

Final Abstract

Final Report Approved on October 9, 2025

M.L. 2023 Project Abstract

For the Period Ending June 30, 2025

Project Title: Enhancing Knowledge of Minnesota River Fish Ecology

Project Manager: Anthony Sindt

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Funding Source:

Fiscal Year:

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 03d

Appropriation Amount: \$199,000

Amount Spent: \$174,141

Amount Remaining: \$24,859

Sound bite of Project Outcomes and Results

This project enhanced understanding of Minnesota River fish ecology by studying seasonal diets of four lower trophic fish species, conducting trawl surveys for unique benthic fishes at 21 study reaches, and tracking movements of 74 fish surgically implanted with acoustic transmitters.

Overall Project Outcome and Results

The Minnesota River is an important natural resource supporting over 80 fish species, yet many aspects of its fish ecology remain poorly understood. This project collected baseline data on fish diets, understudied bottom-dwelling species, and movement patterns of native fish.

Seasonal diets of Bigmouth Buffalo, Emerald Shiner, Gizzard Shad, and Spotfin Shiner were evaluated in spring, summer, and fall of 2024. Analysis of 287 fish foregut contents revealed seasonal patterns, with zooplankton dominating diets in spring, while insects and phytoplankton were most important during summer and fall. These findings enhance our understanding of the river's food web and how fish respond to seasonal changes in food availability.

Benthic trawl surveys at 21 sites captured over 3,200 fish representing 38 species, including rarer benthic species such as Blackside Darter, Slenderhead Darter, and Shoal Chub. Results indicate some species are more abundant than previously

thought and demonstrate the importance of using complementary sampling methods for assessing fish communities. Seventy-four fish representing eight native species were surgically implanted with acoustic transmitters. Their movements and habitat use will be monitored for 2–5 years using an array of acoustic receivers. Preliminary results show some fish moved more than 150 river miles within months, including migrations into the Mississippi River. Overall, this project provides foundational knowledge of the Minnesota River ecosystem and fish ecology. Data collected will guide the Minnesota DNR and partners in understanding responses to future ecosystem changes, such as climate impacts, invasive species, and land use alterations, and support conservation strategies to protect, preserve, and enhance fish populations and aquatic habitats for a healthy, resilient river ecosystem.

Project Results Use and Dissemination

Comprehensive final reports associated with each project activity will be accessible by the public on a Minnesota Department of Natural Resources webpage at <https://www.dnr.state.mn.us/fisheries/minnesota-river.html> (see attached final reports). Preliminary results of this project were presented to fisheries professionals and students at the annual meeting of the Minnesota Chapter of the American Fisheries Society during February 2025. A manuscript associated with activity one will likely be submitted for publication in a peer-reviewed journal.



Environment and Natural Resources Trust Fund

M.L. 2023 Approved Final Report

General Information

Date: November 12, 2025

ID Number: 2023-086

Staff Lead: Mike Campana

Project Title: Enhancing Knowledge of Minnesota River Fish Ecology

Project Budget: \$199,000

Project Manager Information

Name: Anthony Sindt

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Project Reporting

Final Report Approved: October 9, 2025

Reporting Status: Project Completed

Date of Last Action: October 9, 2025

Project Completion: June 30, 2025

Legal Information

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 03d

Appropriation Language: \$199,000 the first year is from the trust fund to the commissioner of natural resources to collect baseline information about the diets, distribution, status, and movement patterns of fish in the Minnesota River to inform management and conservation decisions.

Appropriation End Date: June 30, 2026

Narrative

Project Summary: Collect baseline information about lower trophic fish diets, the distribution and status of rare benthic fishes, and the movement patterns of large river fishes in the Minnesota River.

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

The Minnesota River flows more than 320 miles across our state, providing tremendous fishing and recreation opportunities, and is home to a diversity of aquatic organisms including over 80 species of fish. Landscape alterations, population growth, climate change, invasive species, and conservation efforts continually affect this important resource. Unfortunately, there are still many data gaps that limit our ability to measure change over time and make informed management and conservation decisions. For instance, contemporary knowledge of the Minnesota River food web is insufficient for understanding changes that may be caused by invasive species or climate change. Existing knowledge about fish immigration and emigration between rivers also limits our understanding of appropriate management scales, and the status of several understudied fish species is largely unknown. In general, these and other knowledge gaps diminish the ability to measure change, understand important ecosystem functions, and most effectively monitor and manage the Minnesota River ecosystem. Leveraging the existing capacity of the Minnesota Department of Natural Resources (existing acoustic telemetry array, field equipment, staff expertise, etc.) provides an opportunity to cost effectively fill some of these data gaps with the proposed 2-year project.

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.

The purpose of the proposed project activities is to fill existing knowledge gaps with baseline information about Minnesota River fish ecology. For activity 1 we will evaluate seasonal trends in diets of four lower trophic fish species that likely prey on phytoplankton, zooplankton, and other lower trophic food items. For activity 2 we will conduct benthic trawl surveys to evaluate the status and distribution of several understudied and difficult to capture bottom-dwelling fish species. For activity 3 we will leverage an existing array of acoustic transmitters within the Minnesota River (and connected waterways) to understand movement patterns, home ranges, habitat use, and emigration rates of three recreationally or commercially important fish species. Outcomes of the proposed project will contribute to the goals of A) protecting and enhancing populations of important fishes along with their critical habitats; B) providing the ability to measure ecosystem changes resulting from landscape alterations, climate change, and invasive species; and C) informing efforts to monitor, protect, and enhance this unique and important resource for all Minnesotans to enjoy and utilize. The MN DNR will use project funds to hire unclassified personnel, purchase equipment, and contract laboratory services necessary for achieving project objectives.

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?

Outcomes from this project will improve our fundamental understanding of the Minnesota River ecosystem and fish ecology. The MN DNR and other agencies will continue to build on the information gathered as part of this project and will utilize project outcomes to understand the impacts of future ecosystem changes (e.g., climate change, invasive species, land use alteration) and inform future management and conservation strategies that will benefit the ecological health and fisheries of the Minnesota River.

Project Location

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

Watershed(s): Lower Minnesota River, Minnesota River - Headwaters, Minnesota River - Mankato, Minnesota River - Yellow Medicine River,

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

Watershed(s): Lower Minnesota River, Minnesota River - Headwaters, Minnesota River - Mankato, Minnesota River - Yellow Medicine River,

When will the work impact occur?

During the Project

Activities and Milestones

Activity 1: Evaluate seasonal trends of lower trophic fish diets.

Activity Budget: \$112,000

Activity Description:

Several lower trophic fish species (Bigmouth Buffalo *Ictiobus cyprinellus*, Emerald Shiner *Notropis atherinoides*, Gizzard Shad *Dorosoma cepedianum*, and Spotfin Shiner *Cyprinella spiloptera*) are among the most abundant fishes in the Minnesota River and function as important prey for predatory fishes. Lower trophic fishes generally prey on phytoplankton, zooplankton, and other microscopic food items. Consequently, these species would likely be the most impacted by planktivorous Invasive Carps *Hypophthalmichthys* spp. if they ever established a population in the Minnesota River. For this project activity, we will establish a baseline understanding of seasonal trends and diet overlap of the four lower trophic fish species. Specifically, stomach or foregut contents will be removed from a subsample of the target species from the Minnesota River during May (spring), July (summer), and September/October (fall). Additionally, phytoplankton and zooplankton samples will be collected during each study period. Samples will be processed by a contracted laboratory and the data will be used to describe trends in lower trophic fish diets and evaluate diet overlap among the four study species.

Activity Milestones:

Description	Approximate Completion Date
Collect 370 fish stomach/foregut samples from four lower trophic fish species.	October 31, 2024
Collect 9 phytoplankton and zooplankton samples from the Minnesota River.	October 31, 2024
Describe seasonal trends in lower trophic fish diets along with diet overlap among species.	June 30, 2025
Complete a detailed final report for activity 1.	June 30, 2025

Activity 2: Evaluate the status and distribution of understudied bottom-dwelling fishes in the Minnesota River.

Activity Budget: \$29,000

Activity Description:

The status and distribution of several benthic (bottom-dwelling) fish species (i.e., Banded Darter *Etheostoma zonale*, River Darter *Percina shumardi*, Silver Chub *Macrhybopsis stoeriana*, and Western Sand Darter *Ammocrypta clara*) in the Minnesota River is poorly understood. These species are typically difficult to capture with traditional fisheries sampling methods (e.g., electrofishing, fyke nets) and are also potentially rare within the Minnesota River. Therefore, we will conduct benthic trawl surveys at approximately 20 different sites throughout the Minnesota River to expand the knowledge about the status and distribution of benthic fishes. In addition to some of the rarer fish species, benthic trawl surveys will also provide additional information about other unique benthic fish species such as Blue Suckers *Cycleptus elongatus* and Shovelnose Sturgeon *Scaphirhynchus platyrhynchus*.

Activity Milestones:

Description	Approximate Completion Date
Conduct benthic trawl surveys at approximately 10 Minnesota River reaches during August 2024.	August 31, 2024
Conduct benthic trawl surveys at approximately 10 Minnesota River reaches during September-October 2024.	October 31, 2024
Synthesize knowledge regarding the status and distribution of benthic fishes in the Minnesota River.	June 30, 2025
Complete a detailed final report for activity 2.	June 30, 2025

Activity 3: Utilize an existing acoustic telemetry array to describe movement patterns and habitat use native fish species.

Activity Budget: \$58,000

Activity Description:

An extensive array of acoustic receivers is currently maintained in the Minnesota River and downstream rivers (Mississippi River, St. Croix River). For this project activity we will leverage the existing telemetry array to increase our knowledge of movement patterns and habitat use of eight important fish species in the Minnesota River: Blue Sucker, Bigmouth Buffalo, Channel Catfish, Freshwater Drum, Sauger, Shorthead Redhorse, Smallmouth Buffalo, and Walleye. Fish will be collected with electrofishing or hoop nets and acoustic transmitters will be surgically implanted into 6 to 18 fish of each species. Surgical implantation of transmitters will primarily occur during June and August 2024, but river conditions may postpone these efforts until later in the summer or early fall of 2024. Acoustic transmitters will provide telemetry data for 2–5 years. Outcomes from this study will refine our understanding of behaviors and movement patterns and evaluate the amount of movement between the Minnesota River and Mississippi River and their larger tributaries.

Activity Milestones:

Description	Approximate Completion Date
Surgically implant acoustic transmitters into 72 Minnesota River fishes.	September 30, 2024
Summarize movement patterns of tagged fish.	June 30, 2025
Complete a detailed final report for activity 3.	June 30, 2025

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.

Most of the data collected for this project will be stored in DNR-Fisheries databases and considered “public data” available to other entities. During and after this project, outcomes will be presented at various scientific conferences (e.g., Minnesota Chapter of the American Fisheries Society, Midwest Fish and Wildlife Conference). Additionally, we will seek opportunities to share the outcomes of this project with public stakeholders and other interested parties (e.g., Minnesota River Congress). Upon completion of this project, we will create detailed reports associated with each of the three project activities and the reports will be available to the public. We anticipate outcomes from activity 1 will likely contribute to a peer-reviewed publication in a scientific journal. Outcomes of this project may also be shared by the DNR via social media. The Environment and Natural Resources Trust Fund will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, presentations, and other communications per the ENRTF Acknowledgement Guidelines.

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 MN DNR currently conducts annual fish surveys on the Minnesota River to monitor game species populations and fish community health. Unfortunately, resources and typical funding sources are insufficient for thoroughly evaluating non-game fishes and other important components of the ecosystem. Outcomes of the proposed project will A) inform restoration, conservation, and management of unique large river fishes and their critical habitats; and B) enhance the ability to quantify impacts of future ecosystem changes. The MN DNR will continue to seek external funds to increase capacity for building upon the outcomes of past, current, and future projects.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Enhancing Understanding of Minnesota River Aquatic Ecosystem	M.L. 2016, Chp. 186, Sec. 2, Subd. 03i	\$500,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount	\$ Amount Spent	\$ Amount Remaining
Personnel										
NR Fisheries Specialist		Leads fieldwork and data management			35%	1		\$59,000	-	-
Part-time seasonal		Assist with fieldwork			0%	0.5		\$24,000	-	-
							Sub Total	\$83,000	\$82,218	\$782
Contracts and Services										
EcoAnalysts, Inc.	Service Contract	Identify and enumerate diet items from approximately 370 fish stomachs				0.25		\$56,750	\$37,905	\$18,845
EnviroScience, Inc.	Service Contract	Identify and enumerate 9 phytoplankton and zooplankton samples				0.01		\$10,800	\$10,800	-
							Sub Total	\$67,550	\$48,705	\$18,845
Equipment, Tools, and Supplies										
	Equipment	72 acoustic transmitters	Track movements of surgically implanted fish					\$20,450	\$19,967	\$483
	Tools and Supplies	Field and lab supplies	General supplies (sample bottles, preservatives, surgical tools, nitrile gloves, etc.)					\$3,895	\$3,475	\$420
	Tools and Supplies	Personal protective equipment	Life vests, work boots, rain jackets, etc.					\$600	\$600	-
							Sub Total	\$24,945	\$24,042	\$903
Capital Expenditures										
							Sub Total	-	-	-
Acquisitions and Stewardship										
							Sub Total	-	-	-

Travel In Minnesota										
	Miles/ Meals/ Lodging	Fleet cost for 9,000 miles at approximately \$0.75/mile (approximately 50 round trips to and from the Minnesota River)	Travel between the Hutchinson DNR office and the Minnesota River to conduct fieldwork.					\$6,750	\$3,913	\$2,837
	Miles/ Meals/ Lodging	Meals and lodging associated with distant or overnight trips	Some fieldwork may require longer distance travel (>60 miles) and potentially overnight stays.					\$2,000	\$508	\$1,492
							Sub Total	\$8,750	\$4,421	\$4,329
Travel Outside Minnesota										
							Sub Total	-	-	-
Printing and Publication										
							Sub Total	-	-	-
Other Expenses										
		Direct and Necessary Costs	Direct and necessary costs cover HR Support (\$2,735), Safety Support (\$551), Financial Support (\$2,472), Communication Support (\$1,811), IT Support (\$6,166), and Planning Support (\$1,020).					\$14,755	\$14,755	-
							Sub Total	\$14,755	\$14,755	-
							Grand Total	\$199,000	\$174,141	\$24,859

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	\$ Amount	\$ Amount Spent	\$ Amount Remaining
State						
In-Kind	Minnesota DNR Fisheries Section contribution	Office space, office overhead, technical & field support	Secured	\$6,000	\$6,000	-
In-Kind	Minnesota DNR Fisheries Section contribution	Boats, sampling gears (nets), telemetry equipment, and lab supplies that are already owned and maintained by the DNR.	Secured	\$15,000	\$15,000	-
In-Kind	Minnesota DNR Fisheries Section staff contribution	Existing staff time: Tony Sindt (project manager) - 10% FTE for 24 months, and Brian Schultz (project supervisor) - 5% FTE for 24 months	Secured	\$28,000	\$28,000	-
			State Sub Total	\$49,000	\$49,000	-
Non-State						
			Non State Sub Total	-	-	-
			Funds Total	\$49,000	\$49,000	-

Attachments

Required Attachments

Visual Component

File: [643872d1-072.pdf](#)

Alternate Text for Visual Component

The goal of this study is to enhance knowledge of the lower trophic food web, understudied bottom-dwelling fishes, and fish movement and habitat use in the Minnesota River....

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Background Check Certification Form	6fa1c982-41c.pdf
Project presentation at MN Chapter of the American Fisheries Society meeting	427da8e6-0b1.pdf
Activity 1 Final Report	ab083a0c-777.pdf
Activity 2 Final Report	f85fd733-1a0.pdf
Activity 3 Final Report	f2c9d88c-004.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

First, we refined the project location to the Minnesota River watersheds. Second, we wrote more measurable milestones for activities 1 and 3 (i.e., added numeric goals). Third, we fixed a small \$1 discrepancy in the budget (i.e., moved \$1 from the Direct and Necessary Costs to Tools and Supplies). Lastly, we added a description of our anticipated dissemination efforts.

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?

N/A

Do you understand that travel expenses are only approved if they 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 understand the Commissioner's Plan applies.

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

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

Yes, I understand

Work Plan Amendments

Amendment ID	Request Type	Changes made on the following pages	Explanation & justification for Amendment Request (word limit 75)	Date Submitted	Approved	Date of LCCMR Action
1	Amendment Request	<ul style="list-style-type: none"> • Other • Activities and Milestones • Budget - Personnel • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Budget - Non-ENRTF Funds Contributed 	Scope of activity 1 was significantly reduced by cutting sample sizes in half (from two to one study reach) to account for significantly greater than anticipated sample analysis costs. Budgets were adjusted to account for expected changes. The Game and Fish Fund will cover an anticipated project budget deficit (<\$20,000), likely in the form of project staff salary. An in-kind contribution of 36 additional transmitters will increase the scope of activity 3.	March 28, 2024	Yes	April 16, 2024
2	Amendment Request	<ul style="list-style-type: none"> • Activities and Milestones • Budget - Personnel • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences • Budget - Other • Budget - Non-ENRTF Funds Contributed • Attachments 	Previous budget concerns were not fully realized for multiple reasons. Thus, we request reallocating \$8,000 from fish diet service contract savings (see activity-1 update for details) to cover costs of acoustic transmitters (activity-3) that we previously anticipating needing to pay for with in-kind DNR contributions (see amendment request 1). Associated changes to activity budgets and in-kind contributions were made. We also request shifting funds (\$4,240) from full-time to seasonal salary (resulting from leave-time).	February 20, 2025	Yes	February 26, 2025
3	Amendment Request	<ul style="list-style-type: none"> • Budget • Other • Budget - Personnel • Budget - Capital, Equipment, Tools, and Supplies • Attachments 	Shifted \$1,880 from the supplies budget to the salary budget to account for a minor budgeting/projection error that resulted in a slight over spending on salary. We spent less on supplies, fleet, travel, and diet analysis than expected and are able to cover the slightly greater salary expense.	August 12, 2025	Yes	October 3, 2025

Status Update Reporting

Final Status Update August 14, 2025

Date Submitted: August 12, 2025

Date Approved: October 3, 2025

Overall Update

All activity milestones for this project were accomplished by mid-June 2025. For instance, 287 fish were collected for diet analysis, 72 acoustic transmitters were implanted into fish, benthic trawl surveys were conducted at 21 study sites, and 18 water samples were collected for plankton analysis. Data collected during this project provide valuable insight into the Minnesota River food web and lower trophic fish diets, the status and distribution of understudied benthic fishes, and movements and habitat use of migratory river fishes. Final reports associated with each project activity are provided as attachments.

Activity 1

All fieldwork, data analysis, and report writing associated with activity 1 (milestones 1–4) has been completed. We collected 9 zooplankton and phytoplankton samples and 287 fish foreguts from the Minnesota River during 2024. EcoAnalysts, Inc. analyzed diet contents and identified prey items in 228 samples. During winter and spring of 2025, we analyzed and summarized data, reviewed literature, and drafted a report describing seasonal trends and overlap in lower trophic fish diets. In general, fish diets varied seasonally, likely influenced by plankton community dynamics and food availability. Consistent with the relatively high zooplankton biomass in spring samples, spring diets of Bigmouth Buffalo, Emerald Shiner, and Spotfin Shiner primarily consisted of cladoceran zooplankton followed by insects. During summer, Emerald Shiner and Spotfin Shiner diets were almost exclusively insects. During fall, when phytoplankton biovolume was greatest, Bigmouth Buffalo and Gizzard Shad diets were primarily phytoplankton. Phytoplankton was also present in Emerald Shiner and Spotfin Shiner foreguts during fall, but their diets were again dominated by insects. A thorough description of activity 1 accomplishments and outcomes is provided in the attached “Activity 1 Final Report”. We also intend to submit a manuscript associated with activity 1 to a peer-reviewed scientific journal.

(This activity marked as complete as of this status update)

Activity 2

All fieldwork, data analysis, and report writing associated with activity 2 (milestones 1–4) has been completed. We conducted a total of 127 benthic trawls at 21 Minnesota River study reaches during July–October 2024. We captured 3,263 fish, representing 38 fish species, including 11 of 12 target benthic fish species. Despite extensive sampling effort, few Banded Darter, River Darter, Stonecat, and Tadpole Madtom were captured providing evidence that these species may have low abundances in the Minnesota River. In contrast, species like Slenderhead Darter and Shoal Chub were frequently captured, indicating more abundant populations than other sampling gears have indicated. We also failed to capture any Western Sand Darter, a species that has not been reported from the Minnesota River in over 50 years. A thorough description of activity 2 accomplishments and outcomes is provided in the attached “Activity 2 Final Report”.

(This activity marked as complete as of this status update)

Activity 3

All 72 acoustic transmitters were surgically implanted into Minnesota River fish (milestone 1) during June 2024–June 2025, two of which were recovered from harvested Walleye and re-implanted into other fish. Implanted fish include 12 Bigmouth Buffalo, 6 Blue Sucker, 12 Channel Catfish, 6 Freshwater Drum, 6 Smallmouth Buffalo, 5 Sauger, 6 Shorthead Redhorse, and 21 Walleye. One additional transmitter recovered from a harvested Walleye will be implanted into another Walleye or Sauger during 2025. Telemetry data collected through fall 2024 have been summarized (milestone 2) and included in the attached “Activity 3 Final Report” (milestone 3). For instance, a tagged Channel Catfish and a Freshwater drum exhibited home ranges of over 150 river miles within several months. Data from relatively few acoustic

receivers were uploaded during spring 2025 and were not incorporated into the final report. Additional telemetry data collected during the next 2–5 years will provide valuable insight about the home ranges, movement patterns, and habitat uses of the tagged fish.

(This activity marked as complete as of this status update)

Dissemination

No formal project dissemination occurred since the last status update. Final reports associated with each project activity will be accessible by the public on a Minnesota Department of Natural Resources webpage (<https://www.dnr.state.mn.us/fisheries/minnesota-river.html>) once approved and finalized. We intend on submitting a manuscript associated with activity 1 for publication in a peer-reviewed journal, likely during 2026.

Status Update Reporting

Status Update April 1, 2025

Date Submitted: February 20, 2025

Date Approved: February 26, 2025

Overall Update

A tremendous amount of fieldwork, laboratory processing, and data analysis was completed during April 2024–February 2025 that will provide enhanced understanding of Minnesota River fish ecology. More specifically, we collected 287 fish diet samples and 18 plankton samples for activity 1, we conducted 127 benthic trawls at 21 study reaches for activity 2, and we implanted acoustic transmitters into 63 fish for activity 3. Data analyses and report writing for all three activities are on pace for completion before June 30th, 2025. The only unanticipated delay in achieving project milestones is the remaining need to implant 12 acoustic transmitters into fish for activity 3. Budgetary concerns that were the impetus for the first amendment request were not fully realized and instead we had unanticipated savings associated with the amended fish diet service contract budget (see activity 1 update). Therefore, we've submitted a second amendment request to primarily reallocate funds within the budget (e.g., allocate savings from the fish diet service contract budget for activity 1 to the equipment budget for acoustic transmitters used for activity 3) to utilize cost savings and better reflect actual project costs. The budget status update includes expenditures posted through January 10th, 2025.

Activity 1

All fieldwork and laboratory processing associated with activity 1 (milestones 1 & 2) has been completed. During May, July, and October 2024 we collected nine zooplankton and nine phytoplankton samples and 287 fish foreguts from the Minnesota River. Unexpectedly, we did not encounter age-0 Gizzard Shad and age-0 Spotfin Shiner until the fall sample period and we never encountered sufficient age-0 Emerald Shiner which resulted in 53 fewer fish diet samples than intended. Additionally, 59 of the submitted diet samples did not have identifiable food contents and the lab charged a reduced "empty stomach" rate of \$35 rather than \$175 per sample. Therefore, the final cost of the service contract for fish diet analysis will be \$26,845 under the previously budgeted amount of \$64,750. Preliminary analyses reveal trends in lower trophic fish diets that often corresponded with concentrations of zooplankton and phytoplankton in the plankton samples. Some preliminary results are provided in the attached presentation that was given at a recent (February 13th) Minnesota Chapter of the American Fisheries Society meeting. Data analyses and a final report for activity 1 (milestones 3 & 4) are on schedule to be completed before June 30th, 2025.

Activity 2

All fieldwork and data analysis associated with activity 2 (milestones 1–3) has been completed. We conducted a total of 127 benthic trawls at 21 Minnesota River study reaches during July–October 2024 (a map of the study reach locations is provided in the attached presentation). Benthic trawls captured a total of 3,263 fish, representing 38 fish species, including 11 of 12 target benthic fish species. Despite extensive sampling effort, few Banded Darter, River Darter, Stonecat, and Tadpole Madtom were captured providing evidence that these species may have low abundances in the Minnesota River. In contrast, species like Slenderhead Darter and Shoal Chub were frequently captured indicating more abundant populations than other sampling gears have indicated. We also failed to capture any Western Sand Darter, a species that has not been reported from the Minnesota River in over 50 years. A final report for activity 2 (milestone 4) is near completion and will be finalized well before June 30th, 2025.

Activity 3

Sixty-three of 72 acoustic transmitters were surgically implanted into Minnesota River fish during June–October 2024, including 9 Bigmouth Buffalo, 6 Blue Sucker, 8 Channel Catfish, 6 Freshwater Drum, 5 Smallmouth Buffalo, 5 Sauger, 6 Shorthead Redhorse, and 18 Walleye. High water negatively impacted our ability to capture target species during June, which is when we had planned to implant most of the transmitters. Additionally, anglers reported harvesting four of the

Walleye and we were able to recover three transmitters. Therefore, we intend on implanting the remaining 12 transmitters into additional Minnesota River fish during June–July 2025. Telemetry data collected during spring 2025 and during the next 2–5 years will provide valuable insight about the home ranges, movement patterns, and habitat uses of the tagged fish. As of fall 2024, 24 of the fish were detected by telemetry receivers on three or more dates and exhibited home ranges from 0 up to 185 miles. Telemetry data collected during spring 2025 will be incorporated into a final report for activity 3 (milestones 2 & 3) that will be finalized by June 30th, 2025.

Dissemination

Analyses associated with this project are still preliminary, but a project overview and preliminary results were presented internally to Minnesota Department of Natural Resources Fisheries staff during December 2024 and to a diversity of fisheries professionals and students at the Annual Minnesota Chapter of the American Fisheries Society Meeting during February 2025 (see attached PDF of the presentation). Final reports associated with each project activity will be accessible by the public on a Minnesota Department of Natural Resources webpage (<https://www.dnr.state.mn.us/fisheries/minnesota-river.html>) once completed. We intend to submit a manuscript associated with activity 1 for publication in a peer-reviewed journal, likely during late-2025 or early-2026.

Status Update Reporting

Status Update October 1, 2024

Date Submitted: September 23, 2024

Date Approved: October 1, 2024

Overall Update

This status update is waived per guidance from LCCMR staff provided on August 13, 2024.

Activity 1

This status update is waived per guidance from LCCMR staff provided on August 13, 2024.

Activity 2

This status update is waived per guidance from LCCMR staff provided on August 13, 2024.

Activity 3

This status update is waived per guidance from LCCMR staff provided on August 13, 2024.

Dissemination

This status update is waived per guidance from LCCMR staff provided on August 13, 2024.

Status Update Reporting

Status Update April 1, 2024

Date Submitted: March 28, 2024

Date Approved: April 16, 2024

Overall Update

Fieldwork associated with this project will begin May 2024. Therefore, negligible progress towards project outcomes has been achieved. The primary accomplishment thus far is offering the temporary NR Fisheries Specialist position funded by this project to Amanda Craft. Amanda has an M.S. in Biology from Bemidji State University and is well suited for this position. Amanda's first working day will be April 1. Additionally, two summer interns funded by this project will begin during May. Preliminary bids for the fish diet and plankton sample analysis contracts are 2–4 times greater than anticipated. Therefore, we will be submitting an amendment request to reduce the scope of activity 1 (i.e., reducing the number of study-reaches from two to one) to essentially halve expenses associated with sample collection and analysis. Despite the proposed amendments to the scope of activity 1, we still anticipate a \$10,000-\$20,000 budget deficit that will be covered with in-kind contributions from the Game and Fish Fund. Additionally, an in-kind contribution of 36 additional acoustic transmitters for project activity 3 will provide additional fieldwork for project staff to compensate for the proposed reduction of fieldwork associated with activity 1.

Activity 1

During fall of 2023, a literature review was performed to refine fieldwork and diet analysis methods associated with project activity 1. Contracts are being finalized for the fish diet and plankton sample processing. Fieldwork (fish and plankton sampling) associated with activity 1 will begin during May 2024.

Activity 2

No progress towards project activity 2 was achieved. Fieldwork associated with activity 2 will begin during late-summer 2024.

Activity 3

A purchase order is being created for the 36 acoustic transmitters that will be used to tag Bigmouth Buffalo, Channel Catfish, and Walleye. Fieldwork associated with project activity 3 will begin during June 2024.

Dissemination

Project outcomes have not been disseminated, but a general overview of project activities has been presented internally to various Minnesota Department of Natural Resources staff and externally to the Hutchinson Area Avid Anglers group and members of the Lower Sioux Indian Community.