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

Project Title: ENRTF ID: 086-E1
Enabling Dynamic Access to Biodiversity Information
Topic Area: E1. NR Info Collection /Analysis - Statewide
Total Project Budget: \$ _311000
Proposed Project Time Period for the Funding Requested: <u>3 yrs, July 2013 - June 2016</u>
Other Non-State Funds: \$ 0
Summary:
Provide digital records of Minnesota biodiversity to professionals and citizens. Current and historical data must be integrated to track and forecast invasive species for effective management and environmental education.
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Sponsoring Organization: U of MN - Bell Museum of Natural History
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ocation
Region: Statewide
County Name: Statewide
City / Township:
Funding Priorities Multiple Benefits Outcomes Knowledge Base
Extent of Impact Innovation Scientific/Tech Basis Urgency
Capacity ReadinessLeverageEmploymentTOTAL%



**PROJECT TITLE:** Enabling Dynamic Access to Biodiversity Information

#### **I. PROJECT STATEMENT**

Suppose you encounter a species in a Minnesota lake that you have never seen before. How would you identify it? Even with Google, Wikipedia, and mobile devices in hand, finding accurate information about Minnesota's biodiversity remains difficult. This project offers new accessibility to scientific records statewide that are needed to address the emerging challenges of invasive species and climate change.

One of the first projects supported by ENRTF digitized Minnesota's plant collections as preserved in the Bell Museum of Natural History at the University of Minnesota. Since 1872, when the Legislature entrusted the Museum to house our state scientific collections, biological specimens have provided the baseline for managing Minnesota's biodiversity. For example, historic and contemporary records document the arrival and spread of invasive species. Purple loosestrife, today a major pest plant of Minnesota wetlands, was first collected in Ramsey County in 1924 while the first specimens of silver carp in Minnesota arrived just this year. Without access to accurate records of occurrence over time, effective management and public understanding of environmental issues is compromised.

Overall project goals include:

- 1. Enable the public (including educators) web access to Minnesota specimen records of birds, mammals, fish, reptiles, amphibians, plants, fungi, lichens, and mussels.
- 2. Engage in dynamic, distributed database networks to repatriate Minnesota records residing out-state and provide historic, geographic, and taxonomic information to partners in resource management.
- 3. Illustrate the invasive species of Minnesota with digital images of specimens and provide geographic information as a baseline for statewide tracking of expanding invasive populations.

This proposal builds upon prior ENRTF support and MN DNR Biological Survey activity by enabling access to specimen databases now supported by the Minnesota Supercomputing Institute (MSI). First, a searchable web interface to existing records among all collections will be deployed to the computing cloud. Compared to the static webpages of the past, a dynamic approach will display images and maps from diverse sources in real time. Second, we will develop capacity for participation in distributed database networks such that the latest information may be shared dynamically with our partners in the DNR Biological Survey and other state agencies. Third, digital imaging and geo-referencing of aquatic species (invasives and exotics) will provide opportunity for forecasting of invasive spread.

#### **II. DESCRIPTION OF PROJECT ACTIVITIES**

Activity 1: Serving Minnesota Biodiversity Information Budget: \$99,000

Although Minnesota library records are searchable online, records of Minnesota plant and animal specimens are not. We will develop a dynamic interface for sharing the statewide distribution of biodiversity records compiled with Wikipedia, Encyclopedia of Life, and other public resources (e.g. DNR, USDA, USFWS, etc.).

Outcome	<b>Completion Date</b>
1. Public interface for a model specimen collection (plants)	July 2014

2. Public interface for priority collections containing invasives (fish, mussels, birds)	July 2015
3. Public interface for remaining collections	July 2016

### Activity 2: Participating in Database Networks

Budget: \$99,000

Substantial records of Minnesota biodiversity residing in out-of-state museum collections are currently inaccessible in our state. Participation in distributed national and global biodiversity database networks (GBIF, ORNIS, MANIS, HERPNET, etc.) is necessary to obtain all available data on Minnesota specimens.

Outcome	Completion Date
1. GBIF and MN data network compatibility for a model collection (plants)	July 2015
2. Network participation for priority collections containing invasives	December 2015
3. Network participation for remaining collections	July 2016

### Activity 3: Imaging and Geo-referencing

Budget: \$113,000

Static maps and illustrations of species become outdated the moment they are published. Similar to the national weather service, we will use database technology to provide continually updating maps of exotic species as new information becomes available with potential for forecasting.

Outcome	<b>Completion Date</b>
1. Digitally imaged and geo-referenced invasive plant records on-line	July 2014
2. Digitally imaged and geo-referenced priority aquatic invasive records on-line	July 2015

### **III. PROJECT STRATEGY**

### A. Project Team/Partners

Team: Bell Museum curators contribute taxonomic expertise including G. Weiblen (project coordination), F. K. Barker (vertebrates), A. Simons (fish), S. Weller (invertebrates), A. Cholewa (plants & lichens), and D. McLaughlin (fungi). Minnesota Supercomputing Institute personnel provide database expertise including B. Lynch (project management) and T. Wennblom (software development). Partners: Minnesota Biological Survey (DNR) including C. Converse (project coordination), and selected staff. Wennblom, a research informatics support specialist, and a curatorial assistant will be supported by ENTRF whereas others are supported by other sources.

### **B. Timeline Requirements**

Activities (1-3) will commence in parallel during year 1 using the Bell Museum's largest existing specimen database (plants) as a model. Activities 1 and 3 for plants will require a single year of development whereas Activity 2 will require two years for completion. Application of the model to other collections in years 2 and 3 will prioritize collections containing aquatic invasives as follows: fish, mussels, birds, mammals, fungi, reptiles and amphibians, and lichens.

### C. Long-Term Strategy and Future Funding Needs

This proposal builds upon an early ENRTF award from 1991 that digitized Minnesota biodiversity records. The Bell Museum is committed to maintaining and serving this information for the long-term. It continues to support collections through the University budget, federal grants, and contracts for services. This LCCMR proposal provides potential leverage to related grant proposal for \$300,000 to digitize targeting the US National Science Foundation in October 2012.

## IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM	<u>AMOUNT</u>	
Personnel: Database administrator/developer (Wennblom, MSI) at 20% FTE for three	\$63,000	
years. Base salary \$76,000 per annum plus 36% fringe.		
Personnel: Information technology specialist (Research Informatics Support, MSI) at 50%	\$117,000	
FTE for in year 1 and 25% in years 2 and 3. Base salary \$86,000 per annum plus 36%		
fringe.		
Personnel: Project Manager (Lynch, MSI) at 5% FTE for three years. Base salary \$91,000	\$18,000	
per annum plus 36% fringe.		
Personnel: Graduate student curatorial assistant at 50% FTE for three years. Base salary	\$113,000	
\$21,145 per annum plus 78% benefits including fringe and tuition.		
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$311,000	

## **V. OTHER FUNDS**

SOURCE OF FUNDS		MOUNT	<u>Status</u>
Other Non-State \$ Being Applied to Project During Project Period:	\$	-	NA
Other State \$ Being Applied to Project During Project Period:	\$	-	NA
<b>In-kind Services During Project Period:</b> Bell Museum (University of Minnesota) curatorial effort including Weiblen, Weller, Barker, Cholewa, McLaughlin, and Simons at 5% FTE for each for three years. Base salary approx. \$80,000 per annum plus 36% fringe.	\$	100,000	Secured
Remaining \$ from Current ENRTF Appropriation (if applicable):		NA	
<b>Funding History:</b> LCMR, A computerized database for plants of Minnesota, 1991-1993, \$130,000 LCMR, Improved Minnesota fungus collection and database, 1999-2001, \$79,000	\$	209,000	



## **Project Manager Qualifications and Organization Description**

### George D. Weiblen

Address: Department of Plant Biology, 250 Biological Sciences Center, 1445 Gortner Avenue, St. Paul, Minnesota, 55108, Fax 612-625-1738, Tel 612-624-3461, E-mail gweiblen@umn.edu

### **Professional preparation**:

Reed College, Portland, Oregon B.A. in Biology, 1992 Harvard University, Cambridge, Massachusetts, A.M. in Biology, 1997, Ph.D. in Biology 1999

### **Professional appointments**:

Bell Museum of Natural History, University of Minnesota, Minneapolis, Minnesota Curator of Plants (2001-present)

Plant Biology Department, University of Minnesota, St. Paul, Minnesota Professor (2011-present), Associate Professor (2006-2010), Assistant Professor (2001-2005)

National Museum of Natural History, Smithsonian Institution, Washington, DC

Research Associate in Entomology and Botany (2001-present)

## Qualifications:

The project manager currently oversees database development for the scientific collections of the Bell Museum. During his career he has published 54 peer-reviewed scientific articles. He has also received more than 20 grants and contracts totaling \$3.7 million dollars.

### Synergistic activities:

• An interactive tool for plant identification (<u>http://geo.cbs.umn.edu/treekey/navikey.html</u>)

• A digital herbarium of New Guinea plants (<u>http://ng.atrium-biodiversity.org/atrium/</u>)

## **Organization description**:

The Bell Museum of Natural History was established by state legislative mandate in 1872 to collect, preserve, skillfully prepare, display, and interpret our state's diverse animal and plant life for scholarly research and teaching and for public appreciation, enrichment, and enjoyment. Its governance belongs, by state legislative designation, to the University of Minnesota.

The exceptional scientific collections of the Bell Museum continue to grow as state agencies deposit biological specimens annually. Nearly 4 million specimens of mammals, birds, fishes, plants, mollusks, insects and fungi provide opportunities for research and learning. The Museum houses the world's largest collection of Minnesota biodiversity. Academic curators are internationally known researchers with expert knowledge spanning the tree of life. The unique synergy of research, teaching, and public engagement, possible only on the campus of a great university, distinguishes the Bell Museum as a cradle of innovation in environmental science.