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

LCCMR ID: 160-F3+4

Project Title: Identifying Marginal Lands For Energy And Environmental Services

Category: F3+4. Renewable Energy

Total Project Budget: $ $370,810

Proposed Project Time Period for the Funding Requested: 3 yrs, July 2011 - June 2014

Other Non-State Funds: $ 0

Summary:

This project identifies features of marginal lands that make them available for certain uses. It then estimates statewide acreage of these lands available for bioenergy crop and environmental service use.

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Location

Region: NW, Central, SW, SE

Ecological Section: Paleozoic Plateau (222L), Minnesota and NE Iowa Morainal (222M), Lake Agassiz, Aspen Parklands (223N), Red River Valley (251A), North Central Glaciated Plains (251B)

County Name: Statewide

City / Township:

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

Identifying Marginal Lands For Energy And Environmental Services

I. PROJECT STATEMENT

The use of marginal land for production of energy crops, biorefinery feedstocks, and environmental services has been heavily promoted over the last 5 to 10 years. These loosely defined 'marginal' lands often refer to historically prairie, rural lands that are not currently in agricultural production. Some of these lands are clearly capable of producing large quantities of biomass or providing environmental benefits, including habitat, water filtration, soil stabilization and recreational land. Therefore, the concept of using them for production of biomass feedstocks and other environmentally beneficial activities has significant merit.

Unfortunately, there has been little consideration about what constitutes a marginal land and how the definition translates into usable land for bioenergy production. With a likely 20 year operational life, investing in both the bioenergy facility and the equipment to harvest biomass depends on a solid understanding of the landscapes ability to produce biomass over that 20 year span. Similar investments of private and public money are required for lands destined for environmental services. The limited information about both the extent of available marginal lands and their productivity is a barrier to developing new projects that may use these lands.

In several publications, theoretical ecological work has cited the amount of conservation reserve program (CRP) land as a good indicator of the amount of land available for energy crop production. Unfortunately, these estimates fail to take into account the practical landscape realities that dictate feasible uses for a given tract of land. Marginal lands are often limited by the topology (the terrain) and economics (potential inputs and resulting yields). Typical terrain limitations include rock outcroppings, high water tables/frequent flooding, or very steep slopes. These issues restrict the ability of modern equipment to operate on the sites and, therefore, limit the land to uses, such as environmental services. Economically, the ability of the soil to support sufficient plant growth can limit both environmental services and biofuel production. The size and shape of a parcel of land can also make it uneconomical to use for biofuel production and ineffective for environmental services.

Minnesota played a large role in the development of first generation biofuels (ethanol and bio-diesel) and saw an increase in economic development and employment as a result. More accurate biomass resource information is needed to further the States' efforts to enhance economic development by promoting new locally sourced renewable energy opportunities. This project is designed to fill that crucial gap in knowledge by identifying the features of marginal lands that indicate their potential uses and refining our estimates on how many acres of these lands are available for bioenergy use. The information will also assist habitat managers and other natural resource planners effectively use their funds on a variety of projects, such as improving habitat for pheasants and deer, enhancing water quality in lakes and streams, and preventing soil erosion.

II. DESCRIPTION OF PROJECT ACTIVITIES

Result 1: Identify and Model Land Use Indicators on Marginal Lands **Budget: $192,010**

This first step of this project is to identify the properties of marginal land that make it attractive for particular land use activities. A model will then be developed by comparing what information can be found in soil surveys, USDA cropping information, GIS and other databases and with in-person site assessments that examine potential opportunities for land use. The model will be refined by conducting intensive ground truthing in three counties spread over the prairie grassland eco-region. Nearby marginal lands that have been converted to other uses, such as DNR or US FWS lands will be analyzed for productivity and when feasible, incorporated into the model to predict biomass productivity and/or environmental service benefits on land in the region.

Deliverables	Completion Date
1. Identify Factors and Model Available Land	Nov. 2012
2. Model Verification and Ground Truthing	Nov. 2013

Result 2: Inventorying Lands for different Uses **Budget: $132,000**

The model developed in Result 1 will be used statewide to estimate marginal acreage suitable for different uses on a county by county basis. County data will then be used to identify likely locations for bioenergy projects, habitat projects, and other centrally located environmental services projects based on the availability of suitable land for that use in a given area.

Deliverables	Completion Date
1. Regional Estimates and Statewide Estimates	Nov. 2013
2. Evaluate Production Areas	Nov. 2013

Result 3: 'Marginal' Land Management Strategy Outreach and Education Budget: $46,800

The final part of the project is working with the stakeholders to productively manage marginal lands. Because many of the alternative uses for marginal lands fall outside traditional agricultural uses, there has been little guidance on how to best manage them. Whether it is establishing biomass harvest rates for energy crops on these lands or deciding what grasses might work best on riparian buffer strips, proper management is needed to assure the lands future ecological health and productivity. The project team will work with the best available literature and consult with stakeholders such as the MN DNR and others to compile best management practices for the marginal land. Several stakeholder meetings will be held with interested parties to disseminate the information, which will also be in print form and posted on the web for widespread access.

Deliverables	Completion Date
1. Develop Management Strategies for Productive and Sustainable Lands	June 2014
2. Work with Landowners On Uses and Management Of Marginal Lands	June 2014

III. PROJECT STRATEGY

A. Project Team/Partners

The University of Minnesota, West Central Research and Outreach Center (WCROC) will lead the project research, with input from its research collaborator and stakeholders. This project follows up on bioenergy feedstock work on marginal lands conducted in conjunction with the Minnesota DNR and the U.S. Fish and Wildlife Service. The Minnesota DNR has indicated their continued support for our work. We plan to continue using DNR and US Fish and Wildlife Service lands as models to evaluate potential land uses and, in addition, ask for input from private landowners and statewide conservation groups.

B. Timeline Requirements

A three year timeline will allow us to refine the model using the variations in weather over the three years. Most of the modeling and ground-truthing (result 1) will be done during the first two years and the statewide analysis and outreach (results 2 and 3) being conducted in years two and three.

C. Long-Term Strategy

The overall goal of our research is to promote conservation and economic development projects that enhance our communities, while efficiently and sustainably using Minnesota's resources. This project seeks to overcome the gap in knowledge about the extent of resources that are available for such projects, which is a limiting factor in their development. By identifying which state lands are underutilized and determining the best feasible use for them, we can protect our lands while using them to their fullest.

2011-2012 Detailed Project Budget

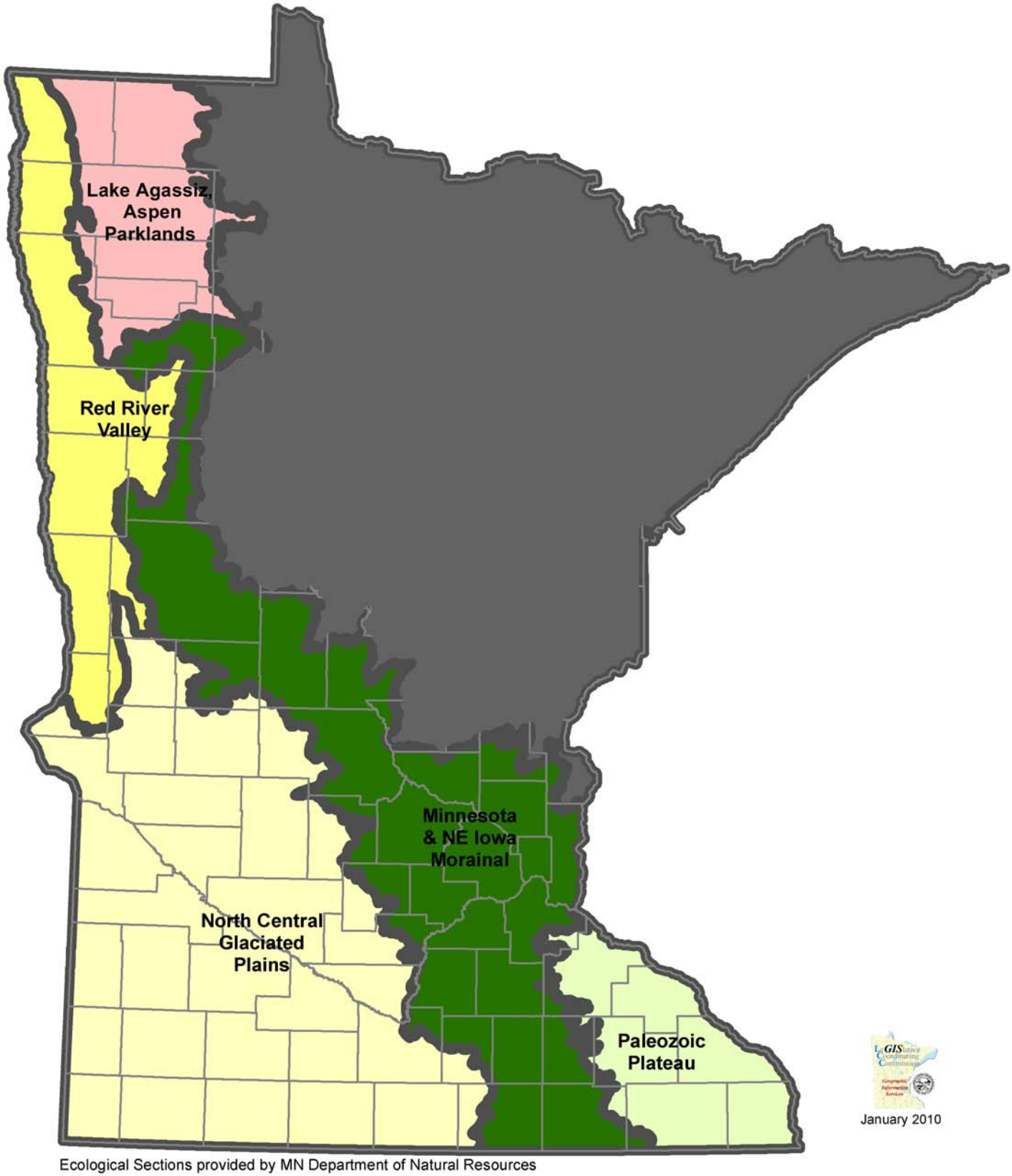
IV. TOTAL TRUST FUND REQUEST BUDGET *3* years

BUDGET ITEM	AMOUNT	
Program Manager, 60% FTE, 3 year, (36,000 sal, 12,600 ben)	$ 150,660	
Graduate Research Asstant, 50% FTE, 3 year (13,835 sal, 14,348 ben)	$ 91,500	
Research Technician, 50% FTE, 3 Year (17,500 Sal, 5200 ben)	$ 39,000	
Faculty Researcher, 10% FTE, 3 Year (9,500 Sal, 2,850 ben)	$ 74,100	
		$ 355,260
Equipment/Tools/Supplies:		
Biomass Sampling Equipment	$ 1,750	
ArcInfo Software (License for 3 years, multiple computers)	$ 1,800	
		$ 3,550
Travel: *Travel to sites throughout minnesota using a mileage rate of 50.5 cents per mile. Travel will be for ground truthing model, interacting with stakeholders on best management and land use.*		$ 12,000
TOTAL ENVIRONMENT & NATURAL RESOURCES TRUST FUND $ REQUEST	$	370,810

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Funds:	$ -	

Section VI: Study Area and Area of Impact



Study Area and Area of Impact. The study will be conducted in portions of the state that were historically prairie and grassland. These are primarily in southern and western Minnesota regions indicated on the map above. Results of the project will be applicable to these regions as well as marginal lands with similar conditions in adjacent states.

VII-A Organization Description: University of Minnesota

Dr. Joel Tallaksen, Biomass Gasification Project Coordinator
West Central Research and Outreach Center
University of Minnesota

Dr. Joel Tallaksen is the Project Coordinator at the University of Minnesota Biomass Gasification facility in Morris, MN. As an applied scientist, Dr. Tallaksen's efforts focus on developing the systems needed to provide biomass resources for energy production. He is actively working to promote sustainable collection of biomass materials by researching the economic, environmental, and cultural factors limiting their harvest and use. To overcome these barriers, Dr. Tallaksen's research brings together businesses, scientists, conservationists, farmers and foresters. His philosophy is that the biomass feedstock supply chain is a system and needs to be researched as such, by working with all parties involved.

Selected publications and talks:

Tallaksen, J. 2009. Panel Moderator "Biomass Feedstocks- Availability, Cost, and Logistical Challenges", 4th Annual Platts Cellulosic Ethanol and 2nd Generation Biofuels Conference, Chicago, IL.

Tallaksen, J. 2008. Integrating Biomass Heat and Electricity Production in Community Scale Projects: The Morris Campus as a Model. Invited Speaker at Biomass 08: Technical Workshop, Grand Forks, ND

Tallaksen, J. and L. Rasmussen. 2008. Integrating wind and biomass to manage carbon emissions. Proceeding of the 16th European Biomass Conference & Exhibition, Valencia, Spain, June 2-6th 2008

White, J. A., J. Tallaksen, I. Charvat. 2008. The effects of arbuscular mycorrhizal fungal inoculation at a roadside prairie restoration site. Mycologia 100(1): 6-1

Tallaksen, J. 2007. Biomass Harvesting of Native Grasslands in West Central Minnesota: A production scale pilot study. Available at: http://renewables.morris.umn.edu/documents.htm

Tallaksen, J. 2007. Creating a Market for Corn Stover and Other Biomass. *Morris SunTribune*. Morris, Minnesota

VII-B Organization Description: WCROC- University of Minnesota

The University of Minnesota, West Central Research and Outreach Center's (WCROC) is one of a network of regional research facilities that provide living laboratories to conduct community based applied research and outreach. With a wide range of stakeholders, the WCROC is well positioned to test and get feedback on how basic research findings can be used in applied situations. WCROC Faculty and staff, drawing upon an extensive network of University of Minnesota researchers, farmers, businesses, industry, state agencies and rural leaders, to conduct their research and educational programming. These partnerships keep us connected to the varied and changing needs of the producers and citizens of Minnesota.

The University of Minnesota is a world class educational and research institution with campuses and research centers throughout the state. The combination of exceptional faculty and staff knowledge with the latest in research facilities and equipment gives the University of Minnesota the ability to consistently conduct ground-breaking research.