



Lessard-Sams Outdoor Heritage Council

Six Mile Creek-Halsted Bay Habitat Restoration Phase I

Laws of Minnesota 2018 Final Report

General Information

Date: 12/20/2023

Project Title: Six Mile Creek-Halsted Bay Habitat Restoration Phase I

Funds Recommended: \$567,000

Legislative Citation: ML 2018, Ch. 208, Art. 1, Sec. 2, subd 5(p)

Appropriation Language: \$567,000 the second year is to the commissioner of natural resources for an agreement with the Minnehaha Creek Watershed District to restore and enhance fish habitat in the Six Mile Creek - Halsted Bay subwatershed. A list of proposed restorations and enhancements must be provided as part of the required accomplishment plan.

Manager Information

Manager's Name: Jill Sweet

Title: Research & Monitoring Technician

Organization: Minnehaha Creek Watershed District

Address: 15320 Minnetonka Blvd

City: Minnetonka, MN 55345

Email: jsweet@minnehahacreek.org

Office Number: 952-930-1976

Mobile Number: 651-301-0761

Fax Number:

Website: minnehahacreek.org

Location Information

County Location(s): Carver and Hennepin.

Eco regions in which work will take place:

- Metro / Urban

Activity types:

- Restore

Priority resources addressed by activity:

- Habitat

Narrative

Summary of Accomplishments

The Six Mile Creek Halsted Bay (SMCHB) Habitat Restoration program restored 2,488 acres of deep and shallow lake habitat by implementing the state's most ambitious program to manage common carp below the threshold where they damage lake ecosystems with three primary tactics:

- Installation of utilities to operate aeration at three locations to limit carp reproduction.
- Construction of four carp barriers to impede carp migration.
- Removal of approximately 30,325 carp totaling 284,119 pounds, resulting in the majority of waterbodies meeting or near the 100 kg/ha carp biomass goal.

Process & Methods

The program took a comprehensive approach to managing common carp in the SMCHB Subwatershed to reach the 100 kg/ha carp biomass threshold for each waterbody.

This approach consisted of three management strategies:

Adult biomass removal:

Over the past five years, the District deployed a variety of tactics to remove carp across the SMCHB Subwatershed. These methods included stream trapping at barriers, baited box net trapping, and commercial winter seining.

Barriers to prevent carp movement:

Barrier locations were determined by a University of Minnesota Study to block critical movement pathways between lakes and impede carp migration between Lake Minnetonka and the SMCHB subwatershed. The barriers were designed to be durable and minimally impact the stream channel to prevent erosion. They were also designed to be raised and lowered to allow for easy cleaning and to facilitate native fish passage at times when carp migration is not occurring.

Aeration of shallow lakes to prevent carp reproduction:

Surface water aeration was implemented in high-risk carp recruitment areas. Aeration prevents winterkill of the native bluegill sunfish, a predator of carp eggs. Feasibility of each site included consideration of the closest utility connection, reasonable ability to access, and best location for operating aerators near the deepest point on the lake.

Adaptive Management and Effectiveness Monitoring

Throughout the implementation of the SMCHB Habitat Restoration Program, the District deployed an adaptive management strategy that utilized a variety of monitoring approaches and evaluation techniques. These actions included quantifying biomass removal relative to original carp removal targets for each lake, monitoring surveys that update carp population estimates with boat electrofishing, and documenting in-lake habitat response as carp densities were reduced through aquatic vegetation surveys and water quality sampling. These actions have enabled us to refine our system understanding, minimize uncertainty and risks by removing carp, track ecosystem responses to reduced carp densities, and guide the development of a long-term monitoring and maintenance plan that will sustain program achievements beyond the LSOHC funding period. As MCWD continues to analyze data from the program, it will document insights and formulate recommendations to further the collective understanding of where targeted implementation of carp management yields the highest return on investment when compared to other restoration strategies.

How did the program address habitats of significant value for wildlife species of greatest conservation need, threatened or endangered species, and/or list targeted species?

This habitat restoration project will have benefits across the entire trophic chain. Now that carp populations are reduced, we will continue to conduct effectiveness monitoring to assess the improvement of aquatic vegetation, macroinvertebrates, and water quality, restoring food and habitat for numerous species of fish and wildlife, and in turn, restoring populations of these species.

In particular, carp management will allow shallow lakes to shift to a new, healthier stable state. Much of the subwatershed's littoral area currently lacks a healthy plant community. However, with fewer carp uprooting vegetation, submerged aquatic vegetation should return to littoral areas of restored lakes. Evidence suggests that this alternative stable state positively impacts the food web on many levels. Higher abundance and diversity of aquatic vegetation are related to higher abundance, diversity and growth rates of fish and waterfowl, because vegetation provides better refuge and spawning habitat. These factors, combined with reduced competition for macroinvertebrates and other food, explain why carp management can have indirect effects on many species.

The area contains over 75 species of birds including over 20 species of waterfowl that breed or migrate through the area, has over 15 Minnesota Biological Survey (MBS) Sites of Biodiversity significance, and the lakes support over 20 species of fish. These restoration benefits are endorsed by the Minnesota Waterfowl Association and the US Fish and Wildlife Service.

Specific species that will benefit include:

Harvested waterfowl: Mallard, Wood Duck, Blue and Green-winged Teal, Canada Goose, Snow Goose, American Black Duck, Northern Shoveler, Northern Pintail, Ring-necked Duck, Bufflehead, Common Goldeneye, Hooded Merganser, Common Merganser, American Coot, and Lesser Scaup.

Water-birds listed on the Minnesota DNR Species in Greatest Conservation Need (including but not limited to): Northern Pintail, American Black Duck, Lesser Scaup, Trumpeter Swan, Common Loon, Great Egret, Green Heron, Western Grebe, Horned Grebe, Red-necked Grebe, Eared Grebe, Night Heron, Franklin's Gull, Black Tern, Forster's Tern, Common Tern, American White Pelican, American Bittern, Semipalmated Sandpiper.

Game and non-game fish: Largemouth bass, northern pike, walleye, muskellunge, yellow perch, bluegill, pumpkinseed, shiners, Iowa darter, brook silverside, johnny darter, minnows, white sucker, and black/white crappie.

How did the program use science-based targeting that leveraged or expanded corridors and complexes, reduced fragmentation, or protected areas in the MN County Biological Survey.

MCWD's SMCHB Habitat Restoration program was the most robust carp management effort conducted in MN. The foundation for the program was a three-year assessment conducted in partnership with the UMN which evaluated carp abundance, recruitment patterns, and seasonal movement patterns in SMCHB. This data allowed the District to develop a well-timed, targeted management approach with quantifiable goals.

SMCHB is an incredibly rich ecological system that has seen declining conditions due to over-abundant carp, and land use patterns that have substantially altered the hydrology, nutrient cycling, and ecology of the 2,900 acres of wetland, and its 14 lakes.

SMCHB subwatershed has 5,165 acres of nearly contiguous DNR-designated Regionally Significant Ecological Area that spans the watershed and 15 MBS Sites of Biodiversity significance. The 5,700 acre Carver Park Reserve

provides habitat for over 75 species of birds, including seven species of waterfowl that nest in the area and will benefit from restored foraging opportunities. The subwatershed lies within the Mississippi flyway, a critical corridor for migratory waterfowl. SMCHB provides all this ecological benefit and value within 25 miles of downtown Minneapolis, making its restoration and preservation that much more critical to support the overall ecological value with the metro region and provide habitat for species negatively impacted by urbanization.

The carp management program is coupled with MCWD's comprehensive restoration work in the SMCHB subwatershed. In 2013 MCWD restored 209 acres of prairie adjacent to Six Mile Marsh within a regionally significant ecological corridor. MCWD restored a 20-acre wetland complex situated between two MBS sites of biodiversity significance that will enhance the vegetative diversity of the site. In 2021 the Wassermann Preserve was built in partnership with the City of Victoria to restore and protect a wetland and shoreline adjacent to Wassermann Lake, facilitate stormwater treatment on site, and create recreation opportunities for the community. In 2021 and 2022 MCWD conducted alum treatments of Wassermann Lake and Wassermann West Pond to increase the health and clarity of the lake. MCWD will continue to strategically implement targeted restoration projects to enhance the impact of its in-lake management approach.

Explain Partners, Supporters, & Opposition

Throughout the implementation of the SMCHB Habitat Restoration Program, MCWD worked in partnership with the Cities of Victoria, Minnetrista, St. Bonifacius, Waconia, Laketown Township, Carver County, Hennepin County, Three Rivers Park District, and Pierson and Wasserman Lake Associations. The SMCHB Planning Partnership was established in 2015 and was comprised of policymakers and staff from the public agencies within the subwatershed. Using sound science, the planning partnership identified restoration strategies for implementation based on environmental needs, local priorities, and real-time opportunities.

Exceptional challenges, expectations, failures, opportunities, or unique aspects of program

During the SMCHB Habitat Restoration Program, the District employed an adaptive management strategy to enhance our understanding, improve effectiveness, track ecosystem responses, and ensure ongoing success in a new area of water resource management. This strategy allowed the District to make course corrections such as shifting barrier location and design to better meet goals, pursuing aeration where critical and feasible, and staying abreast of new technologies and resources to implement our strategies effectively. This approach will continue to shape the long-term monitoring and maintenance plan, sustaining achievements beyond the LSOHC funding period.

One of the more challenging waterbodies, Parley Lake, had a substantial number of its carp population removed over the past five years ; however subsequent monitoring has shown that it is still above the 100 kg/ha goal. MCWD will continue to conduct carp removals in Parley Lake after the LSOHC funding period to meet the original project goals.

What other dedicated funds may collaborate with or contribute to this program?

- Clean Water Fund

How were the funds used to advance the program?

Clean Water Funds were acquired beginning in 2020 to conduct alum treatments on two waterbodies within the subwatershed, Wassermann West Pond and Wassermann Lake, resulting in significant in-lake phosphorus reductions. Early findings throughout our management efforts suggest that improving lake vegetation is dependent on two factors: carp abundance and water clarity. These alum treatments in conjunction with lowering the carp abundance have allowed us to reach our habitat restoration goals.

What is the plan to sustain and/or maintain this work after the Outdoor Heritage Funds are expended?

MCWD is a governmental entity created by state statute and operates under a series of 10-year water resource management plans that are approved by the Minnesota Board of Water and Soil Resources (BWSR). SMCHB will continue to be a priority of the next 10-year plan, which will include maintaining our carp management efforts and implementing subsequent phases of the habitat restoration program.

MCWD relies on multiple funding sources including a local levy as well as public and private partnerships, including LSOHC. The District has the commitment and funding sources necessary to maintain existing and future natural resource enhancement projects.

MCWD is committed to utilizing its staff and expertise to maintain the results of this management approach in perpetuity. MCWD will monitor the system post-project to identify and respond to any unanticipated recruitment events and continue to conduct carp removals if necessary.

MCWD has a robust operations and maintenance program for its physical infrastructure and the maintenance of the aeration and barrier facilities will be rolled into that program, except where another agency has agreed to maintain infrastructure within their jurisdiction.

Effectiveness monitoring will continue to occur to track the ecosystem changes in response to the management efforts and determine where additional restoration projects may be needed.

Actions to Maintain Project Outcomes

| Year | Source of Funds | Step 1 | Step 2 | Step 3 |
|------------------|-----------------|---|-----------------------|--|
| 2023 | MCWD Levy | Carp Removals on Parley Lake | - | - |
| 2023 and ongoing | MCWD Levy | Maintenance of Carp Barriers | Operation of Aeration | Maintain carp biomass at target thresholds |
| 2023 and ongoing | MCWD Levy | Effectiveness Monitoring: Aquatic Vegetation, Water Quality, and Carp Biomass | - | - |

Budget

Totals

| Item | Requested | AP Amount | Spent | Leverage | Received Leverage | Leverage Source | Original Total | Final Total |
|----------------------------|------------------|------------------|------------------|------------------|-------------------|------------------|--------------------|--------------------|
| Personnel | - | - | - | \$269,400 | \$269,400 | MCWD Levy, USFWS | \$269,400 | \$269,400 |
| Contracts | \$424,000 | \$405,000 | \$394,500 | \$3,000 | - | MCWD Levy | \$427,000 | \$394,500 |
| Fee Acquisition w/ PILT | - | - | - | - | - | - | - | - |
| Fee Acquisition w/o PILT | - | - | - | - | - | - | - | - |
| Easement Acquisition | - | - | - | - | - | - | - | - |
| Easement Stewardship | - | - | - | - | - | - | - | - |
| Travel | - | - | - | - | - | - | - | - |
| Professional Services | - | - | - | \$6,000 | \$76,000 | MCWD Levy | \$6,000 | \$76,000 |
| Direct Support Services | - | - | - | - | - | - | - | - |
| DNR Land Acquisition Costs | - | - | - | - | - | - | - | - |
| Capital Equipment | \$143,000 | \$162,000 | \$164,000 | \$22,000 | \$22,000 | MCWD Levy | \$165,000 | \$186,000 |
| Other Equipment/Tools | - | - | - | \$93,800 | \$70,000 | MCWD Levy | \$93,800 | \$70,000 |
| Supplies/Materials | - | - | - | \$50,000 | \$21,000 | MCWD Levy | \$50,000 | \$21,000 |
| DNR IDP | - | - | - | - | - | - | - | - |
| Grand Total | \$567,000 | \$567,000 | \$558,500 | \$444,200 | \$458,400 | - | \$1,011,200 | \$1,016,900 |

Personnel

| Position | Annual FTE | Years Working | Amount Spent | Leverage | Leverage Source | Total |
|----------------------------|------------|---------------|--------------|-----------|-----------------|-----------|
| MCWD Position 1 | 0.6 | 4.0 | - | \$151,900 | MCWD Levy | \$151,900 |
| MCWD Position 2 | 0.5 | 4.0 | - | \$72,200 | MCWD Levy | \$72,200 |
| MCWD Position 3 | 0.3 | 4.0 | - | \$43,300 | MCWD Levy | \$43,300 |
| USFWS technical assistance | 0.0 | 1.0 | - | \$2,000 | USFWS | \$2,000 |

Capital Equipment

| Item | Amount Spent | Leverage | Leverage Source | Total |
|---|--------------|----------|-----------------|----------|
| Aeration Units | - | \$22,000 | MCWD Levy | \$22,000 |
| Wassermann Barrier | \$26,000 | - | - | \$26,000 |
| Auburn Barrier | \$35,000 | - | - | \$35,000 |
| Fish Barrier/Fish Trap (Mud to Halsted Bay) | \$76,000 | - | - | \$76,000 |
| Crown College Pond Barrier | \$27,000 | - | - | \$27,000 |

Explain any budget challenges or successes:

A budget amendment was submitted pertaining to the construction of carp barriers under the capital equipment activity. The request fell under two categories: Change in narrative and change in budget. Narrative changes included modifying the Crown College barrier from a permeable berm to a permanent barrier structure and modifying the Lundsten barrier from a stilling well/weir to a permanent barrier at the outlet of Auburn Lake. Change in budget amendments were for higher than original budget for cost of construction due to an increase in material costs. The difference was shifted from contracts budget and supplemented by District budget.

Total Revenue: \$0

Revenue Spent: \$0

Revenue Balance: \$0

Of the money disclosed above, what are the appropriate uses of the money:

Output Tables

Acres by Resource Type (Table 1)

| Type | Wetland (AP) | Wetland (Final) | Prairie (AP) | Prairie (Final) | Forest (AP) | Forest (Final) | Habitat (AP) | Habitat (Final) | Total Acres (AP) | Total Acres (Final) |
|--|--------------|-----------------|--------------|-----------------|-------------|----------------|--------------|-----------------|------------------|---------------------|
| Restore | 0 | 0 | 0 | 0 | 0 | 0 | 2,488 | 2,488 | 2,488 | 2,488 |
| Protect in Fee with State PILT Liability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Protect in Fee w/o State PILT Liability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Protect in Easement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Enhance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 2,488 | 2,488 | 2,488 | 2,488 |

Total Requested Funding by Resource Type (Table 2)

| Type | Wetland (AP) | Wetland (Final) | Prairie (AP) | Prairie (Final) | Forest (AP) | Forest (Final) | Habitat (AP) | Habitat (Final) | Total Funding (AP) | Total Funding (Final) |
|--|--------------|-----------------|--------------|-----------------|-------------|----------------|------------------|------------------|--------------------|-----------------------|
| Restore | - | - | - | - | - | - | \$567,000 | \$560,000 | \$567,000 | \$560,000 |
| Protect in Fee with State PILT Liability | - | - | - | - | - | - | - | - | - | - |
| Protect in Fee w/o State PILT Liability | - | - | - | - | - | - | - | - | - | - |
| Protect in Easement | - | - | - | - | - | - | - | - | - | - |
| Enhance | - | - | - | - | - | - | - | - | - | - |
| Total | - | - | - | - | - | - | \$567,000 | \$560,000 | \$567,000 | \$560,000 |

Acres within each Ecological Section (Table 3)

| Type | Metro / Urban (AP) | Metro / Urban (Final) | Forest / Prairie (AP) | Forest / Prairie (Final) | SE Forest (AP) | SE Forest (Final) | Prairie (AP) | Prairie (Final) | N. Forest (AP) | N. Forest (Final) | Total (AP) | Total (Final) |
|--|--------------------|-----------------------|-----------------------|--------------------------|----------------|-------------------|--------------|-----------------|----------------|-------------------|--------------|---------------|
| Restore | 2,488 | 2,488 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,488 | 2,488 |
| Protect in Fee with State PILT Liability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Protect in Fee w/o State PILT Liability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Protect in Easement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Enhance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 2,488 | 2,488 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,488 | 2,488 |

Total Requested Funding within each Ecological Section (Table 4)

| Type | Metro/ Urban (AP) | Metro/ Urban (Final) | Forest / Prairie (AP) | Forest / Prairie (Final) | SE Forest (AP) | SE Forest (Final) | Prairie (AP) | Prairie (Final) | N. Forest (AP) | N. Forest (Final) | Total (AP) | Total (Final) |
|--|-------------------------|----------------------------|--------------------------------|-----------------------------------|----------------------|-------------------------|-----------------|--------------------|----------------------|-------------------------|------------------|------------------|
| Restore | \$567,000 | \$560,000 | - | - | - | - | - | - | - | - | \$567,000 | \$560,000 |
| Protect in Fee with State PILT Liability | - | - | - | - | - | - | - | - | - | - | - | - |
| Protect in Fee w/o State PILT Liability | - | - | - | - | - | - | - | - | - | - | - | - |
| Protect in Easement | - | - | - | - | - | - | - | - | - | - | - | - |
| Enhance | - | - | - | - | - | - | - | - | - | - | - | - |
| Total | \$567,000 | \$560,000 | - | - | - | - | - | - | - | - | \$567,000 | \$560,000 |

Target Lake/Stream/River Feet or Miles

3.89 square miles

Explain the success/shortage of acre goals

Acreage restoration goals were achieved. Some parcel acreage have further restoration needs that will be pursued after LCOHC completion included additional carp removals on Parley and Mud Lakes to get closer to target carp biomass thresholds.

Outcomes

Programs in metropolitan urbanizing region:

- Improved aquatic habitat indicators ~ 2,488 acres of habitat for fish and wildlife were restored across 14 connected lakes. Aquatic vegetation was restored, providing improved conditions that will benefit fish and waterfowl. The macroinvertebrate community will rebound, restoring the food source for waterfowl and many fish species. Evaluating changes in the aquatic plant community will continue to occur by using the DNR's FQI, among other metrics. Fish and macroinvertebrate communities are predicted to improve over time based on increases in aquatic vegetation. The DNR's Fish IBI will be completed and be compared to previously collected data.

Parcels

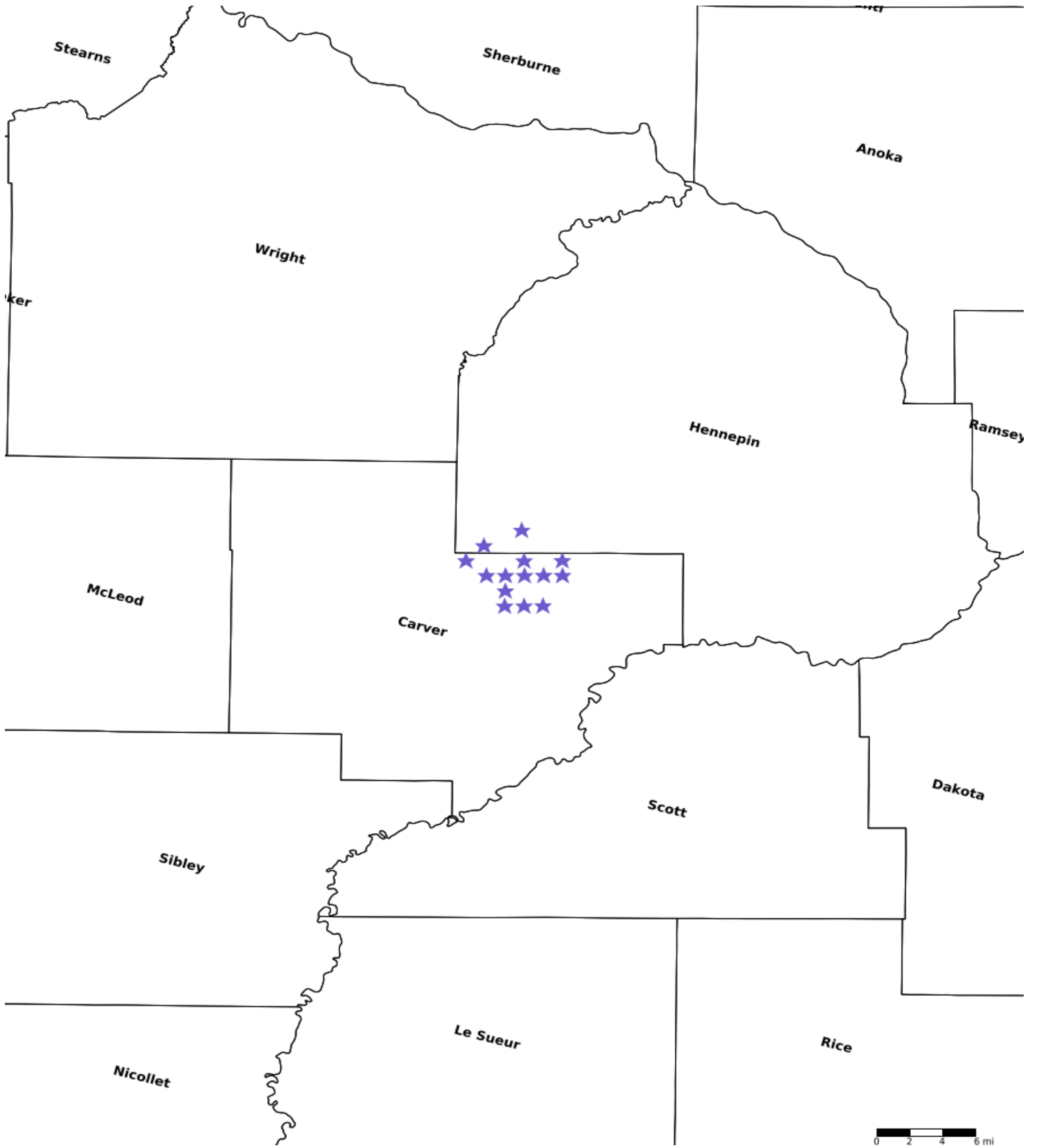
Sign-up Criteria?

[Yes - Sign up criteria is attached](#)

Restore / Enhance Parcels

| Name | County | TRDS | Acres | Est Cost | Existing Protection |
|------|----------|----------|-------|-----------|---------------------|
| 24 | Carver | 11624221 | 267 | \$14,620 | Yes |
| 7 | Carver | 11624206 | 258 | \$187,052 | Yes |
| 25 | Carver | 11624223 | 163 | \$59,897 | Yes |
| 17 | Carver | 11624209 | 146 | \$49,385 | Yes |
| 16 | Carver | 11624212 | 166 | \$14,298 | Yes |
| 15 | Carver | 11624211 | 146 | \$48,543 | Yes |
| 18 | Carver | 11624210 | 144 | \$48,543 | Yes |
| 26 | Carver | 11624222 | 139 | \$0 | Yes |
| 10 | Carver | 11624203 | 100 | \$0 | Yes |
| 12 | Carver | 11624201 | 271 | \$46,158 | Yes |
| 14 | Carver | 11624208 | 0 | \$0 | Yes |
| 20 | Carver | 11624216 | 40 | \$0 | Yes |
| 5 | Hennepin | 11724232 | 93 | \$15,225 | Yes |
| 2 | Hennepin | 11724227 | 571 | \$76,533 | Yes |

Parcel Map



- Protect in Easement
- ▲ Protect in Fee with PILT
- Protect in Fee W/O PILT
- ★ Restore
- ✕ Enhance
- ⊕ Other