake Water Quality Improvement Project. Data show the lake is now meeting State water quality standards. It is slated to be removed from the 303(d) impaired waters list in 2024.

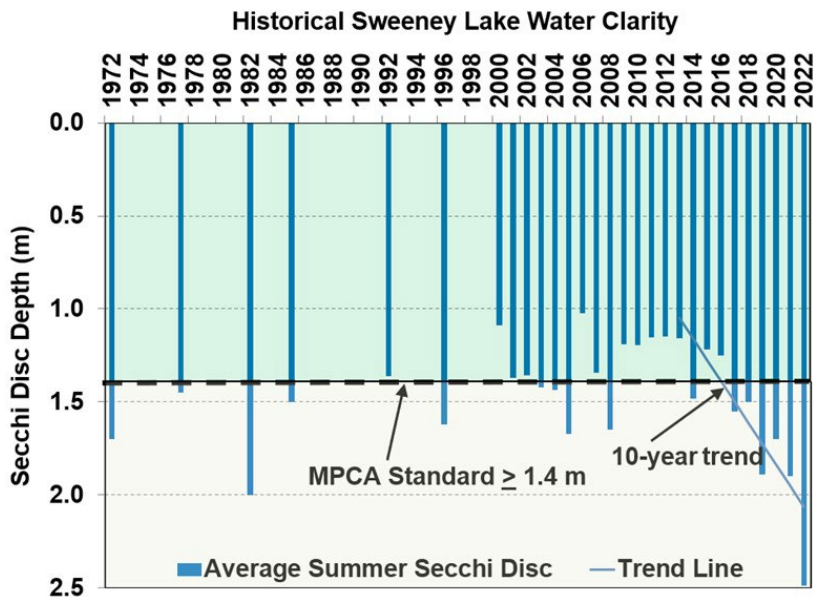
The following figure shows how the historical Sweeney Lake average summer total phosphorus concentrations compare to the 40 µg/L State standard for deep lakes. The current data and 10-year trend show that the most recent summer average phosphorus concentrations are consistently meeting the MPCA standard, with a significantly improving trend in the past 10 years. The average total phosphorus concentration in Sweeney Lake has dropped from 58 µg/L (thru 2006) to an average of 34 µg/L during the past ten years.



The following figure shows how the historical Sweeney Lake average summer chlorophyll-a concentrations compared to the 14 µg/L State standard for deep lakes. The current data show that the most recent summer average chlorophyll-a concentrations are consistently meeting the MPCA standard, with a significantly improving trend in the past 10 years. The average chlorophyll-a concentration in Sweeney Lake has dropped from 20 µg/L (thru 2006) to an average of 15.7 µg/L during the past ten years.



The following figure shows how the historical Sweeney Lake average summer Secchi disc transparency (a measure of water clarity) compares to the 1.4-meter State standard for deep lakes. The current data and 10-year trend show that the most recent summer average Secchi disc transparencies are consistently meeting the MPCA standard, with a significantly improving trend in the past 10 years. The average Secchi disc transparency in Sweeney Lake has improved from 1.46 meters (thru 2006) to an average of 1.61 meters during the past ten years.



**Carp Assessment:** In the summer of 2022, our carp management subcontractor, Carp Solutions, re-surveyed the carp populations in Schaper Pond and Sweeney Lake and we compared biomass estimates with past surveys, as shown in the following table. The results of the 2022 carp population survey confirmed that the 2020 box net removal resulted in lasting control of the adult carp, with estimated biomass densities well below the 100 kg/ha water quality impact threshold in both Schaper Pond and Sweeney Lake.

Carp Population Survey	Date	Estimated Carp Biomass (kg/ha)	
		Schaper Pond	Sweeney Lake
Baseline Assessment	October, 2018	420	1,030
Following Box Net Removal	Summer, 2020	75	68
Re-assessment	Summer, 2022	44	83

**Products:**

There were various documents and reports produced throughout the project and posted to the [project website](#) those listed below.

- 2022 Carp Population Assessment and Sweeney Lake Water Quality Results
- Sweeney Lake Water Quality Improvement Project 2020 Activities and Outcomes Report for results from 2020
- 2020 Carp Removal Results: Technical Memo
- Curly-leaf Pondweed Treatment Areas (May 2020) ~ Wisconsin DNR Fact Sheet on Herbicide Diquat
- Open House Presentation (April 8, 2020) Questions & Answers from Open House
- Report and Presentation on Results of Carp Population Survey in Sweeney Lake and Schaper Pond

Additionally, BCWMC staff gave a presentation on this project at the Minnesota Watersheds Annual Meeting and Conference in Alexandria, MN in December 2022.

## **Long-term results:**

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This project is expected to have long term results due to the nature of typical alum treatments. Further, the BCWMC plans to continue assessment of carp populations in Schaper Pond and Sweeney Lake in 2024. If preliminary results of the 2024 carp surveys show high populations of carp (i.e., above the critical threshold of 100 kg/ha) in May and June, the Commission Engineer will contract and coordinate with Carp Solutions to perform carp removal with box nets. In addition, the BCWMC will continue regularly monitoring the water quality of Sweeney Lake through its regular monitoring program and through participation in the Met Council's Citizen Assisted Monitoring Program (CAMP). Monitoring results will always be reported in EQIS.

This project spurred significant conversation and engagement with lakeshore residents. Prior to this project, the BCWMC performed a study of the year-round aeration system and shared results with residents at a meeting in August 2018. This meeting with lake homeowners included education about "how a lake works" and built support for permanently turning off the aerators and preparing for a future alum treatment. Coordination and cooperation from the homeowners following that meeting continued throughout this project. Lakeshore residents were so impressed by and happy with the results of this project, they are eager to learn how to maintain the improved water quality. BCWMC staff will attend their June 2023 annual meeting to further discuss the project and long term maintenance.

As noted in this report, lakeshore residents were kept informed about the project through an initial open house and regular communication, often disseminated through the homeowners association president.

Although the COVID pandemic hit just as this project was getting underway, no project objectives were delayed or suffered as a result of the pandemic. The initial open house was planned to be in person in March 2020, but we quickly pivoted to an online format that was attended by many residents. The project fieldwork was not impacted by the pandemic. Overall, the project progressed smoothly without significant challenges.

Communication with and assistance from the MPCA project management and grant specialists was always timely and helpful.

## **Final Expenditures**

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Please see the attached final project budget spreadsheet.

# Grant project summary

Project title: Sweeney Lake Water Quality Improvement Project  
Organization (Grantee): Bassett Creek Watershed Management Commission  
Project start date: December 20, 2019 Project end date: January 31, 2023 Report submittal date: May 25, 2023  
Grantee contact name: Laura Jester Title: Administrator  
Address: 16145 Hillcrest Lane  
City: Eden Prairie State: MN Zip: 55346  
Phone number: 952-270-1990 Fax: \_\_\_\_\_ Email: Laura.jester@keystonewaters.com  
Basin (Red, Minnesota, St. Croix, etc.)  
/Watershed & 8 digit HUC: Upper Mississippi River Basin HUC: 07010206 County: Hennepin

## Project type (check one):

- Clean Water Partnership
- Total Maximum Daily Load (TMDL)/Watershed Restoration or Protection Strategy (WRAPS) Development
- 319 Implementation
- 319 Demonstration, Education, Research
- TMDL/WRAPS Implementation

## Grant funding

Final grant amount: \$ 330,000 Final total project costs: \$ 559,111.80  
Matching funds: Final cash: \$229,111.80 Final in-kind: \$0 Final Loan: \$0  
MPCA project manager: Amy Timm

## For TMDL/WRAPS development or TMDL/WRAPS implementation projects only

Impaired reach name(s): \_\_\_\_\_  
AUID or DNR Lake ID(s): \_\_\_\_\_  
Listed pollutant(s): \_\_\_\_\_  
303(d) List scheduled start date: \_\_\_\_\_ Scheduled completion date: \_\_\_\_\_  
*AUID = Assessment Unit ID*  
*DNR = Minnesota Department of Natural Resources*

## Executive summary of project (300 words or less)

This summary will help us prepare the Watershed Achievements Report to the Environmental Protection Agency. (Include any specific project history, purpose, and timeline.)

### Problem (one paragraph)

Sweeney Lake in Golden Valley has been on the impaired waters list since 2004 due to high nutrients. The poor water limited recreation and contributed to poor aquatic habitats. The lake is the receiving waterbody of a 2,400-acre fully developed watershed. Despite numerous best management practices installed or implemented in its watershed over the years, water quality in Sweeney Lake had not improved significantly with total phosphorus concentrations exceeding the state standard 74% of the time from 1974 to 2018. Further, the lake had a history of Harmful Algae Blooms, negatively impacting the lake's recreational usability. A significant project was needed to "flip" the lake from a eutrophic, algae dominated system, to a healthy, clear water system that can fully support aquatic recreation and a balanced ecosystem for aquatic biota.

### Waterbody improved (one paragraph)

This project was centered on Sweeney Lake, a 67-acre lake in the City of Golden Valley, MN with a maximum depth of 25 feet and an average depth of 12 feet. The lake provides recreational value for fishing, boating, and swimming; and it harbors a variety of panfish, a limited game fishery, and an average plant community. The lake is the receiving waterbody of a 2,400-acre fully developed watershed. Nearly all of the flow to the lake enters through the Sweeney Branch of Bassett Creek. The creek flows from the south and through Schaper Pond which is immediately upstream of Sweeney Lake. The creek exits the lake through a natural outlet to the north.



**Project highlights (one paragraph)**

The Sweeney Lake Water Quality Improvement Project implemented a suite of practices that, together with the end of year-round aeration, resulted in vastly improved water quality. A curly-leaf pondweed treatment in May 2020 removed approximately 5.6 acres of curly-leaf pondweed (CLP) in order to reduce the chances of significant CLP growth after the alum treatment. A two-phased alum treatment in 2020 and 2022 was completed to bind phosphorus in the lake sediments making them unavailable for spurring algae growth. Finally, a total of more than 600 common carp were removed from Sweeney Lake and Schaper Pond, immediately upstream of the lake dropping the carp biomass to 68 kg/ha in Sweeney Lake 75 kg/ha in Schaper Pond.

**Results (one paragraph)**

Post-project monitoring shows significantly improved water quality with 10-year declining trends in total phosphorus, chlorophyll-a, and Secchi transparency. Lake users and residents noted the vastly improved water clarity following the alum treatments. On-going carp assessments and carp management by the BCWMC will help maintain the water quality in the lake.

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**Partnerships (Name all partners and indicate relationship to project)**

City of Golden Valley – provided logistical support and communication with residents

Sweeney Lake Homeowners Association – assisted with communication with residents

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**Pictures**

