Environment and Natural Resources Trust Fund

M.L. 2024 Approved Work Plan

General Information

ID Number: 2024-114

Staff Lead: Mike Campana

Date this document submitted to LCCMR: June 7, 2024

Project Title: Implementing Innovative Techniques to Manage Low-Density Invasive Carp

Project Budget: $634,000

Project Manager Information

Name: Brian Nerbonne

Organization: MN DNR - Fish and Wildlife Division

Office Telephone: (651) 259-5789

Email: brian.nerbonne@state.mn.us

Web Address: https://www.dnr.state.mn.us/fishwildlife/index.html

Project Reporting

Date Work Plan Approved by LCCMR: June 20, 2024

Reporting Schedule: June 1 / December 1 of each year.

Project Completion: June 30, 2027

Final Report Due Date: August 14, 2027

Legal Information

Legal Citation: M.L. 2024, Chp. 83, Sec. 2, Subd. 06c

Appropriation Language: $634,000 the second year is from the trust fund to the commissioner of natural resources to implement new and innovative methods and to enhance ongoing efforts to detect, monitor, and remove invasive carp and to evaluate watershed boundaries for potential breaches to avoid invasive carp establishment in Minnesota.

Appropriation End Date: June 30, 2027

Narrative

Project Summary: This project will enhance the current program, integrating new invasive carp control and detection methods to monitor and remove invasive carp to avoid establishment in Minnesota.

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Early detection and response efforts are important for protecting MN resources from the negative environmental and economic impacts of invasive carp. When abundant, invasive carp can harm native fish populations and make water recreation dangerous due to leaping fish. Since 2011, 410 invasive carp have been removed from Minnesota's waters through this program, and 8 captured fish have been surgically implanted with acoustic tracking transmitters and released. The capture of these fish makes it apparent that invasive carp are at our doorstep but that control efforts are showing success in Minnesota waters. The Minnesota Department of Natural Resources (DNR) began its grant-funded invasive carp program in 2012, and expanded the program using 2013, 2017 and 2021 LCCMR grants. DNR is seeking additional funding to continue our invasive carp work, and implement promising new techniques.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

Several new advancements show promise to increase our effectiveness to disrupt invasive carp before they become established in Minnesota. This proposal builds on the previous successes from LCCMR- funded work, expanding effective techniques while adding others. Our program targets the leading edge of the invasion and protects waters further upstream. Improving fish tracking capability by adding real-time tracking receivers and environmental sensors, investment in specialized nets to take advantage of fish behavior, incorporating new technologies, and evaluating potential watershed boundary breaches will increase our ability to disrupt invasive carp before they become established. Specifically, the implementation of semi-automated remote kayaks equipped with underwater speakers to herd fish during capture events, remote controlled deep water deterrents and anti-jump nets to increase capture effectiveness in nets for silver carp will all enhance the removal of invasive carp in Minnesota waters. Working with USFWS we will employ eDNA testing to enhance the efficiency of sampling to detect invasive carp reproduction. We have chosen to focus our efforts on the St. Croix, Minnesota, and Mississippi Rivers to detect invasive carp and remove early invaders, but will target other locations if warranted. Work will be done statewide to evaluate watershed breaches for potential future expansion.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

Invasive carp are a serious threat to Minnesota's aquatic ecosystems. The DNR continues to conduct surveys and sampling of our major rivers. Enhancing this effort to detect and remove invasive carp is important to Minnesota's invasive carp management strategy. This project will continue improving DNR invasive carp field activities to determine the distribution and abundance of invasive carp in Minnesota waters, remove invasive carp, and inform other management efforts. Removal of carp will disrupt the potential establishment of invasive carp in Minnesota waters. eDNA testing will enhance our ability to delineate the leading edge of invasive carp reproduction in Minnesota.

Project Location

What is the best scale for describing where your work will take place?

Statewide

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Adapting and applying innovative techniques

Activity Budget: $290,000

Activity Description:

As invasive carp move upstream, localized population density increases. Commercial fishing has proven to be one of the most successful methods for removing invasive carp in these localized populations due to the tight schooling behavior of these species. Driving carp into areas suitable for commercial fishing requires many boats and personnel working in close coordination over large areas. Building semi-automated remote herding kayaks, equipped with a speaker each, will allow large sections of river to be covered with a small crew. Driven invasive carp tend to jump commercial seines and block nets when trapped; by adding floating nets to the top of block nets we can take advantage of this behavior and increase captures. MN DNR has used larval fish sampling to look for invasive carp reproduction, but that is time consuming and expensive.

Activity Milestones:

Description	Approximate Completion Date
Contract commercial fishermen to deploy 4 seine and 3 gill net days in 2024	December 31, 2024
Partner with USFWS for eDNA testing of larval samples in 2024	December 31, 2024
Build 3 semi-automated, remote kayaks with mounted speakers for herding carp	March 31, 2025
Begin deploying semi-autonomous kayaks with speakers in carp removal efforts in conjunction with commercial fishing	May 31, 2025
Build and begin deployment of floating nets to capture jumping Silver Carp	June 30, 2025
Contract commercial fisherman to deploy 4 seine days and 3 gill net days in 2025.	December 31, 2025
Partner with USFWS for eDNA testing of larval samples in 2025	December 31, 2025
Evaluate effectiveness of semi-autonomous kayaks relative to traditional methods	December 31, 2025
Contract commercial fisherman to deploy 5 seine days and 3 gill net days in 2026	December 31, 2026
Partner with USFWS for eDNR testing of larval samples in 2026	December 31, 2026

Activity 2: Advancing tagging and tracking of invasive carp

Activity Budget: $282,000

Activity Description:

The first tagged Bighead Carp in 2017 has led to the capture of five invasive carp, including the tagging another invasive carp. Since that first tagging we have tagged an additional 6 silver carp. The movement patterns of these carp have influenced sampling efforts by informing us of new locations and adapting sampling timing to better fit carp movement in low-density populations. Building additional real-time receivers will allow for efficient monitoring of backwater or hard to reach habitats. In lower pools of the Mississippi River correlations have been found between water quality characteristics and timing of carp inhabiting those areas. Adding water quality sensors to real-time receivers will allow us to better understand how that variable relates to the presence of invasive carp.

Activity Milestones:

Description	Approximate Completion Date
Build 3 additional real-time receivers to increase tracking effiency	June 30, 2025
Incorporate environmental sensors onto new and existing real-time receivers	December 31, 2025
Maintain 50-70 tracking receivers and annually contract for professional data analysis	June 30, 2027

Activity 3: Evaluating watershed boundaries for potential breaches

Activity Budget: $62,000

Activity Description:

Barriers are well known for impeding upstream movement of fish. Although this can be detrimental to native fish populations, these barriers also play a role in slowing the spread of invasive species. Because of human alterations such as ditching, what historically were watershed boundaries can at times be crossed by fish during high water. Updating the 2013 "Minnesota DNR Barrier and Watershed Breach Study" will include the impact of barriers that have been implemented since the 2013. This update will guide further evaluation through ground-truthing. Results from this update and boots-on-the-ground investigation will be provided to MNDNR Area Offices and Regional Managers for consideration of future barrier development needs.

Activity Milestones:

Description	Approximate Completion Date
Create an updated watershed map for barrier assessment	December 31, 2025
On-the-ground evaluation of watershed boundaries for potential breaches	December 31, 2026
Develop recommendations for potential locations for barrier development	June 30, 2027

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.
Information regarding sites sampled, effort expended, Invasive Carp caught, and native species associated with sampling sites will be compiled. This information will also be shared with other state and federal agencies including the University of Minnesota, U.S. Fish and Wildlife Service, National Park Service, U.S. Geological Survey, U.S. Army Corps of Engineers, Upper Mississippi River Conservation Committee, and others. Results will be presented at appropriate conferences, and, if appropriate, compiled and written for publication in peer reviewed journals. In addition, MN DNR annual reports will be written synthesizing the year's sampling activities and results and updates will be provided on the MN DNR website's Invasive Carp webpage.
Invasive Carp collected will be processed by MN DNR staff, information will be relayed to the U.S. Geological Survey's Nonindigenous Aquatic Species online database (http://nas.er.usgs.gov/) and representatives from other state and federal agencies. Samples from Invasive Carp will be sent to collaborating agencies for age validation, determination of sex and reproductive maturity, microchemistry, genetics, and other purposes as they arise following established protocols. DNR recognizes LCCMR's acknowledgement requirements for dissemination of information related to this grant and plans to follow them fully.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?
The DNR invasive carp field program is partially grant supported. In addition to DNR Game and Fish Funds, it has been and is funded by a variety of sources that include Minnesota Environment and Natural Resource Trust Fund, Lessard Sams Outdoor Heritage Fund, and USFWS grants. NPS, USGS and USFWS field crews have provided additional field support. DNR will continue seeking additional grants and partnerships. These additional funding sources will continue to add to the program that is already in place and continue to work on using new techniques to remove invasive carp.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Applying New Tools And Techniques Against Invasive Carp	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 06d	$478,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Invasive Carp Specialist		Specialist will conduct at least 200 field sampling days annually, oversee commercial fishing operations, and compile, analyze, and report findings			30%	3		$270,000
Student Interns		Interns will assist with field data collection activities in support of project objectives			0%	1.5		$60,000
							Sub Total	**$330,000**
Contracts and Services								
TBD	Professional or Technical Service Contract	Commercial Fishing: Contracted directed commercial seines and large mesh gill nets. Licensed commercial fisherman will be hired to set gill net and seine in conjunction with herding kayaks, remote speakers and anti-jump nets.				0.9		$50,000
Innovasea	Professional or Technical Service Contract	Innovasea data processing fee for 2 locations for 3 years as well as receiver maintenance. Innovasea will assist in analyzing tagging data to identify seasons and locations where invasive carp congregate, allowing planning for future removal. VEMCO units are used as part of a network with other state/federal agencies.				-		$20,000
MNIT	Internal services or fees (uncommon)	MNIT GIS staff will work with existing and new data to evaluate and map watersheds and potential breach points. This work is an update to include all of the barriers that have been implemented since the original barrier study in 2013.				0.3		$20,000
							Sub Total	**$90,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Replacement nets, specialized nets including large mesh gill nets (floating gill net components 4 @ $500 = $2000), trammel nets (4 @ $400 = $1,600); associated supplies to deploy nets such as rope, anchors, floats (Quantity depends on needs as they arise, approx. $2,500); miscellaneous supplies such as	Nets, buoys, rope, anchors are necessary to capture invasive carp at various life stages and in various habitats. All other equipment such as PPE's, repairs, and replacements are					$30,500

		personal protective equipment, repairs, replacements, etc. (Quantity depends on needs $20,400)(No single piece of equipment will exceed $5,000). Larval supplies (Ethanol 15L @ $263 = $4,000) Costs are based on expected bids and may vary.	essential in continuing our operations and completing our objectives.					
	Equipment	Real-time receiver environmental sensors. Two types of sensors will be incorporated: 9 - Dissolved Oxygen/Temp/Depth ($2,210/sensor) & 7 - Chlorophyll ($4,650/sensor).	Environmental sensors allow for the programs existing real-time receivers to be retrofitted with sensors to monitor water quality. We use water quality data to inform us on environmental conditions in locations invasive carp are choosing to inhabit, which informs where we might also look for invasive carp aggregations in places with similar conditions.	X				$52,000
	Equipment	Remote underwater speaker. Speakers are approx. $2,059 each.	A remote underwaters speaker allows for fish to be driven out of deep holes, areas of high current or areas with many snags. It not only improves crew safety but allows for improved efficiency when driving or herding invasive carp.					$4,500
							Sub Total	**$87,000**
Capital Expenditures								
		Semi-automated remote herding kayaks. Overall cost of the 3 kayaks will be approx $9,000 each ($1,100/kayak, $4,200/trolling motor, $3,700/depth finder)	Building semi-automated remote kayaks will allow for precision and greater coverage of large areas when herding invasive carp to an area appropriate for contracted commercial harvest. These kayaks will be equipped with underwater speakers for scaring fish away from the kayak and each kayak will take the place of a boat with a 2 person crew. The use of remote control will allow for a smaller field crew to drive large areas of river.	X				$30,000
		Real-time tracking receivers. Two receiver systems will be purchased from Innovasea at $8,195 each. Additional funds are used to build the floating housing and anchoring system.	Real-time receivers allow for active remote tracking of deployed locations. This allows for continuous monitoring for tagged invasive carp and allows	X				$16,500

			crews to focus efforts on high priority effort while still allowing for rapid response efforts should a tagged fish be detected.					
		Supplies to build deployment system for real-time receivers	A deployment system must be build for the real-time receivers in order for them to be used in the field. Deployment methods include building a floating platform with self adjusting anchoring system and shore mounts with a benthic hydrophone anchoring system. Each deployment method is build with a waterproof electronic housing, solar panels, charge controller and large capacity battery.	X				$13,500
							Sub Total	**$60,000**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Other	Fleet transportation expense for 3 years; base of operation will be Warner Road, St. Paul Fisheries office.	Fleet costs allow staff to use state vehicles in order to better meet goals and objectives.					$25,000
							Sub Total	**$25,000**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
		DNR's Direct and Necessary Costs- Direct and necessary costs cover HR Support ($8,256), Safety	Direct and necessary costs reflect the amounts directly related to and					$42,000

		Support ($1,716), Financial Support ($6,718), Communication Support ($2,123), IT Support ($21,479), Planning Support ($1,036).	necessary for the accomplishing the project outcomes that would not exist but for the receipt of the appropriation. It is standard DNR policy to recoup these costs incurred when we receive external grant funding.					
							Sub Total	**$42,000**
							Grand Total	**$634,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Equipment, Tools, and Supplies		Real-time receiver environmental sensors. Two types of sensors will be incorporated: 9 - Dissolved Oxygen/Temp/Depth ($2,210/sensor) & 7 - Chlorophyll ($4,650/sensor).	Existing real-time receivers from past LCCMR funding are made by Innovasea, there currently are no existing 3rd party sensors that are compatible with these systems. Innovasea receivers and tags are currently used throughout the Upper Mississippi River by partnering agencies (USGS, USFWS, NPS, U of M) as part of a large telemetry study. **Additional Explanation :** These sensors will be fitted onto existing receivers. These receivers are the most effective way of tracking tagged invasive carp. Often these real-time receivers are in key habitats where tagged carp have been based on past telemetry data. Water quality data has been limited to in-person monitoring. These sensors would be deployed as part of the real-time receiver and provide additional data to characterize preferred habitats.
Capital Expenditures		Semi-automated remote herding kayaks. Overall cost of the 3 kayaks will be approx $9,000 each ($1,100/kayak, $4,200/trolling motor, $3,700/depth finder)	These kayaks will need to be custom built. This is new technology developed by USGS and not available as a preassembled unit. These kayaks will allow crews to herd fish with fewer boats and few staff, allowing for multiple crews to be deployed to multiple locations improving both safety and efficiency. **Additional Explanation :** These kayaks will allow for versatility in changing ecosystems of the future and will continue to be used for herding fish after this proposal has ended. These kayaks also have the ability to be adapted in the future to monitor fish trying to escape past the underwater speakers. The progression of invasive carp upstream will continue to need management after the life of this grant and these kayaks will continue to be safe and efficient herding technique for removal efforts after the life of this grant.
Capital Expenditures		Real-time tracking receivers. Two receiver systems will be purchased from Innovasea at $8,195 each. Additional funds are used to build the floating housing and anchoring system.	The existing telemetry network in the Mississippi River (MNDNR, WDNR, USGS, USFWS, UofM-Twin Cities, NPS) uses Innovasea technology. If we were to move outside of this system we could no longer use the extensive network that MNDNR and partners have in place. These receivers allow for real-time response to carp utilizing specific habitats. They can also be used to alert for large schools at pinch points along the river during highwater events. **Additional Explanation :** These receivers are the most effect way of tracking tagged invasive carp. Tags used for carp tracking can last for up-to 10 years and with the invasion front continually pushing upstream, carp will continue to be tagged in Minnesota's waters for the foreseeable future. There are also additional tagged carp from lower pools that are moving upstream into Minnesota's waters. These real-time receivers will continue to provide critical data on carp movement for as long as a National Telemetry Network and tagging studies on invasive carp continue.
Capital Expenditures		Supplies to build deployment system for real-time receivers	The existing telemetry network in the Mississippi River (MNDNR, WDNR, USGS, USFWS, UofM-Twin Cities, NPS) uses Innovasea technology. If we were to move outside of this

			system we could no longer use the extensive network that MNDNR and partners have in place. These receivers allow for real-time response to carp utilizing specific habitats. They can also be used to alert for large schools at pinch points along the river during highwater events. **Additional Explanation :** These receivers are the most effect way of tracking tagged invasive carp. Tags used for carp tracking can last for up-to 10 years and with the invasion front continually pushing upstream, carp will continue to be tagged in Minnesota's waters for the foreseeable future. There are also additional tagged carp from lower pools that are moving upstream into Minnesota's waters. These real-time receivers will continue to provide critical data on carp movement for as long as a National Telemetry Network and tagging studies on invasive carp continue.

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount
State				
Cash	MN DNR Game and Fish Funds	Funding to support half of the salary for field lead invasive carp specialist over 3 years. The other half of the salary comes from the various other Non-State Grants (USFWS Invasive Carp Grants)	Secured	$105,000
Cash	Laws 2023, chapter 60, article 1, section 3, subdivision 3, paragraph	Funding for additional staff based out of the Lake City office, telemetry equipment, commercial fishing, study for native fish passage and deterrent feasibility study, travel funds, outreach, and equipment.	Secured	$1,720,000
			State Sub Total	**$1,825,000**
Non-State				
Cash	USFWS Invasive Carp Grant FY23	Funding to support and maintain fieldwork for monitoring of and response to invasive carp populations. Includes support for 2 multi-agency netting events and contracted commercial fishing.	Secured	$385,000
Cash	USFWS Invasive Carp Grant FY24	Funding to support and maintain fieldwork for monitoring of and response to invasive carp populations. Includes support for contracted commercial fishing, telemetry, development of new removal approaches.	Pending	$365,000
Cash	USFWS Invasive Carp Grant	Funding to contract with USGS to determine which pools of the Upper Mississippi River in Minnesota could support reproduction if a spawning event were to occur using the FluEgg model. This grant includes support for USGS to apply the model to Mississippi River Pools 1-9, publish a report, and host a workshop to train DNR staff in the use of the FluEgg model.	Secured	$80,000
Cash	USFWS Invasive Carp Grant FY22	Funding to support and maintain fieldwork for monitoring of and response to invasive carp populations. Includes support for 1-2 modified-unified method events and contracted commercial fishing.	Secured	$385,000
Cash	USFWS Invasive Carp Grant FY24 Telemetry	Funding to purchase 30 receivers to expand current telemetry array. Includes salary funds for maintaining network	Potential	$115,000
In-Kind	USFWS Invasive Carp eDNA	USFWS conducts yearly eDNA testing in Minnesota's rivers to aid in monitoring infrequently sampled areas where invasive carp could congregate. This funding includes salary, lab processing, supplies and travel.	Secured	$100,000
			Non State Sub Total	**$1,430,000**
			Funds Total	**$3,255,000**

Attachments

Required Attachments

Visual Component

File: 1203a03c-0bf.pdf

Alternate Text for Visual Component

Summary of invasive carp proposal, including importance of contracted commercial fishing for removals, innovative new gear such as remote controlled kayaks for herding fish and real-time receivers to detect tagged fish, and an assessment of watershed boundaries for potential breaches....

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Changes to work plan include moving forward dates for building and deploying modified nets, environmental sensors, and remotely controlled kayaks. Date for on-ground evaluation of watershed boundaries moved forward. Number of tagged fish has been updated to include fish tagged since the proposal was submitted. Date used for deploying nets (Milestone 3) is slightly later than we previously discussed on the phone because we wanted to account for the possibility of a later start date to sampling in 2025 if we have especially high water in spring.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

No

Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I agree to the Commissioner's Plan.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

No

Does the organization have a fiscal agent for this project?

No

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?

No