



Environment and Natural Resources Trust Fund

2023 Request for Proposal

General Information

Proposal ID: 2023-060

Proposal Title: Restoring Mussels in Streams and Lakes - Continuation

Project Manager Information

Name: Madeline Pletta

Organization: MN DNR - Ecological and Water Resources Division

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Project Basic Information

Project Summary: Restoring native mussel assemblages can improve water quality and ecological health of rivers. Mussel filter water, purifying and improving water clarity by removing particles and contaminants like E. coli bacteria.

Funds Requested: \$825,000

Proposed Project Completion: June 30, 2025

LCCMR Funding Category: Methods to Protect, Restore, and Enhance Land, Water, and Habitat (F)

Project Location

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

Statewide

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

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

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

Minnesota's native mussels are a critically important component of aquatic ecosystems, but have been lost or diminished in many Minnesota water bodies. Historical accounts speak of mussels literally paving the bottom of rivers. Harvest for pearls and buttons, pollution, dams and destabilized waterways have caused mussel populations to decline dramatically in North America including Minnesota where 80% of our species have been affected. This drastic decline of mussels over the last century has diminished the filtering capacity and other benefits mussels provide. Today, Clean Water Act implementation and advances in mussel culture and restoration offer opportunities to mitigate this trend. A single mussel can filter 10 gallons of water a day, over years to decades of its life, and a 6-mile stretch of mussel beds can filter out over 25 tons of particulates per year while filtering the entire volume of a river many times over at base flows.

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.

We propose to restore native mussel assemblages in the Cedar, Cannon, and Mississippi rivers by continuing to propagate, rear, release and monitor mussels in these watersheds.

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?

Reintroducing up to six species of mussels historically present in the Cedar River downstream of Austin, MN, up to two species historically present in the Cannon River system upstream of Northfield, MN, and up to six species historically present in the Mississippi River upstream of its confluence with the Minnesota River. Reestablishing the water cleansing and nutrient processing capacity that mussel populations provide will improve water quality and restore the biotic communities that mussels support and that fish and wildlife depend on while helping delist endangered and threatened species.

Activities and Milestones

Activity 1: Monitoring mussels released into streams

Activity Budget: \$200,000

Activity Description:

Mussels released at each site in each stream will be monitored for survival, growth and eventually reproductive status annually. Additionally, environmental variables (e.g., flow, water temp, water depth, ammonia, etc.) will be monitored to determine potential reasons we see the survival and growth response.

Activity Milestones:

Description	Completion Date
Quantify environmental parameters at mussel release sites	June 30, 2025
Recapture at least 10 tagged mussels at restoration sites annually.	June 30, 2025
Document reproductive status	June 30, 2025
Quantify growth and survival for site (per river).	June 30, 2025

Activity 2: Propagate and rear mussels for reintroduction in rivers

Activity Budget: \$400,000

Activity Description:

Up to ten brooding female mussels of each target species will be collected by wading, snorkeling or with SCUBA. Broodstock are collected from early spring to late fall depending on the targeted species' life history. Host fish will be inoculated with larvae harvested from female mussels by combining them in an aerated water bath. Post inoculation, fish will be moved into holding tanks specifically designed for mussel propagation, placed into cages within their watershed or released at selected mussel restoration sites. Juveniles will be collected from the host fish retained at our facility for 2-12 weeks after inoculation. All juveniles collected will be counted and placed into mussel rearing systems and monitored for growth and survival. Juvenile mussels may be reared at our Center for Aquatic Mollusk Programs (CAMP) for up to 18-months before moving them to a natural system for continued growth.

Activity Milestones:

Description	Completion Date
Yearly collection of host fish; 10-200 host fish per mussel species.	May 31, 2024
Yearly collection of gravid females (broodstock); 2-10 mussels per species.	September 30, 2024
Juvenile mussels (50-1,000) will be collected from each host fish per mussel species.	October 31, 2024
Rear juvenile mussels to releasable size (10-1,000 per species).	June 30, 2025

Activity 3: Reintroduce mussels into to selected restoration sites

Activity Budget: \$150,000

Activity Description:

Once mussels reach a releasable size (minimum size 1.5 cm), each mussel is marked with a unique identifier (PIT tag, Hallprint tag, colored glue dot) to provide growth and survival information upon recapture. Mussels will be released into 1-3 selected restoration sites per river. Site selection is determined by flow, depth, water quality, and presence of current mussel population. Additionally, Monkeyface, a state threatened species, has only been documented as empty shells in the Cedar River in Minnesota. However, a stable population remains in northern Iowa. Although Monkeyface has been at the forefront of propagation efforts, difficulties with host fish have resulted in unsuccessful cohort years. With permitting by the Iowa DNR, 50 Monkeyface will be collected, tagged with passive integrated transponders (PIT),

and transported to the Cedar River in Minnesota for two consecutive years. Monkeyface will be monitored for survival and gravidity annually.

Activity Milestones:

Description	Completion Date
Place unique identifiers and measure mussel prior to release.	June 30, 2025
Select additional release sites based on prior data collection.	June 30, 2025
Reintroduce juvenile mussels to selected restoration sites (1-3 sites per river of each species).	June 30, 2025
Collect, tag, and relocate up to 50 Monkeyface annually	June 30, 2025

Activity 4: Outreach to citizens

Activity Budget: \$75,000

Activity Description:

Inform the public and media about our program and the importance of mussels. We will update and publish a digital field guide of the Freshwater Mussels of Minnesota. Species names and distribution have been revised since the original publication (Sietman 2003). The updated guide will be available for download on the DNR webpage. Also, we will staff a booth at the MN State Fair each year. Here, citizens can acquire the new ENRTF mussel ID app, see demonstrations on its use, and try it out with native mussel shells on display. Additionally, we will have posters available for handout and a collection of shells that people can see and handle. Quarterly posts to the DNR Facebook page and our CAMP newsletter will update citizens on our activities funded by the ENRTF and will feature results of our milestones for propagation, releases and monitoring.

Activity Milestones:

Description	Completion Date
Yearly staff presentations at various platforms (State Fair, Water Festival, Nature Centers)	March 31, 2025
Newsletter reaching greater than 3,000 recipients	June 30, 2025
Greater than 250 downloads of the Mussel Phone App	June 30, 2025
Update and publish Digital Field Guide	June 30, 2025

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Joe Walton	Dakota County Parks Natural Resources	Monitor mussel cage site location for disturbances	No
Tim Ruzek	Cedar Watershed District	Assist with mussel release locations in the Cedar River, and monitor East Side Lake cage location	No
Kelly Poole	Iowa DNR, Threatened and Endangered Species Coordinator	Access to female mussels in Iowa's Cedar River	No
Alison Holdhusen	National Park Service, Mississippi National River and Recreation Area	Assists with monitoring and collection of donor mussels	No
Byron Karns	National Park Service, St. Croix National Riverway	Assists with monitoring and collection of donor mussels	No
Tam Smith	US Fish and Wildlife Service, Twin Cities Field Office	Permitting and planning for reintroduction of federally listed species	No
Doug Aloisi	US Fish and Wildlife Service, Genoa National Fish Hatchery	Assists with obtaining host fish and female mussels	No
Dan Kelner	US Army Corps of Engineers	Coordinates and pays for monitoring of reintroduction sites on the Mississippi River	No
Ben Meinrich	MN Zoo	Assist with growing juvenile mussels to release size at Zoo lake	No
Scott Gritters	IA DNR	Fisheries Biologist and Malacologist; assist with Monkeyface permitting	No
Luke Reese	Hormel Nature Center	Director and project advocate for mussel in Austin and at HNC	No
Andrew Scholten	MN DNR Waterville Fish Hatchery	Primary contact for secondary culture in ponds at Waterville Fish Hatchery	No

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?

This will be our fourth grant from the ENRTF and part of a long-term effort to reestablish mussels in these streams. As we seek funding from other sources to expand our work to other rivers and lakes it is crucial to be able to retain our staff and facility that makes this work possible.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Restoring Native Mussels in Streams and Lakes	M.L. 2016, Chp. 186, Sec. 2, Subd. 04c	\$600,000
Restoring Native Mussels in Streams and Lakes	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03b	\$500,000
Restoring Mussels In Streams And Lakes - Continuation	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 08b	\$619,000

Project Manager and Organization Qualifications

Project Manager Name: Madeline Pletta

Job Title: Natural Resources Specialist Senior, Lead Propagation Biologist

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

Madeline Pletta (NR Senior) is the lead propagation biologist at CAMP. She spearheaded the growth of our facility and propagation efforts statewide. Madeline has over 10 years of experience with mussels, and a master’s degree focusing on propagation and feeding requirements of juvenile mussels. Additionally, she has been an integral part of previous ENRTF reporting and proposals (2016, 2019, 2021).

Organization: MN DNR - Ecological and Water Resources Division

Organization Description:

MN DNR EWR, River Ecology Unit, Center for Aquatic Mollusk Programs (CAMP).

CAMP specializes in freshwater mussel conservation statewide. This includes surveys to determine species distributions, abundance and population health of mussel assemblages that began in 1987 and was expanded in 1999 with two years of funding from the Environment and Natural Resources Trust Fund. These surveys have collected mussel data from about 4,000 sites around the state and inform our reintroduction program, determine impacts to listed mussels at sites of disturbance such as bridge replacements, pipeline crossings etc. We conduct monitoring of known mussel communities at sixteen long-term sites in twelve rivers in Minnesota and and at six reintroduction sites in the Mississippi River in Minnesota for the federally endangered Higgins' Eye mussel. We have contracted with the USACE St. Paul District to monitor Essential Habitat Areas for Higgins' Eye in the Mississippi and St. Croix Rivers each year since 2001. Having acquired extensive knowledge of our mussel resources over these years and with documented success in reintroducing Higgins' Eye mussels, we began a long-term project to reintroduce select state listed mussel species to the Cedar, Cannon and Mississippi Rivers in 2016 with funding from the ENRTF.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Madeline Hayden, NR Spec Sr		Lead Mussel Propagation Biologist			50%	2		\$229,441
NR Spec Intermediate		Fish husbandry, lab management/maintenance, monitoring release sites			62%	1.2	X	\$104,823
Zeb Secrist, NR Spec		Database manager, IT support, dive survey expert			14.3%	0.3	X	\$23,155
Lindsay Ohlman, NR Spec Int		Mussel Propagation and Rearing Biologist			33%	2	X	\$165,714
Bernard Sietman, Research Scientist		Lends expertise in mussel distribution, taxonomy and biology helping to improve results and design monitoring plans			23%	0.4	X	\$46,084
Kathryn Holcomb		Mussel Program Supervisor			50%	0.3	X	\$35,476
NR Spec Intermediate		Juvenile mussel culture/fish husbandry/monitoring release sites			80%	1.2	X	\$101,510
							Sub Total	\$706,203
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Tools and Supplies	Temperature loggers and water quality instruments	Track temperature and WQ at monitoring sites, ponds, and all other mussel culture systems					\$7,000
	Tools and Supplies	PVC parts and pumps for juvenile culture systems	Expand or update juvenile capture and culture systems					\$8,000
	Tools and Supplies	Mussel culture supplies	Food for mussels and fish, purchase host fish					\$20,000

	Tools and Supplies	SCUBA equipment maintenance	SCUBA equipment require yearly maintenance (regulators and BCDs), and air tanks refills					\$1,069
							Sub Total	\$36,069
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Fleet charges and expenses for staff	Collect brooding mussels and host fish, place juveniles in growing baskets, collect juveniles for tagging and release, monitoring reintroduction sites. Outreach events.					\$15,000
							Sub Total	\$15,000
Travel Outside Minnesota								
	Miles/ Meals/ Lodging	Fleet charges and staff expenses, no lodging	Trips to Iowa to collect female mussels needed for propagation	X				\$4,000
							Sub Total	\$4,000
Printing and Publication								
	Publication	Mussel phone app annual cost of maintenance	To keep the phone app supported requires and annual expenditure to the vendor					\$4,000
							Sub Total	\$4,000
Other Expenses								
		Direct and necessary expenses includes all department support services.	To support the costs related to the program administration *Direct and Necessary expenses: People Support					\$59,728

			(\$13,490), Safety Support (\$2,718), Financial Support (\$10,269), Communication Support (\$1,811), IT Support (\$30,420), and Planning Support (\$1,020) necessary to accomplish funded programs/projects.					
							Sub Total	\$59,728
							Grand Total	\$825,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Personnel - NR Spec Intermediate		Fish husbandry, lab management/maintenance, monitoring release sites	Classified : This position does not have a permanent dedicated funding base and so the MN DNR cannot backfill the ENRTF portion of their salaries. Classified staff manage this program but they may not be retained to work on mussels without the support of this ENTRF grant. Retaining these positions is essential for implementing this project.
Personnel - Zeb Secrist, NR Spec		Database manager, IT support, dive survey expert	Classified : This position does not have a permanent dedicated funding base and so the MN DNR cannot backfill the ENRTF portion of their salaries. Classified staff manage this program but they may not be retained to work on mussels without the support of this ENTRF grant. Retaining these positions is essential for implementing this project.
Personnel - Lindsay Ohlman, NR Spec Int		Mussel Propagation and Rearing Biologist	Classified : This position does not have a permanent dedicated funding base and so the MN DNR cannot backfill the ENRTF portion of their salaries. Classified staff manage this program but they may not be retained to work on mussels without the support of this ENTRF grant. Retaining these positions is essential for implementing this project.
Personnel - Bernard Sietman, Research Scientist		Lends expertise in mussel distribution, taxonomy and biology helping to improve results and design monitoring plans	Classified : This position does not have a permanent dedicated funding base and so the MN DNR cannot backfill the ENRTF portion of their salaries. Classified staff manage this program but they may not be retained to work on mussels without the support of this ENTRF grant. Retaining these positions is essential for implementing this project.
Personnel - Kathryn Holcomb		Mussel Program Supervisor	Classified : This position does not have a permanent dedicated funding base and so the MN DNR cannot backfill the ENRTF portion of their salaries. Classified staff manage this program but they may not be retained to work on mussels without the support of this ENTRF grant. Retaining these positions is essential for implementing this project.
Personnel - NR Spec Intermediate		Juvenile mussel culture/fish husbandry/monitoring release sites	Classified : This position does not have a permanent dedicated funding base and so the MN DNR cannot backfill the ENRTF portion of their salaries. Classified staff manage this program but they may not be retained to work on mussels without the support of this ENTRF grant. Retaining these positions is essential for implementing this project.
Travel Outside Minnesota	Miles/Meals/Lodging	Fleet charges and staff expenses, no lodging	Out of state travel is required to collect female mussels needed for propagation.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Attachments

Required Attachments

Visual Component

File: [f40255a9-f48.pdf](#)

Alternate Text for Visual Component

Top: a collection of photos from our program, starting at upper left: 6-month old Mucket mussels, brooding female displaying her mantle lure, tagging propagated Black Sandshell, reintroducing mussels, public outreach, juvenile mussel collection system, and mussels recovered during monitoring (center). Bottom: depiction of CAMP's objectives relating to the mussel lifecycle....

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?

No

Does the organization have a fiscal agent for this project?

No



CAMP's Objectives

Mussel Lifecycle and Propagation

Select appropriate mussel broodstock (based on genetics)

Determine productive host fishes

Inoculate host fish with mussel larvae called glochidia, which attach to fish gills

Retrieve and rear juvenile mussels in the lab for >1 year (primary culture)

Monitor mussels for survival, growth, and natural recruitment

Mark and release sub-adult mussels at pre-selected sites in 3 rivers

Move juvenile mussels to secondary culture locations and natural systems



