



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-271

Proposal Title: Improving Toe-Wood Design and Installation in Stream-Restoration Projects

Project Manager Information

Name: Michele Guala

Organization: U of MN - St. Anthony Falls Laboratory

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Project Basic Information

Project Summary: Design and carry out a study to look at the use of toe-wood to stabilize cut banks and improve stream habitat in meandering, single thread Minnesota rivers.

ENRTF Funds Requested: \$436,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Water (B)

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

Narrative

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

The DNR's preferred method for streambank stabilization is referred to as toe-wood, which involves the installation of logs, root wads, brush, and sod matting on the outside bends of streams. In addition to short-term stabilization of stream banks that are actively eroding or in jeopardy of failing, it also promotes natural, long-term stability in the stream (applicable in stream restoration projects). Properly installed toe-wood will improve water quality and in-stream habitat. Toe-wood has been the subject of little hydraulic modelling and research. The advantages of toe-wood over traditional streambank stabilization methods – such as riprap armoring – are primarily based on practitioner experience. This project aims to provide valuable insight to local water resource managers on toe-wood structure impacts on channel hydraulics and geomorphology. It will provide water managers with reference material that they can then pass along to project proposers that wish to implement streambank stabilization measures. Guidance will be developed for streamlining installation techniques, which will be a valuable resource for stream restoration practitioners. The proposed research will serve to make stream restoration and stabilization projects more likely to succeed long-term and will result in improved efficiency for permit acquisition and implementation (see support letters from various MN watershed districts).

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.

This project will conduct detailed research on the hydraulic performance of toe-wood. We will study how toe-wood impacts the bank, how it protects the streambanks, and how to optimize installation to minimize cost and increase performance. We will quantitatively evaluate toe-wood installations using laboratory controlled stream experiments, field measurements, and numerical simulations in collaboration with the MN-DNR (see support letters). The project will deliver:

- Optimal distribution of toe-wood structures to avoid erosion and failure as well as excessive sediment deposition, along the bend; cost/benefit threshold of density of toe-wood
- Optimal start/stop position of toe-wood installation along the outer stream banks
- Limitations of toe-wood as a recommended method (high sinuosity or incised stream)
- Quantification of habitat enhancements (pool depth, near bank velocity, point bar extension) with toe-wood, as compared to other methods.
- Safety factors to introduce in the structural and hydraulic design of toe-wood installation.

We will also identify 1) how to mitigate the effects of non-ideal upstream inflow conditions, 2) how to apply toe-wood structures in hydraulic modelling scenarios commonly used for project planning, 3) the orientation, spacing, and the vertical distribution of root wads (staggered, aligned, possible implications due to ice loads).

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?

Toe-wood is a natural and effective way of restoring Minnesota stream banks. This project will develop science-based design methodologies that will directly improve future toe-wood installations in the state. The design methods will improve hydraulic performance, longevity of installations, and reduce costs of installations. Design methods will be developed in collaboration with DNR River Ecology Unit and will be adopted by the DNR, practitioners, and the other stakeholders in guiding future design and expanding use of toe-wood on Minnesota streams. Ultimately, the project will lead to better use of public resources and restoration of our streams and rivers.

Activities and Milestones

Activity 1: Review of toe-wood design strategies and repeated monitoring of recent installations in Minnesota. What worked and what did not?

Activity Budget: \$175,000

Activity Description:

We will perform a literature review across journals, reports, recent plans and projects. We will identify the basis for current design approaches, and a subset of “typical” projects. For each source, we will evaluate the challenges and strengths of currently adopted installation guidelines and determine the common failure mechanisms of cut banks and restorations where toe-wood has been utilized. We will also select one or more field sites, in agreement with the DNR river ecology unit to monitor for the entire duration of the project. The Zumbro River near the Highway 52 bridges is a possible candidate: within the same stream restoration project, along specific streambanks the toe-wood collapsed and the floodplain was significantly eroded, while in nearby reaches the installation was successful and vegetation has grown to provide additional stability (see visual). We will closely work with DNR, along with other local units of government throughout the state (South St. Louis, Buffalo-Red River) to identify other sites (see letters of support). We will explore case studies examining, among other variables, the near-bank velocity and stress, which will help focus laboratory experiments to define a metric to quantify the urgency of bank protection installation. Field measurements will continue until end-of-project.

Activity Milestones:

Description	Approximate Completion Date
Complete data collection of toe-wood protection and floodplain conservation systems in single thread meandering streams.	December 31, 2027
Complete data collection on installation and repair costs of toe-wood installations since 2010.	December 31, 2027
Identify toe-wood installation(s) to monitor and perform repeated field measurements in collaboration with MnDNR.	April 30, 2030

Activity 2: Perform small and intermediate-scale flume experiments to optimize the design and performance of toe-wood installations under various flood conditions.

Activity Budget: \$128,000

Activity Description:

We will conduct a series of small-scale laboratory experiments in SAFL’s indoor and outdoor flumes to identify the minimum set of stream parameters needed to recommend toe-wood installation, and optimize toe wood design for a range of hydraulic and geomorphic conditions. Key questions are:

How far upstream and downstream along the outer bank of a meander should toe-wood protection extend?

How persistent are the scour holes created by toe-wood under varying sediment supply and discharge?

Will scour holes fill with sand, remain stable, or continue to erode?

What spacing of cross stream trunks and root wads yields the most effective outer bank array?

What transverse bed slope can a toe-wood installation maintain under equilibrium conditions for a given stream sinuosity, width, or depth?

How much of the cross-sectional area should the toe-wood occupy?

Toe-wood elements (trunks and root balls) will be scaled using 3D printed models. We will quantify the drag on individual root balls and on streamwise arrays to identify configurations that maximize energy dissipation and reduce near-bank velocities. Across a range of discharges, sinuosities, and flow depths, we will document how different toe-wood layouts influence local hydraulics, sediment transport, and the spatial and temporal evolution of scour holes.

Activity Milestones:

Description	Approximate Completion Date
Laboratory experiments using different toe-wood models mounted in straight flumes.	May 31, 2029
Experiments in the meandering Outdoor Stream Lab using optimized toe-wood installation along the outer bank.	October 31, 2029

Activity 3: Compare laboratory measurements and field observations to identify mechanisms of toe-wood failure.**Activity Budget:** \$75,000**Activity Description:**

With the optimal toe-wood configuration identified from scaled laboratory experiments in Activity 2, we will design and conduct new experiments in the meandering Outdoor Stream Lab (OSL, see visual) to reproduce near-bank flow conditions and potential failures. These experiments will be compared with field measurements of stream velocities collected along predefined cross-sections at the site(s) of interest in Activity 1. Flow measurements and bathymetric surveys in both settings will document detailed hydraulic characteristics throughout the stream bend and around toe-wood installations, enabling us to translate laboratory findings to natural stream conditions.

Key questions to address:

How can forces and moments acting on toe-wood structures be estimated under realistic hydraulic conditions?

What mechanisms of failure are most prevalent, and under what flow regimes do they occur?

How can these insights improve design approaches and installation strategies?

Our focus will be on quantifying structural loading on toe-wood models, evaluating how increasing discharge and near-bank velocities influence stability, and identifying critical failure mechanisms inferred during field site visits. Combined results from Activities 1 and 3 will also help characterize slower, long-term processes, including:

- 1) stabilizing effects of vegetation growth on toe-wood
- 2) negative effects of scour holes filling by sediment

Activity Milestones:

Description	Approximate Completion Date
Perform repeated flow measurements in the Outdoor Stream Lab testing failure mechanism under increasing discharges.	October 31, 2029
Map the deepest sediment pockets under sequences of floods at various discharges and sediment loads.	October 31, 2029
Compare stream velocities obtained in the OSL and in natural streams near the outer banks.	January 31, 2030

Activity 4: Integrate laboratory and field-scale results to validate available numerical predictions, identify their limitations or suggest new models, disseminate key outcomes.**Activity Budget:** \$58,000**Activity Description:**

We will develop a protocol for comparative analysis between the available computational model, HEC-RAS 2D, which is the standard modeling software that DNR and practitioners are using, and our laboratory and field monitoring results. The goal is to understand the limitations of the model and the uncertainty of the simulation output before starting stream restoration projects in a natural river. We will provide a brief comparison of the major differences found in near-bank velocities, sediment deposition and scour patterns for toe-wood installations versus alternative solutions, such as stream barbs, j-hooks and riprap rocks.

Our team will establish a technical advisory panel at the beginning to help guide the project and will include experienced engineers from the Minnesota DNR, and experienced practitioners. We will conduct a literature review and synthesis of the existing written material on the topic. We will compile results from two scales of physical experiments (laboratory flumes and field installation in a natural river) and 2D numerical simulations, which will allow us to assess how reliable are the models accessible to the engineering communities. It is imperative we disseminate our results to the broadest audience including K-12 students, UMN undergraduate and graduate students, practitioners (see Dissemination section).

Activity Milestones:

Description	Approximate Completion Date
Quantitative comparison between experimental and numerical results.	May 31, 2030
Uncertainty quantification in experimental measurements or inflow conditions, and identification of modeling limitations.	May 31, 2030
Summary of findings, dissemination, and reporting.	June 30, 2030

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Jeffrey Marr	St. Anthony Falls Laboratory	Jeff Marr is the Associate Director of SAFL for applied research, a licensed profession engineer in Minnesota with expertise in fluvial hydraulics, morphodynamics, and sediment transport. Jeff Marr will plan the field measuring campaign, will contribute to the design of scaled laboratory experiments and will co-lead the Outdoor Stream-Lab experimentation	Yes
Jessica Kozarek	Michigan Tech University	Researcher collaborating on project with 16 years of experience in stream restoration research and design guidance in MN. Will provide input on experimental design, field work protocols, and measuring strategies in the Outdoor Stream Lab during summer months.	Yes
Paul LeClaire	Minnesota DNR River Ecology Unit	Professional engineer with more than 10 years of experience in water resources engineering applications. Will lead coordination with the Department of Natural Resources (DNR) on data analysis review and guidance document development. Will also support field monitoring procedures and field coordination efforts.	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.

The following activities will be carried on to ensure the dissemination of our results to the broader audience:

1) Direct dissemination to MN practitioners, through:

1a) 1-day Workshop (Mn DNR) and/or slides and case study examples for incorporation into MN DNR training modules,
 1b) Summary of design guidance that will be shared with project partner Paul LeClaire (DNR) and released to other DNR units (see support letter from the division director of the MN DNR, Ecological and Water Resources).

1c) Continuous interaction with Minnesota agencies on field sites (streams) selection, status of monitored toe-wood installations through repeated measurements or 1-day visits, potential interventions, opportunities for new installations based on improved design guidelines. We included support letters from Stearns, South St. Louis, Wabasha, Red Lake, Buffalo-Red river soil and water conservation districts and watershed districts, as well as engineers in the West Central Technical Service Area (WCTSA). We thus have contacts and support across the state that will be essential to translate our research findings into engineering and stream restoration practice, both during and after the project.

2) Presentation at MN Water Resources Conference.

3) Public engagement through signage in Water Power Park.

4) Presentation(s) at the Upper Midwest Stream Restoration Symposium.

5) Publication of scientific results in peer-reviewed, open-access articles (UMN covers the publication costs for most journals, a small contribution is budgeted to explore other avenues).

6) Publication of experimental data to UMN DRUM - data repository (publicly available)

7) Participation to the Science Day at the Minneapolis Mills Museum from K-12 students and families.

8) Inclusion of research material in UMN undergraduate and graduate classes (fluid mechanics, open channel hydraulics and sediment transport)

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?

Integrating laboratory and field results on toe-wood installations will contribute to our understanding of what constitutes a habitat improvement in regard to flow depth, velocity, and substrate. While pool depth and stream-bank

preservation may be the most important outcome of toe-wood installation for fish habitat and erosion control, respectively, the diversity of species in Minnesota stream ecosystem would require that long-term monitoring of selected installations may be beneficial for expanding stream restoration practices. This project will guide DNR permitting, design, and monitoring efforts in the next decade, and will improve fish habitats, stream-banks protection, and floodplain connectivity in Minnesota rivers.

Project Manager and Organization Qualifications

Project Manager Name: Michele Guala

Job Title: Full Professor

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

Michele Guala is a professor in the Department of Civil, Environmental, and Geo Engineering at UMN (Twin Cities), and a faculty member at the St. Anthony Falls Laboratory, since 2011. His research primarily focuses on experimental fluid dynamics, river morphodynamics, and particle-turbulence interactions in geophysical flows. He has used extensively (and published on) all the SAFL facilities and flumes required for this experimental investigation, including the Outdoor Stream Lab (OSL) and the SAFL Main Channel. Dr. Guala will supervise one PhD student dedicated to the project and will join him/her for all the field measurements, along with budgeted SAFL support staff, and project partners Jeffrey Marr (SAFL), Jessica Kozarek (Michigan Tech University) and Paul LeClaire (Mn DNR). Guala's Career proposal (2014-2019) awarded by the National Science Foundation has been centered on geophysical flow control in fluvial environment, and his recent grant with DOE (PI Jeffrey Marr, active from 2021 to 2025) was on sediment diversion channel for hydropower dams.

Recent published works on the topic include:

Chien-Yung Tseng; Jiyong Lee; Michele Guala; Mirko Musa (2024) "Experimental Tests of Lateral Bedload Transport Induced by a Yawed Submerged Vane Array in Open-Channel Flows", ASCE J. of Hydraulic Engineering 150 (6).

Jiyong Lee, Arvind Singh, Michele Gual (2023) "On the scaling and growth limit of fluvial dunes" Journal of Geophysical Research: Earth Surface 128 (6).

Jiyong Lee, Jeff Marr, Michele Guala (2022) "On Sediment Mass Flux Directionality Induced by Yawed Permeable Vanes under Near-Critical Mobility Conditions" ASCE J. of Hydraulic Engineering 148 (10).

These recent research activities and expertise are at the very core of what is proposed here, i.e. to better control sediment transport near natural stream banks by means of toe-wood installations designed to achieve reduced erosion and improved fish habitat.

Organization: U of MN - St. Anthony Falls Laboratory

Organization Description:

The University of Minnesota is one of the largest, most comprehensive, and prestigious public universities in the United States. The St. Anthony Falls Laboratory (SAFL) has been the leading laboratory in US for the study of river flows, hydraulics, and sediment transport, exporting flume design and measuring systems to many of research partners and institutions in the last 30 years. Several National Academy members, from Gary Parker to Efi Foufoula, spent a considerable portion of their academic career at SAFL. Many prominent US scientists in the field of environmental fluid mechanics, sediment transport, fluvial geomorphology and hydraulics have been trained at SAFL, as PhD students and postdocs. In terms of the specific project activities proposed here, SAFL provides and maintains the laboratory flumes and the meandering channels that are critical for testing nature-inspired stream bank protection systems, such as the toe-wood installations we proposed to study here. In addition, SAFL engineering staff, have been supporting and designing field measuring systems to be deployed from boats, canoe, bridges, autonomous vehicles and buoys. Their expertise and help are critical for monitoring near bank velocities and scour hole depths in natural meandering streams that will be selected in collaboration with MnDNR.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Michele Guala		PI			38.5%	33		\$66,522
Jeff Marr		Co-PI			38.5%	9.75		\$38,695
Chris Feist		Technician			38.5%	6.24		\$14,945
Erik Steen		Technician			38.5%	12.51		\$17,252
Richard Christopher		Technician			38.5%	6.24		\$7,504
Chris Milliren		Technician			38.5%	12.48		\$21,372
Graduate Student		Graduate Student			24.2%	150		\$128,292
Undergraduate Student		Undergraduate Student			0%	90		\$11,386
Ben Erickson		Technician			34.2%	9		\$12,871
							Sub Total	\$318,839
Contracts and Services								
Michigan Technological University	Subaward	Dr. Kozarek will support UMN PI: Michele Guala's proposal to the Minnesota LCCMR and ENTRF with the following scope of work. Kozarek will participate in research and planning meetings (~1 per month), assist and support UMN in literature search, field work planning and experimental design, manuscript writing, and translation of research		X		10.5		\$28,795
							Sub Total	\$28,795
Equipment, Tools, and Supplies								
	Tools and Supplies	As part of the project activities, we will run experiments at SAFL, using our flumes and open-air channel (Outdoor Stream Lab), and in the field, along natural streams. For SAFL experiments we constantly need to purchase sand of specific grain size distribution (1200\$). In addition we have to 3D	The sand is required to fill flumes with a prescribed bed material composition and thus allow us to study how the toe-wood scour holes will respond under migrating bedforms with finer or coarser sand.					\$6,000

		print root wad models of different sizes for the different flumes (2000\$). We also include tools and supplies for indoor SAFL cart maintenance, and for field (measuring tapes, support systems for stream measurements)	The root wad models will be inserted in the Outdoor Stream Lab and indoor flume banks to study the optimal spacing and vertical distribution of toe-wood elements.					
							Sub Total	\$6,000
Capital Equipment								
		Measuring system for bathymetry and velocity measurements to be deployed in the Outdoor Stream Lab (OSL), at SAFL, and in the natural streams we will monitor in the course of the project.	The integrated system will be designed by SAFL staff engineers and will allow to integrate an Acoustic Doppler Velocimeter (ADV) measuring flow velocities and a sonar measuring bed elevation. SAFL will provide the ADV and will reuse some of the component currently available in the OLS cart, but the whole acquisition system has to be re-built to be used in larger rivers and anchored on the outer bank. SAFL has currently a NSF-funded project to re-design river measuring systems (Sandpiper project, PI C. Nguyen) , so we will able to identify and purchase the most advanced components and use the data storage framework that is currently under work.	X				\$5,000
							Sub Total	\$5,000
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	5 trips for 4 travelers over the summers	These trips will be taken to collect field data and to present results in state conferences					\$7,280
							Sub Total	\$7,280

Travel Outside Minnesota								
	Conference Registration Miles/ Meals/ Lodging	2 trips for 2 people, about 4 days each, in year 2 and 3 to S. Francisco, or New Orleans, or Washington.	The Fall meeting of the American Geophysical Union (AGU) is the most interesting conference in USA for sediment transport and fluvial geomorphology.	X				\$8,400
							Sub Total	\$8,400
Printing and Publication								
	Publication	Publication Costs in prestigious, open access, academic journals	To maximize the dissemination of scientific results, one highly prestigious academic journal will be selected for 3rd year summary of our research activity. Possible options are Nature geoscience, Proceeding of the National Academy of Sciences. The publication fees are not covered by UMN for those journals.					\$3,000
							Sub Total	\$3,000
Other Expenses								
		Tuition Costs	Tuition Costs for Graduate Student					\$58,686
							Sub Total	\$58,686
							Grand Total	\$436,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Contracts and Services - Michigan Technological University	Subaward	Dr. Kozarek will support UMN PI: Michele Guala's proposal to the Minnesota LCCMR and ENTRF with the following scope of work. Kozarek will participate in research and planning meetings (~1 per month), assist and support UMN in literature search, field work planning and experimental design, manuscript writing, and translation of research	We are requesting this sub award to an out-of-state university due to Dr. Kozarek's expertise and experience conducting stream restoration research and translating research to practice in Minnesota
Capital Equipment		Measuring system for bathymetry and velocity measurements to be deployed in the Outdoor Stream Lab (OSL), at SAFL, and in the natural streams we will monitor in the course of the project.	A computer will be purchased to control the measuring equipment and will be dedicated to acquisition and data processing (this will not be a laptop for the PhD student, it will remain with the field measuring equipment). The computer is just one of the component of the measuring system we need to assemble. Additional Explanation : The system will be deployed in the field cooperation with DNR (see letters of support) and will remain available at SAFL after the project completion. Paul LeClaire and his team at DNR will have access to it whenever they need. In addition, the data structure envisioned by Sandpiper will be implemented in the UMN Data Repository (DRUM) ensuring that all measurements will be available to all (thus including practitioners, students, agencies, citizens) for decades.
Travel Outside Minnesota	Conference Registration Miles/Meals/Lodging	2 trips for 2 people, about 4 days each, in year 2 and 3 to S. Francisco, or New Orleans, or Washington.	It is important that both the hired PhD student and the project PI have the opportunity to present and discuss the results of current research activities at the AGU meeting in front of the broadest audience and the leading scientists in US. We have to be aware of new ideas and developments in stream restoration practice and of similar experimental and numerical investigations in other states. It is also important for the future academic career of the PhD student to present at such recognized conferences and build a network of contacts.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$436,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [ba0c0fe0-d72.pdf](#)

Alternate Text for Visual Component

We show a toe-wood installation in the Zumbro river which failed due to significant erosion during a flood in 2023 (Motivation), and a schematic of toe-wood key structural components. Those will be optimized in the imaged SAFL open air laboratory flume. Pros and cons of toe-wood installations are listed....

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Authorization from UMN to submit the proposal	639d22bb-62c.pdf
Support Letter from West Central Technical Service Area	a06047e8-de7.pdf
Support letter from Stearns Conservation District	77ae0772-f2b.pdf
Support letter from Wabasha Soil & Water Conservation District	809da114-a4d.pdf
Michigan Tech Statement of Work	3ce8728a-f69.pdf
Michigan Tech Budget Justification	be97c3f8-4eb.pdf
Michigan Tech LOI	19c00d58-db4.pdf
Support letter from the Red Lake Watershed District	018668d0-45f.pdf
Support letter from DNR Division of Ecological and Water Resources	df8fb3fd-05d.pdf
Support letter from the South St. Louis County Soil and Water Conservation District	d7988b4d-cf8.pdf
Support letter from Buffalo-Red River Watershed District	a0ddefbf-0fe.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they 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 understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

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

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Angela Boutch (SAFL, UMN), Nicolas Allyn, Sponsored Projects Administration, UMN (see attached letter)

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A