Environment and Natural Resources Trust Fund
2012-2013 Request for Proposals (RFP)

Project Title: **ENRTF ID:** **095-E2**

Minnesota from Above: Informing Conservation through Satellite Imagery

Topic Area: E2. NR Info Collection/Analysis

Total Project Budget: $ 385,920

Proposed Project Time Period for the Funding Requested: 3 yrs, July 2013 - June 2016

Other Non-State Funds: $ 0

Summary:

Demonstrate utility and cost-effectiveness of cutting-edge remote sensing assessment methods. Determine effectiveness of site-level management on landscape-level benefits over time. Develop best practices for six Minnesota landscapes (4.5 million acres).

Name: Meredith Cornett

Sponsoring Organization: The Nature Conservancy

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Location

Region: NW, NE, Central

County Name: Aitkin, Cass, Clay, Crow Wing, Itasca, Kandiyohi, Kittson, Koochiching, Marshall, Morrison, Norman, Otter Tail, Pennington, Polk, Pope, Red Lake, Roseau, St. Louis, Stearns, Swift, Todd, Wadena, Wilkin

City / Township: Various

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ Employment	_____ TOTAL _____%

PROJECT TITLE: Minnesota from Above – Informing Conservation through Satellite Imagery

I. PROJECT STATEMENT

Large-scale problems call for large-scale solutions. Minnesota's lands and waters face unprecedented threats, from destructive flooding to invasive species. Land managers and scientists increasingly recognize that sustaining critical services for Minnesota's citizens requires maintaining healthy, resilient landscapes. But for decades, land managers have addressed impacts on a site-by-site basis that continues to be an ad hoc affair. **How well does site-level management translate to landscape-level benefits in Minnesota's forests and grasslands**? Answering this question requires zooming out.

The past decade has seen remarkable advances in remote sensing to detect trends in land cover changes, such as deforestation in the Amazon, savanna rehabilitation in sub-Saharan Africa, and forest recovery in the Ukraine. More recently, breakthroughs in satellite imagery analysis have honed our ability to detect changes. For example, today we can assess trends in composition and structure that previously could only be gleaned through expensive on-the-ground surveys. Consistent with the LCCMR Six-Year Strategic Plan, we will acquire critical remote sensing data for **six Minnesota landscapes** (three grasslands and three forests). The project will employ several satellite sensors including Landsat TM, Spot, Radar, LiDAR, and MODIS. To minimize costs we will use imagery from existing sources where available and supplement with new imagery when necessary. In total we will assess management effectiveness and landscape-level trends across **4.5 million acres**.

Minnesota from Above is a proof-of-concept intended to demonstrate the utility and cost-effectiveness of the latest cutting-edge remote sensing methods in assessing landscape-level benefits of site-level management. Our primary audience comprises state, federal, and county land management agencies. We will develop six landscape analysis reports summarizing current management, landscape trends over time (1980s to present), and recommended best practices for enhancing landscape-level benefits such as water storage and productivity. Our methods will complement, not replace, more expensive on-the-ground assessments which cost anywhere from $5 to $1,000 per acre. For just **1/10 of 1 cent per acre**, *Minnesota from Above* will shed light on how to manage smarter for greater benefits.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Assess Forest Management Effectiveness Budget: $177,646

We will assess forest management for three landscapes (Map 1) across a total of 2 million acres: Sugar Hills (300,000 acres), Little Fork (1.3 million acres), and Lake Alexander/Saint Croix Moraines (400,000 acres). Specifically, we will characterize trends related to such practices as conservation easements, harvest, and restoration. A targeted set of field measures will be used to verify land types, practices, and trends. Landscape analysis reports will emphasize best practices for improving benefits such as water quality, forest productivity, carbon storage, and habitat connectivity.

Outcome	Completion Date
1. Current and historical imagery acquired for three landscapes	12/15/2013
2. Imagery classified into land types and practices	7/31/2014
3. Completion of field data collection	8/31/2014
4. Remote sensing and field data integrated	12/31/2014
5. Change detection/trend analysis completed	2/28/2016
6. Forest landscape analysis reports made available online	6/30/2016

Activity 2: Assess Grassland Management Effectiveness **Budget: $208,274**

We will assess grassland management for three landscapes (Map 1) across a total of 2.5 million acres: Tallgrass Aspen Parkland (1.5 million acres), Agassiz Beach Ridges (620,000 acres) and Ordway Glacial Lakes (380,000 acres). Specifically, we will characterize trends related to current practices of prairie reconstruction, prescribed fire, invasive species management, and sustainable grazing. A targeted set of field measures will be used to verify land types, practices, and trends. Landscape analysis reports will emphasize best practices for improving benefits such as water storage, water quality, habitat structure, and habitat connectivity.

Outcome	Completion Date
1. Current and historical imagery acquired for three landscapes	12/15/2013
2. Imagery classified into land types and practices	7/31/2015
3. Completion of field data collection	8/31/2015
4. Remote sensing and field data integrated	12/31/2015
5. Change detection/trend analysis completed	4/30/2016
6. Grassland landscape analysis reports made available online	6/30/2016

III. PROJECT STRATEGY

A. Project Team/Partners

Over the past five years, **Nature Conservancy scientists Mark White (M.S.) and Meredith Cornett (Ph.D.)** have tested remote sensing methods in four Minnesota landscapes. **Nature Conservancy Prairie Ecologist Marissa Ahlering (Ph.D.)** brings expertise in grassland ecology and landscape analysis to the project. The Conservancy will collaborate with **Peter Wolter (Ph.D.) of Iowa State University**. Dr. Wolter has more than 20 years of experience modeling and mapping vegetation structure in Minnesota and Wisconsin. He has pioneered new methods that can precisely estimate composition and structure in Minnesota's forests and grasslands.

Roles: Project Manager & Communications (Cornett/TNC), Forest Lead & Field Operations (White/TNC), Grassland Lead & Field Operations (Ahlering/TNC), Remote Sensing & Analysis (Wolter/Iowa State). TNC will receive funds from the ENRTF and contract with Iowa State for remote sensing & analysis. Matching contributions are reflected in the budget.

B. Timeline Requirements

Due to the large number of acres for which imagery will be required and analyzed, forest analysis will be completed in the first half of the project and grassland analysis will take place in the second half. Field measures for forests will occur over the 2015 field season. Grassland field measures will occur over the 2016 field season. For consistency in format and content, landscape analysis reports will be completed for all six landscapes over the last six months of the project (January – June 2016).

C. Long-Term Strategy and Future Funding Needs

Minnesota from Above is a three-year project with discrete products and serves as a proof of concept for affordable landscape-level assessments. Such assessments will be an ongoing need in Minnesota. By demonstrating the utility and cost-effectiveness of a healthy landscapes approach to management, we will work with state agencies and county land departments on ways to build similar assessments into their budgets as well as compete in future rounds for LCCMR funding.

2012-2013 Detailed Project Budget (The Nature Conservancy)

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IV. TOTAL ENRTF REQUEST BUDGET (3 years)

BUDGET ITEM	AMOUNT
Personnel:	
Project Manager: (10% empl.*1 position (67% salary, 33% benefits)*3 yrs. [Project oversight & reporting, budgeting & contract management, reportcards & management recommendations, communications]	$ 31,950
Technical Leads: (10% empl.*2 positions (67% salary, 33% benefits)*3 yrs. [Direct remote sensing outcomes, oversee field operations, integrate remote sensing and field data, develop reportcards & management recommendations]	$ 51,120
Contracts:	
Iowa State University (Graduate Student): satellite imagery classification, change detection and trend analyses for 6 landscapes (4.5 million acres)	$ 225,000
Equipment/Tools/Supplies: Remote sensing data acquisition - reflects 30% discount if purchased through academic institution	$ 50,650
Travel: Covers mileage reimbursement, lodging & food (per the Commissioners' requirements) for 2-person field crew over the course of two field seasons	$ 17,200
Additional Budget Items: Design and publication of data and landscape analysis reports for Results 1&2.	$ 10,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 385,920

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ Being Applied to Project During Project Period: TNC will contribute cash resources to the project to cover 100% of salary and benefits for 2 field workers in each field season ($25,160). In addition TNC will contribute cash match to cover 50% of the cost of remote sensing imagery ($25,325)	$ 50,485	Secured
Other State $ Being Applied to Project During Project Period: (None)	$ -	N/A
In-kind Services During Project Period: Peter Wolter's time will be donated to the project, including (total of two months) training and supervising a graduate student hired specifically for to classifyimagery, conduct change analyses, and produce final reports ($18,000); TNC's unrecovered indirect costs at a rate of 18% ($69,500)	$ 87,500	N/A
Remaining $ from Current ENRTF Appropriation (if applicable): Reconnecting MN's Fragmented Prairie Landscapes (2010 Appropriation of $380,000)- *Of the $380,000 appropriated in 2010, $72,886 has been spent. $196,822 is legally obligated to the University of Minnesota. The remaining $110,292 is unspent.*	$ 110,292	unspent
Funding History: *Specific sources of funding secured prior to July 1, 2013 for activities directly relevant to this specific funding request (from lines 17 & 19)*	$ 137,985	Sum of in-kind & cash

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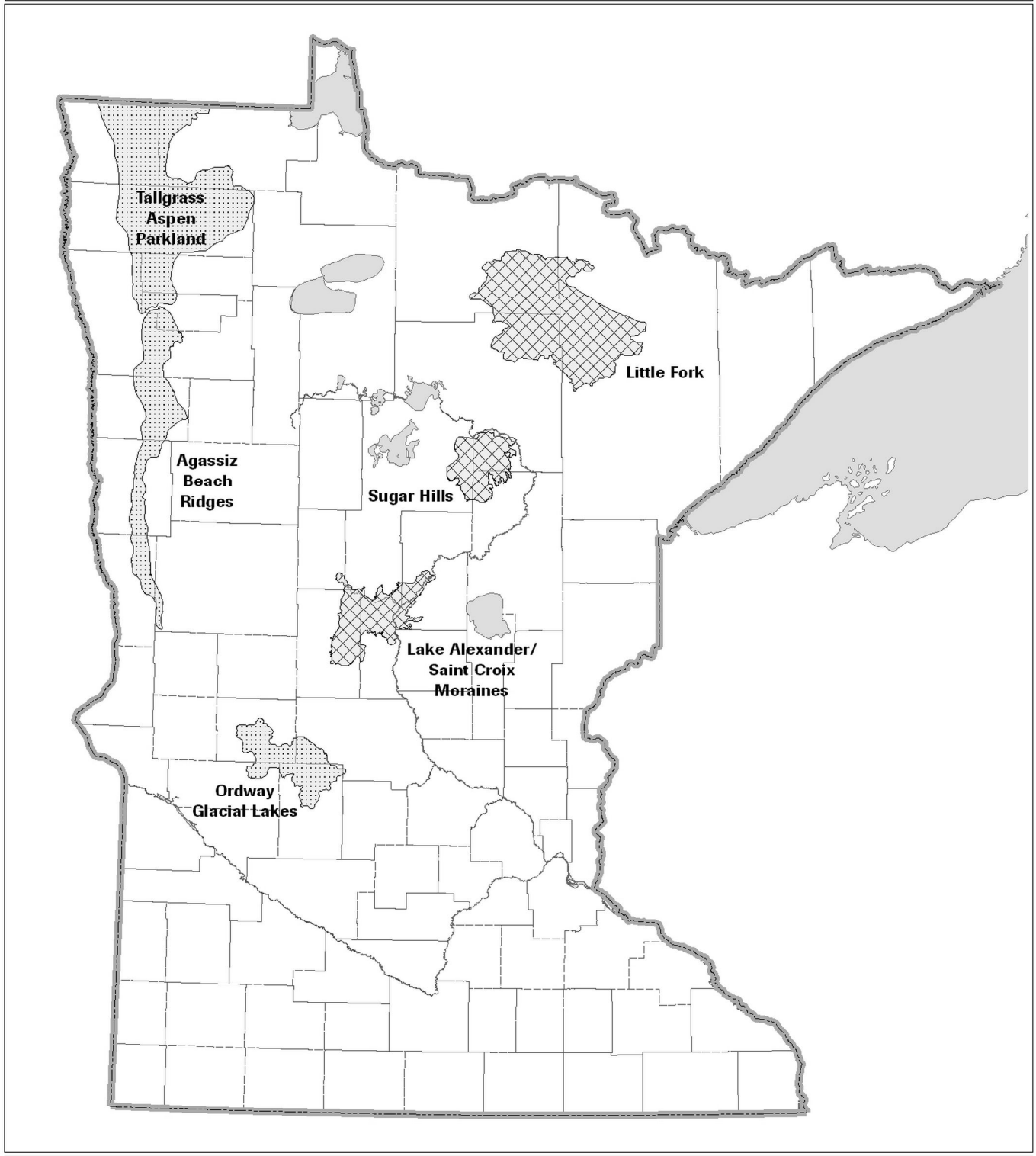
The Nature Conservancy - April, 2012



Minnesota from Above: Informing Conservation through Satellite Imagery
Project Manager Qualifications for Meredith Cornett and
Organization Description for The Nature Conservancy

Project Manager Qualifications

Meredith Cornett is Director of Conservation Science with The Nature Conservancy in Minnesota. Over the course of her career, she has managed dozens of conservation projects with multiple partners and complex budgets. She joined the Conservancy's staff as a forest ecologist more than 10 years ago. In 2004, she was selected to direct the chapter's science program. Cornett is responsible for the development of conservation plans throughout the state and works with closely with conservation practitioners to implement monitoring and evaluation techniques to determine effectiveness of land management in forests, grasslands, and freshwater habitats. Prior to her employment with the Conservancy, Cornett worked for the Minnesota Department of Natural Resources as a Community Ecologist in the Metro Region.

In addition to her current position at The Nature Conservancy, Cornett serves as an adjunct member of the graduate faculty in the University of Minnesota's Conservation Biology Program. Cornett holds an M.S. and Ph.D. in Forestry from the University of Minnesota – Saint Paul and a B.A. in Biology from Oberlin College in Ohio. She served as a Peace Corps Volunteer in the Republic of Panama between college and graduate school.

Organization Description

The mission of **The Nature Conservancy** is to conserve the lands and waters on which all life depends. Using a collaborative, science-based approach, the Conservancy identifies those areas that offer the best chance for large-scale preservation of biodiversity and forges partnerships with businesses, governments, landowners, and residents to develop and implement solutions to environmental threats.

The Nature Conservancy was founded in 1951, and we have protected nearly 120 million acres of land and 5,000 miles of rivers worldwide. We work in all 50 states and in more than 30 countries protecting habitats from grasslands to coral reefs. We address threats to conservation involving climate change, fire, fresh water, forests, invasive species, and marine ecosystems. We use a science-based approach, and we pursue non-confrontational**,** pragmatic solutions to conservation challenges. We partner with indigenous communities, businesses, governments, multilateral institutions, other non-profits, and individuals.

Since 1958, The Nature Conservancy has protected more than 650,000 acres of Minnesota's forests, prairies, rivers, lakes and wetlands. We currently own and manage 57 preserves across the state, encompassing more than 72,000 acres. We have more than 23,000 members in Minnesota.