

**Environment and Natural Resources Trust Fund
2017 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 035-B

Rearing Native Mussels and Building Water Quality Awareness

Category: B. Water Resources

Total Project Budget: \$ 591,925

Proposed Project Time Period for the Funding Requested: 3 years, July 2017 - June 2020

Summary:

The Minnesota Zoo will accelerate the reintroduction of native mussels into Minnesota rivers and streams through expanded mussel rearing, research, and state-wide educational activities promoting mussel conservation and water quality.

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Sponsoring Organization: Minnesota Zoo

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

The graphic depicts the relationship between the Zoo's three proposed activities - mussel rearing, research, and education – and the work of the DNR, as well as to the ultimate goals of recovering native mussel populations, improving water quality, and creating healthy fish habitat.

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



PROJECT TITLE: REARING NATIVE MUSSELS AND BUILDING WATER QUALITY AWARENESS

I. PROJECT STATEMENT

Native mussels play a critical role in keeping our State’s streams and rivers clean and in creating healthy fish habitat. But today, freshwater mussels are the most at-risk group of species in the United States and they have been lost or their populations greatly diminished in many Minnesota water bodies.

The Minnesota Zoo has recently begun a collaborative project with Minnesota DNR to reverse this trend – nurturing juvenile mussels originally produced at DNR facilities in the Zoo’s main lake until they are large enough to be reintroduced into selected Minnesota waterways. However, current Zoo resources are insufficient to rear the thousands of mussels needed to effectively re-establish native mussel populations.

With additional financial support, the Zoo can use its unique site and aquatic expertise to expand and optimize this mussel-rearing program, accelerating re-introduction and increasing the likelihood of reintroduction success. The ultimate goal is to reestablish threatened and endangered mussel populations in Minnesota, to improve stream and ecosystem health. The Zoo will also use its education expertise to build awareness in students in schools throughout Minnesota of the relationship between native mussels and water quality and encourage action to support mussel conservation and improve water quality in state waterways.

Specific objectives of the project are:

- Expand capacity to rear 10,000 reintroduction-ready individuals from seven threatened and endangered mussel species—mucket, elktoe, monkeyface, fluted shell, Higgins’ eye, snuffbox, and winged mapleleaf.
- Advance the science of mussel husbandry and better understand key factors that promote mussel survivorship and growth.
- Train 6,000 students as ambassadors for native mussels and clean water, ultimately reaching up to 60,000 people through student digital media campaigns—online videos, websites, social media outreach, etc.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Expand capacity to rear mussels on-site at the Zoo for reintroduction Budget: \$364,210

The Zoo will increase its capacity to rear mussels from 1,000 to 10,000, focusing on four state-threatened and three federally endangered species. Using juveniles provided by DNR, these mussels will be reared using specialized systems at the Zoo for 2-3 years—until they are large enough to withstand most predation in the wild. Mussels will then be strategically released by the DNR, with Zoo staff participation, into pre-determined locations in the Cedar River, Canon River system, and Mississippi River. To achieve the desired outcomes, the Minnesota Zoo must expand and improve its rearing systems and dedicate staff to conduct this work.

Outcome	Completion Date
1. Systems and staffing are in place to expand rearing capacity to 10,000 juvenile mussels.	10/15/2018
2. Up to 1,000 mussels per species are reared annually to sizes needed for reintroduction and provided for release.	6/30/2020

Activity 2: Conduct research to optimize rearing protocols Budget: \$135,665

Using a subset of mussels (excluding federally endangered species), the Zoo will conduct research to optimize rearing protocols to improve growth and survivorship. Staff will systematically vary diet type (lake water, commercial shellfish diet, or a combination of the two), food concentration, and water temperature to understand how these factors influence growth and survivorship of juvenile mussels. Since species’ responses may vary, research will be conducted with up to four mussel species, as sample sizes and space allow.



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Mussels studied will be individually marked and tracked, so that their growth and survivorship can be monitored and compared across treatments, even after reintroduction. A new research and rearing pod will provide the controlled facilities for conducting this work, and will contribute to expanding the Zoo’s rearing capacity.

Outcome	Completion Date
1. A new mussel pod is installed on Zoo site, increasing capacity to rear mussels in a controlled research environment.	10/15/2018
2. Mussel performance under different experimental treatments is compared using statistical analysis; rearing protocols are updated to reflect practices that optimize growth and survivorship.	6/30/2020

Activity 3: “Show Us Your Mussels” Digital Media Challenge for High School Students Budget: \$92,050

The Zoo will use its educational outreach expertise to recruit schools throughout Minnesota to participate in a project aimed at increasing Minnesotan’s knowledge of the importance of native mussels to water quality and encouraging actions to improve water quality in state waterways. With guidance and support from the Zoo, students will develop and deliver digital media campaigns—such as online videos, websites, social media outreach, etc.—promoting mussel conservation, water quality awareness, and personal or community action. Schools will be challenged to reach a large audience, and the five schools’ campaigns with the largest impact (# of people reached) will be recognized with a free field trip to the Zoo. One grand prize winner will participate in hands-on mussel conservation work at the Zoo. The Zoo will compile resources and materials needed by students and will showcase winning projects on its website. The Zoo will further promote mussel conservation through Zoo media-based educational outreach.

Outcome	Completion Date
1. 60 schools/6000 students recruited to create digital media projects.	12/31/2019
2. 60,000 community members reached by student digital media projects.	3/31/2020
3. 1500 students visit the Zoo to view and participate in on-site mussel conservation work.	6/10/2020

III. PROJECT STRATEGY

A. Project Team/Partners: Zoo aquariums, life support, and conservation staff will plan and implement Activities 1 and 2. Zoo education staff will plan and implement Activity 3. DNR will be the primary partner on Activities 1 and 2, with USFWS-Genoa National Fish Hatchery and Twin Cities Field Office also serving as partners. US Army Corps of Engineers and National Park Service are also involved with the mussel restoration work. Teachers at selected schools will assist student projects proposed in Activity 3. Minnesota Zoo would be the sole recipient of funds under this proposal. DNR has been recommended for ENRTF funds for their related mussel work.

B. Project Impact and Long-Term Strategy: This proposal is part of a larger multi-partner effort to reintroduce threatened and endangered mussel populations across the upper Midwest and restore historic mussel populations. Given the massive filtration rates performed by healthy mussel communities and mussels’ abilities to remove harmful bacteria and contaminants from the water, it is reasonable to expect that restoring Minnesota’s native mussel populations will play an important part in achieving the state’s clean water goals. The combined efforts of the Zoo and DNR will also advance the recovery of state and federally listed mussel species in Minnesota. Public awareness about mussel conservation and actions to improve water quality will also be increased by our activities. We expect that the mussel rearing activities will need to continue beyond the period of this grant proposal, and that the Zoo may submit a future proposal to fund this work in the future.

C. Timeline Requirements: Project outcomes will be achieved within three years, as outlined above, but the Zoo’s mussel rearing activities are expected to continue. Publication of research results will extend beyond the grant period.

2017 Detailed Project Budget

Project Title: REARING NATIVE MUSSELS AND BUILDING WATER QUALITY AWARENESS

IV. TOTAL ENRTF REQUEST BUDGET, 3 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel:	
Project Manager (1 person, 72% salary/28% benefits), 0.1 FTE for 3 years	\$ 33,485
Aquarist (1 person, 64% salary/36% benefits), 0.5 FTE for 3 years	\$ 111,590
Life Support Systems Coordinator (1 person, 81% salary/19% benefits), 0.5 FTE for 3 years	\$ 129,535
Research Scientist Supervisor (1 person, 72% salary/28% benefits), 0.1 FTE for 3 years	\$ 32,665
Construction Project Manager for rearing pod (1 person, 72% salary/28% benefits), 0.1 FTE for 4 months	\$ 5,000
Education Project Coordinator (1 person, 72% salary/28% benefits), 0.05 FTE for 3 years	\$ 12,000
Graphic Designer for education campaigns (1 person, 72% salary/28% benefits), 0.1 FTE for 2 months	\$ 1,100
Web Developer for exhibition of digital media campaigns (1 person, 72% salary/28% benefits), 0.1 FTE for 2.5 months	\$ 2,750
Education Project Evaluator (1 person, 72% salary/28% benefits), 0.1 FTE for 3 months	\$ 2,700
Professional/Technical/Service Contracts:	
Teacher contracts for school materials development (5 teachers x \$1000 ea x 3 years)	\$ 15,000
Equipment/Tools/Supplies:	
Mussel research and rearing pod - including design, purchase, placement, and customization of a commercially available unit, and hookup to water/sewer and electrical	\$ 130,000
Mussel rearing systems supplies & equipment (pumps, filters, pipes, etc)	\$ 40,000
Research supplies/equipment - including transponder tags for individually marking research mussels, transponder reader, microscope, digital calipers, and scale	\$ 13,000
Lab supplies for in-house water quality testing, for lake water used to rear mussels	\$ 3,600
Travel:	
3 trips/year x 3 years, MNZoo (Apple Valley) to DNR mussel facility (Lake City) + ~ 3 trips to reintroduction sites in the state	\$ 1,000
Additional Budget Items:	
Promotional post card printing and mailing (\$5000/year x 3 years)	\$ 15,000
Transportation for 500 students to MN Zoo (\$1500/school x 5 schools x 3 years)	\$ 22,500
Student visits to MN Zoo (500 students x \$10/student x 3 years)	\$ 15,000
Zoo-based educational outreach, highlighting mussel conservation (\$2,000/year, 3 years)	\$ 6,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST	\$ 591,925

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:		
Association of Zoos & Aquariums Conservation Grant Fund	\$ 25,370	Pending
Other State \$ To Be Applied To Project During Project Period:		
The Zoo's general operating fund will provide additional support to the project, including utilities and administrative costs	\$ -	
Our work builds on the DNR's 2016 ENRTF-supported project	\$ -	
In-kind Services To Be Applied To Project During Project Period: N/A	\$ -	
Funding History:		
Minnesota Zoo Foundation, FY16 and 17 activities	\$ 25,000	Current and pending
Legacy Fund appropriation to Minnesota Zoo, FY16 activities	\$ 10,000	
Remaining \$ From Current ENRTF Appropriation: N/A	\$ -	

REARING NATIVE MUSSELS AND BUILDING WATER QUALITY AWARENESS



The Minnesota DNR collects wild female mussels, harvests larvae and rear them to the juvenile stage.

At the Minnesota Zoo, juveniles are reared for eventual reintroduction. Minnesota DNR reintroduces and monitors mussels in state waterways.



Zoo staff researches techniques to improve survivorship and growth.



The Zoo partners with state high schools to raise awareness for water quality and mussels.



GOAL
RECOVERED MUSSELS
CLEANER WATER
HEALTHY FISH HABITAT



PROJECT MANAGER QUALIFICATIONS

Allan Maguire, Minnesota Zoo’s Supervisor of Aquariums and Life Support, will serve as project manager for the proposed work. He has extensive experience caring for aquatic organisms, having been employed as part of the Zoo’s aquatics program for the past 34 years. Maguire supervises Aquariums staff members who provide for the daily care of thousands of fish, corals, mussels, and other aquatic life. He also supervises Life Support professionals who are responsible for maintaining exhibit water quality, as well as the mechanical systems that move and filter water at the Zoo. Maguire has been a member of the construction planning committees for all aquatic exhibits at the Minnesota Zoo, and has worked with architects, engineers, and contractors during construction of Zoo aquatic systems.

For the proposed project, Maguire will provide oversight of project planning and implementation, supervision of staff involved in mussel rearing/research and design/installation of aquatic systems, budget management, and reporting.

ORGANIZATION DESCRIPTION: Minnesota Zoological Garden

The Minnesota Zoo is a unique state agency. Established 1978 to provide Minnesota residents and guests with a unique opportunity to experience animals from the exotic to the familiar in natural habitats, today the Zoo is one of the State’s premier cultural, educational, and conservation institutions.

The Zoo’s mission is ***to connect people, animals and the natural world to save wildlife***. With over 1.2 million guests a year and state-wide outreach programs reaching thousands more, the Zoo is in a unique position to strengthen Minnesotans’ awareness and understanding of our State’s cultural commitment to wildlife, science and conservation. The Zoo is, in fact, the State’s largest environmental educator with more than 500,000 participants in Zoo education programs.

The Minnesota Zoo has also become a worldwide leader in conservation – leading and participating in a variety of conservation programs at the Zoo, in Minnesota, and across the globe. The Zoo has recently enhanced its efforts to focus on Minnesota wildlife and habitats, including efforts to conserve Minnesota’s native moose, bison, mussel and prairie butterfly populations. It is also addressing habitat issues on its own 485-acre site, looking to restore undeveloped areas to native conditions and exploring ways to provide educational opportunities to interpret those efforts.

The Zoo has a proven record of using its resources efficiently and effectively, ***matching*** the State’s investment with private funds and earned income.