

Final Abstract

Final Report Approved on February 11, 2025

M.L. 2021 Project Abstract

For the Period Ending June 30, 2024

Project Title: Collaborative State and Tribal Wild Rice Monitoring Program

Project Manager: Josh Knopik

Affiliation: MN DNR - Ecological and Water Resources Division

Mailing Address: 1601 Minnesota Drive

City/State/Zip: Brainerd, MN 56401

Phone: (218) 203-4364

E-mail: joshua.knopik@state.mn.us

Website: <https://www.dnr.state.mn.us/ewr/index.html>

Funding Source:

Fiscal Year:

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03i

Appropriation Amount: \$644,000

Amount Spent: \$251,303

Amount Remaining: \$392,697

Sound bite of Project Outcomes and Results

The State-Tribal Wild Rice Monitoring Collaboration brought together a network of state agency, tribal entities and other organization professionals to develop a collaborative around collecting and sharing data on wild rice abundance. This baseline data was used to refine remote sensing application to create statewide maps of wild rice coverage.

Overall Project Outcome and Results

The State-Tribal Wild Rice Monitoring Collaboration was created to address the decline of natural wild rice in Minnesota, a vital ecological and cultural resource. Despite its importance, only 3% of Minnesota's wild rice lakes were being monitored, with fragmented and inconsistent data. This project established a coordinated, statewide wild rice monitoring program to improve conservation efforts, enhance data collection, and develop new tools for tracking wild rice abundance.

Working in partnership with tribal nations, state agencies, and conservation organizations, the project collected field data from 2,925 survey points across 27 lakes in 2022 and 2023. Plant density, disease prevalence, and habitat conditions were documented. The project also improved a Google Earth Engine (GEE) remote sensing tool to map wild rice statewide, refining techniques to better detect changes in abundance. Additionally, UAV (drone) technology was

tested for its potential to improve monitoring accuracy and efficiency.

A key outcome was the creation of a collaborative network of 12 tribal and state partners, improving relationships and coordination in wild rice conservation. Annual Wild Rice Knowledge Symposiums provided a platform for sharing data, integrating Indigenous knowledge, and fostering cross-agency cooperation.

The project enhances Minnesota's air, water, and land quality by helping provide baseline data on wild rice. Wild rice is not only important culturally, but also ecologically as it filters phosphorus, prevents shoreline erosion, and supports fish and wildlife habitats. Findings from the monitoring program are shaping future conservation strategies, and research efforts to address climate change and human impacts on wild rice. The data will continue to be used for long-term environmental planning, ensuring that wild rice remains a thriving resource for future generations. This collaborative approach sets a model for state-tribal partnerships in natural resource management, demonstrating the power of shared knowledge in preserving Minnesota's ecological and cultural heritage.

Project Results Use and Dissemination

The Wild Rice Conservation Report outlines efforts to protect and monitor Minnesota's wild rice through state-tribal collaboration, data collection, and advanced remote sensing to sustain its ecological and cultural significance.

Modeled Wild Rice Presence 2023 results are available at the Minnesota Natural Resources Atlas. <https://mnatlas.org/>
Proceedings of the Wild Rice Knowledge Symposium are being published by the UMN, with a weblink forthcoming.



Environment and Natural Resources Trust Fund

M.L. 2021 Approved Final Report

General Information

Date: February 17, 2025

ID Number: 2021-159

Staff Lead: Mike Campana

Project Title: Collaborative State and Tribal Wild Rice Monitoring Program

Project Budget: \$644,000

Project Manager Information

Name: Josh Knopik

Organization: MN DNR - Ecological and Water Resources Division

Office Telephone: (218) 203-4364

Email: joshua.knopik@state.mn.us

Web Address: <https://www.dnr.state.mn.us/ewr/index.html>

Project Reporting

Final Report Approved: February 11, 2025

Reporting Status: Project Completed

Date of Last Action: February 11, 2025

Project Completion: June 30, 2024

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03i

Appropriation Language: \$644,000 the first year is from the trust fund to the commissioner of natural resources to work with Tribal partners to create a collaborative and comprehensive monitoring program to conserve wild-rice waters, develop remote sensing tools for statewide estimates of wild rice coverage, and collect consistent field data on wild rice health and abundance.

Appropriation End Date: June 30, 2024

Narrative

Project Summary: Work with tribal partners in the conservation of wild rice waters, creating a collaborative monitoring program and developing remote sensing tools for statewide assessment of natural wild rice abundance.

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

Minnesota supports the largest abundance of natural wild rice in the United States, yet less than three percent of Minnesota's wild rice lakes are monitored, and that data is fragmented and isolated. Both the Governor's and the Minnesota Tribal Wild Rice Task Forces identified the need for a statewide monitoring program in 2018. DNR has no dedicated funds for wild rice monitoring, and limited funds for wild rice management. Adopted as the state grain in 1977, wild rice has declined in statewide distribution.

Wild rice is important to the state of Minnesota. In lakes, wild rice reduces phosphorous, protects shorelines from erosion, and provides habitat for, fish, birds, muskrats, and dragonflies. In the fall, wild rice lakes are important feeding areas for waterfowl during migration. Wild rice is culturally and spiritually significant to Minnesota tribes, and both tribal and non-tribal citizens harvest the seed.

Monitoring of wild rice has been initiated in parts of the state. The 1854 Treaty Authority began a program in 1998 to document wild rice abundance in northeastern Minnesota. From their initial program, a wild rice monitoring field guide and handbook was developed with partners, providing a tool for a more consistent approach.

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.

We propose to create a tribal-state wild rice monitoring program to develop a coordinated baseline of wild rice abundance in Minnesota. Data collected from the field will be used to improve a remote sensing tool for assessing statewide abundance of wild rice, analyze trends, and support investigations of challenges facing wild rice.

Current wild rice mapping efforts include the use of new technologies. Tribal entities are using drones for lake wide assessment, and Colorado State University developed a remote sensing application using Google Earth Engine (GEE) to identify wild rice stands across Minnesota. While the initial GEE process shows utility, refinement is necessary before the tool can be operational.

We are seeking funding to:

1. Build and develop a collaborative for comprehensive wild rice monitoring.
2. Use developed methods to collect field data on wild rice abundance and disease assessment on a selected set of wild rice lakes.
3. Improve and operationalize the existing Google Earth Engine tool to estimate annual coverage of wild rice statewide.

Support has been expressed by the following Tribes: Fond du Lac, Leech Lake, Grand Portage, Mille Lacs, White Earth, and Red Lake Nations, and inter-tribal organizations including the 1854 Treaty Authority, MCT and GLIFWC

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?

A state-tribal collaborative for monitoring wild rice will:

- Increase consistency among data sets on wild rice density, coverage, disease and phenology;
- Improve our understanding of wild rice abundance and coverage at the state level;
- Enhance our collective understanding of cultural perspectives and approaches to conservation of wild rice;
- Develop more robust tools for monitoring wild rice;

- Reveal long-term changes in wild rice that may result from a variety of factors such as climate change, land use change and lake shore development;
- Improve relationships between state and tribal resource staff engaged in wild rice management.

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

Activities and Milestones

Activity 1: Coordinate and collect field data on wild rice abundance and health across a sub-set of wild rice lakes

Activity Budget: \$439,750

Activity Description:

Annually coordinate and assess a minimum of 15-20 wild rice lakes using agreed upon monitoring methods and guidance. Depending on collaboration process, this number could increase substantially (50-100). Assessments on each wild rice lake may include: mapping of floating and emergent aquatic plants, collection of water samples for water quality, sediment sampling, and water level data. Multiple sample sites (minimum of 40 per lake) will be used to collect detailed plot data, including wild rice stem density, water depth, presence of other aquatic plants, sediment characteristics, and presence of disease (such as brown fungal spot and rice worms).

Activity Milestones:

Description	Approximate Completion Date
Work flow developed and guidance documents created (database and field applications)	June 30, 2022
Long-term monitoring lakes selected and monitoring tiers developed per collaborative agreement	June 30, 2022
Wild rice lakes sampled and monitoring data entered into database (annually)	December 31, 2023
Annual Review and Presentation of Data to Collaborative	February 28, 2024

Activity 2: Build and develop a collaborative for comprehensive wild rice monitoring.

Activity Budget: \$73,000

Activity Description:

Building trust and developing relationships are critical for creating a long-term wild rice monitoring Collaborative. The milestones described below are potential milestones, recognizing that the point of the Collaborative is to share, discuss and build a framework for the collaborative that we construct together. Discussions have begun online, showing interest in a collaboration, however each tribal entity will decide whether to participate and at what level, should the proposal be funded.

Support for early and regular communication, and building awareness of cultural values and differences have been part of our first conversations. It is our intent to continue communication during the entire LCCMR process. Suggested milestones for the Collaborative include monthly coordination and collaborative meetings in the first year. Coordination prior to monitoring season and an annual meeting to discuss and present monitoring results has been identified as a priority.

Activity Milestones:

Description	Approximate Completion Date
Meet monthly with tribal and state partners to develop collaborative guidance.	June 30, 2022
Hold annual Collaborators Wild Rice Symposium	February 28, 2023
Wild Rice Conservation Report	June 30, 2024

Activity 3: Improve and operationalize Google Earth Engine remote sensing tool to estimate statewide wild rice coverage.

Activity Budget: \$100,000

Activity Description:

Operationalize and refine the Google Earth Engine (GEE) wild rice mapping application initially developed by Colorado State University. Use the field data from the annually monitored wild rice lakes, and satellite imagery, to improve accuracy of the GEE model. With each year of lake monitoring, improve and assess wild rice mapping methods. The final product will include a consistent data workflow, resulting in annual, statewide wild rice coverage maps.

One of the constraints with the current model is accuracy in stands of wild rice that are sparse and stands which consist of mixed vegetation. In the first year, additional data will be collected to determine at what point (stems per square meter) accuracy of the model declines. A benefit of refining the model is that the incorporated satellite imagery and radar data is available back to 2017. This can potentially provide an extended look at wild rice abundance through the years, prior to the project years.

Activity Milestones:

Description	Approximate Completion Date
Trial and test field assessment/ ground truthing methods to enhance density gradients	January 31, 2022
Refine GEE model using increased stand density data and methods (DNR Resource Assessment)	June 30, 2022
(DNR Resource Assessment) develops annual statewide map of wild rice coverage (2023, 2024)	January 31, 2024
Statewide wild rice coverage maps using 2017-2021 satellite imagery/radar data	June 30, 2024

Activity 4: Hold Collaborative Wild Rice Knowledge Symposium

Activity Budget: \$31,250

Activity Description:

Hold a symposium to bring together tribal agency members, students, researchers, non-profits, federal and state agency representatives, and others for two days of collaborative and knowledge-focused discussion on wild rice monitoring, harvesting, stewardship, and community gathering. The Wild Rice Knowledge Symposium will directly benefit the monitoring collaboration by providing a venue and large wild rice focused audience to highlight and promote the results of monitoring efforts. Active recruitment will be done through a workshop and by directly extending invitations to entities not yet participating in the monitoring collaboration. Symposium success will be measured by 1. increased participants to future monitoring collaboration meetings and workshops, 2. additional utilization of monitoring collaboration results/products, and 3 participant responses to end of symposium feedback survey. Symposium proceedings will be documented, and digital formats will be published on symposium website and Planning Committee websites for public dissemination. Printed copies will be made available and distributed by planning partners. To ensure attendance and participation by necessary people, needs-based financial support will be provided up to 30 participants.

Activity Milestones:

Description	Approximate Completion Date
Hold Collaborative Wild Rice Knowledge Symposium	November 30, 2023
Bring together at least 100 people from at least 8 different entities	November 30, 2023
Summarize and publish symposium proceedings	January 31, 2024
Add new partners to monitoring collaboration	January 31, 2024

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Michael Northbird	Minnesota Chippewa Tribe Environmental Program	Collaboration building. Serves as central communicator for environmental and natural resource work among the Tribes (Mille Lacs, Bois Forte, Grand Portage, Leech Lake, White Earth and Fond du Lac).	No
Katie Draper	Mille Lacs Band of Ojibwe Department of Natural Resources	Collaboration building and wild rice monitoring interest. Sub-award to be determined.	Yes
Shane Bowe	Red Lake Nation Department of Natural Resources	Collaboration building; Currently involved in collecting drone imagery for wild rice monitoring. Sub-award to be determined.	Yes
Peter David	Great Lakes Indian Fish and Wildlife Commission	Conducts monitoring around Mille Lacs area and works in the 1837 treaty ceded territories. Mille Lacs Band of Ojibwe and Fond du Lac are member tribes.	Yes
John Bekkerus	White Earth Nation Division of Natural Resources	Collaboration building. Explore options for monitoring wild rice. Sub-award to be determined.	Yes
Nancy Schuldt	Fond du Lac Band of Lake Superior Chippewa Resource Management Division	Collaboration building. Wild rice monitoring and restoration experience. Sub-award to be determined.	Yes
Crystal Ng and Cara Santelli	University of Minnesota Interdisciplinary Manoomin Collaboration	Inputs on collaboration; Coordination on field sampling, analysis, and data collection.	Yes
Margaret Watkins	Grand Portage Band of Lake Superior Chippewa Environmental and Biology Department	Collaboration building around wild rice monitoring.	No
Kate Hagsten	Leech Lake Band of Ojibwe Division of Resource Management	Collaboration building. Currently assessing wild rice on lakes within the reservation, and began a project to look at rice worms. Looking for partners to extend rice worm work. Sub-award to be determined.	No
Darren Vogt	1854 Treaty Authority	Collaboration building. Governed by the Bois Forte and Grand Portage bands. Currently monitor wild rice and may be interested in working to develop additional efforts. Sub-award to be determined.	Yes
Kristen Blann	The Nature Conservancy	Collaboration building, field data collection and analysis. Sub-award to be determined.	Yes
Jody Vogeler	Colorado State University -	Technology transfer and training on Google Earth Engine model development.	Yes

	Natural Resources Ecology Lab		
Annette Drewes	The Nature Conservancy	Tribal Collaborative Coordinator	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 ENTRF Acknowledgement Requirements and Guidelines.

The end product of this project will be an annual maps of wild rice stands across much of the state of Minnesota. The final database, geographic extent, and map product platform will be decided by the collaborative (to be developed under Activity 2). One potential option that has been discussed is the Minnesota Natural Resource Atlas - host by UMN's NRRRI. ENTRF will be acknowledged through use of the trust fund logos and attribution language on all shared products per the ENTRF 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?

This project will provide the initial foundational framework to build a collaborative effort to monitor wild rice statewide. Increased coordination, expanded monitoring, and consistent data will allow resource managers to better understand impacts to wild rice, plan for protection and identify trends in wild rice distribution. Ongoing efforts will be made to MN DNR management and other organizations to prioritize making this a permanently funded program.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount	\$ Amount Spent	\$ Amount Remaining
Personnel										
Field technician		Field data collection			20%	3		\$152,064	-	-
							Sub Total	\$152,064	\$3,231	\$148,833
Contracts and Services										
DNR Resource Assessment	Internal services or fees (uncommon)	Improve the Google Earth Engine remote sensing application, listed in Activity Three, and produce statewide wild rice coverage maps.				0.99		\$100,000	\$98,166	\$1,834
TBD	Subaward	Sub Awards granted to collaborative partners. Funds will be used for data gathering efforts such as hiring field staff (interns or seasonal technicians).				0		\$181,250	-	\$181,250
The Nature Conservancy	Subaward	Funding to provide tribal collaborative coordination.				0.34		\$22,485	\$22,485	-
White Earth Nation	Subaward	Collecting field data on wild rice abundance and delineations of aquatic plant communities on lakes within the White Earth Reservation. Up to \$780 (\$65/night x 2 nights x 6 people) may be utilized for symposium lodging for committee members, students working at the symposium or core presenters)		X		0.8		\$35,000	\$20,652	\$14,348
Wild Rice Connections	Professional or Technical Service Contract	Provide Collaboration Coordination services (Host meeting, workshops, maintain communication updates, and assist with reporting				0.19		\$22,000	\$18,405	\$3,595
University of Minnesota	Subaward	Organize and host Wild Rice Knowledge Symposium. Detailed budget for the subaward will be managed and submitted in an Excel workbook via the attachments page under "Optional Attachments/ Support Letter or Other" with the file name as the date of		X		0		\$29,950	\$24,876	\$5,074

		submission (for example, YYYY-MM-DD UMN Subaward Budget Update).								
Red Lake Nation	Subaward	Collect, review and share field data on wild rice abundance, and provide training on UAV collected data to other collaboration members				0.75		\$50,000	\$49,976	\$24
							Sub Total	\$440,685	\$234,560	\$206,125
Equipment, Tools, and Supplies										
	Equipment	Field sampling equipment	Canoes and other tools for field sampling.					\$6,000	\$2,522	\$3,478
							Sub Total	\$6,000	\$2,522	\$3,478
Capital Expenditures										
							Sub Total	-	-	-
Acquisitions and Stewardship										
							Sub Total	-	-	-
Travel In Minnesota										
	Miles/ Meals/ Lodging	lodging and meals	lodging and meals during field sampling					\$12,716	\$1,132	\$11,584
	Other	DNR Fleet services	truck lease and mileage (3 trucks for 3 months/yr)					\$10,000	\$3,211	\$6,789
	Conference Registration Miles/ Meals/ Lodging	Lodging \$780 (\$65/person/night x 2 nights x 6 people); Miles \$520 (200mi (rt) X 4 vehicles)	Attendance of 8 DNR Employees directly involved on the project, 4 will be presenting results and findings of monitoring efforts, others are planning committee members or involved field staff. 2 staff are local and not taking lodging	X				\$1,300	\$1,280	\$20
							Sub Total	\$24,016	\$5,623	\$18,393

Travel Outside Minnesota										
							Sub Total	-	-	-
Printing and Publication										
							Sub Total	-	-	-
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 (~\$4,983), Safety Support (~\$926), Financial Support (~\$2808), Communication Support (~\$1,324), IT Support (~\$10,045), and Planning Support (~\$1,149).					\$21,235	\$5,367	\$15,868
							Sub Total	\$21,235	\$5,367	\$15,868
							Grand Total	\$644,000	\$251,303	\$392,697

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Contracts and Services - White Earth Nation	Subaward	Collecting field data on wild rice abundance and delineations of aquatic plant communities on lakes within the White Earth Reservation. Up to \$780 (\$65/night x 2 nights x 6 people) may be utilized for symposium lodging for committee members, students working at the symposium or core presenters)	Attendance at the symposium is necessary to present results of their monitoring efforts.
Contracts and Services - University of Minnesota	Subaward	Organize and host Wild Rice Knowledge Symposium. Detailed budget for the subaward will be managed and submitted in an Excel workbook via the attachments page under "Optional Attachments/ Support Letter or Other" with the file name as the date of submission (for example, YYYY-MM-DD UMN Subaward Budget Update).	The subaward includes multiple generally ineligible expenses directly related to and necessary for the project. See the attached Excel subaward budget spreadsheet for the detailed justifications.
Travel In Minnesota	Conference Registration Miles/Meals/Lodging	Lodging \$780 (\$65/person/night x 2 nights x 6 people); Miles \$520 (200mi (rt) X 4 vehicles)	Attendance for 8 DNR Employees directly working on the project, 4 employees will be presenting results of monitoring and demonstrating the project findings, The 4 others include: planning committee members, and involved field staff.

Non ENRTF Funds

Category	Specific Source	Use	Status	\$ Amount	\$ Amount Spent	\$ Amount Remaining
State						
In-Kind	Natural Resources Specialist - Aquatic Ecologist, Clean Water Funded	Project Manager (0.25 FTE): Writing contracts, participating in collaborative development, budgeting, and some field sampling.	Secured	\$70,200	\$70,200	-
In-Kind	Natural Resource Specialist - Aquatic Biologist, Heritage Enhancement Funded	Field Coordinator: Hire, and train technicians, Coordinate sampling efforts with partners, field sampling	Secured	\$70,200	\$70,200	-
In-Kind	State Program Administrator - Clean Water Specialist : Water Recreation Funded	Tribal Collaborative Coordinator - Bring together tribal and other organizations, through meetings and workshops, to develop a wild rice monitoring collaborative. some field sampling	Secured	\$28,080	\$28,080	-
In-Kind	Professor - Hydrology/Hydrogeology, funded by University of Minnesota, Twin Cities, Dept. of Earth & Environmental Sciences	University collaborative fieldwork coordinator - Assist with training field crew on hydrological monitoring and water/sediment sampling, coordinate field visits, participate in collaboration meetings with tribal partners and MN-DNR	Secured	\$5,368	\$5,368	-
			State Sub Total	\$173,848	\$173,848	-
Non-State						
In-Kind	Freshwater ecologist, The Nature Conservancy in MN, ND, SD	Collaboration building, field data collection and analysis	Secured	\$25,000	\$25,000	-
In-Kind	Environmental Program – Program Manager, Minnesota Chippewa Tribe (MCT)	MCT Coordinator – participation and oversight through meetings and/or workshops related to project and Tribal collaboration	Secured	\$2,500	\$2,500	-
In-Kind	Program Director, Red Lake Nation Water Resources Program	Collaboration building and field protocol development	Secured	\$10,000	\$10,000	-
In-Kind	Water Projects Coordinator, Fond du Lac Band of Chippewa	Collaboration building, field monitoring development	Secured	\$10,000	\$10,000	-
In-Kind	Resource Management Director, 1854 Treaty Authority	Collaboration building and field monitoring development	Potential	\$10,000	\$10,000	-
In-Kind	Natural Resources specialist for Mille Lacs Band of Ojibwe, and associated staff and resources	Collaboration building, monitoring resources and staff time.	Potential	\$7,500	\$7,500	-
Cash	Symposium registration fees	Symposium registration fees will be applied to support symposium expenditures not covered by LCCMR	Potential	\$15,000	\$15,000	-
Cash	NOAA - Harvesting Manoomin Grant	Symposium costs such honoraria, travel and lodging expenses for supported members	Secured	\$6,000	\$6,000	-

In-Kind	Fond Du Lac Reservation Business Counsel	Symposium conference center rooms and facilities	Secured	\$4,000	\$4,000	-
Cash	Wisconsin Department of Natural Resources	Support conference cost (such as Audio Video expense)	Potential	\$2,000	\$2,000	-
			Non State Sub Total	\$92,000	\$92,000	-
			Funds Total	\$265,848	\$265,848	-

Attachments

Required Attachments

Visual Component

File: [28056695-850.pdf](#)

Alternate Text for Visual Component

Title: Collaborative State-Tribal Wild Rice Monitoring Program. Pictures of a wild rice plant; a person measuring wild rice stems in the field, from a canoe; a map of Minnesota and the current and past distribution of wild rice; an aerial photo of Upper Rice Lake with areas of wild rice shown in dark purple and areas in the lake of mixed vegetation with shown in light purple. A three bulleted list of project activities and the logos from the natural resource divisions of Red Lake, Fond du La...

Supplemental Attachments

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

Title	File
UMN_Ng_LetterOfSupport	95434c20-d98.pdf
TNC letter of support for wild rice proposal	ddc4460f-52c.pdf
Leech Lake Band of Ojibwe Letter of Support	42f0f3ab-b90.pdf
Background Check Certification Form 2021_159_Knopik	b9a9fd2f-6ee.pdf
A framework for Collaboration: Wild Rice Monitoring in Minnesota (NALMS 2022)	dc09d6e7-d32.pdf
2023-10-10 UMN Subaward Budget Update	266f6993-64f.xlsx
2024-02-07 UMN Subaward Budget Update	340d9041-256.xlsx
2024-06-01 UMN Subaward Budget Update	31ec7f40-24d.xlsx
Wild Rice Conservation Report	5850d95e-c83.docx
Wild Rice Management Seminar - Framework for Collaboration	ef218291-dfd.pdf
Monitoring Wild Rice Using UAVs	616db8a7-6b6.pdf
Wild Rice Conservation Report 2024	ffa1b2f3-e43.pdf

Media Links

Title	Link
Modeled Wild Rice Presence 2023 Map - Data Portal	https://gisdata.mn.gov/it/dataset/biota-dnr-wild-rice-presence
Modeled Wild Rice Presence 2023 MN Natural Resources Atlas Link	https://mnatlas.org/mapapp/index.html?state=(layers%3A(id%3A!(k_0634)))

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Cuts were made to field sampling (Activity 1), \$130,000 was cut from tribal sub awards, and \$85,000 was cut from DNR technician FTE, Annette Drewes (Tribal Collaborative Coordinator) line was for moved from the personnel budget line item, and added as a sub award received by The Nature Conservancy. This was done to reflect her change of employment, from a classified position with MN DNR to a coordinator with the non-profit organization, The Nature Conservancy. She will continue to fulfil her role within this project despite her change of employment.

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

Work Plan Amendments

Amendment ID	Request Type	Changes made on the following pages	Explanation & justification for Amendment Request (word limit 75)	Date Submitted	Approved	Date of LCCMR Action
1	Amendment Request	<ul style="list-style-type: none"> • Project Collaborators - Project Partner Info • Budget - Professional / Technical Contracts 	removed Grand Portage and Leech Lake Band of Ojibwa from receiving funds, as they already have wild rice sampling program. they remain active partners, but funding is not needed. Added Kristin Blann (TNC) as likely receiving funds as they are considering increasing their sampling efforts.	April 20, 2022	Yes	June 7, 2022
2	Amendment Request	<ul style="list-style-type: none"> • Budget - Professional / Technical Contracts 	Updated Professional and Technical contracts budget: Added White Earth sub award, updated TBD line value, updated missing FTE's in the other sub award lines, and updated budget summary as requested.	December 13, 2022	Yes	December 16, 2022
3	Amendment Request	<ul style="list-style-type: none"> • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Activities and Milestones • Budget - Travel and Conferences • Budget - Printing and Publication • Budget - Other • Budget - Non-ENRTF Funds Contributed 	Remove Colorado State Contract as technology transfer is no longer needed, remove water sampling cost as it was done by UMN, reduce unallocated sub award funds. Move those funds to support the added Wild rice symposium (activity 4). Updated budget items to support the Collaborative Wild Rice Knowledge Symposium to bring together state, tribal and federal entities involved in the wild rice monitoring to highlight efforts, share results, and promote future engagement with potential collaborators.	September 14, 2023	Yes	September 18, 2023
4	Amendment Request	<ul style="list-style-type: none"> • Budget - Printing and Publication • Budget - Other • Budget - Professional / Technical Contracts • Attachments 	Add contract with UMN to provide funding for Wild Rice Knowledge symposium as they are managing symposium budget and expenses. Change collaboration coordinator contractor from TNC to Wild Rice Connections as the project collaboration coordinator is now	October 12, 2023	Yes	October 12, 2023

			employed with Wild Rice Connections, and TNC no longer has the capacity to provide the collaborator role. Contract with Red Lake Nation to support data collection on tribal waters, and provide UAV training to collaboration members.			
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Status Update Reporting

Final Status Update August 14, 2024

Date Submitted: February 3, 2025

Date Approved: February 3, 2025

Overall Update

The Collaborative State and Tribal Wild Rice Monitoring Program was overall successful in accomplishing its intended goals. A database and mobile field application to enhance data collection and sharing was developed. Point intercept (PI) data and Google Earth Engine (GEE) model training polygons were collected over multiple years (2022-2024), with data from 2022 and 2023 analyzed to refine the GEE classification. Field training days were held annually with participants from multiple organizations. Attendees practiced survey methods, mobile data collection, and aquatic plant identification. Data was collected on a total 31 waterbodies and 18 lakes compared over two years, building baseline data. The final map products and metadata of the 2023 GEE classification were published on the MNGEO spatial data commons and NRRI's Natural Resources Atlas, with 2022 data soon to follow. A field study on UAV imagery for wild rice density monitoring was conducted, with protocols documented. Presentations on the collaboration development and initial results were given to numerous audiences, and a Wild Rice Conservation Report written. Some challenges remain regarding data sovereignty for some tribal entities and staffing during the short sampling window, but many opportunities for continued collaboration exist as interest has extended to federal partners and others.

Activity 1

A database and mobile field application were developed and shared among collaborators to consistently collect and share data between entities. Point intercept (PI) data and Google Earth Engine (GEE) model training polygons were collected in 2022, 2023, and 2024. Data from 2022 and 2023 have been reviewed, summarized, and used to revise the Google Earth Engine classification. Results of the data were discussed by the collaborative during a bi-Monthly meeting. Point intercept data was summarized and the results added to the Wild Rice Conservation Report (attached). In summary a total of 31 waterbodies were sampled with the PI survey and data from 18 lakes were compared between the two years. There were several waterbodies that showed significant differences between the years, but the aggregate across all lakes showed a relatively small change. These results are consistent with previously held assumptions on the annual variability of wild rice, and helps develop a baseline dataset for these waterbodies.

(This activity marked as complete as of this status update)

Activity 2

Field training day was held at Tamarac National Wildlife refuge June 28th. 14 Participants from White Earth Nation, The Nature Conservancy, Red Lake Nation, US Fish and Wildlife Service, MN DNR, and UMN attended. Participants learned how to perform field methods, push pole and paddle canoes through rice stands, use the mobile data collection app, and identify common aquatic plants. The Wild Rice Conservation report was completed (attached) and highlights collaboration building process, challenges of wild rice monitoring, and summary of the point intercept data results. Collaboration on wild rice monitoring was overall successful and positive institutional relationships were created with several entities. Challenges and opportunities still exist in expanding collaborations with other entities. Some tribal programs have concerns over data sovereignty challenges, but other, including federal partners (National Fish and Wildlife Refuges, National Park Service, and NOAA's coastal program in Duluth have expressed interest in and are invited to collaboration calls. One of the primary challenges all collaborators face is staffing summer field technicians for the duration of the narrow sampling window (August - mid September). Other states (Michigan) have also reached out and are following our lead in developing their own wild rice collaborations.

(This activity marked as complete as of this status update)

Activity 3

Final exports and metadata of the Google Earth Engine classification for 2023 has been completed and published on the MNGEO spatial data commons and the NRRI's Natural Resources Atlas available in attached hyper link (<https://mnatlas.org/>). Revisions to the model were made and applied to the 2022 classification, improving its accuracy and will be published to the fore mentioned locations soon. We did not complete backdated analysis on 2017 through 2022 data as our primary focus has been on refining the 2022 and 2023 models. High confidence in these models is a prerequisite before conducting back calculations. A comparison analysis of these datasets will be done and attached when completed. With interest from tribes in using UAV(drone) derived imagery as a potential solution to staffing challenges, and an additional data source for GEE training data, a field study on the use of UAV imagery to collect wild rice density data was conducted. A report outlining the protocol for the use of UAV imagery for wild rice monitoring was developed (attached Monitoring Wild Rice with Drones). Red Lake Nation provided assistance to White Earth in procuring a UAV, software, and in-situ training on its usage and data processing.

(This activity marked as complete as of this status update)

Activity 4

Proceedings and notes from the symposium have been compiled, summarized and drafted with final revisions and publishing to be completed Feb 2025. Proceedings will be attached as soon as final publication.

(This activity marked as complete as of this status update)

Dissemination

The attached presentation on the collaboration and initial results was presented at the DNR's Wild Rice Management Seminar series (a public audience), to the Minnesota Surface Water Monitoring group (MN multi agency technical group), The EPA's, State, and Tribal Monitoring and Assessment Partnership (a regional, multi agency group of natural resources professionals). Also Attached is the version of the presentation given at the North American Lake Managers Association Annual Conference (Minneapolis Nov.2022) - a national audience of lake managers, NGO, Government and private sector.) The statewide wild rice classification maps for 2023 have been submitted for publication to the MNGEO Commons (2022 soon to follow), and proceedings from the Wild Rice Knowledge Symposium are pending final revisions by the UMN and will be published by UMN and attached to the workplan very soon.

Status Update Reporting

Status Update June 1, 2024

Date Submitted: February 3, 2025

Date Approved: February 3, 2025

Overall Update

Bi-monthly collaboration meetings continue, discussions at these meetings include delegation of tasks to finalize project action items, and updates on these tasks. Additional discussion includes coordination of summer 2024 field data collection, field method training to new collaborators. Data review and finalization continues, as does preparations for publication of that data.

Activity 1

Point intercept and training data collected in 2023 have been reviewed, summarized, and used to revise the Google Earth Engine classification. Results of the data were discussed by the collaborative during a bi-Monthly meeting.

(This activity marked as complete as of this status update)

Activity 2

Wild Rice Conservation Report draft is outlined. Monthly or bi-monthly collaboration meetings continue to coordinate future monitoring and sampling. Training day scheduled late June 2024 to review methods and tools for future data collection.

(This activity marked as complete as of this status update)

Activity 3

Google Earth Engine Classification for 2023 has been completed. Data processing for final distribution to the MNGEO Commons/ Natural Resources Atlas in progress with final publication pending very soon. A report outlining the protocol for the use of UAV(drone) imagery for the collection of wild rice density data is being drafted.

(This activity marked as complete as of this status update)

Activity 4

Proceedings and notes from the symposium have been compiled, summarized and drafted with final revisions and publishing to be completed very soon.

(This activity marked as complete as of this status update)

Dissemination

Presented background and results of the collaboration to Minnesota Wild Rice Management Meeting/webinar, and the Interagency Surface Water Monitoring and Assessment Team.

Status Update Reporting

Status Update December 1, 2023

Date Submitted: February 15, 2024

Date Approved: February 20, 2024

Overall Update

There has been a significant increase in the interest in collaboration on wild rice issues including monitoring and collecting base line data. I received calls and questions from state employees from Wisconsin and Michigan looking for advice on establishing similar collaborative programs with their agencies. We have increased tribal partnerships with Red Lake and federal agencies (National Park Service and Fish and Wildlife service). We have increased the number of training polygons and working on increasing the accuracy of the remote sensing application. We conducted a small research study correlating stem count biomass to drone collected imagery. Drone collected data is of significant interest to the tribal partners and we are exploring options effectively to implement this technology. All work is projected to be completed by end of project. I am waiting awaiting final invoice from UMN subaward and can not provide expense reporting at this time.

Activity 1

Over 1500 survey points, and plant community polygons were sampled across 25 different waterbodies during the 2023 summer field season. These data were collected by at least 7 different organizations (MNDNR, White Earth Nation, Red Lake Nation, UMN, The Nature Conservancy, Mille Lacs Band, 1854 Treaty Authority). These data are being used to refine the Google Earth Engine remote sensing model and estimate biomass and productivity for the waterbodies data were collected on.

Activity 2

Collaboration meetings were held virtually and in person at the wild rice knowledge symposium. A field methods training day was held with 20 participants from 6 different organizations (MNDNR, White Earth Nation, Red Lake nation, US Fish and Wildlife service, The Nature Conservancy, and UMN) at the Tamarac National Wildlife Refuge. This training focused on point survey field methods, creating and classifying plant community polygons, use of the mobile field application, and identification of aquatic plant species. Data is being reviewed and the Wild Rice Conservation Report outline drafted.

Presentations promoting the monitoring collaboration, and using advanced remote sensing tools to monitor wild rice was given to different audiences; the DNR's Climate Change Action webinar series and to the Wild Rice managers public webinar meeting (over 250 attendees).

Activity 3

Coverage maps from 2017 to 2021 will be discussed at our April meeting. The accuracy assessment of back calculating the model hasn't been done. Once it has, we will have a better idea of whether we feel comfortable to proceed. The focus is on making the model as reliable as possible with the 2022 and 2023 data. I am unsure at this point whether this milestone will be met. The statewide map of wild rice coverage for 2022 has been drafted, and the map for 2023 is in final stages of development. Once the 2023 map is completed, we will do a comparison and change detection analysis. At our March meeting, we will discuss/decide on the best format/location(s) for the maps to be accessible for public consumption (MN GEO spatial commons, MN Natural Resources Atlas, and/or interactive webapp). I anticipate 3 map products: 2022 coverage, 2023 coverage, and the change detection. They should be available in May. We collected 6 drone-derived imagery flights and correlated it with the density metric collected. This will help better refine the training data going into the GEE model for 2023. Milestone 4 was completed last year.

Activity 4

The Wild Rice Knowledge Symposium was held Nov. 13th and 14th. There were 275 participants from 40 different tribal, state, and federal entities in attendance, and 40 different presenters spoke on a variety of wild rice related topics, including monitoring, trend, climate, water quality, harvesting, and effective collaboration. There is interest from federal partners (National Park Service and Fish and Wildlife Service), and potentially another tribal entity in contributing to the collaboration. We also received a request from Michigan DNR on guidance to establishing their own wild rice collaboration. 30 registration waivers were funded these included: 17 tribal members (2 elders) who presented or hosted sessions, 11 student support staff, and two non-tribal guest speakers. Post conference survey resulted in largely positive feedback. Numerous accolades on the discussions led by tribal elders, the diversity of topics, and specific mention of sessions we (monitoring collaboration) hosted, as they encouraged active participation, sharing and relationship building. Having a meeting with both technical science and cultural/ traditional knowledge sharing was highly valued by participants and increased the desire for increased cooperation on wild rice issues. The most agreed upon outcome was that this symposium should be held at least biennially.

Dissemination

The LCCMR was listed as contributors and mentioned during several of the presentations and workshops at the Wild Rice Knowledge Symposium. There was a poster displayed highlighting the Wild Rice Monitoring Collaboration, Interactive sessions were hosted by myself and project collaborator. Proceedings from the symposium will be published online and in print. There has not been any dissemination of products or final reports yet, as they are being drafted and scheduled for spring 2024.

Status Update Reporting

Status Update June 1, 2023

Date Submitted: June 25, 2023

Date Approved: June 26, 2023

Overall Update

Numerous collaboration meetings were held and general consensus was made on sampling objectives and methodology. The first season of data collection was completed (summer 2022) which included sampling wild rice frequency, density, and remote sensing training data on 27 lakes across the state. This data was used to develop the first draft of a statewide wild rice distribution map.

Activity 1

Field data collection: The first season of data collection was completed (summer 2022) which included sampling wild rice frequency, density, and collecting remote sensing training data on 27 lakes (this includes 1425 sample locations) across the state (from Lake of the Woods to Red Wing). A data workflow has been developed and documentation has been drafted. Initial monitoring lakes were sampled summer 2022 and plans are being made for sampling 2023.

Activity 2

Build Collaboration: Virtual meetings continue to be held bimonthly or monthly as needed to collaborate on monitoring objectives and schedules. Two field training days were held (at White Earth and Mille Lacs) to provide training on aquatic plant ID and field sampling methods. The first annual Collaborators wild rice symposium was held in person February 2023. Planning is ongoing for the second annual symposium, in conjunction with wild rice management group in November 2023.

Activity 3

Milestone 1: Statewide wild rice coverage map has been drafted but refinement is ongoing

Milestone 2: Initial wild rice classification (using Google Earth Engine) was developed using data collected from 2022 field season. This initial draft shows location of dense stands of wild rice across the state of Minnesota. Results from 2022 are still in draft form at this time and not widely distributed.

Milestone 4: Refine GEE model- Initial model has been completed and will be refined with 2023 data.

Milestone 3: Completed - Initial testing and assessment of ground truthing methods was completed during 2021 and 2022 field seasons.

Dissemination

Presentation of methods and initial results was delivered at the 2022 North American Lake Management Society national conference (Nov 2022).

Status Update Reporting

Status Update December 1, 2022

Date Submitted: December 13, 2022

Date Approved: December 16, 2022

Overall Update

Collaboration continues with regular meetings between collaborators. A mobile field application was developed to facilitate data collection and sharing. Field data was collected by on 27 different waterbodies by 7 different entities using the common mobile application.

Activity 1

Field data on wild rice density, biomass, and other health metrics was collected on 27 different waterbodies. This included 1425 points sampled, and nearly 200 polygons of remote sensing training data. A mobile field application was developed to facilitate data collection and sharing. A sub award to White Earth Nation was established to help develop a sampling program. A sub award with Red Lake Nation is in progress to assist with data collection equipment and staff time.

Activity 2

Collaboration continues with regular virtual meetings, discussing sampling methods, coordinating effort, training field staff. Planning efforts are underway for a mid winter workshop to review draft map products and further data needs.

Activity 3

A contract with the Resource Assessment programs has been established. Data collected during the 2022 field season is currently being reviewed and processed with the remote sensing application. This work will continue during the upcoming winter.

Dissemination

A presentation about the development of the collaboration was given at the annual North American Lake Management Society Meeting held in Minneapolis. A similar presentation was given to MN DNR fisheries habitat management staff.

Status Update Reporting

Status Update June 1, 2022

Date Submitted: April 19, 2022

Date Approved: June 7, 2022

Overall Update

Monthly collaboration meetings with partners has resulted in establishing relationship building and trust between entities, developing a timeline for decisions and planning, discussions and work toward agreement on sampling objectives and methodology. Contracts have been made with a few partnership, and several contracts are in development with a few other entities. The database and mobile web map for data collection has been drafted.

Activity 1

Survey objectives and methodology used has been discussed at monthly collaboration meetings, and general agreement has been made. The database and mobile web app used for data collection has been drafted and will begin initial testing in the coming weeks. Sub award contracts for White Earth, Prairie Island, Mille Lacs, and Red Lake tribal entities are in progress for preparations for summer field sampling. Specific lakes/waterbodies to be monitored annually is on the next meeting agenda for discussion/decision making.

Activity 2

The Nature Conservancy was granted a sub award to provide a tribal coordinator, whom has set up and hosted monthly collaboration meetings. These meeting have been well organized and productive in facilitation discussion and group decision making processes. A mural website was developed to help share information, ideas, and resources.

Activity 3

A sub award contract has been developed with MN DNR's Resources Assessment program to provide the technical expertise. The database and mobile field web app for data collection and sharing has been drafted, and will be tested in the coming weeks. A sub award for Colorado State University for the technology transfer is in progress.

Dissemination

Dissemination of the results is not applicable at this time, we need to collect and analyze this coming years worth of data.