Environment and Natural Resources Trust Fund

M.L. 2022 Approved Work Plan

General Information

ID Number: 2022-298

Staff Lead: Michael Varien

Date this document submitted to LCCMR: August 12, 2022

Project Title: Forest Data Inventory

Project Budget: $500,000

Project Manager Information

Name: Dennis Kepler

Organization: MN DNR - Forestry Division

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Project Reporting

Date Work Plan Approved by LCCMR: August 17, 2022

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

Project Completion: June 30, 2025

Final Report Due Date: August 14, 2025

Legal Information

Legal Citation: M.L. 2022, Chp. 94, Sec. 2, Subd. 10d

Appropriation Language: $500,000 the second year is from the trust fund to the commissioner of natural resources for an enhanced forest inventory on county and private lands.

Appropriation End Date: June 30, 2025

Narrative

Project Summary: Design and pilot the expansion of a program to conduct an enhanced forest inventory on private and county lands, complementing the work already begun on some public forest lands.

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

This project is designed to expand the MNDNR novel forest inventory process currently being conducted on state, county and federal lands to tribal, and private lands. The data collected will expand statewide analyses for tree density, forest changes, and carbon storage, which are critical elements in understanding our options for climate change response while making proactive, collaborative forest management possible. Since 2020, MNDNR has been transitioning to a more efficient and data-rich forest inventory method that combines plot-based forest inventory (PBI) and high-density light detection and ranging (lidar) derived data. Lidar uses pulsed lasers to measure features on and above the ground in three dimensions with great detail. PBI gathers precise forest metrics on the ground at distributed locations. Combining lidar derived information and field data from PBI provides accurate forest inventory information. These modernized forest inventory efforts to-date have focused mainly on DNR and USFS lands, only select counties and one Tribal Nation are participating currently. Private and county ownership account for the majority of Minnesota's forests. It is essential that PBI data also be collected for private and county forest lands to ensure Minnesota has reliable forest inventory information statewide.

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.

The rich dataset collected through lidar derived information and PBI represents Minnesota's dynamic forests and supports highly detailed mapping, improved modeling, and increased monitoring capabilities. This information will significantly enhance the ability of forest managers to make and measure data-driven management decisions, including decisions regarding climate change mitigation and adaptation efforts. This project provides funding to begin the expansion of PBI data collection beyond DNR-managed lands and extend field data collection to interested county and private forest land managers. Significant coordination and planning will be necessary to design the most comprehensive and effective program and align with ongoing lidar data collection. This effort will provide the PBI data needed to expand and modernize the forest inventory on millions of additional acres of forest land in Minnesota. This investment builds on current FMIA appropriations for partnering on lidar and PBI data collection, potentially doubling the total area of modernized forest inventory to 10 million acres of forest land. This is more than half of the 17.8 million acres of forest land in Minnesota.

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?

The key benefit of this project is the programmatic design of a forest inventory system that provides increased efficiencies of conducting forest inventory across state, county, and private lands – greatly accelerating our ability to comprehensively measure and monitor Minnesota's forest resources. This includes metrics such as volume and biomass, resulting in improved timber growth and yield projections statewide. These improvements support the DNR and other land managers in sustainable decision making. Improved information will advance fire fuel estimates, risk assessment, forest change detection, guideline monitoring, accuracy of carbon storage mapping and modeling, and forest health planning including climate adaptation.

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: Begin Planning and Network Design for Programmatic Approach to Plot Based Inventory and Landowner Involvement.

Activity Budget: $100,000

Activity Description:
DNR Resource Assessment Program (RA) will work with the DNR's Operational Services Division (OSD) to develop a new programmatic approach to expand forest inventory across non-state forest lands. RA and OSD will define the process for developing and maintaining relations with new and existing collaborators and stakeholders. Emphasis will be on both new relationships and existing relationships, with specific attention given to add value to existing relationships with additional products and services while recognizing their early participation. Strategic design will also focus on working with the DNR's Private Forest Management Program (PFM) and other designated cooperative forest management partners that work with private landowners.

Programmatic design will continue throughout the first year of the proposed project, with heavy emphasis in the first six months. Coordination will be led by RA, with several other state and non-state partners involved in development of this program.

Strategic elements to be addressed include: identification and collaboration with PFM organizations, inventory collection design elements, as well, facilitated focus groups and listening sessions with private landowners, Tribal and County professionals, to better understand their data needs. Flexibility and additional efforts will be needed to identify all feasible logistical solutions for the activity.

Activity Milestones:

Description	Approximate Completion Date
Project definition and programmatic design team established	November 30, 2022
Agreement on strategic organizational roles and responsibilities, identification of collaborators and stakeholders, project organizational chart.	January 31, 2023
Identification of landscape priorities for PBI; forest conditions, areas to be sampled; pilot area selected.	January 31, 2023
Develop draft plan for engaging private vendors able to complete private lands PBI field work.	March 31, 2023

Activity 2: Strategize, test design, and begin private landowner outreach and PBI network development.

Activity Budget: $275,000

Activity Description:
Partner input is essential in solidifying the organizational structure needed to accomplish the project objectives. After the initial six months, the Project Team assembled in Activity 1 will continue working with the defined stakeholder community to define a pilot area and measurable outcomes that will be used to test the efficacy of the piloted programmatic approach. The private lands PBI network will depend on partner capacity and organizational priorities, among other considerations to be determined.

RA will work with identified internal and external stakeholders to coordinate private landowner outreach associated with strategic priorities and needs defined. RA will work with PFM and external organizations to identify private forestry consultants to conduct PBI on lands where permission to collect data is granted. Training on the procedures and standards used for PBI data collection will follow the public lands PBI effort currently nearing completion. This activity

will also include facilitated focus groups and listening sessions with private land owners, Tribal and County professionals, to better understand their data needs.

Activity Milestones:

Description	Approximate Completion Date
Priority landowner identification, landowner contact and permissions for private lands PBI collection.	April 30, 2023
Development of request for proposals and contract for use with private forestry consultants doing PBI.	May 31, 2023
Coordination with partners producing inventory models based on FIA and other forest inventory data.	May 31, 2023

Activity 3: PBI Data Collection on County and Private Lands.

Activity Budget: $125,000

Activity Description:
The DNR's Resource Assessment Program (RAP) and collaborators from UMN and MFRC will investigate incorporating other field inventory plots from public lands PBI and United States Department of Agriculture's Forest Inventory and Analyses Program (FIA) to improve precision of final products. Implementing any strategic design and collaboration will start in a priority pilot region.
RAP staff and contractors contractors will also conduct forest inventory on approximately 250 PBI plots across county, private, and tribal forestland ownerships within the selected pilot region. Then assess the ability of the new plot data to enable extension of public lidar derived forest inventory models to all-lands.

Activity Milestones:

Description	Approximate Completion Date
Conduct focus groups and listening/input sessions with stakeholders.	June 30, 2023
Develop new forest inventory model estimates within the pilot region.	January 31, 2024
Assess the model results with and without the expanded plot network .	March 31, 2024
Conduct outreach and education workshops with participating landowners.	May 31, 2024
Collect PBI data on private lands.	October 31, 2024

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Minnesota Forest Resources Council	Minnesota DNR - Forestry	Partner Coordination, Landscape Prioritization for PBI Collection, Strategic Direction and Oversight of Project Objectives and Deliverables, Oversight of student workers involved with private landowner interactions.	No
Private Forest Management Program	Minnesota DNR - Forestry	Private Landowner Contact and PBI Permissions for Private Lands	Yes
Extension Services	University of Minnesota	Private Landowner Contact and Permissions	No
Minnesota Forestry Association	Minnesota Forestry Association	Private Landowner Contact and Participation	Yes
Forest Stewardship Planning Coordination	Minnesota Board of Soil and Water Resources	Coordination with local Soil and Water Conservation Districts, Partner Coordination, Strategic Direction and Contribution to Project Objectives and Deliverables, Private Landowner Contact and Participation	No
Resource Assessment Program	Minnesota DNR - Forestry	Project Management, Remote Sensing Model Development, Partner Coordination, PBI Network Design, PBI Collection Procedure Oversight, Time Series Map Production.	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.
Forest inventory information needs to be available across entire landscapes that encompass multiple ownerships. This project will aim to develop program materials that assist private forest landowners in particular, to address their forest management challenges and stewardship goals. Maintaining the connection between professional foresters and the myriad of landowners with a programmatic approach that includes collection of forest inventory and monitoring data will be key (i.e., PBI). Web based GIS solutions will be needed. DNR Resource Assessment will also conduct an analysis of the newly acquired high density lidar and any high resolution aerial photography with all available forest inventory information (e.g., PBI, other existing plot data). If possible, all of the newly acquired data will be provided free to the public and will be hosted through the most effective acceptable internet website (e.g., http://www.mngeo.state.mn.us/, https://gisdata.mn.gov/). A brief report will be prepared to summarize the project research and development, including a condensed version of an accuracy assessment.
The Environment and Natural Resources Trust Fund will be acknowledged through the use of the trust fund logo or attribution language on project print and electronic media, publications, signage, 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 project will develop a programmatic approach to engaging with private landowners on collecting time sensitive PBI data. These data will be collected with the goal to merge with public data to produce statewide estimates of forest resources information, and pilot results will be shared with participants in the form of property specific maps and reports. Private landowners and associated stakeholders will help the project team understand landowner priorities and

desired incentives. This pilot project will leverage current funding for state and federally managed lands and build the programmatic structure for future funding requests.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Private Forest Management Program - MNDNR Forestry		PFM foresters working on private stewardship plans will provide a point of contact with landowners likely to agree to participate in the private lands PBI network. PFM foresters may collect PBI plots on lands where they have developed stewardship plans.			25%	0.4		$50,000
							Sub Total	**$50,000**
Contracts and Services								
Resource Assessment Program	Internal services or fees (uncommon)	RAP will provide overall project coordination, hiring, data analysis, model development, and contractor management services. All project deliverables will be produced directly by RAP (lidar inventory models, maps, property reports).				1.6		$200,000
Private Forestry Consultants	Professional or Technical Service Contract	Private Forestry Consultants will do most of the actual plot based inventory data collection. Private contractors will report to Resource Assessment.				1.5		$187,500
Minnesota Forestry Association	Professional or Technical Service Contract	MFA will provide a point of contact with private forest stewards possibly interested in participation in the private lands PBI network. Landowner communications related to this effort will be maintained by MFA. Participating landowners will be provided with a private forestry consultant to collect PBI data.				0.4		$50,000
							Sub Total	**$437,500**
Equipment, Tools, and Supplies								
	Equipment	5 sub-meter accuracy GPS's	Plot Based Inventory requires highly accurate GPS locations to tie into the high-density lidar.					$12,500
							Sub Total	**$12,500**

Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
							Sub Total	**-**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$500,000**

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: 20f6e4ca-739.pdf

Alternate Text for Visual Component

Plot network design is planned where there is only forest cover. Each map shows total number of proposed PBI plots per county and private ownership, with yellow to red background color indicating a lower total number of plots, green to yellow color indicates higher total number of plots....

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

No changes from proposal to work plan.

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?

N/A

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?

No

M.L.2022. Kepler, D. Forest Data Inventory

This project will design and pilot the expansion of a Plot Based Inventory (PBI) forest data inventory program to conduct an enhanced forest inventory on all forest lands. The expansion complements work that has already begun on some public forest lands, thanks in part to the ENRTF funded pilot project in 2016, *Development of Innovative Cost-Saving Methodology for Forest Inventory*, and partnerships with several counties and the US Forest Service Superior and Chippewa National Forests.

Initial planning around plot network design is highlighted in the maps below, with color coming through where there is forest cover (National Land Cover Dataset, 2016). On the left, labels show the total number of proposed PBI plots per county, and yellow to red background color indicate a lower total number of plots, green to yellow color indicate higher total number of plots. On the right, labels show the number of proposed private PBI plots per county, where the yellow to red color background indicates a high private PBI plot percentage. Counties with a red background are prime candidates for piloting this program.