



Environment and Natural Resources Trust Fund

2022 Request for Proposal

General Information

Proposal ID: 2022-076

Proposal Title: Modernizing Minnesota's Digital Lake Inventory

Project Manager Information

Name: Steve Kloiber

Organization: MN DNR - Ecological and Water Resources Division

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Project Basic Information

Project Summary: Enhance lake conservation planning of state and local partners with a comprehensive update of Minnesota's lake and pond GIS data as well as streamlining future maintenance.

Funds Requested: \$787,000

Proposed Project Completion: June 30 2025

LCCMR Funding Category: Foundational Natural Resource Data and Information (A)

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?

In the Future

Narrative

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

Minnesota's lake GIS dataset suffers from a variety of issues, including missing features, inaccurate boundaries, and classification errors. This project proposes a comprehensive update of lake and pond GIS data. This dataset is one of the Department of Natural Resources' (DNR) most requested GIS layers. It is used to derive other lake information and is part of several key web applications, such as DNR's LakeFinder and Watershed Health Assessment Framework.

The current lake GIS data was largely derived from USGS topographic maps created in the 1970s. Although selected features have been updated, most of the mapped boundaries remain identical to the original maps and are incompatible with modern high-resolution aerial imagery and lidar data. This has significant implications for the use of these data for natural resource management. Errors affect how lakes appear in maps, reports, and web-based mapping applications. Many lake assessments, such as groundwater dependent lakes or lakes of phosphorus sensitivity, rely on the surface area of the lake as an element of the analysis. Errors in mapped area translate into errors that affect analysis results and in turn affect how lake management efforts are prioritized. These errors can lead to wasted effort or missed opportunities.

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.

This project will create a new authoritative GIS dataset for lakes and ponds using the most current information available. We will leverage the recently updated National Wetland Inventory (NWI) for Minnesota (funded by ENRTF, completed in 2019), and the latest high-resolution aerial imagery and lidar data to create a new dataset. A semi-automated process will be developed to assemble and modify NWI polygons into an initial dataset. These features will be verified using the most recent lidar and aerial imagery data. We will transfer the DNR Basin ID numbers from the existing dataset, ensuring the new dataset complements the existing NWI and integrates with current applications. The end result will be a dataset with more accurate boundaries and improved classification of waterbody types.

Creating an accurate and up-to-date inventory of lakes in Minnesota is an enormous challenge. Accordingly, we have assembled a highly qualified project team. Team members include Saint Mary's University and DNR Resource Assessment Program (RA). The DNR has historically played, and will continue to play, a key role in providing accurate lake inventory information for Minnesota. In addition, we will engage with key stakeholders throughout the process to ensure that data meets their needs.

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?

The updated lake GIS data will enhance conservation planning efforts of state and local governments, as well as non-governmental organizations. It will improve prioritization and targeting of lake management. The data will be made publicly available, used to update a variety of derived lake information, and replace older lake data in several web-based mapping applications. Furthermore, project will also provide natural resources and GIS mentorship opportunities for college students at St. Mary's University. Additionally, this project will simplify maintenance efforts, through combining support of this new dataset with that of the NWI data.

Activities and Milestones

Activity 1: Data design and governance

Activity Budget: \$108,000

Activity Description:

This activity will engage a cross-section of end users to provide input on the database design and business rules for the data to ensure that the product meets the needs of a wide array of users. This includes documenting problems with the existing data, expected uses of the data, and opportunities for future enhancement. The DNR will form a representative team of end users from across multiple sectors to engage in a structured discovery process to understand customer needs. Input from this process will be incorporated into a draft data design that we will pilot for a small area. The steering team will evaluate the pilot data, and the feedback will be used to finalize the design. This team will also help define ongoing governance for the data to ensure that the data continues to meet user needs.

Activity Milestones:

Description	Completion Date
Identify end users and define user requirements.	December 31 2022
Database design and pilot testing completed	April 30 2023
Data governance and rules developed and refined	April 30 2023

Activity 2: Create statewide updated lake GIS dataset

Activity Budget: \$578,000

Activity Description:

The database design and business rules defined under Activity 1 will guide the development of a statewide updated lake GIS dataset. Saint Mary's University will have primary responsibility for this activity, with the steering team supporting their progress throughout the project. Saint Mary's will develop, test, and document an efficient process for creating this dataset and assigning the correct DNR basin ID numbers to corresponding polygons from the NWI layer. This will be a semi-automated process involving attribute and spatial queries to create an initial relationship, but significant human interpretation and manual editing during the draft data development phase of the project will be needed to resolve discrepancies and ensure the accurate assignment of ID numbers. The draft data will be provided to the DNR; independent reviews will be provided by RA and other stakeholders. DNR will compile the feedback on the draft data and use this to guide any modifications to be completed by Saint Mary's before publishing the final data. As part of data finalization, Saint Mary's will add attribute fields, which are required to support the end users' needs defined in Activity 1 (e.g., waterbody class).

Activity Milestones:

Description	Completion Date
Method development, testing and documentation	April 30 2023
All draft data developed and delivered for review	December 31 2024
Data reviewed and quality control completed	April 30 2025

Activity 3: Data delivery and user outreach

Activity Budget: \$101,000

Activity Description:

This activity will facilitate the integration of the new lake GIS dataset into existing applications and web maps (such as

the MN Geospatial Commons, DNR LakeFinder, Watershed Health Assessment Framework, and others). We will publicize and promote the dataset through conferences, webinars, and other meetings aimed at local and state watershed and lake managers as well as associated technical communities including GIS professionals. The steering team established in Activity 1 will also be engaged to assist in the effort to promote and publicize the data within their respective organizations. This activity also includes the development of a dedicated public-facing web application for non-GIS users. Additional project outcomes include sharing information about the value of Minnesota's lakes and ponds, and highlighting the importance of maintaining clean water.

Activity Milestones:

Description	Completion Date
Web application for the non-GIS public completed	May 31 2025
Integrate data into existing lake GIS applications	June 30 2025
User outreach and promotion (conferences, map/poster distribution)	June 30 2025

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Andy Robertson	Saint Mary's University of Minnesota	GeoSpatial Services at Saint Mary's University (GSS) will provide technical assistance with conducting the statewide update of the Minnesota lake GIS dataset. GSS has been involved in similar projects, such as the National Wetlands Inventory(NWI) update project for Minnesota.	Yes
Minnesota IT Services	Minnesota IT Services	Development of data editing and updating application, a public viewable web application, and technical data steward to assist with database design and technical coordination.	Yes
DNR Resource Assessment	DNR Resource Assessment	Conduct quality control and quality analyses of the data produced by Saint Mary's University. RA will also provide additional testing, data management, or data analyses tasks as needed by DNR or the steering team. RA has provided these services in the past for several similar projects, including the NWI.	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?

DNR and MNIT will provide ongoing stewardship of these data to ensure that they are maintained and accessible to all users. Data maintenance and dissemination will be integrated into existing programs. DNR and MNIT will incorporate ongoing maintenance of these data with the maintenance of the NWI data funded through existing sources for data stewardship. Data will be publicly available on the MN Geospatial Commons, and used across multiple previously mentioned platforms (LakeFinder, Watershed Health Assessment Framework, etc).

Project Manager and Organization Qualifications

Project Manager Name: Steve Kloiber

Job Title: Lake Ecology Unit Supervisor

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

Steve Kloiber supervises the Lake Ecology Unit for the Minnesota DNR. Prior to this, he served as the DNR's wetland monitoring coordinator and managed a 10-year ENRTF project for a statewide update of the National Wetland Inventory. In this position, he also oversaw the wetland status and trends monitoring program. Before joining the DNR, he was the lead environmental analyst for the Metropolitan Council of the Twin Cities from 1997 to 2008 and he served on the Nine Mile Creek Watershed District Board from 2007 to 2019. He has over 30 years of experience in water resource science and GIS. He received his master's and PhD from the University of Minnesota in environmental engineering with a minor in water resources science.

Organization: MN DNR - Ecological and Water Resources Division

Organization Description:

The Minnesota Department of Natural Resources (DNR)'s mission is to work with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life. The Department consists of seven Divisions including Fish and Wildlife, Forestry, Lands and Minerals, Parks and Trails, Enforcement, Operations Services and Ecological and Water Resources, as well as four regions.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Project Coordinator		Coordinate the project plan, schedule meetings, help organize and coordinate the work of partners (SMU and MNIT), coordinate with steering team to provide overall direction.			25%	1.05	X	\$120,000
							Sub Total	\$120,000
Contracts and Services								
St Mary's University	Sub award	Sub-award for developing the lake GIS data update. This will include participating in the user requirements discovery process, developing and testing procedures for the update, developing draft data for review, and revising the data to create a final dataset.				2		\$350,000
MNIT Services	Professional or Technical Service Contract	Develop, test, deploy data review tool similar to buffer map tool or NWI review tool. Develop a basic data explorer type web map to provide access to the data for the non-GIS user				0.4		\$220,000
MN DNR Resource Assessment	Professional or Technical Service Contract	Conduct an independent check of the data produced by Saint Mary's University, and provide any additional data management or analyses tasks as needed by DNR or the steering team. RA has provided these services in the past for several similar projects, such as the NWI.				0		\$80,000
							Sub Total	\$650,000
Equipment, Tools, and Supplies								
							Sub Total	-
Capital Expenditures								
							Sub Total	-

4/7/2021

Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Conference Registration Miles/ Meals/ Lodging	Travel and attendance for one DNR or MNIT staff person to present at three different conferences	Promotion of new hydrology dataset and feedback					\$3,000
							Sub Total	\$3,000
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Printing	Design, layout, and printing for 500+ statewide lake map posters	Promotion and public awareness.					\$4,326
							Sub Total	\$4,326
Other Expenses								
		Direct and Necessary	DNR's direct and necessary costs pay for activities that are directly related to and necessary for accomplishing appropriated projects. HR Support (~\$1747), Safety Support (~\$271), Financial Support (~\$1619), Communication Support (~\$1311), IT Support (~\$3718), and Planning Support (~\$1008).					\$9,674
							Sub Total	\$9,674
							Grand Total	\$787,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Personnel - Project Coordinator		Coordinate the project plan, schedule meetings, help organize and coordinate the work of partners (SMU and MNIT), coordinate with steering team to provide overall direction.	Classified : Diverted duties will be backfilled through other available staffing options.

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: [48d6dd82-edb.pdf](#)

Alternate Text for Visual Component

Title: Modernizing Minnesotas Digital Lake Inventory. Inset map showing MN Lakes. "Many lake boundaries originate from old maps and are inaccurate."

Illustrated by map inset showing existing Deadman Lake boundary (in blue outline) overlaying original 1970's USGS quadmap, an arrow directing to map inset of updated Deadman Lake Boundary over modern aerial imagery. "Existing data have numerous classification errors. This project seeks to correctly classify the open water and wetland fringe of l...

Optional Attachments

Support Letter or Other

Title	File
GoodhueCo Letter of Support	52d55df4-081.pdf
UMN Letter of Support	c7ba7e57-3e1.pdf

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

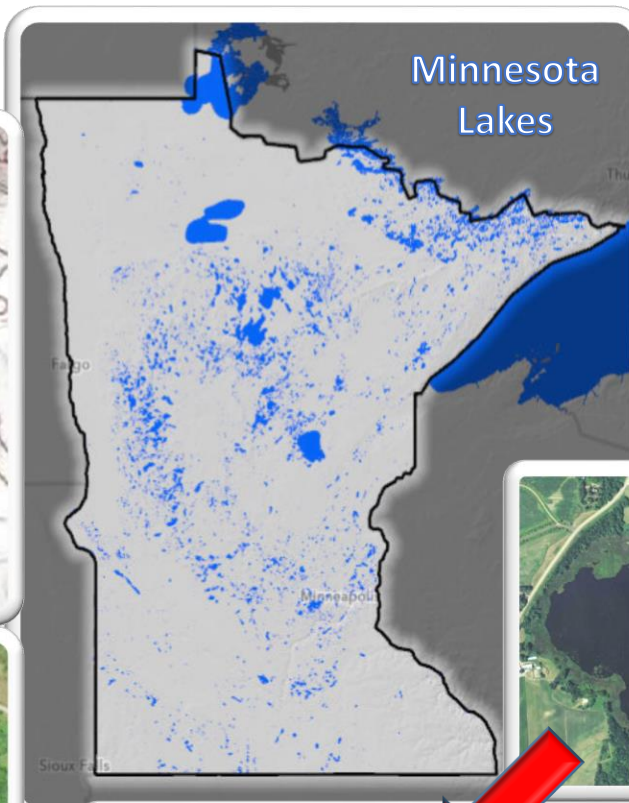
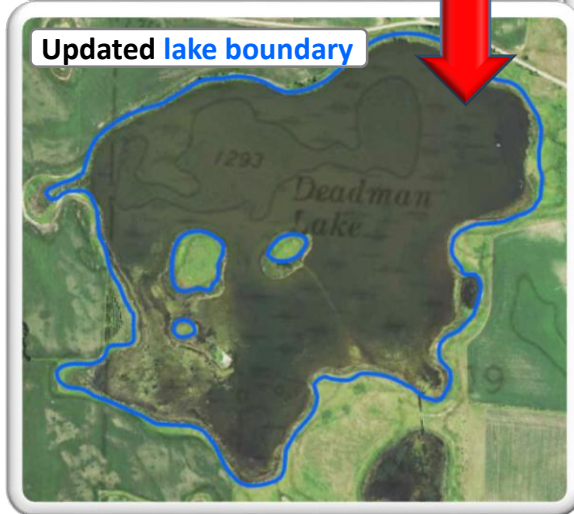
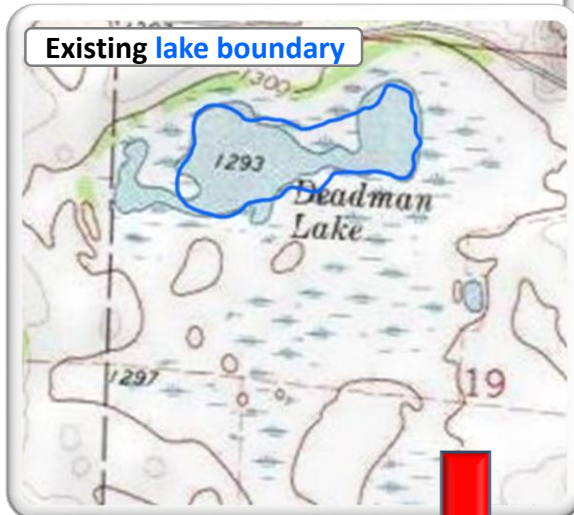
Does your project include original, hypothesis-driven research?

No

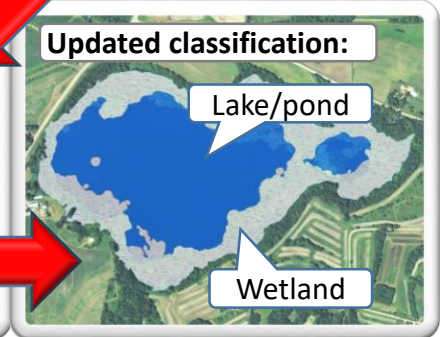
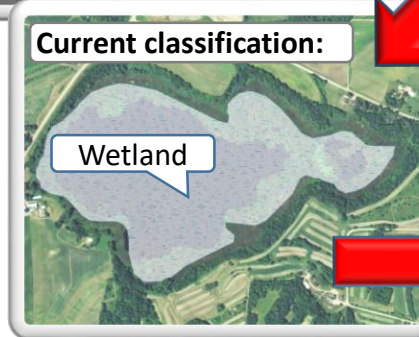
Does the organization have a fiscal agent for this project?

No

Modernizing Minnesota's Digital Lake Inventory



Does MN still have 11,842 Lakes?
-
This project will provide a more accurate lake census.



Many lake boundaries originate from old maps and are inaccurate.

Existing data have numerous classification errors. This project seeks to correctly classify the open water and wetland fringe of lake basins.

Project goals and benefits:

- Update the digital lake inventory using the latest high-resolution data.
- Integrate digital lake data with the larger National Wetlands Inventory.
- Accurate, up-to-date lake data is fundamental to protecting Minnesota's lakes.
- Many organizations rely on the DNR lake data to connect a wide array of vital information.

