



# Environment and Natural Resources Trust Fund

## 2023 Request for Proposal

### General Information

**Proposal ID:** 2023-086

**Proposal Title:** Enhancing Knowledge of Minnesota River Fish Ecology

### Project Manager Information

**Name:** Anthony Sindt

**Organization:** MN DNR - Fish and Wildlife Division

**Office Telephone:** (320) 753-0333

**Email:** anthony.sindt@state.mn.us

### Project Basic Information

**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.

**Funds Requested:** \$199,000

**Proposed Project Completion:** June 30, 2025

**LCCMR Funding Category:** Small Projects (H)

**Secondary Category:** Foundational Natural Resource Data and Information (A)

### Project Location

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

Region(s): SE, SW, Metro,

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

Region(s): SE, SW, Metro,

**When will the work impact occur?**

During the Project

## Narrative

### **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.

## Activities and Milestones

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

**Activity Budget:** \$127,870

**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 an upstream and downstream reach of the Minnesota River during May (spring), July (summer), and October (fall). Additionally, phytoplankton and zooplankton samples will be collected from each study reach 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	Completion Date
Collect fish stomach/foregut samples along with phytoplankton and zooplankton samples.	October 31, 2024
Describe seasonal trends in lower trophic fish diets and diet overlap.	June 30, 2025

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

**Activity Budget:** \$29,650

**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	Completion Date
Conduct benthic trawl surveys at approximately 20 Minnesota River reaches	October 31, 2024
Synthesize knowledge regarding the status and distribution of benthic fishes in the Minnesota River.	June 30, 2025

### Activity 3: Utilize an existing acoustic telemetry array to describe movement patterns and habitat use of Bigmouth Buffalo, Channel Catfish, and Walleye.

**Activity Budget:** \$41,480

**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 three recreationally or commercially important fishes in the Minnesota River: Bigmouth Buffalo, Channel Catfish *Ictalurus punctatus*, and Walleye *Sander vitreus*. Fish will be collected with electrofishing or hoop nets and acoustic transmitters will be surgically implanted into 12 fish of each species. Acoustic transmitters will provide telemetry data for 5–10 years. Outcomes from this study will refine our understand 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	Completion Date
Surgically implant acoustic transmitters into Bigmouth Buffalo, Channel Catfish, and Walleye.	September 30, 2024
Summarize movement patterns of tagged fish.	June 30, 2025

## 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

## Project Manager and Organization Qualifications

**Project Manager Name:** Anthony Sindt

**Job Title:** Minnesota River Fisheries Specialist, Sr.

**Provide description of the project manager's qualifications to manage the proposed project.**

Tony Sindt, M.S., is the Minnesota River Fisheries Specialist, Sr. for the MN DNR Fish and Wildlife Division. Tony received his B.S. in Ecology from Minnesota State University, Mankato in 2008 and his M.S. in Fisheries Biology from Iowa State University in 2011. His thesis was titled "fish species of greatest conservation need in wadeable Iowa streams: status, habitat associations, and effectiveness of species distribution models". Prior to becoming the Minnesota River Specialist for the MN DNR in 2014, Tony spent three years working as a fisheries biologist for the Ohio Division of Wildlife's Inland Fisheries Research Unit where he functioned as the Ohio River research biologist. Tony has authored six peer reviewed articles, presented original research at numerous professional conferences, has acted as the project leader for multiple fisheries research projects, and served as the project manager for a previously ENRTF funded project (M.L. 2016, Chp. 186, Sec. 2, Subd. 03i Enhancing understanding of the Minnesota River). Tony's extensive experience working on large river systems, knowledge about aquatic ecosystems, and experience as a project manager makes him an ideal candidate for leading this project.

**Organization:** MN DNR - Fish and Wildlife Division

**Organization Description:**

The mission of the Minnesota Department of Natural Resources is to work with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life. Within the DNR, the Division of Fish and Wildlife bears primary responsibility for managing, protecting, and regulating the State's fisheries and wildlife resources. As part of the divisions mission, it will promote habitat protection and development of private and public lands. The DNR has extensive experience administering and coordinating projects funded by the ENRTF.

## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
NR Fisheries Specialist		Leads fieldwork and data management			35%	1		\$67,920
Summer intern		Assist with fieldwork			0%	0.25		\$7,800
Summer intern		Assist with fieldwork			0%	0.25		\$7,800
							<b>Sub Total</b>	<b>\$83,520</b>
<b>Contracts and Services</b>								
TBD	Professional or Technical Service Contract	Identify and enumerate diet items from approximately 870 fish stomachs				-		\$65,250
TBD	Professional or Technical Service Contract	Identify and enumerate 18 phytoplankton and zooplankton samples				-		\$5,850
							<b>Sub Total</b>	<b>\$71,100</b>
<b>Equipment, Tools, and Supplies</b>								
	Equipment	36 acoustic transmitters (\$375 each)	Track movements of surgically implanted fish					\$13,500
	Tools and Supplies	Field and lab supplies	General supplies (sample bottles, preservatives, surgical tools, nitrile gloves, etc.)					\$6,774
	Tools and Supplies	Personal protective equipment	Life vests, work boots, rain jackets, etc.					\$600
							<b>Sub Total</b>	<b>\$20,874</b>
<b>Capital Expenditures</b>								
							<b>Sub Total</b>	<b>-</b>

<b>Acquisitions and Stewardship</b>								
							<b>Sub Total</b>	-
<b>Travel In Minnesota</b>								
	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
	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
							<b>Sub Total</b>	<b>\$8,750</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	-
<b>Printing and Publication</b>								
							<b>Sub Total</b>	-
<b>Other Expenses</b>								
		Direct and Necessary Costs	Direct and necessary costs cover HR Support (\$2,735), Safety Support (\$551), Financial Support (\$2,474), Communication Support (\$1,811), IT Support (\$6,166), and Planning Support (\$1,020).					\$14,756
							<b>Sub Total</b>	<b>\$14,756</b>
							<b>Grand Total</b>	<b>\$199,000</b>

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
<b>State</b>				
In-Kind	Minnesota DNR Fisheries Section contribution	Office space, office overhead, technical & field support	Secured	\$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
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
			<b>State Sub Total</b>	<b>\$49,000</b>
<b>Non-State</b>				
			<b>Non State Sub Total</b>	-
			<b>Funds Total</b>	<b>\$49,000</b>

## 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....

## Administrative Use

**Does your project include restoration or acquisition of land rights?**

No

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

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?**

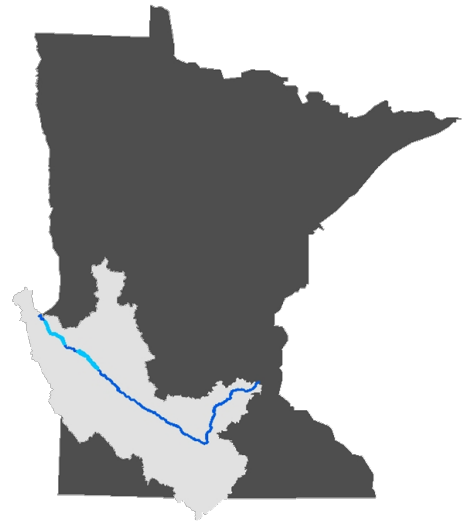
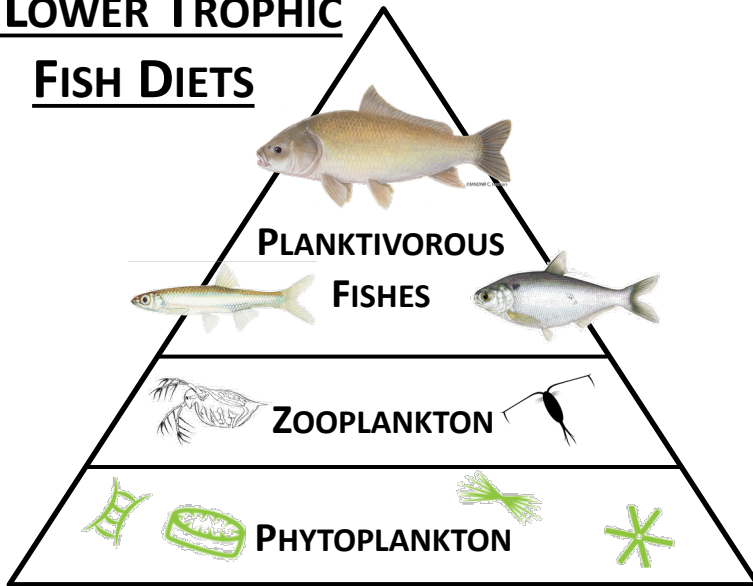
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**Does the organization have a fiscal agent for this project?**

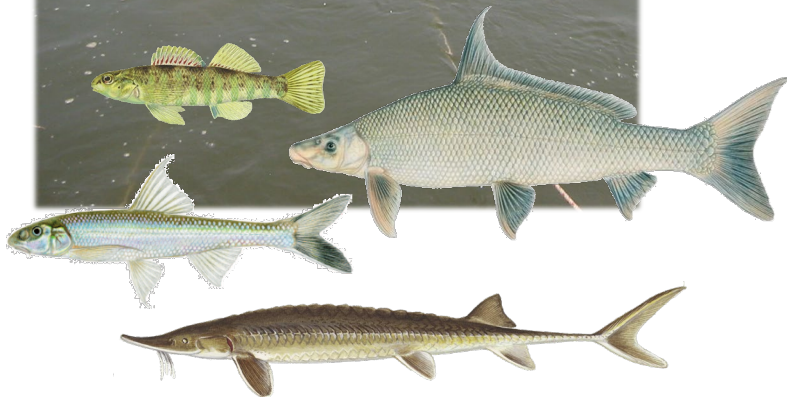
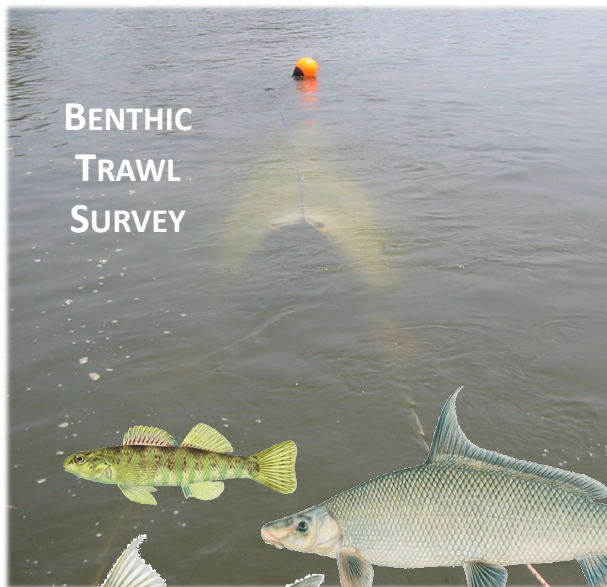
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# ENHANCING KNOWLEDGE OF FISH ECOLOGY IN THE MINNESOTA RIVER

## 1. LOWER TROPHIC FISH DIETS



## 2. UNDERSTUDIED BENTHIC FISHES



## 3. FISH MOVEMENT AND HABITAT USE

