



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-444

Proposal Title: Evaluation of Redhorse in Mississippi River Tributaries

Project Manager Information

Name: Devon Oliver

Organization: MN DNR - Fish and Wildlife Division

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Project Basic Information

Project Summary: The goal of this project is to increase knowledge and fill information gaps related to River, Shorthead, Greater, and Black Redhorse in Cannon, Zumbro and Root Rivers to inform management.

ENRTF Funds Requested: \$129,000

Proposed Project Completion: September 30, 2029

LCCMR Funding Category: Small Projects (G)

Secondary Category: Fish and Wildlife (D)

Project Location

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

Region(s): SE

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

Narrative

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

Redhorse (*Moxostoma* sp.), like many Catostomidae, generally lack advocacy groups dedicated to their conservation and are frequently overlooked compared to sportfish counterparts. Consequently, many species experience a significant lack of demographic and life history data throughout much of their range. In Minnesota, this issue is especially evident for Black Redhorse (S3 state rank; State Special Concern; SGCN) and, to a lesser extent, River Redhorse (S3 state rank; SGCN). Insufficient basic life history and demographic information can lead to misaligned conservation objectives, ineffective management actions, undetected stock declines, and the late discovery of populations nearing extirpation. Furthermore, for River Redhorse, the morphometric and meristic characteristics used to distinguish this species from Shorthead and Greater Redhorse are often subjective, highly variable, may require specimen harvest, or are inconsistent in their determination across metrics both within and across different source materials.

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 project addresses several critical areas identified as key priorities in 2023 MN DNR Native Fish Conservation Report. Specifically, it addresses a need for Redhorse population structure and dynamics data; Redhorse was identified as a priority species group. Additionally, evaluating genetic diversity among and within redhorse populations in the lower Mississippi River basin is essential to enhance understanding of population connectivity and genetic health.

Genetic evaluation of Black Redhorse will identify genetic stock structure and estimate effective genetic population size in the Cannon, Zumbro, and Root Rivers. We will also use mark-recapture, N-mixture, and occupancy modeling in a weight-of-evidence approach to garner an initial understanding of population size and distribution within the Cannon, Zumbro, and Root Rivers. Additionally, using these approaches will inform and initial understanding of broad-based movement and population connectivity based on relocation of PIT tagged fish and genetic diversity indices.

Genetic and morphometric evaluation of River, Shorthead, Greater Redhorse will increase genetic and morphometric sample size and expand sampled systems for resolving identification of the three species, previous samples exist for Pools 3 – 8 of the Mississippi, St. Croix, and Minnesota River. Additionally, we will estimate effective genetic population size in the Cannon, Zumbro, and Root Rivers.

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?

Evaluation of Black Redhorse

1. Determination of population connectivity, and ecologically relevant management units and boundaries based on genetic stock structure and PIT tag relocation.
2. An initial understanding of population distribution and relative size, for which the department does not have any supporting data, despite the upcoming implementation of regulations.

Evaluation of River Redhorse, Shorthead Redhorse, Greater Redhorse

1. Increased ability to resolve inconsistencies in identifying the three species.
2. Determination of population connectivity, and ecologically relevant management units and boundaries based on genetic stock structure.

Activities and Milestones

Activity 1: Field data collection and genetic sample collection

Activity Budget: \$75,931

Activity Description:

The objective of this activity is to collect field data that will be used to develop an initial understanding of population size and distribution of Black Redhorse within the Cannon, Zumbro, and Root Rivers. Additionally, this activity will increase genetic and morphometric sample size for resolving identification of River Redhorse; data will also be used to determine effective genetic population size. Site selection will be based on historic MNDNR records and on-site observations of fish and suitable habitat. We will use a combination of boat electrofishing and nearshore fyke netting to collect Redhorse samples from spring through fall seasons for two years (approximately 25 field trips/year). To develop mark-recapture models for Black Redhorse, up to 5000 individuals will be PIT tagged in each system. Each Black Redhorse will be measured, and genetic samples will be taken from 250 fish from each system. Genetic samples will also be taken from River, Shorthead, and Greater Redhorse (25 per species per system). This data will be used in modeling to develop an initial understanding of population distribution and relative size, for which the department does not have any supporting data. It will also increase the ability to resolve inconsistencies in identifying River

Activity Milestones:

Description	Approximate Completion Date
Complete Field Data Collection	September 30, 2029

Activity 2: Genetic, population, and morphometric analysis

Activity Budget: \$47,950

Activity Description:

We will use restriction site-associated DNA (RAD) sequencing to generate a genome-wide SNP dataset following a modified version of the BestRAD protocol. Genomic data will be subject to numerous standard analyses to assess the genetic structure among populations and genetic diversity within populations using the vast power provided by thousands of SNPs. Additionally, genetic ID confirmation will also be obtained via mitochondrial DNA and Microsatellite analysis. Fish capture and PIT tag data will be evaluated using a weight-of-evidence approach via mark-recapture, N-mixture, and occupancy modeling to garner an initial understanding of population size and distribution within the Cannon, Zumbro, and Root Rivers. These data will aid the MNDNR in determination of population connectivity, and ecologically relevant management units and boundaries based on genetic stock structure and PIT tag relocation. Additionally, determining relative population size of Black Redhorse (SGCN species) will allow MNDNR managers to evaluate potential vulnerability of the state's Black Redhorse populations to habitat/system degradation, potential overfishing, and recruitment collapse.

Activity Milestones:

Description	Approximate Completion Date
Genetic Analysis	April 30, 2029
Population Modeling	June 30, 2029

Activity 3: Communication and Outreach

Activity Budget: \$5,119

Activity Description:

The objective of this activity is to disseminate results of our study with the scientific community and general public. We will share our results with the scientific community by publishing our findings in peer-reviewed scientific journals and presenting at professional meetings (e.g. Minnesota chapter of the American Fisheries Society). We will share our results with the general public by publishing a River Redhorse Identification fact sheet that may be published online or in current print publications.

Activity Milestones:

Description	Approximate Completion Date
Communicate project updates peer-review, continuously as completed, over project timeline	September 30, 2029
Present at meetings (public and professional) continuously over project timeline	September 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Loren Miller	Minnesota DNR	Dr. Miller has expertise in fish genetics and will oversee genetic sample collection and preparation for analysis.	No
Brian Beyerl	Minnesota DNR	Brian Beyerl is a fisheries biologist that manages and conducts research on the Zumbro, Cannon, and Root Rivers for the Lake City area office, and will aide in sample site selection and fish sample collection.	No
Daniel Spence	Minnesota DNR	Daniel Spence is a fisheries biologist that manages and conducts research on the Zumbro, Cannon, and Root Rivers for the Lake City area office, and will aide in sample site selection and fish sample collection.	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.

We will share our results with the scientific community by publishing our findings in peer-reviewed scientific journals and presenting at professional meetings (e.g. Minnesota chapter of the American Fisheries Society). We will share our results with the general public by publishing a River Redhorse Identification fact sheet that may be published online or in current print publications.

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?

For all four redhorse species these results will be used to determine population status, potential effectiveness of current regulations, and aide in determination if additional management is needed; these results can be implemented immediately by local and regional management. Additionally, the identification of metrics used for identifying River Redhorse relative to Shorthead and Greater Redhorse will be immediately implemented within the MNDNR by both biologists and enforcement for correct identification of newly managed rough fish species. The results will also be disseminated to the public to aide in identification of captured species.

Project Manager and Organization Qualifications

Project Manager Name: Devon Oliver

Job Title: Fisheries Scientist

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

I am a MNDNR fisheries scientist with a Ph.D. in Zoology. Since 2009, I have focused my research on large rivers and large-river fish species and have a consistent record of peer-reviewed publication. I have also served as a technical advisor for the MNDNR public roughfish workgroup. Currently, I am completing the final reporting stages of a project evaluating the genetic stock structure of River and Shorthead Redhorses in the Mississippi, St. Croix, and Minnesota Rivers, which is similar to the current proposed project.

Organization: MN DNR - Fish and Wildlife Division

Organization Description:

The Fish and Wildlife Division works with Minnesotans to manage, conserve and enhance the state's wildlife, fishes and the habitats on which they depend.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
							Sub Total	-
Contracts and Services								
Michigan State University	Service Contract	SNPs Analysis				-		\$47,950
							Sub Total	\$47,950
Equipment, Tools, and Supplies								
	Equipment	Fyke Nets	Used for passive capture of Redhorse, and is particularly useful for smaller individuals					\$18,000
	Equipment	PIT Tag Readers	Used to identify if fish have been tagged by personal					\$3,600
	Equipment	Quick Lock Implanters	Used to implant PIT tags in Redhorse					\$320
	Tools and Supplies	Preload Pit Tags	Used to tag and individually identify tagged fish					\$44,250
	Tools and Supplies	General Supplies	Used to cover supplies for taking genetic samples, replace broken materials, and general supplies necessary for running a project for 3 years					\$5,000
							Sub Total	\$71,170
Capital Equipment								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-

Travel In Minnesota								
	Other	24 months of Boat trailer maintenance and Milage Coverage	Costs of using and maintaining electrofishing boat trailer					\$504
	Miles/ Meals/ Lodging	Travel to and from field sites	Approximate cost of operating MNDNR vehicle for project across the 2 years of field sampling					\$4,257
							Sub Total	\$4,761
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
		Direct and Necessary Costs	DNR's direct and necessary costs pay for activities that are directly related to and necessary for accomplishing appropriated projects. People Support (\$0), Safety Support (\$0), Financial Support (~\$1,490), Communication Support (~\$2,086), IT Support \$0), and Planning Support (~\$1,543).					\$5,119
							Sub Total	\$5,119
							Grand Total	\$129,000

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
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$129,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [62c0a6b5-f58.pdf](#)

Alternate Text for Visual Component

Map of proposed sampling locations on the Cannon and Zumbro Rivers based on past sampling efforts from MNDNR area staff; Root River sample locations will be determined based on in field scouting....

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?

Yes

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:

NA

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