Environment and Natural Resources Trust Fund

M.L. 2023 Approved Work Plan

General Information

ID Number: 2023-060

Staff Lead: Corrie Layfield

Date this document submitted to LCCMR: June 2, 2023

Project Title: Restoring Mussels in Streams and Lakes - Continuation

Project Budget: $825,000

Project Manager Information

Name: Madeline Pletta

Organization: MN DNR - Ecological and Water Resources Division

Office Telephone: (651) 314-6306

Email: madeline.pletta@state.mn.us

Web Address: https://www.dnr.state.mn.us/ewr/index.html

Project Reporting

Date Work Plan Approved by LCCMR: June 22, 2023

Reporting Schedule: April 1 / October 1 of each year.

Project Completion: June 30, 2025

Final Report Due Date: August 14, 2025

Legal Information

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 08d

Appropriation Language: $825,000 the first year is from the trust fund to the commissioner of natural resources to propagate, rear, and restore native freshwater mussel assemblages and the ecosystem services they provide in the Mississippi, Cedar, and Cannon Rivers; to evaluate reintroduction success; and to inform the public on mussels and mussel conservation.

Appropriation End Date: June 30, 2026

Narrative

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

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. Multiple age classes, requiring multiple years of effort are needed to increase genetic diversity and long-term success.

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.

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

Activities and Milestones

Activity 1: Monitoring mussels released into streams

Activity Budget: $200,000

Activity Description:
Mussels that have been reintroduced in the Cedar and Cannon River watersheds will be monitored annually. There are three geographically separate sites within each watershed, and monitoring will consist of measuring physical and chemical parameters (water depth and temperature, dissolved oxygen, pH, conductivity, ammonia) at three points per site. Flow will be measured at one point per site. Additionally, each site will be surveyed using passive integrated transponder (PIT) equipment to recapture tagged mussels to collect shell length and assess gravidity. Data on the number of mussels captured, as well as size data, will be used to model survival and growth of each species at each site. Mussels reintroduced at two sites within the Mississippi River watershed will be monitored for gravidity, and will consist of timed searches to find tagged mussels. Tagged mussels that will be recaptured (monitored) during the grant period were reintroduced in 2020-2022. Annual monitoring began in 2021 and will extend into this period because three years of recapture data is needed to calculate survival estimates.

Activity Milestones:

Description	Approximate Completion Date
Quantify environmental parameters at mussel release sites	June 30, 2025
Recapture at least 10 tagged mussels at previously-funded restoration sites annually (2-3 sites/watershed).	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	Approximate 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 in up to six selected restoration sites per river. Site selection is determined by flow, depth, water quality, substrate, 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	Approximate 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 (1-6 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	Approximate 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
Tim Ruzek	Cedar Watershed District	Assist with mussel release locations in the Cedar River, and monitor East Side Lake cage location (in-kind contribution)	No
Kelly Poole	Iowa DNR, Threatened and Endangered Species Coordinator	Access to female mussels in Iowa's Cedar River (in-kind contribution).	No
Alison Holdhusen	National Park Service, Mississippi National River and Recreation Area	Assists with monitoring and collection of donor mussels (in-kind contribution).	No
Tam Smith	US Fish and Wildlife Service, Twin Cities Field Office	Permitting and planning for reintroduction of federally listed species (in-kind contribution).	No
Megan Bradley	US Fish and Wildlife Service, Genoa National Fish Hatchery	Assists with obtaining host fish and female mussels (in-kind contribution).	No
Dan Kelner	US Army Corps of Engineers	Coordinates and pays for monitoring of reintroduction sites on the Mississippi River (non-state funding source)	No
Ben Meinrich	MN Zoo	Assist with growing juvenile mussels to release size at Zoo lake. MN Zoo has their own ENRTF funding directly relating to this project.	No
Scott Gritters	IA DNR	Fisheries Biologist and Malacologist; assist with Monkeyface permitting (in-kind contribution).	No
Luke Reese	Hormel Nature Center	Director and project advocate for mussel in Austin and at HNC (in-kind contribution).	No
Andrew Scholten	MN DNR Waterville Fish Hatchery	Primary contact for secondary culture in ponds at Waterville Fish Hatchery (in-kind contribution).	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 be disseminating our work project results via DNR Social Media accounts, public presentations, State Fair booth, and CAMP newsletters. Additionally, we will involve partners in areas where restoration work is occurring. The Mussel Application will include information obtained by our ENTRF grant and is publicly available via App Store. All project communication and outreach will acknowledge ENRTF by ENRTF logo, and attribution language.

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

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
Isabel Boyce		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
Deanna Meyer		Juvenile mussel culture/fish husbandry/monitoring release sites			80%	1.2	X	$101,510
							Sub Total	**$706,203**
Contracts and Services								
Mussel phone app annual cost of maintenance	Professional or Technical Service Contract	To keep the phone app supported requires and annual expenditure to the vendor				2		$4,000
							Sub Total	**$4,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Temperature loggers and water quality instruments. No single piece of equipment will exceed $5,000.	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. No single piece of equipment will exceed $5,000.	Expand or update juvenile capture and culture systems					$10,000
	Tools and Supplies	Mussel culture supplies	Food for mussels and fish, purchase host fish					$11,000
	Equipment	New employee gear	New employee gear (masks, snorkel, wetsuit, regulator, BCD, waders, boots)					$2,069
							Sub Total	**$30,069**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Fleet charges and travel expenses for staff - Vehicle costs range from 0.32 - 0.39 cents per mile, vehicle costs in FY2021 were $4,200; staff receive meal coverage for travel over 35 miles, all 50 trips in FY21 were greater than 35 miles.	Collect brooding mussels and host fish, place juveniles in growing baskets, collect juveniles for tagging and release, monitoring reintroduction sites. Outreach events.					$17,000
							Sub Total	**$17,000**
Travel Outside Minnesota								
	Miles/ Meals/ Lodging	Fleet charges and staff expenses, no lodging	Trips to Iowa to collect female mussels needed for propagation	X				$2,000
							Sub Total	**$2,000**
Printing and Publication								
	Publication	Digital Field Guide (update 2013 version)	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					$6,000

			available for download on the DNR webpage.					
							Sub Total	**$6,000**
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 ($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.					$59,728
							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 - Isabel Boyce		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 - Deanna Meyer		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				
Cash	USACE funds periodic monitoring at Mississippi River reintroduction sites	Supports staff salary, expenses and equipment cost to conduct monitoring. Not guaranteed funding for this grant period.	Potential	$10,000
			Non State Sub Total	**$10,000**
			Funds Total	**$10,000**

Attachments

Required Attachments

Visual Component

File: 5aa74b45-034.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....

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
Background Check Certification	fcc57f6f-04a.pdf
Table of Species Reintroductions in MN	634334f7-ca9.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Reporting Date requested May 1, and November 1

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

Do you agree travel expenses must 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 agree to the Commissioner's Plan.

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