

## **2011 Project Abstract**

For the Period Ending June 30, 2012

### **PROJECT TITLE: Minnesota County Biological Survey**

**PROJECT MANAGER:** Carmen Converse

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**FUNDING SOURCE:** Environment and Natural Resources Trust Fund)

**LEGAL CITATION:** M.L. 2011, First Special Session, Chp. 2, Art.3, Sec. 2, Subd. 03a

**APPROPRIATION AMOUNT:** \$2,250,000

**Overall Project Outcome and Results:** The need to protect and manage functional ecological systems, including ecological processes and component organisms continues to accelerate with increased demands for water and energy, continued habitat fragmentation, loss of species and genetic diversity, invasive species expansion, and changing environmental conditions.

Since 1987 the Minnesota County Biological Survey (MCBS) has systematically collected, interpreted and delivered baseline data on the distribution and ecology of plants, animals, native plant communities, and functional landscapes. These data help prioritize actions to conserve and manage Minnesota's ecological systems and critical components of biological diversity.

During this project period baseline surveys continued, focused largely in northern Minnesota (see map). One highlight was data collection in remote areas of the patterned peatlands that included three helicopter-assisted field surveys coordinated with other researchers to increase the knowledge of this ecological system and to continue long-term collaborative monitoring.

Another goal was to begin monitoring to measure the effectiveness of management and policy activities. For example, prairie vegetation and small white lady's slipper monitoring began in western Minnesota sites in response to ecological measures identified in the Minnesota Prairie Conservation Plan 2010.

MCBS also provided data and interpretation related to the DNR's forest certification goals and began monitoring activities in selected sites in the Aspen Parkland and in southeastern Minnesota.

Since July 2011 new records of 929 rare features were added to the Rare Features Database. Since 1987, MCBS has added a total of 20,018 new rare feature records. Statewide 10,192 MCBS sites of Biodiversity Significance and 63,232 polygons of native plant communities are now publically available on the DNR's Data Deli. Since 1987, MCBS has contributed 4,972 of the 9,467 Minnesota vegetation plot records in the DNR's Relevé (vegetation plot) Database. Since 1987 botanists documented 1,194 rare aquatic plants during targeted aquatic plant surveys of 1,872 lakes.

### **Project Results Use and Dissemination**

Results and interpretation of data included web-delivery, technical assistance and publications that are identified in more detail in the final report.

For example, in 2013 MCBS reports of vegetation observed in 1836 lakes were added as a link in the Lakefinder application <http://www.dnr.state.mn.us/lakefind/index.html>

External partners such Lake and St Louis counties, Trust for Public Lands, the Kawishiwi Watershed Protection Project, the Superior National Forest, the collaborators in the implementation of the Minnesota Prairie Conservation plan and the North American vegetation plot database working group received data and technical assistance.

The book [Native Orchids of Minnesota](#) was published that included substantial new distributional information from survey botanists. Substantial progress was made on a book related to natural history sites in NW Minnesota based in part on MCBS work in that region.



**Environment and Natural Resources Trust Fund (ENRTF)  
M.L. 2011 Work Plan Final Report Main Document**

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**Date of Status Update:** 11/8/2013

**Final Report**

**Date of Work Plan Approval:** 6/23/2011

**Project Completion Date:** 6/30/2013

**Is this an amendment request? Yes**

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**Project Title: Minnesota County Biological Survey**

**Project Manager:** Carmen Converse

**Affiliation:** MN DNR

**Address:** 500 Lafayette Rd

**City:** St Paul **State:** MN **Zipcode:** 55155

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**Email Address:** carmen.converse@state.mn.us

**Web Address:** <http://www.dnr.state.mn.us/eco/mcbs/index.html>

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**Location:**

**Counties Impacted:** Statewide

**Ecological Section Impacted:** Lake Agassiz Aspen Parklands (223N), Minnesota and Northeast Iowa Morainal (222M), North Central Glaciated Plains (251B), Northern Minnesota and Ontario Peatlands (212M), Northern Minnesota Drift and lake Plains (212N), Northern Superior Uplands (212L), Paleozoic Plateau (222L), Red River Valley (251A), Southern Superior Uplands (212J), Western Superior Uplands (212K)

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**Total ENRTF Project Budget:**

**ENRTF Appropriation \$:** 2,250,000

**Amount Spent \$:** 2,250,000

**Balance \$:** 0

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**Legal Citation:** M.L. 2011, First Special Session, Chp. 2, Art.3, Sec. 2, Subd. 03a

**Appropriation Language:**

\$1,125,000 the first year and \$1,125,000 the second year are from the trust fund to the commissioner of natural resources for continuation of the Minnesota county biological survey to provide a foundation for conserving biological diversity by systematically collecting, interpreting, and delivering data on plant and animal distribution and ecology, native plant communities, and functional landscapes.



## Environment and Natural Resources Trust Fund (ENRTF) M.L. 2011 Work Plan Final Report Main Document

### I. PROJECT TITLE: Minnesota County Biological Survey

**II. FINAL PROJECT STATEMENT:** The need to protect and manage functional ecological systems, including ecological processes and component organisms continues to accelerate with increased demands for water and energy, continued habitat fragmentation, loss of species and genetic diversity, invasive species expansion, and changing environmental conditions.

Since 1987 the Minnesota County Biological Survey (MCBS) has systematically collected, interpreted and delivered baseline data on the distribution and ecology of plants, animals, native plant communities, and functional landscapes. These data help prioritize actions to conserve and manage Minnesota's ecological systems and critical components of biological diversity.

During this project period baseline surveys continued, focused largely in northern Minnesota (see map). One highlight was data collection in remote areas of the patterned peatlands that included three helicopter-assisted field surveys coordinated with other researchers to increase the knowledge of this ecological system and to continue long-term collaborative monitoring.

Another goal was to begin monitoring to measure the effectiveness of management and policy activities. For example, prairie vegetation and small white lady's slipper monitoring began in western Minnesota sites in response to ecological measures identified in the Minnesota Prairie Conservation Plan 2010.

MCBS also provided data and interpretation related to the DNR's forest certification goals and began monitoring activities in selected sites in the Aspen Parkland and in southeastern Minnesota.

Since July 2011 new records of 929 rare features were added to the Rare Features Database. Since 1987, MCBS has added a total of 20,018 new rare feature records. Statewide 10,192 MCBS sites of Biodiversity Significance and 63,232 polygons of native plant communities are now publically available on the DNR's Data Deli. Since 1987, MCBS has contributed 4,972 of the 9,467 Minnesota vegetation plot records in the DNR's Relevé (vegetation plot) Database. Since 1987 botanists documented 1,194 rare aquatic plants during targeted aquatic plant surveys of 1,872 lakes.

**Amendment Request (11/08/2013):** This is a request that funds be shifted to Activity #1 from Activity #2 in the amount of \$30,118. Expenditures in these two categories as estimated in the work program were not correct.

### III. PROJECT STATUS UPDATES:

#### **Project Status as of January 2012**

Since July 2011, MCBS added 49 new records to the Rare Features Database. A total of 19,138 records have been entered since 1987. Map polygons for 10,065 MCBS sites of Biodiversity Significance and 62,931 native plant communities are now publically available on the DNR's Data Deli. This includes over 68,000 acres of native plant communities found in the Toimi Uplands Subsection. Rare aquatic plants and vegetation in 64 lakes were surveyed in since July. One of the rarest finds was the fourth location in Minnesota of jointed rush (*Juncus articulatus*).

Major improvements to the DNR's Relevé (vegetation plot) Database were made to improve data entry and access. Since 1987, MCBS has contributed 4,699 of the 9,825 vegetation plot records in the Relevé Database.

A week-long helicopter-assisted field survey of plants, animals and the native plant communities in the Red Lake Peatlands of Beltrami County was completed during a week in August. English sundew (*Drosera anglica*), was one of the distinctive plants located during these forays.

Staff invested significant time to adapt fieldwork to disruptions caused by the state government shutdown in July and the Pagami Creek Fire in northeastern Minnesota in September.

MCBS staff provided substantial data interpretation related to the DNR's forest certification goals and Corrective Action Requests, and assisted with forest certification audits held in northwestern Minnesota.

MCBS staff provided assistance to DNR Southern Region Parks and Trails staff in use of MCBS data to guide development and management. This included conservation efforts in the Chanarambie Creek area and Des Moines River Valley.

### **Project Status as of October 2012**

Since July 2011, MCBS added 502 new records to the Rare Features Database. A total of 19,591 records have been entered since 1987. Map polygons for 10,116 MCBS sites of Biodiversity Significance and 63,146 native plant communities are now publically available on the DNR's Data Deli. Since 1987, MCBS has contributed 4,699 of the 9,825 vegetation plot records in the DNR's Relevé (vegetation plot) Database. Rare aquatic plants and vegetation in 124 lakes were surveyed since July, 2011. To date 1189 rare plant occurrences have been found during 1,836 aquatic plant searches in lakes in 43 counties in Minnesota

Three helicopter-assisted field surveys of plants, animals and native plant communities in the Red Lake Peatlands of Beltrami County were completed in 2011 and 2012.

MCBS staff took part in forest certification audits held in northwestern and southeastern MN where staff had completed monitoring activities on selected sites. In the preliminary findings following the 2012 audit the department was recognized for exemplary performance due to the widespread application of the ecological concepts of native plant communities by field managers.

The pilot year of small white lady's slipper monitoring was completed in 16 western Minnesota prairie sites as part of the implementation of the Minnesota Prairie Conservation Plan 2010.

Staff invested significant time to adapt fieldwork to disruptions caused by the state government shutdown in July and the Pagami Creek Fire in northeastern Minnesota in September 2011.

### **Project Status as of March 2013**

Since July 2011, MCBS added 502 new records to the Rare Features Database. A total of 19,591 records have been entered since 1987. Map polygons for 10,192 MCBS sites of Biodiversity Significance and 63,232 native plant communities are now publically available on the DNR's Data Deli. Since 1987, MCBS has contributed 4,926 of the 9,421 Minnesota vegetation plot records in the DNR's Relevé (vegetation plot) Database. Rare aquatic plants and vegetation in 124 lakes were surveyed since July, 2011. Since 1987 botanists documented locations of 1,189 rare aquatic plants during targeted aquatic plant surveys of 1,836 lakes in 43 counties.

Staff adapted fieldwork due to disruptions caused by the state government shutdown and the Pagami Creek Fire in 2011.

Three helicopter-assisted field surveys of plants, animals and native plant communities in the Red Lake Peatlands of Beltrami County were completed in 2011 and 2012.

MCBS staff participated in forest certification external audits including sites where staff conducted monitoring activities related to high conservation value forests. The 2012 audit recognized the

department for exemplary performance due to the widespread application of the ecological concepts of native plant communities by field managers.

The pilot year (2012) of small white lady's slipper monitoring was completed in 16 western sites as part of the implementation of the Minnesota Prairie Conservation Plan 2010. Monitoring plans are in progress for 2013.

The St Louis County Land Department staff requested a list of ecologically significant areas on county land and met with MCBS staff to discuss consideration of sites for designation under the county's Special Sites program.

#### **IV. PROJECT ACTIVITIES AND OUTCOMES:**

##### **ACTIVITY 1: Field Surveys and Monitoring**

**Description:** Data on the distribution and ecology of plants, animals, native plant communities and functional landscapes will be collected, providing a basis for the maintenance of elements of biological diversity and ecological systems through ecological management, monitoring, planning, research, and critical habitat acquisition.

Monitoring will begin to assess impacts of policies and management activities on various components of ecological systems and species populations in the Tallgrass Aspen Parklands and the Prairie Parkland Ecological Provinces, where MCBS has completed baseline data collection. Monitoring needs associated with these ecological provinces have been highlighted in a number of recent initiatives such as the *Minnesota Prairie Conservation Plan 2010: A Habitat Plan for Native Prairie, Grassland, and Wetlands in the Prairie Region of Western Minnesota* (Minnesota Prairie Plan Working Group 2010), the State of Minnesota's Forest Certification process (DNR 2005) and the State's Wildlife Action Plan (DNR 2006). These complement many of the critical land protection goals identified in the Statewide Conservation and Preservation Plan (2008).

##### **Procedure:**

Data review and Survey site identification (see Map 1): Plant ecologists, botanists and zoologists review existing relevant natural resource data and record information using Geographic Information Systems and other DNR information systems to consolidate and organize data. Examples of these data include forest inventories, wetlands inventories, aquatic plant surveys, wildlife habitat inventories, park surveys, soil surveys, land-use data, historical public land surveys, academic research, and records from museum collections. Using these data, supplemented by the interpretation of aerial photography or other imagery, staff identify MCBS sites and species habitats for targeted surveys.

Monitoring site identification (see Map 2): The Aspen Parklands Province contains Minnesota's largest, most continuous and highest quality prairie/parkland ecological systems. As a result of MCBS baseline surveys, three core areas encompassing MCBS sites of outstanding or high biodiversity significance were identified in the province. In a number of recent plans—including the Minnesota Prairie Conservation Plan, the Aspen Parkland Important Bird Area, the State Wildlife Action Plan, and preliminary Minnesota Forest Certification monitoring plans for High Conservation Value Forests—guidance is provided for the identification of measures of successful management. Within these core areas of the Aspen Parklands Province, monitoring sites will be selected to measure: 1) stable or increasing populations of birds and mammals characteristic of the Aspen Parklands; 2) stable or increasing populations of terrestrial invertebrates with a focus on butterfly and moth species; and 3) maintenance of high-quality condition of native prairie plant communities and prairie complexes. Prairie vegetation sampling and species survey protocols have been developed in the Minnesota River Valley to assess specific fire and grazing management activities at a large management area. In the Aspen Parklands, another project area will be identified to repeat the sampling protocols related to the use of fire and grazing management.

Small white lady's-slipper (*Cypripedium candidum* - see Map 2) is identified as an important ecosystem measure in the Minnesota Prairie Conservation Plan. In the Prairie Parkland Province, monitoring will focus on high-quality prairie/wetland sites containing populations of small white lady's-slipper. Sites will be selected to represent the geographic range of the species in the western Minnesota prairie.

Coordination: Staff notify and coordinate surveys and monitoring activities when possible with other divisions within the DNR, universities, counties, municipalities, tribal governments, watershed districts, federal natural resource agencies, conservation organizations, corporations, and individual landowners. This is critical to the success of data consolidation and field surveys.

Field Surveys: Ground surveys to assess MCBS site and native plant community quality and condition include the collection of vegetation samples in coordination with other sampling (soils, water chemistry etc.) when possible. Aerial surveys will be especially important to the survey of the large peatlands where ground access is extremely challenging. Additional specialized techniques are used during field seasons to survey selected rare species or groups of species (e.g., plants, birds, mammals, reptiles, amphibians, insects, fishes). Monitoring activities will be designed to inform specific management activities or be conducted to update historic baseline data (presence/absence) with more detailed collection of population size and estimated viability.

**Summary Budget Information for Activity 1:**

**ENRTF Budget:** \$ 900,000  
 \$ 930,118  
**Amount Spent:** \$ 930,118  
**Balance:** \$ ~~30,118~~  
 \$ 0

**Amendment Request (11/08/2013):** This is a request that funds be shifted to Activity #1 from Activity #2 in the amount of \$30,118. Expenditures in these two categories as estimated in the work program were not correct.

**Activity Completion Date:**

<b>Outcome (see also attached maps)</b>	<b>Completion Dates</b>	<b>Budget</b>
1. Field survey: Lake County	Fall 2012	
2. Field survey St Louis County: Nashwauk Uplands	plants, native plant communities (npc) Fall 2012; animals begin 2012	
3. Field survey St Louis: Border Lakes	animals 2013; plants, npc begin 2011	
4. Field survey St Louis: Tamarack Lowlands	plants, npc, animals begin 2012	
5. Field survey St Louis: Littlefork-Vermillion Uplands	plants, npc, animals begin 2012	
6. Field survey: Beltrami & Clearwater counties	plants, npc Fall 2012; no animals	
7. Rapid assessment: Potential survey sites identified in Lake of the Woods and Koochiching counties.	Dec 2012 (interpretation of aerial imagery/other natural resource data)	
8. Monitoring samples collected to measure management actions; establish permanent plots.	2012 Establish locations and sample selected birds, mammals, terrestrial invertebrates at up to 10 management sites in Aspen Parklands (AP). 2012 Establish and collect data on 10 permanent npc plots (AP). Identify grazing/fire management monitoring project area. 2012, 2013 Sample at least 20 populations of small white lady's-slipper ( <i>Cypripedium candidum</i> ).	

Note: The status of each activity above is described in regular work program updates.

## **Activity Status as of January 2012**

### **Data review and survey site identification**

In Lake County, adjustments were made to areas targeted for surveys in the vicinity of the Pagami Creek fire which burned much of a proposed survey area. An updated SNF-Forest Cover Type Inventory cover map was acquired to assist with site review. A review of the proposed sites for final field surveys in the Nashwauk Uplands was completed by a plant ecologist with review by animal survey staff to follow. Native plant community surveys in the Tamarack Lowlands are proposed to begin in 2012 in conjunction with some animal surveys.

Review of data and identification of MCBS sites for native plant community surveys were nearly completed for Koochiching and Lake of the Woods counties, which along with Beltrami County contain much of the 2.5 million acres of mostly unaltered patterned peatlands of the Lake Agassiz Lowlands. Complex landform patterns include watertrack fens, ovoid bog islands and ribbed fens.

### **Monitoring site identification**

In the Aspen Parkland, plant and animal ecologists consulted with DNR land managers to identify a site to establish monitoring plots to evaluate the effectiveness of grazing/fire management as a management tool for grasslands. Two potential locations that include portions of State Wildlife Management Areas were identified; both contain elements leading to their identification as "high conservation value forests". Identification of potential animal survey efforts and establishment of permanent plots for native plant communities is underway.

Botanists drafted a proposed plan for monitoring of small white lady's-slipper (*Cypripedium candidum*), with a pilot project to begin in 2012. Various monitoring techniques were discussed and responsibilities were assigned with a schedule of activities for 2012 to be finalized in late winter. Botanists contacted knowledgeable professionals in adjacent states and provinces, at several universities, and at private conservation organizations in order to update a file containing information regarding survey and monitoring efforts for this species. This data file includes published scientific documents and information garnered from conversations with botanists or from more informal publications.

As related to the opportunity to participate in monitoring of landscape recovery in the Pagami Creek Fire, staff worked with a USFS Northern Research Station research team and Superior National Forest (SNF) staff on a project designed to measure fire severity and ecosystem impacts of the fire.

### **Coordination**

Additional communication with the SNF related to survey and monitoring coordination took place following the Pagami Creek Fire, which burned about 93,000 acres in the BWCAW. The fire directly influences 2012 field plans for this area where surveys had begun prior to the state government shutdown and the fire.

Coordinated delivery was completed of a GIS cover of MCBS preliminary Sites for the Lake County portion of the Border Lakes Subsection for review by Regional Forestry, Wildlife, Fisheries and EWR staff as per the interdisciplinary Forest Management Coordination Framework.

In August 2011 staff successfully continued surveys in the Red Lake Peatlands with the Red Lake Department of Natural Resources and the University of Minnesota. In the Northeast, coordination with the Superior National Forest was especially critical due to the need to re-schedule Boundary Waters Canoe Area Wilderness (BWCAW) trips (which require permits) that were cancelled due to the shutdown of state government in July.



## Field Surveys

### **Northeastern Surveys (Border Lakes)**

The large functional landscapes of the Border Lakes Subsection contain high quality fire-dependent forests and large areas experiencing or recovering from a series of wildfires and wind storms. Native plant community and botanical surveys were conducted largely in the BWCAW portion of Lake County using canoe access for extended trips. Field work was conducted from a series of base camps.

Some of the botanical highlights in Border Lakes Subsection of Lake County included documentation of the following plant species of interest: St. Lawrence grapefern (*Botrychium rugulosum*), Katahdin sedge (*Carex katahdinensis* or *C. conoidea*), Robbin's spike-rush (*Eleocharis robbinsii*), Autumn fimbriatylis (*Fimbristylis autumnalis*), bog rush (*Juncus stygius*), American shore-plantain (*Littorella uniflora*), broadleaf water milfoil (*Myriophyllum heterophyllum*) (only the 3<sup>rd</sup> reported location in MN), small white waterlily (*Nymphaea leibergii*), small green wood orchid (*Platanthera clavellata*), small yellow water crowfoot (*Ranunculus gmelinii*), sooty-colored beak rush (*Rhynchospora fusca*), Torrey's mannagrass (*Torreyochloa pallida* var. *fernaldii*), soapberry (*Shepherdia canadensis*), Oregon woodsia (*Woodsia oregano*), lavender bladderwort (*Utricularia resupinata*), adder's tongue (*Ophioglossum pusillum*), twig rush (*Cladium mariscoides*) and montane yellow-eyed grass (*Xyris Montana*). Several non-native species with no previous documentation in Lake County were recorded: Queen Ann's lace (*Daucus carota*), field cottonrose (*Logfia arvensis*) and green sorrel (*Rumex acetosa*).

Animal surveys for mammals, fish, butterflies, moths, and jumping spiders were conducted in the Border Lakes and Nashwauk Uplands subsections of St. Louis County during this activity period. New records obtained for species of greatest conservation concern included Smoky shrew (*Sorex fumeus*), Rock vole (*Microtus chrotorrhinus*), Shortjaw cisco (*Coregonus zenithicus*), Longear sunfish (*Lepomis megalotis*), and Taiga alpine (*Erebia mancinus*). In addition, new distributional records were obtained for several moth and jumping spider species.

### **Northwestern Surveys**

Native plant community surveys were completed in Clearwater County and are nearly complete in Beltrami County

A major accomplishment was the completion of a week of helicopter-based field surveys that included animal, plant and native plant community surveys in the Red Lake Peatlands of Beltrami County and a brief reconnaissance survey of Lake of the Woods and Koochiching counties. Data were collected related to native plant communities, and rare plants such as the small white water lily (*Nymphaea leibergii*), English sundew (*Drosera anglica*), Lapland buttercup (*Ranunculus lapponicus*), and ram's-head lady slipper (*Cypripedium arietinum*). A brief field visit to Pine and Curry Island in Lake of the Woods County resulted in the relocation of rock sandwort (*Minuartia dawsonensis*), last observed at the site in 1894. Animal survey staff assessed the scope of future work desirable to assess the distribution of small mammals and invertebrates.

### **Aquatic plant surveys**

Since July 2011 surveys of 64 lakes for rare aquatic plants and vegetation were completed. One of the rarest finds for 2011 was the fourth occurrence in Minnesota of jointed rush (*Juncus articulatus*). This species was first found in Minnesota in 1926 on the shores of White Bear Lake. In the course of the Minnesota County Biological Survey, a second occurrence was found in Aitkin County, a third in Cass County and now this fourth occurrence in Beltrami County. This rush has been found at only three of the 1,762 lakes in which rare aquatic plant surveys have been conducted, making it one of the rarest species documented by the survey.

The location of small white water lily (*Nymphaea leibergii*) in the channel of the Tamarac River as it flows into Upper Red Lake was also of interest. Previously there has been only one outlying occurrence of this species documented beyond its two known disjunct populations in Minnesota (Lake County and

the other south of Lake of the Woods). This is the first occurrence found beyond these two known areas since 1977.

## **Activity Status as of October 2012**

### **Data review and survey site identification**

A review of proposed sites for field surveys of native plant communities in the Tamarack Lowlands and Littlefork-Vermillion Uplands subsections of St Louis County was completed, with field surveys to begin in 2013.

Review of data and identification of MCBS sites for native plant community surveys was completed for Koochiching and Lake of the Woods counties, which along with Beltrami County contain much of the 2.5 million acres of mostly unaltered patterned peatlands of the Agassiz Lowlands Subsection. Complex landform patterns include watertrack fens, ovoid bog islands and ribbed fens.

### **Monitoring site identification**

In the Aspen Parklands, plant and animal ecologists continued consultation with land managers to identify additional sites for the establishment of monitoring plots to evaluate the effectiveness of grazing/fire management as a management tool for grasslands. A total of three sites have been identified for monitoring: Caribou Wildlife Management Area, Pankratz Prairie and Lac Qui Parle Prairie.

Botanists prepared a plan for the first year of monitoring of small white lady's-slipper populations (*Cypripedium candidum*), which resulted in a pilot project that began in 2012. Various monitoring techniques were discussed and responsibilities were assigned with a schedule of activities for 2012.

As related to the opportunity to participate in monitoring of landscape recovery in the Pagami Creek Fire, staff worked with a USFS Northern Research Station research team and Superior National Forest (SNF) staff on a project designed to measure fire severity and ecosystem impacts of the fire.

### **Coordination**

GIS covers of MCBS preliminary Sites that include updated site delineation for the Border Lakes Subsection, Koochiching County and Lake of the Woods County were distributed for review by others in the DNR as per the interdisciplinary Forest Management Coordination Framework.

Staff met with DNR Forestry staff in Warroad and Baudette to present work plans for MCBS in the northwest region.

Surveys in the Red Lake Peatlands included ongoing coordination with the Red Lake Department of Natural Resources and researchers from the University of Minnesota.

In the northeast, coordination with the Superior National Forest continued, including participation in a Forest Service meeting of those with current research and monitoring projects in the SNF.

MCBS organized a field meeting of DNR plant ecologists in the spring of 2012 to discuss establishment of permanent vegetation monitoring plots. The group field tested potential data collection methods that could be performed by resource managers in conjunction with other field responsibilities. The group also reviewed ideas that would require more intensive methods to be conducted on fewer sites by plant ecologists and botanists.

Work recently initiated by Natural Resources Conservation Service (NRCS) in northeastern MN is providing an opportunity for exchange of site classification concepts and datasets (vegetation, soils).

The northern coordinator communicated with various organizations regarding the methodology and data sources for the development of native plant community mapping for the Northern Superior

Uplands and Minnesota Drift and Lake Plain ecological sections. MCBS vegetation maps and vegetation samples were available for assistance with the project. These map products are being developed by the Natural Resources Research Institute (NRRI) for the Minnesota Forest Resources Council NE Landscape Committee as part of the NE Landscape Plan revision and the USFS Northern Institute of Applied Climate Science (NIACS) Northwoods Climate Change Vulnerability Assessment.

Northeastern ecologists collaborated with the Superior National Forest in a developing project to use LIDAR data to discern historic logging roads and trails in the BWCAW portion of the Border Lakes subsection using LIDAR data. This layer will be useful to MCBS for the interpretation of current landscape and native plant community conditions and site ranking in the Border Lakes.

## **Field Surveys**

### ***Northeastern Surveys***

Field work in the Nashwauk Uplands subsection is completed. Due to the shutdown in 2011 survey work in the Border Lakes subsection portion of Lake County was extended into 2012 with completion scheduled for 2013. The native plant community field surveys in the Littlefork-Vermillion Uplands and the Border Lakes subsections of St Louis County are now scheduled to begin in June 2013.

The large functional landscapes of the Border Lakes Subsection contain high quality fire-dependent forests and large areas experiencing or recovering from a series of wildfires and wind storms. Native plant community and botanical surveys were conducted largely in the BWCAW portion of Lake County using canoe access for extended trips and included training of new plant ecologists. Examples of lakes where field surveys were based include Ella Hall Lake, Wind Lake, Sucker Lake, and Pipestone Bay of Basswood Lake.

Botanical highlights in the Border Lakes Subsection of Lake County included documentation of the following plant species: twig rush (*Cladium mariscoides*), Robbin's spike-rush (*Eleocharis robbinsii*), small green wood orchid (*Platanthera clavellata*), lanceleaf violet (*Viola lanceolata*), sooty-colored beak rush (*Rhynchospora fusca*), montane yellow-eyed grass (*Xyris montana*), maidenhair spleenwort (*Asplenium trichomanes subsp. trichomanes*), Michaux's sedge (*Carex michauxiana*), olivaceous spikerush (*Eleocharis flavescens var. olivacea*), American shore-plantain (*Littorella americana*), slender water milfoil (*Myriophyllum tenellum*), small white water lily (*Nymphaea leibergii*), Franklin's phacelia (*Phacelia franklinii*), small green wood orchid (*Platanthera clavellata*), sooty beak-rush (*Rhynchospora fusca*), and the dung-moss, *Splachnum ampullaceum*. A large population of the quite rare lavender bladderwort (*Utricularia resupinata*), and populations of purple meadow-rue (*Thalictrum revolutum*) were of particular interest.

Surveys of the Nashwauk Uplands portion of St. Louis County were completed in 2012. This work included vegetation sampling and location of rare plant populations including necklace sedge (*Carex ormostachya*), floating marsh marigold (*Caltha natans*), sooty-colored beak rush (*Rhynchospora fusca*), and Lapland buttercup (*Ranunculus lapponicus*).

In the Tamarack Lowlands subsection of St Louis County, botanical, zoological and ecological field surveys will begin in 2013.

### ***Northwestern Surveys***

Native plant community surveys were completed in Clearwater County and are nearly complete in Beltrami County.

A major accomplishment was the completion of two weeks of helicopter-based field surveys that included animal, plant and native plant community surveys in the Red Lake Peatlands of Beltrami County and parts of Lake of the Woods and Koochiching counties. Ecologists established permanent vegetation monitoring plots and collected data related to native plant communities and rare plants such as English sundew (*Drosera anglica*), Lapland buttercup (*Ranunculus lapponicus*), and ram's-head lady slipper (*Cypripedium arietinum*). Other species collected were dragon's mouth (*Arethusa bulbosa*),

white adder's mouth (*Malaxis monophyllos*), hair-like sedge (*Carex capillaris*), linear-leaved sundew (*Drosera linearis*), montane yellow-eyed grass (*Xyris montana*), twig rush (*Cladium mariscoides*), sooty-colored beak rush (*Rhynchospora fusca*) and northern comandra (*Geocaulon lividum*).

One of the more challenging groups of plants for survey is collectively known as moonworts (*Botrychium* spp.) and grapeferns (*Sceptridium* spp.). A concerted search for locations of species within these genera was conducted largely in a portion of Lake of the Woods County with other searches conducted mostly in June 2012 in Beltrami, Koochiching, St Louis and Lake counties. Over 100 populations of seven species of *Botrychium* were recorded. A significant outcome of the searches was the identification of 12 new populations of upswept moonwort (*Botrychium ascendens*). Previously, only two populations of upswept moonwort were known to occur in the state. In addition, one new population of the proposed endangered species spatulate moonwort (*Botrychium spathulatum*) was documented.

### **Aquatic plant surveys**

Since July 2011 surveys of 124 lakes for rare aquatic plants and vegetation were completed. During the 2012 field season in St. Louis and Cook counties new occurrences were recorded of lavender bladderwort (*Utricularia resupinata*), awlwort (*Subularia aquatica*), American shore plantain (*Littorella americana*), spiny coontail (*Ceratophyllum echinatum*), Vasey's pondweed (*Potamogeton vaseyi*), humped bladderwort (*Utricularia gibba*), slender water milfoil (*Myriophyllum tenellum*), Robbins' spikerush (*Eleocharis robbinsii*) and Oakes' pondweed (*Potamogeton oakesianus*). Slender water naiad (*Najas gracillima*) was found in Cook County, which is unusual as there is only one other collection of this species from the northeast of Minnesota.

### **Animal Surveys**

Most of the animal surveys were conducted with funding provided through State Wildlife Grants. The following report provides the most recent update on those activities: State Wildlife Grant Interim Report Minnesota's Wildlife Resources and Habitat Surveys and Information Management T-5-R-3 March 2012.

### **Monitoring**

Vegetation plots were established in the Aspen Parklands at Caribou WMA and in Pankratz Prairie for the purpose of assessing the impacts of grazing and fire management. These plots were sampled in July and August 2012. This included the sampling of 50 plots in each of five management units at Caribou WMA and 12 plots in six pairs in upland prairie and 6 plots in three pairs at Pankratz Prairie.

"Stable or increasing native prairie orchid populations" is one of the ecosystem measures of successful implementation of the Minnesota Prairie Conservation Plan. The habitat for the orchid small white lady's-slipper is closely tied to the state's scarce prairie and prairie wetlands. MCBS agreed to lead the first statewide monitoring effort for this species. The orchid is exceedingly rare in the states and provinces adjacent to Minnesota. It is listed as "state special concern" in Minnesota due to large populations that range from southern to northern latitudes in Minnesota provide a basis for an effective monitoring network. Since the plant's habitat is rare and also highly fragmented, management of sites where it occurs could strongly influence resilience of the orchid populations. In May and June 2012 botanists and trained volunteers selected 18 prairie sites across the geographic range of the species in the state for preliminary sampling. Because the plants are most easily identified for rapid assessment while in bloom, the effort began in May with monitoring activities accelerated by unusually warm weather (early blooming) and ending abruptly due to a mid- June frost. Flowers in two northwestern sites had frost damage that was too severe to efficiently count the plants. In the 16 sites where counts were effective, over 22,000 plants were recorded. The highest number of plants recorded was at Expandere Wildlife Management Area (9,373 plants) followed by Plover Prairie (4,530 plants). Over 1,000 plants were recorded in each of the following sites: Iron Horse SNA, Ottawa WMA and Altona WMA. As part of the implementation of the Minnesota Prairie Conservation Plan a science team has been formed and will include a review of this first phase of the monitoring of small white lady's slipper at a January 2013 meeting.

As related to Forest Certification, a Minor Corrective Action Request (2010.13) was assigned to the DNR in 2010 that required a plan for monitoring elements of high conservation value (HCV) in identified locations such that these elements are maintained or enhanced as related to management practices. DNR teams that included MCBS staff developed a response that was accepted following an audit in October 2011.

In 2012 monitoring began at selected sites in the Aspen Parkland associated with grazing/fire management (see description above as related to the prairie plan implementation) along with basic Lepidoptera (moth and butterfly) surveys. In southeastern Minnesota, 27 known populations of rare plants were relocated and permanently marked for future monitoring work. Eight new populations were identified and mapped. Species located included the state threatened hair-like beak rush (*Rhynchospora capillacea*) and the state threatened James' sedge (*Carex jamesii*). Perched Valley WMA, one the sites where plant monitoring was conducted in 2012, was visited by the external auditors as part of the October 2012 field review.

### **Activity Status as of March 2013**

#### **Data review and survey site identification**

Staff reviewed data and refined preliminary MCBS sites for native plant community surveys for the Border Lakes and Littlefork Vermillion Uplands subsection portions of St Louis County.

The delineation of preliminary survey sites for the St. Louis County portion of the Tamarack Lowlands subsection was completed including 22 sites of moderate survey priority (325,733 acres) and eight sites of high survey priority (226,798 acres).

A review of proposed sites for aquatic plant surveys in the Tamarack Lowlands subsection and portions of Lake County was completed, with surveys scheduled for 2013.

#### **Coordination**

GIS layers of the preliminary survey sites for the Littlefork Vermillion Uplands and Border Lakes subsection portions of St Louis County have been made available to external and internal partners.

GIS layers of the preliminary survey sites for the Tamarack Lowlands were provided on an internal DNR website for interdisciplinary review.

Koochiching County preliminary survey sites that are currently available for regional DNR staff review have resulted in consultations and suggested updates to proposed survey targets and priorities.

MCBS ecologists met with other DNR staff in Tower to present 2013 work plans in the northeast region and to gather comments and suggestions from participants.

Northeast staff conferred with biologists from Voyageurs National Park to evaluate existing park data in order to determine the extent of additional MCBS surveys in the park. MCBS reviewed Park reports and data related to vegetation surveys and long-term monitoring efforts as part of the Great Lakes Inventory and Monitoring Network.

Northeast staff attended a workshop to explore enhanced application of LiDAR to surveys.

A summary of 2012 MCBS results on Potlatch lands was submitted to the company along with an official request for a 2013 permit to survey on Potlatch lands.

Red Lake Peatland surveys include ongoing coordination with the Red Lake Department of Natural Resources.

In the northeast, coordination with staff from the Superior National Forest including the BWCAW continues to include data exchange and permit applications for 2013 surveys.

MCBS staff are coordinating with various planning activities in the DNR. A few examples include: The Prairie Conservation plan implementation team, conservation planning related to Lake Superior, selected watershed planning efforts, the Strategic Groundwater Management team, the Scientific and Natural Area plan, the update to the State Wildlife Action plan, and the DNR's vulnerability assessment plan. MCBS data and interpretation are being used in many of these efforts. For example, an ecologist participating in the Groundwater Management team provides representation of issues related to peatland and fen native plant communities.

DNR plant ecologists from various divisions continue to communicate regarding the establishment of permanent vegetation monitoring plots statewide.

### ***Animal Surveys and Monitoring***

Many of the animal surveys are funded by State Wildlife Grants. A report submitted March 2013 includes the recent update on survey and monitoring activities. This report *State Wildlife Grant Final Report Minnesota's Wildlife Resources and Habitat Surveys and Information Management T-5-R-3 September 2012* will be available on the web in April 2013.

In association with the establishment of monitoring activities in the Aspen Parkland, 2012 bird surveys were conducted at Caribou WMA that included 26 point counts, nine species lists and four incidental records. Three birds listed as state special concern were recorded including Marbled Godwit, Acadian Flycatcher and Nelson's Sparrow. Lepidoptera surveys at the site included a sampling area of a typical aspen parkland mosaic of meadows and brush prairie interspersed with aspen and bur oak groves where light to moderate grazing history was evident. Collection methods included diurnal searches and the use of Ultraviolet (UV) light traps, UV sheet, and rotten banana-brown sugar baits. A total of 396 specimens were collected, representing over 181 species. Identification of the collections made in the Aspen Parkland is underway (winter of 2012-13). A number of seldom observed species were found in good abundance including the following moths: *Agonopterix flavicomella*, *Peoria gemmatella*, *Apamea niveivenosa*, and *Oligia egens*. These initial results have filled a large gap in the understanding of the aspen parkland species in order to select lepidoptera species for monitoring efforts in the various burn/grazing projects.

### **Monitoring Planning**

In preparation for continued monitoring at, Caribou WMA, Pankratz Prairie and Lac Qui Parle Prairie land managers have been consulted to coordinate 2013 management activities and monitoring. The prairie plant ecologist is identifying potential field assistants to conduct the 2013 vegetation monitoring. The animal survey staff plans to continue sampling of reptiles, selected small mammals and invertebrates at several sites to include Lac Qui Parle Prairie and locations in the Aspen Parkland.

Botanists prepared a plan for the second year of monitoring of small white lady's-slipper populations (*Cypripedium candidum*) in western Minnesota based on the outcomes of the 2012 pilot project. The monitoring approach is being modified for 2013 sampling. A report entitled *2012 Cypripedium candidum: monitoring activities in Minnesota* (November 2012) summarizing the 2012 pilot project was delivered to partners in the winter 2012. A version of the report will be available on the MCBS DNR website in April 2013.

In southeastern Minnesota, a plan to continue monitoring populations of rare plants relocated and permanently marked in 2012 has been prepared to address the monitoring requirements related to the high conservation value forests (Forest Certification).

### **Final Report Summary:**

During this project period, the name of the Minnesota County Biological Survey (MCBS) changed to the "Minnesota Biological Survey." For the purposes of this report the MCBS is used because that name is referenced in the appropriation language.

Budget management was complicated during this period due to the implementation of SWIFT, the state government shutdown, and the creation of the agency Information Technology for Minnesota Government (MNIT).

### **Data review and survey site identification**

Proposed sites were finalized for field surveys in the Nashwauk Uplands, the Tamarack Lowlands, and the Littlefork-Vermillion Uplands subsections of St Louis County. Review of data and identification of MCBS sites for native plant community surveys were completed for Koochiching and Lake of the Woods counties, which along with Beltrami County contain much of the 2.5 million acres of mostly unaltered patterned peatlands of the Agassiz Lowlands Subsection. Complex peatland landform patterns include watertrack fens, ovoid bog islands and ribbed fens. .

In Lake County, adjustments were made to areas targeted for surveys in the vicinity of the Pagami Creek Fire which burned much of a proposed survey area. In addition, the 2011 state government shutdown delayed completion of Lake County surveys until the next biennium.

Northeast staff attended a workshop to explore enhanced application of LiDAR to surveys.

### **Monitoring site identification**

Staff participated in monitoring of landscape recovery following the Pagami Creek Fire along with a USFS Northern Research Station research team and Superior National Forest (SNF) staff. The project is designed to measure fire severity and ecosystem impacts of the fire.

In the Aspen Parklands of Northwestern Minnesota plant and animal ecologists consulted with land managers to identify sites for the establishment of monitoring plots to evaluate the effectiveness of the use of grazing/fire as a management tool for grasslands. Caribou Wildlife Management Area and Pankratz Prairie were selected. Caribou WMA also contains ecological features that resulted in its identification as a high conservation value forest as outlined in the DNR's Forest Certification plan.

Two other sites in the prairie region were identified for monitoring as related to grazing and fire management: Lac Qui Parle WMA/Chippewa Prairie and Prairie Coteau WMA. Monitoring sites are now established across the geographic array of the western MN prairie regions (north to south). In addition, staff identified potential intensified animal survey and/or related monitoring efforts associated with these sites.

"Stable or increasing native prairie orchid populations" is one of the ecosystem measures of successful implementation of the Minnesota Prairie Conservation Plan. The habitat for the orchid small white lady's-slipper (*Cypripedium candidum*) is closely tied to the state's scarce prairie and prairie wetlands. MCBS agreed to lead the first statewide monitoring effort for this species. The orchid is exceedingly rare in the states and provinces adjacent to Minnesota. It is listed as "state special concern" in Minnesota due to large populations that range from southern to northern latitudes in Minnesota and provide a basis for an effective monitoring network. Since the plant's habitat is rare and also highly fragmented, management of sites where it occurs could strongly influence resilience of the orchid populations. Botanists prepared a 2012 plan for the pilot phase of the project and made revisions to sampling approaches based on 2012 field work to prepare for the second year of monitoring in 2013. A report entitled *2012 Cypripedium candidum: Monitoring activities in Minnesota* (November 2012) summarizing the 2012 pilot project was delivered to partners in the winter 2012.

In southeastern Minnesota, a plan to continue monitoring populations of rare plants relocated and permanently marked in 2012 was prepared to address the monitoring requirements related to high conservation value forests (Forest Certification).

## **Coordination**

In the northeast, coordination with the Superior National Forest (SNF) continued, including participation in a Forest Service meeting of those with current research and monitoring projects in the Forest. Additional communication took place following the Pagami Creek Fire, which burned about 93,000 acres in the Boundary Waters Canoe Area Wilderness (BWCAW). The fire directly influenced 2012 field plans for this area where surveys had begun prior to the fire. The SNF's adaptive response to MCBS schedules was critical due to the need to re-schedule some of the BWCAW trips (which require special permits) that were cancelled due to the shutdown of state government in July 2011.

Northeastern ecologists also collaborated with the Forest Service in a developing a project to use LIDAR data to discern historic logging roads and trails in the BWCAW portion of the Border Lakes Subsection. This layer will be useful to MCBS for the interpretation of current landscape and native plant community conditions and ranking of sites for biodiversity significance in the Border Lakes.

Work recently initiated by Natural Resources Conservation Service (NRCS) in northeastern Minnesota is providing an opportunity for exchange of site classification concepts and datasets (vegetation, soils).

Map products are being developed by the Natural Resources Research Institute (NRRI) for the Minnesota Forest Resources Council Northeast Landscape Committee as part of the Northeast Landscape Plan revision and the USFS Northern Institute of Applied Climate Science (NIACS) Northwoods Climate Change Vulnerability Assessment. The northern coordinator communicated with various organizations regarding the methodology and data sources for the development of native plant community mapping for the Northern Superior Uplands and Minnesota Drift and Lake Plain ecological sections. MCBS vegetation maps and vegetation samples were made available for assistance with the project.

Northeastern staff conferred with biologists from Voyageurs National Park (VNP) to evaluate existing park data in order to determine the need for additional MCBS surveys in the park. MCBS reviewed VNP reports and data related to vegetation surveys and their long-term monitoring efforts as part of the Great Lakes Inventory and Monitoring Network.

A summary of 2012 MCBS results on Potlatch lands was submitted to the company along with an official request for a 2013 permit to survey on Potlatch lands.

The relevé vegetation sampling method was provided to forest ecology researchers from Iowa State University (Cooley and Wolter) and the University of Minnesota-Duluth (Zlonis and Neimi). This has resulted in the Iowa State Project incorporating nearly 150 relevé vegetation plots into their project. A proposal for vegetation sampling (up to 72 plots) associated with the University of Minnesota Duluth avian research project is in progress. All of these plots fall within MCBS sites in the Border Lakes Subsection.

Northeast staff participated in the Ontario Natural Heritage Information Centre (NHIC) data access and sensitivity training required for authorization to access rare features data in that province. The herbarium at the University of Manitoba was queried for records of Minnesota collections of plants proposed to add to Minnesota's list of endangered, threatened and special concern species.

The DNR's interdisciplinary Forest Management Coordination Framework requires the delivery of a GIS cover of MCBS preliminary Sites for review by Regional Forestry, Wildlife, Fisheries and Ecological and Water Resources (EWR) staff. GIS covers of MCBS preliminary survey sites were made available that included updated site delineation for the Border Lakes Subsection, the Tamarack Lowlands Subsection, Koochiching County, and Lake of the Woods County. GIS layers of the preliminary survey sites for the Littlefork Vermillion Uplands and Border Lakes subsection portions of St Louis County were also made available to external and internal partners. In Koochiching County preliminary survey sites that were



reviewed by regional DNR staff have resulted in consultations and suggested updates to proposed survey targets and priorities.

MCBS ecologists presented survey plans at area DNR offices in Little Fork, Deer River, Tower, and Baudette that included staff from DNR Forestry, Wildlife and Fisheries. The Koochiching County land manager also attended a meeting. Survey efforts related to Lake Vermillion were specifically addressed at another meeting where the plant ecologist received helpful suggestions to make survey work around the lake more efficient.

In August 2011 staff successfully continued surveys in the Red Lake Peatlands in coordination with the Red Lake Department of Natural Resources and the University of Minnesota.

Aquatic vegetation surveys were planned for 2013 in coordination with sampling by other aquatic ecologists in the EWR Division as related to a Rum River Watershed project.

MCBS organized a field meeting of DNR plant ecologists in the spring of 2012 to discuss establishment of permanent vegetation monitoring plots. The group field tested potential data collection methods that could be performed by resource managers in conjunction with other field responsibilities. The group also reviewed ideas that would require more intensive methods to be conducted on fewer sites by plant ecologists and botanists. DNR plant ecologists from various divisions continue to communicate regarding the establishment of permanent vegetation monitoring plots statewide.

A workshop to review the relevé methods with others within and outside of the DNR was held at St Croix State Park in June 2013.

Prairie plant ecologists assisted with training in prairie plant identification for the Grassland Monitoring Team (multi-agency/organization) and at the Minnesota Prairie Summit held near Spicer in June 2013. Another workshop was held in western Minnesota to train plant ecologists from other agencies/organizations in evaluation of native prairie and in how to use the relevé sampling method. One outcome is that participants are interested in contributing their plot data to the DNR's relevé database.

Plant ecologists are part of the prairie plan implementation team and continue to work closely with the partners to assure that native prairie is maintained in good condition. This included very successful coordination with DNR wildlife managers on the monitoring sites described previously. Prairie ecologists also provided the Division of Wildlife with a list of Wildlife Management Areas where grazing implementation should be delayed until a more specific review process is implemented. The concern related to potential negative impacts is largely on areas that contain high quality prairie communities and rare features with unknown sensitivity to grazing. A draft procedure for writing grazing plans will require consultation with EWR prairie ecologists to identify and avoid sensitive prairies and rare features.

Two MCBS plant ecologists organized a half-day session related to vegetation classification that was accepted as part of a national meeting of the Ecological Society of America (August 2013, Minneapolis) entitled *The development of regional plot-based vegetation classifications: How classifications based on large sets of plot data further our understanding of vegetation ecology and conservation*. As part of this effort they also organized several webX meetings with Ontario ecologists as related to ecological land classification and the use of vegetation plot data. The Canadians agreed to participate in a workshop at the August meeting to specifically address plot data, centralized repositories of data, and analytical tools. In addition, they agreed to have an additional meeting with Minnesota staff to discuss the hemi-boreal forests that cross the international border—providing a rare opportunity to discuss in person this shared landscape.

Staff coordinated with Minnesota museums and herbaria as well as with other experts in specific taxon to whom they send specimens to ensure that identification is accurate. A few examples of plants:

*Sphenopholis intermedia* was sent to Tom Daniel at California Academy of Sciences who confirmed its identification which was the first location of this otherwise widespread grass on a cliff in northeastern Minnesota. Rob Soreng at the Smithsonian Museum is an expert in the genus *Poa* and was consulted about collections. Dr. Robert R. Haynes provides routine verification of selected aquatic plants and Tom Philbrick is an authority on the genus *Callitriche*. *Bidens* authority, John Strother recently sent confirmation of the correct identification of four *Bidens discoidea* specimens.

Minnesota bryologist Jan Janssens continues to work with MCBS to record significant updates on the state's distribution of bryophytes. Not only has he identified many of the collections made by plant ecologists and botanists, but he has provided field training in identification and sampling. In addition, he is working closely with MCBS to add mosses to an online list of plants. The mosses on this list can be used in recording species in vegetation samples and will enhance results especially in native plant communities, such as peatlands, where mosses are dominant organisms but often poorly recorded by botanists more familiar with vascular plants.

MCBS continued coordination with various planning activities in the DNR. A few examples include: The Minnesota Prairie Conservation plan implementation team, Lake Superior Biodiversity Conservation Assessment, selected watershed planning efforts, the Strategic Groundwater Management team, the Scientific and Natural Area plan, the update to the State Wildlife Action plan, the DNR's vulnerability assessment plan, Forest Certification, School Trust stewardship parcel identification, NRCS ecological planning, Potlatch land assessment.

## Field Surveys

### ***Northeastern Surveys***

The large functional landscapes of the Border Lakes Subsection contain high quality fire-dependent forests and large areas experiencing or recovering from a series of wildfires and wind storms. Native plant community and botanical surveys were conducted largely in the BWCAW using canoe access for extended trips. Field work was conducted from a series of base camps. Due to the loss of prime field survey time during the state government shutdown in 2011, surveys in the Border Lakes subsection portion of Lake County were extended beyond the fall 2012 deadline.

Field work in the Nashwauk Uplands Subsection was completed in 2012. The native plant community field surveys in the Tamarack Lowlands, the Littlefork-Vermillion Uplands and the Border Lakes subsections of St Louis County began in June 2013.

Some of the botanical highlights in Border Lakes Subsection of Lake County included documentation of the following plant species of interest: St. Lawrence grapefern (*Botrychium rugulosum*), Katahdin sedge (*Carex katahdinensis* or *C. conoidea*), Robbin's spike-rush (*Eleocharis robbinsii*), autumn fimbriistylis (*Fimbristylis autumnalis*), bog rush (*Juncus stygius*), American shore-plantain (*Littorella americana*), broadleaf water milfoil (*Mysiophyllum heterophyllum*) (only the 3<sup>rd</sup> reported location in MN), small white waterlily (*Nymphaea leibergii*), small green wood orchid (*Platanthera clavellata*), small yellow water crowfoot (*Ranunculus gmelinii*), sooty-colored beak rush (*Rhynchospora fusca*), Torrey's mannagrass (*Torreyochloa pallida* var. *fernaldii*), soapberry (*Shepherdia canadensis*), Oregon woodsia (*Woodsia oregano*), adder's tongue (*Ophioglossum pusillum*), twig rush (*Cladium mariscoides*), montane yellow-eyed grass (*Xyris montana*), lanceleaf violet (*Viola lanceolata*), maidenhair spleenwort (*Asplenium trichomanes* subsp. *trichomanes*), Michaux's sedge (*Carex michauxiana*), olivaceous spikerush (*Eleocharis flavescens* var. *olivacea*), Franklin's phacelia (*Phacelia franklinii*), and the dung-moss, (*Splachnum ampullaceum*). A large population of the quite rare lavender bladderwort (*Utricularia resupinata*) and populations of purple meadow-rue (*Thalictrum revolutum*) were of particular interest. Several non-native species with no previous documentation in Lake County were recorded: Queen Ann's lace (*Daucus carota*), field cottonrose (*Logfia arvensis*), and green sorrel (*Rumex acetosa*).

Early field surveys in 2013 in the Border Lakes subsection of St. Louis County included a nine-day extended survey trip into the Trout Lake Bedrock Complex Land Type Association. Highlights were the documentation of *Buxbaumia aphylla* (bug-on-a stick moss), a rare bryophyte previously only known in

Minnesota from a single location in Winona County, and the sedge *Carex exilis* (a St. Louis County record) located in a large Graminoid Poor Fen (water track), an uncommon peatland community in the Border Lakes subsection.

This period also included field surveys to review western Jacob's-ladder (*Polemonium occidentale*) sites in order to update the population status of this very rare plant. This species was the subject of an intense distribution-wide status survey over 15 years ago and is a likely candidate for future monitoring efforts.

### **Northwestern Surveys**

Native plant community surveys were completed in Clearwater County and are nearly complete in Beltrami County.

A major accomplishment was the completion of three weeks of helicopter-based field surveys that included animal, plant, and native plant community surveys in the Red Lake Peatlands of Beltrami County and parts of Lake of the Woods and Koochiching counties. Ecologists established permanent vegetation monitoring plots and collected data related to native plant communities and rare plants such as English sundew (*Drosera anglica*), Lapland buttercup (*Ranunculus lapponicus*), small white water lily (*Nymphaea leibergii*), and ram's-head lady slipper (*Cypripedium arietinum*). Other species collected were dragon's mouth (*Arethusa bulbosa*), white adder's mouth (*Malaxis monophyllos*), hair-like sedge (*Carex capillaris*), linear-leaved sundew (*Drosera linearis*), montane yellow-eyed grass (*Xyris montana*), twig rush (*Cladium mariscoides*), sooty-colored beak rush (*Rhynchospora fusca*), and northern comandra (*Geocaulon lividum*).

A brief field visit to Pine and Curry Island in Lake of the Woods County resulted in the relocation of rock sandwort (*Minuartia dawsonensis*) last observed at the site in 1894. Animal survey staff assessed the scope of future work desirable to assess the distribution of small mammals and invertebrates in the county.

One of the more challenging groups of plants for survey is collectively known as moonworts (*Botrychium* spp.) and grapeferns (*Sceptridium* spp.). A concerted search for locations of species within these genera was conducted largely in a portion of Lake of the Woods County with other searches conducted mostly in June 2012 in Beltrami, Koochiching, St Louis, and Lake counties. Over 100 populations of seven species of *Botrychium* were recorded. A significant outcome of the searches was the identification of 12 new populations of upswept moonwort (*Botrychium ascendens*). Previously, only two populations of upswept moonwort were known to occur in the state. In addition, one new population of the proposed endangered species spatulate moonwort (*Botrychium spathulatum*) was documented. These surveys were continued in the spring of 2013 in Lake of the Woods, St Louis, Beltrami and Koochiching counties yielding similar results. Confirmation of the identification of 2013 collections is underway.

### **Aquatic plant surveys**

Since July 2011 surveys of 124 lakes for rare aquatic plants and vegetation were completed. During the 2012 field season in St. Louis and Cook counties new occurrences were recorded of lavender bladderwort (*Utricularia resupinata*), awlwort (*Subularia aquatica*), American shore plantain (*Littorella americana*), spiny coontail (*Ceratophyllum echinatum*), Vasey's pondweed (*Potamogeton vaseyi*), humped bladderwort (*Utricularia gibba*), slender water milfoil (*Myriophyllum tenellum*), Robbins' spikerush (*Eleocharis robbinsii*), and Oakes' pondweed (*Potamogeton oakesianus*). Slender water naiad (*Najas gracillima*) was found in Cook County, which is unusual as there is only one other collection of this species from the northeast of Minnesota.

One of the rarest finds was the fourth documented location in Minnesota of jointed rush (*Juncus articulatus*) found in 2011 in Beltrami County. In addition small white water lily (*Nymphaea leibergii*) was observed in the channel of the Tamarac River as it flows into Upper Red Lake. Previously there has been only one outlying occurrence of this species documented beyond its two known disjunct

populations in Minnesota (Lake County and the other south of Lake of the Woods). This is the first occurrence found beyond these two known areas since 1977.

### **Animal Surveys**

Most of the animal surveys were conducted with funding provided through State Wildlife Grants. During much of this period, animal surveys focused on the Border Lakes ecological subsection in Lake and Cook counties and the Nashwauk Uplands, Littlefork-Vermillion Uplands, Tamarack Lowlands and Laurentian Uplands subsections in St. Louis County. Limited small mammal and lepidoptera surveys were conducted in Beltrami and Koochiching counties when helicopter transport was available to transport surveyors to remote areas. Animal surveys conducted during this period included mammal, breeding-season birds, herpetofauna, nongame fish, lepidoptera and jumping spiders.

Summaries of some of the findings from these surveys are presented in the following report: *State Wildlife Grant Final Report Minnesota's Wildlife Resources and Habitat Surveys and Information Management T-5-R-3* September 1, 2010 – September 30, 2012. [http://files.dnr.state.mn.us/eco/mcbs/mn\\_t5\\_r3\\_final\\_report.pdf](http://files.dnr.state.mn.us/eco/mcbs/mn_t5_r3_final_report.pdf)

### **Monitoring**

**Grazing and fire management** In 2012 monitoring began at selected prairie sites associated with grazing/fire management. Vegetation plots were established in the Aspen Parklands at Caribou WMA and in Pankratz Prairie, which were sampled in July and August 2012. This included the sampling of 50 plots in each of five management units at Caribou WMA and 12 plots in six pairs in upland prairie and 6 plots in three pairs in wetland prairie at Pankratz Prairie.

In association with the establishment of monitoring activities in the Aspen Parkland, 2012 bird surveys were conducted at Caribou WMA that included 26 point counts, nine species lists and four incidental records. Three birds listed as state special concern were recorded including Marbled Godwit, Acadian Flycatcher and Nelson's Sparrow. Lepidoptera surveys at the site included a sampling area of a typical aspen parkland mosaic of meadows and brush prairie interspersed with aspen and bur oak groves where light to moderate grazing history was evident. Collection methods included diurnal searches and the use of Ultraviolet (UV) light traps, UV sheet, and rotten banana-brown sugar baits. A total of 396 specimens were collected, representing over 181 species. A number of seldom observed species were found in good abundance including the following moths: *Agonopterix flavicomella*, *Peoria gemmatella*, *Apamea niveivenosa*, and *Oligia egens*.

At Lac Qui Parle WMA/Chippewa Prairie in west-central Minnesota, a 2013 spring prescribed fire was conducted by wildlife managers followed by grazing as designed in a detailed management plan. MCBS prepared for sampling of this area to be conducted in late summer 2013 (plots were previously established and sampled in 2011 prior to this management treatment). Associated sampling of rare snakes, terrestrial invertebrates and selected small mammals is in progress. A species of moth collected in the vicinity was sent to an expert who confirmed that it is a new species previously undescribed.

A third site was added to the grazing monitoring plan in 2013—Hole in the Mountain WMA, where pairs of plots were located in areas dominated by the non-native grass, smooth brome (*Bromus inermis*) and areas at the transition between smooth brome and native prairie. This plan was reviewed with wildlife managers and plots were established.

**Small white lady's-slipper** (see also map) In May and June 2012 botanists and trained volunteers selected 18 prairie sites across the geographic range of the species in the state for preliminary sampling. Because the plants are most easily identified for rapid assessment while in bloom, the effort began in May with monitoring activities accelerated by unusually warm weather (early blooming) and ending abruptly due to a mid-June frost. Flowers in two northwestern sites had frost damage that was

too severe to efficiently count the plants. In the 16 sites where counts were effective, over 22,000 plants were recorded. The highest number of plants recorded was at Expandere WMA (9,373 plants) followed by Plover Prairie (4,530 plants). Over 1,000 plants were recorded in each of the following sites: Iron Horse SNA, Ottawa WMA and Altona WMA. A report on the 2012 work is available: [http://files.dnr.state.mn.us/eco/mcbs/2012\\_cypripedium\\_candidum\\_report.pdf](http://files.dnr.state.mn.us/eco/mcbs/2012_cypripedium_candidum_report.pdf)

In spring of 2013 thirty-one sites where plants had historically been recorded were visited in order to map population boundaries using a GPS unit and to update the estimated population size. In northwestern Minnesota, Halma Swamp WMA and Newfolden WMA were visited due to historic records of small populations. No plants were observed at either of these sites. The historic records stated that these populations contained 20 or fewer individuals. Of the 29 other sites visited, eight had over 1,000 plants; three sites contained over 500 plants; and six sites had over 100 plants. The remaining sites had less than 100 plants each. Wambach WMA in Mahnomen County, Rothsay WMA in Wilkin County, and Sena WMA in Chippewa County had some of the largest populations visited this year. Each of these sites have large areas of available habitat, more than was possible to survey during the brief blooming period. Each of these sites is estimated to contain more than 10,000 plants. Several sites where population boundaries were established in 2012 were selected for long-term quantitative monitoring. Plots were established at Plover Prairie, Expandere WMA, and Highland Grove WMA. At other sites, population boundaries mapped in 2012-2013 will help identify where to place transects for future quantitative monitoring throughout the geographic range of the orchid in Minnesota. Additionally, botanists made a number of phenological observations to inform a degree day model to improve estimation of the emergence of the plant in future years. This will improve the efficiency of sampling since the bloom period is short and timing is influenced by weather.

**Forest certification monitoring** DNR Forestry and Wildlife forested lands are currently dual certified by the Forest Stewardship Council (FSC) and by the Sustainable Forest Initiatives (SFI). MCBS plant ecologists have provided substantial data interpretation as related to the DNR's forest certification goals and Corrective Action Requests (CARs). A Minor Corrective Action Request (CAR 2010.13) was assigned to the DNR in 2010 that required a plan for monitoring elements of high conservation value (HCV) in identified locations. The intent of the CAR is that DNR should assure that the elements that make the site of high conservation value should be "maintained or enhanced" as related to management practices. DNR teams that included MCBS staff developed a response that was accepted following an audit in October 2011. In southeastern Minnesota, the "high conservation value" was largely due to the presence of several species of rare plants. Ten sites were selected for monitoring over two field seasons. Six sites were visited in coordination with the regional DNR plant ecologist. Thirty-three state listed rare plants were observed and 11 new locations of rare plant populations were recorded in 2012-2013.

For example in June 2013 the boundaries of populations of snow trillium (*Trillium nivale*) and twin leaf (*Jeffersonia diphylla*) were accurately mapped using GPS at a HCV site, West Indian Creek. In Fillmore County, Shattuck Creek was visited to record in more detail the mapped extent and numbers of individuals of the rare plants known to occur at the site including reniform sullivantia (*Sullivantia renifolia*) and James' sedge (*Carex jamesii*), the latter having substantially larger population sizes than recorded during historic visits. The plant ecologist also identified previously unknown populations of great Indian plantain (*Arnoglossum reniforme*) and Goldie's fern (*Dryopteris goldiana*). In addition, the second population known in the state of green violet (*Hybanthus concolor*) was located at the site.

In the fall of 2012, Perched Valley WMA was one of the sites visited by SFI and FSC auditors and DNR staff as part of the annual external forest certification audit enabling the DNR to demonstrate that action was taken related to the monitoring CAR. One of the species monitored due to the CAR was the state threatened hair-like beak rush (*Rhynchospora capillacea*) which is found at Perched Valley WMA.

Since these southeastern Minnesota sites were first surveyed by MCBS, technology has greatly improved (GPS, GIS and LIDAR) leading to the ability to map the spatial extent of the populations in more detail and with greater accuracy. Future monitoring of rare plant populations for the purpose of

forest certification might best be accomplished by periodic visits to repeat GPS mapping of population boundaries, to estimate numbers of plants, and to record observed threats (invasive species for example). In addition, consultation with managers when specific management activities are proposed might prompt additional monitoring needs.

The various monitoring efforts thus far indicate that areas of outstanding and high biodiversity significance used in the nomination of areas of high conservation value based on rare plant populations was merited. It also indicates that more detailed survey of outstanding and high sites of biodiversity significance should be a future direction of the Survey.

## **Activity 2: Information System Expansion**

**Description:** MCBS provides data and specimens to museums and information systems. This results in long-term storage of collections and databases for analysis and distribution of information to individuals, organizations, and agencies with diverse natural resource goals.

**Procedure:** Data collected by MCBS are entered into manual and computerized files in the DNR's information systems. Key databases include those tracking locations of plants and animals, rare features, relevés (vegetation plot samples), aquatic plant lists/lakes, MCBS sites, native plant community polygons (GIS), and animal aggregations. Locations of native plant communities and MCBS sites are mapped using ArcGIS and procedures are in progress to provide for updates to these shape files. Shape files of native plant communities and MCBS sites are available on the DNR's Data Deli, accessible through the website.

Targeted species locations are entered into an Observation Database that is connected to Biotics, an information system developed by NatureServe, an international organization with a major focus on the storage, distribution, and interpretation of rare features data. Photographic vouchers, imagery, and other digital media are stored at the DNR, St. Paul. Field data sheets or data collected on field data recorders are filed electronically and/or manually.

Data generated by monitoring activities are entered into the databases listed above or in related databases that provide for analysis. For example, the Observation Database can be modified to store the results of repeated visits to populations of small white lady's slipper where more detailed population information is collected such as number of plants per area, number in bloom or fruit, etc. These data are linked to an updated map of the spatial extent of the population in the prairie/wetland site using GIS. Monitoring data collected for animals might include timed searches, point counts, and plot counts, which are also stored in the Observation Database.

Monitoring data will be provided to be linked to management databases currently in use or being developed in the DNR (Divisions of Fish and Wildlife, Forestry, Ecological and Water Resources and Parks and Trails). In addition, data will be accessible to other partners in prairie/grassland and forest management who maintain adaptive management databases associated with specific managed areas.

**Information System Development:** The collection and management of data continues to improve through the use of GIS, global positioning systems, tools/products accessible on the web, and field data recorders. MCBS participates in the DNR's efforts to maintain data standards and quality of data, to integrate databases, and to improve information delivery on the web. Data delivery using the web requires heightened attention to data standards, data security, metadata, and other documentation.

MCBS also coordinates with other state and national information system developments. For example, recent collaboration with the Bell Museum on developments related to collections management and information access is anticipated to continue, with specific attention to the rapidly changing taxonomy of flora and fauna. Long-term monitoring of species and habitats is especially influenced by the need to "crosswalk" new and old names of species, which is critical to reliable analysis, interpretation and

communication of results. A new version of NatureServe’s Biotics (Biotics 5) will be installed during this project period.

Preparation of Collections: All plant and animal specimens are identified and collections are prepared for permanent storage and deposited in appropriate repositories at the University of Minnesota’s J.F. Bell Museum of Natural History and at the Science Museum of Minnesota.

**Summary Budget Information for Activity 2:**

**ENRTF Budget:** ~~\$ 800,000~~  
**\$ 769,882**  
**Amount Spent:** **\$ 769,882**  
**Balance:** **\$ 30,118**  
**\$ 0**

**Amendment Request (11/08/2013):** This is a request that funds be shifted to Activity #1 from Activity #2 in the amount of \$30,118. Expenditures in these two categories as estimated in the work program were not correct.

**Activity Completion Date:**

<b>Outcome</b>	<b>Completion Dates</b>	<b>Budget</b>
1. Survey data entered and managed in DNR’s information systems.	Winter 2011, Winter 2012	
2. Preparation & delivery of plant & animal collections to museums.	Winter 2011, Winter 2012	
3. Monitoring data entry & analysis (DNR Info Systems)	Winter 2011, Winter 2012	

Note: The status of each activity above is described in regular work program updates.

**Activity Status as of January 2012**

**Data entered in DNR Information Systems**

Since July 2011 new records of 49 rare features were added to the Rare Features Database. Since 1987, MCBS has added a total of 19,138 new rare feature records. Since 1987, MCBS has contributed 4,699 of the 9,825 total database records to the Relevé (vegetation sampling) Database. Statewide, 10,065 MCBS sites of Biodiversity Significance and 62,931 polygons of native plant communities are now publically available on the DNR’s Data Deli.

One of the largest additions to the Data Deli during this project period were maps (GIS shapefiles) of MCBS sites and associated native plant communities in the Toimi Uplands Subsection. The Toimi Uplands contain 40 MCBS sites. Three are ranked as MCBS Outstanding Sites of Biodiversity Significance, 18 as High, 13 as Moderate, and six were considered “Below”. In this shapefile, 68,807 acres were mapped to a native plant community type, native plant community complex, or as disturbed land. Examples of native plant community highlights include the Chicken Creek Hardwoods site which contains an excellent example of a white cedar–yellow birch forest and the Wolf Lake site which contains a good example of a northern rich fen (water track) native plant community.

A DNR team of ecologists and GIS specialists met several times to evaluate the results of a pilot project to use computer mapping software known as eCognition to accelerate mapping and classification of native plant communities. In northern Minnesota, it was determined that results from the current National Wetlands Inventory project might inform mapping of other native plant communities. Thus far, the possible efficiencies in the utilization of this software appear to be outweighed by its expense, the need for extensive training of staff to operate it and questionable future support by the DNR.

The Relevé Database that stores the vegetation plot data was significantly upgraded to enable improved online data entry and quality control by data managers and plant ecologists. Parallel with this development were improvements to the standardized state list of plants, which continues in collaboration with others in the DNR and the University of Minnesota herbarium. Documentation for users to access these databases was completed. Recent changes in organization of the state's information system have thus far contributed to delays in application development of these databases that have highly specific and complex data models.

The Observation Database associated with the national database, Biotics, continues to be developed and populated. Data associated with collections of mammals, birds and fishes are the current focus of this project. At the onset of this project, the person who had been assigned to lead the project was re-assigned to other tasks in the Division. Other biologists were assigned to the project this fall.

In collaboration with the Bell Museum of Natural History and the Science Museum of Minnesota, progress continues on the curation of mammal, fish and amphibian collections.

MCBS continues to provide staff one day per week to prepare museum plant specimens (mount pressed plants and labels on herbarium sheets) using standard herbarium procedures for collections contributed by MCBS to the Bell Museum of Natural History. For several months during this period, the herbarium was not accepting new collections due to upgrades to their information systems.

### **Activity Status as of October 2012**

#### **Data entered in DNR Information Systems**

Since July 2011 new records of 502 rare features were added to the Rare Features Database. Since 1987, MCBS has added a total of 19,591 new rare feature records. Since 1987, MCBS has contributed 4,699 of the 9,825 total database records to the Relevé (vegetation sampling) Database. Statewide 10,116 MCBS sites of Biodiversity Significance and 63,146 polygons of native plant communities are now publically available on the DNR's Data Deli. Since July 2011 surveys of 124 lakes for rare aquatic plants and vegetation were completed and data were entered into a lakes database. Since 1987 1,189 rare plant occurrences have been found during 1,836 rare aquatic plants searches in lakes in 43 counties in Minnesota. 1,836 species lists (lists of every aquatic plant species observed at each lake by genus and species) were created, one for each lake surveyed.

The Relevé Database that stores vegetation plot data continues to be upgraded to enable improved online data entry and quality control by data managers and plant ecologists. The development of a related standardized state list of plants continues in collaboration with others in the DNR and the University of Minnesota. Recent changes in the organization of the state's information technology delivery services (MNIT) continues to contribute to delays in application development of these databases, which have highly specific and complex data models. This has resulted in the need for additional MCBS staff time for project management, preparation of Service Level Agreements and "data stewardship" activities. In addition, MNIT seems to be lacking sufficient staff to address the volume of programming demands.

Development of monitoring databases is also influenced by the above changes. Resource professionals are becoming more proficient at database design and development. For example, a student worker entered the vegetation plot data collected as part of the prairie monitoring project at Caribou WMA and Pankratz Prairie into an Access database shortly after data collection (September 2012). An obvious drawback is the potential for a proliferation of databases where data standards are difficult to manage.

Currently, in an attempt to consolidate databases in the DNR, a MCBS plant ecologist is managing a project to develop a unified statewide "core database" of native plant communities mapped using the



native plant community classification. This project involves coordination with the divisions of Parks and Trails, Fish and Wildlife, Forestry, and Ecological and Water Resources, and the new MNIT.

A MCBS plant ecologist is part of a DNR/MNIT team that is exploring a more unified approach to the use of cost-effective and standardized data recorders.

The Observation Database associated with the national database, Biotics, continues to be developed and populated. Data associated with collections of mammals and birds has been entered. Data related to fishes are the current focus of entry.

A student worker is scanning many MCBS field forms as part of an accelerated archival process. In addition an accelerated effort to update the management and accessibility of images (photos, slides, digital images etc.) collected for over 25 years using a variety of media will begin in December 2012.

MCBS continues to provide staff one day per week to prepare museum plant specimens (mount pressed plants and labels on herbarium sheets) using standard herbarium procedures for collections contributed by MCBS to the Bell Museum of Natural History.

### **Activity Status as of March 2013**

#### **Data entered in DNR Information Systems**

Since July 2011 new records of 502 rare features were added to the Rare Features Database. Since 1987, MCBS has added a total of 19,591 new rare feature records. Statewide 10,192 MCBS sites of Biodiversity Significance and 63,232 polygons of native plant communities are now publically available on the DNR's Data Deli. Since 1987, MCBS has contributed 4,926 of the 9,421 Minnesota vegetation plot records in the DNR's Relevé (vegetation plot) Database.

Over 1000 polygons of native prairie were reviewed to match "quality ranks" with the spatial polygon data displayed on the Data Deli. This will help inform Prairie Plan implementation.

A revision of the Minnesota List of Endangered, Threatened and Special Concern species is underway with public hearings and review completed during the winter of 2013. In anticipation of potential changes to the state list a plan was made for collection of data from physical records of proposed newly listed species located in Minnesota museums for inclusion in the Natural Heritage Information System. In particular staff at the herbaria at the University of MN Duluth, the Bell Museum, St John's University, St Cloud State and others have been contacted and have been crucial collaborators in this effort, often providing assistance to DNR staff in the evaluation of collections.

The development of a standardized state list of plants will now allow web users to create distribution maps of Minnesota vascular plants. The recent changes in the organization of the state's information technology delivery services resulting in the creation of the Information Technology for Minnesota Government (MNIT) resulted in early termination of a service level agreement related to the web application of the project largely due to the lack of sufficient MNIT staff to address the high volume of programming demands. Delays in application development of databases are now expected especially with applications that have specific and complex data models. These often result in a steep learning curve for the programmer assigned to the project such that MNIT staff sometimes spend a portion of their contractual time learning new applications (training) with sometimes less than ideal outcomes. For example, the graphic quality of the plant distribution maps now on the website is not up to current standards. Finally when complex projects are continued in a new service level agreement, often a new programmer is assigned requiring additional MCBS staff time to assist with the project management, preparation of Service Level Agreements and data stewardship activities.

Development of monitoring databases continues to be influenced by the above changes. Resource professionals are consequently becoming more proficient at database design and development resulting in a proliferation of databases where data standards are difficult to manage.

MCBS is working with DNR/MNIT to improve this relationship. For example, a DNR/MNIT project to develop a unified statewide “core database” of native plant communities mapped using the native plant community classification is progressing in a positive fashion. This project involves coordination with the divisions of Parks and Trails, Fish and Wildlife, Forestry, and Ecological and Water Resources that includes a large service level agreement with MNIT. MCBS is providing a plant ecologist as the project manager. His understanding of native plant communities and proficiency in GIS mapping has contributed to his effectiveness in working with MNIT staff. This is hopefully is a model for future collaboration of inventory and monitoring data in the DNR.

A MCBS plant ecologist took part in a DNR/MNIT team exploring a more unified approach to the use of cost-effective and standardized data recorders. The result thus far is that various devices will be explored during the 2013 field season. MCBS will be using up to 3 new types of recorders for inventory and monitoring related to vegetation, amphibians and reptiles, and orchids.

A student worker has completed scanning of many historic MCBS field forms as part of an archival process.

As one example of the increased sophistication of new technology a high resolution scan of rare sedge (*Carex pallescens*) was sent to a botanical expert in Michigan who confirmed that it was properly identified.

A volunteer with computer programming experience assisted the aquatic botanist in the preparation of reports of vegetation recorded at 1836 lakes to be linked to LakeFinder-a DNR website often queried by many Minnesotans from their mobile devices. MNIT staff familiar with LakeFinder have provided good support in adding this link that will hopefully be available by June 2013.

MCBS continues to provide staff one day per week to prepare museum plant specimens (mount pressed plants and labels on herbarium sheets) using standard herbarium procedures for collections contributed by MCBS to the Bell Museum of Natural History.

Botanists and plant ecologists have delivered 2,392 plant collections to the Bell Museum herbarium since July 2012.

The delivery of the new version of the information system product Biotics 5 from NatureServe has been delayed until sometime in 2013.

## **Final Report Summary:**

### **Data entered in DNR Information Systems**

Since July 2011 new records of 929 rare features were added to the Rare Features Database. Since 1987, MCBS has added a total of 20,018 new rare feature records. Statewide 10,192 MCBS sites of Biodiversity Significance and 63,232 polygons of native plant communities are now publically available on the DNR’s Data Deli. Since 1987, MCBS has contributed 4,972 of the 9,467 Minnesota vegetation plot records in the DNR’s Relevé (vegetation plot) Database. Since 1987 botanists documented 1,194 rare aquatic plants during targeted aquatic plant surveys of 1,872 lakes.

Over 1,000 polygons of native prairie were reviewed to match “quality ranks” with the spatial polygon data displayed on the Data Deli. This will help inform Prairie Plan implementation.

A revision of the Minnesota List of Endangered, Threatened and Special Concern species nears completion. In anticipation of potential changes to the state list, data were collected from physical records of proposed newly listed species located in Minnesota museums for inclusion in the Natural Heritage Information System. In particular staff at the herbaria at the University of Minnesota Duluth, the University of Minnesota (Minneapolis/St Paul), St John’s University (Collegeville), and St Cloud

State University were some of the collaborators in this effort, often providing assistance to DNR staff in the evaluation of collections.

The development of a standardized state list of plants now allows web users to create distribution maps of Minnesota vascular plants. The recent changes in the organization of the state's information technology delivery services resulting in the creation of the Information Technology for Minnesota Government (MNIT) has resulted in delays in implementation largely due to the lack of sufficient MNIT staff to address the high volume of DNR programming demands. Delays in application development of databases are now expected, especially with applications that have specific and complex data models. These often result in a steep learning curve for the programmer assigned to the project such that MNIT staff sometimes spend a portion of their contractual time learning new applications (training) with sometimes less than ideal outcomes. For example, the graphic quality of the plant distribution maps now on the website is not up to current standards. Finally when complex projects are continued in a new service level agreement, often a new programmer is assigned, requiring additional MCBS staff time to assist with the project management, preparation of service level agreements and data stewardship activities.

Development of monitoring databases continues to be influenced by the above changes. Resource professionals are consequently becoming more proficient at database design and development, resulting in a proliferation of databases where data standards are difficult to manage.

MCBS is working with DNR/MNIT to improve this relationship. For example, a DNR/MNIT project to develop a unified statewide "core database" of native plant communities mapped using the native plant community classification is progressing in a positive fashion. This project involves coordination with the divisions of Parks and Trails, Fish and Wildlife, Forestry, and Ecological and Water Resources and includes a large service level agreement with MNIT. MCBS provided a plant ecologist as the project manager. His understanding of native plant communities and proficiency in GIS mapping has contributed to his effectiveness in working with MNIT staff. This is hopefully a model for future collaboration of inventory and monitoring data in the DNR.

A MCBS plant ecologist took part in a DNR/MNIT team exploring a more unified approach to the use of cost-effective and standardized field data recorders in the DNR. Despite this effort, very little specific guidance was derived, so each program selected recorders to explore during the field season. MCBS obtained four Panasonic Toughpad tablets since they have software supported by MNIT, are ruggedized, are made to be visible in bright sunlight, and have swappable batteries. MNIT did not have time to create a data entry program, so an ecologist created an Access program for recording prairie vegetation data. Another ecologist developed an iPad application for collecting relevé data collection using Filemaker Pro and Go. Another data entry version was developed on an iPad Mini for aquatic plant surveys (needed a waterproof case) with the assistance of a volunteer programmer to ensure that the data were properly backed up and uploaded to a more secure database. These various efforts need further assessment especially related to data integration and standards.

A student worker has completed scanning of many historic MCBS field forms as part of an archival process.

As one example of the increased sophistication of new technology, a high resolution scan of the rare sedge (*Carex pallescens*) was sent to a botanical expert in Michigan who confirmed that it was properly identified.

Reports of vegetation recorded by MCBS at 1,836 lakes can now be found as a link on LakeFinder—a DNR website often queried by Minnesotans from their mobile devices.

MCBS continues to provide staff one day per week to prepare museum plant specimens (mount pressed plants and labels on herbarium sheets) using standard herbarium procedures for collections

contributed by MCBS to the Bell Museum of Natural History. Botanists and plant ecologists have delivered 2,392 plant collections to the Bell Museum herbarium since July 2012.

The delivery of the new version of the information system product Biotics 5 from NatureServe has been delayed until fall 2013.

**Activity 3: Guidance for Conservation and Management**

**Description:** MCBS will provide interpretation of results through products and technical assistance to guide private and public conservation and management of ecological systems, rare resources, and sites of biodiversity significance.

**Summary Budget Information for Activity 3:**

**ENRTF Budget: \$ 550,000**  
**Amount Spent: \$ 550,000**  
**Balance: \$ 0**

**Activity Completion Date:**

<b>Outcome</b>	<b>Completion Dates</b>	<b>Budget</b>
1. DNR’s website provides updated and accurate survey & monitoring procedures, results and tools. (Examples given at right--not an exhaustive list).	Add GIS map files of results in 4 counties (2011). Update Rare Species Guide for 20 species (2011), 20 species (2012). Create data portal for: -Vegetation plot data (Winter 2011) -MCBS site data (Winter 2012) -MN plant list database (June 2013)	
2. Ecological Evaluations (EE) are reports describing attributes of high-biodiversity sites to guide conservation, management, and monitoring actions.	(Example: LaSalle Lake EE in Hubbard County). Write 10 EEs (Winter 2011); 10 (Winter 2012); 10 (July 2013).	
3. Monitoring results provided to monitoring collaboratives & resource managers to inform future conservation/management actions.	Winter 2012, June 2013	
4. Technical assistance: e.g., advice on grazing and prescribed fire plans, aquatic plant management guidelines, national vegetation plot-monitoring protocol and restoration of plant communities, county plans addressing biodiversity and native habitat protection, forest certification.	Throughout project period	
5. Aspen Parkland-Red River Valley natural history guide book based on the results of MCBS.	Manuscript delivered spring 2012; Publication by June 2013	

Note: The status of each activity above is described in regular work program updates.

## Activity Status as of January 2012

### Website

The GIS specialist added GIS map files of results in Polk and Murray counties and in the Toimi Uplands subsection.

A data portal for vegetation plot data (relevé) now exists for improved access to relevé data within the DNR. Data continue to be made available to external users upon request.

Staff added more than 20 field updates to MCBS's [News from the Field](#).

Three ecological evaluations were completed during this time describing the ecological significance of: 1) Middle Fork Zumbro Forest; 2) Rose Dell Prairie; and 3) Horseshoe Bay Shore.

*Minnesota Prairie Conservation Plan 2010: A Habitat Plan for Native Prairie, Grassland, and Wetlands in the Prairie Region of Western Minnesota* (Minnesota Prairie Plan Working Group 2010) was posted on the DNR's web site by MCBS.

### Technical assistance

Northeastern staff met with St Louis County land managers to provide an update of survey status and MCBS products in the county.

MCBS data, interpretations and technical assistance were provided to other external partners such as: Environmental Resources Management, Lake County, Trust for Public Lands, and Potlatch.

Northern staff assisted with review of the proposed DNR/SNF BWCAW land exchange and the effects of Trust Fund status on Sites of Biodiversity Significance, High Conservation Value Forests and old growth forests.

Staff attended meetings of the newly formed North Shore Forest Collaborative.

A plant ecologist made a presentation on MCBS at a State Tribal Mining Update meeting.

As a member of the DNR's North Shore Field Team, a plant ecologist reviewed and commented on various projects or proposals including St. Louis County tax forfeit land sales, USFS Encampment Minerals mineral exploration, a private land acquisition proposal, and the Cook County Water Plan revision priorities.

DNR Forestry and Wildlife forested lands are currently dual certified by the Forest Stewardship Council (FSC) and by the Sustainable Forest Initiatives (SFI). MCBS plant ecologists have provided substantial data interpretation as related to the DNR's forest certification goals and Corrective Action Requests (CARs). The outcome of a 2010 FSC/SFI audit included a decision that MCBS sites of Outstanding and High Biodiversity Significance that intersected with these state lands be a first source of data to enable the DNR to identify potential HCVPs in parts of the state where MCBS data are available. In 2010 a Minor Corrective Action Request (2010.13) was assigned that required a plan for monitoring elements of high conservation value in identified locations such that these elements of HCV be maintained or enhanced as related to management practices. DNR teams that included MCBS staff developed a response that was accepted following the October 2011 audit. Monitoring activities in the Aspen Parklands identified in this work program specifically address this requirement. Three ecologists participated in the field audit held in NW Minnesota.

A botanist is reviewing the results of research on the susceptibility of wild rice to elevated levels of sulfates in wild rice waters and specifically helping to interpret ecological and biological data to evaluate the status of wild rice stands in the Embarrass and Partridge River systems.

Two staff participated in the development and release of the Minnesota Prairie Conservation Plan.

Plant ecologists continue to provide advice related to the management plans for the new LaSalle Lake State Recreation Area to ensure that especially the recreation plan adequately address the valuable ecological resources of the area.

Key MCBS staff recently completing work in Southern Minnesota presented results at a DNR regional staff meeting in New Ulm and an ecologist made a presentation to the DNR's Southern Region Parks and Trails Division that included how MCBS data could be used to inform development and management. Examples of how MCBS data have been used in the southern region include: 1) The Chanarambie Creek area, which is a privately owned area of outstanding statewide significance. Five prairie bank tracts now are established there and MCBS data and technical assistance have increased local landowner awareness of the significance of the area. 2) The Des Moines River Valley, where MCBS has identified a concentration of forests and prairies that contain 50 records of rare species in 90 MCBS sites, including the federally listed plant prairie bush clover (*Lespedeza leptostachya*). These data are being used to inform Parks and Trails planning in the region. 3) An MCBS project to track wood turtles (*Clemmys insculpta*) using GPS methods, which was featured as a way to assess ongoing impacts of land-use changes and water management as related to rare turtles.

Related to the proposed increased use of grazing to manage public lands in Minnesota, a prairie ecologist compiled literature, participated in discussions related to grazing management and proposed monitoring plans to help assess the effectiveness of this tool in the state. This included presentations/posters detailing a monitoring project currently underway at Lac Qui Parle Wildlife Management Area at two conferences: America's Grasslands and a Patch Burn working group annual meeting.

Several staff participated in species "teams" that are composed of professionals for a number of native animal species groups with a focus on rare or declining species. Others took part in several "vulnerability assessment" teams associated with the forthcoming revision of the State Wildlife Action Plan.

In November MCBS made presentations at the Bailey Herbarium in honor of the accession of the 30,000th specimen (collected by MCBS botanist, Mike Lee) into the College of St Benedict/St John's University herbarium, the largest private college herbarium in the state.

New graphics, updated distribution maps, new photos of 49 orchid species and illustrations are part of a new DNR book on Minnesota's orchids to be published in spring 2012. The book provides an update to the presently out-of-print but very popular book, *Orchids of Minnesota*. Botanists and plant ecologists finalized the verification of identification of their most recent field updates on the state's orchids for inclusion in the new book,

Writing of assigned portions of the natural history guide book *Minnesota's Red River Valley and Aspen Parkland* is underway. The general outline is below:

**Part 1: Landscape History**

Geologic History and Major Landforms  
Postglacial Landscape  
Vegetation at the Time of the Public Land Surveys  
Cultural Change and the Landscape  
Summary

**Part 2: Native Plant Communities**

Introduction  
Fire-Dependent Forests and Woodlands  
Mesic Hardwood Forests  
Floodplain Forests

Wet Forests  
Forested Rich Peatlands  
Lakeshores  
River Shores  
Upland Prairies  
Wet Prairies  
Open Rich Peatlands  
Wet Meadows/Carrs  
Marshes  
Summary and Outlook

**Part 3: Guide to Important Sites**

Regional Tours  
Important Sites

**Activity Status as of October 2012**

**Website**

The GIS specialist added GIS map files of survey results in a portion of the Laurentian Uplands.

A state plant list for Minnesota's plants is available on the DNR's public website and now includes distribution maps that reflect the plant collections largely stored at the University of MN herbarium:  
[MNTaxa: The State of Minnesota Vascular Plant Checklist](#).

A data portal for vegetation plot data (relevé) now exists for improved access to relevé data within the DNR. Data continue to be made available to external users upon request. Examples of how relevé data have been used: ecological site classification work by NRCS, determination of hydrologic and ecological value of wetlands along the Minnesota River Valley (Lower MN Watershed District), a study correlating wetlands and hydric soils (Bemidji State U), project baseline seed banking at U MN Duluth (location of common native species), carbon sequestration and biodiversity studies (U North Dakota).

A project is in progress to make the aquatic plant data collected by MCBS more readily available to other DNR staff with the potential for working with DNR Fisheries to add these data to the popular "Lake finder".

The current plan for updating the Rare Species Guide calls for completion of summaries for 30 of the plant species proposed for addition to the state list of endangered, threatened and special concern species by June 30, 2013.

Staff added 18 new field updates to MCBS's [News from the Field](#).

Ecological evaluations were completed or are in progress during this time describing the ecological significance of: 1) Great Bend 21-22 (Cottonwood County); 2) Fish Fry Lake; 3) Jackson NW (Jackson County); 4) Galena 12 (Martin County); 5) Lake Alice (Hubbard County); and 6) a draft ecological evaluation for a large area that includes Giants Ridge.

Posted map of Areas of Biodiversity Significance in Minnesota on the web:  
[MCBS Site Biodiversity Significance Ranks](#)

Contributed images and other reports to the ENRTF:  
[Minnesota Environment and Natural Resources Trust Fund's Facebook page](#)

The new DNR book, Orchids of Minnesota was published by the University of Minnesota Press and distributed this spring with excellent response. It was featured on the front page of the DNR web site and Welby Smith provided a one page summary of the book for the Minnesota Conservation Volunteer:  
[Native Orchids of Minnesota](#)

Distribution maps of Minnesota's Amphibian and Reptiles was updated on the DNR website: [Minnesota's Amphibian and Reptile Distribution Maps](#)

A web site was developed related to the White-nose syndrome in bats: [White-nose Syndrome and Minnesota's Bats](#)

An updated version of *Minnesota Prairie Conservation Plan: A Habitat Plan for Native Prairie, Grassland, and Wetlands in the Prairie Region of Western Minnesota* (Minnesota Prairie Plan Working Group 2010) was posted on the DNR's web site by MCBS: [Minnesota Prairie Conservation Plan](#)

### **Technical assistance**

MCBS ecologists are participating in the implementation planning associated with the Minnesota Prairie Conservation Plan and are members of the Implementation team's science group.

A prairie plant ecologist made two presentations at a conference on conservation grazing held in Hankinson, North Dakota. The presentations were: "Monitoring Patch-Burn Grazing at Lac Qui Parle WMA and Chippewa Prairie Preserve" and "Grazing and Conservative Plant Species in Minnesota." Conference website: <http://www.ag.ndsu.edu/2012conservationgrazingworkshop>.

Comments were provided to guide proposed trail construction and prairie management at a meeting about the Sibley State Park management plan.

Extensive written comments were provided on the draft environmental impact statement for the Unimin South Mine located adjacent to Kasota Prairie SNA.

Staff ecologists reviewed a University of Minnesota climate change research project on prairies in southwestern Minnesota that will compare modeled effects of climate change on sites with little topographic relief versus sites with much topographic relief. Staff made suggestions about SNAs and WMAs such as Expandere WMA that might provide good comparisons and provided vegetation samples and other native plant community data.

A plant ecologist met with St Louis County staff to update them on the survey status.

Technical guidance was provided related to a trail center at Bear Head State Park.

Staff from the Binational program received MCBS data and interpretation.

Northeastern staff presented MCBS survey results at the Superior National Forest Border Lakes research meeting. This included delivery and exchange of data, methods and preliminary results in the Pagami Creek Fire area with USFS Northern Research Station researchers and collaborators (UW Madison, Superior NF).

Staff reviewed Superior National Forest vegetation management project proposals (Windy, Pearl), delivered relevant MCBS Site data and provided technical assistance in the field to SNF biologists working on these interdisciplinary project teams.

Staff exchanged information on objectives and methods with U of MN Department of Forest Resources researchers investigating boreal species refugia, and the expansion of temperate tree species and earthworms in the Border Lakes subsection.

Ecologists provided technical assistance on MCBS procedures and available data to the Trust for Public Lands - Northwoods Initiative.



Technical assistance continued to inform the Manitou Collaborative (Lake County, SNF, DNR, MFRC, Wolf Ridge ELC) and the NE Region SNA program on implementation of the Art Lake Ridges Natural Area project, including potential SNA acquisition of private lands within the area.

Staff participated in the annual partners meeting for the Kawishiwi Watershed Protection Project (WICOLA).

MCBS staff went with Superior National Forest natural resources staff on a field review of conservation concerns at Fishfry Lakes, a MCBS Site of high biodiversity significance, to review threats to geological features and rare species populations. The forthcoming ecological evaluation includes planning for the management of invasive species at the site.

MCBS data, interpretations and technical assistance were provided to other external partners such as Environmental Resources Management, Lake County, Trust for Public Lands, and Potlatch.

Northern staff assisted with review of the proposed DNR/SNF BWCAW land exchange and the effects of Trust Fund status on Sites of Biodiversity Significance, High Conservation Value Forests and old growth forests.

Staff attended meetings of the North Shore Forest Collaborative.

DNR Forestry and Wildlife forested lands are currently dual certified by the Forest Stewardship Council (FSC) and by the Sustainable Forest Initiatives (SFI). MCBS plant ecologists have provided substantial data interpretation related to the DNR's forest certification goals and Corrective Action Requests (CARs). The outcome of a 2010 FSC/SFI audit included a decision that MCBS sites of Outstanding and High Biodiversity Significance that intersected with these state lands be a first source of data to enable the DNR to identify potential HCVPs in parts of the state where MCBS data are available

The plant ecologist working in northwest Minnesota assisted with field evaluation of native plant communities and condition ranks for areas to be flooded within several proposed dam sites in Roseau and Lake of the Woods counties.

A plant ecologist provided consultation on a proposed plan for La Salle Lake area blowdown salvage logging.

A plant ecologist assisted with a response to Hubbard County regarding their request to salvage log in a ram's head orchid (*Cypripedium arietinum*) registry site that was affected by a recent blowdown.

A plant ecologist assisted with lowland black spruce field data collection in coordination with an interdisciplinary group that resulted in site selection of stands of varying age classes. The plant ecologist classified the native plant communities and provided an ecological perspective on the site.

Staff continue to be engaged in the consideration of vegetation plot-monitoring protocol following a meeting in spring 2012. At the national level, MCBS proposed a session at the forthcoming Ecological Society of America meeting (August 2013) to review consolidation of vegetation monitoring data as related to various classifications used in North America.

Writing of assigned portions of the natural history guide book *Minnesota's Red River Valley and Aspen Parkland* is underway. Major progress was made on Part #1 Landscape History, and Part #2 Native Plant Communities, including data analysis and writing on the Fire-dependent Forests, Floodplain Forests, Mesic Hardwood Forests, Open Rich Peatlands, and Wet Meadow/Carr communities and Part #3 Guide to Important Sites introduction and sources of information were completed. An outline of the book is included below:

## **Part 1: Landscape History**

Geologic History and Major Landforms  
Postglacial Landscape  
Vegetation at the Time of the Public Land Surveys  
Cultural Change and the Landscape  
Summary

## **Part 2: Native Plant Communities**

Introduction  
Fire-Dependent Forests and Woodlands  
Mesic Hardwood Forests  
Floodplain Forests  
Wet Forests  
Forested Rich Peatlands  
Lakeshores  
River Shores  
Upland Prairies  
Wet Prairies  
Open Rich Peatlands  
Wet Meadows/Carrs  
Marshes  
Summary and Outlook

## **Part 3: Guide to Important Sites**

Regional Tours  
Important Sites

## **Activity Status as of March 2013**

### **Website**

A state plant list for Minnesota's plants is available on the DNR's public website and now includes distribution maps. [MNTaxa: The State of Minnesota Vascular Plant Checklist](#).

A data portal for vegetation plot data (relevé) provides for improved access to relevé data. Data continue to be made available to external users upon request. Examples of how relevé data have been used include research on mesic forests where earthworms are now present, evaluation of compositional change in SE MN prairies and assessment of prairie remnants for restoration guidance, and update of National Wetlands Inventory scores for plants.

Progress continues on making aquatic vegetation data collected by MCBS available on the DNR's LakeFinder with June 2013 as the proposed date for public availability on the web.

The web-based Rare Species Guide is being updated. Text has been drafted for 31 rare plant species three species of amphibians and reptiles. Photos of these species taken largely by MCBS staff are being consolidated.

Staff added 17 new field updates to MCBS's [News from the Field](#).

### **Technical assistance:**

DNR Forestry and Wildlife forested lands are currently dual certified by the Forest Stewardship Council (FSC) and by the Sustainable Forest Initiatives (SFI). MCBS plant ecologists have provided substantial data interpretation related to the DNR's forest certification goals and Corrective Action Requests (CARs). The outcome of a 2010 FSC/SFI audit included a decision that MCBS sites of Outstanding and High Biodiversity Significance that intersected with these state lands be a first source of data to enable the DNR to identify potential high conservation value forests (HCVFs) in parts of the state where MCBS data are available. The statewide HCVF work group recently provided some modifications to the potential HCVF sites that as of January 2013 encompassed 362,533 acres. The spring 2013

recommendation of DNR senior management is that sites encompassing nearly 296,000 acres will become HCVPs and future management of these sites, including timber harvest will include consideration of the high conservation elements at each site.

During aquatic plant surveys, a total of 187 locations of non-native invasive plants have been recorded and reported to the invasive species program since 1987, including Eurasian water milfoil (*Myriophyllum spicatum*), curly pondweed (*Potamogeton crispus*) and purple loosestrife (*Lythrum salicaria*).

Northeast staff reviewed a plan and data needs for Lake Superior Biodiversity Assessment and Strategic plan and will provide complete and accurate MCBS and related DNR data for the plan.

Northeast staff continue to provide native plant community and rare species habitat information related to management projects on the Superior National Forest such as the Windy project.

The northern coordinator provided comments regarding some probable errors in the interpretation of MCBS data used as a source for the development of native plant community mapping for the Northern Superior Uplands and Minnesota Drift and Lake Plain ecological sections. These map products are being developed by the Natural Resources Research Institute (NRRI) for the Minnesota Forest Resources Council NE Landscape Committee as part of the NE Landscape Plan revision and the USFS Northern Institute of Applied Climate Science (NIACS) Northwoods Climate Change Vulnerability Assessment.

EWR staff met with representatives of the St. Louis County Land Department to provide a list of ecologically significant places on county land for consideration for designation under the county's Special Sites program.

Staff provided guidance to managers at Red Lake Wildlife Management Area related to cattails, jack pine regeneration and aspen harvest, as well as documentation on the native plant communities recorded during site visits. This was requested as part of an environmental review regarding placement of a new Roseau River dam in Lake of the Woods County.

Staff provided detailed field notes, photos, and native plant community classifications on four sites in the DNR Baudette Area to Forestry, Wildlife and EWR staff in Lake of the Woods and Beltrami counties related to black spruce and tamarack regeneration.

MCBS provided leadership for the consolidation of DNR data related to the "stewardship" GIS layer used in DNR's evaluation of School Trust parcels. MCBS/MNIT staff assisted with the data synthesis and interpretation of portions of the stewardship data layer.

The Scientific and Natural Area program is undertaking a planning process that has involved the consideration of data collected by MCBS.

An ecologist assisted with interpretative materials for Mille Lacs Moraine SNA (Crow Wing County).

An ecologist with familiarity with the Snake River Watershed landscape area is participating in a St Croix River Watershed Protection Plan in collaboration with others in Ecological and Water Resources, The St Croix River Association, TNC and Washington Conservation District.

Ecologists continue to be engaged in the consideration of a DNR vegetation plot-monitoring and information system network.

At the North American level MCBS ecologists are participating in a vegetation plot database (VegBank) working group. In spring 2013 three tasks were considered by a core group that included MCBS (MN) and other ecologists from New Mexico, North Carolina, California, and Washington DC. The discussion was concerning structural ideas and funding to enhance a North American database of vegetation

plots. They considered: 1) the potential use of the Global Index of Vegetation-Plot Database ([www.givd.info/](http://www.givd.info/)) as a registry of vegetation plot database. 2) development of a very simple database of all plots that includes location, vegetation classification, kind of data available, and contact information to help contribute to GIVD. 3) Develop full plot data exchange. There are potentially matching funds to do at least a pilot project related to upgrade the VegBank product.

A MCBS proposed session at the August 2013 Ecological Society of America meeting was accepted that examines vegetation plot data as related to various classifications used in North America. Several staff will be assisting with the session and presenting Minnesota perspectives.

Staff made a presentation focusing on arctic/alpine disjuncts, rare species and MCBS methods to Steve Handler (Climate Change Specialist, Northern Institute of Applied Science) for Climate Change Response Framework. <http://www.nrs.fs.fed.us/niacs/climate/northwoods/> .

A presentation at the Minnesota Landscape Arboretum's "Spring Expo" was made by botanist/author Welby Smith related to the book [Native Orchids of Minnesota](#).

NE staff are collaborating with USFS Superior NF on the Art & Science in Wilderness project developed by the Aldo Leopold Wilderness Research Center and the Colorado Art Ranch to bring the work and insights of artists and scientists together. The project is proposed to involve 8-10 days of MCBS field surveys in the BWCAW in 2013.

MCBS ecologists are participating in the implementation planning associated with the Minnesota Prairie Conservation Plan and are members of the Implementation team's science group. This group is currently developing a parallel implementation plan for survey and monitoring.

The prairie ecologist commented on, edited and approved grazing plans for Waubun WMA, Wambach WMA, and Caribou WMA.

Staff participated in a Climate Change Assessment meeting to identify the potential consequences of climate change in surrogate grasslands.

A prairie plant ecologist gave a presentation at the Prairie Enthusiasts Annual Meeting entitled *Rock Outcrops and Calcareous Fens: Hot and Cold Spots for Some of Southern Minnesota's Rarest Wetland Plants*. A presentation was also made to the Glacial Lakes Prairie Plan Local Implementation Plan Team that included a multi-agency group of resource professionals who will be working to implement the prairie plan in the Glacial Lakes core area identified in the Prairie Conservation plan.

An Ecological evaluation was completed for a site in Nobles County called Bigelow 21.

Writing is progressing on the natural history guide book *Minnesota's Red River Valley and Aspen Parkland*. Only Part 3 remains to be completed. The book will not be published during this project period.

An outline of the book is included below:

**Part 1: Landscape History**

Geologic History and Major Landforms  
Postglacial Landscape  
Vegetation at the Time of the Public Land Surveys  
Cultural Change and the Landscape  
Summary

**Part 2: Native Plant Communities**

Introduction  
Fire-Dependent Forests and Woodlands

Mesic Hardwood Forests  
Floodplain Forests  
Wet Forests  
Forested Rich Peatlands  
Lakeshores  
River Shores  
Upland Prairies  
Wet Prairies  
Open Rich Peatlands  
Wet Meadows/Carrs  
Marshes  
Summary and Outlook

**Part 3: Guide to Important Sites**

Regional Tours  
Important Sites

**Final Report**

**Website**

The GIS specialist added GIS map files of results in Polk and Murray counties, the Toimi Uplands subsection, and a portion of the Laurentian Uplands subsection.

The web-based Rare Species Guide is being updated. Text has been drafted for 31 endangered and threatened vascular plant species, three species of amphibians, eight dragonfly species, three jumping spider species, four snails, six lichens, 16 caddisfly species, 13 fish, and four fungi. Over 360 images were collected and organized to add to the guide. The project manager wrote up a project definition for the Rare Species Guide Technical Rebuild Project that will be the framework for a service level agreement with MNIT, which hopefully will have time to rewrite the programming for the Rare Species Guide to include a more stable web product.

A data portal for vegetation plot data (relevé) now exists for improved access to relevé data within the DNR. Data continue to be made available to external users upon request. Examples of how relevé data have been used: ecological site classification work by NRCS, determination of hydrologic and ecological value of wetlands along the Minnesota River Valley (Lower MN Watershed District), a study correlating wetlands and hydric soils (Bemidji State U), project baseline seed banking at U MN Duluth (location of common native species), carbon sequestration and biodiversity studies (U North Dakota), research on mesic forests where earthworms are now present, evaluation of compositional change in SE MN prairies and assessment of prairie remnants for restoration guidance, and update of National Wetlands Inventory scores for plants.

A state plant list for Minnesota's plants is available on the DNR's public website and now includes distribution maps that reflect the plant collections largely stored at the University of MN herbarium [MNTaxa: The State of Minnesota Vascular Plant Checklist](#).

MCBS reports of vegetation observed in 1,836 lakes were added as a link in the Lakefinder application of the DNR website listed as "aquatic plant reports." These handicapped accessible reports are now available to all internal and external users and the list will be updated at the completion of each field season.

<http://www.dnr.state.mn.us/lakefind/index.html>

Staff added over 50 field updates to MCBS's [News from the Field](#)

A map of MCBS Sites of Biodiversity Significance in Minnesota was posted on the DNR web [MCBS Site Biodiversity Significance Ranks](#)

Distribution maps of Minnesota's Amphibian and Reptiles were updated on the DNR web [Minnesota's Amphibian and Reptile Distribution Maps](#)

A web site was developed related to the White-nose syndrome in bats [White-nose Syndrome and Minnesota's Bats](#)

Staff contributed images and other reports to the [Minnesota Environment and Natural Resources Trust Fund's Facebook page](#)

*Minnesota Prairie Conservation Plan 2010: A Habitat Plan for Native Prairie, Grassland, and Wetlands in the Prairie Region of Western Minnesota* (Minnesota Prairie Plan Working Group 2010) was posted on the DNR's web site by MCBS and updated with a revision. [Minnesota Prairie Conservation Plan](#)

Ecological evaluations were completed or are in progress for: Middle Fork Zumbro Forest (Dodge County), Rose Dell Prairie (Rock County), Horseshoe Bay Shore (Cook County), Great Bend 21-22 (Cottonwood County), Fishfry Lake (Lake County), Jackson NW (Jackson County), Galena 12 (Martin County), Lake Alice (Hubbard County), Badoura Woodlands (Hubbard County), Bigelow 21 (Nobles County), and a large area that includes Giants Ridge (St. Louis County).

## **Technical assistance**

### ***Northeastern Minnesota***

Northeastern staff met with St. Louis County land managers to provide an update of survey status and MCBS products in the county that included a requested list of ecologically significant places on county land for consideration for designation under the county's Special Sites program.

Technical guidance was provided related to a trail center at Bear Head State Park and an ecologist assisted staff at Jay Cooke State Park in a survey of the plants colonizing the dry lakebed of Forbay Reservoir which drained catastrophically in the June flood.

Staff reviewed a plan and data needs for the Lake Superior Biodiversity Assessment and Strategic plan and will provide complete and accurate MCBS and related DNR data for the plan.

MCBS staff provided native plant community and rare species habitat information related to management on the Superior National Forest (SNF), such as the Windy and Pearl projects.

Northeastern staff presented MCBS survey results at a SNF Border Lakes research meeting. This included delivery and exchange of data, methods and preliminary results in the Pagami Creek Fire area with USFS Northern Research Station researchers and collaborators (UW Madison, Superior NF).

MCBS staff conducted a field visit with SNF natural resources staff to review conservation priorities at Fishfry Lake, a MCBS Site of high biodiversity significance. This included a review of threats to geological features and rare species populations.

Staff are collaborating with the SNF on the Art & Science in Wilderness project developed by the Aldo Leopold Wilderness Research Center and the Colorado Art Ranch to bring the work and insights of artists and scientists together. The project is proposed to involve MCBS field surveys in the BWCAW in 2013.

Ecologists assisted with review of the proposed DNR/SNF BWCAW land exchange and the effects of School Trust Fund status on sites of biodiversity significance, high conservation value forests and old-growth forests.

As a member of the DNR's North Shore Field Team, a plant ecologist reviewed and commented on various projects or proposals including St. Louis County tax forfeit land sales, USFS Encampment mineral exploration, a private land acquisition proposal, and the Cook County Water Plan revision priorities.

Technical assistance continued to inform the Manitou Collaborative (Lake County, SNF, DNR, MFRC, Wolf Ridge ELC) and the NE Region SNA program on implementation of the Art Lake Ridges Natural Area project, including potential SNA acquisition of private lands within the area.

MCBS data, interpretations and technical assistance were provided to other external partners such as Environmental Resources Management, Lake County, Trust for Public Lands - Northwoods Initiative, the Kawishiwi Watershed Protection Project, the North Shore Forest Collaborative, and NatureServe's Coastal and Marine Strategy.

A plant ecologist made a presentation on MCBS at a State Tribal Mining Update meeting.

A botanist is reviewing the results of research on the susceptibility of wild rice to elevated levels of sulfates in wild rice waters and specifically helping to interpret ecological and biological data to evaluate the status of wild rice stands in the Embarrass and Partridge River systems.

The northern coordinator provided comments for the Northern Superior Uplands and Minnesota Drift and Lake Plain ecological sections. These map products are being developed by the Natural Resources Research Institute (NRRI) for the Minnesota Forest Resources Council NE Landscape Committee as part of the NE Landscape Plan revision and the USFS Northern Institute of Applied Climate Science (NIACS) Northwoods Climate Change Vulnerability Assessment.

Staff exchanged information on objectives and methods with U of MN Department of Forest Resources researchers investigating boreal species refugia, and the expansion of temperate tree species and earthworms in the Border Lakes subsection.

### ***Northwestern Minnesota***

The plant ecologist working in northwestern Minnesota assisted with field evaluation of native plant communities likely to be flooded as a result of several proposed dam sites in Roseau and Lake of the Woods counties.

A plant ecologist assisted with a response to Hubbard County regarding their request for salvage logging in a ram's head orchid (*Cypripedium arietinum*) registry site that was affected by a recent blowdown.

Plant ecologists provided advice related to the management plans for the new LaSalle Lake State Recreation Area to ensure that especially the recreation plan adequately addresses the valuable ecological resources of the area. Additional comments were made in response to the salvage logging proposed in response to a blowdown that later affected the site.

A plant ecologist assisted with lowland black spruce field data collection in coordination with an interdisciplinary group that resulted in site selection of stands of varying age classes. The plant ecologist classified the native plant communities and provided an ecological perspective on a specific site. Detailed field notes, photos, and native plant community classifications on four stands in the DNR Baudette Area were provided to Forestry, Wildlife and EWR staff in Lake of the Woods and Beltrami counties related to black spruce and tamarack regeneration.

Staff provided guidance to managers at Red Lake Wildlife Management Area related to cattails, jack pine regeneration and aspen harvest, as well as documentation on the native plant communities recorded during site visits. This was requested as part of an environmental review regarding placement of a new Roseau River dam in Lake of the Woods County.

A plant ecologist commented on the Zippel Bay State Park and Garden Island State Recreation Area management plan related to campsite placement and rare resources.

### **Forest Certification**

The outcome of a joint external audit for the 2010 Forest Stewardship Council (FSC) and Sustainable Forest Initiatives (SFI) included a decision that MCBS sites of outstanding and high biodiversity significance that intersected with these state lands be a first source of data to enable the DNR to identify potential high conservation value forests (HCVFs) in parts of the state where MCBS data are available. The statewide HCVF work group provided some modifications to the potential HCVF sites that as of January 2013 encompassed 362,533 acres. The spring 2013 recommendation of DNR senior management is that sites encompassing nearly 296,000 acres are recommended as HCVFs and future management of these sites, including timber harvest, will include consideration of the high conservation elements at each site. These recommendations are undergoing additional review.

In 2010 a Minor Corrective Action Request (2010.13) was assigned that required a plan for monitoring elements of high conservation value in identified locations such that these elements of HCV be maintained or enhanced as related to management practices. DNR teams that included MCBS staff developed a response that was accepted following the October 2011 audit. Monitoring activities identified in this work program specifically address this requirement. Three ecologists participated in the field audit held in northwestern Minnesota in 2011 and two participated in the field audit in southeastern Minnesota in 2012.

### **Prairie**

Two staff participated in the development and release of the Minnesota Prairie Conservation Plan and ecologists are participating in the implementation planning associated with the Minnesota Prairie Conservation Plan and are members of the Implementation team's science group.

Prairie ecologists provided the Division of Wildlife a list of Wildlife Management Areas where grazing implementation should be delayed until a more specific review process is implemented. The concern related to potential negative impacts is largely on areas that contain high-quality prairie communities and rare features with unknown sensitivity to grazing. A draft procedure for writing grazing plans requires consultation with EWR staff to identify and avoid sensitive prairies and rare features. A prairie ecologist commented on, edited, and approved grazing plans for Waubun WMA, Wambach WMA, and Caribou WMA.

A prairie plant ecologist gave a presentation at the Prairie Enthusiasts Annual Meeting entitled *Rock Outcrops and Calcareous Fens: Hot and Cold Spots for Some of Southern Minnesota's Rarest Wetland Plants*. A presentation was also made to the Glacial Lakes Prairie Plan Local Implementation Plan Team which includes a multi-agency group of resource professionals who will be working to implement the prairie plan in the Glacial Lakes core area identified in the Prairie Conservation plan.

Related to the proposed increased use of grazing to manage public lands in Minnesota, a prairie ecologist compiled literature, participated in discussions related to grazing management and proposed monitoring plans to help assess the effectiveness of this tool in the state. This included presentations/posters detailing a monitoring project currently underway at Lac Qui Parle Wildlife Management Area at two conferences: America's Grasslands and a Patch Burn working group annual meeting.

A prairie plant ecologist made two presentations at a conference on conservation grazing held in Hankinson, North Dakota. The presentations were: "Monitoring Patch-Burn Grazing at Lac Qui Parle WMA and Chippewa Prairie Preserve" and "Grazing and Conservative Plant Species in Minnesota." Conference website: <http://www.ag.ndsu.edu/2012conservationgrazingworkshop>.



Staff helped organize and lead the Minnesota Prairie Summit that included site tours and a short workshop on plant identification and vegetation sampling. The positive response of many people included extensive interest in future training in evaluation of native prairie condition and plant identification. In two other events a prairie ecologist led groups that included field assistants, graduate students, and resource professionals from DNR, TNC, USFWS, and the University of MN to review plant identification, vegetation sampling and/or discuss prairie condition including various types of grazing.

Key MCBS staff recently completing work in southern Minnesota presented results at a DNR regional staff meeting in New Ulm and an ecologist made a presentation to the DNR's Southern Region Parks and Trails Division that included how MCBS data could be used to inform development and management. Examples of how MCBS data have been used in the southern region include: 1) The Chanarambie Creek area, which is a privately owned area of outstanding statewide significance, five prairie bank tracts now are established there and MCBS data and technical assistance have increased local landowner awareness of the significance of the area. 2) The Des Moines River Valley, where MCBS has identified a concentration of forests and prairies that contain 50 records of rare species in 90 MCBS sites, including the federally listed plant prairie bush clover (*Lespedeza leptostachya*); these data are being used to inform Parks and Trails planning in the region. 3) An MCBS project to track wood turtles (*Clemmys insculpta*) using GPS methods, which was featured as a way to assess ongoing impacts of land-use changes and water management as related to rare turtles.

Staff ecologists reviewed a University of Minnesota climate change research project on prairies in southwestern Minnesota that will compare modeled effects of climate change on sites with little topographic relief versus sites with much topographic relief. Staff made suggestions about SNAs and WMAs such as Expandere WMA that might provide good comparisons and provided vegetation samples and other native plant community data.

Extensive written comments were provided on the draft environmental impact statement for the Unimin South Mine located adjacent to Kasota Prairie SNA.

A field tour of Ordway Prairie was proposed by a prairie plant ecologist and accepted as part of the national meeting of the Ecological Society of America to be held in Minneapolis in August 2013.

### ***Other technical assistance***

A revision of the state list of endangered, threatened and special concern species was announced and will be official in August 2013. An estimated 60% of the changes in the list were based in part on the improved information provided by the MCBS. Updates to the list were informed by new data, resulting in the need to list additional species, "downgrade" others and NOT to list some species that were proposed but were determined not to be currently at risk. For example, Black-throated Blue Warblers were considered for listing but MCBS breeding bird surveys revealed that populations seem be stable in northeastern Minnesota. 181 species were added to the list and 29 species were removed from the list. See also: <http://www.dnr.state.mn.us/ets/index.html>

Several staff participated in species "teams" that are composed of professionals for a number of native animal species groups with a focus on rare or declining species. Others took part in several "vulnerability assessment" teams associated with the forthcoming revision of the State Wildlife Action Plan.

Activities related to watershed management and conservation goals included the consideration of a list of "quality lakes" to be considered as part of the protection goals of the watershed restoration and protection strategy being developed in the state. This is one possible avenue for integration of conservation plans. For example a portion of the Pomme de Terre watershed contains a core area identified in the Minnesota Prairie Conservation Plan and several lakes of interest suggesting collaborative opportunities.

During aquatic plant surveys, a total of 187 locations of non-native invasive plants have been recorded and reported to the invasive species program since 1987, including Eurasian water milfoil (*Myriophyllum spicatum*), curly pondweed (*Potamogeton crispus*) and purple loosestrife (*Lythrum salicaria*).

MCBS provided leadership for the consolidation of DNR data related to the “stewardship” GIS layer used in DNR’s evaluation of School Trust parcels. MCBS/MNIT staff assisted with the data synthesis and interpretation of portions of the stewardship data layer.

MCBS also assisted with consideration of Potlatch lands that might be of interest in terms of the DNR’s land asset management.

The Scientific and Natural Areas program is undertaking a planning process that has involved the considerable data collected by MCBS.

Data are also being used in the new update to the State Wildlife Action Plan now in progress.

An ecologist assisted with interpretative materials for Mille Lacs Moraine SNA (Crow Wing County).

An ecologist with familiarity with the Snake River Watershed landscape area is participating in a St Croix River Watershed Protection Plan in collaboration with others in Ecological and Water Resources, The St. Croix River Association, TNC and Washington County Conservation District.

Staff assisted with training as part of the 2013 Ecological Classification System Workshop held in the Virginia, Minnesota area. The workshop was attended by staff from the SNF, Lake County, private industry, and the following DNR divisions: Forestry, Fisheries and Wildlife, and Parks and Trails.

At the North American level MCBS ecologists are participating in a vegetation plot database (VegBank) working group. In spring 2013 three tasks were considered by a core group that included MCBS (MN) and other ecologists from New Mexico, North Carolina, California, and Washington DC. The discussion was concerning structural ideas and funding to enhance a North American database of vegetation plots. They considered: 1) the potential use of the Global Index of Vegetation-Plot Database (GIVD) ([www.givd.info/](http://www.givd.info/)) as a registry of vegetation plot databases; 2) development of a very simple database of all plots that includes location, vegetation classification, kind of data available, and contact information to help contribute to GIVD; and 3) development of a full plot data exchange. There are potentially matching funds to do at least a pilot project related to upgrade the VegBank product.

A MCBS proposed session at the August 2013 Ecological Society of America meeting was accepted that examines vegetation plot data as related to various classifications used in North America. Several staff will be assisting with the session and presenting Minnesota perspectives.

Staff made a presentation focusing on arctic/alpine disjuncts, rare species and MCBS methods to Steve Handler (Climate Change Specialist, Northern Institute of Applied Science) for Climate Change Response Framework. <http://www.nrs.fs.fed.us/niacs/climate/northwoods/>

Staff participated in a Climate Change Assessment meeting to identify the potential consequences of climate change in surrogate grasslands.

MCBS made presentations at the Bailey Herbarium in honor of the accession of the 30,000th specimen (collected by MCBS botanist, Mike Lee) into the College of St. Benedict/St. John’s University herbarium, the largest private college herbarium in the state.

The aquatic botanist provided a list of 562 lakes where wild rice was observed to the Minnesota Pollution Control Agency.

New graphics, updated distribution maps, new photos of 49 orchid species and illustrations are part of a new DNR book on Minnesota's orchids published in spring 2012. The book provides an update to the presently out-of-print but very popular book, *Orchids of Minnesota*. Botanists and plant ecologists finalized the verification of identification of their most recent field updates on the state's orchids for inclusion in the new book. The book was featured at presentations such as the Minnesota Landscape Arboretum's "Spring Expo" and appeared on the front page of the DNR web site that included a reference to the book in the Minnesota Conservation Volunteer [Native Orchids of Minnesota](#).

A MCBS botanist prepared a featured profile of the small white lady's slipper (*Cypripedium candidum*) for the July-August 2013 issue of the *Minnesota Conservation Volunteer*.

Staff assisted Dr. Ruth Shaw (U of M professor) with the identification of specific locations of populations of partridge pea (*Chamaecrista fasciculata*) populations in southwestern Minnesota for genetics research, and helped Laura Phillips-Mao identify prairies in southwestern Minnesota for research comparing modeled effects of climate change.

A presentation was made at the 2012 Phenology Conference, Milwaukee Sept 10-13, 2012: *Sather, Biederman, Prekker, Beckman, and Anderson. Phenological responses of threatened Platanthera praeclara to environmental triggers.*

A poster entitled *Phenological responses of threatened Western prairie fringed orchid (Platanthera praeclara Sheviak and Bowles) to environmental triggers* was presented at the 2012 Smithsonian Botanical Symposium Washington DC and at the national meeting of NatureServe in Baltimore, both in April 2013. Poster authors: Nancy Sather and Derek Anderson- Minnesota Biological Survey, Minnesota Department of Natural Resources; Lori Biederman Iowa State University; Judith Beckman, Jeanne Prekker, and Donna Spaeth, Citizen Scientists, Minnesota Department of Natural Resources.

As validation of her many years of work with Federally listed plants, Nancy Sather was honored in May 2103 by the US Fish and Wildlife Service with a National Endangered Species Recovery Champion award that was presented to her in at a well-attended meeting of the Minnesota Native Plant Society.

Two examples of the ongoing conservation impact of MBS data are the addition of 454 acres to Forestville/Mystery Cave in spring 2012 and the Washington County identification of top conservation targets for their Land Water Legacy Program that include consideration of biodiversity elements— see [www.co.washington.mn.us](http://www.co.washington.mn.us)).

### **Aspen Parkland-Red River Valley natural history guidebook**

Writing is progressing on the natural history guide book *Minnesota's Red River Valley and Aspen Parkland*. Part 3 remains to be completed. The book will not be published during this project period.

An outline of the book is included below:

#### **Part 1: Landscape History**

Geologic History and Major Landforms  
Postglacial Landscape  
Vegetation at the Time of the Public Land Surveys  
Cultural Change and the Landscape  
Summary

#### **Part 2: Native Plant Communities**

Introduction  
Fire-Dependent Forests and Woodlands  
Mesic Hardwood Forests

Floodplain Forests  
Wet Forests  
Forested Rich Peatlands  
Lakeshores  
River Shores  
Upland Prairies  
Wet Prairies  
Open Rich Peatlands  
Wet Meadows/Carrs  
Marshes  
Summary and Outlook

### **Part 3: Guide to Important Sites**

Regional Tours  
Important Sites

## **V. DISSEMINATION:**

### **Description:**

MCBS data are stored primarily in the Division of Ecological and Water Resources information systems, which are increasingly linked to other databases in the MN DNR. In addition, MCBS procedures, updates, recent maps, and links to related data are presented on the DNR website. Many GIS datasets are delivered to clients through the web. Data on rare species are available through agreements with the requesting agency and the DNR. For data on locations or rare features, a data request form is available via the web: <http://www.dnr.state.mn.us/eco/nhnrp/nhis.html>

MCBS publishes and distributes survey results in a variety of formats for various audiences. Many products are available on the DNR website, including GIS shape files of native plant communities and MCBS sites, native plant community field guides, and guides to sampling techniques such as vegetation plot data collection using the relevé method. MCBS web pages are updated with new information and have links to associated resources. <http://www.dnr.state.mn.us/eco/mcbs/index.html>

The DNR and Legislative libraries and other local information repositories (such as libraries within counties) have access to published products, including books, maps, reports, field guides and digital media. MCBS has published several books and field guides and the publication of a natural history book based on MCBS data collected in the northwestern prairie region and Red River Valley is underway. Based on local collaborator interest and the results of regional focus groups, this book will include a guide to selected natural areas of the region. A Minnesota publisher has agreed to publish this book.

Staff routinely make presentations that describe MCBS methodologies and results to a wide range of audiences including county boards, local planning groups, citizen advisory groups, other biologists, land managers, and students. MCBS staff provide local planners with ecological interpretations describing important sites of biodiversity identified during the Survey to assist with management plans. Staff lead or participate in technical workshops and field trips to exchange ideas on survey methodology and provide training in the application and interpretation of the data.

Physical collections are deposited at Minnesota repositories, primarily at the University of Minnesota's J.F. Bell Museum of Natural History and at the Science Museum of Minnesota, St. Paul. As part of a larger network of museums and herbaria, these cooperators are essential to the documentation and sharing of MCBS results. MCBS and museum staff meet periodically to address curatorial, data management, and interpretive needs.

MCBS also delivers data through an international organization, NatureServe and also shares data with cooperators at colleges and universities and with others in ecological regions where surveys are ongoing or completed.

**VI. PROJECT BUDGET SUMMARY:**

**A. ENRTF Budget:**

<b>Budget Category</b>	<b>\$ Amount</b>	<b>Explanation</b>
Personnel:	\$ 1,969,000	Biologists, Ecologists for surveys, monitoring, technical assistance and interpretation, Information Managers and Officers
Professional/Technical Contracts:	\$ 70,000	Survey and monitoring will require contractual agreements following standard DNR procedures for contract processing.
Service Contracts	\$ 50,000	This includes service level agreements for application development (such as the vegetation sampling database development) and some other information management system support needs following procedures required by DNR's Management and Information System Bureau.
Equipment/Tools/Supplies:	\$ 21,000	Field equipment/supplies. Equipment is used from previous survey periods when at all possible (For example-GPS units, canoes, cameras, communication equipment etc.) Sometimes new technology to expedite data collection is merited-for example data recorders of between \$2000 and \$3500 potentially could reduce data entry time (a few units will be purchased to explore their durability and convenience in remote areas). In addition, items such as batteries, collecting materials, paddles, and aerial photography need to be replaced or updated.
Travel Expenses in MN:	\$ 140,000	This is largely related to field survey and monitoring. Travel expenses are subject to State of Minnesota labor agreements and DNR policy. Most travel expense is related to the 4-5 months of time when 14 staff are conducting field work that requires food, transport in seasonal DNR fleet vehicles and lodging (The preferred and least expensive options are locally rented "field houses" or camping and the most expensive are motels). The current work in the large peatlands of north-central MN requires some helicopter transport with rates of approximately \$900/hour. In contrast, canoe transport in the Border lakes region requires a vehicle to transport the canoe to an entry point, then up to 10 days of canoeing/camping in order to conduct surveys.
<b>TOTAL ENRTF BUDGET:</b>	<b>\$ 2,250,000</b>	

**Explanation of Use of Classified Staff:** Any classified staff position paid for by ENRTF will either:  
 1) Be backfilled with a new position OR 2) The work done by this position will be delayed, eliminated, or completed by the start of the project. The activities of all or portions of the following six classified staff are directly related to this work program.

A portion of the time of two plant ecologists (1.50 FTE) is directed to the authorship of the Aspen Parkland-Red River Valley natural history/guide book that is specifically identified in Activity #3. Due to decades of their field experience and investigation in the prairie and parkland region, these ecologists bring knowledge and perspectives that will result in a professional and accessible publication. The other

.50 FTE of their time is proposed to receive Federal endangered species funding for rare plant monitoring activities and State Wildlife Grant funding for an insect project.

A MCBS ecologist/northern coordinator currently working 100% on the survey will be paid in part by ENRTF (.50 FTE).

The GIS specialist (.50 FTE) will manage the shape files developed by the project. He will be responsible for adding to and maintaining the polygons of native plant communities and the MCBS sites of biodiversity significance on the DNR’s website. He also develops customized GIS projects and products to be used in plans and publications. Since this .50 FTE of work is specific to MCBS, there is no one else needed to backfill to accomplish other Divisional tasks. A portion of another information specialist (.15 FTE) is needed specifically to manage the MCBS update of the state plant checklist and the related vegetation monitoring data (Activities 2 and 3). This person will also manage service level agreements for work by the DNR’s Management Information Systems Bureau.

A botanist (1.0 FTE) is needed to verify identification of plants collected by MCBS botanists and plant ecologists, to coordinate with the repositories of these collections (herbaria), to help guide *Cypripedium candidum* monitoring (Activity #1) and to assist with the update of the rare plant species guide identified in Activity #3. Some of the botanist’s previous responsibilities have been assigned to others or are included projects that have been completed or eliminated from Divisional priorities.

**Explanation of Capital Expenditures Greater Than \$3,500:** N/A

**Number of Full-time Equivalent (FTE) funded with this ENRTF appropriation:** 14.8 FTE

**B. Other Funds:**

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
<b>Non-state</b>			
State Wildlife Grant-Federal grant –pending	\$ 500,000	\$	Animal surveys, data management and monitoring.
<b>State</b>			
General Funds--pending	\$ 420,000,	\$	Rent, salary of supervisor, shared services
Heritage Enhancement Account (Lottery-in-lieu)	\$1,159,000		Salaries, contracts, supplies, rent
Outdoor Heritage	\$ 80,000		Prairie management assessment
<b>TOTAL OTHER FUNDS:</b>	<b>\$ 2,159,000</b>	<b>\$</b>	

(\$127,980 is estimated for DNR shared services; \$165,000 for estimated Division Support). Shared services (operations support governance) are services that DNR relies on in order to conduct business and support the work of the department. These services are more efficient when shared.

**VII. PROJECT STRATEGY:**

**A. Project Partners:** This request does not include funding for the following primary partners: The Bell Museum, the Science Museum, and the Superior National Forest. Red Lake Reservation lands are being surveyed in collaboration with Red Lake Department of Natural Resources. NatureServe provides guidance in database structure, collection, and distribution standards.

**B. Project Impact and Long-term Strategy:** Funding for an ongoing Minnesota Biological Survey will be requested to address: **1) Data Gaps**, including survey of areas where weather conditions, life-history cycles, lack of experts, etc. left data gaps (e.g., invertebrates, aquatic plants); and identification of outstanding aquatic landscapes (lakesheds, watersheds, groundwater systems). **2) Re-Survey** of landscapes altered due to habitat fragmentation, development, and invasive species, especially where MCBS was conducted in the 1980s–1990s. **3) Expansion of Monitoring** of ecological conditions in

sites of biodiversity significance to assess impacts of policies and management activities on ecological systems and species populations (e.g., prairie grazing, recreational activities, groundwater use, forest certification, climate change, energy, and invasive species). **4) Use of new technology** in remote sensing, data collection, analyses, modeling, and information delivery; these will be combined with traditional survey methods (field biologists) and communication pathways (e.g., personal contacts by professionals, publications).

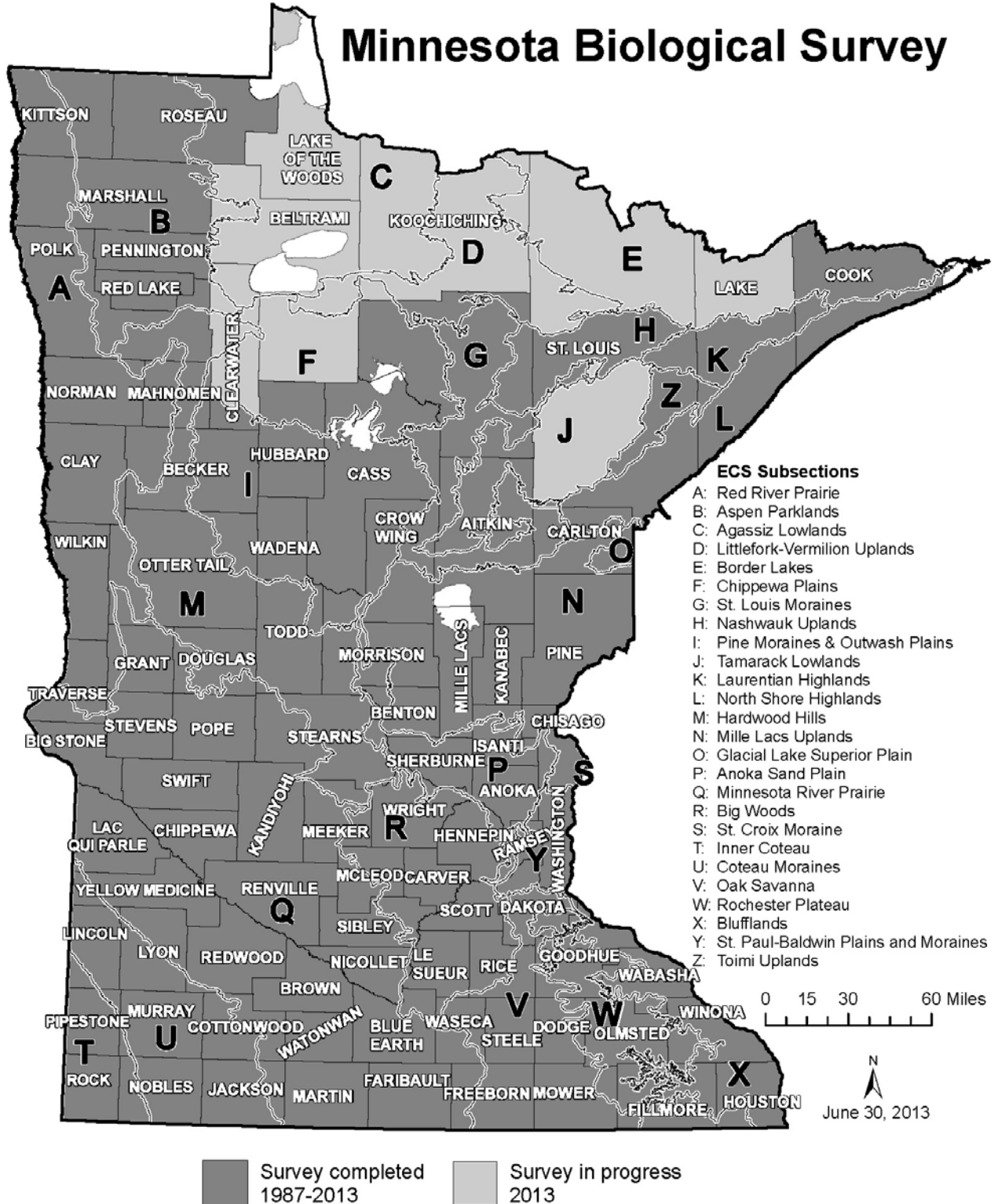
<b>C. Spending History: Funding Source</b>	<b>FY 2004-05 ML2003 Subd. 08a</b>	<b>FY 06-07 ML2005 Subd. 8a</b>	<b>FY08-09 ML 2007 Subd. 6a</b>	<b>FY 2010-11 ML2009 Subd. 3a</b>
ENRTF	900,000	1,000,000	1,500,000	2,100,000
General Fund	373,000	373,000	700,000	700,000
RIM (General)	181,400	181,400		
Heritage Enhancement	1,012,400	1,125,000	1,159,000	1,159,000
State Wildlife Grant (Federal)	429,500	439,000	400,000	500,000

For further detail on past spending, please see table in MCBS final work program: Legal Citation: ML 2005, First Special Session, Chap. 1, Art. 2, Sec. 11, Subd. 8a.

**VIII. ACQUISITION/RESTORATION LIST: N/A**

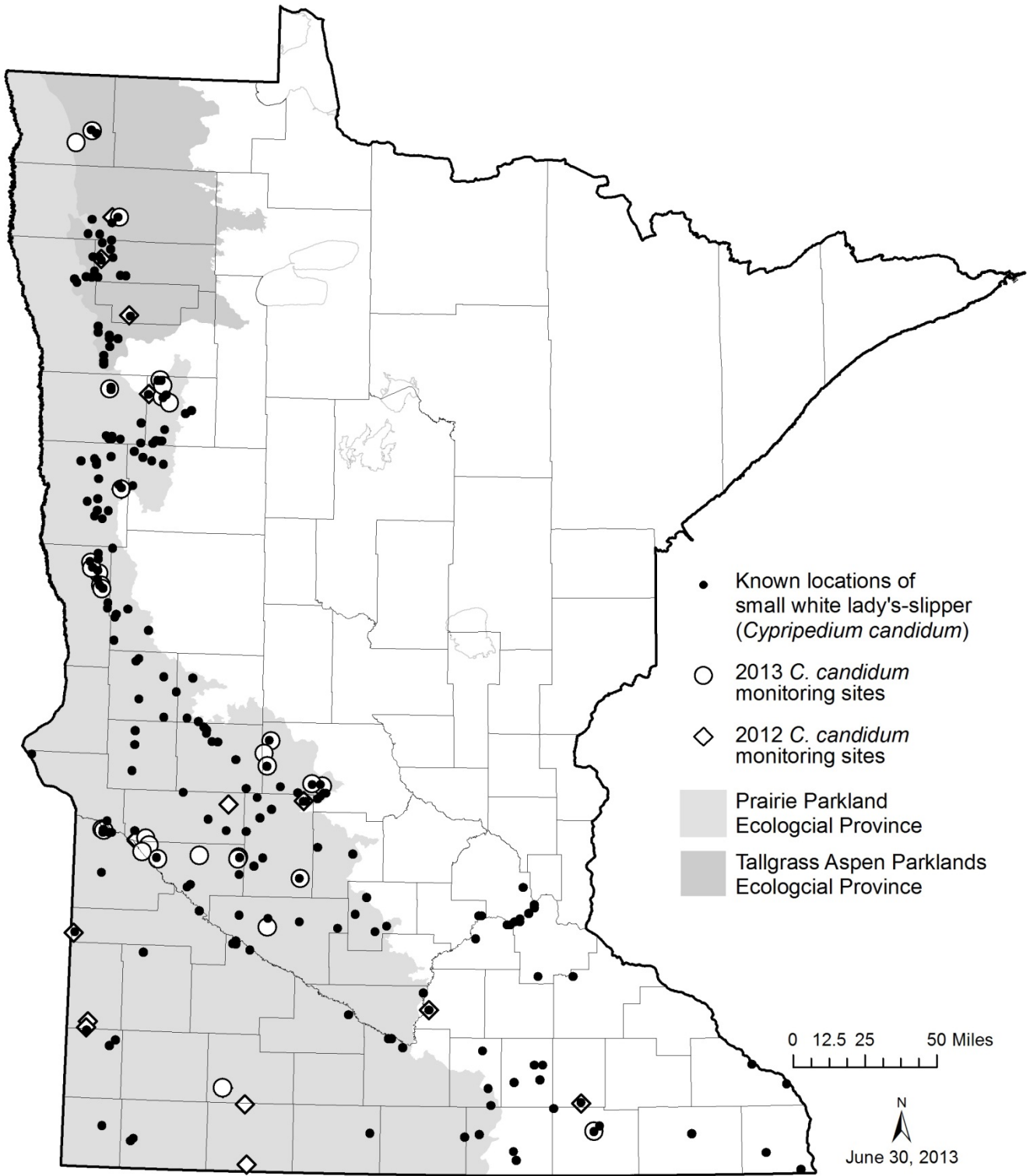
**IX. MAP(S):**

# Minnesota Biological Survey





M.L. 2011 Final Report: Minnesota County Biological Survey



**X. RESEARCH ADDENDUM:N/A**

**XI. REPORTING REQUIREMENTS:**

**Periodic work plan status update reports will be submitted not later than January 2012, October 2012, and March 2013. A final report and associated products will be submitted between June 30 and August 1, 2013 as requested by the LCCMR.**

Final Attachment A: Budget Detail for M.L. 2011 (FY 2012-13) Environment and Natural Resources Trust Fund Projects													
Project Title: Minnesota County Biological Survey													
Legal Citation:													
Project Manager: Carmen Converse													
M.L. 2011 (FY 2012-13) ENRTF Appropriation: \$2,250,000													
Project Length and Completion Date: 30 June 2013													
Date of Update: November 2013													
ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget Activity 1 \$900,000	Revised Activity 1 Budget	Amount Spent	Balance	Budget Activity 2 \$800,000	Revised Activity 2 Budget	Amount Spent	Balance	Budget Activity 3 \$550,000	Amount Spent	Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Field Surveys/ Monitoring				Information System expansion				Guidance-Conservation/Mgt.				
OVERALL Personnel (Wages and Benefits) The following staff are State of MN employees so salary and fringe are included in the budget estimates. Most positions require specialized professional skills in plant and animal surveys (understanding of taxonomy, behavior, field survey techniques, sampling design, statistics, specimen preparation and documentation/data management). The amount listed after each position is the estimated budget for that work effort.	619,000	618,900	618,900	0	800,000	769,882	769,882	0	550,000	550,000	0	1,938,782	0
Botanist (2 unclassified) @ 100% time (\$272,000)													
Botanist (1 classified) @ 100% time (\$166,000)													
Zoologist (1 unclassified) @ 75% time (\$74,000)													
Ecologists (7 unclassified) @ 100% time (\$881,000)													
Ecologist (1 classified) @50% time (\$83,000)													
Ecologists(2 classified) @75% time (\$256,000)													
Information Managers ( 1 classified) @ 15% (\$33,000)													
Information Officer (1 unclassified) 90% time (\$102,000)													
Data management-student worker @ 50% time (\$36,000)													
Information Manager GIS (1 classified) @ 50% time (\$66,000)													
Professional/Technical Contracts: Field surveys peatlands and monitoring vegetation	70,000	84,700	84,700	0								84,700	0
Service contracts: Service agreements for information management	60,000	43,681	43,681	0								43,681	0
Equipment/Tools/Supplies: Supplies and field equipment needed to conduct surveys and monitoring. GPS units, data recorders, cameras, communication safety equipment, plant and animal specimen collection supplies, water chemistry sampling supplies batteries, air photos, maps, water resistant notebooks etc.	21,000	43,423	43,423	0								43,423	0
Travel expenses in Minnesota: In-state travel including food and lodging expenses for staff in travel status. Also for vehicles used during the summer field season. Large peatland aerial survey and transport is a specific travel expenditure in the northern counties.	140,000	139,414	139,414	0								139,414	0
			0				0	0		0			
<b>COLUMN TOTAL</b>	<b>\$900,000</b>		<b>\$930,118</b>	<b>\$0</b>	<b>\$800,000</b>		<b>\$769,882</b>	<b>\$0</b>	<b>\$550,000</b>	<b>\$550,000</b>	<b>\$0</b>	<b>\$2,250,000</b>	<b>\$0</b>