



Environment and Natural Resources Trust Fund

M.L. 2021 Approved Work Plan

General Information

ID Number: 2021-091

Staff Lead: Rory Anderson

Date this document submitted to LCCMR: July 21, 2021

Project Title: Long-Term Efficacy Of Invasive Removal In Floodplain Forests

Project Budget: \$25,000

Project Manager Information

Name: Mike Anderson

Organization: Macalester College

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Project Reporting

Date Work Plan Approved by LCCMR: July 20, 2021

Reporting Schedule: March 1 / September 1 of each year.

Project Completion: September 30, 2024

Final Report Due Date: November 14, 2024

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 06b

Appropriation Language: \$25,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with Macalester College to begin a long-term scientific study at the Ordway Field Station to provide information to land managers on protecting Minnesota's floodplain forests from combined threats of overabundant deer, invasive shrubs, and earthworms. This appropriation is available until June 30, 2025, by which time the project must be completed and final products delivered. A report on the results of the long-term study must be submitted at the

end of the appropriation and an update must be submitted five years after the appropriation ends or at the study's conclusion, whichever is first.

Appropriation End Date: June 30, 2025

Narrative

Project Summary: This funding will begin a long-term scientific study that will provide much-needed information for land managers protecting Minnesota’s floodplain forests from threats of overabundant deer, invasive shrubs and earthworms.

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

Floodplain forests – forests that are flooded for a portion of every year – provide many services that Minnesotans value along the rivers of our home state. The roots of trees and shrubs absorb pollutants from river water and bind soil, helping control flooding and prevent erosion. Their dense crowns evaporate excess water, and provide critical habitat and protection to resident and migrating bird species.

Floodplain forests also face multiple threats. Competition from invasive shrubs prevents establishment of the seedlings that provide the next generation of forest canopy. Overabundant deer eat many of the seedlings that escape such competition. And invasive earthworms create soil conditions that favor the invasive shrubs.

Effective ecosystem management requires understanding not only what threats exist, but also how they interact with each other. While removal of invasive shrubs, for example, may alleviate competition on native seedlings, it may also provide easier access for deer. Still, shrub removal may decrease earthworm populations, providing more nutrients for native seedlings. The balance of such interacting threats can differ in different ecosystems, so it is important that land managers have information specific to ecosystems they are trying to protect. Such information is not yet available to floodplain forest managers in Minnesota.

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.

We propose a scientific study of interactions between invasive shrubs, deer, and earthworms in a floodplain forest along the Mississippi River at Macalester College’s “Ordway” Field Station. Our conservation partner – Friends of the Mississippi River (FMR) – will be removing invasive shrubs in 30 acres of Ordway’s floodplain forest in 2021. Our proposal adds a scientific component to this restoration that will provide valuable information to floodplain managers across the state.

Removing invasive species from an area provides scientific opportunities to unambiguously measure their effects, and the effectiveness of their removal. This study will take advantage of these opportunities in two ways: 1) by measuring the effects of deer and invasive shrubs on survival and growth of tree seedlings and herbs, and 2) by measuring the effect of invasive shrub removal on invasive earthworm populations. Ordway is an excellent location for such a study, as it contains one of the most common floodplain forest types in Minnesota, has an overabundance of deer, and has a large earthworm population. The shrub species we are studying – buckthorn and honeysuckle – are also listed among the University of Minnesota’s Invasive Terrestrial Plants and Pests Center’s 15 top priority species.

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 study will investigate important threats to Minnesota’s floodplain forests, and provide information relevant to their effective management. We will address:

1. The individual effects of deer browsing and non-native invasive shrubs on native plants.
2. How the effects of deer browsing and non-native invasive shrubs depend on each other.
3. How deer and shrubs affect non-native invasive earthworm populations.
4. Whether native plant communities naturally recover when non-native invasive shrubs and/or deer are removed.
5. How long any positive effects of shrub and/or deer removal are likely to last.

8/22/2021

Project Location

What is the best scale for describing where your work will take place?

Region(s): Metro

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

Statewide

When will the work impact occur?

In the Future

Activities and Milestones

Activity 1: Experiment development

Activity Budget: \$23,000

Activity Description:

This study will require careful design, which begins with selection of appropriate field sites. To provide replication, several suitable sites at least 10 meters x 10 meters will be identified within the 30-acre restoration area. Site selection will be based on presence and evenness of invasive shrubs, earthworms and deer activity across the site. Selection will be conducted by Ordway and FMR personnel, in order to provide as wide a range of expertise as possible. Once sites are chosen, experimental plots (2 meters x 2 meters) will be situated within them such that the plots are as similar as possible in elevation, soil type, invasive shrub cover, and native vegetation.

Once plots have been established, experimental treatments will be applied. Invasive shrubs will be removed from half of each chosen site. Then, in half of each half-site (invasives removed/not removed) one 3 meter x 3 meter deer 'exclosure' fence will be built to prevent deer access. Exclosure construction will be conducted by Ordway personnel, who have experience in this activity.

A report on the results of the long-term study will be submitted at appropriation's end, and an update submitted five years afterward or at project's end, whichever is first.

Activity Milestones:

| Description | Completion Date |
|--|--------------------|
| Construction of deer exclosure fences | July 31, 2022 |
| Selection of appropriate field sites and planning of experimental treatments | July 31, 2022 |
| Removal of invasive shrubs from field plots | September 30, 2022 |
| Submit Final Report | September 30, 2024 |
| Submit update report, end of project or 5 years after appropriation end | September 30, 2024 |

Activity 2: Baseline data collection

Activity Budget: \$2,000

Activity Description:

In year 1, when the study is established, data will be collected by Ordway personnel after sites are selected, but before invasive shrubs are removed. These will represent the 'baseline' state of each plot prior to the experiment.

Vegetation, light, and earthworm populations will be measured at baseline, then once per year in June every year thereafter. All measurements will follow protocols that have been used successfully by Ordway personnel for several years. Vegetation measures will focus on the number and size of native tree seedling species, but will also include the most common herb species, and several diversity measures of the whole understory plant community. Light will be measured as percent of sky visible in canopy photographs taken at 1 meter above the ground. Earthworm populations will be measured using a standard liquid mustard extraction method.

LCCMR funds will be used for year 1 data collection activities, but long-term data collection will be funded through Ordway's regular budget.

Activity Milestones:

| Description | Completion Date |
|---|-----------------|
| Collection of baseline data: vegetation, light, earthworm populations | July 31, 2022 |

Project Partners and Collaborators

| Name | Organization | Role | Receiving Funds |
|--------------|----------------------------------|--|-----------------|
| Jerald Dosch | Macalester College | Co-PI for the project | Yes |
| Alex Roth | Friends of the Mississippi River | Conducting restoration activities that the proposed project seeks to measure the effects of. | No |
| Karen Schik | Friends of the Mississippi River | Conducting restoration activities that the proposed project seeks to measure the effects of. | No |

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.

We will disseminate the results of our work in several ways. Whenever possible, we will include contributions from Macalester students.

1. After at least 2 years of enclosure and data collection, we will write and submit a scientific paper to a high impact restoration journal such as Restoration Ecology for dissemination to the wider restoration community.
2. We will present both preliminary and final findings at local and/or regional conferences - such as the Upper Midwest Invasive Species Conference - to reach both practitioners and landowners interested in restoration. Anderson and Dosch have institutional funds available for this.
3. We will create a short video explaining the project and demonstrating the results, and share it on the Ordway website.
4. We will create a short write-up to be shared in Friends of the Mississippi River's newsletters and social media, reaching over 12,000 people.
5. All dissemination products stemming from this project will adhere to the ENRTF Acknowledgement Requirements and 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?

While we propose to use LCCMR funding to cover the costs of establishing this study, the study will continue long-term. Initial costs include materials for building deer enclosures, and salary for hiring extra student workers and covering extra faculty and staff time commitments during the first year's site selection, data collection, and enclosure construction activities. Once established, long-term data collection will be performed during Ordway's regular research activities and fall comfortably within our budget. Year 1 and longer-term data will be analyzed during Ordway's regular research activities. Results will be written and submitted for publication in the conservation literature.

Budget Summary

| Category / Name | Subcategory or Type | Description | Purpose | Gen. Ineligible | % Benefits | # FTE | Classified Staff? | \$ Amount |
|---------------------------------------|---------------------|---|--|-----------------|------------|-------|-------------------|-----------------|
| Personnel | | | | | | | | |
| Student Researcher | | Assist with and learn research activities | | | 9% | 0.19 | | \$6,050 |
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| Jerald Dosch | | Supervisor/Co-PI | | | 9% | 0.08 | | \$9,215 |
| Mike Anderson | | Project Manager | | | 9% | 0.08 | | \$565 |
| | | | | | | | Sub Total | \$21,880 |
| Contracts and Services | | | | | | | | |
| | | | | | | | Sub Total | - |
| Equipment, Tools, and Supplies | | | | | | | | |
| | Tools and Supplies | 5 pounds of organic mustard powder | Extract earthworms from soil for measuring abundance | | | | | \$100 |
| | Equipment | 240' of 1" PVC piping | Permanently mark corners of measurement plots | | | | | \$100 |
| | Equipment | Heavy-duty zipties, 2000 | Connectors for fencing; Remove deer access from experimental plots | | | | | \$200 |
| | Equipment | 500 feet of heavy wire fencing | Removal of deer access from experimental plots | | | | | \$1,300 |
| | Equipment | Fenceposts for 12x 40' perimeter exclosures | Remove deer access from experimental plots | | | | | \$1,100 |
| | | | | | | | Sub Total | \$2,800 |
| Capital Expenditures | | | | | | | | |
| | | | | | | | Sub Total | - |
| Acquisitions and Stewardship | | | | | | | | |

8/22/2021

| | | | | | | | | |
|---------------------------------|-------|--|--|--|--|--|--------------------|-----------------|
| | | | | | | | Sub Total | - |
| Travel In Minnesota | | | | | | | | |
| | Other | Transport boats to field site | Move 2 boats from storage to field site: 42 miles round-trip * 2 boats * \$1.75/mile | | | | | \$150 |
| | Other | Fuel and maintenance of 2 boats, 30 1-mile round trips | Transport materials and personnel to field sites | | | | | \$170 |
| | | | | | | | Sub Total | \$320 |
| Travel Outside Minnesota | | | | | | | | |
| | | | | | | | Sub Total | - |
| Printing and Publication | | | | | | | | |
| | | | | | | | Sub Total | - |
| Other Expenses | | | | | | | | |
| | | | | | | | Sub Total | - |
| | | | | | | | Grand Total | \$25,000 |

Classified Staff or Generally Ineligible Expenses

| Category/Name | Subcategory or Type | Description | Justification Ineligible Expense or Classified Staff Request |
|---------------|---------------------|-------------|--|
|---------------|---------------------|-------------|--|

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: [22fa5596-837.docx](#)

Alternate Text for Visual Component

Satellite photo of the project area (circled in red), which encompasses a >1 mile length of Mississippi River floodplain forest. Note that the most ready access to the project area from the field station building (address marker) involves boat transportation across River Lake....

Financial Capacity

File: [f05b93b6-c32.pdf](#)

Optional Attachments

Support Letter or Other

| Title | File |
|---|-----------------------------------|
| Letter of support from Friends of the Mississippi River | 126cd07a-0a0.pdf |
| Ordway Field Station Research Addendum | dc358d02-ec6.docx |
| Background Check | 5ba21b52-941.pdf |

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

The project end date has changed from 2021 to 2022, to allow time to submit a report to LCCMR.

The size of study plots and exclosures has been decreased, and their number increased, in the project description (see Research Addendum).

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 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

