

**Environment and Natural Resources Trust Fund
2016 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 036-B

Restoring Native Mussels for Cleaner Streams and Lakes

Category: B. Water Resources

Total Project Budget: \$ 744,798

Proposed Project Time Period for the Funding Requested: 3 years, July 2016 to June 2019

Summary:

Native mussels are important to streams but have been lost. Clean up today allows for their return but is constrained by dams. Propagation and reintroduction will return mussels to streams.

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Sponsoring Organization: MN DNR

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Chart shows mussels are most endangered group of animals in North America, eg. 70% of species in trouble compared to 10% of birds, mussel-fish host life cycle, and scale showing size of larval mussel, juvenile ready for zoo growing, size for stocking and adult size.

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____ %



PROJECT TITLE: RESTORING NATIVE MUSSELS FOR CLEANER STREAMS AND LAKES

I. PROJECT STATEMENT

1. Minnesota’s native mussels are a critically important component of aquatic ecosystems, but have been lost or diminished in many Minnesota water bodies. 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 (see graphics). Improvements from Clean Water Act implementation and watershed restoration work are creating opportunities to reverse this trend. However, native mussels’ life cycle (see graphic) prevents populations from self-restoring. Reestablishing the water cleansing, and nutrient processing capacity that mussel populations provide will restore the biotic communities that mussels support and that fish and wildlife depend on while helping delist species in trouble.
2. Goals for this project are:
 - A. Restore historic mussel species aggregations in our streams to improve health through restoring their unique provisioning of ecosystem services;
 - B. Reestablish mussel populations that contribute to delisting state endangered and threatened species;
 - C. Engage and inform the public about the importance of aquatic ecosystems and the unique role that mussels play in benefiting people by rearing juvenile mussels in full view of MN Zoo visitors.
3. Female mussels will be collected from the nearest population, larvae harvested and host fish inoculated. Fish will be held in the DNR’s Center for Aquatic Mollusk Programs lab, transformed juvenile mussels (see graphic) collected and placed into rearing troughs where filtered river water feeds them until they have grown to 4-5 mm (see graphic). Juveniles not retained in the lab will be transferred to the MN Zoo where they will be grown using the zoo’s lake water until they are 30-50 mm in length (see graphic), then released into the river segment targeted for restoration. Monitoring released mussels will allow us to determine when mussels have been successfully restored.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Juvenile mussel production

Budget: \$208,543

Female mussels holding larvae will be collected by wading, snorkel or SCUBA. Larvae will be flushed from each female and placed into buckets containing host fish. Inoculated fish are placed into an artificial aquatic habitat system, as mussel larvae transform to juveniles they are collected for transfer to growing chambers.

Outcome	Completion Date
1. Four or more gravid females of each species collected each year to assure adequate genetic contribution.	April-Sept each year depending on species
2. 20 or more host fish inoculated with 200-1,000 larvae each.	Within 10 days of collection
3. 500 or more juvenile of each species recovered for transfer to growing chambers.	30 days post



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Activity 2: Rearing juvenile mussels

Budget: \$357,503

Transformed juveniles will be placed into trays with filtered river water flowing over them to provide food and oxygen. Surviving juveniles are moved to the MN Zoo when 4-5 mm and grown in public view in the Zoo’s lake or indoor display.

Outcome	Completion Date
1. 500 or more juvenile mussels of each species survive and grow to 4-5 mm	Varies species 100-400 days
2. 500 or more mussels of each species transferred to MN Zoo	30 days from transfer
3. 500 or more mussels of each species raised at the zoo will be released into rivers.	June 30, 2018

Activity 3: Releasing and monitoring juvenile mussels.

Budget: \$178,752

Juvenile mussels 30-40 mm or larger will be released at reintroduction sites in rivers. These mussels will be monitored annually to determine survival.

Outcome	Completion Date
1. 80 percent of released mussels of each species survive annually at each release site	Annual fall monitoring
2. 2 to 4 mussel species released at each site in each river	September 2018

III. PROJECT STRATEGY

A. Project Team/Partners:

MN DNR - Mike Davis, Bernard Sietman, Zeb Secrist and Shelby Marr partially supported by ENRTF, mussel biologist added with ENRTF.

Nathan Eckert and Doug Aloisi, Genoa National Fish Hatchery - supplying some host fish with federal funds

MN Zoo staff - rearing mussels at the zoo and providing public outreach using MN Legacy funds.

Corps of Engineers, Dan Kelner – section 206 funds years 2 and 3 and monitoring support at reintroduction sites.

B. Project Impact and Long-Term Strategy

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 of effort as outlined in this proposal. Indications of success can be demonstrated within 3-6 years of ENRTF expenditures. Demonstrating success will lead to permanent non ENRTF funding of this work.

This project is a natural progression from 1999 when an LCMR 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 with potential for reintroduction. Our research has established host fish relationships needed for propagating mussels. This proposal builds on these investments.

C. Timeline Requirements

This project will implement the final phase of our Statewide Mussel Program. We expect mussel restoration to be a continuing program for the foreseeable future as watershed restoration programs are implemented and improve river health enough to allow mussels to thrive once again throughout the state. Additional LCCMR funding for this program may be needed until the program secures a permanent, dedicated funding base.

2016 Detailed Project Budget

Project Title: RESTORING NATIVE MUSSELS FOR CLEANER STREAMS AND LAKES

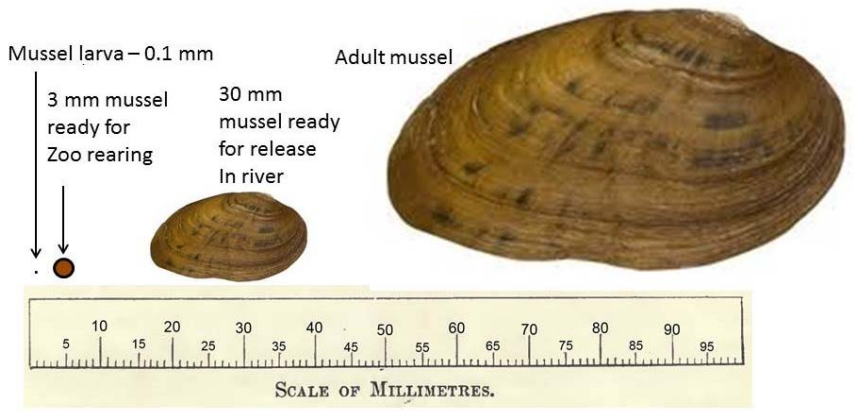
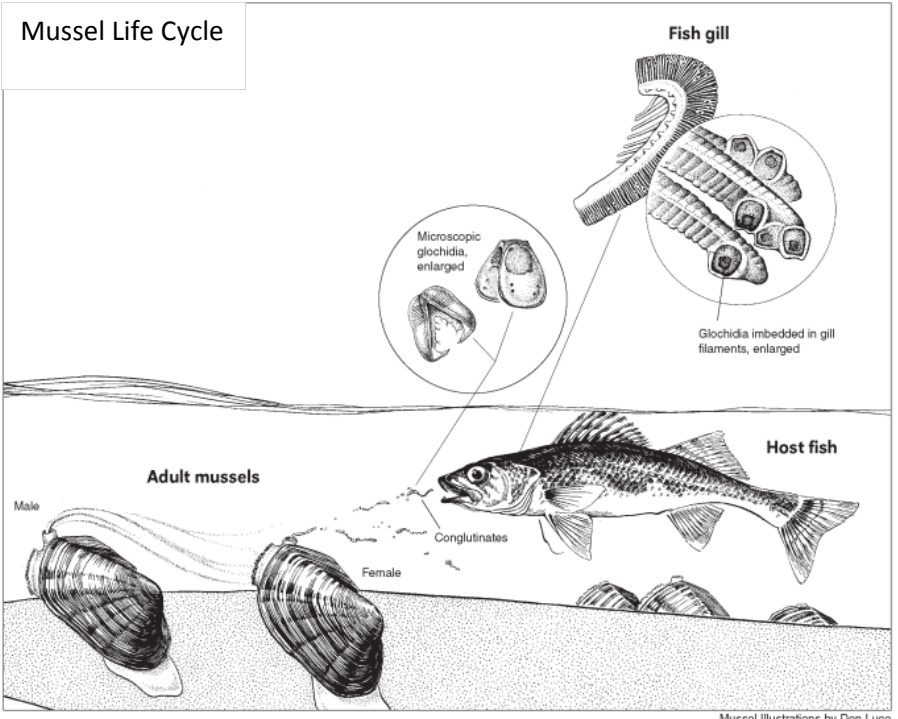
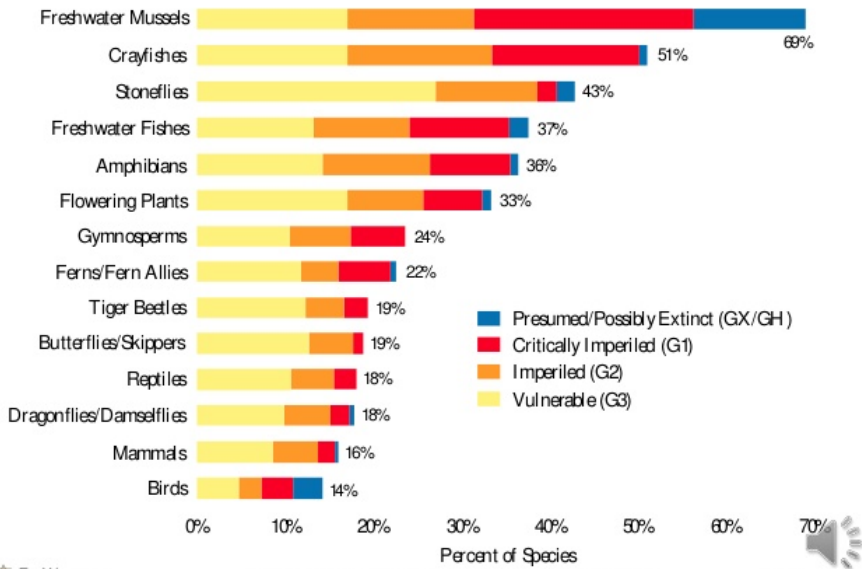
IV. TOTAL ENRTF REQUEST BUDGET years: 3

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel:	
Mike Davis, Project Manager, (72% salary, 28% benefits); .5 FTE year 1	\$ 47,288
Bernard Sietman, Malacologist, (72% salary, 28% benefits); .75 FTE year 1; .5 FTE years 2&3	\$ 133,578
Shelby Marr, Aquarist/malacologist, (72% salary, 28% benefits); 1 FTE year one and .5 FTE year 2&3	104,255
Zebulin Secrist, Data manager/malacologist, (72% salary, 28% benefits); .75 FTE year one and .5 FTE year 2&3	94,355
Seasonal Student Worker position, (82% salary, 18% benefits); .33 FTE	26,880
Seasonal Student Worker position, (82% salary, 18% benefits); .33 FTE	26,880
Mussel Culture Biologist, (72% salary, 28% benefits); 1 FTE year 1,2&3	185,614
Total Personnel	618,850
Equipment/Tools/Supplies:	
Aquaneering fish habitat system - This equipment will be used only for mussel projects for decades to come	\$ 16,000
water transport trailer and tank with pump for acquiring "wild" river water, this has a life expectancy of ten years or more, use specific to mussel propagation.	5,000
Dive equipment and supplies - this will cover air tank refills, inspections, safety gear and also replace existing gear that is expected to need replacement during this project	6,000
Lab equipment and supplies - includes lighting for scopes, chemicals and filtration supplies used for this project	5,000
Fish and fish food - The cost of obtaining fish for propagation work includes purchase from hatcheries and feeding and rearing fish for up to a year	10,000
Travel:	
Instate Travel: to donor female mussel sites and return, to MN Zoo to deliver juveniles and bi monthly to monitor growing mussels, mussel restoration sites for release and monitoring - 3 yrs.	\$ 15,000
Out of State Travel: to Iowa and Wisconsin to collect mussel donor females, these are for mussel species not available in Minnesota today: 2-3 trips/year/site, will require overnight stays - 3 yrs	10,000
Additional Budget Items: *Direct and Necessary expenses: HR Support (~\$16,660), Safety Support (~\$3,927), Financial Support (~\$9,602), Communication Support (~\$1,236), IT Support (~\$26,459), Planning Support (~\$829), and Procurement Support (~\$235) necessary to accomplishing funded programs/projects.	\$ 58,948
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 744,798

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ To Be Applied To Project During Project Period: US Army Corps of Engineers, Section 206 winged mapleleaf mussel project. Leverage federal money at the 35 state/65 federal ratio for work done by state. Amount shown reflects years 2 and 3 of this project obtaining this federal money	\$ 372,000	<i>Pending</i>
Other State \$ To Be Applied To Project During Project Period: State Wildlife Grant (SWG) - USFWS. This is supporting work in 2015 for resurveys of the Crow Wing watershed and propagation work on snuffbox and mucket mussels this year, we anticipate using LCCMR funds to match federal money at the 35%state/65% federal to secure \$90,000/yr for the three years of this proposal from SWG	\$ 270,000	<i>Pending</i>
Heritage Enhancement, State of Minnesota, in governors budget for the next biennium	\$ 187,000	<i>Pending</i>
In-kind Services To Be Applied To Project During Project Period: None	\$ -	
Funding History:		
USCOE - funds for monitoring reintroduced Higgins' eye mussel populations in the Mississippi River and Higgin's eye Essential Habitat Areas	\$ 50,000	
State Wildlife Grant - USFWS. This is supporting work in 2015 for resurveys of the Crow Wing watershed and propagation work on snuffbox and mucket mussels this year	\$ 90,000	
USGS - funds for diving services to support research into mussel habitat, growth rates, mortality, and recruitment in the Mississippi River	\$ 12,000	
MNDNR mussel cash mitigation fund - this was established to accept cash mitigation for impacts to mussels associated with dredging and bridge construction following the I-35 bridge collapse that prompted replacement of many of the state's large river bridges and the building of the Stillwater bridge. These funds have supported mussel program staff for the past three years and funded the start up of our mussel propagation facility. These funds will be depleted by July 1, 2015 - additional funds are not anticipated in the future.	\$ 250,000	
MNDOT - funds for bridge survey over Mississippi River	\$ 20,000	
Remaining \$ From Current ENRTF Appropriation:	NA	

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



PROJECT MANAGER QUALIFICATIONS

Mike Davis – MNDNR Program Consultant, Aquatic Ecologist

Farmer and commercial fisherman from 1971-1985

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

DNR Description

The Minnesota Department of Natural Resources works to integrate and sustain the interdependent values of a healthy environment, a sustainable economy, and livable communities. DNR's integrated resource management strategy shares stewardship responsibility with citizens and partners to manage for multiple interests. DNR protects the state's natural heritage by conserving the diversity of natural lands, waters, and fish and wildlife that provide the foundation for Minnesota's recreational and natural resource-based economy (M.S. 84, M.S. 97A). DNR manages natural lands such as forests, wetlands, and native prairies; maintains healthy populations of fish and wildlife; and protects rare plant and animal communities throughout the state. DNR manages the state's water resources, sustaining healthy waterways and ground water resources. DNR provides access to enrich public outdoor recreational opportunities, such as hunting, fishing, wildlife-watching, camping, skiing, hiking, biking, motorized recreation, and conservation education through a state outdoor recreation system that includes parks, trails, wildlife management areas, scientific and natural areas, water trails, and other facilities (M.S. 86A). DNR supports natural resource-based economies, managing state forest lands for multiple forest values (M.S. 89), ensuring the maximum long-term economic return from school trust lands (M.S. 127A), and providing other economic opportunities in a manner consistent with sound natural resource conservation and management principles. The mission of the Minnesota Department of Natural Resources is to work with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.