



# Environment and Natural Resources Trust Fund

## 2021 Request for Proposal

### General Information

**Proposal ID:** 2021-158

**Proposal Title:** Evaluating Stream Habitat Projects in Southeast Minnesota

### Project Manager Information

**Name:** Doug Dieterman

**Organization:** MN DNR - Fish and Wildlife Division

**Office Telephone:** (651) 299-4029

**Email:** douglas.dieterman@state.mn.us

### Project Basic Information

**Project Summary:** Assess how climate stressors, such as flooding, interact with stream habitat project designs and local stream geomorphology to influence achievement of project objectives and need for maintenance.

**Funds Requested:** \$197,000

**Proposed Project Completion:** 2024-06-30

**LCCMR Funding Category:** Small Projects (H)

**Secondary Category:** Water Resources (B)

### Project Location

**What is the best scale for describing where your work will take place?**

Region(s): SE

**What is the best scale to describe the area impacted by your work?**

Statewide

**When will the work impact occur?**

During the Project

## Narrative

### **Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.**

Since 2008, over \$19 million dollars have been appropriated, mostly through Trout Stamp and Outdoor Heritage Funds, to improve coldwater stream habitat to benefit trout populations and the recreational anglers they support. Increased funding has led to many stream projects being implemented using a variety of stream habitat designs. Unfortunately, some projects have been damaged by climate-induced stressors, such as more frequent and intense rainfall events and associated flooding. These damaged projects have led to additional public expenditures to maintain them and constituent concerns. Concerns have included (1) how long each design type should be expected to last before needing maintenance (longevity); (2) how effective different designs are at achieving project objectives, such as providing habitat for trout and other aquatic organisms (effectiveness); and (3) overall quality of the angling experience provided.

### **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 develop a risk analysis model to quantify how climate-induced stressors, such as flooding, interact with selected project factors (e.g., design type, local stream geomorphology) to influence the effectiveness (i.e., achievement of project objectives) and need for maintenance (project longevity). Over 40-50 projects using a variety of engineering designs, and that span over 20 years, have been implemented across southeast Minnesota. This robust dataset represents a rare opportunity to evaluate stream habitat projects. We will compile existing data and measure new data on fish habitat quality, stream geomorphology and fish populations at habitat project sites and non-project control (reference) sites to evaluate habitat project effectiveness. We will use a more robust Before-After, Control-Impact (BACI) design and analysis for all sites where pre-project data are available.

Where possible, we will also align this project with work being proposed to LCCMR by Dr. Valerie Brady (Natural Resources Research Institute, UMN-Duluth) to evaluate stream restoration and habitat work in northeast Minnesota. We will share data for selected aspects of each project that are amenable to duplication resulting in an even broader analysis of construction designs and making results applicable to a broader range of stream conditions.

### **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?**

1. Identify external constraints (e.g., local geomorphic controls, stream size, riparian zone conditions) that most influence stream habitat project longevity and effectiveness
2. Use information on external constraints to help stream managers prioritize sites for stream habitat work (i.e., assess risk of future projects)
3. Identify which habitat designs are most resistant to climate stressors

## Activities and Milestones

### Activity 1: Quantify stream project longevity and identify geomorphic and land use factors influencing longevity

**Activity Budget:** \$70,132

#### Activity Description:

Identify stream habitat project sites in southeast Minnesota and compile existing data on each. We anticipate collecting data on about 40-50 sites. Existing data will include (1) the year the project was completed; (2) type of habitat design used; (3) external (i.e., non-project manipulated) environmental variables, such as upstream watershed area and land use, mean stream width, riparian zone conditions; (4) availability of post-project data that was manipulated such as sinuosity, stream slope, channel entrenchment and floodplain width; and (4) the year post-project, any maintenance needs were identified or performed. Where post-project data are unavailable, we will measure these geomorphic conditions using established field procedures in 2021 and 2022. Risk analysis models will be developed independently for each habitat design type to quantify when the probability that maintenance will be needed is highest and any factors influencing the need for maintenance.

#### Activity Milestones:

Description	Completion Date
Identify stream habitat project sites and compile existing data	2022-05-31
Measure post-project geomorphic conditions	2022-10-31
Develop models for risk analysis	2023-05-31

### Activity 2: Compare effectiveness of stream habitat designs

**Activity Budget:** \$126,868

#### Activity Description:

Just knowing how long a stream habitat project should be expected to last does not confirm that the project effectively accomplished its objectives. To assess effectiveness, we will measure fish habitat, geomorphic and fish population variables at paired project and non-project control sites (approx.. 80-100 total sites) in 2021, 2022 and 2023. We will measure variables reflecting habitat quality for adult trout (e.g., fish cover such as overhead bank cover, instream rock and pool depth), spawning gravel suitability, bank stability, flood resistance (e.g., floodplain width, low bank height), and abundance of juvenile and adult trout. Paired site data will be analyzed and results shared with stream managers and conservation organizations such as Trout Unlimited. Where pre-project data for a project site and a paired reference site exist, we will use a more rigorous Before-After, Control-Impact (BACI) analysis.

#### Activity Milestones:

Description	Completion Date
Measure fish habitat, geomorphology and fish population data	2023-09-30
Compare fish habitat, geomorphology and fish population data at paired sites	2024-05-31
Disseminate information to managers and conservation organizations (Trout Unlimited)	2024-06-30

## Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Valerie Brady	U of MN - Duluth - NRRRI	Dr. Brady has proposed a companion project in northeast MN. Her team will collaborate on design and sampling methods to allow a broader evaluation of stream habitat projects applicable to most coldwater streams in Minnesota.	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?**

Results will be disseminated to stream habitat managers in state agencies such as DNR and private conservation partners such as Trout Unlimited via Trout Unlimited's Driftless Area Restoration Effort (TUDARE) and the Driftless Area National Fish Habitat Partnership. Results will help stream habitat managers identify project sites and designs that have the highest probability of successfully achieving desired outcomes while simultaneously having the lowest probability of needing maintenance. Such information will be critical to inform stream habitat projects that use public funds, such as those from the Outdoor Heritage Fund or Trout Stamp dollars.

## Project Manager and Organization Qualifications

**Project Manager Name:** Doug Dieterman

**Job Title:** Research Scientist 2

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

Doug Dieterman is a Research Scientist 2 at the Lake City Fisheries Research Office. He has been working in the Fisheries Research Unit for 19 years. He has statewide responsibilities and has worked on river and stream research projects from the Ottertail River in west-central Minnesota to the Kettle River in east-central Minnesota to the Driftless Area streams and Mississippi River of southeast Minnesota. His research has focused on fish-habitat interactions in coldwater trout streams, medium-sized warm water rivers, and large floodplain rivers. Doug received his PhD from the University of Missouri-Columbia in 2000, studying imperiled Missouri River fishes on a multi-state, multi-agency (five federal, seven state, and six universities) project. He received his MS degree from South Dakota State University in 1995 studying prairie river fish community responses to implementation of the Clean Water Act.

**Organization:** MN DNR - Fish and Wildlife Division

**Organization Description:**

The Minnesota Department of Natural Resources works with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and provide for commercial uses of natural resources in a way that creates a sustainable quality of life. This mission requires sharing stewardship with citizens and partners working together to address often competing interests.

## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
NR Spec. Int. Fish Research		Conducts fish, habitat and geomorphology studies (1 FTE for 2 yrs)			28%	2		\$132,675
Fisheries Intern		Assist with field and lab work (3 interns @ 0.25 FTE ea.)			0%	0.75		\$23,400
							<b>Sub Total</b>	<b>\$156,075</b>
<b>Contracts and Services</b>								
							<b>Sub Total</b>	<b>-</b>
<b>Equipment, Tools, and Supplies</b>								
	Tools and Supplies	General field supplies	Waders, rubber gloves (for electrofishing), waterproof paper (recording data) and similar supplies					\$950
	Equipment	Temperature loggers (approx. 80-90)	Measure fish habitat (water temperature)					\$10,400
	Tools and Supplies	Tape measures, rebar (survey benchmarks) and other gear needed to measure fish habitat and geomorphology	Measure fish habitat and geomorphology					\$1,101
							<b>Sub Total</b>	<b>\$12,451</b>
<b>Capital Expenditures</b>								
							<b>Sub Total</b>	<b>-</b>
<b>Acquisitions and Stewardship</b>								
							<b>Sub Total</b>	<b>-</b>
<b>Travel In Minnesota</b>								

	Miles/ Meals/ Lodging	Mileage and truck fees to travel to 80-100 sites over three field seasons.	Travel to stream sites approx.140 mi./site x 100 sites = 14,000 miles x 0.66/mile = \$9,240					\$9,240
							<b>Sub Total</b>	<b>\$9,240</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	-
<b>Printing and Publication</b>								
							<b>Sub Total</b>	-
<b>Other Expenses</b>								
		*Direct and Necessary Expenses: HR Support (~\$4,568), Safety Support (~\$848), Financial Support (~\$2,137), Communication Support (~\$1,324), IT Support (~\$9,208), and Planning Support (~\$1,149) necessary to accomplish funded programs/projects.	*Direct and Necessary Expenses includes all Department Support Services.					\$19,234
							<b>Sub Total</b>	<b>\$19,234</b>
							<b>Grand Total</b>	<b>\$197,000</b>

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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## Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
<b>State</b>				
In-Kind	Minnesota DNR Fisheries Section contributed effort	Doug Dieterman (Research Scientist 2; 72% salary, 28% benefits; \$145,000) serving as Principle Investigator leading overall management, coordination and implementation of project. Other Fisheries employees assisting with field work and project oversight (\$10,000). Existing DNR equipment: trucks, sampling equipment (electrofishing equipment, total station, nets, radios), lab supplies (\$8,000) and DNR facilities and services (office space, technical support, \$2,000)	Secured	\$165,000
			<b>State Sub Total</b>	<b>\$165,000</b>
<b>Non-State</b>				
			<b>Non State Sub Total</b>	-
			<b>Funds Total</b>	<b>\$165,000</b>



## Attachments

### Required Attachments

#### *Visual Component*

File: [cc3dfc99-eee.docx](#)

#### *Alternate Text for Visual Component*

Three photos showing excessive flooding and two stream channels representing two habitat designs after the flood has passed. Design 1 shows an eroded streambank whereas design 2 shows an intact stream channel and floodplain. A graph shows an example of risk analysis models quantifying the probability each design will require maintenance at several points in time after project completion. A heading asks the question, how can we mitigate land use and climate change impacts on stream habitat projects?

## 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

How can we mitigate land use and climate change impacts on stream habitat projects?

