



Environment and Natural Resources Trust Fund

2021 Request for Proposal

General Information

Proposal ID: 2021-039

Proposal Title: Restoring Mussels in Streams and Lakes - continuation

Project Manager Information

Name: Mike Davis

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: 2023-06-30

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 has 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? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and 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: Propagate, grow and release mussels for reintroduction in rivers

Activity Budget: \$630,000

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. Mussels will be released into selected rivers at 2-years or once they reach a releasable size.

Activity Milestones:

Description	Completion Date
Number of host fish inoculated with each mussel species from each river (yearly).	2022-05-31
Number of gravid females of each species collected from each river (yearly).	2022-09-30
Number of juveniles collected from host fish of each mussel species (yearly).	2022-10-31
Number of mussels reintroduced into selected restoration sites (1-3 per river).	2023-06-30
Number of mussels of each species reared to a releasable size.	2023-06-30

Activity 2: Monitoring mussels released into streams

Activity Budget: \$150,000

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. Physical attributes of two release sites on the Cannon River and two sites on the Cedar River will be characterized.

Activity Milestones:

Description	Completion Date
Percent survival of released mussels at each site in each stream	2022-10-31
Physical characterization of monitoring sites on the Cedar River and Cannon River	2023-06-30
Quantifying environmental parameters at mussel release sites	2023-06-30
Number of released mussels of each species that survive to maturity in each stream	2023-06-30

Activity 3: Outreach to citizens

Activity Budget: \$45,000

Activity Description:

Inform the public and media about our program and the importance of mussels. 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. We will host an annual Open House where citizens can tour our lab; and see juvenile mussels of various sizes and the fish that host them.

Activity Milestones:

Description	Completion Date
Number of Mussel Phone App downloaded	2022-09-30
Number of posters distributed	2022-09-30
Staff present at various platforms (State Fair, Water Festival, Nature Centers)	2022-09-30

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Ben Meinrich	MN Zoo	Assist with growing juvenile mussels to release size at Zoo lake.	No
Dan Kelner	US Army Corps of Engineers	Coordinates and pays for monitoring of reintroduction sites on the Mississippi River	No
Doug Aloisi	US Fish and Wildlife Service, Genoa National Fish Hatchery	Assists with obtaining host fish and female mussels	No
Tam Smith	US Fish and Wildlife Service, Twin Cities Field Office	Permitting and planning for reintroduction of federally listed species	No
Byron Karns	National Park Service, St. Croix National Riverway	Assists with monitoring and collection of donor mussels	No
Alison Holdhusen	National Park Service, Mississippi National River and Recreation Area	Assists with monitoring and collection of donor mussels	No
Kelly Poole	Iowa DNR, Threatened and Endangered Species Coordinator	Access to female mussels in Iowa's Cedar River	No
Tim Ruzek	Cedar Watershed District	Assist with mussel release locations in the Cedar River, and monitor East Side Lake cage location.	No
Joe Walton	Dakota County Parks Natural Resources	Monitor mussel cage site location for disturbances.	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 be funded?

This will be our third 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
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Restoring Native Mussels in Streams and Lakes	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03b	\$500,000
Restoring Native Mussels in Streams and Lakes	M.L. 2016, Chp. 186, Sec. 2, Subd. 04c	\$600,000

Project Manager and Organization Qualifications

Project Manager Name: Mike Davis

Job Title: Natural Resources Program Consultant

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

Employed as a river ecologist at the MNDNR since 1987, the project manager began his career with a mussel survey of the Cannon River system that year. In 1999 he proposed and received a grant from the LCMR to begin a systematic survey of mussels across the state of Minnesota. Since that time over 4,000 survey sites have been completed and 16 long-term monitoring sites established. In 2014 he established the Center for Aquatic Mollusk Programs (CAMP) in Lake City, MN in a leased 7,000 square foot building in order to expand the propagation and rearing of mussels for reintroduction into three river systems. CAMP also does contract work for the USACE, MNDOT and USGS to collect mussel data in rivers. CAMP presently has five full time and one half time employee.

Organization: MN DNR - Ecological and Water Resources Division

Organization Description:

MN DNR, Ecological and Water Resources Division, 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 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								
Mike Davis, Natural Resources Program Consultant		Project management, provides institutional knowledge and context			8%	0.5		\$56,000
Madeline Hayden, NR Spec Sr		Mussel Propagation Biologist			24%	2	X	\$169,000
Bernard Sietman, Research Scientist		Lends expertise in mussel distribution, taxonomy and biology helping to improve results and design monitoring plans			24%	1	X	\$108,000
Lindsay Ohlman, NR Spec Int		Mussel Propagation and rearing biologist			33%	2	X	\$175,000
Zeb Secrist, NR Spec		Database manager, IT support, dive survey expert			31%	1	X	\$77,000
Anna Scheunemann, NR Spec		Fish husbandry, lab management/maintenance, monitoring release sites			31%	1.4		\$88,000
							Sub Total	\$673,000
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Tools and Supplies	Lab supplies	Food for mussels and fish, purchase host fish					\$15,000
	Equipment	mussel rearing baskets and solar powered aerators	For containing and supporting juvenile mussels growing in ponds or rivers					\$14,893
	Equipment	Dock and aeration	Dock and aeration for pond culture					\$19,318

	Tools and Supplies	PVC parts and pumps for juvenile culture systems	Expand current juvenile capture and culture systems					\$5,000
	Equipment	Tagging Supplies: Pit Tags, Hallprint Tags, Laser Engraver Unit	Mark each mussel with identifier for monitoring, laser permanently marks mussel shell					\$10,000
	Tools and Supplies	Heated Shirts	Spring and fall water temperatures are often below 50 degrees, heated shirts will prevent hypothermia while collecting broodstock.					\$2,000
	Tools and Supplies	Temperature Loggers	Track temperature at monitoring sites, ponds, and all other mussel culture systems					\$1,000
	Equipment	Outboard motor for 20 ft dive boat (150hp E-Tech)	Existing motor is 12 years old, to ensure reliability replacing with new is needed					\$15,000
							Sub Total	\$82,211
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					\$10,000
							Sub Total	\$10,000
Travel Outside Minnesota								
	Miles/ Meals/ Lodging	Fleet charges and staff expenses, no lodging	Trips to Iowa to collect female mussels needed for propagation					\$2,000

							Sub Total	\$2,000
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: People Support (\$13,122); Safety Support (\$2,437); Financial Support (\$9,305) ; Communication Support (\$1,324); IT Support (\$26,452); and Planning Support (\$1,149) necessary to accomplish funded programs/projects.	*Direct and necessary expenses includes all department support services.					\$53,789
							Sub Total	\$53,789
							Grand Total	\$825,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Personnel - Madeline Hayden, NR Spec Sr		Mussel Propagation 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 - 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 - 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.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
Cash	USACE funds periodic monitoring at Mississippi River reintroduction sites	Supports staff salary, expenses and equipment cost to conduct monitoring.	Pending	\$10,000
			Non State Sub Total	\$10,000
			Funds Total	\$10,000

Attachments

Required Attachments

Visual Component

File: [da95f91a-6bc.pdf](#)

Alternate Text for Visual Component

Left to right: MNDNR biologists releasing mussels into the Cedar River near Austin, MN. Juvenile mussels with identifying tags glued to their shells. Mussel life history graphic showing relationship with host fish. A bag of tagged mussels ready for release. Graphic showing the percent of mussels that are threatened and endangered compared to other animal groups in North America.

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Does your project have patent, royalties, or revenue potential?

No

Does your project include research?

Yes

Does the organization have a fiscal agent for this project?

No



