



Environment and Natural Resources Trust Fund

M.L. 2021 Draft Work Plan

General Information

ID Number: 2021-017

Staff Lead: Rory Anderson

Date this document submitted to LCCMR: February 2, 2021

Project Title: Starch Allocation Patterns Of Starry Stonewort (*Nitellopsis Obtusa*) Harvested From Lake Koronis, MN

Project Budget: \$101,000

Project Manager Information

Name: Ryan Wersal

Organization: Minnesota State Colleges and Universities - Minnesota State University Mankato

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Project Reporting

Date Work Plan Approved by LCCMR:

Reporting Schedule: December 1 / June 1 of each year.

Project Completion: July 31, 2023

Final Report Due Date: September 14, 2023

Legal Information

Legal Citation:

Appropriation Language:

Appropriation End Date: June 30, 2024

Narrative

Project Summary: Starry stonewort is a macro-algae that has invaded Minnesota lakes, though nothing is known about its starch allocation. These data can identify weak points in allocation strategy to enhance management.

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

Starry stonewort is a non-native macro-algae from Europe and western Asia that was introduced into Lake Koronis, MN in 2015, and has since spread to 14 other waterbodies. Unlike many of the native green macro-algae, starry stonewort can elongate into the water column, and in some cases reach plant lengths of 2 meters. Dense growth of starry stonewort can alter the community structure of aquatic habitats by extirpating native vegetation, thereby changing macro-invertebrate assemblages and ultimately fish assemblages. Starry stonewort interferes with boating and other recreational activities. Aquatic invasive species like starry stonewort have also resulted in declines in property values. Starry stonewort is anchored to bottom sediments by rhizoids. These rhizoids are important as they often contain bulbils, or are the point of bulbil production. Bulbils are starch-containing tissues used for overwintering and perennation. When conditions are conducive for growth, bulbils will sprout and grow a new plant. Although there are data on its impact as a non-native species, and how to manage it; to date, there are few studies on its life history characteristics, and no studies on phenology and resource (starch) allocation patterns for this species.

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.

The proposed project will utilize laboratory techniques to quantify seasonal starch allocation patterns in starry stonewort form samples previously collected from two growing seasons on Lake Koronis, MN. The commercially available starch assay kit (Sigma Aldrich) will be used to separate starch from aboveground, rhizoid, and bulbil biomass. Data will elucidate seasonal patterns in starch allocation for starry stonewort and identify which structures are important for storage. This approach has been utilized by the principle investigator on other aquatic species such as parrotfeather, phragmites, Eurasian watermilfoil, and Cuban bulrush. Funding is being sought to support a graduate student for two summers to conduct the tissue analysis of starry stonewort harvested from Lake Koronis from two growing seasons. Funding will also support undergraduate wages in order to involve undergraduate students in the research process. Funds are being sought by the principle investigator for summer salary to manage the project and mentor both the graduate and undergraduate students. Funds will be needed to purchase the necessary starch kits, reagents, and supplies to conduct the analyses.

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?

Having an understanding of starch allocation patterns in starry stonewort will allow for better management of this species. Knowing when starry stonewort begins growth and when it achieves maximum starch reserve is crucial in developing targeted management approaches. Management then occur during the times when starch reserves are at their lowest points making the plant more vulnerable to management techniques. Targeting starry stonewort during low points in its starch allocation curve will make managing this species easier and potentially more cost effective resulting in fewer impacts to Minnesota lakes and non-target species; and ultimately restore and conserve our water resources.

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: Seasonal Starch Analysis

Activity Budget: \$101,000

Activity Description:

The proposed project will utilize laboratory techniques to quantify seasonal starch allocation patterns in starry stonewort from samples previously collected from two growing seasons on Lake Koronis, MN. We will conduct tissue analysis using the commercially available starch assay kit (Sigma Aldrich) to separate starch from aboveground, rhizoid, and bulbil biomass. We will then analyze the data to elucidate seasonal patterns in starch allocation for starry stonewort and identify which structures are important for storage. Knowing when starry stonewort begins growth and when it achieves maximum starch reserve is crucial in developing targeted management approaches. Management can then occur during the times when starch reserves are at their lowest points making the plant more vulnerable to management techniques. Targeting starry stonewort during low points in its starch allocation curve will make managing this species easier and potentially more cost effective resulting in fewer impacts to Minnesota lakes and non-target species; and ultimately restore and conserve our water resources.

Final findings will be presented at a regional or national conference and will be developed into a peer-reviewed journal article for publication in an appropriate journal.

Activity Milestones:

Description	Completion Date
Begin Starch Extraction and Quantification of Resource Allocation	June 30, 2022
Present Preliminary Findings at the Aquatic Plant Management Society annual meeting	July 31, 2022
Finish Starch Extraction, Data Analysis, and Begin Final Report	June 30, 2023
Prepare and Submit Journal Article	July 31, 2023
Present Final Findings at the Aquatic Plant Management Society annual meeting	July 31, 2023

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.

Results from this project will be disseminated both orally and in written form. The graduate student funded on this project will give at least one presentation at the national Aquatic Plant Management Society annual conference. Either the graduate student or Dr. Wersal will give additional presentations at statewide or regional scientific meetings as time or travel restrictions allow. These presentations will have regional to national reach and will impact researchers, managers, regulators, and in some instances lakeshore owners. Dr. Wersal will work closely with the Koronis Lake Association and the Minnesota Department of Natural Resources (DNR) - Aquatic Invasive Species staff to further refine management recommendations for starry stonewort in Minnesota based phenology and starch allocation patterns. The collaborative partnerships with lake associations and the Minnesota DNR will ensure that data are being applied in an effective manner to better focus management efforts in order to better protect, conserve, or enhance Minnesota's waterbodies. Finally, a peer-reviewed journal article will be developed and submitted to an appropriate journal for publication. A journal publication will allow the major results from this study to be accessible to researchers and managers for many years to come. With many journals, individual articles can be accessed by anyone via the internet so that private lakeshore owners can find scientifically sound information on starry stonewort.

The Environment and Natural Resources Trust Fund will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgment Guidelines.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this be funded?

Results from this project will have direct implications for how starry stonewort is managed nationwide. Presentations and journal publications will be developed and made available to the resource managers, lake associations, and the public. Stakeholder meetings with state agencies, such as the Minnesota Department of Natural Resources (MN DNR, lake associations, watershed districts, and federal agencies will continue in order to redefine management strategies for this species. Future in-field management projects will be developed based on results from this project with funds sought from the MN DNR, aquatic invasive species prevention program, Federal grants, and private companies.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Student Personnel		Student Personnel Summer			7.65%	0.3		\$17,294
Graduate Student		Graduate Student Summer			7.65%	0.3		\$13,456
Dr. Ryan Wersal		Project Director			19%	0.3		\$42,631
							Sub Total	\$73,381
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Tools and Supplies	Cost per item # of item - STA20 Starch Assay Kits-\$206.00 (50 kits), Sulfuric Acid Reagent-\$475.00 (3 bottles), Reagent Alcohol-\$149.00 (3 bottles), Demethyl Sufoxide-\$810.00 (3 bottles), Pipette Tips-\$150.00 (9 containers), Test Tubes-\$494.00 (4 boxes), Test Tube Racks-\$56.00 (5 racks), Centrifuge Tubes -\$85.60 (5 boxes), Centrifuge Tube Caps-\$12.50 (3 boxes)	Materials and supplies to complete the research					\$18,392
							Sub Total	\$18,392
Capital Expenditures								
		Udy Cyclone Sample Mill	Plant samples will be ground using a Cyclone Sample Mill. Approximately 50 mg of the ground sample will be transferred into plastic centrifuge tubes for storage and preparation for the starch analysis					\$5,127
							Sub Total	\$5,127

5/25/2021

Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
							Sub Total	-
Travel Outside Minnesota								
	Conference Registration Miles/ Meals/ Lodging	Aquatic Plant Management Society Annual Meetings	The meeting attendees include academic researchers, state and federal agency personal, local and state resource managers, watershed district personnel, and pesticide applicators. These data would be applicable to all individuals currently managing starry stonewort in their respect regions	X				\$3,500
							Sub Total	\$3,500
Printing and Publication								
	Publication	Publication costs	Publication of results					\$600
							Sub Total	\$600
Other Expenses								
							Sub Total	-
							Grand Total	\$101,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Travel Outside Minnesota	Conference Registration Miles/Meals/Lodging	Aquatic Plant Management Society Annual Meetings	<p>The Aquatic Plant Management Society has an annual meeting each year and is very inviting to graduate student presentations. The focus of the proposed project aligns with the Society's mission and goals and therefore would be of interest to Society members and meeting participants. Furthermore the meetings are generally well attended by government agency personnel and resource managers who would benefit from data generated from the proposed study to aid in starry stonewort management. The meeting is also a good venue for graduate students to build their professional network.</p> <p>Travel to the meeting will be to facilitate a formal presentation (oral or poster) of the proposed project outcomes to a wider scientific and management orientated audience.</p>

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: [598386ad-1e7.pdf](#)

Alternate Text for Visual Component

The attached visual is a map of the locations on Lake Koronis where seasonal biomass was harvested from a previous project. The seasonal biomass samples are the ones to be analyzed for starch content during the proposed study....

Optional Attachments

Support Letter or Other

Title	File
Research Addendum	6756bb01-338.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

I changed the typo in the activities and milestone title.

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?

Yes

Do you agree travel expenses must 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 agree to the Commissioner's Plan.

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?

Yes

Does the organization have a fiscal agent for this project?

No

