Environment and Natural Resources Trust Fund
2015 Request for Proposals (RFP)

Project Title: MSU Moorhead Science Center Restoration & Monitoring

ENRTF ID: 123-F

Category: F. Methods to Protect, Restore, and Enhance Land, Water, and Habitat

Total Project Budget: $ 527,760

Proposed Project Time Period for the Funding Requested: 5 years, July 2015 - June 2020

Summary:

Minnesota State University Moorhead's Science Center will restore and monitor 160 acres of prairie and riparian habitat resulting in development and dissemination of monitoring protocols for understanding long-term ecological recovery.

Name: Brian Wisenden

Sponsoring Organization: Moorhead State University

Address: 1104 Seventh Ave S

Moorhead Minn 56563

Telephone Number: (701) 212-5801

Email wisenden@mnstate.edu

Web Address http://web.mnstate.edu/wisenden

Location

Region: NW

County Name: Clay

City / Township: Moorhead

Alternate Text for Visual:

Location of MSUM Science Center with respect to existing natural areas, and highlight of areas to be restored

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

PROJECT TITLE: Minnesota State University Moorhead Science Center Restoration & Monitoring

I. PROJECT STATEMENT: Minnesota State University Moorhead's Science Center will restore and monitor 160 acres of prairie and riparian forest habitat resulting in the development and dissemination of monitoring protocols for understanding long-term ecological recovery.

This restoration site is of special ecological value because:

- It is adjacent to, expands and buffers existing protected prairie habitat managed by the Department of Natural Resources Buffalo River State Park and Scientific and Natural Area.
- It expands and buffers contiguous riparian habitat that provide ecological services protecting the Buffalo River catchment upstream from Buffalo River State Park.
- Its proximity to the designated "high" and "outstanding" biological diversity of the Bluestem Prairie Complex facilitates the comparative study of species and genetic diversity between restorations and remnant prairies.

This restoration monitoring project is unique because:

- Under faculty mentorship, undergraduate students will collect restoration data to monitor community dynamics providing baseline and long term benchmarks to assess the restoration effort.
- These data will result in peer-reviewed research publications relating to restoration ecology and serve as a case study for future restoration efforts state-wide.
- The novel undergraduate protocols developed for monitoring this restoration will serve as a model for ongoing assessment of restoration efforts across the state.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Restoration of 143 acres of prairie and 17 acres of riparian terrace forest **Budget: $247,380**
Prairie restoration units consisting of 100 acres of old field and 43 acres of cultured turf recently managed as a golf course will be restored to a mesic prairie community. Forest restoration units consisting of 17 acres of cultured turf, recently managed as golf course fairways, within the Buffalo River floodplain will be restored to a terrace forest community. Department of Natural Resources Parks & Trails will oversee the restoration process.

Outcome	Completion Date
1. Site preparation, seed harvest, archeological review, plant, invasive control initiated	*2016*
2. Continue weed control, mow/burn, invasive control, add herbaceous complements	*2017, 2018, 2019*
3. Plant trees/shrubs, deer protection in forest. Continue weed control/mow/burn.	*2020*

Activity 2: Post-Restoration Monitoring by Minnesota State University Moorhead faculty and undergraduate students **Budget: $240,000**
Undergraduate students will collect foundational data on species distribution and genetic diversity. Faculty-mentored research students will conduct surveys of the abundance and locations of rare and threatened organisms in addition to indicator species used to assess the success of the restoration. We will compare species and genetic diversity of restored sites against reference samples taken from high quality habitats from within the Bluestem Prairie Complex. These activities will use a customized GIS database to facilitate the development of restoration monitoring strategies and protocols and the assessment effort.

Outcome	Completion Date
1. Customized GIS database developed	*2016*
2. Foundational and pre-restoration data collection completed	*2017*
3. Annual survey program initiated and reference samples collected	*2017*

Activity 3: Interpretation of restoration project **Budget: $40,380**

Project data will serve as a guide for ongoing restoration efforts and provide broader state-wide impact as a case study for future restoration projects elsewhere. Our results and curricular protocols appropriate at the undergraduate level will be published in peer-reviewed journals in restoration ecology and education. Project interpretation directed at the general public will utilize a combination of signage and public programming. The Science Center will expand its public program offerings to include restoration specific activities that add value to the restoration. Examples include citizen science level biological monitoring, seed collection and seedling propagation/planting.

Outcome	Completion Date
1. Signage installed and public programming delivered	2016
2. Citizen monitoring and seedling program established	2016
3. Manuscripts submitted for journal publication	2018

III. PROJECT STRATEGY

A. Project Team/Partners

Project Partners Receiving Funds (for 3 years):

Faculty engaged in mentored student research:

- Biosciences Department: **Brian Wisenden** (Behavioral Ecologist, project manager), **Sara Anderson** (Geneticist), **Alison Wallace** (Plant Ecologist, Science Education), **Donna Bruns Stockrahm** (Mammalogist), **Chris Chastain** (Plant Physiologist),
- Anthropology/Earth Science Department: **Kirk Stueve**, design/manage the GIS; **George Holley** (Archaeologist), site inventory/assessment; **Rinita Dalan** (Geoarchaeologist), GIS data collection/mapping/site assessment
- MN DNR Parks & Trails: Regional Resource Specialist will oversee and execute the restoration

Project Partners Not Receiving Funds:

- **Dan McEwen**, Biosciences Dept, MSUM: Aquatic Ecologist; teaches ecology course during academic year;
- **Anthony Bormann**, Science Center, MSUM: coordinate interpretation and restoration activities with DNR;
- **Sue Galatowitcsh**, Dept Fish Wild Cons Biol , UMN: consultant of post-restoration ecological monitoring.

B. Project Impact and Long-Term Strategy The Bluestem Prairie is Minnesota's largest remnant tall grass prairie (6700 acres) comprising lands owned by The Nature Conservancy, Department of Natural Resources and Minnesota State University Moorhead. Most of the prairie complex is "outstanding" or "high" bio-diversity and 1300 acres are designated as a Scientific and Natural Area. The proposed restoration expands and buffers contiguous prairie habitat including riparian areas that provide ecological services protecting the Buffalo River catchment. The area supports over 20 state-listed plant/animal species. NatureServe rankings are *S-2*, state imperiled (for northern dry and mesic prairies) or *S-3,* state vulnerable to extirpation (for northern terraced forest and wet prairie). The restoration will: (i) increase water quality by slowing runoff of surface waters into the river, (ii) increase effective population size for endangered pollinators, (iii) provide a buffer for high the biodiversity in the State Park, and (iv) remove invasive species such as European and glossy buckthorn and exotic honeysuckle. Minnesota State University Moorhead is committed to permanently retaining these areas in their restored state for the education of students and the public.

C. Timeline Requirements **Year 1:** Site preparation, archeological inventory, planting, monitoring protocol development, baseline data collection; **Year 2:** Restoration data collection, weed control, faculty-mentored student research, citizen science and outreach; **Year 3:** Weed control, mowing, monitoring, faculty-mentored student research, citizen science and outreach; **Year 4, 5**: Weed control, tree/shrub seedling planting.

2015 Detailed Project Budget

Project title: Minnesota State University Moorhead Science Center Restoration & Monitoring

IV. TOTAL ENRTF REQUEST BUDGET over 3 years

Activity 1: Restoration of 143 acres of prairie and 17 acres of riparian terrace forest

** Years 4 & 5 are due to riparian forest restoration requirements*

Restoration tasks	Year 1	Year 2	Year 3	Year 4*	Year 5*	Totals
Woody stem removal, herbicide, pile burn	$60,000					$60,000
Prairie seed harvest/cleaning, planting	$60,000					$60,000
Weed control, mowing, prescribed fire		$22,000	$22,000	$22,000		$66,000
Tree/schrub seed harvest & propogation	$5,000					$5,000
Plant trees/schrubs, deer protection, add herb species					$17,000	$17,000
Buckthorn & invasive control	$12,000	$6,000		$6,000		$24,000
Archeology survey						
George Holley: Archeologist	$9,180					$9,180
3 student interns @ $12/h x 40h/wk x 4 wk	$5,760					$5,760
1 car X 32 miles X .55 per mile X 25 trips	$440					$440
Totals	$152,380	$28,000	$22,000	$28,000	$17,000	**$247,380**

Activity 2: Post-Restoration Monitoring by MSU-Moorhead faculty and undergraduate students

All MSUM faculty are on 9-month teaching contracts-these represent 1-month summer appointments

	Year 1	Year 2	Year 3	Totals
Brian Wisenden: Behavioral Ecologist	$9,180	$9,180	$9,180	$27,540
Sara Anderson: Geneticist	$7,080	$7,080	$7,080	$21,240
Rinita Dalan: GeoArcheology/GIS	$9,400	$9,400	$9,400	$28,200
Kirk Stueve: GIS mgmt	$7,080	$7,080	$7,080	$21,240
Chris Chastain: Plant Phyiologist	$9,400	$9,400	$9,400	$28,200
Donna Bruns Stockrahm: Mammalogist	$11,360	$11,360	$11,360	$34,080
Alison Wallace: Plant Ecologist	$9,180	$9,180	$9,180	$27,540
7 student interns each summer @ $12/h x 40h/wk x 4 wk	$13,440	$13,440	$13,440	$40,320
2 cars X 32 miles X .55 per mile X 25 trips per year	$880	$880	$880	$2,640
Genetics sequencing services	$3,000	$3,000	$3,000	$9,000
Totals	$80,000	$80,000	$80,000	**$240,000**

Activity 3: Interpretation of restoration project

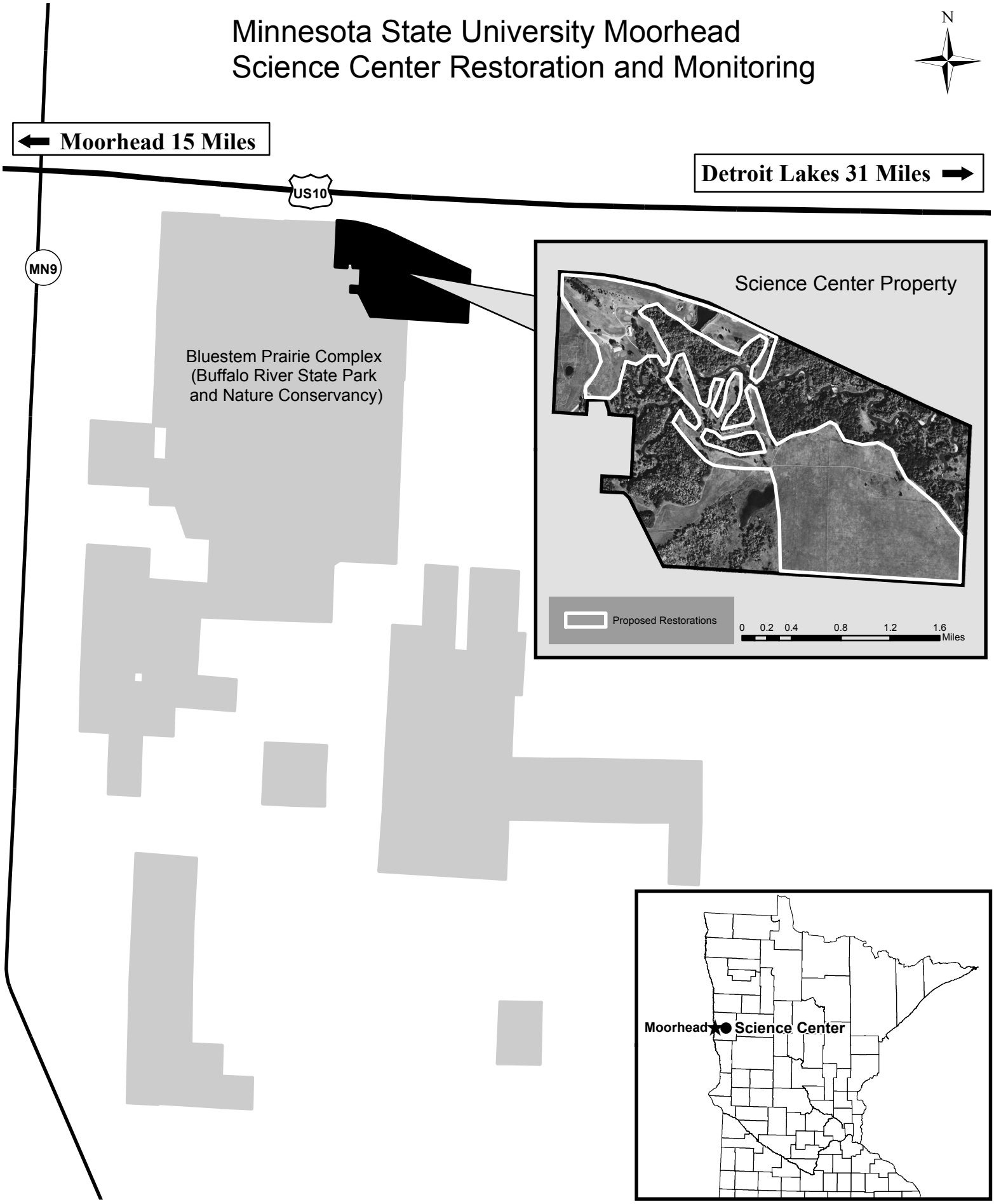
	Year 1	Year 2	Year 3	Totals
Brian Wisenden:Project Mgmt & Protocol publication	$9,180	$9,180	$9,180	$27,540
2 student interns each year @ $12/h x 40h/wk x 4 wk	$3,840	$3,840	$3,840	$11,520
1 car X 32 miles X .55 per mile X 25 trips per year	$440	$440	$440	$1,320
Totals	$13,460	$13,460	$13,460	**$40,380**

TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST = $527,760

V. OTHER FUNDS

Source of funds	**Amount**	**Status**
Other Non-State $ To Be Applied To Project During Project Period:		
Budget to demolish club house, remove irrigation system, install signage	$50,000	Pending
Other State $ To Be Applied To Project During Project Period:	None	N/A
In-kind Services To Be Applied To Project During Project Period:		
Anthony Bormann salary, research faculty: academic year salary, MSUM research facilities	$ 200,000	Secured
Funding History:	None	N/A
Remaining $ From Current ENRTF Appropriation:	None	N/A

Minnesota State University Moorhead
Science Center Restoration and Monitoring



Project manager qualifications and Organization Description

Project manager:

Brian Wisenden, Biosciences Department, Minnesota State University Moorhead

PhD in Behavioral Ecology, 1993, University of Western Ontario, London, Ontario, Canada
MSc in Fisheries Biology, 1988, Lakehead University, Thunder Bay, Ontario, Canada
BSc in Fisheries Biology, 1985, University of Guelph, Guelph, Ontario, Canada

2013 Council for the Advancement and Support of Education (CASE) Minnesota Professor of the year

2006-	Professor, Biosciences Department, Minnesota State University Moorhead
2002-2006	Associate Professor, Biology Department, Minnesota State University Moorhead
1998-2002	Assistant Professor, Biology Department, Minnesota State University Moorhead
1997-98	Post-Doctoral Research Fellow, Department of Biological Sciences, University of Alberta
1995-97	Post-Doctoral Research Fellow, CEEB, University of Kentucky
1993-95	Post-Doctoral Research Fellow, Department of Biology, University of Saskatchewan

Funding: 31 funded grants to date, summing to $359,239
Teaching: Organismal Biology, Invertebrate Zoology, Animal Behavior, Tropical Field Biology
Supervisory experience: Graduate students: 4; Undergraduate research mentees: 149
Publications: Books: 1; Reviews and book chapters: 18; peer-reviewed research articles: 58
Service to field of behavioral ecology: Since 2006: Managing editor of **Behaviour**, an international journal in behavioral biology, www.editorialmanager.com/beh

Organizational description:

Minnesota State University Moorhead (MSUM) is a regional 4-year liberal arts college within the Minnesota State College and University (MnSCU) system. Total enrollment ranges from 6500 to 7500 students. There are no graduate programs in the Biosciences or Anthropology/Earth Sciences Departments. MSUM faculty are leaders in the state of MN for actively engaging undergraduates in research experience, including frequent co-authorship with undergraduate researchers on research publications.

The MSUM Regional Science Center, located 15 miles east of Moorhead and adjacent to Buffalo River State Park, is 400 acres of prairie, woods, and river communities, with an interpretive center and astronomical observatory. Science Center programming serving over 10,000 visitors annually is a mix of year round outdoor science education for preschool to high school students and the general public. The Center also serves as a biological field station for MSUM and other higher education institutions using the site as an outdoor laboratory in a variety of undergraduate research and coursework in biology, geology, anthropology and astronomy.