Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-295

Proposal Title: Fish Movement Patterns in the Upper Mississippi River

Project Manager Information

Name: Brett Nagle

Organization: MN DNR - Fish and Wildlife Division

Office Telephone: (651) 259-5424

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Project Basic Information

Project Summary: The proposed project would establish a telemetry network to monitor the movements of ten species of native fish in the Upper Mississippi River system between Brainerd and Grand Rapids.

ENRTF Funds Requested: $929,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Fish and Wildlife (D)

Project Location

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

Region(s): NE

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

Region(s): NE

When will the work impact occur?

During the Project and In the Future

Narrative

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

At nearly 180 miles, the Mississippi River between Brainerd and Grand Rapids is the longest free-flowing reach without a main branch barrier in the Upper Mississippi River. This reach of river is the backbone of a complex ecosystem of connected lakes, tributary streams, and wetland complexes that is home to more than 90 species of native fish and supports significant fisheries for several popular game species. However, our understanding of this fish community lacks actionable detail. At present, very little is known about movement patterns, habitat use, and home ranges for fish species within this vital resource. While this is true for even relatively well-studied game species like walleye, this lack of knowledge is even more substantial for native rough fish species whose basic life history and population dynamics are largely unstudied. Most riverine fish species are highly migratory, moving seasonally among varied habitats, tributaries, and connected lakes. The lack of a detailed understanding of these movement patterns within this complex and interconnected natural resource severely limits the ability to measure changes, characterize ecosystem functions and effectively monitor, manage and conserve fish populations in the Upper Mississippi River ecosystem.

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 is to fill significant knowledge gaps about fish movement patterns in the Upper Mississippi River. To achieve this, the project would establish an array of telemetry receivers that detect the presence of fish with surgically implanted receivers. The proposed array would span this under-researched section of the Mississippi River and its principal tributary confluences. This configuration would allow managers to track the movements of fish among the varied habitats of the river's main channel and into/out of its principal tributaries that are connected to hundreds of lakes within the watershed. The program would yield critical information about a suite of game and native rough fish species, including walleye, northern pike, smallmouth bass, channel catfish, burbot, bigmouth buffalo, three redhorse species, and white sucker. These data will build an improved understanding of migration and movement behaviors, habitat use, critical spawning and winter staging areas, ecological interactions with waterway features (e.g., mussel beds, vegetation, other species, and flows), and fish use of various depths and temperature regimes. With so little known about fish behavior and biology in this stretch of the Mississippi, there is much to be gained.

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 Upper Mississippi River ecosystem and the fish populations that rely on it. 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, and land use alteration) and inform future gamefish and native rough fish management and conservation strategies that will benefit the ecological health and fisheries of the Mississippi River.

Activities and Milestones

Activity 1: Installation of stationary telemetry receivers

Activity Budget: $373,130

Activity Description:
An array of 50 telemetry receivers will be installed within the main channel of the Mississippi River and upstream of the confluence in each principal tributary between Brainerd and Grand Rapids. Placement of receivers in tributaries allow managers to detect when fish migrate out of the Mississippi River into lower order stream habitats and connected waterbodies. Selection of potential receiver locations will begin in July 2027 via aerial photography and site reconnaissance. Stationary receivers will be deployed from bridge supports, shore mounted cables, and anchor mounts deployed on the riverbed. Timing of deployment activity will depend on procurement timelines and river flow conditions with a goal of beginning deployments in Fall 2027 and a completion of the array installation by July 2028.

Activity Milestones:

Description	Approximate Completion Date
Determine suitable locations and spacing of stationary receiver deployments	September 30, 2027
Complete assembly of substrate anchored, bridge mounted, and shore deployed stationary receiver housings	March 31, 2028
Complete deployment of 50 stationary receivers	July 31, 2028
Complete a detailed final report for activity 1	June 30, 2030

Activity 2: Capture of fish and implantation of acoustic transmitters

Activity Budget: $340,748

Activity Description:
A suite of five gamefish and five native rough fish species, including walleye, northern pike, smallmouth bass, channel catfish, burbot, bigmouth buffalo, shorthead redhorse, silver redhorse, greater redhorse, and white sucker will be collected via electrofishing or hoop nets within the study area. Thirty individuals of each species will be surgically implanted with acoustic transmitters that provide telemetry data for 3 to 10 years. Active telemetry arrays operated by DNR in other major river systems in Minnesota (Red River of the North, St. Croix River, Lower Mississippi River, and the Minnesota River) demonstrate that sample sizes of >25 individuals are critical to characterize species-wide movement patterns due to variation in behavior and movement of individuals. Two sizes of transmitters will be used depending on the body size of the fish. Smaller transmitters provide data for 3-5 years, and the larger models transmit for 10 years. The multi-year datasets are critical for capturing annual variation of movement patterns as seasonal variations in flow regimes impact fish movement. Understanding the effects of flow regimes on fish movements is especially valuable as the timing and intensity of precipitation changes in Minnesota.

Activity Milestones:

Description	Approximate Completion Date
Surgically implant acoustic transmitters in 300 Upper Mississippi River fish	October 31, 2028
Summarize movement patterns of tagged fish	June 30, 2030
Complete a detailed final report for activity 2	June 30, 2030

Activity 3: Receiver array maintenance and manual tracking of tagged fish

Activity Budget: $215,122

Activity Description:

Each of the 50 stationary receivers in the array will require maintenance inspections throughout the navigable season on the river to: ensure that the receiver has not been displaced by current or buried in sediment, download data stored on the device, and replace the unit's batteries. While conducting maintenance forays within the receiver network, a boat mounted manual tracking receiver and hydrophone can be employed to locate tagged fish in areas of interest between the stationary receivers. Manual tracking of tagged fish in tandem with the stationary array can aid in the characterization of fish interactions with river features. Identification of movement patterns, spawning areas, and critical habitats for the suite of species in this study will allow for enhanced management of game fish populations, provide valuable insight into understudied populations of native rough fish species, and help identify critically important habitat for protection or restoration needs.

Activity Milestones:

Description	Approximate Completion Date
Maintenance visits, data downloads, and battery replacements for stationary receivers throughout the navigable season	June 30, 2030
Manually track tagged fish in various habitats throughout the study area	June 30, 2030
Summarize movement patterns of tagged fish	June 30, 2030
Complete a detailed final report for activity 3	June 30, 2030

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Rick Bruesewitz	MN DNR	Rick Bruesewitz is the Aitkin Area Fisheries Supervisor with decades of experience in fisheries management in the Upper Mississippi River and surrounding watersheds. The Aitkin Area Fisheries office will serve as a base of operation for the execution of this project.	No

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, internal DNR Fisheries Conference). Additionally, we will seek opportunities to share the outcomes of this project with public stakeholders and other interested parties. Upon completion of this project, we will create detailed reports associated with each of the project activities and the reports will be available to the public. 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 ENTRF 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?
If funded, this project will establish an infrastructure for long-term monitoring of fish populations in the Upper Mississippi River. The tremendous research utility of this infrastructure would be leveraged to seek additional funding and partnerships. Ongoing gamefish species management is occurring in this reach of river. This project would improve management actions by facilitating the identification of seasonal habitat use which greatly informs management factors such as species vulnerability to angling pressure. MN DNR has some special project resources that could be used to fund additional future work, though availability will depend on future base budget status and priorities.

Project Manager and Organization Qualifications

Project Manager Name: Brett Nagle

Job Title: Native Fish Biologist

Provide description of the project manager's qualifications to manage the proposed project.
Brett Nagle, M.S., is the Native Fish Biologist for the MN DNR Fish and Wildlife Division. Brett received his B.A. in Biology and Spanish Language Studies from the University of Minnesota Twin Cities in 2003 and his M.S. in Conservation Biology from the U of MN, TC in 2010. His thesis was titled "Early quaternary sea level changes and rapid diversification in in the North American minnow genus Nocomis (Ostariophysi: Cyprinidae)." Prior to becoming the Native Fish Biologist for the MN DNR in December of 2024, he was an Environmental Specialist for the MN Pollution Control Agency from 2014 to 2024. In this role, he planned, coordinated and conducted fish community surveys in streams and rivers throughout Minnesota in support of water quality monitoring and assessment efforts. During this time he also served as a watershed project lead in six of MN's major watersheds. From 2008-2014 he was an Animal Survey Specialist for the MN DNR's Minnesota Biological Survey. In this position, Brett planned, coordinated and conducted field surveys for rare fish

and small mammal species throughout Minnesota. He also served as a project lead for MN DNR's federally endangered Topeka shiner population monitoring efforts. Brett has authored three peer reviewed scientific publications, numerous agency reports at both MN DNR and MPCA, and presented research projects at multiple national conferences. Brett's extensive experience conducting field surveys in streams and rivers coupled with considerable project management in multiple roles makes him a well-suited candidate for managing this project on behalf of the MN DNR.

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
Personnel								
Natural Resource Specialist Intermediate		River Telemetry Field Lead			31%	3		$255,000
							Sub Total	**$255,000**
Contracts and Services								
TBD	Service Contract	Graduate student: conduct field work, data analysis, report writing.				1.5		$184,672
							Sub Total	**$184,672**
Equipment, Tools, and Supplies								
	Equipment	50 Next Trac R1 Receivers	Hydroacoustic Receivers for detecting implanted fish					$138,600
	Equipment	1 VR100 manual tracking receiver	Manual tracking receiver for boat mounted detection of implanted fish between stationary receivers					$7,245
	Equipment	1 VH165 omni directional hydrophone	Omni directional hydrophone for boat mounted tracking of implanted fish between stationary receivers					$890
	Equipment	320 V13/V16 transmitter tags	Transmitters to implant in fish for tracking					$133,760
	Equipment	300 batteries for stationary receivers	Stationary receivers run on battery power					$7,000
	Equipment	50 Mounting brackets	cages, brackets, and anchors for deploying stationary receivers					$20,000
	Equipment	3 Vinyl coated steel wire 500'	Cable for shore deployed receivers					$540
	Tools and Supplies	Misc hardware, supplies, and PPE	Misc. supplies including dissection supplies, hardware, and personal protective equipment					$7,237
							Sub Total	**$315,272**

Capital Equipment								
		Boat/Motor/Trailer	Boat/Motor/Trailer for deploying receivers, fish capture, and manual tracking of tagged fish	X				$35,000
							Sub Total	**$35,000**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	In State Fleet Vehicle Mileage at ~.$075: Semi-weekly travel to/from St. Paul/Aitkin 6mo/year. Daily Travel btwn Aitkin/Grand Rapids area 6mo/year: ~74K miles. Meals and lodging for staff in intermittent travel status ~6mo/year	Fleet Vehicle Mileage, Meals and Lodging, for 3 project staff for 3 years					$99,000
							Sub Total	**$99,000**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
		Direct and Necessary Costs	HR Support ($7,277), Safety Support ($954), Financial Support ($8,468), Communication Support ($2,086), IT Support ($19,728), Planning Support ($1,543)					$40,056
							Sub Total	**$40,056**
							Grand Total	**$929,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Capital Equipment		Boat/Motor/Trailer	The execution of this project requires a dedicated watercraft for all aspects of the work required to complete it. Existing boats in DNR's possession are dedicated to other required purposes. The logistics of using existing boats for this purpose over three years of river work is not a tenable option. **Additional Explanation :** This project, if funded, will establish a long-term telemetry monitoring array on the Upper Mississippi River that will persist beyond the duration of the proposed project. This boat will be dedicated to that purpose.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
In-Kind	Minnesota DNR Fisheries Section staff contribution	Existing staff time: Native Fish Biologist, Brett Nagle (project manager), 0.35 FTE, 36 months (65% Salary, 35% Fringe)	Secured	$147,000
In-Kind	Minnesota DNR Fisheries Section staff contribution	Existing staff time: NR Specialist Senior, 0.15 FTE, 36 Months, (65% Salary, 35% Fringe)	Secured	$53,000
In-Kind	Minnesota DNR Fisheries Section staff contribution	Existing staff time: Area Fisheries Supervisor, 0.10 FTE, (65% salary, 35% fringe)	Secured	$59,000
In-Kind	Minnesota DNR Fisheries Section staff contribution	Existing staff time: NR Specialist, 0.15 FTE, (65% salary, 35% fringe)	Secured	$34,000
In-Kind	Minnesota DNR facilities and services	Office space, office overhead, technical and field support	Secured	$10,000
In-Kind	Minnesota DNR Fisheries Section contribution	Sampling gear (nets, buoys etc.), tools and supplies owned and maintained by the DNR	Secured	$20,000
			State Sub Total	**$323,000**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**$323,000**

Total Project Cost: $1,252,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: 4da25dc6-ce7.pdf

Alternate Text for Visual Component

Graphic title: 'Fish movement patterns in the Upper Mississippi River'. It contains images of four fish within the watershed boundary of this portion of the Mississippi. There are radio tower icons and location pins to symbolize fish telemetry. There is a map of MN that highlights the study area....

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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

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

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Rick Bruesewitz, MN DNR Aitkin Area Fisheries Supervisor. Shannon Fisher, MN DNR Populations and Regulations Manager. Kelly Straka, MN DNR Fish and Wildlife Division Director.

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