# Environment and Natural Resources Trust Fund
# 2019 Request for Proposals (RFP)

**Project Title:** **ENRTF ID: 009-A**

An Integrated Statewide Forest Monitoring System for Minnesota

**Category:** A. Foundational Natural Resource Data and Information

**Sub-Category:**

**Total Project Budget: $** 371,000

**Proposed Project Time Period for the Funding Requested:** June 30, 2022 (3 yrs)

**Summary:**

Minnesota's forests face many challenges. We propose a system of regular "check-ups" to track forest health over time, detect distress signals, and correct course through active management.

**Name:** Meredith Cornett

**Sponsoring Organization:** The Nature Conservancy

**Title:** Director of Science

**Department:** Minnesota

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**Web Address** https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/minnesota/index.htm

**Location**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

**Alternate Text for Visual:**

An integrated system of site level and landscape level data will help land managers and decision makers with "check-ups" that will maintain forest health

| | | | |
|---|---|---|---|
| _____ Funding Priorities | _____ Multiple Benefits | _____ Outcomes | _____ Knowledge Base |
| _____ Extent of Impact | _____ Innovation | _____ Scientific/Tech Basis | _____ Urgency |
| _____ Capacity Readiness | _____ Leverage | _____ TOTAL | _____% |
| ____ If under $200,000, waive presentation? | | | |

**PROJECT TITLE: An Integrated Statewide Forest Monitoring System for Minnesota**

## I. PROJECT STATEMENT

Much has changed since the passage of Minnesota's Sustainable Forest Resource Act of 1995 (Act). Harvesting patterns have shifted dramatically, with substantial declines on private lands, but steady or increasing rates on state and county lands. Invasive pests and a changing climate increasingly threaten the health of the forest. Forest loss due to agriculture has accelerated in some counties. Despite these changes, we lack an integrated, statewide monitoring system to assess and report on forest conditions over time. The overall goal of the project is to develop a comprehensive, "State-of-the-Forest" monitoring system that: 1) fulfills the landscape monitoring requirements of the Act; 2) meets common monitoring needs of forest management agencies on private and public lands; and 3) makes use of existing data, ongoing monitoring projects, and digital engagement platforms. We will produce an affordable and robust system by **integrating** remotely sensed data (landscape-level) with field-based data (site-level). We will use existing, regularly-collected remotely sensed imagery and collaborate with agency partners who do ongoing, intensive field-based forest monitoring to be economical. The result will be a statewide set of mapped forest ecosystem indicators for all land types that provides important information to manage for healthier, more resilient forests.

This project is needed because the Act requires measuring progress toward the landscape-level, multi-ownership goals specified for each of the state's six major forested regions (mn.gov/frc/landscapes.html), which can be paraphrased as: 1) maintain or expand total forested areas; 2) maintain healthy, resilient forest ecosystems within an appropriate mixture of forest types and ages for timber, biodiversity, and habitat; 3) provide of a full range of products, services, and values. Past attempts at forest monitoring have failed to meet this long-term need, falling short in one or more of the following ways: insufficient geographic extent, infrequent updates, limited representation of ownership, single-scale only (i.e., either site-level or landscape-level), or narrow scope with little attention to a full range of values. Monitoring provides a basis for assessing change and progress to meet these goals, over time.

## II. PROJECT ACTIVITIES AND OUTCOMES

**Activity 1:** *Summarize field-based, site-level data.* We will compile the most currently available site-level data from three highly complementary data sources: 1) Forest Inventory and Analysis (FIA), managed by the US Forest Service; 2) MNDNR's relevé database; and 3) Minnesota's Ecological Monitoring Network (EMN), an LCCMR-supported MNDNR initiative managed by the Minnesota Biological Survey (MBS) Program;. Together, these data sources provide statewide forest coverage (FIA – 2 plots per 6,000 acres), native plant community characteristics (>11,000 relevés) and rich detail on habitat conditions (EMN). Other forest inventory data (e.g., county land departments) may also be used for ground truthing. The integrated dataset will provide the foundation for estimating forest condition. We will work with the Minnesota Forest Resources Council (MFRC), Interagency Information Cooperative (ICC) and other stakeholders to develop a set of key forest indicators, determine the types and formats for "State-of-the-Forest" summaries, and create a long-term plan for sustaining this work as a cooperative interagency project. The final products for Activity 1 will be shared via an interactive "State-of-the-Forest" online workspace.

**ENTRF BUDGET: $96,000**

| Activity 1 Outcome | Completion Date |
|---|---|
| *1. Acquire and summarize data.* | *06/30/2020* |
| *2. Develop "beta" version of online workspace; complete summary report.* | *06/30/2020* |
| *3. Create protocols for maintenance of site-level data in "State of the Forest" workspace* | *07/31/2020* |

**Activity 2:** *Analyze remotely sensed, landscape-level data*. This project will integrate three types of remotely sensed data: 1) Satellite and aerial photography (e.g., Landsat, NAIP); 2) Light detection and ranging data (Lidar); and 3) Stereo imagery (i.e., three-dimensional data). The satellite data we would use is free, provides landscape-level coverage, and is regularly collected, allowing for continuous updates in forest condition, including

information on forest cover and composition. Where available, we will use the existing Lidar data to assess structure and confirm forest trends observed over time (i.e., in NE, SE, Metro and Central MN). For forested areas where we lack the appropriate and/or time-sensitive Lidar data, stereo-photography will fill in the gaps. Lidar and stereo-photography are well-suited for deriving detailed information on forest structure and age, each critically important for mapping wildlife habitat and native plant communities. The baseline for assessing change in forest cover composition will be the most recent Statewide Land Use Cover Map (UMN 2013) funded by a previous LCCMR grant. We will contract with MN DNR Resource Assessment to process composition data, Lidar- and stereo-based structure data, and satellite-derived change detection information using readily available, repeatable methods. The data assembled in Activity 1 (above), which serves as the field-based foundation for estimating forest condition, will also be used for validation and fine-tuning the landscape-level mapping results.

**ENTRF BUDGET: $132,000**

| Activity 2 Outcome | Completion Date |
|---|---|
| *1. Acquire remote sensing data and analyze key factors (structure, age, composition, etc.)* | *06/30/2020* |
| *3. Protocols for maintenance of landscape-level data on the "State of the Forest" website* | *02/28/2021* |
| *4. Add products to beta version of "State-of-the-Forest" website* | *06/30/2021* |

**Activity 3:** *Integrate site-level and landscape-level data to produce an All-Lands "State-of-the-Forest" Assessment System.* Based on methods piloted by The Nature Conservancy and the Superior National Forest in northeast Minnesota, we will integrate the site-level and landscape-level results (Activities 1 and 2, respectively). Site-level results will characterize trends in forest composition and structure, which translate to key ecosystem processes and human land use change over the short and long term. Landscape-level results will supply coarser resolution data at larger geographic scales, which translate to broad scale trends over space and time. The results will be shared via the "State-of-the-Forest" website, where land managers, decision makers, and other users will be able to analyze specific areas of interest and generate summary reports for critical indicators relevant to landscape-scale forest management.

**ENTRF BUDGET: $143,000**

| Outcome | Completion Date |
|---|---|
| *1. User guide for "State-of-the-Forest" website* | *01/30/2021* |
| *2. Public launch of the web-based dashboard with continuous reporting capabilities* | *03/30/2021* |
| *3. Work plan and formalize agreements for maintaining the "State-of-the-Forest" system* | *06/30/2021* |

**III. PROJECT PARTNERS:**

**A. Partners receiving ENRTF funding**

| Name | Title | Affiliation | Role |
|---|---|---|---|
| George Host | Initiative Director | NRRI | Contractor: site-level data analysis |
| Resource Assessment Program Staff | Research Analyst Specialist Senior | MNDNR | Contractor: landscape-level data analysis |

**B. Partners NOT receiving ENRTF funding**

| Name | Title | Affiliation | Role |
|---|---|---|---|
| Hannah Texler | Plant Survey Supervisor | MNDNR, MBS Program | Project advisor + EMN data |
| Mark Nelson | Research Forester | USFS Northern Research | Project advisor + FIA data |
| Chris Beal | Wildlife Biologist | Superior National Forest | Project advisor - data integration |

**IV. LONG-TERM-IMPLEMENTATION AND FUNDING:**

Agencies will develop a cooperative model for sustaining the work over time (see Activity 3, Outcome 3).

**V. TIME LINE REQUIREMENTS:** Three years

**VI. SEE ADDITIONAL PROPOSAL COMPONENTS**

# 2019 Proposal Budget Spreadsheet

**Project Title: An Integrated, Statewide Monitoring System for Minnesota**

**IV. TOTAL ENRTF REQUEST BUDGET: 3 years**

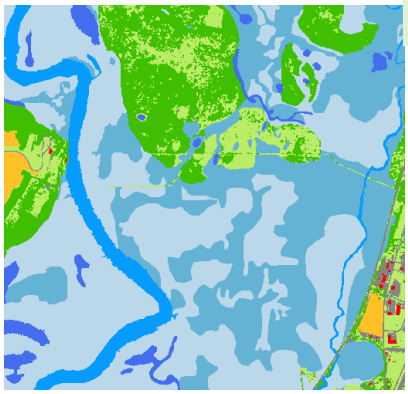
| **BUDGET ITEM** (See "Guidance on Allowable Expenses") | **AMOUNT** |
|---|---|
| **Personnel:** *Project Manager: 15%FTE per year x 3yr Science Support: 15%FTE years 1&2, 25%FTE year 3* *Benefits budgeted at 28.6% of personnel costs, will be charged at rate subject to change annually.* | $ 106,000 |
| **Professional/Technical/Service Contracts:** *Site-level analysis, production and outreach contract planned with Natural Resources Research Institute* *Landscape-level data analysis contract planned with MN DNR* | $ 265,000 |
| **Equipment/Tools/Supplies:** N/A | $ - |
| **Acquisition (Fee Title or Permanent Easements):** N/A | $ - |
| **Travel:** N/A | $ - |
| **Additional Budget Items:** N/A | |
| | $ 371,000 |

**V. OTHER FUNDS** *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

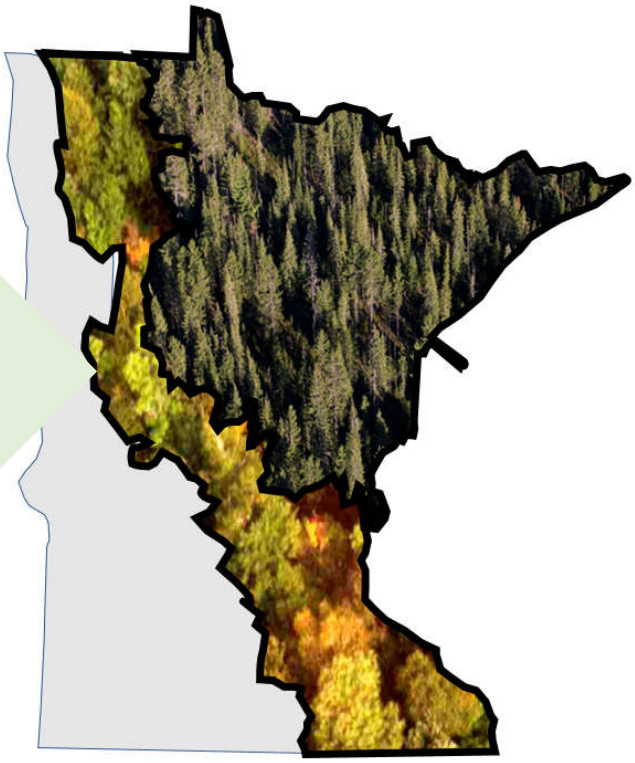
| **SOURCE OF FUNDS** | **AMOUNT** | **Status** |
|---|---|---|
| **Other Non-State $ To Be Applied To Project During Project Period:** *Includes unrecovered indirect as leverage, budgeted conservatively and reported at our NICRA rate, as well as cash match ($20k toward each of the three activities).* | $140,764 | *Confirmed* |
| **Other State $ To Be Applied To Project During Project Period:** | $ - | *N/A* |
| **In-kind Services To Be Applied To Project During Project Period:** *A number of our partners (both state and federal) will contribute time and resources on this collaborative project, leveraging the investment by LCCMR considerably (not to be construed as match). For example, at the time of proposal submission, $18k has been confirmed by Chris Beal, Superior National Forest.* | $ 18,000 | *Confirmed* |
| **Past and Current ENRTF Appropriation:** | $ - | *N/A* |
| **Other Funding History:** N/A | $ - | *N/A* |

# An Integrated Statewide Monitoring System for Minnesota

***Now more than ever, Minnesota's forests need regular "check-ups."***



Site data + landscape data



## Minnesota's State-of-the-Forest Monitoring System

**Canopy cover**

**Revenue**

**Age**

**Productivity**

**Habitat**

An interactive digital platform to support forest management.

**Organization Description**

For nearly 60 years, The Nature Conservancy has been working across the state of Minnesota to conserve the lands and waters on which all life depends. With more than 1 million members The Nature Conservancy is one of the leading conservation organizations working around the world to address the most pressing conservation threats to nature and people. The Conservancy convenes people of differing views and applies science-based solutions locally and globally. To conserve Minnesota's forests, we work with with forest managers, government and other decision-makers to: 1) help set forest conservation priorities for the next 20 years, 2) make the Northwoods more resilient to climate change and other stresses through targeted restoration and protection and 3) expand the scale of forest restoration and protection by helping to develop good policies and plans for public forest lands and increasing funding for forest restoration. For more information visit:

https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/minnesota/explore/protecting-our-future-forests.xml

**Project Manager Qualifications**

**Dr. Meredith Cornett, Director of Conservation Science**, has served as the director of the Conservancy's science program in Minnesota, North Dakota, and South Dakota since 2004. She oversees conservation planning, research, and monitoring across the three-state chapter. In addition, Cornett is an adjunct member of the graduate faculty in Forest Resources and Conservation Biology at the University of Minnesota. She holds an M.S. and Ph.D. in Forestry. Climate adaptation has been a major focus of Cornett's work in recent years—serving as the project manager for a previous WCS CAF project (AFNW) and regional coordinator for ongoing Conserving Nature's Stage work throughout the Great Lakes. A listing of Cornett's relevant publications is available on Google Scholar: https://scholar.google.com/citations?hl=en&user=QtJ9msUAAAAJ&view_op=list_works&sortby=pubdate