



Environment and Natural Resources Trust Fund

M.L. 2026 Draft Work Plan

General Information

ID Number: 2026-298

Staff Lead: Michael Varien

Date this document submitted to LCCMR: December 15, 2025

Project Title: Identifying Flooding Hazards on Mille Lacs Tribal Lands

Project Budget: \$800,000

Project Manager Information

Name: Charles Lippert

Organization: Mille Lacs Band of Ojibwe

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Project Reporting

Reporting Schedule: April 1 / October 1 of each year.

Project Completion: June 30, 2030

Final Report Due Date: August 14, 2030

Legal Information

Legal Citation:

Appropriation Language:

Appropriation End Date: June 30, 2030

Narrative

Project Summary: Hydrologic and hydraulic models will be developed for the Big Sandy Lake and upper Rice River watersheds to map flood-prone areas and identify restrictive infrastructure that may contribute to flooding.

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

The Mille Lacs Band of Ojibwe (MLBO) region's exposure to flood hazards has increased due to more frequent extreme precipitation events. A 2012 storm produced 6.27 inches of rainfall across the Big Sandy Lake watershed, merging this large wetland complex into a single body of water. During the height of the flood, MLBO communities at Sandy Lake, Minnewawa, and East Lake were isolated for nearly two weeks without access to food, clean water, and energy. In other years, flash flooding in east-central and north-central Minnesota has impacted Treaty resources, including manoomin. Climate projections indicate that the intensity of precipitation events are expected to continue to increase, motivating an enhanced understanding of flood hazards to facilitate improved community resiliency. The flood hazard maps that are available for this area are over 40 years old, rely on poorly constrained, simplistic, 1D models, and provide only limited information regarding potential flooding extent, and no information on flood durations or other components of flood hazards such as flow velocities. This project seeks to address this flood hazard knowledge gap by developing well-constrained surface hydrology and hydraulics models for the area and incorporating model results into hazard preparedness plans.

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.

In response to a history of catastrophic flooding which has stranded Mille Lacs community members for weeks and extensively damaged infrastructure, the MLBO have asked the US Geological Survey's Upper Midwest Water Science Center (UMWSC) to develop a multi-scenario unsteady, 2D, surface water model for the Big Sandy Lake and upper Rice River watersheds. These models will be used to identify flood-prone areas, facilitate informed risk management, and increase community resilience to flood-related natural hazards. Unsteady 2D hydraulic and hydrologic model(s) will be developed for the Big Sandy Lake and upper Rice River watersheds for several design storm and historical precipitation scenarios, including variable antecedent moisture conditions and design storms that incorporate potential shifting precipitation regimes. Culvert inventories, water surface elevation and bathymetric surveys, and LiDAR data processing will be conducted to provide model inputs. To ensure the models are well-calibrated and validated, they will leverage hydrologic data collected at existing MN DNR gages along with 12 new USGS continuous monitoring stations including 10 locations with water surface elevation data and two with fully telemetered streamflow. The resulting modeled water elevation and flow velocity outputs will be used to identify vulnerable infrastructure and facilitate emergency preparedness.

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 generate detailed 2D chrono-sequences of flood extent, inundation depth, and flow velocity in the Big Sandy Lake and upper Rice River watersheds for historical precipitation scenarios and design storms that include the effects of non-stationary precipitation extremes. These model results will be used to quantify flood risk and identify vulnerable infrastructure, and the results will be incorporated into emergency preparedness plans. Additionally, these results will identify restrictive infrastructure that may exacerbate flood hazards and these models will be used to investigate the impacts of stream and wetland restoration and alternative infrastructure designs on flooding, guiding management decisions.

Project Location

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

Region(s): NE

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

Region(s): NE

When will the work impact occur?

In the Future

Activities and Milestones

Activity 1: Installation and operation of hydrologic monitoring stations, culvert inventories, and field surveying

Activity Budget: \$300,000

Activity Description:

Hydrologic monitoring equipment will be installed by the UMWSC to continuously measure water surface elevations, precipitation, and streamflow throughout the study area for approximately 32 months. These measurements will provide the calibration and validation data needed to inform model parameterizations and ensure the hydrologic and hydraulic models are able to reproduce rainfall-runoff partitioning, surface water routing, and hydraulic phenomena. 10 water surface elevation stations will be distributed across lakes and streams in the study watersheds, and 4 of these will also monitor precipitation. Discharge will be monitored along the Rice River and the Prairie River, the major streams in the study watersheds. Field measurements will be used to verify the values reported by the continuous monitoring stations and the data will undergo robust quality assurance and quality checks prior to final publication. The data will be published to either the National Water Information System (NWIS) or to the USGS ScienceBase repository where they will be available for public download. Additionally, the UMWSC will conduct a field measurement campaign that will include a synoptic water surface elevation survey, a culvert inventory, and bathymetric data collection for limited areas such as the outlet of Big Sandy Lake to the Mississippi River.

Activity Milestones:

Description	Approximate Completion Date
Installation of 10 water surface elevation and 2 stream discharge stations	November 30, 2026
Completion of culvert inventories and field surveying	September 30, 2027
Continued operation and field checks of hydrologic monitoring network	June 30, 2029
Final publication of hydrologic data to public databases	September 30, 2029

Activity 2: LiDAR and other auxiliary data preparation and analysis

Activity Budget: \$100,000

Activity Description:

The UMWSC will develop a hydro-flattened watershed digital elevation model to provide the underlying terrain for the hydraulic model(s) and explore the connectivity and storage capacity of internally drained depressions. This hydro-flattened DEM will be augmented with existing lake and stream bathymetric data as well as data collected during the field measurement campaign. The final hydro-flattened DEM will be published to the USGS ScienceBase repository as a component of the model archive documenting the hydrologic and hydraulic model(s). The UMWSC will also download and pre-process land cover, soils, and historical precipitation data required for the hydraulic model.

Activity Milestones:

Description	Approximate Completion Date
Download existing LiDAR and LiDAR-derived elevation data from public repositories	November 30, 2026
Development of a preliminary hydro-flattened DEM and high-resolution drainage network for planning purposes	February 28, 2027
Download and pre-processing of land cover, soils, and historical precipitation data	May 31, 2027
Development of a final hydro-flattened DEM	February 28, 2028
Final publication of model inputs to public databases	September 30, 2029

Activity 3: Initial development of hydrologic and hydraulic models

Activity Budget: \$180,000

Activity Description:

The UMWSC will develop an unsteady 2D HEC-RAS model(s) for the project watersheds incorporating existing land cover, soils, bridge/culvert, and the final hydro-flattened DEM information. A variably-spaced mesh will be generated to capture the most important hydraulic features in sufficient detail to accurately model surface water flows. Runoff generation will be modeled using either distributed methods (e.g., Noah-MP, HEC-RAS rain-on-mesh) or semi-distributed methods (i.e., HEC-HMS) using a combination of in-situ and remotely sensed precipitation data. The model(s) will be calibrated to a subset of the observational data, while the remaining observational data will be used to validate the performance of the calibrated model. Remotely sensed WSE observations may also be incorporated for model calibration and validation.

Activity Milestones:

Description	Approximate Completion Date
Completion of model mesh development	April 30, 2028
Completion of calibrated hydraulic and hydrologic model(s)	April 30, 2029

Activity 4: Prognostic modeling, model synthesis, data publication, and report writing

Activity Budget: \$180,000

Activity Description:

Following successful model calibration and validation, model scenarios will be run for a range of design storms with dry, normal, and wet background conditions. The UMWSC will also run model scenarios incorporating the potential impacts of non-stationarity on precipitation intensity and duration, as well as models incorporating natural flood management designs and changes to restrictive hydraulic infrastructure. These models will provide time series outputs of water depth, water surface elevation, and depth averaged velocity across the study area. If data regarding structure locations and first floor elevations are available, we will use the model outputs to identify impacted structures under each scenario. We will also identify impacted critical infrastructure. An interpretive report will be written and published communicating the findings of the surface water modeling study. All supporting data and model archives will be published to an appropriate open-access repository. The report will describe the data collected for the modeling efforts, model calibration and validation results, and the results of the multi-scenario prognostic modeling effort.

Activity Milestones:

Description	Approximate Completion Date
Completion of prognostic modeling scenarios	June 30, 2029
Completion of critical infrastructure and impacted structure analysis	July 31, 2029
Submission of final report for peer review and publication of model archive	September 30, 2029

Activity 5: Incorporation of model results into emergency preparedness plans

Activity Budget: \$40,000

Activity Description:

USGS in coordination with the Mille Lacs Band of Ojibwe Department of Natural Resources and Office of Emergency Management will brief the Tribal Emergency Response Committee (TERC) on progress of the project, soliciting comments and concerns for the USGS to address in their final report. Once the model results are complete, identified

critical infrastructure and impacted structures of the Tribe will be referenced in the Tribe's Hazard Mitigation Plans, and go before the TERC to identify actions the Tribe will take. These actions identifying flood hazards brought by the USGS models will then be incorporated into the Tribe's Emergency Operations Plan. Before completion of the project, Department of Natural Resources will provide the Mille Lacs Band elected officials a briefing before the Band Assembly, providing the overview of the project, TERC's agreed actions, and the steps taken to incorporate the model results into the various parts of the Tribe's emergency preparedness plans.

Activity Milestones:

Description	Approximate Completion Date
Briefing before the Tribal Emergency Response Committee (TERC)	September 30, 2027
Updated briefing before the TERC	September 30, 2028
Addition of critical infrastructure and impacted structure in Tribe's Hazard Mitigation Plans	August 31, 2029
Revise Tribe's Emergency Operations Plan to reflect flood hazards identified by the USGS	September 30, 2029
Briefing before the Mille Lacs Band Assembly (elected Tribal leadership) and TERC	September 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Anna Baker	US Geological Survey	Co-Principal Investigator	Yes
Angus Vaughan	US Geological Survey	Co-Principal Investigator	Yes

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.

Sharing of the collected data with the local Soil and Water Conservation Districts. Publication on project updates by the Tribe's Ojibwe Inaajimowin newspaper. Publication and archiving of the model on a publicly accessible US Geological Survey website. Presentation before the Tribal Emergency Response Committee and the Mille Lacs Band of Ojibwe Band Assembly. Presentation before the Minnesota Tribal Environmental Committee. Presentation before the national Tribal Lands and Environment Forum. Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgment Guidelines.

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?

Project results will aid local partners to identify vulnerable communities and infrastructure due to flooding in the study watersheds. MLBO and local partners (Aitkin, Carlton, and South St. Louis SWCDs) will incorporate the project findings into area emergency management plans. The modeling results will be used to determine whether there are critical pinch points in the surface water system that exacerbate flooding. The model results will be used to support the infrastructure upgrades siting and natural flood management projects to reduce flooding. Funds for the incorporation of findings into emergency preparedness plans are included in this proposal.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Air Quality Specialist		Project Coordinator			50.73%	0.27		\$31,515
							Sub Total	\$31,515
Contracts and Services								
US Geological Survey	Subaward	Creation of an Unsteady 2D HEC-RAS model to identify flood-prone areas and support a real-time flooding decision support tool. Costs include: Personnel = \$622,600, Travel = \$28,100, Equipment = \$114,300				8		\$765,000
							Sub Total	\$765,000
Equipment, Tools, and Supplies								
							Sub Total	-
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel between Vineland, MN, and St Paul, MN: 100-miles x 2 x 18 trips	Quarterly coordination meetings at the US Geological Survey Minnesota Water Science Center, Mounds View, MN					\$2,520
	Miles/ Meals/ Lodging	Travel between Vineland, MN, and East Lake, MN: 53-miles x 2 x 13 trips	Monthly Community Meetings at Mille Lacs Band of Ojibwe District II Community Center in East Lake, MN					\$965

							Sub Total	\$3,485
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
							Sub Total	-
							Grand Total	\$800,000

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
State				
			State Sub Total	-
Non-State				
In-Kind	USGS Cooperative Matching Funds from Upper Midwest Water Science Center	Funds used to offset ineligible overhead expenses associated with bureau assessed overhead costs for the project	Pending	\$83,900
Cash	Mille Lacs Band of Ojibwe cash match	<ul style="list-style-type: none"> General Office Supplies -- For the operation of the MLBO Department of Natural Resources Environmental Programs <p>Total funds allocated for office supplies over the course of the funding cycle:</p> <ul style="list-style-type: none"> Paper, 8½"×11": $40 \times 8 = \\$320$; Toner, Cyan: $175 \times 2 = \\$350$; Toner, Yellow: $175 \times 2 = \\$350$; Toner, Magenta: $175 \times 2 = \\$350$; Toner, Key (Black): $96 \times 3 = \\$288$. Total of supplies = \$1,658. <ul style="list-style-type: none"> Federally negotiated Indirect Cost of 13.15% -- Indirect Cost for support of MLBO Department of Natural Resources Administration staff, MLBO Office of Management and Budget support staff, MLBO Administration Human Resources staff and Facilities staff. <p>Indirect cost (IDC) is calculated by taking all costs, less contract, direct services and equipment, which subtotals to amount subject to IDC, and then the IDC rate of 13.15% is used to determine the IDC:</p> <ul style="list-style-type: none"> \$31,515 personnel + \$3,485 travel + \$1,658 general office supplies = \$36,658 subject to IDC; \$36,658 subject to IDC \times 0.1315 IDC rate = \$4,821 IDC. <p>IDC is used to fund departments that are not easily allocated to this project such as Human Resources, Office of Management and Budget (for financial reporting, payment of invoices, and requesting reimbursement from agency), and facilities costs. IDC rate is provided to MLBO annually by the US Department of the Interior.</p> <ul style="list-style-type: none"> Band Match \$6,479 = \$1,658 General Office Supplies + \$4,821 Indirect Costs. 	Pending	\$6,479

			Non State Sub Total	\$90,379
			Funds Total	\$90,379

Total Project Cost: \$890,379

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [163e362b-9c5.pdf](#)

Alternate Text for Visual Component

Visual Element showing proposed and potentially additional project partners, history of damaging floods of area, which motivates improved understanding of flood hazards and mitigation opportunities, including a map of the study area, with an example of deliverable interactive flood depth & velocity map to aid planning and decision-making....

Board Resolution or Letter

Title	File
Mille Lacs Band of Ojibwe Assembly Resolution_received 5-30-25	1ccb7693-bfc.pdf

Supplemental Attachments

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

Title	File
Aitkin SWCD Letter of Support	96166143-fd3.pdf
Carlton SWCD Letter of Support	bb14e573-4d6.pdf
South St. Louis SWCD Letter of Support	2a3da3ce-117.pdf
"Heavy Rains Cause Flooding in East Lake" in Ojibwe Inaajimowin, July 2012, page 5	6537bd39-4ce.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Budget has been adjusted, and adjusted to be \$800,000 in LCCMR costs. USGS subaward description updated to include cost breakdown, and to identify Generally Ineligible Expenses. Total Project Cost adjusted. Dissemination updated. Change in a Co-Principal Investigator. Updated individuals assisting in completion of this project. Project end date changed to June 30, 2030. Moved into Non-ENRTF Funds Contributed to the Project: Moved USGS Facilities cost into overhead as USGS In-Kind; moved MLBO Supplies and MLBO IDC to MLBO Cash match.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

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 Commissioner's Plan 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 project:

Faith Fitzpatrick, US Geological Survey; Ben Torrison, US Geological Survey

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