

**Environment and Natural Resources Trust Fund
2019 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 003-A

Restoring Native Mussels in Streams and Lakes

Category: A. Foundational Natural Resource Data and Information

Sub-Category:

Total Project Budget: \$ 735,981

Proposed Project Time Period for the Funding Requested: June 30, 2022 (3 yrs)

Summary:

Restore native freshwater mussel assemblages in the Mississippi, Cedar, and Canon rivers to provide necessary ecosystem services, expand imperiled species populations, and inform the public on mussels and their conservation.

Name: Mike Davis

Sponsoring Organization: MN DNR

Title: Natural Resources Program Consultant

Department: _____

Address: 2109 North Lakeshore Drive

Lake City MN 55041

Telephone Number: (651) 314-6302

Email mike.davis@state.mn.us

Web Address

Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Freshwater mussels are highly imperiled (top) due in part to their complex life cycle requiring a host for their larvae (middle) and vulnerable young life stages (bottom).

<input type="checkbox"/>	Funding Priorities	<input type="checkbox"/>	Multiple Benefits	<input type="checkbox"/>	Outcomes	<input type="checkbox"/>	Knowledge Base
<input type="checkbox"/>	Extent of Impact	<input type="checkbox"/>	Innovation	<input type="checkbox"/>	Scientific/Tech Basis	<input type="checkbox"/>	Urgency
<input type="checkbox"/>	Capacity Readiness	<input type="checkbox"/>	Leverage	<input type="checkbox"/>		TOTAL	<input type="checkbox"/> %
<input type="checkbox"/> If under \$200,000, waive presentation?							



PROJECT TITLE: Restoring Native Mussels in Streams and Lakes – Continuation

I. PROJECT STATEMENT

Minnesota’s native mussels are a diverse and critically important component of aquatic ecosystems. Mussels function as ecosystem engineers by filtering and cleaning vast volumes of water, cycling nutrients, and forming a basis for aquatic food webs by capturing and depositing organic matter in which other organisms depend. As sentinels of ecosystem health, mussel populations have declined dramatically in North America (see graphics) including Minnesota, where 80% of our species are affected. Improvements from Clean Water Act implementation and watershed and stream restoration work are creating opportunities to reverse this trend. However, the complex life cycle of native mussels (see graphic) prevents some populations from recovering naturally. Captive culture and reintroduction provides an established alternative to restore native mussel populations that have been lost. Reestablishing mussel assemblages will improve habitat and water quality, and will help to restore biotic communities to their natural state. Furthermore, increasing populations of threatened and endangered mussels will help delist species in conservation need. This proposal will continue and build upon previous mussel conservation efforts by restoring historical native mussel assemblages and their ecosystem services.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Restore historic mussel populations of threatened and endangered species in select streams to improve stream health through restoration of their unique provisioning of ecosystem services. Use established field and laboratory methods to propagate and reintroduce up to six threatened or endangered (T&E) mussel species in the Cedar River, up to three T&E species in the Cannon River, and up to six T&E species in the Upper Pool 2 of the Mississippi River in St. Paul.

ENRTF BUDGET: \$551,936

Outcome	Completion Date
1. Yearly field collection of female broodstock and host fishes for each mussel species. 2-10 mussels per species; 10-200 host fish per mussel species.	June 30, 2022
2. Propagate and rear juvenile mussels to releasable size (see graphic) for each species and river system. 10-1000 juvenile mussels to releasable size per species.	June 30, 2022
3. Reintroduce cultured juvenile mussels to selected restoration sites. Release mussels at 1-3 sites in each river system.	June 30, 2022

Activity 2: Support research into contaminants of emerging concern

Provide glochidia, propagated juvenile mussels, and adult mussels to supply research projects at University of St. Thomas, University of MN St. Anthony Falls Lab, and the MN Zoo.

ENRTF BUDGET: \$73,598

Outcome	Completion Date
1. Collect or produce the necessary number of glochidia, juvenile mussels, and adult mussels for research projects. 5-20 gravid females; 1000-5000 newly metamorphosed; 50-500 juveniles 2-10mm; 5-100 adults (>30mm).	June 30, 2022

Activity 3: Engage and inform the public about freshwater mussels

Develop and produce interpretive displays in high traffic areas to illustrate the importance of mussels to aquatic ecosystems and their benefits to people.

ENRTF BUDGET: \$110,447

Outcome	Completion Date
1. Interpretive display for the MN Zoo’s mussel shed on Main Lake	June 30, 2021



**Environment and Natural Resources Trust Fund (ENRTF)
2019 Main Proposal**

2. Added content for the Minnesota DNR and MN Zoo’s website on mussel importance and ongoing conservation activities within the state.	Ongoing
3. Create public displays at Minnesota State Parks and boat launches that serve rivers and lakes with native mussel populations.	June 30, 2021

III. PROJECT PARTNERS:

Partners receiving ENRTF funding

Name	Title	Affiliation	Role
Ben Minerich	Mussel Conservation Specialist	MN Zoo	Fish culture support, mussel rearing and contaminants
Dalma Martinovic	Associate Professor	St. Thomas University	Contaminant research

B. Partners NOT receiving ENRTF funding

Name	Title	Affiliation	Role
Dan Kelner	Fish Biologist	U.S. Army Corps of Engineers	Support monitoring of federally endangered mussels
Tamara Smith	Endangered Spp. Biologist	USFWS	Planning and permitting
Nathan Eckert	Mussel Biologist	USFWS	Mussel propagation support
Byron Karns	Ecologist	National Park Service	Permitting support in NPS areas
Jessica Kozarek	Research Associate	University of Minnesota St. Anthony Falls Lab	Contaminant research

IV. LONG-TERM- IMPLEMENTATION AND FUNDING:

Native mussel restoration in Minnesota is a long-term strategy to rebuild our aquatic ecosystem infrastructure and a natural progression of efforts that build on prior public investments that have made this feasible. Successful restoration can take a decade or more of effort. Indications of success can be demonstrated within 3-6 years of ENRTF expenditures. Demonstrating success is intended to lead to permanent non-ENRTF funding of this work. This project is a natural progression from 1999 when a LCCMR grant began mussel surveys of the state’s rivers. Surveys continued with other funds resulting in data from over 3,200 sites covering all 81 major watersheds in the state. This information is used to identify streams for mussel reintroductions. Our research identified host fish relationships needed to propagate most of Minnesota’s mussel species. This proposal builds on these investments. Expertise in accomplishing mussel restoration began in 2000 with the USFWS Jeopardy Decision for the Higgin’s eye pearly mussel. The first propagated Higgin’s eye were produced by the MNDNR in Lake Pepin in 2001. Funding from the USACE expanded that effort for 10 years resulting in the release of over 40,000 propagated Higgins’ eye in the Mississippi River. New recruits from this population were found in 2012, a first ever milestone for a reintroduced federally endangered mussel. This project expands those efforts to other species and other river systems.

V. TIME LINE REQUIREMENTS:

This is a long-term project, mussels that are released need one to five years to become sexually mature and begin reproducing. Their offspring will take two to five years to grow to an easily detectable size. It is evidence for self-perpetuating populations that ultimately defines the success of these reintroduction efforts.

VI. SEE ADDITIONAL PROPOSAL COMPONENTS:

- A. Proposal Budget Spreadsheet**
- B. Visual Component or Map**
- F. Project Manager Qualifications and Organization Description**

2019 Proposal Budget Spreadsheet

Project Title: Restoring Native Mussels in Streams and Lakes

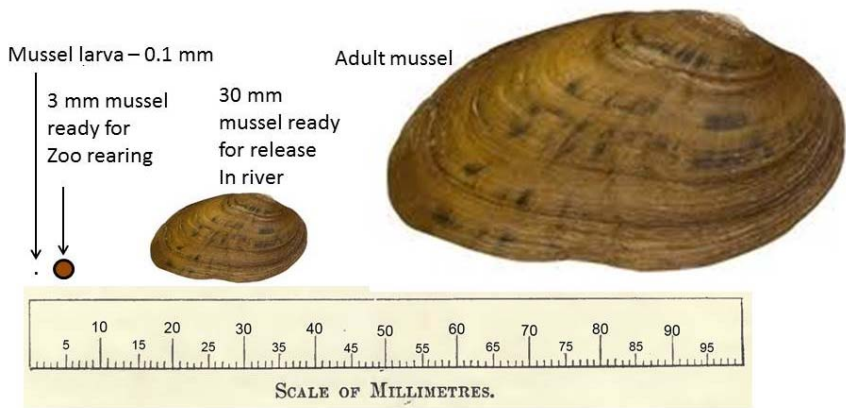
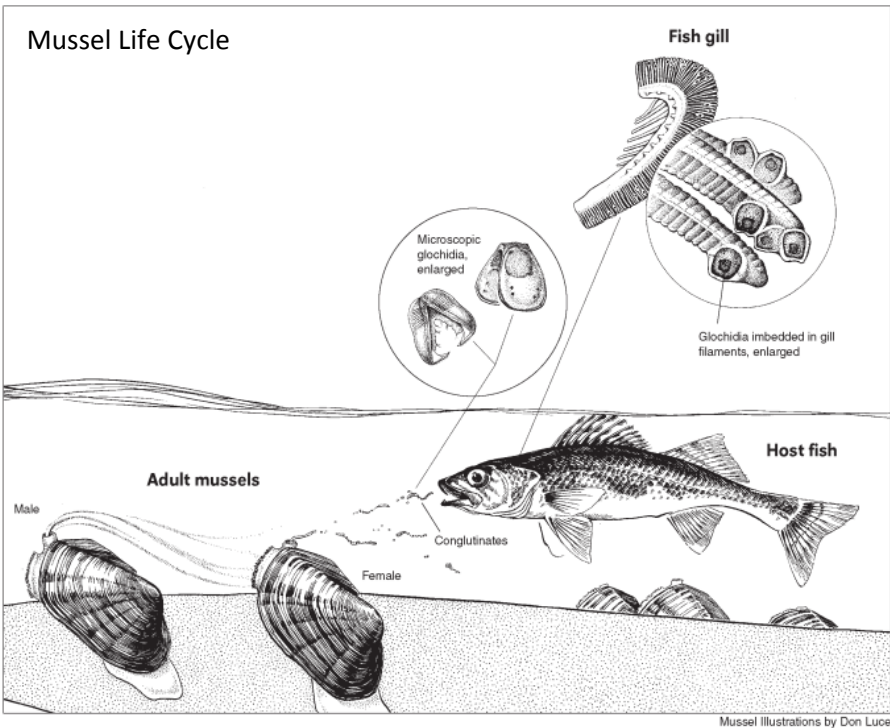
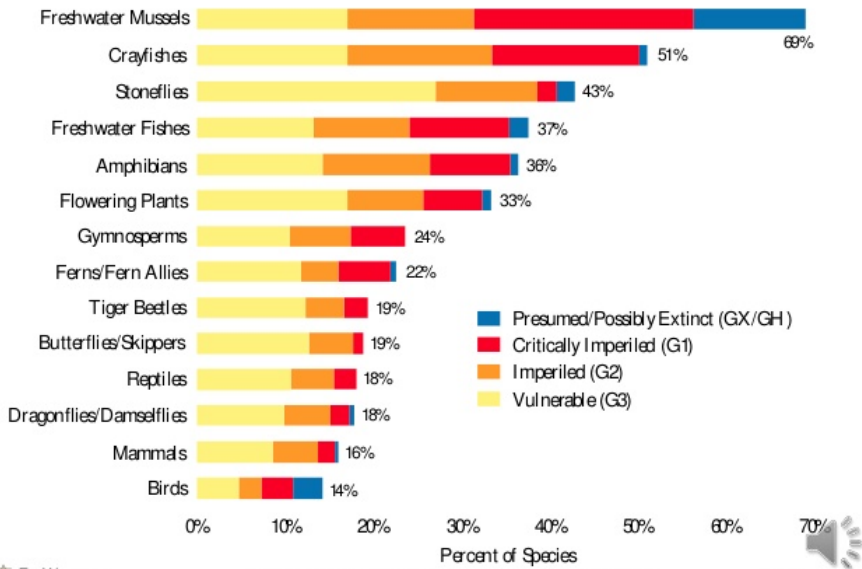
IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM (See "Guidance on Allowable Expenses")	AMOUNT
Personnel: Mussel Culture Biologist: (72% salary, 28% benefits), 1 FTE for 3 years.	\$195,704
Aquarist/survey diver: (72% salary, 28% benefits), 1 FTE for 3 years	\$158,172
Malacologist: \$116,500 (72% salary, 28% benefits), .50 FTE for 3 years	\$130,473
Lab, database and survey diver: \$79,869 (72% salary, 28% benefits), .50 FTE for 3 years	\$90,107
Project Manager/malacologist (Mike Davis): (72% salary, 28% benefits), .25 FTE for 3 years	\$79,547
Professional/Technical/Service Contracts:	\$ -
Equipment/Tools/Supplies: Purchase of host fish, food for fish, mussel food, filtration supplies, air fills.	\$ 15,000
Acquisition (Fee Title or Permanent Easements):	\$ -
Travel:	\$ 5,997
Additional Budget Items: DNR Direct and Necessary	\$ 60,981
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 735,981

V. OTHER FUNDS *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ To Be Applied To Project During Project Period: C-SWG (Competitive State Wildlife Grant). For work on the Cedar River, expanding our partnership with Iowa DNR to propagate and reintroduce mussels in both states. Proceeds pay rent on our facility and allow for purchase of needed equipment and other expenses	\$254,512	3 years July 2017-19
Other State \$ To Be Applied To Project During Project Period: LCCMR funds used as match for federal C-SWG grant	\$113,625	
In-kind Services To Be Applied To Project During Project Period:	\$ -	
Past and Current ENRTF Appropriation: July 1, 2016 - June 30, 2019	\$ 600,000	
Other Funding History: US Army Corps of Engineers, monitoring funds for Mississippi River, \$75,200 of which about 1/3 supports monitoring of mussel reintroduction in Upper Pool 2.	\$ 25,000	

Share of U.S. species at risk by plant/animal group



PROJECT MANAGER QUALIFICATIONS

Mike Davis

Farmer and commercial fisherman from 1971-1985

30-year career emphasizing mussel and stream conservation with the Minnesota Department of Natural Resources.

Began Minnesota DNR career in 1986, completed a native mussel survey of the Cannon River System in 1987 documenting the presence of a species not previously reported in the state.

Lead the startup of federally funded Long Term Resource Monitoring of the Mississippi River from 1989-1990.

Established seven long-term mussel monitoring sites in Lake Pepin and completed surveys of the Sunrise and Kettle Rivers between 1990 and 1998.

Proposed and implemented with LCCMR funds a Statewide Mussel Survey Program in 1999 that continues with other funding today.

Served 5 years as a river ecologist on the US Army Corps of Engineers' Upper Mississippi River Navigation and Ecosystem Sustainability Program's Science Panel made up of 10 river experts across the nation.

Is a Founding member of the Freshwater Mollusk Conservation Society.

Is an author or coauthor of numerous publications on native mussel ecology published between 1987 and the present.

Established the MNDNR Center for Aquatic Mollusk Programs in Lake City, MN in 2014