SIX MILE CREEK-HALSTED BAY HABITAT RESTORATION

MINNEHAHA CREEK
WATERSHED DISTRICT

The Minnehaha Creek Watershed District (MCWD), state, and regional partners have completed a major restoration initiative to manage the overabundance of invasive common carp across fourteen connected lakes in the Six Mile Creek-Halsted Bay Subwatershed (SMCHB).

PARTNERSHIP WITH PURPOSE

Since their introduction in the 1800s, common carp (Cyprinus carpio) have thrived in Minnesota's shallow lakes, where they reduce aquatic vegetation and outcompete native fish.

As part of a comprehensive effort to restore habitat and water quality throughout the 27-square mile Six Mile Creek – Halsted Bay subwatershed that drains to Lake Minnetonka, MCWD worked with leading University of Minnesota researchers to develop a data-driven management strategy drawing on an understanding of carp abundance, movement patterns, and spawning areas.

Working in partnership with the Lessard-Sams Outdoor Heritage Council (LSOHC) in the form of a $567,000 grant, local communities and Three Rivers Park District, MCWD implemented a management strategy to reduce common carp populations, improve water quality and habitat, and inform the ongoing science of carp management as one of many watershed restoration tools.

Partners also include the Area Partnership for Pierson Lake Enhancement (A.P.P.L.E).

UNDERSTANDING THE SMCHB SUBWATERSHED

Located at the western edge of Lake Minnetonka and comprising the headwaters of the Minnehaha Creek Watershed, the Six Mile Creek – Halsted Bay subwatershed represents one of the largest tributaries to Lake Minnetonka.

The subwatershed includes over 14-lakes, many of which are impaired for excess nutrients (including Halsted Bay), is within the Mississippi flyway, a corridor for migratory waterfowl, and includes more than 5,000 acres of DNR-designated, regionally significant ecosystems. It also boasts impressive fisheries and is the home to record-setting largemouth bass.

Recognizing the need and opportunity, MCWD designated SMCHB as a focal geography in 2015, committing time and resources to make significant, lasting habitat and water quality improvements.

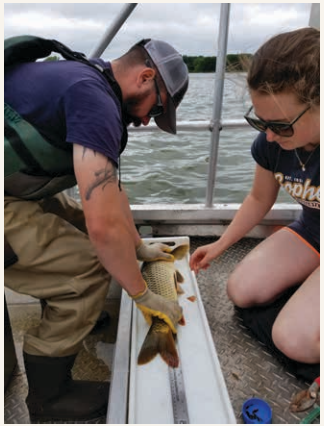
Since then, MCWD has built a regional coalition of partners to deliver large-scale restoration in the subwatershed, focusing on upland and wetland systems, stormwater treatment, in-lake alum treatment, carp management, and building new water-based places that support local community goals.

A DATA-DRIVEN STRATEGY

Between 2014 and 2017, MCWD funded one of the largest field assessments of carp population dynamics, led by the University of Minnesota's Aquatic Invasive Species Research Center (MAISRC).

MAISRC's assessment estimated carp populations, tracked carp movement using radio tagging, and determined carp age ranges throughout the SMCHB subwatershed.

MCWD leveraged this assessment in partnership with MAISRC to develop a three-pronged management plan for managing carp within the subwatershed, below damaging thresholds of 100 kg/ha. The maps on the right show the implementation of these strategies across the SMCHB subwatershed.



IMPEDE CARP MIGRATION:

Four permanent barriers were placed to block carp migration to spawning areas and lakes where removals had already been successful.

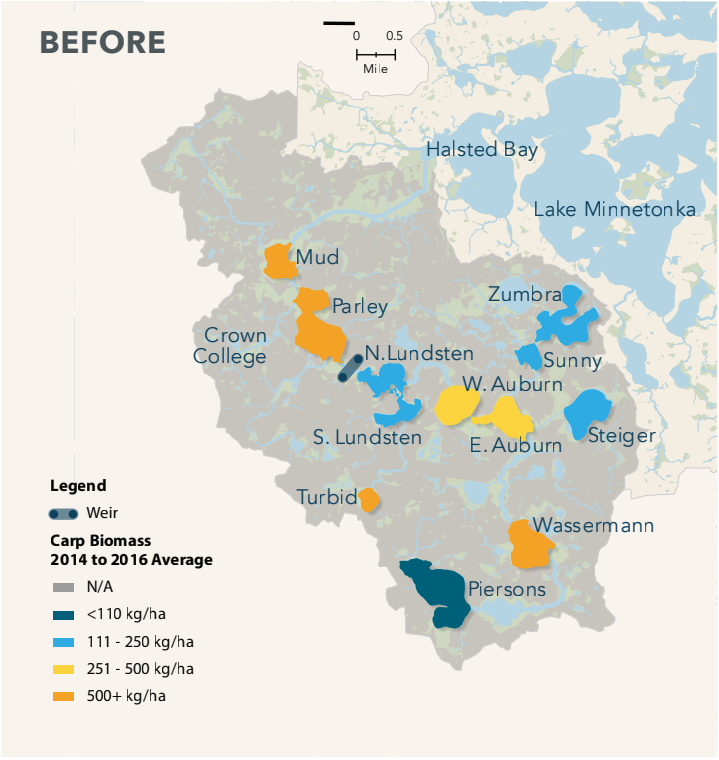
LIMIT CARP SPAWNING:

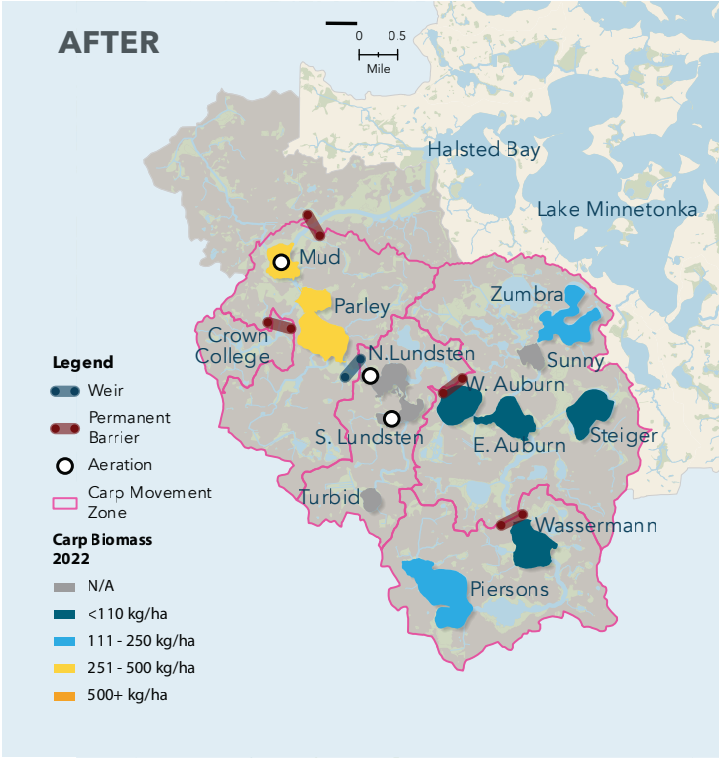
Aeration was used in known carp nurseries to prevent winterkill of the native bluegill sunfish, a predator of carp eggs.

REMOVE ADULT CARP:

Using a variety of tactics, MCWD led fifty carp removal efforts across eight water bodies, and eliminated over 29,000 carp.

These maps show the implementation of MCWD's strategy across the SMCHB subwatershed.



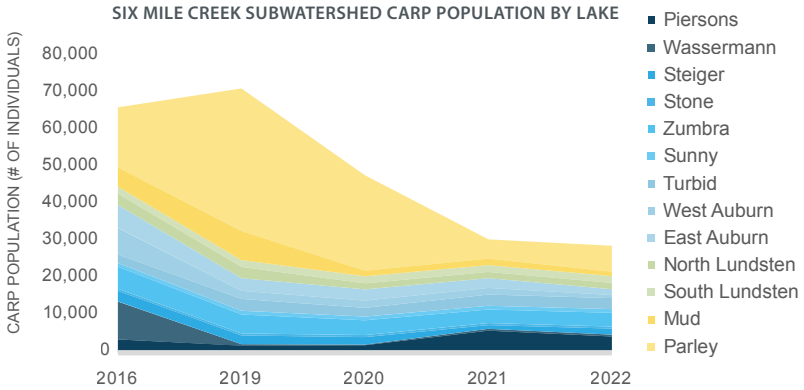


MEASURABLE RESULTS

Through the carp management project, MCWD successfully reduced carp biomass at or near the 100 kg/ha threshold across 14 connected lakes, with Parley, Mud, and Wassermann lakes showing the most notable improvements. The figure below shows how carp populations have changed over time within the subwatershed's lakes.

These efforts:

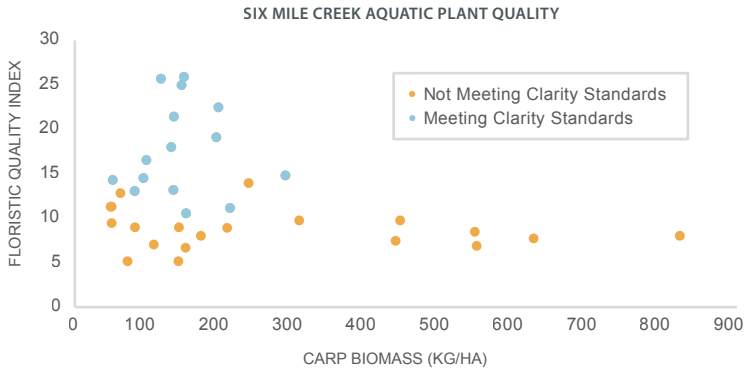
- Improve habitat and forage for native fish, waterfowl, and other wildlife
- Support native vegetation restoration
- Enhance recreational opportunities



Another goal of this project was to further the applied science of carp management's role within watershed management. Data collected during this large-scale project is yielding new information and raising valuable questions, that will be used to inform future carp management efforts, which MCWD is working on evaluating with its partners in 2023-2024.

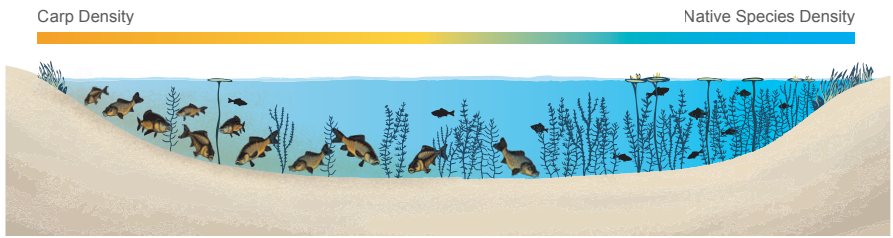
For example, early findings s uggest t hat improving lake vegetation quality is dependent on two factors, including carp abundance and water clarity.

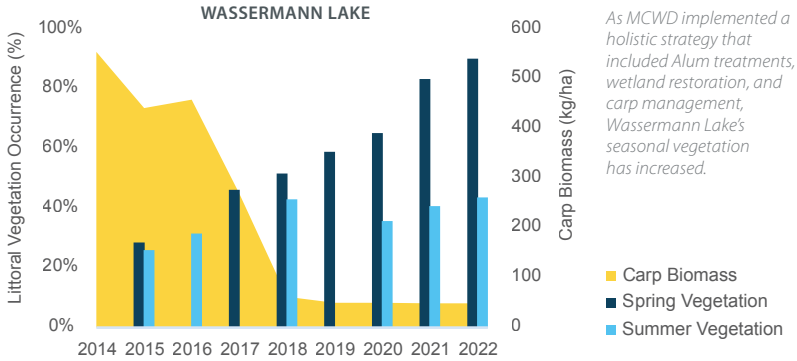
- Lakes that have carp biomass greater than 300-400 kg/ha consistently have poor vegetation quality.
- However, lakes with the best vegetation quality must have low carp biomass and meet state water clarity standards.



The Floristic Quality Index (FQI) is a tool used in ecological assessments to evaluate the quality and health of plant communities within a particular area or habitat. In the figure (left), lakes with a lower carp biomass recorded higher floristic quality indexes.

As bottom feeders, carp uproot native vegetation and stir up sediment, which reduces water clarity and degrades the habitat of native fish species.





As MCWD implemented a holistic strategy that included Alum treatments, wetland restoration, and carp management, Wassermann Lake's seasonal vegetation has increased.

WASSERMANN LAKE RESTORATION: A HOLISTIC APPROACH

In 2015, the City of Victoria and MCWD identified Lake Wassermann as an area of mutual priority due to its poor water quality — the lake received an impaired waterbody designation in 2002 — and its location within the growth corridor of Victoria. Since then, MCWD has implemented a suite of restoration projects that have significantly improved habitat, water quality, and recreational value.

WETLAND RESTORATION

- New wetland creation restores native vegetation and enhances biodiversity.
- A restored wetland outlet mimics the area's pre-development state.

WASSERMANN LAKE PRESERVE

- In partnership with City of Victoria, MCWD planned and constructed a waterfront eco-park with restoration of several ecosystem types.
- The new park connects communities to recreation opportunities with a new boardwalk, fishing pier, and interpretive features that tell the story of the watershed.

CARP MANAGEMENT

- Wassermann Lake had one of the highest carp populations observed in the subwatershed.
- Spawning areas were blocked off to reduce repopulation and adult carp were removed via winter seining.

ALUM TREATMENT

- In-lake alum treatments of the lake and adjacent pond resulted in a significant phosphorus reduction.
- The treatments improve water clarity, which increases the zones of aquatic vegetation that support native wildlife.


32
acres of restored green space
4
alum treatments conducted
10
acres of restored wetland
412
lbs/year phosphorus reduction
200
feet of restored stream channel

LEARNINGS & NEXT STEPS

MCWD's initial findings indicate that while removing carp can be valuable in improving aquatic habitat, especially in shallow lake environments, vegetation and water quality did not respond universally across the system.

Carp management must be:

- Leveraged strategically by drawing on a strong, data-driven understanding of carp population dynamics in a system.
- Targeted in its application.
- Complemented with a holistic watershed restoration strategy to address external sources of pollution from the surrounding landscape.

To further the collective understanding of where targeted implementation of carp management yields the highest return on investment, MCWD plans to work with state and regional partners to analyze this project's data, document insights, and formulate recommendations that can help support the work of others.

MINNEHAHA CREEK
WATERSHED DISTRICT

"We collaborate with public & private partners to protect and improve land and water for current and future generations."

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