

**Environment and Natural Resources Trust Fund
2014 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 023-A

Restoring Long-Lost Forest Data and Extending Ecological Monitoring

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: \$ 196,000

Proposed Project Time Period for the Funding Requested: 2 Years, July 2014 - June 2016

Summary:

Long-term forest data; focus on restoration of long-lost statewide forest inventories of 1935, 1953 and 1966 to link with more recent data; to extend long-term ecological monitoring.

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Location

Region: Statewide

County Name: Statewide

City / Township:

<input type="checkbox"/> Funding Priorities	<input type="checkbox"/> Multiple Benefits	<input type="checkbox"/> Outcomes	<input type="checkbox"/> Knowledge Base
<input type="checkbox"/> Extent of Impact	<input type="checkbox"/> Innovation	<input type="checkbox"/> Scientific/Tech Basis	<input type="checkbox"/> Urgency
<input type="checkbox"/> Capacity Readiness	<input type="checkbox"/> Leverage	<input type="checkbox"/> Employment	<input type="checkbox"/> TOTAL <input type="checkbox"/> %



PROJECT TITLE: Restoring Long-Lost Forest Data and Extending Ecological Monitoring.

I. PROJECT STATEMENT

Long-term forest plot datasets have proven invaluable for understanding the changing conditions and ecology across Minnesota’s 17.3 million acres of forestland. Major forest conditions, e.g., forest type and age class distributions, have changed dramatically in the last century. One dataset that has contributed enormously to our understanding of change is the statewide forest inventories reported on in 1935, 1953, 1966, 1977, 1990, 2003, 2008 and 2013. These data are from the USDA Forest Service Forest Inventory and Analysis (FIA) program and represent very high quality data. Unfortunately, only the data from 1977 to the present is available in detail; the earlier plot records have been lost. We propose to locate and restore and/or reconstruct the earlier data down to a level useful for ecoregion to local change analysis and thereby reestablish linkage to the 1977 and more recent data. We may also be able to locate the original field data in archives. With that data we will gain 40+ years of detailed forest dynamics—invaluable to climate, environment and habitat change understanding.

It is also crucial to extend intensive long term forest monitoring. A key case is the 400 forest plot inventory on the University’s 3,500 acre Cloquet Forestry Center—measured 7 times from 1959 to 2000. An 8th measurement is overdue. We propose that for 2014 with augmentation to address interests in habitat change, notably for ruffed grouse. To wait longer will induce a very limiting gap in this database.

Research hypothesis: We recognize the increasing value of large, long-term and intensive forest inventory datasets for examining a wide range of ecological, habitat and economic issues. We anticipate that today’s search, database management, scanning, digitizing, interpolation, extrapolation and imputation methodologies are sufficient to complete databases with gaps or missing data such that truly useful detail can be restored and linked to the more recent records. Further, we anticipate that informed searching of published records, internal agency reports and data archive sites can provide sufficient information and perhaps original data to allow nearly complete and highly useful dataset restoration.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Collect, assemble and recover information on and details of the 1935, 1953 and 1966 statewide forest inventories. Budget: \$115,150

The 1935, 1953 and 1962 data are available only in summary reports on a statewide and sometimes regions and counties. We have systematically sought further documentation describing these data and also interviewed individuals who executed these surveys, including past and present administrators. Here we extend those efforts to restore the subject datasets.

Outcome	Completion Date
1. Collection and synthesis of documentation, summaries, maps and field data records from federal (Kansas City) archives for the subject inventories.	January 2015
2. Digitization, processing, and recovery of data down to region, county and plot levels; verification of restoration by comparison with official reports.	January 2016
3. Database formatted to link for analysis with datasets for 1977 to present and reporting.	March 2016

Activity 2: Extend the Cloquet Forestry Center forest monitoring. Budget: \$48,500

Conduct an augmented 8th field measurement of this intensively measured set of plots to create one of the longest such databases in the Eastern U.S. and immediately useful for forest and habitat change analysis.

Outcome	Completion Date
1. Organization, planning and conduct of the 8 th field plot data collection.	September 2014
2. Data compilation and addition of data to long-term Cloquet database.	November 2014
3. Linkage to geographic stand data, supporting thematic data and reporting.	February 2015

Activity 3: Identify and restore other long-term forest plot databases. Budget: \$32,350

Seek out and recover additional long-term datasets that have potential for understanding forest change. Key criteria are that these datasets (a) describe ecologically important conditions over a large area, (b) have detail for meaningful change analysis, and (3) describe timeframes in excess of 30 years. These datasets will focus on naturally occurring forest conditions, though some portion may have a history of management treatments.

Outcome	Completion Date
1. Collection of documentation and field data for the subject inventories.	October 2015
2. Digitization, processing, and restoration of data with recompilation to compare and verify against official reports.	March 2016
3. Database and data formatted for forest change analysis and reporting.	June 2016

III. PROJECT STRATEGY

A. Project Team/Partners. The University of Minnesota will receive the funding and contribute substantial time and effort to the project. Project team members are from the University's Department of Forest Resources. Members include Professors Alan Ek and Thomas Burk and Research Associate John Zobel. Cooperators include the USDA Forest Service Forest Inventory and Analysis unit in St. Paul and a related Federal Archives site (in Kansas City, Missouri), plus to governmental entities in Minnesota that have been involved with collection of FIA and other data in the past.

B. Timeline Requirements. A Two-year project length is needed to be able to seek out, collect, process and make the subject datasets available for analysis.

C. Long-Term Strategy and Future Funding Needs. We plan for restored databases, data descriptions, change analyses and publications and other reports to be developed and made available to ecologists, inventory specialists, and resource analysts through publications and web access (via the Department of Forest Resources and the Forest Resources Interagency Information Cooperative websites) in convenient data formats including those compatible with current statewide forest inventory data. These datasets will be employed as soon as they become available for examination of long-term forest change, specifically for their implications for climate change (resilience, adaptation), for understanding long-term carbon sequestration in forests statewide, and for habitat change, e.g., for ruffed grouse, moose and forest health and biodiversity implications as well. We anticipate our own (other) projects in these subject areas will provide the funding for using these data further; we will also make these data available for applications by others within and beyond the University on funding they may have available.

**2014-2016 Detailed Project Budget
Overall Project Budget**

IV. TOTAL ENRTF REQUEST BUDGET: 2 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel: Research Support: Research Associate J Zobel for 2.0 years at .50 time. Salary and fringe (33.6 %). Work will be synthesis, compilation and verification of data plus linkage to recent data and including some supervision of others (research fellow and students on the project). Total 1.0 FTE	\$ 68,000
Research Support: Research Fellow D. Wilson for 2.0 years at .50 time. Salary and fringe (33.6 %). Work will be synthesis, compilation and verification of data. Total 1.0 FTE	\$ 57,000
Graduate research assistants: Salary and fringe (86.4%) for 1 University of Minnesota graduate students for 2.0 years, at 25% time (10 hours/week). Graduate fringe is budgeted at 0.87 of salary load and includes tuition for the academic year, health care for the fiscal year, and social security and Medicare for summer pay periods. Work will be digitizing and compiling forest inventory data in the restoration process. Total 1.0 FTE.	\$ 34,000
Undergraduate students: Salary and fringe (7.43%) for four University of Minnesota students for 3 months for field data collection at the Cloquet Forestry Center. Total 1.0 FTE	\$ 24,000
Equipment/Tools/Supplies: For remeasurement of the Cloquet Forestry Center inventory plots: (1) For expendable field measurement supplies \$1360; (2) for field measurement and data capture equipment... qty 2 Criterion RD 1000 Electronic BAF-scope/Dendrometers @ \$1,470 ea; ...qty 2 Juniper Systems ruggedized field PCs with accessories including GPS receiver @ \$1,600 ea.	\$ 7,500
Travel: To locate and collect historic long-term records from cooperators in Minnesota (DNR and Northern counties), and at the Federal Records Center in Kansas City, KS, and field data Collection at Cloquet Forestry Center.	\$ 5,500
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 196,000

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non State \$ Being Applied to Project During Project Period:	\$ -	NA
Other State \$ Being Applied to Project During Project Period:	\$ -	NA
In-kind Services During Project Period: Project manager (Ek) will contribute 1% time to the project; other University PI (Burk) will contribute 1% time to working with project employees and cooperators.	\$ 6,594	Secured
Unrecovered indirect costs @ 52% of modified total direct cost base of \$180,096	\$ 93,650	Secured
Other in-kind Services During Project Period.	\$ -	NA
Remaining \$ from Current ENRTF Appropriation (if applicable): NA	\$ -	NA
Funding History: None. However, project PI's have decades of experience with FIA, Cloquet and other inventory designs and data.	\$ -	NA

GRAPHIC: History of Statewide Forest Inventories in Minnesota from 1935 to 2013.

- **2013:** The figure below describes the location of the latest Forest Inventory and Analysis (FIA) field plots in Minnesota (6,139 plots, each consisting of four 1/24th acre subplots) and examples of data collected.

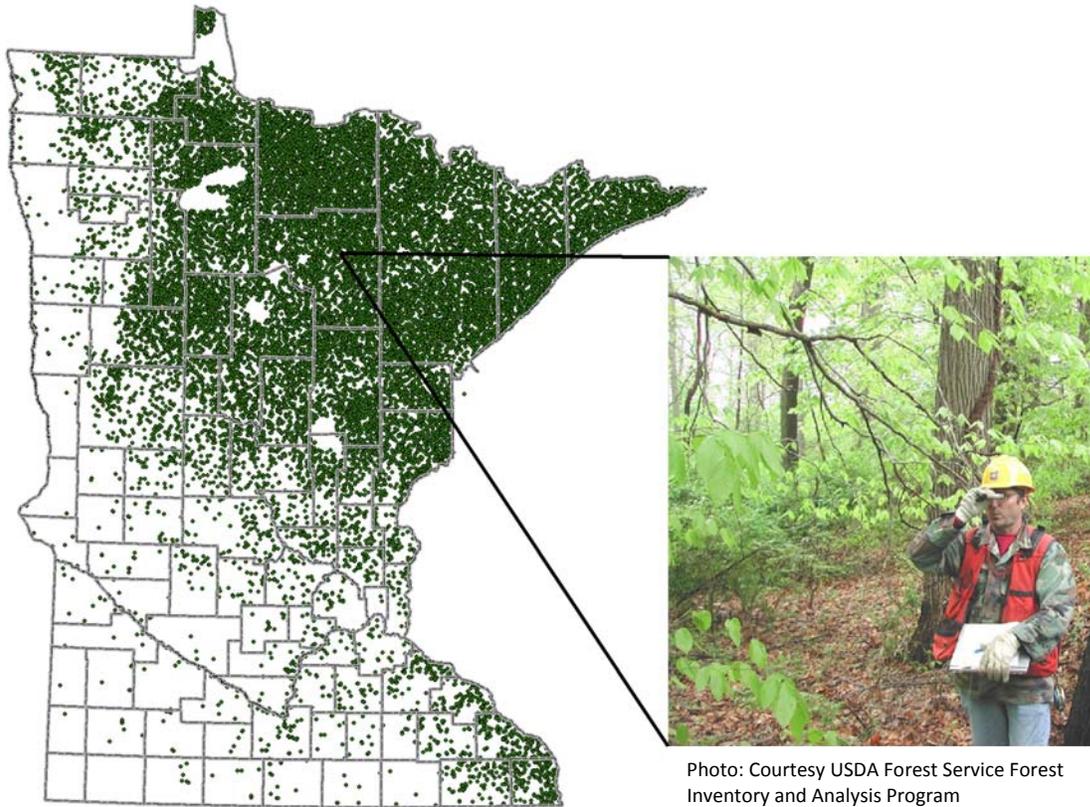


Figure 1: FIA plots in Minnesota in 2013. The plots were measured over a 5 year period (2009-2013) and provide estimates of forest area, ownership, cover type, stand tree and site description, numerous ecological descriptors, habitat indicators, and numerous other measures.

- **2008:** Same sample plot grid layout and measurement as 2013
- **2003:** Same sample plot grid layout and measurement as 2008
- **1999:** Same sample plot grid layout and measurement as 2003
- **1990:** Similar sample plot grid layout and measurement as 1999
- **1977:** Same sample plot grid layout and measurement as 2013
- **1966:** Data lost...
- **1953:** Data lost...
- **1935:** Data lost...

Project Activity: Locate, collect and restore the lost inventory data and compilations.

Results: Extension of forest and related ecological monitoring data and compilations for 40+ years, thus greatly strengthening historic detail on forest dynamics—invaluable to climate, environment and habitat change understanding.

PROJECT TITLE: Restoring Long-Lost Forest Data and Extending Ecological Monitoring
Project Manager Qualifications/Organization

Alan R. Ek, Professor and Head

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Background: Alan Ek has B.S. and M.S. degrees from the University of Minnesota in forestry and a PhD from Oregon State University in forest measurements. He joined the faculty at Minnesota in 1977 after service with the Canada Department of Fisheries and Forestry and the University of Wisconsin. He is the author of 150+ research and technical papers on forest inventory design and conduct, resource analysis and planning. He was elected a Fellow of the Society of American Foresters (SAF) in 1991 and has served as chair of the SAF Forest Science and Technology Board; from 1990-1994 he served as the Study Group Coordinator for the Generic Environmental Impact Study of Timber Harvesting and Forest Management in Minnesota. In 1997, he worked in Finland as a Fulbright Scholar. In the late 1990s he served on the USDA Forestry Research Advisory Council, including two years as chair. He has also served several terms as Research Chair for the National Association of University Forest Resource Programs. In the recent past he served as a member of the Governor's Task Force on the Competitiveness of Minnesota's Primary Forest Products Industry. He is also a member of the Minnesota Forest Resources Council and director of the Forest Resources Interagency Information Cooperative. Finally, he has in-depth experience working with statewide forest inventory data since the 1970s.

Responsibilities for the proposed project: Supervision of project budget, staff and activities including developing details for project operations, details for activities 1-3 and associated tasks and timelines, development of research protocols, including data searches, recovery and processing, cooperator communications, plus oversight for details in the development of deliverables. He will also serve as a co-investigator for all three project activities, specifically by providing knowledge of historic data and expertise in data searches, recovery and field data collection.

For activities 1-3, the lead investigators will be A. Ek and J. Zobel, Research Associate.