



Environment and Natural Resources Trust Fund (ENRTF)

M.L. 2019 ENRTF Work Plan (Main Document)

Today's Date: 20 August 2018

Date of Next Status Update Report: 1 March 2020

Date of Work Plan Approval:

Project Completion Date: 30 June 2022

Does this submission include an amendment request? ___

PROJECT TITLE: Citizen-aided carp management: overcoming roadblocks to lake restoration.

Project Manager: Andrew Dickhart

Organization: Carver County

College/Department/Division: Planning & Water Management

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Location: Benton Lake – Metro Region – Central Carver County – City of Cologne

Total Project Budget: \$106,000

Amount Spent: \$0

Balance: \$106,000

Legal Citation: M.L. 2019, Chp. xx, Sec. xx, Subd. xx

Appropriation Language:

I. PROJECT STATEMENT:

The goal of this project is to demonstrate a new method of managing invasive common carp that can be implemented by citizen groups and LGUs to improve water quality by reducing in-lake nutrient loading. This new approach would overcome current roadblocks to successful carp management. Although research shows that lakes can be restored by managing common carp, widespread implementation of carp management has been severely hindered by lack of effective removal methods. Traditional methods such as lake drawdowns, poisoning, and commercial seining are often ineffective, harmful to native species, cost-prohibitive, and/or rely on a few specialized contractors that are difficult to secure. We propose to address these challenges by enlisting local citizens to field-test a simple, innovative method of removing carp via baiting and trapping using corn and custom “box nets”. This new approach was developed by the U of MN startup company, Carp Solutions, and is consistent with research findings that common carp can be trained to feed in specific locations of a lake using corn as bait. The chief advantage of box nets, which are stationary, is that carp can be lured into them and removed even in lakes with debris or where carp do not form natural aggregations. Further, baiting is simple enough that citizens can be trained to administer it, increasing the scalability and affordability of this strategy. Carp Solutions conducted proof-of-concept experiments in 4 lakes in 2017 which showed that 20-50% of carp were removed from each lake using only 1-4 nets, with no non-target impacts. This promising method could easily be scaled up by enlisting citizen groups to provide volunteer labor.

We request funding for a full-scale demonstration of carp removal using baited box nets in Benton Lake, a small lake in Carver County impaired for excess nutrients, which would serve as a model for other systems. The Carver County Watershed Management Organization (CCWMO) will partner with Carp Solutions and local citizens to test this new method. Effectiveness will be evaluated by quantifying carp removal efficiency and associated water quality improvements. This information will be used to guide implementation of this method in carp-infested lakes impaired for excess nutrients across the state. Our findings will also fill in important gaps in the scientific understanding of the impacts of carp and carp removal on annual nutrient dynamics. Carp Solutions LLC is the chosen consultant for this project because of their extensive knowledge and proven expertise in carp management. They are local, affordable, and are currently the only contractor using this novel approach to managing carp. Carver County solicited for bids for this project, receiving none other than from Carp Solutions.

Benton Lake is an ideal site for this test because there is detailed information on the existing carp population, a fish barrier at the outlet to prevent recolonization during removal efforts, an extensive water quality monitoring record, and local partners who are willing to participate in lake restoration activities by providing in-kind support. Specifically, in 2017, the CCWMO contracted Carp Solutions to conduct a carp assessment which showed that carp biomass was very high (~400 kg/ha) and typical of shallow lakes in Minnesota. Furthermore, phosphorus modeling revealed that Benton Lake requires a 97% reduction in internal phosphorus loading to meet State water quality standards and support recreation. The proposed project will make much-needed progress towards improving the water quality in this severely degraded lake and its findings will be broadly applicable to restoring similarly impaired waters.

II. OVERALL PROJECT STATUS UPDATES:

First Update March 1, 2020

Second Update September 1, 2021

Third Update March 1, 2021

Fourth Update September 1, 2022

Fifth Update March 1, 2022

Final Report between project end (June 30) and August 15, 2022

III. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Demonstration of the new baited box net method

We will use multiple (≥ 5) baited box nets to aggressively remove carp from Benton Lake. The nets will be placed along the shoreline in mid-summer and baited using corn to condition the carp to aggregate at the bait site at night. Baiting will be conducted by citizens/partners who will be trained to administer the appropriate amount of bait and monitor its consumption by carp. The carp will be conditioned for 5-10 days and then the sides of the nets will be lifted to enclose the carp for counting and removal. The proportion of the carp population removed will be calculated by examining previously marked fish. This effort will be repeated at least four times per year; the goal is to achieve at least a 50% reduction in abundance in year 1. This effort will be conducted for two years in an attempt to reduce carp biomass from approximately 400 kg/ha to below 100 kg/ha (management threshold) and examine how quickly the goal can be achieved and whether effectiveness decreases as carp abundance declines. Overall removal efficiency (% population removed) will be calculated and plotted against time (number of net lifts and carp abundance). Labor and costs will also be calculated, including in-kind contributions, to enable calculations of cost per lb phosphorus (See Activity 3).

ENRTF BUDGET: \$ 80,776 (\$26,780 of additional in-kind support)

Outcomes	Completion Date
<i>1. Capture, marking, & release of ≥ 200 carp to enable tracking of removal progress</i>	<i>July 31, 2019</i>
<i>2. Nets installed, citizens/partners trained</i>	<i>Aug 31, 2019</i>
<i>3. Reduction of carp abundance by $\geq 50\%$; Season 1</i>	<i>Dec 31, 2019</i>
<i>5. Nets re-installed after winter, citizen/partner refresher workshop</i>	<i>June 30, 2020</i>
<i>6. Reduction of carp abundance $\geq 75\%$; Season 2</i>	<i>Dec 31, 2020</i>

ACTIVITY 2: Monitoring of lake response to carp removal activities

We will collect detailed data to monitor improvements in Benton Lake resulting from carp removal to fill in key data gaps in the scientific literature. Specifically, lake restoration efforts via carp management typically focus only on total phosphorus (TP) and only during the growing season (May-September). We will measure in-lake concentrations of TP and total Kjeldahl nitrogen (TKN) year-round as well as select response variables including Secchi transparency, total suspended solids, chlorophyll-a, cyanobacteria abundance, and presence of cyanotoxins. We will also measure aquatic vegetation richness and cover, native fish community structure, waterfowl use, and recreational use. Furthermore, we will measure stream flow and nutrients at the outlet to calculate changes in nutrient export to downstream waters. All monitoring will be conducted annually for two years.

ENRTF BUDGET: \$22,600 (\$19,400 of additional in-kind support)

Outcome	Completion Date
<i>1. Water quality, vegetation, fish, and waterfowl surveys – year 1 summer and fall</i>	<i>Dec 31, 2019</i>
<i>2. Water quality monitoring– year 1 winter and spring</i>	<i>June 30, 2020</i>
<i>3. Water quality, vegetation, fish and waterfowl surveys – year 2 summer and fall</i>	<i>Dec 31, 2020</i>
<i>4. Water quality monitoring– year 2 winter and spring</i>	<i>June 30, 2021</i>

ACTIVITY 3: Summarizing results and reporting findings

This task involves analyzing the carp removal and water quality data to quantify removal efficiency and lake response. The cost efficiency of reducing nutrients (\$ per lb of P and N) via carp management will be calculated for TP and TKN based on the mass of carp removed, measured in-lake nutrient concentrations, and annual discharge. Before and after comparisons of clarity, chlorophyll-a, plants, fish, waterfowl, and recreation will be also reported. Findings will be formally presented at the annual MN Water Resources Conference which brings together natural resource managers from across the state. CCWMO will also conduct educational outreach at pop-up stations onsite during carp removal efforts and at their annual city-wide festival.

ENRTF BUDGET: \$ 2,775(\$6,900 of additional in-kind support)

Outcome	Completion Date
<i>2. Cost effectiveness and lake response report – year 1</i>	<i>June 30, 2020</i>
<i>4. Final report on cost effectiveness and lake response</i>	<i>June 30, 2021</i>

First Update March 1, 2020

Second Update September 1, 2021

Third Update March 1, 2021

Fourth Update September 1, 2022

Fifth Update March 1, 2022

Final Report between project end (June 30) and August 15, 2022

IV. DISSEMINATION:

Description: Project results will be formerly presented at the annual MN Water Resources Conference and possibly the Upper Midwest Invasive Species conference. Project information and updates will be made available on the [Carver County Website](#) in story map form.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the [ENRTF Acknowledgement Guidelines](#).

First Update March 1, 202

Second Update September 1, 2021

Third Update March 1, 2021

Fourth Update September 1, 2022

Fifth Update March 1, 2022

Final Report between project end (June 30) and August 15, 2022

V. ADDITIONAL BUDGET INFORMATION:

A. Personnel and Capital Expenditures

Explanation of Capital Expenditures Greater Than \$5,000: N/A

Explanation of Use of Classified Staff: N/A

Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 0

Enter Total Estimated Personnel Hours for entire duration of project: 0

Divide total personnel hours by 2,080 hours in 1 yr= TOTAL FTE: 0

Total Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: 2

Enter Total Estimated Contract Personnel Hours for entire duration of project:

Divide total contract hours by 2,080 hours in 1 yr = TOTAL FTE: 2

VI. PROJECT PARTNERS:

A. Partners outside of project manager’s organization receiving ENRTF funding

Name	Affiliation	Role
Carp Solutions, LLC	Consultant	Provides technical expertise and equipment for carp removal and fish surveys

B. Partners outside of project manager’s organization NOT receiving ENRTF funding

Name	Affiliation	Role
Benton Lake Watershed Conservancy	Citizen Group	Provides volunteer labor and monitoring

VII. LONG-TERM- IMPLEMENTATION AND FUNDING:

In addition to providing in-kind support for this project, CCWMO has invested in assessments and infrastructure to plan for long-term carp management in this system. In 2013, CCWMO installed a carp barrier at the outlet of Benton Lake, to protect this system from downstream sources of carp. In 2017, CCWMO contracted Carp Solutions to estimate carp abundance which showed that carp biomass was very high (661 kg/ha) and that carp were most likely responsible for poor water quality. In 2017, CCWMO also conducted a preliminary assessment of the box net technology, which showed that 21% of the population (5,105 carp) were removed with just 2 nets. In 2018, CCWMO is committed to investing in studies of carp recruitment, seasonal migrations, and overwintering sites. CCWMO is also examining the need for a winter aeration system to strengthen native fishes (bluegills) to reduce future carp reproductive success. Implementation of these activities is funded by local dollars through annual budgetary processes including the Carver County Capital Improvement Plan. Overall, the vision of CCWMO is to implement an integrated pest management strategy for carp in a shallow lake system that could be used as a model for other locations across Minnesota.

VIII. REPORTING REQUIREMENTS:

- Project status update reports will be submitted March 1 and September 1 each year of the project
- A final report and associated products will be submitted between June 30 and August 15, 2021

IX. SEE ADDITIONAL WORK PLAN COMPONENTS:

- A. Budget Spreadsheet**
- B. Visual Component or Map**
- C. Parcel List Spreadsheet**
- D. Acquisition, Easements, and Restoration Requirements**
- E. Research Addendum**

Attachment A:
Environment and Natural Resources Trust Fund
M.L. 2019 Budget Spreadsheet



Legal Citation:

Project Manager: Andrew Dickhart

Project Title: Citizen-aided carp management: overcoming roadblocks to lake restoration

Organization: Carver County

Project Budget: \$106,000

Project Length and Completion Date: 3 years, June 30, 2022

Today's Date: 20 August 2018

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)	N/A		
All Carver County staff time will be listed as in-kind contribution.			
Professional/Technical/Service Contracts			
Subcontract Carp Solutions LLC, to provide technical expertise and specialty equipment for: electrofishing to catch, mark, and release carp for progress tracking (\$3,840). Training Citizens & local partners to bait/monitor nets, oversight (\$3,600). Seasonal deployment and management of box nets, removal, and disposal of carp (\$70,336). Native fish community surveys following DNR protocols (\$4,000). Data analysis and reporting (\$2,400). Carp Solutions LLC is the chosen consultant for this project because of their extensive knowledge and proven expertise in carp management. They are local, affordable, and are currently the only contractor using this novel approach to managing carp. Carver County solicited for bids for this project, receiving none other than from Carp Solutions.	\$ 84,176	\$ -	\$ 84,176
Subcontract RMB Labs for water quality analyses: In-lake monitoring for TP,TKN, TSS, Chl-a, biweekly; year-round, 2 years (\$6,250). In-lake monitoring for cyanobacteria/cyanotoxins, monthly; July - Sept, 2 years (\$6,100). Outlet monitoring for TP, TKN; year round; 2 years (\$2,950). Courier for sample pick up, 2 years (\$1,400). Our organization recently started contracting with RMB Labs for all of our water quality analyses. We recieved 4 bids and chose RMB based on affordable cost, proven track record, and local offices.	\$ 16,700	\$ -	\$ 16,700
Equipment/Tools/Supplies			
Continuous water level logger for outlet stream	\$ 1,400	\$ -	\$ 1,400
Trail cameras for wildlife monitoring	\$ 500	\$ -	\$ 500
Corn for baiting 6 nets, 4 attempts per year; 2 years	\$ 3,000		\$ 3,000
Capital Expenditures Over \$5,000	N/A		
Fee Title Acquisition	N/A		
Easement Acquisition	N/A		
Professional Services for Acquisition	N/A		
Printing	N/A		
Travel expenses in Minnesota (will be reported as in-kind)	N/A		
Other: Registration fee for Water Resources Conference	\$ 375	\$ -	\$ 375
COLUMN TOTAL	\$ 106,151	\$ -	\$ 106,151

OTHER FUNDS CONTRIBUTED TO THE PROJECT	Budget	Spent	Balance
Non-State:	N/A		
State:	N/A		
In kind:			
Carver County Staff time for water quality monitoring, community outreach, & data analysis.	\$ 30,800	\$ -	\$ 30,800
Citizen baiting and monitoring of box nets	\$ 22,280	\$ -	\$ 22,280
PAST AND CURRENT ENRTF APPROPRIATIONS	Budget	Spent	Balance
Current appropriation:	N/A		
Past appropriations:	N/A		