

Environment and Natural Resources Trust Fund

2022 Request for Proposal

General Information

Proposal ID: 2022-079

Proposal Title: Rainfall History Recovered From Old Oak Tree Rings

Project Manager Information

Name: Daniel Griffin Organization: U of MN - College of Liberal Arts Office Telephone: (870) 476-9508 Email: griffin9@umn.edu

Project Basic Information

Project Summary: We will use tree rings to recover rainfall history over the last 250-300+ years. We will organize workshops and multimedia resources to communicate our findings with stakeholder communities across Minnesota.

Funds Requested: \$570,000

Proposed Project Completion: June 30 2024

LCCMR Funding Category: Water Resources (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. BUR OAK TREE RINGS OFFER ROBUST AND EASY TO INTERPRET INFORMATION ON THE HISTORY OF RAINFALL GOING BACK 250–300+ YEARS, BUT THESE DATA HAVE NOT YET BEEN DEVELOPED FOR MINNESOTA.

Have summer rainfall patterns in Minnesota already begun to change? According to the State Climatology Office, the 10 combined wettest and warmest years have all occurred since 1997. A run of wet years starting around 2014 led up to 2019, the wettest year on record for Minnesota.

So is this a short-term fluctuation? Or has our region now begun shifting into a new wet period? We need long-term perspective to be sure, and robust information for planning and decision-making. But most of our state's rainfall records go back only 50–100 years.

Tree rings can provide longer term context for these recent extremes, with records that cover the last 250–300+ years at regional and statewide scales. Tree rings are easy to understand, to communicate, and can be quite useful to inform long-term water resources planning and sustainability. We will develop and use new tree-ring data to understand Minnesota's rainfall history, and to engage stakeholders in dialogue on past, present, and future climate across the Northstar State.

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 will develop tree-ring records from old-growth bur oak at 20 sites across greater Minnesota. Combining these records, rain gauge data, and straightforward statistics, we will produce quantitative reconstructions of regional rainfall patterns over the past 250–300+ years.

Throughout the state, we will host a series of stakeholder engagement workshops, with the goal of putting observed and projected changes in rainfall in context with this past climate information. These interactive sessions will engage a range of audiences, including farmers, elected officials, educators, and natural resource managers, in dialogue around the State's critical water resources, risks, and management priorities. These engagements will be supplemented with public-facing multimedia communications to showcase this exciting field-based research and the role that trees rings and other past climate tools play in informing our understanding of Minnesota's climate-related risks.

Our team brings a breadth of expertise and strong community relationships that will catalyze project outcomes. Collectively, we have many years of experience with tree rings, climate of the past, effective science communication, and productive stakeholder engagement. The project will benefit from the energy and enthusiasm of several early career researchers in Minnesota, and make the most of strong connections to communities through Extension (Roop and Zeleznik).

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?

This project will provide unique, high-quality, and quantitative information about the long-term history of rainfall at regional scales across the state of Minnesota. This data, suitable for risk assessment, scenario planning, and sustainable management strategy development related to rainfall, streamflow, groundwater, flood control, civil infrastructure, natural ecosystems, and agriculture, will be made publicly available.

Activities and Milestones

Activity 1: 1. DEVELOP TREE RING RECORDS FROM OLD GROWTH BUR OAK AT 20 SITES ACROSS GREATER MINNESOTA

Activity Budget: \$257,229

Activity Description:

Griffin's pilot study research indicates that old growth oak trees can be found on many public properties across Minnesota, and that these oak tree rings contain valuable information on rainfall history for the past 250–300+ years. At each of 20 public properties across greater Minnesota, we will collect and analyze tree-ring data from approximately 30 old growth bur oak trees. Tree ring core samples will be collected during the fall and winter, when there is no concern for transmitting oak wilt fungus (http://z.umn.edu/oakwilt), using methods that do not harm the trees.

Samples will be prepared and scanned at ultra high resolution, and processed into DendroElevator, our web platform for online tree ring collections and analysis (http://z.umn.edu/treerings). Wide rings form in wet years, and narrow rings form during dry years, so tree rings will be dated and measured with standard methods to quantify growth. All data developed in this project will be made available through a publicly accessible Elevator database, which is ideal for stakeholder and student education, and citizen science research.

Activity Milestones:

| Description | Completion Date |
|---|-------------------|
| Complete tree-ring core sampling fieldwork | March 31 2023 |
| Complete tree-ring image acquisition and processing | September 30 2023 |
| Complete tree-ring dating and width measurement | December 31 2023 |

Activity 2: 2. USE TREE RINGS FOR QUANTITATIVE MODELING OF REGIONAL RAINFALL VARIABILITY AND CHANGE OVER THE PAST 250–300+ YEARS

Activity Budget: \$108,926

Activity Description:

Using precisely dated records of tree-ring width, we will reconstruct 250–300+ years of rainfall history using a systematic analysis to integrate tree rings, rain gauge data, and simple statistics. First, we will use correlation with rain gauge data to understand the strength and seasonality of the tree ring signals across the network of 20 sites. We will then use regression modeling techniques to scale the tree-ring records into inches of rainfall for each year.

We will analyze these rainfall patterns across space and time to address questions such as the following: Is there any evidence for long-term changes in rainfall? How does this vary across Minnesota? How does 2019 and the recent run of wet years compare to earlier events? How do other extreme wet years (such as 2016, 2010, 1993, 1986, 1977, 1967, 1965, and 1951) compare with extreme wet years in the tree ring record? How do extreme dry years (such as 2012, 1988, 1934, and 1910) compare with the driest years from previous centuries? Were multi year wet and dry periods in the past more severe, persistent, or frequent than any during the last 100 years?

Activity Milestones:

| Description | Completion Date |
|---|------------------|
| Access and collate relevant rainfall gauge datasets | December 31 2023 |
| Complete statistical modeling of relationships between tree rings and rainfall data | March 31 2024 |
| Finalize tree-ring rainfall history reconstructions | May 31 2024 |

Activity 3: 3. 'RESEARCH IN YOUR BACKYARD' INTERACTIVE STAKEHOLDER WORKSHOPS

Activity Budget: \$124,333

Activity Description:

We will organize and host a series of 15 dialogue-building workshops in communities throughout the state. These will connect community stakeholders directly to the scientists and environmental research that is being done in their "backyard." Co-Investigators Roop (University of Minnesota) and Zeleznik (North Dakota State University) both hold Extension appointments and will leverage these community relationships and connections to promote the workshops and recruit attendees.

These highly interactive "Research In Your Backyard" workshops will provide an opportunity for participants to engage with the project activities and the state of climate research in Minnesota. We anticipate between 15-25 participants in each workshop. Each workshop will include the opportunity to see and interact with tree-ring samples and our field equipment and will include a data-driven discussion about precipitation variability and change in their specific region. These workshops will use highly-localized climate information and climate projections data to engage participants in conversations about past, present and future rainfall variability and its implications for water in their "backyard." A deliverable from each workshop will be a narrative-based summary around past and present climate in each workshop location and a summary of community concerns, opportunities for effective water resources management in their community.

Activity Milestones:

| Description | Completion Date |
|------------------------------------|------------------|
| Host first six community workshops | December 31 2023 |
| Host last nine community workshops | May 31 2024 |

Activity 4: 4. DEVELOP PUBLIC COMMUNICATION RESOURCES SHOWCASING TREE RING PERSPECTIVE ON RAINFALL IN MINNESOTA

Activity Budget: \$79,512

Activity Description:

Tree rings are an easily accessible gateway to environmental systems thinking. Most folks know that trees form one ring per year, and many also understand that trees can provide important information on past environmental conditions. To take advantage of this opportunity, we will develop a suite of graphic-driven and multimedia communication resources including short videos, infographics, and factsheets that will be hosted on Extension's forthcoming climate change website managed by Co-I Roop (anticipated July, 2021). These materials will include high-level information about Minnesota's climate, seasonal precipitation variability, and water resources-related impacts of changing rainfall variability. These materials will also include the narrative summaries produced during each workshop of climate impacts and climate concerns around the state related to water resources and precipitation. We plan to translate a subset of these materials into Spanish, Hmong and Somali to increase the audience reach of these materials. We will also follow Extension's best practices to increase accessibility of these resources including using closed-captioning on videos and alttext on images.

Activity Milestones:

| Description | Completion Date |
|---|------------------|
| Produce overview graphic summaries and introductory project materials | December 31 2022 |

| Produce series of infographics and short videos to summarize mid-project outcomes | August 31 2023 |
|---|----------------|
| Develop and post final materials and translation online and promote resources | June 30 2024 |

Project Partners and Collaborators

| Name | Organization | Role | Receiving Funds |
|------------------------------|--|---|--------------------|
| Heidi Roop, Ph.D. | University of Minnesota/Extension | Co-Investigator Roop, climate scientist and Extension Specialist for Climate Change and Adaptation will support the field research, supervise the project post-doctoral researcher in the planning, coordination and | Yes |
| | | evaluation of the workshops (Activity 3), and provide oversight and support of the development of the project communication resources (Activity 4). | |
| Joseph Zeleznik, Ph.D. | North Dakota State University/Extension | Co-Investigator Zeleznik, Forestry Extension Specialist, will spearhead tree ring data collection in northern and northwestern Minnesota (Activity 1), collaborate in rainfall modeling (Activity 2), and support the planning and operations of the community workshops, particularly for the project activities in-and-adjacent-to the Red River Valley area of northern Minnesota (Activity 3). | Yes |
| Matthew Trumper, M.A. | University of Minnesota | A tree-ring scientist and statistical data analyst, Trumper will spearhead the scientific-technical aspects tree-ring data development in central and southern Minnesota (Activity 1) and the statistical modeling of rainfall history (Activity 2). He will supervise the student members of the project team, and contribute to project reporting requirements. | Yes |
| Sophie Pitney, B.S. | University of Minnesota | A graduate student in the Griffin Lab, Pitney will participate in the collection and development of the tree-ring data, working with Trumper and the undergraduate research assistants (Activity 1). | Yes |
| TBD | University of Minnesota | A post-doctoral researcher on co-I Roop's team will be responsible for assisting the team in the planning, coordination, and delivery of the stakeholder workshops, facilitating community interaction and follow-up (Activity 3), and overseeing the development of the communications resources and materials (Activity 4). They will also contribute to project reporting. | Yes |
| Daniel Griffin, Ph.D. | University of Minnesota | Principal-Investigator Griffin is a tree-ring and paleoclimate scientist. He will supervise project staff and students through development of the tree-ring data (Activity 1) and modeling of regional rainfall history (Activity 2), and will provide scientific support for the workshops (Activity 3) and the development of communication materials (Activity 4). | Yes |

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?

This project will develop new information about the nature of past climate in Minnesota, as well as summaries about the state's current climate and expected climate changes. The graphic-driven and multimedia communication resources developed during this project, including short videos, infographics, and factsheets, will be hosted on Extension's forthcoming climate change website managed by Co-I Roop (anticipated July, 2021).

Project Manager and Organization Qualifications

Project Manager Name: Daniel Griffin

Job Title: Assistant Professor University of Minnesota

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

PROJECT MANAGEMENT QUALIFICATIONS:

Dr. Daniel Griffin is Lead PI or co-PI on science research projects on tree rings, water, and climate with federal funding

exceeding \$1.4M (NSF, NOAA, EPA), with demonstrated success leading large science projects and managing teams of scientists and students.

RELEVANT PROFESSIONAL EXPERIENCE:

Dr. Griffin has expertise in old-growth oak woodlands and conifer forests, tree-ring data development and interpretation, and applications of tree rings for water resources management, including quantitative reconstruction of rainfall in Arizona, California, and elsewhere in the United States. Griffin has prior experience collaborating with water resource stakeholders, and with studies of climate extremes and natural climate processes and patterns in Arizona, California, New Mexico, and North Carolina. For the past six years, Griffin has been doing preliminary research with bur oak tree rings at various sites in Minnesota, including at the UMN Ecosystem Science Reserve near Bethel, Minnesota.

PROFESSIONAL APPOINTMENTS AND PREPARATION

University of Minnesota, Faculty Member, 2014-present Woods Hole Oceanographic Institution, NOAA Climate & Global Change Fellow, 2013–2015 University of Arizona, Ph.D., 2013 University of Arkansas, M.A., 2007 University of Arkansas, B.S., 2002

PEER-REVIEWED PUBLICATIONS

Griffin has published 40 peer-reviewed scientific papers on tree rings, rainfall, climate, and old growth, including several in high profile journals (Science, Nature Climate Change, Water Resources Research, Global Change Biology, Journal of Climate, Geophysical Research Letters, Environmental Research Letters): http://griffinlab.umn.edu/publications

ORGANIZATION DESCRIPTION

The University of Minnesota is both the state land-grant university, with a strong tradition of education and public service, and the state's primary research university.

PROJECT MANAGER CONTACT

Department of Geography, Environment & Society, University of Minnesota, Minneapolis, MN 55455 E-mail: griffin9@umn.edu; Phone: 612-625-2562; Website: http://griffinlab.umn.edu

Organization: U of MN - College of Liberal Arts

Organization Description:

The University of Minnesota is both the state land-grant university, with a strong tradition of education and public service, and the state's primary research university.

Budget Summary

| Category / | Subcategory | Description | Purpose | Gen. | % | # | Class | \$ Amount |
|--------------|-------------|--|---------|-------|--------|------|--------|-----------|
| Name | or Type | | | Ineli | Bene | FTE | ified | |
| | | | | gible | fits | | Staff? | |
| Personnel | | | | | | | | |
| 1 Principal | | Professor Griffin requests 1.5 months of | | | 26.74% | 0.24 | | \$36,147 |
| Investigator | | summer salary support for both years 1 | | | | | | |
| | | and 2. In summer 2022, salary support | | | | | | |
| | | will cover project management, | | | | | | |
| | | fieldwork, and lab work for tree-ring | | | | | | |
| | | data collection and development, and | | | | | | |
| | | participation in the workshops for | | | | | | |
| | | community and stakeholder | | | | | | |
| | | engagement. In summer 2023, salary | | | | | | |
| | | support will cover project management, | | | | | | |
| | | lab work, data development, numerical | | | | | | |
| | | data analysis, report preparation, and | | | | | | |
| | | dissemination of findings through | | | | | | |
| | | workshops, websites, and reports. | | | | | | |
| | | Professor Griffin will supervise project | | | | | | |
| | | staff member, Trumper, and will also | | | | | | |
| | | help oversee graduate and | | | | | | |
| | | undergraduate assistants during the life | | | | | | |
| | | of the project. A 2% increase in salary is | | | | | | |
| | | included for each year. | | | | | | |
| 1 Co- | | Professor Roop requests 1.5 month of | | | 26% | 0.24 | | \$40,441 |
| Investigator | | summer salary support for both years 1 | | | | | | |
| | | and 2. In summer 2022, salary support | | | | | | |
| | | will cover project activities related to | | | | | | |
| | | organization and execution of workshops | | | | | | |
| | | for community and stakeholder | | | | | | |
| | | engagement, development of | | | | | | |
| | | multimedia climate communication | | | | | | |
| | | resources. Professor Roop will also | | | | | | |
| | | participate in tree-ring fieldwork and | | | | | | |
| | | coordinate with other project personnel. | | | | | | |
| | | In summer 2023, salary support will | | | | | | |
| | | cover project activities related to | | | | | | |
| | | organization and execution of workshops | | | | | | |
| | | for community and stakeholder | | | | | | |

| | engagement development of | | | | |
|-----------------|--|--|-------|------|-----------|
| | multimedia climate communication | | | | |
| | resources. Over the life of the project | | | | |
| | Roop will be responsible for the | | | | |
| | supervision of project personnel Susanna | | | | |
| | Clark, and for leveraging Extension | | | | |
| | resources and audiences to support | | | | |
| | broad reach and application of the | | | | |
| | project process and outcomes across | | | | |
| | Minnesota and the Midwest region. A | | | | |
| | 2% increase in salary is included for each | | | | |
| | year. | | | | |
| 1 Project Staff | Matthew Trumper: 100% FTE salary | | 26.7% | 2 | \$154,409 |
| Scientist | support requested for years 1 and 2. | | | | . , |
| | Trumper will be participating in all | | | | |
| | aspects of the research, with a primary | | | | |
| | responsibility for executing tree-ring | | | | |
| | collections, data development activities, | | | | |
| | and statistical analyses over the life of | | | | |
| | the project, including supervising | | | | |
| | graduate student and undergraduate | | | | |
| | research assistant work. A 2% increase in | | | | |
| | salary is included for each year. | | | | |
| 1 Graduate | Sophie Pitney: Support is requested to | | 42.9% | 1.24 | \$78,138 |
| Research | hire one graduate research assistant for | | | | |
| Assistant | 100% FTE in summer (520 | | | | |
| | hours/summer) of project years 1 and 2, | | | | |
| | and 50% FTE in one academic year | | | | |
| | semester (390 hours/semester) of | | | | |
| | project year 1 (Spring 2023) and one | | | | |
| | academic year semester of project year 2 | | | | |
| | (Fall 2023). This student will assist in field | | | | |
| | data collection, lab data analysis, | | | | |
| | supervision of undergraduate research | | | | |
| | assistants, preparation of the final | | | | |
| | report, and dissemination of findings. A | | | | |
| | 2% increase in salary is included for each | | | | |
| | year. | | | | |
| 3 | TBD Undergraduate Research Assistants: | | 0% | 1.3 | \$40,770 |
| Undergraduate | Support requested to hire three | | | | |
| | undergraduate student research | | | | |

| Research | | assistants to assist with fieldwork. lab | | | | | |
|---------------|-------------------------------------|--|--|------|------|-------|------------------|
| Assistants | | analysis and data development over the | | | | | |
| 7 10010101110 | | life of the project. We anticipate paying | | | | | |
| | | these students \$15/hr with a total | | | | | |
| | | allocation of 1800 hours in project year | | | | | |
| | | 1 and 900 hours in project year 2 | | | | | |
| 1 Project | | TBD Postdoctoral Scientist: 50% ETE | | 26% | 1 | | \$78 583 |
| Postdoctoral | | salary support for a postdoctoral | | 2070 | - | | <i>\$</i> 70,505 |
| Scientist | | scientist is requested for years 1 and 2 | | | | | |
| Scientist | | This person will be responsible for | | | | | |
| | | organization and execution of workshops | | | | | |
| | | for community and stakeholder | | | | | |
| | | angagement, and development and | | | | | |
| | | doployment of multimodia climate | | | | | |
| | | communication resources. This will | | | | | |
| | | include lowersging Extension resources | | | | | |
| | | and audieness to support broad reach | | | | | |
| | | and application of the project process | | | | | |
| | | and application of the project process | | | | | |
| | | Adductomes across Minnesota and the | | | | | |
| | | is included for each user | | | | | |
| | | is included for each year. | | | | Cult | ¢ 420, 400 |
| | | | | | | Sub | \$428,488 |
| Constants and | | | | | | Total | |
| Contracts and | | | | | | | |
| Services | | | | | 0.24 | | 640.044 |
| North Dakota | Sub award | Joseph Zeleznik (Detroit Lakes, MN), is a | | | 0.24 | | \$40,944 |
| State | | NDSU Forestry Extension Specialist and | | | | | |
| University | | expert in dendrochronology at the | | | | | |
| | | prairie/forest interface of western | | | | | |
| | | Minnesota for over 10 years. He will | | | | | |
| | | collaborate in fieldwork and will be | | | | | |
| | | involved in the workshops that take | | | | | |
| | | place in-and-adjacent-to the Red River | | | | | |
| | | Valley area of Minnesota. | | | | | |
| TBD | Professional | Graphic design, video, and translation | | | - | | \$20,000 |
| | Troressional | | | | | | |
| | or Technical | services: We request \$20,000 total to | | | | | |
| | or Technical Service | services: We request \$20,000 total to support our multimedia communication | | | | | |
| | or Technical Service Contract | services: We request \$20,000 total to support our multimedia communication resource outcomes: \$15,000 for graphic | | | | | |
| | or Technical Service Contract | services: We request \$20,000 total to support our multimedia communication resource outcomes: \$15,000 for graphic design and video production costs and | | | | | |

| | | findings and reports into Spanish, | | | | |
|--------------------------------------|-----------------------|---|---|--|--------------|----------|
| | | Hmong, and Somali. | | | Cult | 600.044 |
| | | | | | Sub Total | Ş60,944 |
| Equipment, Tools, and Supplies | | | | | | |
| | Tools and Supplies | Dendrochronology Fieldwork Supplies | To accomplish the tree-ring sampling in project year 1, we request \$5,538 for Dendrochronology research supplies: 2-thread increment borers (6x 16", 2-thread increment borers, \$294 each ; 4x 20" increment borers, \$484 each; and 2x24" increment borers \$594 each); and \$250 for expendable straws to transport individual tree cores back to the lab. We also request \$250 USD for a DEWALT DCD791B 20V MAX XR Li-lon 0.5" Brushless Compact Drill/Driver with DCB230C 20V Battery Pack, and \$150 for two additional Li- lon battery packs and charging units to adapt to the SMARTBORER device, which will ensure enough battery power for full days of fieldwork sampling. | | | \$5,538 |
| | Tools and Supplies | Dendrochronology Lab supplies | To accomplish the tree-ring specimen preparation and analysis in project year 1, we request \$2570 to cover one case of Leica model 818 microtome razor blades (\$1,670), sanding supplies (\$500), and wooden mounts for increment cores (\$400), plus misc. lab supplies (\$260). | | | \$2,830 |
| | Tools and Supplies | Communications and Engagement Supplies | We are requesting \$4,575 for the workshop materials required for the 15 workshops (\$1830 in year one; \$2,745 in year two). We anticipate \$305 needed to cover the cost of printing large format maps, handouts and for surveys and other supplies (e.g. flip charts, markers). We anticipate holding 6 workshops in year one and 9 workshops in Year 2. | | | \$4,575 |
| | | | | | Sub | \$12,943 |
| Capital Expenditures | | | | | TULAI | |

| | | SMARTBORER | We request \$7,400 for the SMARTBORER(R) | | | \$7,400 |
|--------------|---------|--------------------------------------|--|--|---------|------------------------------|
| | | | Smart increment borer (SmartborerTM, PAT. P.) | | | |
| | | | is a device for automatic sampling of increment | | | |
| | | | cores | | | |
| | | | (https://sites.google.com/site/smartborer/lineup | | | |
| | | |). The tool currently costs 6.000 Euros. or | | | |
| | | | approximately \$7.100 USD, it adapts a cordless | | | |
| | | | battery powered drill, and an increment borer to | | | |
| | | | a low-speed, high-torque output via planetary | | | |
| | | | gear system. This tool will minimize effort and | | | |
| | | | time required to sample 1.200 tree cores and | | | |
| | | | improve safety for researchers. | | | |
| | | | | | Sub | \$7,400 |
| | | | | | Total | <i><i></i><i></i></i> |
| Acquisitions | | | | | | |
| and | | | | | | |
| Stewardship | | | | | | |
| p | | | | | Sub | - |
| | | | | | Total | |
| Travel In | | | | | | |
| Minnesota | | | | | | |
| | Miles/ | Fieldwork Travel | Principal Investigator: UMN Fleet Services | | | \$13,627 |
| | Meals/ | | vehicle rental at \$51/day for fieldtrips lasting 2 | | | |
| | Lodging | | days for 20 fieldtrips (\$2,040) plus mileage cost | | | |
| | 0.0 | | of \$0.37/mile, 300 mile RT per trip for 20 trips | | | |
| | | | (\$2,200). Personal vehicle mileage for Co- | | | |
| | | | Invesitgator, 300 miles RT per trip @ \$0.56/mile | | | |
| | | | for 20 fieldtrips (\$3,360). Lodging for 3 fieldcrew | | | |
| | | | members for one night @ \$96/night/person for | | | |
| | | | 20 field trips (\$5,760). Partial day M&IE for 3 | | | |
| | | | fieldcrew members for two days/trip @ \$41,25 | | | |
| | | | for the 20 field trips (\$5,445). | | | |
| | Miles/ | Engagement Workshops Travel - Year 1 | Community & Stakeholder Engagement | | | \$4,390 |
| | Meals/ | | Workshops: We will host 6 half-day workshops | | | |
| | Lodging | | in Year 1. Each workshop will involve 3 project | | | |
| | 0.0 | | personnel and include personal vehicle mileage | | | |
| | | | of 350 miles RT @ \$0.56/mile for each workshop | | | |
| | | | (\$1,176); lodging for one night @ \$96/night for | | | |
| | | | each project personnel for each of the 6 | | | |
| | | | workshops (\$1,728), and 2 partial day M&IE per | | | |

| | | | diem of \$41,25/day for the 3 project personnel | | | |
|-----------------------------|-----------------------------|--|---|--|----------------|-----------|
| | Miles/ Meals/ Lodging | Engagement Workshops Travel - Year 2 | Community & Stakeholder Engagement Workshops: We will host 9 half-day workshops in Year 2. Each workshop will involve 3 project personnel and include personal vehicle mileage of 350 miles RT @ \$0.56/mile for each workshop (\$1,764); lodging for one night @ \$96/night for each project personnel for each of the 9 workshops (\$2,592), and 2 partial day M&IE per diem of \$41,25/day for the 3 project personnel for the 9 workshops (2,228). | | | \$6,583 |
| | | | | | Sub Total | \$24,600 |
| Travel Outside Minnesota | | | | | | |
| | | | | | Sub Total | - |
| Printing and Publication | | | | | | |
| | | | | | Sub Total | - |
| Other Expenses | | | | | | |
| | | Communications and Engagement Workshops | Workshop costs: venue rental (estimated at \$1,500), food (estimated at \$875; \$35/person for catering for coffee and lunch for 25 people), for a total cost of \$2,375 per workshop. In Year 1 we will host a total of 6 workshops for a total cost of \$14,250; in Year 2 we will host 9 workshops for a total cost of \$21,375. | | | \$35,625 |
| | | | | | Sub Total | \$35,625 |
| | | | | | Grand Total | \$570,000 |

Classified Staff or Generally Ineligible Expenses

| Category/Name | Subcategory or | Description | Justification Ineligible Expense or Classified Staff Request |
|---------------|----------------|-------------|--|
| | Туре | | |

Non ENRTF Funds

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

Attachments

Required Attachments

Visual Component File: <u>3125de78-95e.pdf</u>

Alternate Text for Visual Component

This graphic includes images, maps, and charts to illustrate the project goals and activities.

[Picture of farm fields and flooded neighborhoods] Text: "1. Agriculture, flood control, and other stakeholder groups need robust rainfall planning information."

[Chart of Minnesota statewide precipitation, with wet years in blue and dry years in red, and 2019 as the wettest year on record]

Text: 2.

"Rain gauge records are too short to robustly understand long-term patterns of rainfall history a...

Administrative Use

Does your project include restoration or acquisition of land rights?

No

- Does your project have potential for royalties, copyrights, patents, or sale of products and assets? 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? Yes
- Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration



1. Agriculture, flood control, and other stakeholder groups need robust rainfall planning information.

across Minnesota.

and severe drought are annotated.



2. Rain gauge records are too short to robustly understand long-term patterns of rainfall history and extreme events.



3. The years 2016–2019 had record high rainfall for many counties in Minnesota.



at sites across Minnesota.

online database platform that is well-suited for research, education, and outreach.





frequency, and duration of 1600–2016. Episodes of extreme wetness extreme rainfall can be useful for stakeholder risk assessment.

engagement workshops will be held in communities across the state to improve climate risk preparedness.