



Nine Mile Creek Discovery Point  
12800 Gerard Drive

Eden Prairie, MN 55346

(952) 835-2078

[www.ninemilecreek.org](http://www.ninemilecreek.org)

## MEMO

**TO: Nine Mile Creek Watershed District Board of Managers**

**FROM: Randy Anhorn**

**DATE: February 9, 2021**

**RE: WSB Scope of Work for Continued Goldfish and Carp Population and Inter-Body Movement Assessment**

### Background

As you are aware, the District received a 2020 Hennepin County AIS Prevention Grant to partially fund an inter-waterbody study of goldfish movement in the Lake Cornelia system to track movement with the use of passive integrated transponder (PIT) tags, identify nurseries, age captured fish to determine recruitment and identify potential management methods.

Some of the findings from the 2020 study include:

- Carp populations appear to be very low. The only water body to have more than a couple carp was Swimming Pool Pond, and it seems like they were too large to squeeze down the trash guard over the pipe that leads to North Cornelia. There were no carp found in Nancy Lake.
- Goldfish populations throughout the system are high. Population densities in Swimming Pool Pond and Lake Nancy are higher than North and South Cornelia, but the average size of the fish is smaller. North and South Cornelia had a population of goldfish that indicate that they are overwintering multiple years and on average are larger. These results are typical of carp populations in similar lake systems.
- We did not detect an alarming number of PIT tag crossings at any of the four areas where antennas were placed. However, we hypothesize that, similar to carp, we may see the most movement happening in springtime just before goldfish hit their main spawning season. If Lake Nancy and Swimming Pool Pond indicate recruitment regularly, we will need to continue to monitor how many (if any) goldfish make their way into North and South Cornelia. The report concluded that it would be worthwhile to continue the monitoring of passage of those tags from suspected nurseries between lakes in this system until end of spring 2022 under this project.
- Testing of the goldfish box netting in Lake Nancy was not seen to be successful. We did capture over 100 goldfish in one net pull, but the lake bottom was too soft to work with and required more labor than if we used other potential methods. We did confirm from a few goldfish captured, that the corn bait was being consumed. Therefore, we believe there is an opportunity to bait goldfish into aggregations to target. In summer of 2021, we would like to test the box net in North and South Cornelia where there are more appropriate water depths and sediment consistency.
  - In addition to box netting, to test another management option, we would deploy a 200' seine net to hand pull around the area of the box nets in 2021-2022 to further take advantage of goldfish that are drawn to the baited areas but not within the box net trap area exactly. A seine net can net a much bigger volume of water.
- Finally, understanding nurseries and their contribution to North and South Cornelia is critical to developing a long-term management plan. In 2020, surveys indicated a size structure typical of young of the year and one year old goldfish. In 2021-2022 we would like to sample with mini fyke nets. They are the standard for sampling for presence of young of the year carp and are also applicable for goldfish. The results of sampling all four water bodies combined with 2018 and 2020 data will further indicate the most likely nurseries of goldfish in this system.

Finally, due to the 2020 study only having five months of PIT antenna tracking of goldfish, the final report recommended continued monitoring for another year and a half, especially during the spring when spawning migration takes place would better define movement, potential nurseries, continue to refine population estimates and test additional management alternatives. The proposal will also include the development of a final “feasibility” report that would meet BWSR requirements needed to be able to apply for grant funds to implement management options.

The results of this continued study will guide planning and management to take rapid action to stop the spread of goldfish in this system and reduce internal phosphorus loading.

The proposed cost for the two years of work is \$52,003 (proposal attached). To offset the cost of the phase 2 goldfish assessment, the District applied for and received a \$40,000 BWSR Watershed-Based Funding Grant (the District will need to provide a \$4,000 match) and a \$7,600 Hennepin County AIS grant (no match required).

### **Request**

Authorize the Administrator to enter into an agreement with WSB to complete the scope of work at an amount not to exceed \$52,003.

# PHASE 2: GOLDFISH AND COMMON CARP POPULATION AND INTER-WATERBODY MOVEMENT ASSESSMENT IN LAKE CORNELIA SYSTEM

Scope of work for the Nine Mile Creek Watershed  
District



February 10, 2021

Prepared by:

Jordan Wein, Environmental Scientist

WSB, 178 East 9<sup>th</sup> Street, Suite 200, St. Paul, MN 55101



## INTRODUCTION

Invasive goldfish have just been added to the MAISRC priority list for investigation. They are being released into lakes around the Twin Cities Metro. Clearly, education is needed to prevent initial infestations. But little is known about the risk of spread of this invasive species to other connected water bodies if an infestation has been confirmed. The results of this study and education initiative will work to prevent introductions as well as guide planning and management of watersheds to take rapid action to stop the spread of goldfish in this system and others in Hennepin County.

In addition to goldfish, common carp are well-known to be a significant driver of poor water quality parameters. While foraging, they root around in lake sediments where nutrients like phosphorous can be locked up in an inactive form. When disturbance occurs from an overabundance of carp, large amounts of phosphorous is reintroduced to the water column where it becomes available for algae. This in turn promotes green algae blooms as well as turbid water conditions. Both North and South Cornelia are on the Minnesota Pollution Control Agency's Impaired Waters list due to excess nutrient loads. The main parameters that are measured to decide if a water body belongs on this list are total phosphorous (TP), chlorophyll-a (algae abundance), and clarity (measured by secchi depth). Goldfish and common carp can contribute significantly to the internal loading of TP and management of their populations below a threshold of 100kg/ha (Bajer et al, 2009) is generally considered to be an inexpensive method of managing internal loading (Bartodziej et al, 2017).

In 2018, surveys completed by Riley Purgatory Bluff Creek Watershed District for Nine Mile Creek Watershed District identified carp in Cornelia Lake and surrounding potential nursery lakes. Goldfish and carp were found in numbers that warranted more rigorous assessment and understanding of inter-lake spatial usage in order to guide future long-term management. To properly assess for goldfish and carp biomass levels and the presence of YOY, WSB recommends that electrofishing surveys be properly completed as deemed by protocols in Bajer and Sorensen (2012).

It is also important to know the movement capabilities and patterns between and within lakes in the Cornelia system. WSB would continue to utilize passive integrated transponder (PIT) tags to track movement via antennas at strategic locations in the Cornelia system. WSB will test a series of removal techniques including electrofishing, baited box nets, seining, and cast netting. They will be tested in North and South Cornelia. To take advantage of the baiting that is incorporated in the box netting effort, WSB will also test a novel seine net designed to capture goldfish.

These removal tests will allow the watershed district to plan for the future of removals (if needed) and costs associated with that effort. In general, the data collected in this work will serve as the scientific baseline to determine if/what population reduction is needed to meet biomass goals, understand important pathways to movement, and strategize if/what management of goldfish and/or carp should be planned for the future in order to improve water quality and promote the health of the lake ecosystems.

Follow up electrofishing surveys will be conducted post removal to determine to effect on the CPUE of goldfish in the lakes. Finally, mini-feik nets will be used to survey Lake Nancy, Swimming Pool Pond as well as North and South Cornelia to survey for YOY goldfish, carp, and bluegill sunfish.

To obtain approval of the Minnesota DNR Fisheries, a small amount of time has been included to account for this process. Any administrative expenditures to manage the accounting of this project will be covered by the project management line item. The following is a detailed description of the recommended work plan:

## INSTALLING PIT ANTENNAS TO MONITOR CARP MOVEMENT BETWEEN LAKES

Antennas would be reinstalled and tested to monitor the movements of goldfish in the Cornelia Lake system. Four locations (Figure 1) would have antennas installed to determine which water bodies are important in the recruitment of carp in the system. It will determine what time of year, what proportion of the population is moving and how often use the pathway between bodies.

These antennas will be in place before PIT tags are implanted during the electrofishing surveys described above. The antennas will run for 1.5 years in order to capture the unbiased movement in the spring of 2021 and 2022, when spawning migrations are anticipated to occur. Long term PIT monitoring data is very valuable, so we recommend considering further monitoring of these locations for the future.

If the results show a sizeable movement of tagged fish through one or more pathways, consideration and planning of barriers to impede movement and/or a trap to target the migrations for biomass removal can be built into a management plan.

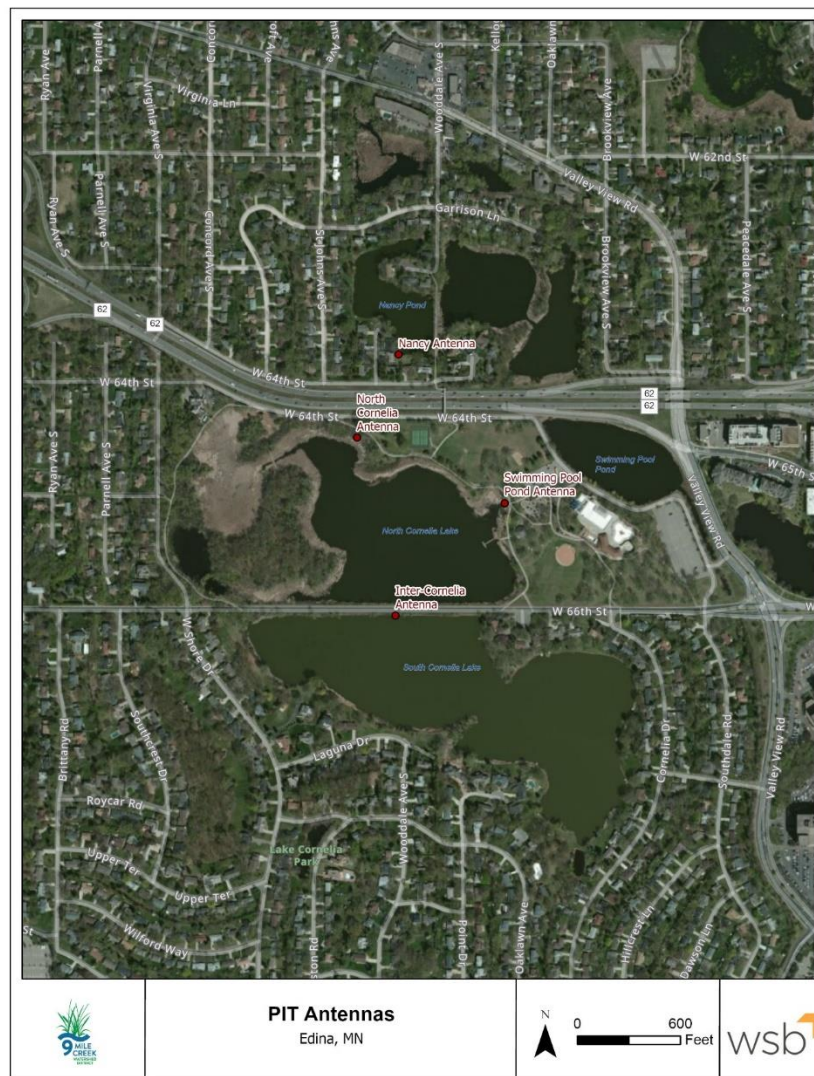


Figure 1: Illustration of locations of PIT antennas strategically placed in potential fish pathways.



## ELECTROFISHING SURVEYS TO COLLECT PRE-REMOVAL BASELINE CPUE IN NORTH AND SOUTH CORNELIA AND IMPLANT PIT TAGS

WSB would conduct at least three 20-minute transects in randomized sections of shoreline in both North and South Cornelia. We would conduct these surveys on two different days at least one week apart. This is to account for differences in environmental conditions that may bias the catch rate. We would calculate the catch per unit effort (CPUE) and continue to refine and adapt the carp model described in Bajer and Sorensen (2012) to quickly determine the carp density, average size/weight and scale that to the lake for an overall goldfish and carp biomass (kg/ha).

We will measure, weigh, implant a sample with PIT tags (up to 200 in each lake) and give a pelvic fin clip to all goldfish before releasing back to the lake. In subsequent capture events, if enough individuals are recaptured, we will be able to calculate a mark/recapture population estimate. This is generally more reliable but requires more effort and cost.

From these data, we will report on the size structure of the populations in each lake with the CPUE data.



*Figure2: Examples of recaptured goldfish with visible fin clip marks.*

## TESTING RAPID MANAGEMENT ACTION TO ADDRESS LOCALIZED INFESTATIONS

Following 2021 baseline CPUE electrofishing surveys, we will employ a technique found to be successful in small water bodies with common carp to determine efficacy with goldfish. A box net trap refers to a mesh net that lays on the lake bottom with attached walls around the outside. These walls are attached to vertical metal pipes that extend above the water surface. The walls are attached to ropes that are run to shore and when the ropes are pulled in, the walls quickly rise above the surface trapping the fish within the trap area inside. The fish are corralled to a corner and removed with a dip net.

A modified baited-box-net trap (one with a mesh size appropriate for goldfish instead of adult carp) will be deployed in North and South Cornelia Lakes and baited with cracked corn (or another bait seen to be effective). A bait bag will be placed on top of the net in order to draw in goldfish. Lake residents and NMCWD staff will tend the bait, filling it if the bag is empty, once per day for up to seven days of baiting and report to WSB. After the first removal attempt, we will drop the walls and bait for an additional week in order to test the trap a second time. This method has been found to be over 98% selective for carp. All fish captured will be counted and measured. All goldfish will be removed from the lake.

To further take advantage of the baited aggregation(s), we will also deploy a 200' seine net adjacent to the box net and around the area. We presume that although the densest part of the aggregation would be close to the bait bag, only fish within the area of the box net would be captured. However, the aggregation may be larger than that and a seine net can cover a wider area than the box net. The seine will be pulled in by hand and with the assistance of a truck mounted winch.

We will tentatively plan four removal events between July and August. All fish captured will be counted, and a sample of each species will be measured for weight and length to develop a comparative size structure.



*Figure 2: In the process of installation of the box net in the Northwest corner of Lake Nancy.*



## **SURVEYING FOR RECRUITMENT**

WSB will survey North and South Cornelia as well as Swimming Pool Pond and Lake Nancy for recruitment. This will be done by setting mini-feik net traps in four locations around each water body. The traps are anchored to shore and stretched perpendicular to the shoreline. A lead line guides fish swimming along the shoreline into the first of multiple tapering throats. The mesh size of these traps is small enough to catch YOY goldfish, carp and bluegill when deployed in August or September. Understanding the tendencies of potential nurseries is critical to long-term management of the population in North and South Cornelia.

## **DATA ANALYSIS AND REPORTING**

Data will be compiled and analyzed to make conclusions based on field work. A report will be compiled to combine data collection for the initial phase of this project in 2020 with 2021 results and will conclude with the spring movement analysis in 2022. The long-term goals of Nine Mile Creek Watershed District is to procure support for implementation grant funding to engage in large-scale management of the lake system in order to improve water quality and to do so sustainably. The results from 2020 through 2022 are intended to serve as a feasibility study to develop an integrated pest management (IPM) plan which includes an understanding of management options and their cost effectiveness. This study is required by the Board of Water and Soil Resources (BWSR) before they will consider financially supporting an implementation plan. WSB staff have experience and success organizing these studies and communicating the results in such a way to make them meet the standards of BWSR and eventual implementation support. Extra consideration for the conclusion of this work has been allotted to the reporting task for such reason.





**BUDGET TABLE:**

<b>Cornelia Lake system Goldfish and Carp Assessment 2021-2022</b>	<b>Expenses</b>	<b>Env. Scientist V hours</b>	<b>Env. Scientist VI hours</b>	<b>Senior Ecologist hours</b>	<b>Line item total</b>
Hourly rate		\$91	\$98	\$147	
Permitting and project management 2021-2022		10			\$910
Installation (March 2021) and uninstallation (June 2022) of PIT antennas.		26			\$2,366
Electrofishing surveys and PIT tagging goldfish in North and South Cornelia 2021	\$800	41	41		\$8,549
Testing baited box net trap for capture of goldfish in North and South Cornelia 2021	\$1,500	36	36		\$8,304
Annual PIT antenna rental 2021 full year	\$7,600				\$7,600
Partial year PIT antenna rental 2022	\$3,800				\$3,800
Bait and seine attempts 2021	\$500	36	36		\$7,304
YOY trap netting in Lake Nancy, North and South Cornelia lakes and Swimming Pool Pond	\$500	40	40		\$8,060
Data analysis and reporting		40		10	\$5,110
<b>Overall Project total</b>					<b>\$52,003</b>

**TIMELINE:**

	2021										2022					
	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June
Re-installation and uninstallation of PIT antennas	■	■														■
Electrofishing surveys and PIT tag implantation				■												
Removal efforts (seining, box netting)				■	■	■	■									
Electrofishing for 2021 mark recapture estimate and CPUE comparison							■									
Nursery surveys (mini feik netting)							■	■								
Data analysis and reporting (preliminary and final)							■			■	■					■

## REFERENCES:

- Bartodziej, W., Sorensen, P.W., Bajer, P.G., Pilgrim, K. and Blood, S. 2017. A Minnesota story: Urban shallow lake management. *NALMS Lakeline*. 23-29.
- Bajer, P.G., and Sorensen, P.W. 2012. Using boat electrofishing to estimate the abundance of invasive common carp in small midwestern lakes. *North American Journal of Fisheries Management*. 32:5, 817-822.
- Bajer, P.G., Sullivan, G., and Sorensen, P.W. 2009. Effects of a rapidly increasing population of common carp on vegetative cover and waterfowl in a recently restored midwestern shallow lake. *Hydrobiologia*. 632: 235-245.