Environment and Natural Resources Trust Fund

M.L. 2025 Approved Work Plan

General Information

ID Number: 2025-075

Staff Lead: Noah Fribley

Date this document submitted to LCCMR: June 5, 2025

Project Title: Integrating Wildlife Objectives in Long-Term Forest Management Planning

Project Budget: $316,000

Project Manager Information

Name: Irene De Pellegrin Llorente

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Office Telephone: (612) 624-4280

Email: depel001@umn.edu

Web Address: https://cfans.umn.edu/

Project Reporting

Date Work Plan Approved by LCCMR: June 24, 2025

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

Project Completion: June 30, 2028

Final Report Due Date: August 14, 2028

Legal Information

Legal Citation: M.L. 2025, First Special Session, Chp. 1, Art. 2, Sec. 2, Subd. 03f

Appropriation Language: $316,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota to develop a harvest-scheduling model that integrates wildlife habitat metrics with timber production objectives in the forest-planning process for more sustainable forest landscape-level outcomes.

Appropriation End Date: June 30, 2028

Narrative

Project Summary: Strategic forest planning helps identify how and when management activities should be scheduled. We integrate wildlife objectives with timber production into the forest planning process to create more sustainable forests

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

The main objective of a forest management planning effort is to identify how and when to schedule the management activities of the forest over a long period of time to maintain the ecological and economic sustainability of forest ecosystems. In other words, what are the optimum management treatments and when to apply them to different stands to achieve the landowner's long-term objectives across the landscape? Conventionally, forest planning models have focused on the production of just one objective or ecosystem service (e.g., timber production). If the landowner's interest is to tackle multiple objectives, e.g., timber production and wildlife habitat conservation, the easiest way to approach these problems is to define different scenarios optimizing the main objective (usually, timber production) and assess the impacts of those harvest levels on the secondary objective (e.g., wildlife habitat). With this approach, management decisions are not made by integrating both objectives, but rather by assessing the impacts after the harvest decision has been made. In this study, we integrate wildlife objectives into the forest management planning process defining a harvest-scheduling model that takes into account the habitat conservation of keystone wildlife species in Minnesota.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

Wildlife and forestry go hand-in-hand. We can truly benefit from the complementary opportunities of these two aspects by developing a forest management planning model that takes into account wildlife habitat conservation objectives. In collaboration with a wildlife expert panel, we will define wildlife habitat metrics that align with a forest management planning framework for the keystone wildlife species in Minnesota. To be able to track the change in habitat of these species through time, these metrics need to rely on parameters found on a basic forest inventory such as density-related variables, age class, site index, species composition, or ecological region. The rest of the pieces of a harvest-scheduling model will include defining the growth and yield model used to project the forest forward, silviculture prescriptions appropriate for each forest type, stumpage prices, and harvest costs. The last step includes assessing the proper harvest levels and incorporating the wildlife metrics into the harvest-scheduling model. This will provide opportunities to ensure that forest management continues to produce critical forest products while also maintaining habitat for important focal species and forest habitat indicator species, such as white-tailed deer, ovenbird, golden-winged warbler, and others.

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 open the door to a completely new forest planning approach where wildlife habitat conservation sits on the decision-making table with timber production. Results from this study will guide and inform the main tradeoffs between timber production and wildlife habitat conservation in different areas of Minnesota. This is crucial information for forest managers on the ground, wildlife managers and specialists, as well as policymakers. Ensuring Minnesota maintains economic, ecological, and wildlife services from its forests not only benefits managers and policymakers but also all citizens across the state.

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 and In the Future

Activities and Milestones

Activity 1: Developing wildlife habitat indices for keystone wildlife species in Minnesota

Activity Budget: $47,726

Activity Description:
Integrating wildlife management objectives into traditional long-term forest planning presents many complex challenges. For instance, forest management planning requires future forest conditions to be linked quantitatively to the habitat requirements of specific wildlife species. However, the habitat suitability models that wildlife managers use to classify habitat quality employ different variables than the ones used in forest inventory. The first activity will include the (1) study of the crucial wildlife species to be considered in this project, (2) conducting a literature review on the current habitat suitability indices or other potential metrics that indicate the habitat requirements of the wildlife species chosen, (3) assess whether these metrics would fit in a harvest-scheduling model, and in case it is needed, (4) adapt or develop wildlife habitat quality metrics to integrate into the project. The output will be used in Activity 2 and Activity 3.

Activity Milestones:

Description	Approximate Completion Date
Determine the focal wildlife species to be included in the project	December 31, 2025
Literature review on habitat requirements and available indices /other metrics of those species	December 31, 2025
Develop wildlife habitat quality metrics to integrate into the project	April 30, 2026
Incorporate the metrics into the harvest-scheduling model	June 30, 2026

Activity 2: Inventory, growth projections, and other parameters needed for the forest planning model

Activity Budget: $131,438

Activity Description:
Long-term forest planning models often require large amounts of information, and this activity will focus on developing the rest of the inputs to the harvest-scheduling model. Using the characteristics from Activity 1, we will develop silviculture prescriptions for each cover type that also align or enhance the wildlife habitat quality of the focal wildlife species. Then, we will use the highly vetted U.S. Forest Service, Forest Vegetation Simulator (FVS) to model the silviculture prescriptions and calculate the projected wildlife habitat quality on each stand. To ensure local accuracy, we will use forest inventory data to calibrate the growth and yield estimation produced by FVS. We will use the growth and yield estimates recently developed in a study developed by the University of Minnesota on Forest Carbon in Minnesota (funded by the Minnesota Forest Resource Council). We will compile detailed estimates of stumpage prices and harvest costs, as they play a crucial role in making the details and the further results of the project more realistic and accurate. This work will be in partnership with personnel from federal, state, and local agencies and research institutes.

Activity Milestones:

Description	Approximate Completion Date
Adapt forest inventory data to integrate into the harvest-scheduling model	December 31, 2026
Define silviculture prescription for each cover type	December 31, 2026
Develop growth and yield models using FVS and forest inventory data	June 30, 2027
Compile estimates of stumpage prices and harvest costs	June 30, 2027

Activity 3: Integration into the forest planning model, peer review, and dissemination

Activity Budget: $136,836

Activity Description:

Forest planning is an iterative process of defining the details of the problem, setting the assumptions, running the model, understanding the results based on the assumptions, revisiting the assumptions, and solving the new model. This is a crucial step to understand the dynamics between the two objectives and capture the nuances and specifics of the problem. Including forest and wildlife practitioners and researchers during this process is imperative to obtaining realistic and informative results. While collaborating with expert personnel, we will define multiple management scenarios that differ in assumptions, external constraints, and/or methods used for balancing the objectives. This will provide important information about trade-offs between different forest management decisions.

Overall, this project will help policymakers and managers to better understand the impact of incorporating multiple ecosystem services into the decision-making process. The results and workflows for future applications will be distributed through academic outlets and educational opportunities such as webinars, workshops, and other meetings with local stakeholders in Minnesota.

Activity Milestones:

Description	Approximate Completion Date
Integrate all information into the forest planning model	December 31, 2027
Define different wildlife and timber production scenarios and solve for the multiple ecosystem benefits	December 31, 2027
Solicit practitioner/researcher feedback and run revised scenarios (as needed) in consultation with expert personnel	April 30, 2028
Hold stakeholder webinars and workshops, and present at regional or state meetings	June 30, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
John Zobel	University of Minnesota	Co-Principle Investigator (Co-Pi)	Yes
Marcella Windmuller-Campione	Univeristy of Minnesota	Co-Pi	Yes
Tyler Gifford	University of Minnesota	Co-Pi	Yes
Alexis Grinde	NRRI	Wildlife ecology expert	No
Michael Joyce	NRRI	Wildlife ecology expert	No
Minnesota DNR willife	MN DNR wildlife and fisheries	Two wildlife experts will collaborate as consultants during Activities 1 and 3	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.
This study will be developed through consultation with the Minnesota Department of Natural Resources (MN DNR) Division of Forestry, the MN DNR Division of Fish and Wildlife, and the Natural Resources Research Institute. Two wildlife experts from the MN DNR Division of Fish and Wildlife and two wildlife specialists from the Natural Resources Research Institute will provide expertise in Activities 1 and 2. Three faculty members and a researcher from the Department of Forest Resources at the University of Minnesota will provide expertise on forestry aspects in Activities 2 and 3.
Before and during the completion of this project, we will involve county land departments and other local governments in regular meetings. We will share details of the project and seek their participation. Additionally, we will attend local conferences in Minnesota annually, such as the Minnesota Society of American Foresters conference, Forestry and Wildlife Research and Practice Review, and the Forest Resources Association Lake States Region Meeting to reach different audiences and gather diverse feedback for incorporation into the project.
After the completion of the project, the results will be shared with the aforementioned agencies, as well as with policymakers, the US Forest Service, and the citizens of Minnesota in an accessible manner. We will also utilize other outlets such as webinars, posts, technical reports, and peer-reviewed publications to reach a broader audience. We will work with UMN Extension, the Sustainable Forest Education Cooperative and the Great Lakes Silviculture Library to disseminate results and share different products with forest professionals and society. The goal is to enhance understanding of the tradeoffs between these two critical ecosystem services and advance the implementation across multiple ownerships and objectives.
In all of our material and products, we will appropriately acknowledge the Environment and Natural Resources Trust Fund through the use of the trust fund logo or attribution language on project print and electronic media, publications, and other communications per the ENTRF 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 work be funded?
This study will be developed through consultation with the Minnesota Department of Natural Resources (MN DNR) Division of Forestry, MN DNR Division of Fish and Wildlife, and the Natural Resources Research Institute. The results will be shared with the previous agencies as well as county land departments, other local governments, policymakers, and

the US Forest Service to improve the knowledge of the tradeoffs between two critical ecosystem services and advance implementation across multiple ownerships and objectives. The same modeling approach can be used on smaller areas for private landowners interested in the joint production of wildlife habitat conservation and timber.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Irene De Pellegrin Llorente		Project Lead			37.1%	0.3		$55,670
John Zobel		Co-Pi			37.1%	0.15		$26,582
Marcella Windmuller-Campione		Co-Pi			37.1%	0.02		$4,483
Tyler Gifford		Co-Pi			37.1%	0.25		$20,508
Post Doc		Researcher 5			27.1%	2		$154,611
							Sub Total	**$261,854**
Contracts and Services								
Minnesota Department of Natural Resources	Subaward	Two wildlife experts from the MN DNR, Division of Fish and Wildlife. They will work as consultants providing expertise and guidance on wildlife matters. Work years 1 & 3				0.06		$7,927
							Sub Total	**$7,927**
Equipment, Tools, and Supplies								
	Tools and Supplies	Woodstock Optimization Studio Software Annual License (2 years)	Woodstock Optimization Studio is the forest planning software that will be used in Activity 2 and 3. This commercial software is used by all the stakholders in Minnesota (MN DNR, county departments, Minnesota Forest Industry, and so on). The use of this software is completely necessary for the project	X				$40,000
							Sub Total	**$40,000**
Capital Expenditures								

							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Traveling for the PI and two of the Co-Pi's. The cost is estimated at $100 per day and includes mileage/vehicle rental, lodging, and per diem.	Organize workshops, seminar and meetings with wildlife experts and other stakeholders, during the project and at the end of the project to provide results					$1,000
							Sub Total	**$1,000**
Travel Outside Minnesota								
	Conference Registration Miles/ Meals/ Lodging	One conference travel outside Minnesota to present results	To present data findings and results	X				$2,000
							Sub Total	**$2,000**
Printing and Publication								
	Publication	Open access publication cost (1 article)	Publish the results of the project in peer-reviewed academic journals					$3,219
							Sub Total	**$3,219**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$316,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Equipment, Tools, and Supplies		Woodstock Optimization Studio Software Annual License (2 years)	Woodstock Optimization Studio is the forest planning software that will be used in Activity 2 and 3. This commercial software is used by all the stakeholders in Minnesota (MN DNR, county departments, Minnesota Forest Industry, and so on). The use of this software is completely necessary for the project. **Additional Explanation :** The annual software license is $20,000. It will be used during years 2 & 3
Travel Outside Minnesota	Conference Registration Miles/Meals/Lodging	One conference travel outside Minnesota to present results	Present research findings at a national forestry conference to increase project visibility

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount
State				
In-Kind	Unrecovered Indirect Costs UMN (55% overhead)	Operating costs of the UMN.	Secured	$180,400
			State Sub Total	**$180,400**
Non-State				
In-Kind	Minnesota Agriculture Experimental Station	Dr. John Zobel and Dr. Marcella Windmuller-Campione provide three weeks of their time as in-kind support.	Secured	$11,505
			Non State Sub Total	**$11,505**
			Funds Total	**$191,905**

Total Project Cost: $507,905

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: daf0dc57-7dc.pdf

Alternate Text for Visual Component

The visual shows the range of ecosystem services that Minnesota's forests provide. Pictures highlight wildlife species such as the Golden-winged Warbler, the ovenbird, the white-tailed deer, and the gray fox. It also provides the visuals of our partner organizations (University of Minnesota, Natural Resources Research Institute, and the Minnesota DNR)...

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Integrating wildlife objectives in long-term forest management planning_ SPA approval	d84d49ad-97f.pdf
2025-075 Research Addendum revised_final	e059eb86-03e.docx

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

We made small changes to the proposal. We decreased the number of wildlife species to be included in this project by one unit. The budgets for Activity 1 and Activity 2 have been reduced accordingly to accommodate the budget recommended.
Additionally, we addressed all the comments suggested after peer review.

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 understand that travel expenses are only approved if they 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 understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

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

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this project:

Tyler Gifford (University of Minnesota)
Marcella Windmuller-Campione (University of Minnesota)
John Zobel (University of Minnesota)

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A