



Environment and Natural Resources Trust Fund

M.L. 2021 Final Work Plan

General Information

ID Number: 2021-467

Staff Lead: Corrie Layfield

Date this document submitted to LCCMR: August 23, 2021

Project Title: Forest Health: Statewide Application of Forest Management Assessment Tool

Project Budget: \$500,000

Project Manager Information

Name: Will Bartsch

Organization: U of MN - Duluth - NRRRI

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Project Reporting

Date Work Plan Approved by LCCMR:

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

Project Completion: June 30, 2023

Final Report Due Date: August 14, 2023

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 19

Appropriation Language: (a) The following amounts, totaling \$840,000, are transferred to the Board of Regents of the University of Minnesota for academic and applied research through the MnDRIVE program at the Natural Resources Research Institute to develop and demonstrate technologies that enhance the long-term health and management of Minnesota's forest resources, extend the viability of incumbent forest-based industries, and accelerate emerging industry opportunities. Of this amount, \$500,000 is for extending the demonstrated forest management assessment tool to statewide application:

(1) the unencumbered amount, estimated to be \$250,000, in Laws 2017, chapter 96, section 2, subdivision 7, paragraph (e), Geotargeted Distributed Clean Energy Initiative;

(2) the unencumbered amount, estimated to be \$20,000, in Laws 2017, chapter 96, section 2, subdivision 8, paragraph (g), Minnesota Bee and Beneficial Species Habitat Restoration;

(3) the unencumbered amount, estimated to be \$350,000, in Laws 2018, chapter 214, article 4, section 2, subdivision 9, paragraph (e), Swedish Immigrant Regional Trail Segment within Interstate State Park; and

(4) the unencumbered amount, estimated to be \$220,000, in Laws 2019, First Special Session chapter 4, article 2, section 2, subdivision 5, paragraph (a), Expanding Camp Sunrise Environmental Program.

(b) The amounts transferred under this subdivision are available until June 30, 2023.

Appropriation End Date: June 30, 2023

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Narrative

Project Summary: This project is an expansion of the work began under LCCMR 2019 Forest and Bioeconomy Research. NRRI is requesting continuing Legislative support for two strategic applied research and demonstration projects.

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

Minnesota's forest products industries, sawtimber, paper, pulp and engineered wood products, contributed \$9.8 billion in forest product shipments and \$3.4 billion in direct value to Minnesota's economy in 2019 (Bergstrand 2019). Declining demand for forest products, a changing climate and new opportunities like carbon markets will require forest managers to think differently about how they manage forest lands and forest products industry about the potential products they can produce.

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.

To assist forest managers we will continue development of a forest management assessment and decision support tool and extend it from the 4 million acres (300K parcels) to cover the more than 17.4 million acres (1.6M parcels) of forestland in the state. This project will develop a spatially-explicit decision tool that integrates forest productivity, ecosystem service, and economic information to help land managers evaluate management options and select management practices that will meet their needs. To assist forest products industry we will continue to develop carbon-negative technology, that can be produced from biomass waste residues, customized for beneficial uses and can create new forestry and manufacturing jobs.

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 project will provide federal, state and county agencies, corporations, habitat management organizations and individuals with a tools that will help them to better understand the forest resources of the state, how changing markets, new technologies, new products streams and a changing climate will impact these forest lands and direct invest to better manage these lands sustainably.

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: Development of Stand level data and landscape level modeling

Activity Budget: \$370,000

Activity Description:

We will develop stand level summary statistics for utilizing available and model current stand conditions for public and private lands across the forest landscape of the state of Minnesota. We will convert this data into a format that can be used by an internationally accepted landscape level change model to model forest change across time. The landscape level change model will evaluate 4 harvest scenarios across the climate change scenario. These output will then be used to model ecosystem goods and services that will be provided under each of the scenario combinations through time.

Activity Milestones:

Description	Completion Date
Develop stand level data for all forest lands in the state of Minnesota	March 31, 2022
Convert spatially explicit stand level data to model input	June 30, 2022
Model landscape level change through time	September 30, 2022
Model ecosystem goods and services	December 31, 2022

Activity 2: Development of Map Application and Outreach Program

Activity Budget: \$100,000

Activity Description:

We will integrate forest management modeling and ecosystem service valuations into an online map-based application that will allow forest land managers and other stakeholders to weigh the costs and benefits of alternative management decisions based on current and future resource availability, supply chain issues, maintenance of ecosystem services, and predicted climate conditions. The application will be built using open-source software, providing us flexibility during the development process. To ensure that the application meets the information needs of the forest industry and is intuitive and stable, we will assemble a group of end users that we will regularly engage throughout development and testing.

Concurrent with the final stages of application development and testing, we will develop an outreach and training program. The program, which will be targeted at forest land managers and decision makers, will consist of in-person and remote training sessions, video tutorials, and a presence at relevant industry events.

Activity Milestones:

Description	Completion Date
Develop the map application with collaborator input; beta-test with end users	February 28, 2023
Launch the map application publicly	April 30, 2023
Conduct outreach and training sessions in model use, present and publish results	June 30, 2023

Activity 3: Voice of customer collection and client engagement

Activity Budget: \$30,000

Activity Description:

We will assemble an extensive and diverse group of stakeholder to collect information about their values, goal and management practices and develop management scenarios based on current and anticipated forest product needs. As we move through the development process we will rely on their assistance to tell us what is working and what does not

work, where the analysis is sufficient and where the data output is lacking and provide suggestions on what we can do to make the tool as useful as possible to planners and practitioners in the field.

Activity Milestones:

Description	Completion Date
Engage stakeholders to identify generally accepted management practices and scenarios	March 31, 2022
Analyze data and provide the modeling teams with recommendations for outputs	September 30, 2022
Review data analysis and suggest improvements to outputs	December 31, 2022

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Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Eli Sagor	University of Minnesota Extension	Dr. Sagor is the Program Manager for the U of MN Extension's Sustainable Forestry Education Cooperative. Dr. Sagor will provide support for the development and implementation of outreach and education activities for professionals and the general public.	Yes
Mae Davenport	University of Minnesota	Dr. Davenport is the Director of the U of MN's Center for Changing Landscapes. Dr. Davenport will provide support and assistance in the design and implementation of the voice of customer research to understand potential end-users needs.	Yes
Steve Polasky	University of Minnesota	Dr. Polasky is the Regents Professor of Evolution and Behavior in the Department of Applied Economics. Dr. Polasky will provide support and assistance in the quantification of ecosystems services.	Yes
Sarah Roth	University of Minnesota	Sarah Roth is a Researcher with the U of MN's Center for Changing Landscapes. Roth will assist with the development and implementation of the voice of customer process.	Yes
William R Herb	University of Minnesota	William Herb is a Researcher with the U of MN's Saint Anthony Falls Laboratory. Herb will lead the modeling efforts to quantify changes in water quality and quantity within the tool.	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 ENRTF Acknowledgement Requirements and Guidelines.

Deployment will include a beta testing phase that will gather feedback and recommendations for improvements to the tool. When completed, this tool will be deployed to end-users (industry, agencies, other stakeholders) with training supported and implemented by U of MN Extension through multiple outlets including the Sustainable Forest Education Cooperative. All public-facing research dissemination for this project will acknowledge the ENRTF funding for the project.

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?

This project will have an extensive advisory committee representing federal, state and county agencies, habitat conservation organizations, forest products industry and entrepreneurs to provide advice on the content and outputs. This same group will help to evaluate project outputs, drive engagement and help to socialize the tools.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
John Du Plissis		Du Plissis will serve as the primary investigator providing leadership and direction to the team. Du Plissis will also be responsible for the modeling of forest lands and generating stand level summary data for use in the landscape level modeling.			25.09%	0.52		\$66,809
Will Bartsch		Bartsch will serve as the project manager as well as lead the graphic user interface team.			25.09%	0.36		\$32,581
Saleh Mamun		Mamun is a resource economist and will be responsible for the evaluation and modeling of ecosystem services.			17.28%	0.18		\$13,923
Lucinda Johnson		Johnson will provide advice and support to the water modeling team in the development of data and the selection and implementation of models.			25.09%	0.02		\$4,557
Alexis Grinde		Grinde will be responsible for data development, analysis and evaluation of the bird habitat within the wildlife management team.			25.09%	0.08		\$9,912
Michael Joyce		Joyce will be responsible for data development, analysis and evaluation of the small mammal habitat within the wildlife management team.			25.09%	0.08		\$6,977
Ron Moen		Moen will provide overall supervision and leadership to the wildlife habitat modeling team as well as be responsible for data development, analysis and evaluation of the large mammal habitat within the wildlife management team.			25.09%	0.36		\$55,843
Meijun Cai		Cai will be responsible for data development, analysis and evaluation of the water quality and quantity within the water modeling team.			25.09%	0.18		\$16,214
Christopher Wright		Wright will support the development of stand level summary data, the conversion of the data for use in the selected landscape change model and the modeling landscape change through time.			25.09%	0.52		\$55,088
Matthew Mlinar		Mlinar will provide project management support and serve as a part of the project management team for this grant.			25.09%	0.08		\$11,257

Jane Reed		Reed will lead the development of the interactive portion of the graphic user interface.			22.3%	0.18		\$12,294
Kristina Nixon		Nixon will provide support to the modeling and graphic user interface teams in the development of spatial data and how it is displayed in the graphic user interface.			22.3%	0.34		\$26,776
Kristofer Johnson		Johnson will lead the development of the graphic user interface, the integration of the landscape level change data into a spatially explicit geographic information framework and the integration of the model outputs into that framework.			25.09%	0.42		\$36,901
Steve Polasky		Dr. Polasky is the Regents Professor of Evolution and Behavior in the Department of Applied Economics. Dr. Polasky will provide support and assistance in the quantification of ecosystems services.			25.09%	0.02		\$9,018
Eli Sagor		Dr. Sagor is the Program Manager for the U of MN Extension's Sustainable Forestry Education Cooperative. Dr. Sagor will provide support for the development and implementation of outreach and education activities for professionals and the general public.			25.09%	0.08		\$9,661
Mae Davenport		Dr. Davenport is the Director of the U of MN's Center for Changing Landscapes. Dr. Davenport will provide support and assistance in the design and implementation of the voice of customer research to understand potential end-users needs.			25.09%	0.14		\$18,730
Sarah Roth		Sarah Roth is a Researcher with the U of MN's Center for Changing Landscapes. Roth will assist with the development and implementation of the voice of customer process.			22.3%	0.2		\$14,807
William Herb		William Herb is a Researcher with the U of MN's Saint Anthony Falls Laboratory. Herb will lead the modeling efforts to quantify changes in water quality and quantity within the tool.			25.09%	0.24		\$25,235
TBD Forest Ecologist		The Forest Ecologist will support the development of stand level summary data, the conversion of the data for use in the selected landscape change model and lead the analysis and modeling landscape change through time.			25.09%	0.52		\$54,187

TBD Researcher 4		This position will provide support to the wildlife habitat modeling team.			22.3%	0.18		\$12,022
TBD Technician, bargaining unit		This position will provide support to the modeling teams with administrative support as needed.			22.3%	0.02		\$1,305
TBD Technician, temp/casual		This position will provide support in the modeling teams to assist with the collection modeling and assessment of data.			6.91%	0.02		\$680
TBD Undergraduate Student		This position will provide support in the modeling teams to assist with the collection modeling and assessment of data.			0%	0.02		\$546
TBD Summer Graduate Student		This position will provide support in the modeling teams to assist with the collection modeling and assessment of data.			18.96%	0.02		\$211
							Sub Total	\$495,534
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
							Sub Total	-
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel costs for project team members. Team members are across the UMD and UMN campus. 300 miles round trip to UMN campus.	This items is to cover the cost of mileage for project members to travel to and from regular meeting to coordinate activities among the					\$4,466

			modeling teams. Standard GSA rates will be applied.					
							Sub Total	\$4,466
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
							Sub Total	-
							Grand Total	\$500,000

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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
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

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Attachments

Required Attachments

Visual Component

File: [1022bdc7-323.pdf](#)

Alternate Text for Visual Component

The graphic describes the goal, opportunities benefits of the forest management opportunities and decision support tools as well as the inputs and out puts produced by the tool...

Optional Attachments

Support Letter or Other

Title	File
Background Check	4891efe8-a84.pdf
Institutional Letter of Support	93ef1666-8ec.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

There were only minor changes made.

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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 UMN Policy.

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?

No

Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration

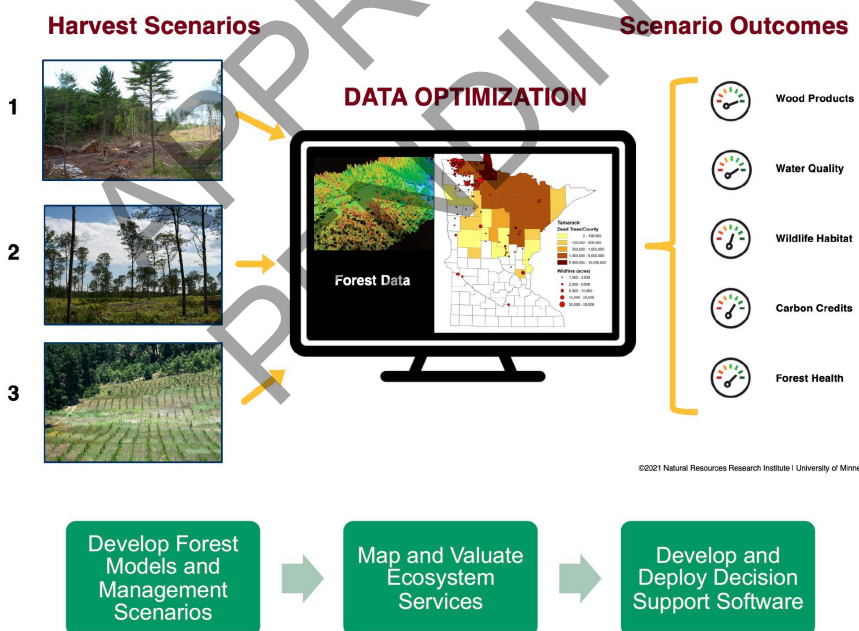
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PROJECT OVERVIEW: This project will **develop a stand level forest inventory for the entire state of Minnesota** that describe forest ecosystem services and evaluate potential impacts from changing harvest and climate scenarios.

OPPORTUNITY: Minnesota’s forest products industries contributed **\$9.8 billion** in forest product shipments and **\$3.4 billion in direct value to Minnesota’s economy** in 2019 (Bergstrand 2019). Maintaining the health and productivity of this resource is of paramount concern to all Minnesotans.

Declining demand for forest products, a changing climate and new opportunities like carbon markets will force forest managers to think differently about how they manage forest lands. Forests show a wide range of variation across Minnesota's landscape. Understanding regional variation is critical for making sound management decisions.

INNOVATION: The goal of this project is to develop a spatially explicit decision tool that integrates forest productivity, ecosystem service, and economic information to **give forest manager the tools that they need** to select management practices and identify optimal outcomes.



BENEFITS:

1. Statewide current forest inventory summary statistics at parcel level
2. Forest harvest scenarios outside of demonstration area
3. Methods to evaluate cumulative impact of landscape level changes
4. Economic assessments in forest health, productivity, habitat and water quality

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