**PROJECT TITLE: Environmental Factors Influencing Nutritional Content of Wild Rice**

**I. PROJECT STATEMENT**

This proposal addresses a critical gap in knowledge by generating foundational natural resource data on the variability in nutritional composition of wild rice (*Zizania palustris*) across our geographic region. There are no comprehensive studies of the natural range of variation of the nutritional quality of northern wild rice. A more detailed understanding of the nutritional variability of wild rice is needed in light of emerging evidence that consumption of northern wild rice can benefit our cardiovascular system while reducing cancer risk.

Wild rice, the official state grain, remains a prominent fixture in Minnesota’s unique cultural cuisine. For many tribal members in the region, harvesting and sharing wild rice are celebrated activities that offer cultural, nutritional and spiritual benefits. Further, 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. Because wild rice faces many threats to its survival--including drought and extreme rain events, invasive species, increased sediment and pollutant loadings--the timing for this project is urgent.

Our proposal plans to:

1) characterize the variability of the nutritional content of wild rice across different sites in Minnesota

2) analyze the relationship between the habitat and the wild rice’s nutritional content

This proposal will increase our knowledge about the relationship between wild rice’s resilient growth and its nutritional assets, schematically shown in the **visual infographic** that accompanies this proposal. The list of potential beneficiaries of this research is broad and includes natural resource managers, governmental agencies, policy makers, local food producers and consumers, tourism/hospitality/restaurant industry planners, biologists, tribal communities, and health professionals. The project team is an interdisciplinary group of university faculty who each bring a unique expertise to the research questions, including an ecologist, a geochemist, a nutrition researcher and a physician. As the health benefits of wild rice are increasingly clear, it is hoped that policy makers and citizens will act deliberately to preserve wild rice habitats and promote its consumption.

**II. PROJECT ACTIVITIES AND OUTCOMES**

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| **Activity 1 Title:** Nutritional Analysis of wild rice seeds from multiple wild and tank test sites  **Description:**  Experienced wild rice observers have noticed that there is variability in wild rice taste, appearance and perceived nutritional quality from lake to lake that potentially correlates to the seed size. These observations now prompt this deeper inquiry--do different “looking” wild rice seeds *actually differ* in the nutrients provided to the human consumer?  Wild rice will be studied at a minimum of six to eight natural sites across northern Minnesota. In consultation with regional wild rice experts, the multiple research sites across northeastern Minnesota will be identified to include the widest range of wild rice seed size and appearance as well as the broadest spectrum of habitat and growing conditions. Wild rice will also be sampled from a series of ongoing experiments in stock tanks that have been used to examine wild rice productivity in relation to sediment chemistry. The data from these experiments will assist in the evaluation of the field data. Replicate rice samples from each study site and experimental stock tank will be harvested at peak ripeness in late summer/early autumn and then analyzed for content of several macronutrients that are important for human health (e.g. protein, fiber, carbohydrates, fat and fatty acids). Elements that are necessary for normal metabolic functions (e.g. iron, copper, zinc) will also be measured in the rice, along with compounds that are associated with nutritional benefit in humans called secondary plant metabolites or phytochemicals. (Jul 2020 – Jun 2022).  **ENRTF BUDGET: $ 122,313.33**  **Activity 2 Title:** Characterize the water and sediment conditions at multiple test sites during wild rice growth  **Description:**  For each study site and experimental stock tank, researchers will measure and monitor several important variables within the water and sediment that surround the wild rice plant during its annual growth over two growing seasons (2020 & 2021). These variables include nitrogen, phosphorus, sulfate, iron and organic matter. Each of these variables has been shown to influence the growth and seed production of the wild rice plant but their effect on nutritional quality is unknown.  **ENRTF BUDGET: $ 55,262.33**  **Activity 3 Title:** Map and correlate the findings to create a dataset, report findings  **Description:**  Combining the findings from Activity 1 and Activity 2, the research team will compile and geospatially map the data. Data will be analyzed to look for associations between growth conditions and the vitality, quality and nutritional composition of wild rice. Water and sediment characteristics will be correlated with the nutritional findings in the wild rice seeds. Findings will be reported. (Jul 2020- Jun 2022)  **ENRTF BUDGET: $ 20,516.34** |  |

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| **Outcome** | **Completion Date** |
| 1.Analyze wild rice samples for several indices of plant vitality (seed size, quantity) and nutritional value (nitrogen/protein, fiber, carbohydrate, & phytochemicals)—Activity 1 | Jul 2022 |
| 2.Collect wild rice samples from northern MN locations & test tanks (annual wild rice harvests from two growing seasons, 2020 & 2021)—Activity 1 | Oct 2021 |
| 3. Measure water and sediment variables at wild rice sampling sites--Activity 2 | Oct 2021 |
| 4. Compilation of the wild rice natural resource dataset, documenting the water and sediment conditions, geographic location and profile of wild rice seeds. Analyze and interpret findings—Activity 3 | Jun 2022 |
| 5. Share findings at regional conference presentations or via publications | Jun 2022 |

**III. PROJECT PARTNERS AND COLLABORATORS:**

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**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

This 2-year research proposal is designed to provide sufficient time to collect field data (Activities 1 & 2) and perform the laboratory analyses (Activity 1). It is not anticipated that this specific project will require funding beyond its end date, though it is possible that additional research questions will arise that necessitate new inquiries. The project team expects that the dataset generated by the work (Activity 3) and any published findings will serve as an enduring resource resulting from the project.