



# Environment and Natural Resources Trust Fund

## 2021 Request for Proposal

### General Information

**Proposal ID:** 2021-061

**Proposal Title:** Manoomin Matters

### Project Manager Information

**Name:** Emily Onello

**Organization:** U of MN - Duluth

**Office Telephone:** (218) 726-7820

**Email:** econello@d.umn.edu

### Project Basic Information

**Project Summary:** The Manoomin Matters project will create a public database to enhance knowledge of and participation in beneficial activities of harvesting and consuming Minnesota's cherished resource, wild rice - manoomin.

**Funds Requested:** \$314,000

**Proposed Project Completion:** 2023-06-30

**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?**

Region(s): NE, NW,

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

Statewide

**When will the work impact occur?**

During the Project and In the Future

## Narrative

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

Recent medical research has suggested that consumption of northern wild rice can benefit our cardiovascular system while reducing cancer risk. Harvesting wild rice is hard work and the effort likely provides additional health benefits, though to date, this has not been studied. Recent analysis has suggested that there may be significant nutritional variability in rice harvested across Minnesota, akin to 'heirloom' varieties of other plant types, such as tomatoes. Many Minnesotans share an affection for wild rice but remain unaware of its health-promoting qualities or its fragile ecological status. Rice has sustained wildlife and people in our region for centuries. It continues to provide food security with its local availability, easy storage and stability at room temperatures.

Wild rice (*Zizania palustris*) faces a multitude of significant new threats to its survival including drought and extreme rain events, invasive species, increased sediment and pollutant loadings. The harvesting and sale of wild rice represents an important small-scale agricultural industry in the state—an industry which relies on healthy and resilient wetlands, rivers and lakes. With expanding threats to its survival, there is an urgent need to document and share the recreational and nutritional health benefits of this resource.

### **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 document the natural nutritional variation in wild rice, addressing a current gap in our knowledge. This project also seeks new information about the physical exertion related to rice harvesting. A web-based clearinghouse called Manoomin Matters will be created to share project findings and to strengthen the public's appreciation for wild rice and the habitat in which it grows.

Wild rice, our state grain, remains a prominent fixture in Minnesota's unique cultural cuisine. Our state has already made significant investments in research aimed at understanding how and where wild rice grows best. So why is more inquiry into wild rice necessary? The answer is that we are just beginning to connect the dots between the ecology of wild rice and the health and well-being of Minnesotans.

Though traditional and local knowledge suggests variations in rice aesthetics and nutrition, there are no comprehensive studies of the natural variation in the nutritional quality of northern wild rice. Most traditional harvesters understand that ricing is hard work. Using modern wearable fitness trackers, our project measures this work and expands our understanding of how harvesting contributes to fitness and health.

### **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 proposal culminates in the launch of a data repository that documents and makes publicly available information on how wild rice contributes to Minnesotans' health. We will generate foundational natural resource data on nutrition and harvesting of Minnesota's wild rice. The project explores the relationship between wild rice's resilient growth and its nutritional assets. Information on this relationship could meaningfully inform future wild rice restoration and conservation efforts. As the health benefits of wild rice are catalogued and documented, policy makers will have the information that they need to make decisions about preserving and promoting wild rice.

## Activities and Milestones

### Activity 1: Measure human physical activity and exertion associated with wild rice harvesting

**Activity Budget:** \$29,164

#### Activity Description:

The extent and duration of physical activity related to wild ricing is not well characterized. To our knowledge, there is minimal information available about the duration, intensity and caloric output of traditional rice harvesting and ricing-related activities. Our objective is to measure and summarize the physical exercise involved with traditional rice harvesting. Both Native and non-Native American adult wild rice harvesters will be invited to participate as study subjects. During rice harvesting activities (and for comparison, during non-harvesting activities), consumer-wearable activity trackers, such as the FitBit© device, will record the wearer's health-related metrics (such as heart rate, number of calories burned). These devices are non-invasive, water-proof and are worn externally on the wrist. Data will be collected for two rice harvesting seasons, 2021 and 2022. Results from this effort will provide Minnesotans with new and important knowledge about the physical activity profile of wild ricing and from this, a more specific understanding of how wild rice harvesting contributes to a healthy lifestyle.

#### Activity Milestones:

Description	Completion Date
Obtain necessary approvals for study involving human rice harvesters	2021-08-31
Collect metrics associated with the human physical activity of harvesting wild rice using activity trackers	2022-10-31

### Activity 2: Develop unique wild rice nutritional profiles in context of the growth environment

**Activity Budget:** \$250,345

#### Activity Description:

This proposal expands our understanding of the micro-habitats that lead to unique 'heirloom quality' wild rice profiles. Current wild rice nutritional information is aggregated and lacks detail about site-specific variability. Preliminary data show that variation exists in starch and iron levels. Minnesota's experienced wild rice observers notice variations in wild rice taste, appearance and perceived nutritional quality from different locations. These observations prompt our inquiry of how different "looking" or "tasting" seeds differ nutritionally.

Natural sites across Minnesota will be selected with ranges in seed appearance and growth habitat. Replicate rice samples will be collected during harvest alongside measures of the hydro-geochemical conditions of the stand. Profiles will be created that characterize the flavor as well as the mineral content (e.g. iron) and macronutrients (e.g. protein, starch). Important variables within the water and sediment that surround the rice plant during its growth will be monitored (e.g. nitrogen, sulfate, iron and organic matter). These variables influence the growth and seed production of the plant, but their effect on nutritional seed quality is unknown. Findings may inform wild rice restoration efforts by identifying habitats with the greatest potential to yield rice with the desired flavor and nutritional profiles.

#### Activity Milestones:

Description	Completion Date
Perform laboratory nutritional analysis on wild rice samples	2023-06-30
Collect and study wild rice samples from multiple northern MN locations	2023-06-30

### Activity 3: Launch Manoomin Matters, an online clearinghouse of new, foundational data on wild rice that is easily usable and publicly accessible

**Activity Budget:** \$34,491

#### **Activity Description:**

The clearinghouse will be a novel repository of matters pertaining to rice harvesting, natural variation and nutrition. It will be free and publicly available. The research team will synthesize and geospatially map our findings from Activities 1 and 2 to contribute foundational data for Manoomin Matters. Throughout the project, but especially while developing the resource, Manoomin Matters, our team members will actively consult with Native American wild rice resource managers and specialists as well as state agencies such as the Minnesota Department of Health to ensure the utility and desirability of the data product. Multiple members of the project team have existing collaborations with wild rice specialists from tribal and state agencies.

The university's library system includes the University's Digital Conservancy (UDC) which provides online service, space and long-term preservation for Manoomin Matters with free access by the public. Using this new interactive resource, Minnesotans and others will share and enhance their knowledge about wild rice and encourage its use and preservation. Team members will make presentations at state and regional public venues (Minnesota Water Resources Conference, St. Louis River Summit) and provide an overview of the data repository to managers working on wild rice restoration.

#### **Activity Milestones:**

Description	Completion Date
Integrate the various wild rice natural resource datasets (geographic location, nutritional profiles, growing conditions)	2023-06-30
Create a user-friendly and interactive clearinghouse, Manoomin Matters, that disseminates information from the project findings for public use	2023-06-30
Share findings at regional conference presentations or via publications	2023-06-30
Continuous consultation with tribal and governmental agency colleagues	2023-06-30

## Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Wayne Warry PhD	University of Minnesota, Memory Keepers Medical Discovery Team	Collaborator: Dr. Warry will serve as a consultant on this project. He and his research team have extensive experience with collaborative, community-based participatory research involving tribal communities. He can facilitate meaningful consultation with tribal specialists concerning wild rice research and culturally-sensitive dissemination of the research findings.	No
Daniel Gallaher PhD	University of Minnesota Twin Cities	Co-Investigator: Dr. Gallaher's expertise in nutrition and mineral biochemistry will ensure the validity and relevance of the nutritional work. He will oversee the nutritional profiling for the wild rice seeds harvested during the 2021 and 2022 growing seasons. All of the project's nutritional analyses will be conducted in his laboratory.	Yes
John Pastor PhD (emeritus professor)	University of Minnesota Duluth	Collaborator: Dr. Pastor will serve as a consultant on this project. He is a biologist and retired professor. He remains a recognized expert in his field of northern ecosystem ecology. He has researched Minnesota's wild rice for many years and has published numerous scientific articles on this topic.	No
Nathan Johnson PhD	University of Minnesota Duluth	Co-investigator: Dr. Johnson's expertise in sediment biogeochemistry and water quality will inform the field research design. He will direct the selection, characterization and natural sampling from the wild rice study sites & oversee the geochemical analyses of specimens for both 2021 and 2022 growing seasons.	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?**

The Manoomin Matters data repository will offer Minnesotans something new and valuable—a “one stop shop” for wild rice information that is scientifically-based, culturally appropriate and appealingly informative. The 2-year research timeline is sufficient to complete the work. We expect that our data repository will serve as an enduring resource for a wide audience of citizens, resource managers and researchers. It will be curated at the U of MN library after the project ends. This specific project will not require funding beyond its end date, though we hope it will stimulate additional wild rice restoration and research.

## Project Manager and Organization Qualifications

**Project Manager Name:** Emily Onello

**Job Title:** Assistant Professor

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

Dr. Emily Onello is a full-time faculty member at the University of Minnesota Medical School Duluth campus. She has experience in managing research and educational grants during her past eight years at the medical school. She has worked on grants from a range of funding sources including the federal government, the university as well as private foundations. She is currently a co-principal Investigator on a research grant for 2019-20 to examine the capacity of wild rice to protect against colon cancer. (Her collaborator on that project is Dan Gallaher PhD, a co-investigator on this LCCMR proposal). She has completed the appropriate training for research involving human subjects.

She has a strong interest in wild rice as an indigenous plant with significant value to the people of Minnesota. She is familiar with many of the geographic, ecological and legislative/regulatory aspects of wild rice growth. Over the past six

years, Dr. Onello has been involved in regional discussions of how alterations of natural resources may impact human health. She recognizes the urgent need for continued scientific study of Minnesota's natural resources in order to support informed decisions about resource preservation and management.

She is part of a professional network of scientific researchers who are expert in their respective fields. Her skills include successful cooperation with scientists and researchers across different disciplines and colleges and campuses of the University of Minnesota. She already has a successful working relationship with Mr. Patrick Bright, the planned research assistant on this proposal. Dr. Onello's well-established working relationships with her co-investigators, as well as her experience in grants management and reporting, will allow her to successfully oversee the project and ensure that each project activity is completed as planned and that the findings will be reported for public use and benefit.

**Organization:** U of MN - Duluth

**Organization Description:**

The University of Minnesota (UMN)-Twin Cities is the state's land-grant university and one of the most prestigious public research universities in the nation. All UMN campuses operate with the accreditation of the Higher Learning Commission. The Twin Cities campus has been accredited continuously since 1913. The Duluth campus has been accredited since 1968. Collectively, UMN's research programs have had a significant impact on our state's economic strength. UMN ranks eighth among U.S. public universities in research spending, and generates an estimated \$8.6 billion annual economic impact for the state of Minnesota. UMN Duluth (or UMD) is a highly-ranked regional research and liberal arts university with a global reputation for freshwater research. UMN's College of Food, Agricultural and Natural Resource Sciences (CFANS) is known for innovative agricultural and natural resource research. The Duluth Campus of the UMN Medical School emphasizes research to improve the health of rural and tribal communities. Project members have access to UMN's rich library system encompassing millions of volumes as well as access to the University Digital Conservancy (UDC) which provides free public access and long-term preservation to works created at the University.

## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
Principal Investigator: Emily Onello		Will coordinate fieldwork and data compilation and while overseeing portion of study that involves human research (harvesting energy expenditure). Will integrate nutritional analyses with geospatial information and oversee the creation of the data repository and the dissemination of findings.			26.7%	0.2		\$46,284
Co-Investigator: Nate Johnson		Will inform the field research design. He will direct the selection, characterization and natural sampling from the wild rice study sites & oversee the geochemical analyses of specimens for both 2021 and 2022 growing seasons.			26.7%	0.12		\$22,441
Co-Investigator: Daniel Gallaher		Will ensure the validity and relevance of the nutritional work. Will oversee the nutritional profiling for the wild rice seeds harvested during the 2021 and 2022 growing seasons.			26.7%	0.04		\$7,518
Research Assistant		Will assist in the coordination and data collection of the human energy expenditure study. Establish baseline datasets and site characteristics, use his cartography skills to integrate data/findings with geospatial graphics and maps, and play a key role during the creation of online data repository and assist with efforts to dissemination findings.			24%	0.2		\$10,902
Graduate Student		Will perform the nutritional analyses on the wild rice samples to include macronutrients and other components.			47.54%	1		\$88,668
Graduate Student		Will perform the field work to collect water and sediment samples over two seasons. Will complete the geochemical analyses of the samples.			47.54%	1		\$88,668
							<b>Sub Total</b>	<b>\$264,481</b>
<b>Contracts and Services</b>								
Tribal Representatives	Professional or Technical	Honoraria for consultation with 4 tribal specialists/representatives regarding wild rice.				0		\$1,200

	Service Contract							
							<b>Sub Total</b>	<b>\$1,200</b>
<b>Equipment, Tools, and Supplies</b>								
	Tools and Supplies	General Laboratory Chemicals	General purpose solvents, buffers, common chemicals, pH meter standard solutions for analysis.					\$1,800
	Tools and Supplies	dietary fiber, protein, fatty acids supplies	To conduct macronutrient analysis of wild rice samples.					\$11,915
	Tools and Supplies	starch content determination and reagents	To conduct starch analysis of wild rice samples.					\$12,435
	Tools and Supplies	Bottles, bags and preserving reagents	geochemical testing					\$900
	Tools and Supplies	consumable filters and water collection supplies	geochemical testing					\$1,300
	Tools and Supplies	sediment coring supplies	geochemical testing					\$800
	Tools and Supplies	FitBit Fitness Trackers	Wearable fitness trackers will be used for the portion of the project that captures physical activity data on adult wild rice harvesters prior to (control) and during (study data) the activities related to wild rice harvesting efforts.					\$1,500
	Tools and Supplies	General Laboratory Supplies (tubes, pipette tips, cuvettes, filtering supplies, nitrogen gas)	To conduct wild rice analysis					\$4,900
							<b>Sub Total</b>	<b>\$35,550</b>
<b>Capital Expenditures</b>								
		Udy Cyclone Mill	Used to grind wild rice samples for the macronutrient analysis as well as the starch analysis and mineral analysis.					\$6,150
							<b>Sub Total</b>	<b>\$6,150</b>



<b>Acquisitions and Stewardship</b>								
							<b>Sub Total</b>	-
<b>Travel In Minnesota</b>								
	Miles/ Meals/ Lodging	Travel to testing sites	Travel for research staff to wild rice testing sites for sediment and water analysis and collection of wild rice samples for two growing seasons.					\$1,593
	Conference Registration Miles/ Meals/ Lodging	Conference Travel	Conference travel and registration for two investigators to disseminate project findings (in state conference).					\$2,000
	Miles/ Meals/ Lodging	Tribal Consultation	Travel for PI and Co-I's for in-person consultations with tribal wild rice representatives.					\$576
							<b>Sub Total</b>	<b>\$4,169</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	-
<b>Printing and Publication</b>								
	Publication	Publication costs	Publication costs for project findings, dissemination.					\$1,200
							<b>Sub Total</b>	<b>\$1,200</b>
<b>Other Expenses</b>								
		Mineral Analysis	Mineral analysis of wild rice samples.					\$1,250
							<b>Sub Total</b>	<b>\$1,250</b>
							<b>Grand Total</b>	<b>\$314,000</b>

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
<b>State</b>				
			<b>State Sub Total</b>	-
<b>Non-State</b>				
In-Kind	Unrecovered indirect costs	Used for indirect costs related to the project.	Secured	\$133,180
			<b>Non State Sub Total</b>	<b>\$133,180</b>
			<b>Funds Total</b>	<b>\$133,180</b>

## Attachments

### Required Attachments

#### *Visual Component*

File: [52a7acc7-504.pdf](#)

#### *Alternate Text for Visual Component*

Atop this vertically-aligned image is the title, Manoomin Matters: A public database on wild rice's nutritional and harvesting health benefits, with the names of collaborating partners listed underneath. The visual graphic is rendered in multiple colors using an artist's cartooned drawings. The image includes schematic of a large funnel that takes up most of the page. At the top of the page, entering the wide mouth of the funnel, is a wild rice seed. Stages of this seed are shown in horizontal progression in its watery environment as it sprouts, grows leaves and ultimately bears its wild rice seeds.

Just beneath the wild rice seed life cycle, an image of a heart and an EKG tracing are positioned to remind the viewer of the connections between humans and the environment. Using the balancing sides of a scale, an image weighs more conventional sports (a cyclist and a jogger) against the physical activity to traditional rice harvesting activities. Measuring the physical activity benefits of ricing is a component of this project. Nearby, images of numerous influences on wild rice (e.g. sun, temperature, sediment) are situated within in a honeycomb-like structure that is reminiscent of a chemical structure diagram. These images represent the project's goal of characterizing the influences of growth habitat on the nutritional content of wild rice.

Farther down the funnel, a map of Minnesota shows the project's goal to generate a map of wild rice nutritional "varietals" for public use. Finally, as the funnel converges on the bottom of the page, images remind the viewer of the data product showing images of computers and Wi-Fi logo as well as multiple people using laptops and accessing the "Manoomin Matters" data clearinghouse with a tagline stating, "A data resource enabling more effective restoration and healthy wild rice consumers!"

### Optional Attachments

#### *Support Letter or Other*

Title	File
Letter of Support from UMN Extension, Regional Sustainable Development Partnerships	<a href="#">1cfb2a7e-465.pdf</a>
UMN Transmittal Letter from Sponsored Projects Administration	<a href="#">ab489f8f-595.pdf</a>

## Administrative Use

**Does your project include restoration or acquisition of land rights?**

No

**Does your project have patent, royalties, or revenue potential?**

No

**Does your project include research?**

Yes

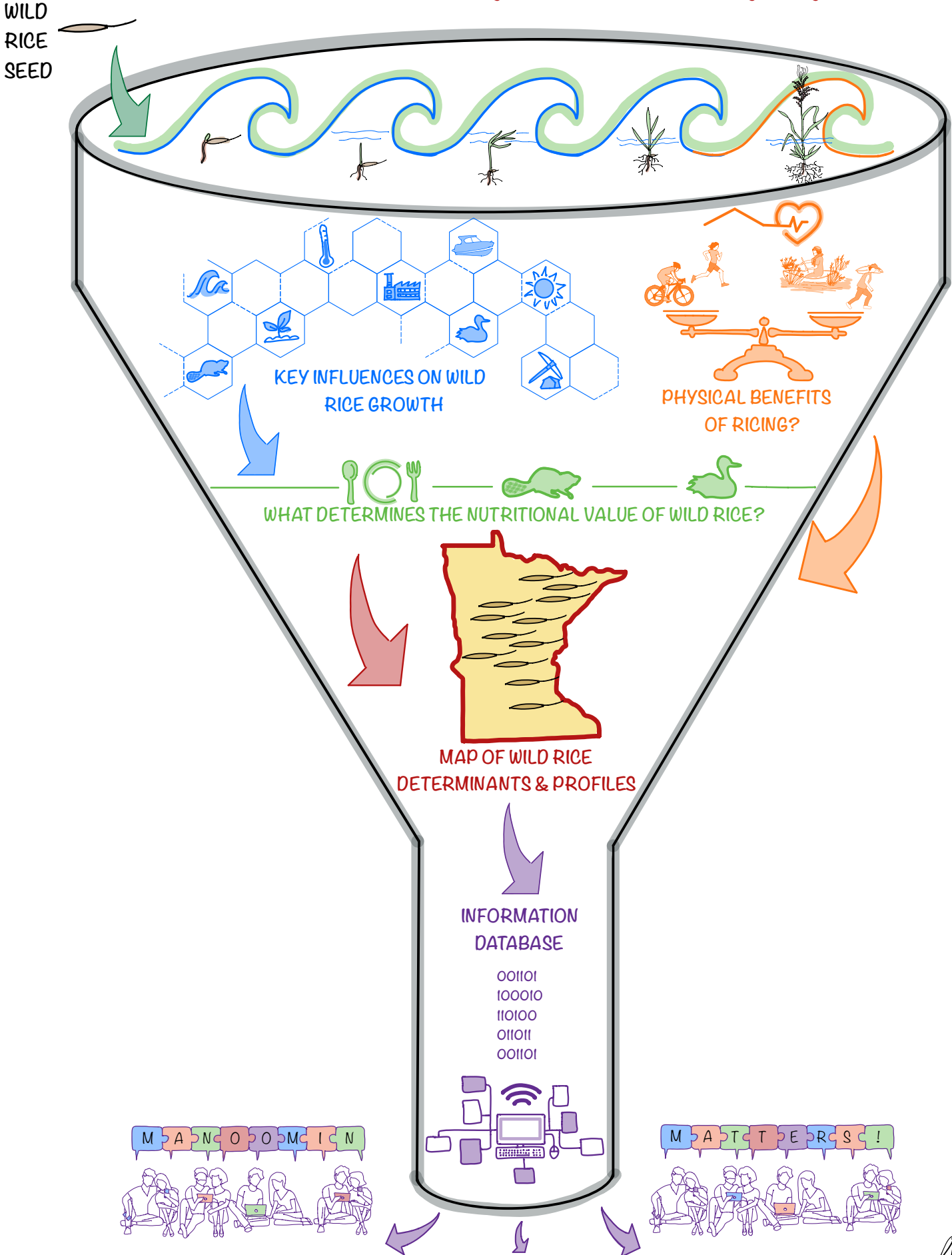
**Does the organization have a fiscal agent for this project?**

No

# Manoomin Matters:

A public database on Wild Rice's nutritional and harvesting health benefits

Daniel Gallaher, PhD; Nathan Johnson, PhD; Emily Onello, MD; John Pastor, PhD; Wayne Warry, PhD



A data resource enabling more effective restoration and healthy wild rice consumers!