

## **2009 Project Abstract**

For the Period Ending June 30, 2011

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

**PROJECT MANAGER:** Carmen Converse

**AFFILIATION:** Department of Natural Resources (DNR)

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

**LEGAL CITATION:** M.L. 2009, Chp. 143, Sec. 2, Subd. 3a

### **APPROPRIATION AMOUNT: \$2, 100,000**

#### **Overall Project Outcome and Results**

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 in 81 of 87 counties. MCBS has added 19,089 new records to the Rare Features Database and contributed 4,544 of the 9,634 total database records to the Relevé (vegetation sampling) Database. Rare aquatic plant and vegetation surveys were completed for 1,764 lakes. Statewide 9,713 MCBS Sites of Biodiversity Significance and 58,957 polygons of native plant communities are now publically available on DNR's Data Deli.

During this project period, northeastern surveys documented features within large functional landscapes of fire-dependent forests, cliff and talus complexes, and undeveloped lakes. Surveys began in a portion of the northern patterned peatlands, one of the state's largest (about 2.5 million acres) and most inaccessible ecological systems. Surveys included successful collaboration with Red Lake Reservation DNR managers and University of Minnesota researchers.

New range distributional data were recorded for Braun's holly fern (*Polystichum braunii*), Laurentian tiger beetle (*Cicindela denikei*), Black-throated Blue Warblers (*Setophaga caerulescens*) and three species of mosses.

MCBS data on the locations of native prairie were a centerpiece of a plan: *Minnesota prairie conservation plan 2010: a habitat plan for native prairie, grassland, and wetlands in the Prairie Region of western Minnesota*. See also: *Minnesota's Remaining Native Prairie 100 Years After the Public Land Survey* ([http://files.dnr.state.mn.us/eco/mcbs/prairie\\_map.pdf](http://files.dnr.state.mn.us/eco/mcbs/prairie_map.pdf))

MCBS provided data and interpretation to inform management and monitoring activities in the Manitou and Sand Lake Seven Beavers Collaboratives- two large multi-jurisdictional landscapes.

DNR's Forest Certification implementation used a MCBS data access tool to assist in evaluation of data related to High Conservation Value Forests.

Maps of the Minnesota locations of 242 breeding birds based on observations by MCBS are on the web: Bird Distribution Maps (<http://www.dnr.state.mn.us/eco/mcbs/birdmaps.html>)

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

Data delivery includes delivery of information to local units of government, presentations and field trips, publications and web products. Several examples of recipients of data during this period include: St Louis County, Becker County, State Parks, northeast Landscape Collaboratives, Potlatch, Hamden Slough National Wildlife Refuge, Voyageurs National Park, Heron Lake Watershed District, and private landowners near the Chandler MN, Chanarambie Creek Prairies.

*Examples of presentations:*

Staff made presentations and prepared posters related to rare aquatic plants as part of the Minnesota Native Plant Society Symposium in March 2011, *Minnesota's Lake Vegetation: Above and Below the Water Line*.

MCBS made a presentation and helped to lead field trips at Morton Outcrops SNA at a June 2010 meeting of the Commissioner's Advisory Committee and others in the Minnesota River corridor-including members of the Green Corridor project. A MCBS plant ecologist has been providing assistance to the Green Corridor project to identify priority sites for conservation action.

*Examples of web delivery:*

The Rare Features Guide [www.mndnr.gov/rsg](http://www.mndnr.gov/rsg) provides information on 439 state listed species for application in conservation and management planning. Many of the recent profiles were written by MCBS biologists.

The Native Plant Community Classification (<http://www.dnr.state.mn.us/npc/classification.html>) page was redesigned providing easier navigation and a link to the NPC classification methods ([http://files.dnr.state.mn.us/natural\\_resources/npc/npc\\_methods\\_paper.pdf](http://files.dnr.state.mn.us/natural_resources/npc/npc_methods_paper.pdf)) description that provides background on how data were analyzed and interpreted utilizing vegetation plot data (relevés) to derive the DNR's current native plant community classification.

Updates including links to other web locations were completed related to the list of Minnesota's vascular plants MNTaxa: The State of Minnesota's Vascular Plant Checklist ([http://www.dnr.state.mn.us/eco/mcbs/plant\\_lists.html](http://www.dnr.state.mn.us/eco/mcbs/plant_lists.html)).

*Publications*

An ecological evaluation for the La Salle Creek and Chain of Lakes corridor in Hubbard County contributed to proposed conservation of this landscape.

Web-based Minnesota's amphibian and reptile distribution maps ([http://www.dnr.state.mn.us/eco/mcbs/amphibian&reptile\\_maps.html](http://www.dnr.state.mn.us/eco/mcbs/amphibian&reptile_maps.html)) will be used to update the book, *Amphibians and Reptiles Native to Minnesota*.

Updates were added for MCBS-related projects on the DNR's website:

*News from the Field 2010* (<http://www.dnr.state.mn.us/eco/mcbs/news2010.html>), *News from the Field 2011* (<http://www.dnr.state.mn.us/eco/mcbs/news2011.html>)

A manuscript entitled *Recent rediscovery of rare plants in temporary pools on Sioux Quartzite outcrops* was published in the proceedings of the 22<sup>nd</sup> North American Prairie conference that was held in Cedar Falls, Iowa in 2010.

New graphics, updated distribution maps, new photos of 35 orchid species and illustrations were completed as part of a new DNR book on Minnesota's orchids that nears publication. This will be 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.

**Environment and Natural Resources Trust Fund 2009 Work Program  
Final Report**

**Date of Report:** September 26, 2011

**Final Report:** June 30, 2011

**Date of Work Program Approval:** June 16, 2009

**Project Completion Date:** This workprogram outlines activities and products to be completed during the two-year duration of this funding (ending June 30, 2011). This is a continuation project so data generated from activities of the Minnesota County Biological Survey (MCBS) in previous biennia will be applied to the proposed outcomes, and data and procedures derived from work this biennium will be applied to future surveys and products.

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

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**Location: (see also map):** Surveys will continue in Lake, Cook and St Louis counties. Surveys will begin in Clearwater and Beltrami counties.

<b>Total Trust Fund Project Budget:</b>	<b>Trust Fund Appropriation:</b> \$ 2,100,000
	<b>Minus Amount Spent:</b> \$ <u>2,069,676</u>
	<b>Equal Balance:</b> \$ 30,324

**Legal Citation: M.L. 2009, Chp. 143, Sec. 2, Subd. 3a**

**Appropriation Language:** Minnesota County Biological Survey  
\$2,100,000 is 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.

**II. and III. FINAL PROJECT SUMMARY:**

**Overall Project Outcome and Results**

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#### **IV. OUTLINE OF PROJECT RESULTS:**

##### **Result 1: Field Surveys (see also attached map)**

**Description:** The status and distribution of rare resources will be identified, providing a basis for the maintenance of Minnesota's biological diversity and ecological systems through ecological management, planning, research, monitoring, and critical habitat acquisition.

**Procedure:** A multi-level survey process is followed.

Review and site identification: Plant ecologists, botanists and zoologists review existing relevant natural resource data and record information into electronic databases, using Geographic Information Systems and other DNR information systems to consolidate and organize data. Examples of these data include forest inventories, wetlands inventories, wildlife habitat inventories, park surveys, soil surveys, land use data, historical public land surveys, biophysical 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.

Coordination: Staff notify and coordinate surveys 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 sometimes supplement ground surveys. 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).

**Summary Budget Information for Result 1:**      **Trust Fund Budget:**      \$ 750,000  
**Amount Spent:**      \$ 817,339  
**Balance:**      \$ (67,339)

<b>Deliverable</b>	<b>Completion Date</b>	<b>Budget</b>	<b>Status (see below)</b>
<b>Review and site identification</b>	June 2010 Northeast August 2009 Beltrami/Clearwater	220,000	
<b>Coordination</b>	July 2009-June 2011	150,000	
<b>Field surveys</b>	July-Oct 2009; April-Oct 2010; April-June 2011	380,000	

## **Final Report Summary June 2011**

### **Review and site identification**

In the Border Lakes subsection, priorities for surveys were determined in 2009 and re-assessed after the 2010 field season. The Superior National Forest blow down data and M.L. Heinselmann’s stand origin data, along with more recent vegetation monitoring activities and procedures in progress in the Border Lakes, were also reviewed. This process resulted in a plan to complete the field surveys of sites, native plant communities, animals and plants in Cook County in 2010. Surveys in the Border Lakes subsection of Lake County were proposed for completion in the 2011 field season pending continuation of funding for MCBS.

In the Nashwauk Uplands and portions of the Tamarack Lowlands subsection, a plant ecologist and zoologists evaluated resources. Sites selected for 2010 survey focused on the Mesabi Range, Big Rice Moraine, and Whalsten Till Plain Land Type Associations. In addition, Bear Head Lake State Park and Lake Vermillion State Park were included for review at the request of the DNR Division of Parks and Trails for expedient surveys.

Clearwater County sites targeted for native plant community survey were identified in 2009 and rare plant and aquatic plant survey sites were added in 2010. Completion of surveys is anticipated by the end of the 2011 field season pending continuation of funding for MCBS.

Beltrami County sites were selected in 2009. In 2010 and 2011 surveys of sites, native plant communities, rare plants and rare animals were planned. Completion of field surveys in the

vicinity of Upper Red Lake in coordination with the Red Lake Reservation Department of Natural Resources is anticipated by the end of the 2011 field season.

## **Coordination**

Coordination with the US Forest Service continues. The results of 2009 surveys on Superior National Forest (SNF) were presented at a fall meeting of the SNF biologists, at a DNR regional meeting of Division of Ecological and Water Resources staff, and at another regional meeting organized by DNR Division of Wildlife that included DNR area wildlife managers and wildlife biologists from the Superior and Chippewa National Forests.

Areas selected for survey within the Superior National Forest, including the Boundary Waters Canoe Area Wilderness (BWCAW), were reviewed with Forest biologists, all required permits were obtained and ongoing monitoring activities in the SNF were discussed. Two SNF Wilderness staff assisted a MCBS plant ecologist on several Wilderness survey canoe-based trips of from four to eight days in duration, providing an excellent opportunity to share information on how MCBS data can be applied to SNF vegetation management and monitoring, most specifically as related to fire monitoring within the SNF and the BWCAW.

Surveys in St. Louis County included work in two State Parks: Bear Head Lake State Park and the new Lake Vermillion State Park. Agreements for species surveys and vegetation mapping within the two parks were developed with regional DNR Division of Parks and Trails staff.

Meetings with local agencies, private landowners and organizations in St Louis County were held to introduce them to the initiation of MCBS in the Nashwauk Uplands subsection. MCBS survey objectives and procedures were explained and input on areas of potential survey interest was requested. In March 2011, the St Louis County Land Department was updated on the status of work in the county and proposed plans for the 2011 field season. An additional meeting with the District One commissioner provided more detail on that area.

MCBS staff attended DNR Regional meetings in Grand Rapids and at Lake Itasca State Park to inform the newly formed division (Division of Ecological and Water Resources) about the procedures and status of MCBS and to further explore options for coordination.

Other DNR Divisions are now mapping lands they manage using the native plant community classification developed by the Division of Ecological and Water Resources and Division of Forestry ecologists. A project within the DNR to create a consolidated spatial data layer of native plant communities currently mapped on all DNR-managed lands is underway.

Related to the above activity, the Ecological Land Classification (ECS) program in DNR's Forestry Division is collecting data to inform mapping projects in a number of state forests with the goal of ultimately mapping native plant communities on all of the state DNR lands having forest management activities. A closer collaboration of mapping resulted in several field days that included field training of forestry staff and review of collected data. MCBS plant ecologists participated in sessions associated with the Nemadji State Forest, the Fond du Lac Reservation,

and the Tower, Cloquet and Hibbing Forestry Areas. Plant ecologists also provided mapping suggestions to ECS forestry staff working in Smokey Hills and Paul Bunyan State Forests.

In Beltrami County, MCBS plant ecologists focused on the survey of peatland native plant communities and rare plants in the vicinity of Upper Red Lake. Communication with staff from the Big Bog Recreation Area, field visits with DNR Division of Wildlife staff at Red Lake WMA and Ecological and Water Resources northwest regional ecologists was an important part of survey planning. Reconnaissance of this vast area provided substantial information and prompted additional strategies for targeting further survey and efficient ways to coordinate with other ongoing survey and monitoring efforts in the area.

Red Lake Reservation in Beltrami and Clearwater counties contains significant natural areas. MCBS biologists and ecologists continued communication with the leadership and staff of the Red Lake Reservation Department of Natural Resources. Continuation of the successful procedures for native plant community, rare animal and rare plant surveys based on the logistical procedures developed in 2010 were extended into the 2011 field season.

Collaboration with scientists involved in long-term peatland research at the University of Minnesota resulted in a successful agreement to share resources for access and vegetation sampling in 2010 and in June 2011, specifically using helicopter transport that provides the best access to sample areas with the least amount of disturbance. Continuation of this agreement is anticipated for August 2011 to include additional sites and opportunities for rare plant and animal surveys at phenologically more optimal times.

Coordination continues with bryologist Jan Janssens in order to incorporate accurate moss identification into MCBS vegetation sampling, native plant community classification, and database organization. Building on a highly successful 2009 training session in the identification of bryophytes (mosses and liverworts) in northeastern Minnesota, Jan provided additional training sessions for botanists and ecologists working in the northwestern region. These organisms are especially prominent in the patterned peatlands landscape and in calcareous fens, both targeted resources for survey in northwestern Minnesota. Training sessions were centered out of Norris Camp (Red Lake Wildlife Management Area) in 2010 and at Itasca State Park in 2011. The MCBS information officer and MCBS ecologists helped to develop training materials.

The MCBS aquatic botanist provided ideas based on MCBS aquatic plant field work at a meeting to develop criteria for a Lake Index of Biotic Integrity (IBI), organized by the Minnesota Pollution Control Agency (MPCA) to consider the development of an aquatic plant indicator for Lake IBI.

Coordination with the wetland inventory and other resource assessment and monitoring efforts continues (National Wetlands Inventory, DNR MIS/GIS, Minnesota Pollution Control Agency wetland monitoring staff and Forestry Assessment). This includes updates on air photo production, joint field visits with MPCA monitoring staff, and exploration of potential ideas for acceleration of mapping through application of new mapping elements and software such as LiDAR and eCognition.

In spring of 2011 Forest Capital Partners, Inc. contacted MCBS about a potential for conducting surveys for rare features on some of their holdings in northern Minnesota. An agreement for a pilot project is being considered pending continued funding of MCBS.

Surveys for rare animals and animal species of greatest conservation need began in Lake County and St Louis counties largely due to funding from a State Wildlife Grant. (For a report on findings see *State Wildlife Grant Report **Project: Minnesota's Wildlife Resources and Habitat Surveys and Information Management. Grant Number: T-5-R-2 Project Period: July 1, 2007-August 31, 2010.***) Additional surveys in Lake, Beltrami and St Louis counties in the 2011 field season began in part funded by the State Wildlife Grant. Surveys beyond the 2011 field season are pending continued Federal funding associated with the State Wildlife Action Plans that have been developed in each state and coordinated nationally.

Coordination with the Bell Museum of Natural History especially as related to long-term curation and of museum collections is ongoing. In addition, the Science Museum of Minnesota also continues to provide logistical support for preparation of some museum collections.

MCBS prairie ecologists are participating in a multi-agency/organization prairie monitoring collaborative that includes The Nature Conservancy, Concordia College, DNR Division of Ecological Resources and Wildlife, the US Fish & Wildlife Service and others. Due to their extensive knowledge and experience in the prairie region, these MCBS ecologists have provided substantial advice related to prairie vegetation sampling protocol and have assisted with field training and sampling. Their experience with data analysis related to native plant community classification, observations of the influences of management on prairie quality and their ability to identify prairie plants even in vegetative condition has been valuable to the collaborative in the determination of best strategies for long-term monitoring of prairie condition as related to management. Clarification of procedures and quality control of data to ensure the most accurate results was one outcome of this coordination.

Two individuals from MCBS with extensive knowledge of Minnesota's native prairie participated in the development of a statewide grassland conservation plan. This multi-agency/organizational effort began in 2010 and was completed in 2011 (see also result #3). Mapped known locations of native prairie collected by MCBS formed the core data of this project that has spatially explicit targets for conservation.

### **Field surveys**

Preparation for field surveys, especially in remote areas requires substantial logistical preparation and coordination. This included obtaining field housing, vehicles, maps, helicopter flights (peatlands), and organizing field gear, checking, repairing and updating equipment, updating GPS files and securing and updating safety items.

Field safety communications using SPOT were highly effective in remote areas such as the Boundary Waters Canoe Area Wilderness and the Red Lake Peatlands. This service provides a reliable means of communicating simple safety messages from a light-weight portable device that includes a GPS interface. This replaced the use of short range radios for safety applications



since radios sometimes had poor reception and reporting times were inconvenient. Satellite phones were borrowed to explore their use but were found to be too expensive for more widespread use by field surveyors. Short range radios were beneficial in the peatlands where several biologists were working in relatively close proximity and needed to be in contact regarding coordination of helicopter transfer.

A safety wilderness training in May 2011 provided an update for all field staff from a previous training session. Due to the extensive work planned in remote areas, this was critical to survey outcomes. The value of wilderness training was demonstrated in 2010 when field surveyors working on a large wilderness lake during extreme weather made bivouac decisions consistent with their training.

In the Border Lakes portion of Cook County, the documentation of ecological data on rare plant and rare animal locations, native plant community and landscape condition in the survey areas was completed in 2010. Survey plant ecologists recorded data related to high quality targeted native plant communities including Red Pine-White Woodland (Canadian Shield), Red Pine-White Pine Woodland (Northeastern Bedrock) and Black Spruce-Jack Pine Woodlands. Records include notes on vegetation response to fire and wind events, past management, locations of legacy patches (serving as source areas), cold drainages and wetland complexes. Vegetation samples (relevés) were collected along with observations using GPS locations. Rare plant and animal searches also included the preparation of species lists for habitats such as cliff faces, lakes, small seepages and wetlands

Data collected included relevés, and information on soils, geomorphology, geology, hydrology, aquatic conditions, topography, landscape context, disturbance history, regeneration and community response to fire, micro-topography and structural components. Locations of rare species, species (animals) of greatest conservation need and records of common species that had no previous museum documentation in the area were priorities.

A major part of the survey effort during this period was accomplished during extended wilderness canoe trips to base camps in the BWCAW from where additional overland surveys were conducted. Examples of sites surveyed in 2010 are Misquah Hills, Omega Lake, Swan Lake, Caribou Lake, Eagle Mountain, Veggie, Bean, Esther Lake, Poplar Lake, Portage Brook Ridge, and Cascade Lake.

Surveys for rare animals and animal species of greatest conservation need began in Lake and St Louis counties in 2010 with funding from a State Wildlife Grant. Animal surveys were also conducted at the new Lake Vermillion State Park as a result of an agreement with the Division of Parks and Trails.

Surveys began in a portion of the northern patterned peatlands, one of the state's largest (about 2.5 million acres) and most inaccessible ecological systems. In the Red Lake Peatlands of Beltrami County, MCBS plant ecologists and botanists worked with Paul Glaser (University of Minnesota) to re-sample vegetation plots established over 20 years ago in the area, to collect additional data in new locations and to conduct aerial reconnaissance of the area for future

surveys. Helicopter access in 2010 and in June 2011 was instrumental in accomplishing this survey.

In Clearwater County native plant community and rare plants surveys within the Red Lake Reservation were completed along with additional sites in other parts of the county, including a number of calcareous fens.

Surveys where rare aquatic plants were targeted were completed in a total of 77 lakes including locations in the Border Lakes portion of Cook County, and in selected lakes in St Louis and Cass counties. This included surveys in both Bear Head Lake and Lake Vermillion State Parks.

Field surveys in June 2011 were challenging due to the impending state of Minnesota government shutdown that required preparations to secure state vehicles and equipment and notify staff and contractors working in remote areas about procedures for potential termination of field work. This preparation reduced the amount of field work accomplished in June and required significant alteration of plans for the entire 2011 field season.

### ***Highlights Northeastern Surveys (Border Lakes, Nashwauk Uplands, Tamarack Lowlands)***

The large functional landscapes of the Border Lakes Subsection portion of Cook County contain high quality fire-dependent forests and large areas recovering from a series of wildfires and wind storms, cliff and talus complexes, and associated groundwater seepage zones. Plant surveys included focused searches for rare aquatic plants that were successful on the numerous undeveloped lakes and associated sedge fens and mud flat communities. For example, Homer, Little Cascade, Little John, Two Island, and Wine lakes all contained more than one species of a rare aquatic plant and/or large populations of a rare species.

Rare plants and other plants of interest that were documented in the northeastern surveys include: maidenhair spleenwort (*Asplenium trichomanes*), matricary grapefern (*Botrychium matricariifolium*), least moonwort (*Botrychium simplex*), nodding sedge (*Carex gynandra*), intermediate sedge (*Carex media*), Michaux's sedge (*Carex michauxiana*), hoary whitlow grass (*Draba cana*), Robbins' spikerush (*Eleocharis robbinsi*), nahanni oak fern (*Gymnocarpium jessoense*), Appalachian fir moss (*Huperzia cf. appalachiana*), a species of clubmoss (*Huperzia appressa*), bog rush (*Juncus stygius*), American shore plantain (*Littorella uniflora* var. *americana*), small-flowered woodrush (*Luzula parviflora*), large-leaved sandwort (*Moehringia macrophylla*), one-flowered muhly (*Muhlenbergia uniflora*), blunt-fruited sweet cicely (*Osmorhiza depauperata*), small green wood orchid (*Platanthera clavellata*), small shinleaf (*Pyrola minor*), sooty-colored beak rush (*Rhynchospora fusca*), Lapland buttercup (*Ranunculus lapponicus*), cloudberry (*Rubus chamaemorus*), encrusted saxifrage (*Saxifraga paniculata*), soapberry (*Shepherdia canadensis*), awlwort (*Subularia aquatica* var. *americana*), Torrey's mannagrass (*Torreyochloa pallida* var. *fernaldii*), a species of lichen (*Usnea longissima*), hidden-fruit bladderwort (*Utricularia geminiscapa*), lavender bladderwort (*Utricularia resupinata*), alpine woodsia (*Woodsia alpina*), Oregon woodsia (*Woodsia oregana*) and Rocky Mountain woodsia (*Woodsia scopulina*). Several additional species of interest include: sago pondweed (*Stuckenia pectinata*), leafy pondweed (*Potamogeton foliosus*), Illinois pondweed (*Potamogeton illinoensis*), sticky groundsel (*Senecio viscosus*), and pellitory (*Parietaria pensylvanica*).

A more detailed count of the number of individuals of Braun's holly fern (*Polystichum braunii*) first recorded at a location in the BWCAW in 2009 was made in 2010 to more adequately document the most northwestern range extent of this species known in the US.

Animal surveys in 2009 and 2010 resulted in new locations for six targeted insects, including Nabokov's blue butterfly (*Plebejus idas nabokovi*) and the first Cook County report of the Laurentian tiger beetle (*Cicindela denikei*), a globally rare species. Mammal surveys resulted in records of Northern bog lemming (*Synaptomys borealis*), Heather vole (*Phenacomys ungava*), Rock vole (*Microtus chrotorrhinus*), Smoky shrew (*Sorex fumeus*), Northern myotis (*Myotis septentrionalis*), and Gray wolf (*Canis lupus*). In terms of amphibians and reptiles, Snapping turtle (*Chelydra serpentina*), and the Eastern red-backed salamander (*Plethodon cinereus*) were located in the study area. Forty-four species of nongame fish were documented. These included Shortjaw cisco (*Coregonus zenithicus*), Kiyi (*Coregonus kiyi*), Nipigon cisco (*Coregonus nipigon*), Bloater (*Coregonus hoyi*), Lake chub (*Couesius plumbeus*), Deepwater sculpin (*Myoxocephalus thompsonii*), and Spoonhead sculpin (*Cottus ricei*). Bird surveys were conducted the Border Lakes Subsection in Lake County in 2010 resulting in 40 locations of rare species. This is a significantly lower number of records than in the Border Lakes Subsection of Cook County in 2009 largely due to about 100 fewer locations of Black-throated Blue Warblers (*Setophaga caerulescens*) recorded in 2010 than in 2009.

Animal surveys conducted in the spring of 2011 resulted in a Sturgeon River location of Northern brook lamprey (*Ichthyomyzon fossor*), and three locations of Four toed salamanders (*Hemidactylium scutatum*) in southern St Louis County, including the first record on the east side of the St. Louis River.

June 2011 breeding bird surveys were focused in the Border Lakes and Tamarack Lowlands subsections of St Louis County with additional preliminary surveys in the Nashwauk Uplands. A total of 153 potential breeding bird species were recorded, including 35 records of rare species: Trumpeter Swan (*Cygnus buccinator*), American Bittern (*Botaurus lentiginosus*), Sandhill Crane (*Grus canadensis*), Upland Sandpiper (*Bartramia longicauda*) and Black-throated Blue Warblers (*Setophaga caerulescens*). Other species of interest that were recorded include Northern Hawk Owl (*Surnia ulula*), Great Gray Owl (*Strix nebulosa*), Eastern Whip-poor-will (*Caprimulgus vociferus*), Black-billed Magpie (*Pica hudsonia*), Tennessee Warbler (*Oreothlypis peregrina*), Bay-breasted Warbler (*Setophaga castanea*) and Wilson's Warbler (*Cardellina pusilla*).

Tennessee Warbler, Cape May Warbler (*Setophaga tigrina*), Bay-breasted Warbler, and Evening Grosbeak (*Coccothraustes vespertinus*) are bird species rarely observed in Minnesota except in isolated areas with spruce budworm outbreaks. Bay-breasted Warblers were recorded at six locations, a relatively high number for this species that is the rarest breeding warbler in Minnesota's boreal forest region. Black-throated Blue Warblers were found to be uncommon to rare in this area that is located near this species' northwestern range limit. It was recorded at two locations in the Nashwauk Uplands Subsection where there have been very few past records.

More detail on the results for surveys of rare animals and animal species of greatest conservation need are found in: ***State Wildlife Grant Project: Minnesota's Wildlife Resources and Habitat Surveys and Information Management. Grant Number: T-5-R-2 Project Period: July 1, 2007-August 31, 2010***. An additional State Wildlife Grant Project report on results of animal surveys will be available in December 2011.

Surveys of plants and native plant communities in the Border Lakes Subsection portion of Lake County continued in the field season of 2011. This included field surveys of rare plants, high quality communities and landscape conditions in places such as the Kawishiwi Triangle area, the vicinity of Fernberg Road east of Ely and the Isabella River watershed. Condition ranks of high quality white pine-red pine forests, upland white cedar forests, jack pine-black spruce and red pine-white pine woodlands and lakeshore communities were documented. Aquatic species were surveyed along rivers and in quiet bays of lakes. Landscape areas were assessed based on statewide biodiversity ranking.

Botanical surveys included wilderness canoe trips into places such as the Sagagana - Topaz Lake area of northeastern Lake County. Species of interest recorded during this time included: dragon's mouth (*Arethusa bulbosa*), soapberry (*Shepherdia canadensis*), small-flowered woodrush (*Luzula parviflora*), Maidenhair spleenwort (*Asplenium trichomanes*), Oregon woodsia (*Woodsia oregano*), smooth cliff brake (*Pellaea glabella*), Lapland buttercup (*Ranunculus lapponicus*), small yellow water crowfoot (*R. gmelinii*), and least moonwort (*Botrychium simplex*).

In the Nashwauk Uplands Subsection, plant community and rare plant surveys were the primary focus of field work. Site surveys included the collection of 50 relevé plots and documentation of numerous rare plant locations in 2009 and 2010, including bog rush (*Juncus stygius* var. *americana*), montane yellow-eyed grass (*Xyris montana*), small green wood orchid (*Platanthera clavellata*), coastal sedge (*Carex exilis*), cuckoo flower (*Cardamine pratensis* var. *palustris*), and discoid beggarticks (*Bidens discoidea*). The specimens of discoid beggarticks were collected from several lake shorelines were sent to the coauthor of the treatment of *Bidens* in *The Flora of North America* for annotation.

Also in the Nashwauk Uplands the plant ecologist completed native plant community mapping in Bear Head Lake State Park and provided this to Parks.

### ***Highlights Clearwater and Beltrami counties***

In Clearwater County surveys were focused in the northern portion of the county where good coordination with the Red Lake Reservation DNR resulted in the completion of surveys in the northern portion of the county. In addition, a number of calcareous fens, two old-growth pine sites and one outstanding peatland site were documented.

In Beltrami County the 2010 re-collection of relevés at 14 permanent plot locations in the patterned peatland where plot data were first recorded over 20 years ago is the beginning of potential long-term vegetation monitoring data collection project with plots selected statewide. In 2010 and June 2011 over 50 relevés were collected in Clearwater and Beltrami counties.

Rare plants and other plants of interest recorded in the region included: dragon's mouth orchid (*Arethusa bulbosa*), ram's head orchid (*Cypripedium arietinum*), barren strawberry (*Waldsteinia fragarioides*), beaked spikerush (*Eleocharis rostellata*), twig rush (*Cladium mariscoides*), linear-leaved sundew (*Drosera linearis*), English sundew (*Drosera anglica*), bog rush (*Juncus stygius* var. *americanus*), montane yellow-eyed grass (*Xyris montana*), sooty-colored beak rush (*Rhynchospora fusca*), small yellow water crowfoot (*Ranunculus gmelinii*), Cooper's milk-vetch (*Astragalus neglectus*), white adder's mouth (*Malaxis monophyllos*), small yellow water crowfoot (*Ranunculus gmelinii*), and matricary grapefern (*Botrychium* cf. *matricariifolium*).

### ***Bryophytes (mosses and liverworts)***

Botanists have been collecting selected mosses and liverworts as an ongoing part of their survey work statewide. The recently completed identification of some of these collections by taxonomic expert, Jan Janssens revealed that three of the mosses collected are the first records of the species in Minnesota: *Philonotis yezoana*, *Tayloria serrata*, and *Fontinalis welchiana*.

### ***Aquatic plants***

Aquatic plant surveys were conducted in various parts of northern Minnesota in 2010 resulting in improved documentation of the distribution of several aquatic plant species. Examples follow: Several large populations of several hundred individuals of American awlwort (*Subularia aquatica* var. *americana*) were observed in several lakes in Cook County, yet no new locations were recorded during directed surveys for this species in Cass or St. Louis counties. American shore plantain (*Littorella uniflora*), recorded in large numbers in several Cook County lakes was also recorded at Larson Lake in Cass County, further documenting the known southwestern extent of its Minnesota range. Leafless water milfoil (*Myriophyllum tenellum*) was found growing in several lakes, often in large populations in Cook County, at Bear Head Lake in St. Louis County and a number of lakes farther south. Slender water naiad (*Najas gracillima*), Guadalupe naiad (*Najas guadalupensis* var. *olivacea*) and humped bladderwort (*Utricularia gibba*) are likely representative of a more southerly Minnesota flora, with no locations recorded in the northeast. Identification of collections from Cass County lakes were confirmed for Oakes' pondweed (*Potamogeton oakesianus*), discoid beggar-tick (*Bidens discoidea*) and pedicelled bulrush (*Scirpus pedicellatus*).

## **Result 2: Information System Expansion**

**Description:** MCBS will provide data and collections to information systems and museums, resulting in the long-term storage of biological collections and the distribution of information to individuals, organizations, and agencies with diverse natural resources goals.

### **Procedure:**

Data collected by MCBS are entered into manual and computerized files in DNR's information systems. Key databases include those tracking locations of plants and animals, rare features, relevé (vegetation plot samples), aquatic plant lists/lakes, MCBS sites, native plant community polygons (GIS), and animal aggregations. Locations of native plant communities are mapped at the scale of U.S. Geological Survey 1:24,000 topographic maps using ARC/GIS. Shape files of native plant communities and MCBS sites are available on the DNR's Data Deli, accessible through the website. Rare species locations are entered into 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, color slides, digital images, and other digital media are stored at the DNR, St. Paul. Field data sheets are filed electronically or manually.

Information System Development: The collection and management of data continues to improve through the use of networks, GIS, relational databases, global positioning systems, and field data recorders. MCBS participates in DNR’s efforts to maintain data standards and quality of data, to integrate databases, and to improve information delivery on the web. MCBS also coordinates with other state and national information system developments. Continued development of information systems is essential to achieve MCBS goals, and requires ongoing investment to satisfy the increasingly complex and diverse demands of users and the related needs for data standards, data security, metadata and other documentation. In order to effectively contribute to data synthesis, analysis, interpretation, and future natural resource monitoring needs, considerable effort is required to maintain data integrity as new technology in Information Systems continuously evolves.

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

**Summary Budget Information for Result 2: Trust Fund Budget: \$ 700,000**  
**Amount Spent: \$ 766,351**  
**Balance: \$ (66,351)**

<b>Deliverable</b>	<b>Completion Date</b>	<b>Budget</b>	<b>Status (see below)</b>
<b>Data entered in DNR Information Systems</b>	January 2010 # records added October 2010 #records added March 2011 #records added June 2011 #records added	575,000	
<b>Information System Development</b>	Updates with each status report	75,000	
<b>Preparation of Collections</b>	March 2010 #collections deposited June 2011 #collections deposited	50,000	

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**Data entered in DNR Information Systems**

Since July 2009 new records of 1,069 rare features were added to the Rare Features Database. Since 1987, MCBS has added 19,089 new rare feature records. Since 1987, MCBS has contributed 4,544 of the 9,634 total database records to the Relevé (vegetation sampling) Database and has surveyed 1,764 lakes for rare aquatic plants and vegetation. Statewide, 9,713

MCBS Sites of Biodiversity Significance and 58,957 polygons of native plant communities are now publically available on DNR's Data Deli.

### **Information System Development**

The NatureServe product, Biotics contains data standards for entry of observations that is shared by users in all NatureServe member programs in the Western hemisphere. During this time 104,871 records of Bird "observation" data were entered. This means that for the 12,835 locations of bird surveys conducted historically by MCBS there is an observation of each species (common or rare) recorded at individual locations. This includes observations from the standard point counts and from other techniques (playback calls for example). A similar effort is being pursued for all of the data collected on mammals by MCBS (inclusive of all species recorded). Over 29,000 species records of common and rare mammals representing over 1,200 locations were compiled. Data recorded by MCBS zoologists on common and rare fish is in the beginning stages of this process.

The first phase of an upgrade of the vegetation sampling database (Relevé Database) was completed that allowed for the entry of samples collected during recent field seasons. The project benefitted from coordinated effort of MCBS plant ecologists and botanists who provided programmers with technical input especially as related to plant taxonomy and related issues of synonymy. Two plant ecologists, located in St Paul, were especially critical to the database design and development. The departure of one of the plant ecologists for a fulltime position with a federal agency was disruptive to this project. A student worker was hired to assist with more routine tasks of the project and other aspects of the project were assigned to another plant ecologist.

The assistance of a computer programmer through a service level agreement with the DNR's Management Information System (MIS) was critical to the upgrade of this database. However, using a new DNR database development protocol, the first phase of this project was assigned through a service agreement to DNR MIS programming staff located in Grand Rapids while the ecological staff were located in St Paul, complicating communications. A second phase of the project was assigned to a MIS programmer in St Paul, who after receiving content-training by the ecologists and Divisional project management staff, worked on the project until departmental MIS staff were largely diverted to assist with the implementation of a new statewide financial system. This unexpected diversion of their time combined with the departure of the plant ecologist is one reason for the unexpended ENRTF funds.

A closely related project to upgrade a standard state database related to a comprehensive list of vascular plants continued to progress but was also disrupted due to the departure of a plant ecologist and other priorities of the MIS staff. Again, some of the DNR programming identified in a service level agreement resulted in unexpended ENRTF funds.

Closer coordination with herbarium database projects at the Bell Museum of Natural History progressed during this time due to effective communication between professional biologists who also have reasonable understanding of data management systems and national museum protocols (including a national software product, Specify 6.0). The project is intended to more closely

coordinate the preparation of specimen information and specimen deposition in the museum repository. For example, when the botanist is preparing a label for a herbarium collection, the same data are simultaneously entered into the database of the Bell Museum thereby reducing data entry time and errors. The outcome will be improved data on plant distribution and phenology. Summaries and exchange of data and collections regionally and nationally that are critical to long-term vegetation monitoring and assessment of environmental changes will be more effective.

A MCBS plant ecologist is the project manager for a multi-divisional effort in the DNR to create a consolidated spatial data (GIS map) layer of native plant communities currently mapped on all DNR-managed lands using the same classification.

A pilot project using the image-processing tool eCognition was completed. Use of eCognition potentially could increase the speed of native plant community mapping that has been a time-consuming task of plant ecologists working especially in northern Minnesota. Test areas of native plant communities already mapped by plant ecologists in Cook and Aitkin counties were compared to results of mapping the same areas using a “trained” computerized mapping procedure utilizing eCognition and a number of related GIS layers. The outcome was that computer-generated native plant community maps seemed to be accurate enough to assist a plant ecologist in their interpretation of air photos before conducting field surveys in order to create a preliminary map of native plant communities. It also could assist in targeting areas to survey and provide validation of native plant community mapping after field surveys are completed. The expense of the software license and the eCognition training required to effectively operate the program are limitations. Future exploration of the potential to have a contractor or a DNR employee to provide this service is underway.

A new photographic image database is in progress for the Division to include imagery from MCBS. Staff contributed to some of the testing of the prototype and suggested further refinement of file transfer procedures.

As part of the Forest Certification process (all state of Minnesota forested lands are dual certified), DNR is responsible for identification of high conservation value forests (HCVF) and for monitoring of the elements that DNR considers as reasons for identifying those forests as containing high conservation value. MCBS Outstanding and High sites of biodiversity significance are being used to identify lands to satisfy these certification guidelines. In order to more quickly deliver information on these sites, MCBS GIS staff worked with MCBS ecologists and the Division of Forestry staff to develop a GIS “viewing tool” that presents data on those Outstanding and High sites on state land where data are currently available in the state. This tool has been successful and efforts to more widely apply this technology to display data on all MCBS sites on the web is in progress, requiring significant editing to the current site database, now in progress.

### **Preparation of collections**

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



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

The Bell Museum has acknowledged the following specimens received during this project period: Total= 5,031

June 1, 2010: 2205 specimens

June 15, 2011: 2826 specimens

**Result 3: Guidance for Conservation and Management. Budget: \$ 650,000**

**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.

<b>Summary Budget Information for Result 3:</b>	<b>Trust Fund Budget:</b>	<b>\$ 650,000</b>
	<b>Amount Spent:</b>	<b>\$ 485,986</b>
	<b>Balance:</b>	<b>\$ 164,014</b>

<b>Deliverable</b>	<b>Completion Date</b>	<b>Budget</b>	<b>Status (see below)</b>
MCBS data on website	Dec 2009 Shape files of sites and native plant communities on DNR's Data Deli for three counties.  Oct 2010 Shape files of sites and native plant communities on DNR's Data Deli for three counties.	100,000	
Technical assistance, ecological evaluations, data interpretation	July 2009-June 2011 Updates with each status report.	200,000	
Publications, web products	June 2010 Vegetation plot data available on the web. Other updates with each status report July 2009-June 2011.	100,000	
Aspen Parkland-Red River Valley natural history/guide book	Updates with each status report July 2009-June 2011. (Proposed publication 2013)	240,000	
<i>Amphibians and reptiles native to Minnesota</i>	Updates with each status report. (2 <sup>nd</sup> edition of book with revisions including new MCBS data. Publication proposed for 2012)	10,000	

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### **MCBS data on website**

Data related to the native plant communities and MCBS Sites of Biodiversity Significance for 15 counties were added as shape files (map files) to DNR's public geographic information system site, known as the Data Deli. Counties added were Becker, Carlton, Cottonwood, Dodge, Faribault, Freeborn, Lincoln, Lyon, Martin, Mower, Nobles, Pipestone, Steele, Waseca, and Watonwan. This exceeded the proposed completion target listed in the table above.

### **Technical assistance, ecological evaluations, data interpretation**

**Lake County Commissioners** were provided examples of how MCBS data could be used in Lake County Land management: Examples of potential application of data: 1) Identification and prioritization of collaborative management projects (such as Manitou and Sand Lake Seven Beavers collaborative areas that each contains several MCBS Sites of Biodiversity Significance. 2) Use of maps of native plant communities and associated Ecological Classification System (ECS) tools in forest management (e.g. silvicultural interpretations by native plant community, and use of tree suitability tables). 3) Use of MCBS data to inform restoration and monitoring projects such as large patch management, hardwoods management, conifer restoration, Art Lake Ridges natural area project, invasive species monitoring. 4) Use of data to satisfy Forest Certification goals. Lake County lands within MCBS sites with Outstanding statewide biodiversity significance (~1,500 acres) could be considered as High Conservation Value Forests (HCVF) as related to Forest Stewardship Council (FSC) Certification standard -Principle #9. 5) Potential use in future modifications of the Lake County Forestry Department Working Management Plan (e.g., native plant community locations, wildlife management options for native plant community management, rare species guidance, etc.)

**St Louis County Land Department** received information on the potential applications of data (sites, rare species, vegetation plots, Ecological Evaluations) as related to management of their lands and to Sustainable Forest Initiatives (SFI) forest certification. Several meetings included discussions of the Sand Lake Seven Beavers Collaborative, "Special Sites" that are a category of land in the county and how MCBS data might be used. A subset of the MCBS site database (sites of biodiversity significance) was provided to the county to help inform them about some of the features in the sites that intersect the land managed by the county in these sites.

**Becker County Board of Commissioners** were given a presentation on survey results and provided a printed map of MCBS Sites of Biodiversity Significance to assist with their review of conservation and management goals on their county lands. A number of follow-up meetings related to site of biodiversity significance included assistance and ecological interpretations provided by MCBS staff.

**Clearwater County Land Department** were informed at a meeting how to interpret data provided in the Natural Heritage Database. This was followed by a letter to Clearwater County

detailing methods for how they might identify high conservation value forests in the county as related to forest certification that included potential examples.

**Beltrami and Carlton Counties:** As related to a five county cooperative Forest Certification audit, MCBS staff discussed ideas of how Carlton County might satisfy guidelines. In addition to state certification plant ecologists prepared preliminary materials for Beltrami County Natural Resource managers regarding potential HCVs on county managed land.

**Hubbard County:** MCBS ecologist worked with the Regional DNR ecologist to provide an update to the county's land management staff on how to use MCBS data.

**White Iron Chain of Lakes Association (WICOLA) Kawishiwi Watershed Protection**

**Project:** MCBS information was shared with this association for joint Minnesota Pollution Control Agency, Lake County Soil and Water Conservation District regarding a project that encompasses a large portion of the Border Lakes subsection of Lake County. Since MCBS field surveys in the Border Lakes subsection over the next two field seasons include much of this area staff explained how data could be made available for project implementation.

**Superior National Forest (SNF):**

A presentation, *Results of 2009 MCBS Surveys on the Superior National Forest* was well-received at an annual review meeting related to the Superior National Forest (SNF) monitoring and research activities. This meeting included participation and presentations from researchers with active wilderness research permits.

MCBS information (site summaries, relevés reports, aquatic species lists for MCBS surveyed lakes, interpretation of native plant community data and existing condition, etc.) for several MCBS Sites were provided to the East Zone SNF biologist and hydrologist, to assist in their analysis of the *Windy* vegetation management project area on the Forest.

Staff interpreted data as related to proposed activities within the Superior National Forest's *Toohey, Twins, and Duncan Border Unit* (prescribed burn) vegetation management project areas. The northern coordinator conferred with biologists, foresters and fire management specialists to integrate MCBS data and interpretations, and provide technical assistance for project planning, resulting in some plan modifications.

A table of all plant species identified of interest to the Superior National Forest was delivered to the Forest botanist and updates on targeted plant searches were exchanged (such as species in the genera *Huperzia* and *Euphrasia*). New locations of USFS Region 9 Sensitive Plant Species recorded by MCBS botanists during the 2009 and 2010 field season were delivered. Assistance was also provided for projects related to non-native invasive worms on the Forest.

Staff provided comments on projects undergoing Regional environmental review (Superior National Forest scoping for BWCAW Non-native invasive species management Environmental Impact Statement, Lake County considerations for potential locations of communications towers, proposed trail bridge crossing related to a rare plant populations etc.)

Staff reviewed the SNF mountain bike trail proposed to cross state and federal lands, within the Onion River Hardwoods MCBS Site of Outstanding biodiversity significance.

The MCBS GIS specialist worked with staff ecologists to build a spatial query to deliver MCBS data for sites within the Lake Superior watershed that are located within the SNF. Northern ecologists consulted with Forest biologists and foresters to provide interpretation of the resources found within the sites as part of a SNF Great Lakes Resource Initiative vegetation restoration project.

The **Chippewa National Forest** was provided a list of rare plants (including the Forest Service Region 9 sensitive species) located by MCBS botanists in 2009 in the Forest and in Beltrami County. They were also provided guidance related to phenology and habitat for a number of orchid species to assist in their surveys and monitoring [white adder's mouth (*Malaxis monophyllos*), bog adder's mouth (*M. paludosa*), small green wood orchid (*Platanthera clavellata*), and ram's head orchid (*Cypripedium arietinum*)].

**Manitou Collaborative (NE MN):** The MCBS northern coordinator continued to be the Division of Ecological and Water Resources representative on this collaborative. Recent contributions have been related to DNR Forest Certification and High Conservation Value Forest (HCVF), and discussions of the ecological significance of Art Lake Hardwood Ridges--an MCBS Site of Outstanding Biodiversity Significance. MCBS delivered and interpreted an Ecological Evaluation for Art Lake Hardwood Ridges Site and discussed possible conservation opportunities for this site. The collaborative proposed to extend monitoring in the Manitou Adaptive Forest Management (AFMP) patch project area and elsewhere in the Manitou collaborative area. The project includes vegetation and invasive species monitoring in control and treatment areas (funded by DNR AFMP program in 2011). MCBS staff worked with members of the collaborative and the UMN IonE Boreal Forest and Community Resilience Project to develop a proposal for a systems mapping workshop.

As part of the **Sand Lake Seven Beavers Collaborative (NE MN)**, staff assisted the Scientific and Natural Area program with review and communications associated with request for access to SNF and The Nature Conservancy (TNC) harvest units along old winter road through Sand Lake Peatlands SNA that lies within the landscape. A plant ecologist provided a review, participated in an on-site visit, and helped prepare final prescriptions for stands proposed for treatment adjacent to Sand Lake Peatlands SNA that is within Sand Lake Seven Beavers Landscape.

**North Shore Collaborative:** The Forest Service has proposed a “north shore collaborative” that would involve a number of agencies and organizations. MCBS staff were contacted to participate and are willing to facilitate delivery of MCBS data should this group continue.

**Subsection Forest Resource Management Planning:** MCBS ecologists continue to assist with implementation of the state’s forest management plans including review of annual plan additions and participation in joint site visits as needed. Some examples: 1) staff participated in the annual DNR Cloquet Area coordination meeting between the divisions of Forestry, Wildlife, and Ecological and Water Resources where jack pine management on the Cloquet River was discussed. 2) Staff attended the State Forest Plan Annual Coordination meeting in Grand Marais and provided mapping guidance and field experience leading to creation of proposed treatments in the MCBS Swamp Lake Hardwoods site, which is also a High Conservation Value Forest. 3) The most current MCBS information for the Border Lakes Subsection was compiled and

delivered to the statewide SFRMP team as they prepare to update the northeast plan (four subsections combined). 4) Additional interpretation of MCBS data was provided for the North Shore Highlands and for the Nashwauk Uplands subsections that are also a part of a combined “four subsection” plan update.

**Forest Certification:** 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 over the past two years as related to the DNR’s forest certification goals and Corrective Action Requests (CARs). The 2009 FSC/SFI Surveillance Audits included participation of selected staff in the audits within the Lake City Forestry Area (Whitewater WMA) and Little Falls Forestry Area (Mille Lacs WMA). A plant ecologist participated in a four-person interdisciplinary team that conducted two internal forest certification audits during this time in the Baudette Forestry Area and the Orr Forestry Area. The group prepared a report on what was learned from the internal auditing.

DNR is responsible for identification of high conservation value forests (HCVF) and for monitoring of the elements that DNR considers as reasons for identifying those forests as containing high conservation value. MCBS Outstanding and High sites of biodiversity significance are being used to identify lands to satisfy these certification guidelines. MCBS staff contributed to the development of a High Conservation Value Forests (HCVF) delivery tool now used in selected portions of the state by DNR land managers to streamline access to relevant MCBS data. This was featured at a training sessions at several regional workshops for managers responsible for implementing the plan to include management of HCVFs. MCBS also participated in the presentations and field visits with auditors as part of the 2010 October surveillance audits.

The outcome of the 2010 audit included Corrective Action Requests (CARs) that the DNR plans to address in part through the application of data collected by MCBS. MCBS sites of biodiversity significance provided a first source of data to enable the DNR to identify potential HCVFs in parts of the state where MCBS data are available. In 2011 staff began development of monitoring approaches to evaluate how to measure that HCVs are maintained or enhanced where identified. The forthcoming work plan being developed will inform Minnesota DNR’s response to this CAR.

**Heart of the Continent Partnership (HOCP):** Staff participated in several meetings of HOCP. Approximately 50 people from the US and adjacent Canada participated in the most recent meeting, including key staff from public land agencies, conservation organizations, citizens groups, corporate land owners, universities, regional economic development agencies and local government representatives from around the HOC region. The meeting centered on a “systems mapping” workshop led by the UMN (Institute on the Environment) Boreal Forest and Community Resilience Project designed to engage public land managers and the private sector in addressing the issues associated with achieving economic and ecological sustainability in the HOC region. Information on MCBS Border Lakes surveys is included in their *Current Projects* and *Database of Research in the Region* located on the HOCP science committee pages on the HOCP website <http://www.heartofthecontinent.org/science-committee>

**Quetico Provincial Park:** Quetico Provincial Park recently decided to use the MN DNR's relevé vegetation plot methodology for documenting native plant communities in the park. The northern coordinator worked with the Park biologist and MCBS data management staff to develop an agreement and process that enables Quetico to store relevé data.

### **Other technical assistance and data delivery**

In the northeast DNR Region, staff met with the Division of Lands and Minerals (LAM) project coordinator, the statewide EWR Environmental Review coordinator and the Regional SNA specialist, to improve application of MCBS data to inform the LAM environmental review and internal coordination process with respect to mineral leases. Staff provided information on survey procedures and description of MCBS sites, biodiversity significance ranking guidelines, ecological evaluations, and how these could be considered in relationship to leases and mine development.

Plant ecologists provided land management recommendations to Potlatch for lands in high quality landscapes of the Nashwauk Uplands Subsection. Potlatch also receives annual summaries of MCBS field survey results as part of an agreement to conduct surveys on Potlatch lands. A letter of permission to conduct surveys on Potlatch lands for 2010 and 2011 and survey results were exchanged.

Recent results of MCBS work in northern Minnesota were sent to Voyageurs National Park.

Plant ecologists coordinated with Grand Portage Monument (National Park Service) and NRCS staff to provide advice on rare species surveys needed for a Grand Portage Band project along Grand Portage Creek on the Grand Portage Reservation.

A plant ecologist provided ecological information in and around Hamden Slough National Wildlife Refuge to use in their update of a management plan.

In response to a request from the DNR Northwest Region, staff reviewed and created potential guidelines for management in areas where impacts could influence viability of ram's head orchid (*Cypripedium arietinum*) populations.

Staff contributed ideas related to an oak management project in a new DNR Wildlife Management Area in Crow Wing County that intersects an MCBS site of moderate biodiversity significance.

Information was provided to DNR's Nongame Wildlife staff related to the ecological quality of a portion of the Cloquet River that is highlighted in a recent MCBS ecological evaluation. This will be used in conservation planning along the St. Louis and/or Cloquet Rivers.

The Heron Lake Watershed District was provided spatial data (GIS files) of existing native prairie found within the district to include in an update of their watershed plan.

In southern Minnesota results from recently completed surveys on the Prairie Coteau and other southern counties was presented to the DNR southern region's Division of Ecological and Water Resources staff.

A prairie plant ecologist participated in a landowner workshop in Chandler MN to describe the significance of the Chanarambie Creek Prairies.

MCBS made a presentation and helped to lead field trips at Morton Outcrops SNA at a June 2010 meeting of the Commissioner's Advisory Committee and others in the Minnesota River corridor-including members of the Green Corridor project. A MCBS plant ecologist has been providing assistance to the Green Corridor project to identify priority sites for conservation action.

A plant ecologist participated in two of the annual Iron Range Earthfest events that included presentations on MCBS, the *Rare and common plants of the Iron Range Area* and an exhibit booth for the Division of Ecological and Water Resources.

Staff participated in the western Minnesota prairie/grassland/wetland planning process led by TNC that included other agency/organization staff with a particular interest and knowledge of prairie. MCBS data on the locations of native prairie were a centerpiece of the plan that was completed in June 2011 entitled, *Minnesota prairie conservation plan 2010: a habitat plan for native prairie, grassland, and wetlands in the Prairie Region of western Minnesota*. See also the MCBS map: [Minnesota's Remaining Native Prairie 100 Years After the Public Land Survey](#).

Environment review issues frequently involve consultation with MCBS staff with specific knowledge of a particular area or resource. Recent mining projects adjacent to a number of calcareous fens and native prairies have involved several staff.

A botanist made a presentation in 2011 that provided a perspective on plants at a symposium on phenology at Wolf Ridge Environmental Learning Center (NE MN).

Staff made presentations and prepared posters related to rare aquatic plants as part of the Minnesota Native Plant Society Symposium in March 2011, *Minnesota's Lake Vegetation: Above and Below the Water Line*. Booklets generated from the web-based Rare Species Guide (see below) highlighting rare aquatic plant species were a popular item distributed at the symposium held at the Bell Museum of Natural History, a co-sponsor of the event.

The Montrose area DNR Fisheries Supervisor was sent photos and other information about the rare aquatic plants for his presentation at a conference about the Avon Hills Area--included were humped bladderwort (*Utricularia gibba*), and the olivaceous Guadalupe Island naiad (*Najas guadalupensis* ssp. *olivacea*).

Information related to rare aquatic plants was included in DNR's sensitive shoreland reports. For example: "A targeted search for rare aquatic [vascular] plants was conducted [by the Minnesota County Biological Survey] on July 7, 2008 (Myhre 2008). This survey focused on an undeveloped shoreline [or other area of the lake] that was most likely to contain rare species. A [brief] habitat description and a list of all plant taxa found in this area were recorded. Voucher specimens were made to document new locations of rare species and some common species.

Data for rare species were entered into the Rare Features Database of the MN DNR Natural Heritage Information System."

The aquatic plant botanist responded to a request for information about leafless water milfoil (*Myriophyllum tenellum*) for a consultant who was writing a stewardship plan for a private landowner in Kanabec County. They were provided information about the plant, why it is tracked and management ideas for the plant.

**Ecological Evaluations provide detailed summaries of the resources found within selected sites of biodiversity significance (some examples follow).**

An ecological evaluation for Rushford Bluffs in Fillmore County was updated for presentation to the Commissioner's Advisory Committee (CAC) in early October, 2010. The presentation to CAC was in response to the availability for purchase of a very significant portion of the site that contains barrens oak savanna and prairie supporting a number of rare plants including the only Minnesota location of a species of grass, *Agrostis hyemalis*.

An ecological evaluation for Horseshoe Bay Shore, located on the North Shore of Lake Superior was prepared and presented by a MCBS ecologist and approved at a CAC meeting.

An ecological evaluation was prepared for Fault Line Ridges, an area of about 6,200 acres located between Beaver Bay and Split Rock Lighthouse State Park in Lake County. Most of this area is a MCBS site of Outstanding Biodiversity Significance and the remainder a High Biodiversity Significance site. This was presented as a potential conservation area along with another site (Art Lake Ridges) to CAC in June 2010 and both were approved for SNA to pursue protection in the area.

An ecological evaluation was prepared for a proposed addition to an SNA in Clearwater County (Itasca 27).

An evaluation for a proposed Aquatic Management Area at Balm Lake in Beltrami County was submitted to the current landowner, the Area Fisheries Supervisor and regional DNR staff. The proposed AMA would consist of ~300 acres of upland mesic forest along an undeveloped portion of shoreline.

Information related to the Mission Creek site near Duluth was added to the larger Magney-Snively ecological evaluation at the request of the northeast DNR Region for discussion about conservation options for the entire area.

A MCBS plant ecologist prepared an ecological evaluation for the La Salle Creek and Chain of Lakes corridor in Hubbard County as part of a conservation effort for protection of a landscape level area of 3,200 acres that includes a potential acquisition of 1,200 acres surrounding the largely undeveloped La Salle Lake. A portion of this site was presented to the Commissioner's Advisory Committee (CAC) and was approved for continued consideration as a potential Scientific and Natural Area.



An ecological evaluation was prepared for Pike Mountain in northeastern Minnesota, which is proposed as a natural area registry site.

### **Other activities**

Some staff attended the joint conference of the Minnesota chapters of the Society for Conservation Biology, The Wildlife Society, American Fisheries Society, and Society of American Foresters where a periodic review of recent scientific literature relevant to MCBS surveys in northeast Minnesota was distributed. In addition, a planning meeting for multi-agency/organizational prairie monitoring took place.

Staff provided technical consultation for wetland issues ranging from assisting in the evaluation of calcareous fens, providing ideas related to the Rapid Floristic Quality Assessment for wetlands, and attending meeting on aquatic plant issues.

A northwestern botanist collected and prepared 35 leaf samples of rose pogonia (*Pogonia ophioglossoides*) as a representative population from “extreme northwestern MN” for a spatial genetics research project conducted by Jyotsna Sharma of Texas Tech University.

A presentation – *Life on the Edge* (biodiversity at the edge of the boreal biome) was made by MCBS as part of a week-long field course sponsored by Forests of the Far North--the Appalachian Forest School (Forests of the Far North course), Vermilion Community College (Nature of the North Woods series), and the Ely Field Naturalists.

<http://www.highlandssanctuary.org/WE/Minnesota/MN.htm>

A presentation and field trip was conducted by a MCBS ecologist for the Brainerd chapter of the “Wild Ones”, to provide information on the native plant community classification. The field trip involved classifying a jack pine forest near the Brainerd Arboretum and discussing the challenges facing Jack Pine in central Minnesota.

MCBS biologists were on the steering committee to plan the 2011 Bioblitz event at Lake Vermillion and Soudan Underground Mine State Parks and were leaders of several of the biological surveys conducted in June 2011.

Staff familiar with rare aquatic resources provided data and attended a meeting to identify conservation quality lakes in Brainerd in the spring of 2011.

A number of field trips were led by staff in the Aspen Parklands, the Minnesota River Valley, Renville County, and Jackson County.

A plant ecologist made a presentation introducing students to MCBS as part of a University of Minnesota Duluth Biology Department seminar series. This included historical context, current status, recent accomplishments, and examples of applications of results. A plant ecologist made another presentation on MCBS in Beltrami County at Bemidji State University.

## **Publications, web products**

A total of 62 plant species profiles were completed largely by MCBS botanists/plant ecologists during this project period so that the DNR's Rare Species Guide is up to date for all of the state's 439 listed species and available on DNR's website: [www.mndnr.gov/rsg](http://www.mndnr.gov/rsg). The guide was featured on the DNR website's front page in late winter 2011. This rare species website provides easy access to information about all of the 439 endangered, threatened and special concern plant and animal species in the state. It synthesizes knowledge from years of research and management experience by biologists, managers and researchers and is the state's authoritative reference on state-listed species. It is written for a broad audience so it is valuable for natural resource professionals preparing conservation and management plans, and environmental review documents. Citizens, educators and students are also finding this site useful as a reliable reference for improved understanding of these resources.

Updates and improvements were made to the MCBS webpage displaying [Bird Distribution Maps](#) for the Minnesota locations of 242 breeding birds based on observations by MCBS throughout the state.

The [Native Plant Community Classification](#) page was redesigned providing easier navigation and a link to the [NPC classification methods](#) description that provides background on how data were analyzed and interpreted utilizing vegetation plot data (relevés) to derive the DNR's current native plant community classification.

*A [web page](#) pertaining to the spread of White Nose Syndrome in bats was developed.*

Updates including links to other web locations were completed related to the list of Minnesota's vascular plants [MNTaxa: The State of Minnesota's Vascular Plant Checklist](#).

## **Aspen Parkland-Red River Valley natural history/guide book**

A contract with the University of Minnesota Press was finalized, along with various administrative agreements needed due to State procedures. The project manager and selected staff ecologists and biologists created a detailed book outline and publication schedule and are currently writing two major portions of the book: native plant community descriptions and the historical accounts. Software specifically selected to organize maps, graphics and photos has helped the project manager to effectively consolidate MCBS data and historical data collected from the region.

## **Amphibians and reptiles native to Minnesota**

As part of the project to update the book, *Amphibians and Reptiles Native to Minnesota*, the distribution maps are now available on the DNR website, [Minnesota's amphibian and reptile distribution maps](#). Species accounts for six salamander, three toad and eleven frog species are being revised and new accounts are being prepared for three species of salamanders.

## **Orchids of Minnesota**

New graphics, updated distribution maps, new photos of 35 orchid species and illustrations were completed as part of a new DNR book on Minnesota's orchids that will be published next year,

providing 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 that is in the final publication stages of review.

Updates were added for MCBS-related projects on the DNR's website:

[\*News from the Field 2010\*](#) , [\*News from the Field 2011\*](#)

[\*Minnesota's Remaining Native Prairie 100 Years After the Public Land Survey\*](#)

In association with the La Salle Lake project, a MCBS ecologist prepared a presentation and brochure for use at a tour of the area that included various regional DNR staff, Trust for Public Land, and the owner of La Salle Lake. The brochure was also used in a legislative bonding tour of the same area.

Three staff participated in a radio interview and field visits in northern Minnesota on August 5 with reporter, Stephanie Hemphill that were aired on Minnesota Public Radio and featured on MPR's related web page. "On the hunt for rare species".

<http://minnesota.publicradio.org/display/web/2009/08/10/rare-species/> ).

An April 2011 MPR presentation featured spring frog calls with commentary by a MCBS herpetologist in a short piece, "The sounds of spring at Carlos Avery".

The MCBS website now includes an update related to the new 2009 MCBS location of weak Arctic sedge (*Carex supina*). This population represents the only U.S. extant population outside of Alaska. For a description of this discovery see:

[http://www.dnr.state.mn.us/wildflowers/weak\\_arctic\\_sedge.html](http://www.dnr.state.mn.us/wildflowers/weak_arctic_sedge.html)

Author/botanist, Welby Smith has been the featured speaker at over 10 well-attended seminars and meetings that were an outcome of the recent DNR publication (2008) *Trees and Shrubs of Minnesota*.

A Native Prairie Bank site in Lac Qui Parle County was featured in a recently distributed 2009 DNR Compact Disk entitled *Prairie treasure--A native prairie bank story*. MCBS staff provided some of the content and reviewed the product that features a site surveyed by MCBS in the 1980's.

A manuscript entitled *Recent rediscovery of rare plants in temporary pools on Sioux Quartzite outcrops* was published in the proceedings of the 22<sup>nd</sup> North American Prairie conference that was held in Cedar Falls, Iowa in 2010.

## **V. TOTAL TRUST FUND PROJECT BUDGET:**

Personnel: \$1,950,000= FTE's: 8.5 ecologists, 3 botanists, 2 data managers, 1 information officer

There are four classified positions that are working all of part of the time on this project (3FTE); 11.5 unclassified staff. (11.5 FTE with professional technical contracts used for a portion of the

salary of one ecologist and .5 information manager due to state hiring restrictions-see attachment A).

Field equipment, including data recorders	\$30,000
Travel and Fleet	\$100,000
Field supplies	\$20,000

**Use of classified staff:** Robert Dana (.5 FTE ecologist) and Nancy Sather (1.0 FTE plant ecologist) are the two primary authors of the Aspen Parkland-Red River Valley natural history/ guide book that is specifically identified in Result #3. This book is an opportunity to publish and permanently archive knowledge and perspectives gained especially by these individuals due to decades of their field experience and investigation in the prairie and parkland region.

Robert's past funding has come from numerous sources. During FY10, he will continue to work on MCBS animal survey projects with temporary funding (Federal) provided by the State Wildlife Grants (as prioritized by the State Wildlife Action plan). The Landowner Incentive Program (LIP), a Federal Program proposed for discontinuation in December 2009, will provide a portion of his salary in early FY10 that enables him to complete a report for his recently completed LIP projects. Robert's expertise related to native prairie and insects will be utilized in Result 3 of the work program as related to management, conservation planning, local assistance and training. In terms of backfilling his position, other Divisional staff including regional staff primarily in the Scientific and Natural Area program, are performing some of the responsibilities once assigned to Robert.

Nancy Sather has been funded in the past by numerous state and federal sources as related to her work both with rare species and native plant communities. Recently much of her work on MCBS was funded by other sources that are no longer available.

Jared Cruz (.5FTE), a GIS specialist, will manage the shape files developed by the project. He will be responsible for adding to and maintaining the polygons of native plant communities (now numbering over 45,000) and the MCBS sites of biodiversity significance, so that polygons are accessible to customers using DNR's "Data Deli." Interpretative products of data for project outcomes presented on the web, in publications and on maps frequently require GIS personnel. Since this .5FTE of work is specific to MCBS, there is no one else needed to backfill to accomplish other Divisional tasks.

Welby Smith (1.0 FTE) is currently assigned to plant collection in the northern regions identified in the project. The size and inaccessibility of the project area make the addition of this highly experienced botanist desirable. Welby's botanical expertise related to verification of collections, comments on issues such as forest management, conservation planning, local assistance and botanical training are utilized as part of Result 3 of this work program. Some of Welby's previous responsibilities have been assigned to others (the coordination of the state list of rare vascular plants for example), or included projects that have been completed or eliminated from Divisional priorities. As one example of a completed product, Welby authored the *Trees and shrubs of Minnesota* published in 2008.

**Field equipment** for work in remote areas (such as tents, tarps, packs, stoves, data recorders, tree corers, GPS units, plant specimen driers)

**Travel and Fleet** includes field season use of state vehicles (“summer loaners”), lodging and related expenses when not camping, and food while in travel status.

**Field supplies** include items such as plant presses, batteries, air photos, maps, water resistant note books.

**TOTAL TRUST FUND PROJECT BUDGET: \$2,100,000**

**Explanation of Capital Expenditures Greater Than \$3,500** None

## **VI. PROJECT STRATEGY:**

**A. Project Partners:** The University of Minnesota Bell Museum of Natural History and the Science Museum of Minnesota provide resources for the curation of specimens collected by MCBS. Surveys of Red Lake Reservation lands will be conducted pending approval by the Red Lake Tribal Council. This request does not include funding for these partners.

**B. Project Impact and Long-term Strategy:** 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, exotic species expansion, and climate change. Baseline data on the distribution and ecology of Minnesota’s plants and animals, native plant communities, and functional landscapes are needed to prioritize actions to conserve and manage ecological systems and critical components of biological diversity. MCBS systematically collects, interprets, and delivers these baseline data to private and public users to help guide decision-making. MCBS prioritizes sites of biodiversity significance for conservation and as potential sites for monitoring of critical habitat and ecological functions. MCBS provides educational products and assists with training, planning, and environmental review. Funding will be requested from the Minnesota Legislature and other sources such as the State Wildlife Grants for an ongoing Minnesota Biological Survey that will extend beyond the completion of the first statewide assessment, proposed for completion in 2021.

### **Proposed future strategies for continuation of a Minnesota Biological Survey**

- 1) Increase technical assistance** from survey staff to interpret data (publications, web-products) and to train and deliver quality information to counties, municipalities, and managers making decisions that impact the state’s ecological systems and rare resources.
- 2) Data Gaps:** Survey areas where weather conditions, life-history cycles, lack of experts, etc. during the first survey left data gaps, and add areas once perceived as lower priority but threatened due to new issues (exotic species, climate change, disease, habitat fragmentation, demands for energy and genetic variability).
- 3) Aquatics:** Expand upon MCBS aquatic surveys and integrate complementary surveys to identify outstanding aquatic landscapes and sites (lakeshed, watershed, etc.).

**4) Establish long-term monitoring** of ecological conditions in priority sites of outstanding and high biodiversity significance and other representative ecological systems (watersheds, ecological land type associations). Track the distribution of plants and animals, with more detailed monitoring of selected species. Monitoring also will be required for specific resource management issues (examples: prairie grazing, recreational impacts, groundwater/calcareous fens, forest certification, climate change).

**5) Continue collaboration** with other resource agencies and with universities, colleges, and museums that provide results of new research, innovative tools and new concepts, collection repositories, and educational opportunities for the public.

**6) Continue information system development** to enter, archive, manage, and deliver data and information.

### **C. Other Funds Proposed to be Spent during the Project Period:**

**All funds are pending:**

**Heritage Enhancement:     \$1,159,000**

**General Fund                 \$   700,000**

**State Wildlife Action grant \$   500,000 (federal-funds most of the animal surveys)**

**D. Spending History:** 2 –year time frame prior to July 1, 2009= \$3,579,400

includes \$1,500,000 Trust Fund. **Legal Citation:** ML 2007, Chap.30, Sec2, Subd. 6a.

## **VII. DISSEMINATION:**

MCBS data are stored primarily in the Division of Ecological Resources information systems. 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 and 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 invests considerable time in publishing and distributing survey results in a variety of formats for various audiences. The DNR and Legislative libraries and other local information repositories (such as libraries within counties) are sent published products, including books, maps, reports, field guides and digital media. 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>

As MCBS nears completion, the publication of natural history books based on MCBS data is consistent with user's demands. The second edition of *Amphibians and reptiles native to Minnesota* will include updated distribution data from MCBS. For example, the four-toed salamander first documented in the state in 1994 has been recorded by MCBS at 50 additional locations since that time. A new book will feature the Aspen Parkland landscape of northwestern Minnesota along with the northwestern prairie region and Red River valley. Based on local collaborator interest, this book will include a guide to selected natural areas of the region. Focus

groups held in the northwestern region expressed strong interest in a book describing the natural history of the region and publication by a Minnesota publisher is planned.

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.

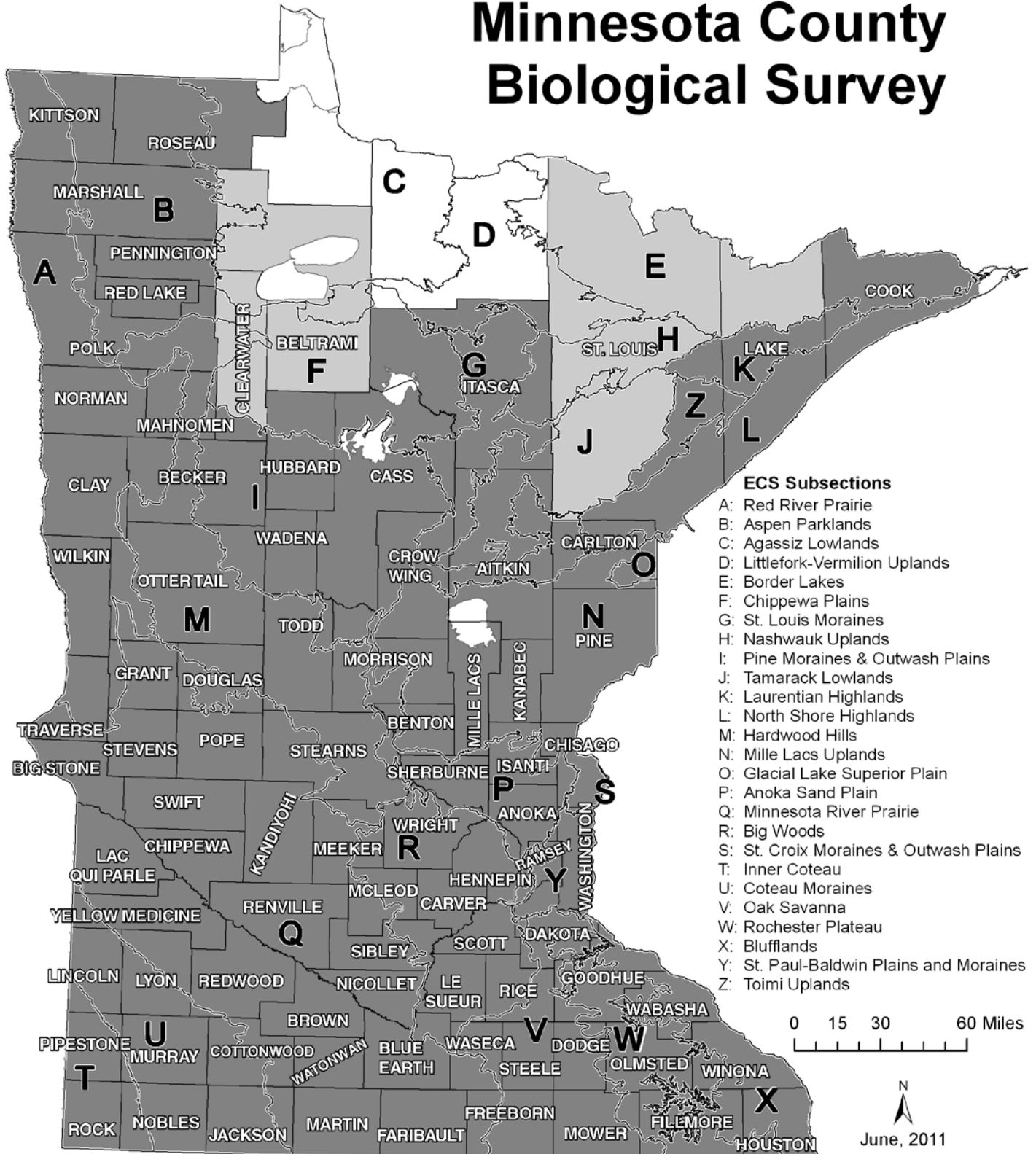
Physical collections are deposited at Minnesota repositories, primarily at the University of Minnesota's J.F. Bell Museum of Natural History and the Science Museum of Minnesota, St. Paul. As part of a larger network of museums and herbaria, these cooperators are essential to the documentation and sharing 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.

**VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than January 2010, October 2010, and March 2011. A final workprogram report and associated products will be submitted between June 30 and August 1, 2011 as requested by LCCMR.**

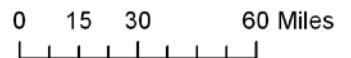
**IX. RESEARCH PROPOSALS: N/A**

# Minnesota County Biological Survey



### ECS Subsections

- A: Red River Prairie
- B: Aspen Parklands
- C: Agassiz Lowlands
- D: Littlefork-Vermilion Uplands
- E: Border Lakes
- F: Chippewa Plains
- G: St. Louis Moraines
- H: Nashauk Uplands
- I: Pine Moraines & Outwash Plains
- J: Tamarack Lowlands
- K: Laurentian Highlands
- L: North Shore Highlands
- M: Hardwood Hills
- N: Mille Lacs Uplands
- O: Glacial Lake Superior Plain
- P: Anoka Sand Plain
- Q: Minnesota River Prairie
- R: Big Woods
- S: St. Croix Moraines & Outwash Plains
- T: Inner Coteau
- U: Coteau Moraines
- V: Oak Savanna
- W: Rochester Plateau
- X: Blufflands
- Y: St. Paul-Baldwin Plains and Moraines
- Z: Toimi Uplands



June, 2011

Survey completed

Survey in progress





**Attachment A: Budget Detail for 2009 Projects**

**Proposal Title:** *Minnesota County Biological Survey*

**Project Manager Name:** Carmen Converse

**Trust Fund Appropriation:** \$ 2,100,000

2009 Trust Fund Budget	<u>Result 1 Budget:\$750,000</u>	Amount Spent	Balance	<u>Result 2 Budget: \$700,000</u>	Amount Spent	Balance	<u>Result 3 Budget: \$650,000</u>	Amount Spent	Balance	TOTAL FOR BUDGET ITEM	Amount Spent
	<i>Field Surveys</i>			<i>Information System Expansion</i>			<i>Guidance Conservation Management</i>				
<b>BUDGET ITEM</b>											
<b>PERSONNEL: Wages and benefits</b>											
Botanist (Karen Myhre)	50,000	37,492	12,508	60,000	64,242	-4,242	26,000	34,083	-8,083	136,000	135,817
Botanist (Lynden Gerdes)	60,000	66,196	-6,196	50,000	55,057	-5,057	26,000	11,286	14,714	136,000	132,539
Botanist (Welby Smith)*	70,000	58,212	11,788	40,000	11,658	28,342	56,000	71,947	-15,947	166,000	141,817
Information Officer (Tom Klein)							136,000	137,828	-1,828	136,000	137,828
Information manager (Sharron Nelson)				136,000	141,662	-5,662				136,000	141,662
GIS (.5FTE Jared Cruz)* .5 FTE vacant				124,000	109,390	14,610				124,000	109,390
Plant ecologist (Chel Anderson)	64,000	83,106	-19,106	40,000	48,273	-8,273	60,000	31,441	28,559	164,000	162,820
Plant ecologist (Vacant)/or contracts	50,000	89,216	-39,216	30,000	23,445	6,555	24,000	6,294	17,706	104,000	118,955
Plant ecologist (Ethan Perry)	60,000	38,162	21,838	40,000	59,527	-19,527	36,000	40,458	-4,458	136,000	138,147
Plant ecologist (Erika Rowe)	60,000	56,789	3,211	30,000	35,969	-5,969	30,000	27,668	2,332	120,000	120,426
Plant ecologist (Jason Johnson)	60,000	66,704	-6,704	40,000	33,063	6,937	20,000	19,486	514	120,000	119,253
Plant ecologist (Rebecca Holmstrom)	50,000	49,679	321	40,000	45,472	-5,472	30,000	18,156	11,844	120,000	113,307
Plant ecologist (Stacey Olszneski)	40,000	23,312	16,688	40,000	48,592	-8,592	20,000	8,191	11,809	100,000	80,095
Plant ecologist (Nancy Sather)*	26,000	13,786	12,214	30,000	66,063	-36,063	110,000	38,423	71,577	166,000	118,272
Ecologist (.5 FTE Robert Dana)*	10,000	26,104	-16,104		23,938	-23,938	76,000	40,725	35,275	86,000	90,767
<b>SALARIES</b>	<b>600,000</b>	<b>608,758</b>	<b>-8,758</b>	<b>700,000</b>	<b>766,351</b>	<b>-66,351</b>	<b>650,000</b>	<b>485,986</b>	<b>164,014</b>	<b>1,950,000</b>	<b>1,861,095</b>
<b>Field equipment (includes data recorders)*</b>	<b>30,000</b>	<b>32,629</b>	<b>-2,629</b>							<b>30,000</b>	<b>32,629</b>
<b>Travel expenses in Minnesota*</b>	<b>100,000</b>	<b>163,290</b>	<b>-63,290</b>							<b>100,000</b>	<b>163,290</b>
<b>field supplies*</b>	<b>20,000</b>	<b>12,662</b>	<b>7,338</b>							<b>20,000</b>	<b>12,662</b>
<b>COLUMN TOTAL</b>	<b>750,000</b>	<b>817,339</b>	<b>-67,339</b>	<b>700,000</b>	<b>766,351</b>	<b>-66,351</b>	<b>650,000</b>	<b>485,986</b>	<b>164,014</b>	<b>2,100,000</b>	<b>2,069,676</b>

Result 1 :Travel expenses exceeded proposed due to use of helicopters in the patterned peatlands as the most cost-effective access. This reduced staff expenses and increased travel especially in this part of the state. In addition, the impending shutdown of state government required unanticipated transport of field vehicles from distant areas to secure DNR offices in June 2011. Results 2 and 3: More staff time was recorded for Result #2 largely due to the data management time required to prepare for the publications outlined in Result #3, including lead staff for the book publications. All expenditures are derived from DNR coding used in timesheet and expenditure records. A new accounting system introduced in late spring 2010 for use in FY2012 that included FY2011 reporting complicated generation and compilation of reports.