

**Environment and Natural Resources Trust Fund
2011-2012 Request for Proposals (RFP)**

LCCMR ID: 134-F1+2+5

Project Title: Establish Scientific Foundation for Peatland Carbon Sequestration Projects

Category: F1+2+5. Climate Change and Air Quality

Total Project Budget: \$ \$493,371

Proposed Project Time Period for the Funding Requested: 2 yrs, July 2011 - June 2013

Other Non-State Funds: \$ 0

Summary:

Measure carbon uptake and methane release in healthy and altered peatlands. Develop a road map for landscape level peatland restoration and carbon sequestration project implementation with carbon offset financing.

Name: Mark Lindquist

Sponsoring Organization: DNR

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New Ulm MN 56073

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Web Address: www.mndnr.gov

Location

Region: NW, NE

Ecological Section: No. Minnesota and Ontario Peatlands (212M)

County Name: Beltrami, Koochiching, Lake of the Woods

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 _____% |

PROJECT TITLE: Establish scientific foundation for peatland carbon sequestration projects

I. PROJECT STATEMENT

We propose to estimate the carbon sequestration benefits of restoring peatlands by measuring the annual fluxes of carbon dioxide (CO₂) and methane (CH₄) obtained in the field and analysis of peat cores. We will also develop a road map for large scale peatland restoration to sequester carbon. This project will build on the University of Minnesota's ongoing, long-term data collection efforts at the Red Lake Peatland Observatory funded by the National Science Foundation and the U.S. Department of Energy by adding needed measurement instruments and expanding the focus of current research to include restorable peatlands.

About 672,000 acres peatland managed by the DNR are within ¼ mile of a drainage ditch, mostly in the glacial lake beds in northern Beltrami, Lake of the Woods, and Koochiching counties. The water levels in these peatlands are affected to varying degrees. Much of this land was tax forfeited, following unsuccessful attempts to drain peatlands for agricultural use. The hydrologic regimes of peatlands have also been altered by road construction or other activities in adjacent lands.

Restoration of degraded peatlands is an essential part of a comprehensive strategy for meeting the state's greenhouse gas emissions reduction goals. Degraded peatlands are likely a significant source of greenhouse gas emissions, whereas healthy peatlands continue to accumulate carbon. Peatland restoration could flip hundreds of thousands of acres from a being a carbon source to a carbon sink. Compared to other climate mitigation strategies, peatland restoration imposes very little burden on the state's economy and taxpayers. Restoring peatland ecosystems will also provide better habitat for wildlife populations and hold more water on the landscape in the flood prone Red River watershed.

Peatland restoration can likely be funded via emerging carbon markets once voids in our knowledge about the carbon storage potential of restored peatlands are filled. As a contribution to achieving the NextGen Energy Act greenhouse gas emission reduction goals, peatland restoration is a readily achievable. Despite the enormous importance of peatlands in storing carbon, there is a dearth of information about changes in carbon storage and methane emissions following alteration or restoration of the hydrologic regimes. Lack of this basic information hinders efforts to direct resources toward peatland conservation and restoration.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Measure flow of carbon gases in peatland

The University of Minnesota will procure and install two new eddy covariance flux towers with capacity to measure the flow of carbon dioxide, methane and water vapor into and out of degraded peatland. In addition, two existing eddy covariance towers located in a pristine peatland will be upgraded to include methane measurements. Data will be used to develop an overall carbon budget for pristine and altered peatlands. The carbon budget will be further broken out to determine the role of both methane and carbon dioxide.

Budget: \$377,894

| Outcome | Completion Date |
|---|------------------------|
| 1. Comparative data on CO ₂ balances in pristine and degraded peatlands | June 2013 |
| 2. Comparative data on methane (CH ₄) emissions in pristine and degraded Peatlands. | June 2013 |
| 3. A total carbon balance (CO ₂ + CH ₄) for pristine and degraded Peatlands. | June 2013 |

Activity 2: Determine peat accumulation rate via peat core analysis

Five peat core samples will be taken from both pristine and altered peatlands where current carbon fluxes are being measured. Ten radio carbon dates will be secured for each peat core in order to

understand the peat accumulation rate over very long time frames. This will be matched and compared to previous peat core work accomplished through the Red Lake Peat Observatory.

Budget: \$63,452

| Outcome | Completion Date |
|---|-----------------|
| 1. A long term (5,000 year) record of peat and carbon accumulation in peatlands | June 2012 |

Activity 3: Outline road map for large scale peatland restoration

DNR staff will develop a high level plan for large scale peatland restoration. Through internal service agreement the Grand Rapids Forestry Resource Assessment Program will compile and verify existing GIS and related data on ditching, road construction and other developments affecting peatland hydrology in Beltrami, Lake of the Woods and Koochiching Counties. If feasible this will include the creation of digital elevation models. Building off this data and other internal and partner experience, a road map will be developed. The road map will identify peatlands with high restoration potential, their carbon sequestration potential and then evaluate carbon offset protocols and offset market status to develop restoration financing strategies.

Budget: \$52,025

| Outcome | Completion Date |
|--|-----------------|
| 1. Verified peatland ditches, roads and related hydrology geographic data set. | June 2012 |
| 2. Digital elevation model of peatlands | December 2012 |
| 3. High level Peatland restoration roadmap | June 2013 |

III. PROJECT STRATEGY

A. Project Team (whose getting money) Space between groups.

Mark Lindquist, DNR Biofuels Program (Commissioners Office) will provide project management and contract management. (\$19,051)

Dr. Clarence Turner, Ecologist (Forestry) will provide internal DNR technical lead on roadmap development. (No Funding)

DNR Forest Resource Assessment Program (Forestry) GIS data and analysis (\$42,500)

The Interagency Carbon Sequestration Team (DNR, MPCA, MDA, BWSR, DOT and Office of Energy Security) interagency coordination (No Funding)

Dr. Paul Glaser, The Department of Geology and Geophysics, University of Minnesota/Red Lake Peatland Observatory, will be the primary recipient of project funding, leveraging federal investments. (\$431,820)

B. Timeline Requirements

This project will require two years for procurement and installation of equipment and data collection and analysis. Once equipment is installed, longer term data sets can be developed and analyzed on two year cycles.

C. Long-Term Strategy and Future Funding Needs

The long term objective is to achieve large scale restoration of Minnesota peatlands that have been degraded by altered hydrology. The ENRTF investment in deeper understanding of peat systems will provide 1) greater capacity to pursue large scale restorations, and 2) open anticipated future funding mechanisms – carbon offset markets – to accomplish the restorations. We anticipate that a continuation of ENRTF to fund a longer data series will be sought. It is also a project objective to maximize the benefit of past and potential future federal investments in the Red Lake Peatland Observatory. The National Science Foundation has already funded two eddy flux towers as well as extensive other basic science pertaining to peatland systems. Additional funding will be pursued. A critical infusion of state cash at this time will position Minnesota for further federal investment.

2011-2012 Detailed Project Budget

INSTRUCTIONS AND TEMPLATE (1 PAGE LIMIT)

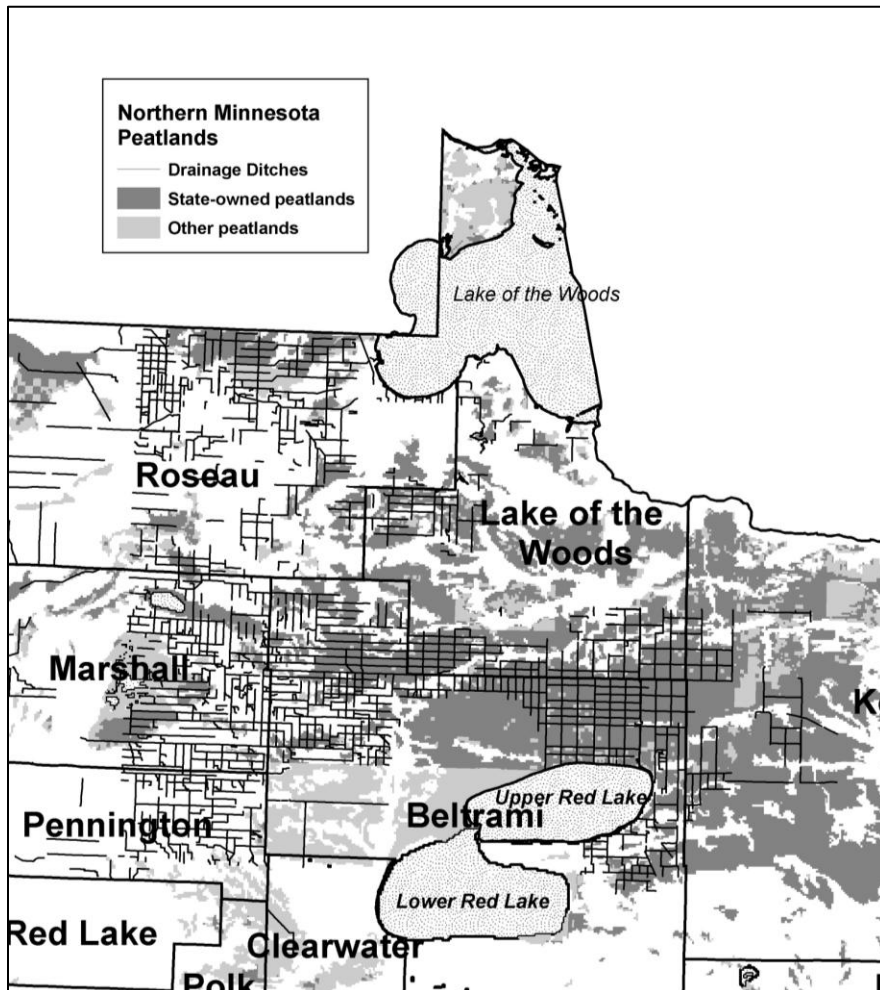
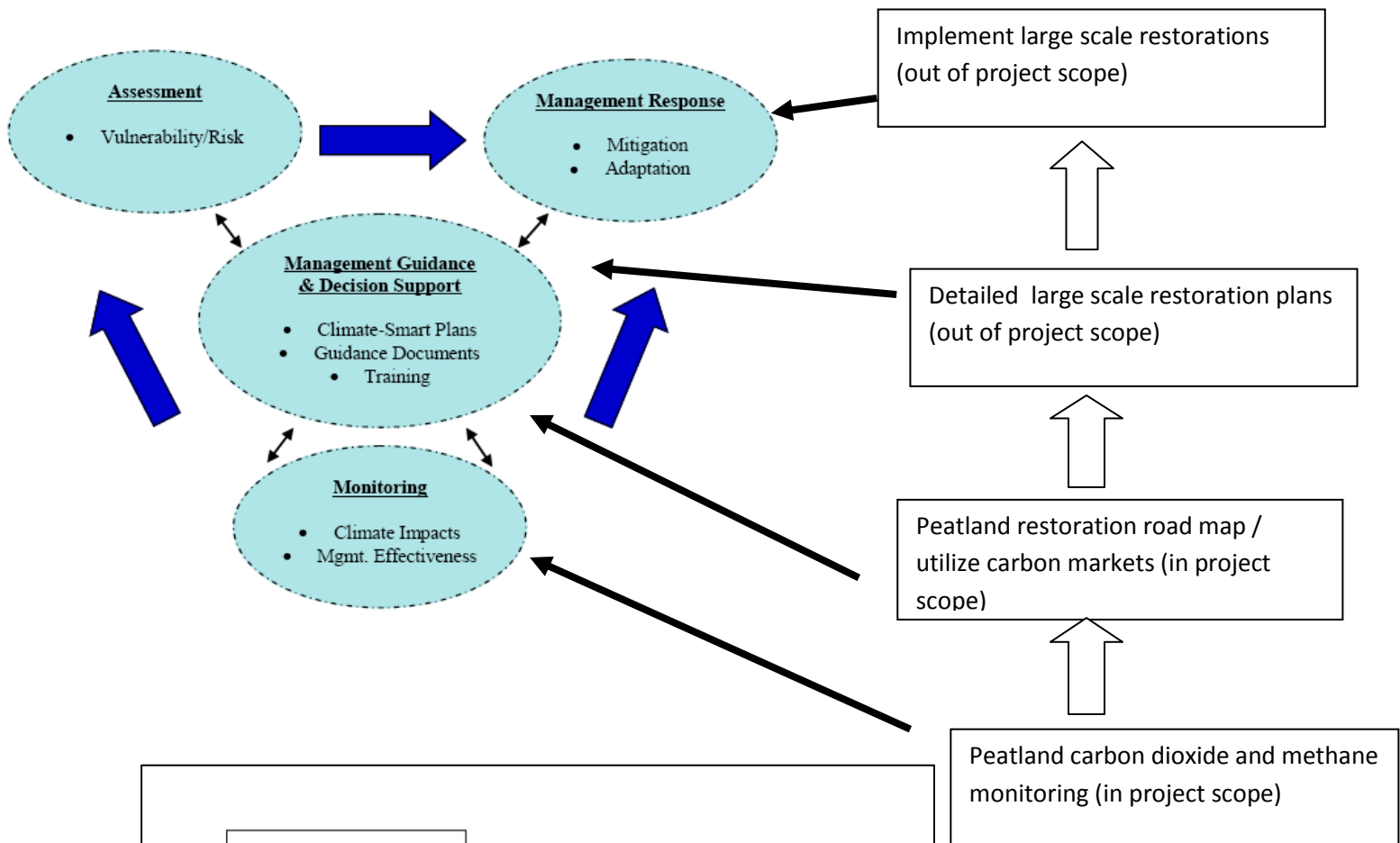
Attach budget, in MS-EXCEL format, to your "2011-2012 LCCMR Proposal Submit Form".
 (1-page limit, single-sided, 10 pt. font minimum. Retain bold text and *DELETE* all instructions typed in italics.
ADD OR DELETE ROWS AS NECESSARY. If a category is not applicable write "N/A", leave it blank, or delete the row.)

IV. TOTAL TRUST FUND REQUEST BUDGET [Insert # of years for project] years

| <i>(1-page limit, single-sided, 10 pt. font minimum. Retain bold text and DELETE all instructions typed in italics. ADD OR DELETE ROWS AS NECESSARY. If a category is not applicable write "N/A", leave it blank, or delete the row.)</i> | AMOUNT |
|---|-------------------|
| Salary: Mark Lindquist, DNR (classified), Project Management and Contract Management (10% time each of two years). This work is beyond normal scope of work and the Department will back fill the 10% time that would have been spent on energy management with other staff. (95,253 salary and fringe) | \$ 19,051 |
| Contracts: University of Minnesota, Department of Geology and Geophysics (Dr. Paul Glaser, principal investigatory) The contract elements will be outlined below as separate line items. | See below |
| Contract (U of MN): Staffing: Dr. Paul Glaser salary and fringe 50% time for 2 years (31,000 salary per year + 32% fringe). Dr. Glaser will be responsible for procurement, installation, maintenance of eddy current flux towers, core sampling, and procurement of core sample carbon dating, as well as data analysis and reporting of GHG fluxes produced on pristine and restored peatlands. | \$ 81,840 |
| Contract (U of MN) Equipment/Tools/Supplies: Open path eddy covariance units to measure CO2, H2O and energy flux 2 @ 37,500 (procurement, operation and maintenance by U of MN in accordance with ENRTF requirements) | \$ 75,000 |
| Contract (U of MN) Equipment /Tools and / Supplies: Li Cor open path CH4 analyzer kit 4@ 40,000 (procurement, operation and maintenance by U of MN in accordance with ENRTF requirements) | \$ 160,000 |
| Contract (U of MN) Equipment/Tools/Supplies: Balance of plant equipment/supplies for covariance and CH4 analyzer units (procurement, operation and maintenance by U of MN in accordance with ENRTF requirements) | \$ 10,000 |
| Contract (U of MN): Carbon dating and lab analysis of peat cores. 100 carbon dates @\$350 + \$5,000 | \$ 40,000 |
| Contract (U of MN) Travel: Helicopter Trips to Red Lake Peatlands 12 trips @ \$5,000 (site is otherwise inaccessible) | \$ 60,000 |
| Contract (U of MN) Travel: 12 Trips to Red Lake Peatland (Baudette) @670 /trip x .50 per mile + 12 hotels @ \$80 per night | \$ 4,980 |
| Additional Budget Items: Internal services agreement with DNR, Grand Rapids Resource Assessment program (operates on internal fee for service contract basis) 500 hours @ \$85 per hour professional services cost. | \$ 42,500 |
| TOTAL ENVIRONMENT & NATURAL RESOURCES TRUST FUND \$ REQUEST | \$ 493,371 |

V. OTHER FUNDS

| SOURCE OF FUNDS | AMOUNT | Status |
|--|---------------|--|
| Other Non-State \$ National Science Foundation will continue to be sought for supporting the broader Red Lake Peatland Observatory project as opportunities arise. | TBD | Indicate: Secured or Pending |
| Other State \$ Being Applied to Project During Project Period: .MN DNR Clarence Turner - activity 3 \$14,250 (7.5% of \$95,000 salary and fringe for two years) Minnesota DNR Shared Services XXXX | | Indicate: Secured or Pending |
| In-kind Services During Project Period: | | |
| <i>Specify \$ and year of appropriation from any current ENRTF appropriation for any directly related project of the project manager or organization that remains unspent or not yet legally obligated at the time of proposal submission. Be as specific as possible. Describe the status of \$ in the right-most column.</i> | \$ - | Indicate: Unspent? Not Legally Obligated? Other? |
| Funding History: NSF Funding (approximately 300,000 for equipment, 75,000 for helicopter site access, and 125,000 for .5 FTE staffing over three years) | 500,000 | |
| Funding History: Legislative appropriation for U of MN study: Potential for Terrestrial Carbon Sequestration in Minnesota (legal citation) | \$ 385,000 | |



Project Target Area:
 Beltrami, Lake of the Woods and Koochiching Counties

Project Manager Qualifications

Mark Lindquist, Biofuels Program Manager,
Commissioners Office
Minnesota Department of Natural Resources

Mr. Lindquist has nine years experience working with the Minnesota DNR and has led the Biofuels Program in the Commissioner's office since 2007. Prior to that, he was the Southern Regional Planner (1998 – 2004). He brings to bear a wide angle vision of the DNR's work and mission.

Currently housed within the Commissioner's Office, Mr. Lindquist is the lead DNR staff on issues pertaining to the intersection of natural resource, climate and energy policy. He provides leadership on legislative policy issues, interagency coordination, internal coordination as well as outreach and partnership development with the private sector.

Experience relevant to this project:

- Represented DNR on the U of MN, Minnesota Terrestrial Carbon Sequestration Initiative
- Proposed creation of and Co-leads DNR Carbon Sequestration Team
- Chair, Interagency Carbon Sequestration Team
- Contract Manager of \$385,000 contract with U of MN to complete: The Potential for Terrestrial Carbon Sequestration in Minnesota and Terrestrial Carbon Sequestration Monitoring Networks and Demonstration Sites as requested by the Legislature in 2007.

Organization Description

The Commissioners Office houses the Chief Executive Officer and direct support staff of the Department of Natural Resources. The Biofuels program was established in the Commissioner's Office in 2007 as significant new challenges and opportunities relating to biofuels, carbon sequestration and climate change confronted the natural resource managers.

Energy and Climate was identified as one of the three strategic trends confronting natural resource managers in Minnesota. Concerns about energy security, fuel prices, and climate change have led to new national and state standards for renewable energy sources. Climate change is predicted to have direct impacts on Minnesota's forests, grasslands, wetlands, lakes, and streams. Climate change can also intensify the negative effects of other factors influencing natural resources, such as the frequency and intensity of wildfires, the spread of invasive species, and the impact of fish and wildlife diseases.

The Biofuels Program provides leadership across DNR and through interagency partnerships to address carbon sequestration and renewable energy development. This includes providing additional resources for commercial activity, enhance traditional resource management through new opportunities and avoid or minimize negative impacts of renewable energy or carbon sequestration development.