2007 Project Abstract
For the Period Ending June 30, 2009

PROJECT TITLE: Minnesota County Biological Survey

PROJECT MANAGER: Carmen Converse
AFFILIATION: Department of Natural Resources (DNR)
MAILING ADDRESS: Box 25, 500 Lafayette Road
CITY/STATE/ZIP: St. Paul, Minnesota 55155
PHONE: (651) 259-5083
FAX: **(**651) 259-1811
E-MAIL: carmen.converse@dnr.state.mn.us
WEBSITE: http://www.dnr.state.mn.us/eco/mcbs/index.html
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: ML 2007, Chap. 30, Sec. 2, Subd. 6a.

APPROPRIATION AMOUNT: $1, 500,000

Overall Project Outcome and Results

This appropriation continued and accelerated the ongoing Minnesota County Biological Survey (MCBS), which identifies significant natural areas and systematically collects and interprets data on the distribution and ecology of native plant communities, rare plants, and rare animals. The information gathered by MCBS serves as a foundation for the conservation of critical components of Minnesota's biological diversity through ecological monitoring, environmental review, planning, and critical habitat protection.

In this phase of the MCBS, surveys were completed in Hubbard, Wadena, Itasca, Lincoln, Murray, Cottonwood, Jackson, Watonwan, and Martin counties. Surveys were accelerated in the Border Lakes and Nashwauk ecological subsections. Since 1987, MCBS has added 17,054 new rare feature records to DNR's Rare Features Database. Over 47,000 polygons of native plant communities and over 7,000 MCBS site polygons are available to external customers on DNR's "Data Deli", including MCBS sites of biodiversity significance. Aquatic plant data have been collected from 1,528 lakes.

New locations of animal species documented during this period included Prairie Vole, Chestnut-collared Longspur, Black-throated Blue Warbler, and Four-toed Salamander. Plants documented included *Najas guadalupensis var. olivacea*, a Great Lakes endemic aquatic plant and *Carex supina*, a cliff-dwelling sedge last observed in Minnesota in the 1930's. Sioux quartzite rock outcrop surveys yielded nearly 100 new records of rare plants. Since 1987, Twenty-one species and one hybrid not previously documented in Minnesota were recorded, with a 2008 addition of the aquatic plant *Potamogeton confervoides.*

Project Results Use and Dissemination

Data delivery and technical assistance were provided as related to:

- Forest certification
- DNR and US Forest Service forest planning
- Peatland management planning
- State land exchanges
- Woody and grasslands biomass guidelines
- Off Highway Vehicle guidelines
- State Wildlife Action plan implementation
- Quality lake identification
- Forest legacy projects

- Landscape collaborative planning
- Lake and native prairie monitoring
- Native prairie bank
- Updates to the state lists of rare species and calcareous fens.

Locally, aquatic plant data were delivered to lake associations, staff led field trips for county residents, and training sessions in plant community and plant identification. The publication, *Native plant communities and rare species of the Minnesota River Counties* was well-received by communities bordering the river corridor.

MCBS provided ecological evaluations for Franconia Bluffs, Seminary Fen, Butternut Valley Prairie, and Langhei Prairie that have since become Scientific and Natural Areas.

A statewide web map of the current extent of native prairie as compared to 100 years ago informs prairie ecosystem conservation planning. Another product is an easily downloaded booklet of the Ecological Systems in the Laurentian Mixed Forest Province.

Several MCBS related articles have been published in the *Minnesota Conservation Volunteer*; examples include *Elusive orchids* and *Rock pools on the prairie.*

Trust Fund 2007 Work Program Final Report

Date of Report: August 31, 2009
Date of Work Program Approval: June 5, 2007
Project Completion Date: This workprogram outlines activities and products to be completed during the two-year duration of this funding (ending June 30, 2009). 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

Program Manager: Carmen Converse
Affiliation: Department of Natural Resources
Mailing Address: Box 25, 500 Lafayette Road
City/State/ Zip: St. Paul, Minnesota 55155
Telephone Number: (651) 259-5083
E-mail Address: carmen.converse@dnr.state.mn.us
FAX Number: **(**651) 259-1811

Web Page address: http://www.dnr.state.mn.us/eco/mcbs/index.html **(see also map):** Surveys will be completed in Hubbard, Wadena, Itasca, Lincoln, Murray, Cottonwood, and Jackson counties. Surveys will begin and be completed in Watonwan and Martin counties. Surveys will be expanded in St Louis, Lake and Cook counties.

Total Trust Fund Project: $1,500,000	**Trust Fund Appropriation:**	**$1,500,000**
	Minus Amount Spent:	**$1,499,192**
	Equal Balance:	**$ 808**

Legal Citation: ML 2007, Chap. 30, Sec. 2, Subd. 6a.

Appropriation Language: Minnesota County Biological Survey
$1,500,000 is from the trust fund to the commissioner of natural resources to accelerate the biological survey that identifies significant natural areas and systematically collects and interprets data on the distribution and ecology of native plant communities, rare plants, and rare animals.

II. and III. FINAL PROJECT SUMMARY

This appropriation continued and accelerated the ongoing Minnesota County Biological Survey (MCBS), which identifies significant natural areas and systematically collects and interprets data on the distribution and ecology of native plant communities, rare plants, and rare animals. The information gathered by MCBS serves as a foundation for the conservation of critical components of Minnesota's biological diversity through ecological monitoring, environmental review, planning, and critical habitat protection.

In this phase of the MCBS, surveys were completed in Hubbard, Wadena, Itasca, Lincoln, Murray, Cottonwood, Jackson, Watonwan, and Martin counties. Surveys were accelerated in the Border Lakes and Nashwauk ecological subsections. Since 1987, MCBS has added 17,054 new rare feature records to DNR's Rare Features Database. Over 47,000 polygons of native plant communities and over 7,000 MCBS site polygons are available to external customers on DNR's "Data Deli", including MCBS sites of biodiversity significance. Aquatic plant data have been collected from 1,528 lakes.

New locations of animal species documented during this period included Prairie Vole, Chestnut-collared Longspur, Black-throated Blue Warbler, and Four-toed Salamander. Plants documented included *Najas guadalupensis var. olivacea*, a Great Lakes endemic aquatic plant and *Carex supina*, a cliff-dwelling sedge last observed in Minnesota in the 1930's. Sioux quartzite rock outcrop surveys yielded nearly 100 new records of rare plants. Since 1987, Twenty-one species and one hybrid not previously documented in Minnesota were recorded, with a 2008 addition of the aquatic plant *Potamogeton confervoides.*

IV. OUTLINE OF PROJECT RESULTS:

Result 1: Field Surveys (see attached map).

Description: The status and distribution of rare resources will be identified providing a basis for the maintenance of Minnesota's biological diversity 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 the DNR's Natural Heritage Information System 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 natural area and native plant community quality and condition also include the collection of vegetation samples using relevés 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, fish).

Summary Budget Information for Result 1:	**Trust Fund Budget:**	**$ 550,000**
	Amount Spent:	**$ 577,349**
	Balance:	**$ (27,349)**

Deliverable	**Completion Date**	**Budget**	**Status (see below)**
Review and site identification	August 2007 south/March 2008 north	120,000	
Coordination	July 2007-June 2009	100,000	
Field surveys	July-Oct 2007; April-Oct 2008; April-June 2009	330,000	

Final Report Summary June 30, 2009

Review and site identification

The Border Lakes ecological subsection (bordering Canada) was one focal area of potential survey site delineation during this project period. This included the development of a scoring procedure to determine survey priority areas. In preparation for the 2008 field surveys, the Vegetable Lakes Till Plain and Trout Lake Bedrock Complex Land Type Associations (LTAs) were selected for review. In the Trout Lake LTA, 28 preliminary sites encompassing 400,000 were prioritized for field survey. Additional aerial photography was acquired, and logistical plans were completed that included canoe-access trips to a subset of these sites.

Following the 2008 field season, biologists and ecologists again examined the available resources for the entire Border Lakes subsection to select additional potential rare species, native plant community and site targets for the 2009 field season. They reviewed GIS layers of topography, geology, soils, hydrology, past fires, digital elevation data, aerial photography, blowdown maps and rare species range distributions, including Canadian data. The 2009 field season focused on the Cook County portion of the subsection in order to simplify logistics. Survey included the Rove LTA, a large intact landscape with high quality fire-dependent forests, unusual cliffs, undeveloped lakes and potential habitat for numerous rare plant species.

For aquatic plants, a list of the lakes in the Trout Lake and Vegetable Lake LTAs that most closely matched (in water chemistry) each of the targeted rare aquatic plants was added to the evaluation process prior to the 2008 field season. The very rare Algae-like pondweed *(Potamogeton confervoides),* located during the 2008 field season prompted additional review of known habitat and water chemistry relationships in order to generate a list of lakes in the Border Lakes subsection potentially harboring additional populations of this aquatic plant.

Preliminary boundaries of sites were also identified for survey in the Nashwauk Uplands subsection (located mostly in St Louis County). Delineated sites were posted in spring 2009 on a DNR web site for review by other Divisions.

In Itasca County, the large lake-dominated landscape of the Itasca Moraine Land Type Association (commonly known as the Woman Lake Area) was identified as a targeted area for 2008 aquatic plant surveys.

In southwestern Minnesota, a review of air photos assisted in planning for final field work in the region.

Coordination

Northern Minnesota examples

Border Lakes subsection surveys were productive in part due to early, coordinated planning with staff from the Superior National Forest (SNF). A meeting was held in early 2008 to discuss priorities and logistics that included USFS and DNR ecologists and biologists, monitoring coordinators, and the SNF wilderness area coordinator.

A proposed emergency communication plan was prepared for MCBS staff conducting field surveys in the Border Lakes in coordination with the SNF. An application to conduct research in the Boundary Waters Canoe Area Wilderness (BWCAW) was prepared and approved by the SNF, along with procedures for obtaining BWCAW regular or administrative permits.

A workshop at Wolf Ridge Environmental Learning Center was held for botanists/plant ecologists from the SNF and MCBS to review a new guide to the bryophytes (mosses and liverworts) of the region (led by bryologist contractor J. Janssens).

Botanists conferred with *Botrychium* expert, Don Farrar and SNF biologist Jack Greenlee regarding their current and ongoing survey and monitoring interests in this group of fern species in northeastern Minnesota to help direct MCBS survey work in the Border Lakes. Many of these species are difficult to identify, complicating the knowledge of the distribution and status of species in the group. Botanical observations in the region are also being exchanged with Tony Reznicek (Michigan) and Mike Oldham (Ontario Conservation Data Center).

Rare aquatic plant surveys were conducted in some lakes lacking Division of Waters (DOW) lake numbers. A list of these was sent to DOW staff for lake number assignment so that all data collected on these lakes can be referenced throughout the DNR.

Ecologists met with Potlatch representatives to provide an update on survey outcomes conducted on some of their lands as part of a permit agreement with the company.

In the Nashwauk Uplands subsection, plant ecologists requested permission to survey lands owned by multiple private landowners (including some mining companies).

Native plant community mapping of McCarthy Beach State Park was completed in coordination with DNR Parks and Trails.

Southern Minnesota examples

Ecologists and biologists met with DNR wildlife and parks staff to relate results of survey work and discuss significant prairie and wetland sites.

Animal survey staff used facilities at Talcott Lake WMA as their field location for survey work in the area in 2008.

A cooperative agreement between the North Heron Lake Game Producers Association and animal survey staff helped to provide access to much of the lake through their lands as well as providing lodging for field staff.

At the request of U.S. Fish and Wildlife Service staff, plant ecologist Fred Harris surveyed rare plants at Big Stone National Wildlife Refuge. One rock outcrop supports large populations of several rare plants including seedlings of mud plantain *(Heteranthera limosa),* one of very few locations of this species in the state.

Other coordination

MCBS staff received training in Wilderness First Aid. "First Responders" and medical staff from Itasca County and Cook County were instructors in the training, providing excellent local perspectives.

In preparation for the proposed statewide Breeding Bird Atlas project, ornithologist Steve Stucker summarized the extensive information collected by MCBS since 1987 related to records of both common and rare species of birds. This is part of a larger effort to summarize data on common animals throughout the Division of Ecological Resources as part of the State Wildlife Action Plan implementation.

Plant ecologists from Minnesota, Wisconsin, Michigan, and NatureServe participated in discussions on the evaluation of forest types in a meeting held at Marine on St. Croix in April 2008. (NatureServe is a national consortium of programs that include biological surveys similar to MCBS).

The Clean Water Legacy Act has focused considerable attention on impaired waters. Another portion of the Act includes the identification and protection of surface waters and shorelines representative of the highest quality locations in the state (i.e. "Legacy Waters"). MCBS participated in a work team to develop a preliminary series of proposed statewide legacy lakes. Staff also participated in the discussions related to the development of a new acquisition plan for Aquatic Management Areas.

Field Surveys

Southern Minnesota
Surveys were completed in Lincoln, Murray, Cottonwood, Jackson, Watonwan and Martin counties.

Highlights
Mammal surveys resulted in the location of three listed species and seven species of greatest conservation need as identified in the State Wildlife Action Plan. These included: American Badger *(Taxidea taxus),* Prairie Vole *(Microtus ochrogaster),* Northern Grasshopper Mouse *(Onychomys leucogaster),* Western Harvest Mouse *(Reithrodontomys megalotis),* and Richardson's Ground Squirrel *(Spermophilus richardsonii).* Bats recorded using the ANABAT tool included: Northern Myotis *(Myotis septentrionalis)* and Eastern Pipistrelle *(Pipistrellus subflavus).*

Surveys for rare jumping spiders documented new records for six species, including the Ant-mimic *(Tutelina hartii),* which had previously been located only two times in Minnesota.

The upper Redwood and upper Cottonwood rivers, Plum Creek, and Great Bend vicinity were some of the focal areas of native plant community surveys.

Twenty-two new calcareous fen locations were documented, often found in association with the Des Moines lobe outwash deposits along major drainages (Rock River and Chanarambie Creek) southwest of the Bemis Moraine. New populations of the calcareous fen plants were located in each of the new fen locations, including hair-like beak-rush (*Rhynchospora capillacea*), marsh arrowgrass *(Triglochin palustris)* and few-flowered spike-rush *(Eleocharis quinquifolius).*

Populations of two federally- protected species were confirmed including western prairie fringed orchid (*Platanthera praeclara*) and a new location of prairie bush clover (*Lespedeza leptostachya*).

Sioux quartzite rock outcrop communities were a focus of botanical surveys. Nearly 100 new locations of rare plants related to rock outcrop communities were an impressive outcome of botanical surveys due largely to excellent timing by survey botanists. By carefully tracking the phenology of this group of often-ephemeral plants, botanists were able to conduct field surveys at the prime time of plant visibility. One example was the documentation of a large population of pigmyweed (*Crassula aquatica*), a small plant inhabiting rock outcrop pools. It was recorded at Blue Mounds State Park and represents only the third known location for this species in southwestern Minnesota.

Northern Minnesota
Surveys of native plant communities and MCBS sites were completed in Hubbard, Itasca, and Wadena counties. Surveys of rare plants and native plant communities were conducted in the Border Lakes and Nashwauk Uplands ecological subsections of Lake, Cook and St Louis counties.

Highlights Hubbard, Wadena and Itasca counties
Ram's-head orchid (*Cypripedium arietinum*) was observed at two new locations in Hubbard County. A population of 135 plants was observed in Wolf Lake Wildlife Management Area (WMA) and 11 plants were found in a sloping black spruce swamp on Hubbard County land. A poor fen in Wolf Lake WMA also supports a large population of another orchid, dragon's mouth (*Arethusa bulbosa*).

Oakes' pondweed *(Potamogeton oakesianus)* occurring at Finn Lake in Wadena County is one of the few very rare plant species located in Wadena County.

In western Itasca County numerous small hardwood forests were surveyed with many showing degradation due to European earthworms. The tree canopy in some of the forests is dominated by bur oak (*Quercus macrocarpa)* and basswood (*Tilia americana)*.

The common down liverwort *(Trichocolea tomentella)* was located in Itasca County, representing the fourth observation of this species in the state. Other plant species of interest observed in the county include triangle moonwort *(Botrychium lanceolatum)*, pale moonwort *(Botrychium pallidum)*, and least moonwort *(Botrychium simplex).*

A Northern Bog Lemming (*Synaptomys borealis*) was documented in Itasca County, confirming a previous 1993 observation at the site made by University of Minnesota Duluth students and a professor that seemed very reliable, but lacked an enduring physical collection for documentation. (The 2008 collection was deposited in the Bell Museum). The site is a small, isolated black spruce swamp far removed from any large peatland complexes, representing a substantial southern expansion of the known Minnesota range of the species.

Fish surveys in Itasca County resulted in 37 records of rare fish, including Least Darter (*Etheostoma microperca*), Pugnose Shiner (*Notropis anogenus),* Longear Sunfish (*Lepomis megalotis*), Greater Redhorse (*Moxostoma valenciennesi,)* and Northern Brook Lamprey (*Ichthyomyzon fossor).*

Five bat recording stations were established in Itasca County with the first seasonal record of a Big Brown Bat (*Eptesicus fuscus*) occurring in early April 2008.

Four-toed Salamanders *(Hemidactylium scutatum)* were recorded in 13 locations on state, federal, county, and private lands. A location of Blanding's Turtle *(Emydoidea blandingii)* was recorded just west of the Mississippi River immediately north of the Aitkin/Itasca county line, the first Blanding's Turtle documented in Itasca County.

Bird survey staff completed 163 point counts in Itasca County and produced 241 species lists. A total of 167 potential breeding bird species were found, representing the third highest species total for a county documented by MCBS. Rare species noted included Trumpeter Swan (5), American Bittern (12), Bald Eagle, Red-shouldered Hawk (2), Yellow Rail (6), Sandhill Crane (5), Black-throated Blue Warbler (2), and Nelson's Sharp-tailed Sparrow (1).

Other species of interest recorded included Northern Goshawk (1 nest), Merlin (2), Great Gray Owl (3), American Three-toed Woodpecker (1), Olive-sided Flycatcher (16), Black-billed Magpie (8), Boreal Chickadee (5), Ruby-crowned Kinglet (22), Golden-winged Warbler (15), Red Crossbill (2), and White-winged Crossbill (37).

Boreal forest birds were particularly well-represented—more Ruby-crowned Kinglets were found in one year than in all previous years combined. White-winged Crossbills were extremely common, with the 37+ records far surpassing the 19 records from all previous years combined.

Highlights Border Lakes

The Border Lakes surveys of the Cook County portion of the subsection were accelerated in the spring of 2009. Survey plant ecologists documented high quality, target native plant communities including Red Pine-White Pine Woodland (Canadian Shield), Red Pine-White Pine Woodland (Northeastern Bedrock) and Black Spruce-Jack Pine Woodland. Records include notes on vegetation response to disturbance (fire and wind events, past management), locations of legacy patches (serving as source areas), cold drainages and wetland complexes (serving as refugia). These notes, along with vegetation samples (relevés) and plant species lists (for habitats such as cliff faces, lakes, small seepages and wetlands) assist with application of site ranking criteria.

New locations of the following rare plants have been documented in the Border Lakes: maidenhair spleenwort (*Asplenium trichomanes*), pale moonwort (*Botrychium pallidum*), black hawthorn (*Crataegus douglasii*), small-flowered woodrush (*Luzula parviflora*), Rocky Mountain woodsia (*Woodsia scopulina*), Alpine woodsia (*W. alpina*), moonwort (*Botrychium lunaria*), Mead's sedge (*Carex media*), large-leaved sandwort (*Moerhingia macrophylla*), White Mountain saxifrage (*Saxifraga paniculata*), Arabian whitlow grass (*Draba arabisans*), American shore plantain (*Littorella uniflora*), slender water milfoil (*Myriophyllum tenellum*), blunt-fruited sweet cicely (*Osmorhiza depauperata*), purple reedgrass (*Calamagrostis purpurascens*). Weak Arctic sedge *(Carex supina),* a cliff-dwelling sedge not found in the state since the 1930's was located in a cliff of the Rove formation.

Fish surveys resulted in collection of several species identified as "species of greatest conservation need" in Minnesota's State Wildlife Action Plan. These include Lake Chub and several species of Ciscos that have been sent to experts to verify identification (likely either Nipigon Cisco and/or Shortjaw Cisco). Two species reaching the southern edge of their ranges were documented: Ninespine Stickleback and Longnose Sucker.

Bird survey staff completed 150 point counts and compiled 247 species in the Border Lakes in 2009. A total of 123 potential breeding bird species were recorded. This included 135 records of rare species: Trumpeter Swan (3), American Bittern (8), Northern Goshawk (1 sighting), Sandhill Crane (3), and Black-throated Blue Warbler (120).

Other species of interest included Boreal Chickadee (13), Ruby-crowned Kinglet (81), Tennessee Warbler (63), Pine Warbler (20), Wilson's Warbler (20), Red Crossbill (2), and White-winged Crossbill (9).

Several boreal forest birds were found in greater numbers than in any other county previously surveyed. Ruby-crowned Kinglets were found at more than 80 locations in 2009, representing a nearly 200% increase in records over all previous years combined. More than 60 singing male Tennessee Warblers were found in 2009. Previously, MCBS had found this species at only two locations elsewhere in northern Minnesota. Black-throated Blue Warblers were relatively common, occurring in relatively mature closed-canopy forests, typically on steep slopes with a dense shrub layer usually dominated by mountain maple *(Acer spicatum).*

Amphibian and reptile surveys did not result in new records of rare species in the Border Lakes. Bat survey call records were obtained and will be analyzed in the winter 2009-10.

Highlights aquatic plant surveys
Border Lakes surveys revealed new locations of Robbins' spikerush (*Eleocharis robbinsii*) and a rather surprising find of lance-leaved violet (*Viola lanceolata*) north of Burntside Lake. A collection of the aquatic species Algae-like pondweed *(Potamogeton confervoides),* a very fine-leaved pondweed, was reported from a small bog pond in the Border Lakes and represents the first record in the state of the species.

Vasey's pondweed *(Potamogeton vaseyi)* and the leafless water milfoil (*Myriophyllum tenellum)* were documented from Ozawindib Lake in Itasca State Park and spiny coontail (*Ceratophyllum echinatum)* was documented at Deer Park in Clearwater County. The slender water naiad *(Najas gracillima)* was found in small lakes in Becker, Hubbard and Clearwater counties. Humped bladderwort (*Utricularia gibba)* was documented in small lakes in Clearwater, Becker, Hubbard and Wadena counties.

Olivaceous Guadalupe Island naiad (*Najas guadalupensis var. olivacea),* a Great Lakes endemic, was found in Beden and Schroeder Lakes in Hubbard County, Hazel Lake in Wadena County and Sand Lake in Cass County.

Rare aquatic plant searches were completed in 81 lakes in Cass County and 10 lakes in the Trout Lake LTA in the Border Lakes subsection. Some highlights are beautiful pondweed (*Potamogeton pulcher*) in Egg Lake in Cass County, and American shore plantain (*Littorella uniflora*) in Nels Lake in the Border Lakes.

By the end of the 2008 field season, a total of 1,528 lakes in 44 counties have been surveyed for rare aquatic plants.

Result 2: Information System Expansion

Description: The Natural Heritage Information System will be expanded by additions to the component databases, including entry of information into a Geographic Information

System. This will result in the distribution of information to individuals, organizations, and agencies having diverse natural resources goals.

Procedure: Natural Heritage Information System: All data collected by MCBS are entered into the related map, manual and computerized files that make up the Natural Heritage Information System. Some of the databases include: rare features (geographic), relevé (vegetation plot samples), county checklists of plants and animal, 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, and shape files are made available on the DNR's Data Deli accessible through the website. Rare species locations are entered into BIOTICS, an information system developed internationally for storing and distributing rare features data such as that collected by MCBS. 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, data portals, relational databases, global positioning systems, and field data recorders. MCBS participates in DNR's efforts to develop shared databases and data standards, and improvements in information delivery using new digital media and the web. MCBS also coordinates with other statewide and national information systems 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:**	**$ 500,000**
	Amount Spent:	**$ 600,272**
	Balance:	**$ (100,272)**

Deliverable	**Completion Date**	**Budget**	**Status (see below)**
Data available in Natural Heritage Information System	January 2008 # records added October 2008 #records added March 2009 #records added June 2009 #records added	425,000	
Information	Updates with each status report	25,000	

System Development			
Preparation of Collections	March 2008 #collections deposited June 2009 #collections deposited	50,000	

Final Report Summary June 30, 2009

Data available in Natural Heritage Information System
Since July 2007, new records of 951 rare features were added to the Rare Features Database. Since MCBS began in 1987, 17,054 new records have been added by MCBS. Since July 2007, 83 vegetation samples (relevés) were added to the statewide Relevé Database, for a total MCBS contribution of 3,880 of the 8,841 total database records. Since July 2007, polygons of about 3,000 MCBS sites of Biodiversity Significance and 11,884 polygons of native plant communities were added to the dataset that resides on DNR's "Data Deli." Statewide, MCBS has added a total of 7,105 MCBS site polygons and 47,398 native plant community polygons since 1987.

Information System Development
Development of a data entry tool using GIS has resulted in more rapid report and map generation related to MCBS sites of biodiversity significance.

Ecological Evaluations describe and interpret the ecological features of some of the most ecologically significant sites evaluated by MCBS. These now have standard templates for presentation and are stored along with historical evaluations in a centralized file. Some of these are also presented on the DNR website.

Native plant community shape files are available to the public on DNR's Data Deli. During this work period, the "year of survey" was added to attribute files associated with the shape files (mapped polygons) that can be obtained by GIS users. This will ensure that the client is aware of the currency of the native plant community polygon data they are retrieving, some of which are now over 20 years old.

Two Corrective Action Requests related to the state's Forest Certification required data summaries created using GIS resources. As one part of this process, names of native plant communities stored in version 1.5 of the DNR's native plant community classification were cross-walked to the version 2.0 classification.

Animal survey staff have analyzed and identified approximately 60,400 bat calls recorded during the 2007 field season in southwestern Minnesota, as well as nearly 11,000 calls recorded in Clearwater County at Itasca State Park in 2005. The analysis of the 2009 Itasca county bat call files continues (30,000 records).

As part of a plan to update the book, *Amphibians and Reptiles of Minnesota*, Carol Hall and her staff sorted, copied, and filed all herp images from all MCBS years based upon year, number, and species.

Plant Name Database: A standard list of plant names and synonymy is critical for effective long-term data collection and analyses proposed for monitoring activities, including issues ranging from climate change to assessment of success of restoration and management activities. Collaboration with national organizations such as NatureServe and federal agencies, along with state museums, universities, colleges and specialists (such as bryologists) is underway as part of this project. Plant ecologist Stacey Olszewski hired during this period has provided substantial assistance to database development.

Field Data Recorders: MCBS, along with others in the Division of Ecological Resources met to explore potential collaboration on programming costs for field hand held data recorders. They determined that the cost was too excessive and that adequate programming assistance was not available. Continued exploration of these tools is probable. Bat recordings continue to be the most successful computerized field data collection tool.

Training of staff in the use of a new version of the computer-mapping tool, ARCGIS caused some delays in mapping, but most ecologists and biologists successfully transferred to the new version.

Specific funding provided through LCCMR for GIS staff, an information officer (web applications) and a plant ecologist with computer skills has been critical to most of the progress related above. However, due to changes in the organization and operation of information system management in the Division and in the Department, assistance especially with programming, has been inadequate to meet the demands.

Preparation of Collections

The Bell Museum herbarium acknowledged the donation of 597 plant collections in fiscal year 2008 and 787 collections in fiscal year 2009. MCBS continues to support the preparation of these collections through staff assistance at the herbarium at least one day per week.

The Bell Museum herbarium worked with MCBS on an agreement to satisfy a new national requirement for labeling plant collections with permit numbers when required for collecting plants in a managed area (such as a National Wildlife Refuge). A DNR permit reference number is being recorded on labels submitted to the herbarium with plant collections that began with field collections made in 2008.

Major progress was made during this project period, working with museums on the proper curation of the fluid-preserved animal specimens.

Result 3: Data Distribution and Interpretation

Description: Private and public protection and ecological management of sites of biodiversity significance identified by MCBS will be promoted through the interpretation

of data and distribution of information through maps, electronic formats, publications, presentations and technical assistance.

Summary Budget Information for Result 3: **Trust Fund Budget: $ 450,000**
Amount Spent: $ 321,571
Balance: $ 128,429

Deliverable	Completion Date	Budget	Status (see below)
MCBS data on sites and native plant communities on DNR Data Deli	Two counties: Oct 2007; Two counties: March 2008; Four counties: June 2009	75,000	
Technical assistance, data interpretation	July 2007-June 2009	200,000	
Publications, web products.	July 2007-June 2009	175,000	

Final Report Summary June 30, 2009

MCBS data on sites and native plant communities were added to the DNR Data Deli for a total of eleven counties.

Technical Assistance and Data Interpretation

General
Staff provided data and technical interpretation as related to the DNR's Conservation Agenda, Climate Change, Forest Certification, State Forest management planning, Forest Legacy project, implementation of the State Wildlife Action Plan, woody and grasslands biomass guidelines, Lakes and Clean Water Legacy, the watershed assessment tool, native prairie monitoring and restoration, and the Lessard-Sams Outdoor Heritage funding proposals.

Plant ecologists worked with other DNR ecologists and DNR park managers and resource staff to plan and lead field training classes for local managers within and outside of the agency in the use of the new native plant community field guides: *Field Guide to the Native Plant Communities of Minnesota: the Prairie Parkland and Tallgrass Aspen Parklands Provinces* and *Field Guide to the Native Plant Communities of Minnesota: the Eastern Broadleaf Forest Province.* Training session locations included Glacial Lake State Park, Kilen Woods State Park and Nerstrand Big Woods State Park.

As related to the state dual Forest Certification, MCBS plant ecologists have provided major assistance, providing data to satisfy a corrective action request related to high conservation value forests. They provided descriptions and reviewed lists of proposed outstanding and high MCBS sites proposed for consideration as HCVF in two ecological sections. Plant ecologist Mike Lee was a member of DNR's Internal Audit Team for Forest Certification that focused on OHV issues.

All staff contributed to the most recent review of the state list of endangered, threatened and special concern species in response to a 1 July 2009 deadline presented to the Division coincidently with 2009 field season preparation in the spring. Staff with botanical expertise worked well with Sarah Wren (Ecological Resources staff assigned to the vascular plant list) to provide their technical input prior to major field season obligations. She then worked with botanist Welby Smith between his field work assignments to draft "Statements of Need and Reasonableness" required for the official update of the list.

Plant ecologist, Nancy Sather coordinated with botanists from the Chicago Botanical Garden on a project to investigate the hybridization of the federally threatened prairie bush clover *(Lespedeza leptostachya)* and the common round-headed bush clover *(L. capitata)*, on some of the MCBS survey sites in Jackson and Cottonwood counties.

The DNR maintains a state list of known locations of calcareous fens. In January 2008 MCBS ecologists provided information on new locations of fens in order to update this list. Under the Minnesota Wetlands Conservation Act (WCA), impacts to calcareous seepage fens are regulated by the DNR. They may not be filled, drained, or otherwise degraded, wholly or partially, by any activity, unless the commissioner of natural resources, under an approved management plan, decides some alteration is necessary (Minn. Statutes 103G.223). In addition to the protection afforded by the WCA, destruction of any state-threatened plants occurring on a calcareous fen may be regulated under Minnesota's endangered species law (Minn. Statutes 84.0895).

Amphibian and reptile surveys documented some unusually dark tiger salamanders *(Ambystomid)* morphs in western Minnesota in 2006 and 2007. Amphibian and Reptile Specialist, Carol Hall is working with researchers at the Bell Museum of Natural History to provide taxonomic clarification of this *Ambystomid* group in western Minnesota. Staff participated in and assisted with the University of Minnesota's Climate Change meetings held in early June 2008.

Prairie Conservation planning and protection

MCBS compiled a statewide map displaying the current known extent of Minnesota's native prairie as compared to prairie recorded about 100 years ago during the public land surveys. Of the 18 million acres that once covered about a third of the state, less than 200,000 acres remains based on MCBS data. This map is available on the web and was widely referenced as part of recent accelerated discussions of issues related to prairie ecosystem conservation including: climate change/monitoring; carbon sequestration; game and non-game wildlife habitat; migratory waterfowl; biofuel production; watershed management (erosion, sedimentation, ditching, drainage etc); exotic species expansion; roadside wildlife habitat; private landowner grassland protection incentive programs; maintenance of adaptability, resilience and genetic diversity of native species, prairie plant communities and processes; and opportunities for growth of nurseries and restoration enterprises.

Data are being used by The Nature Conservancy as part of the Minnesota proposal for a larger Prairie Coteau conservation project (that includes South Dakota).

MCBS worked closely with others in the Division including the Scientific and Natural Area program and the associated prairie private lands programs to assess the current status of protection of prairie habitats based on the near-completion of MCBS surveys in the prairie part of the state. In the fall of 2008, meetings were held in collaboration with Ecological Resources regional staff to review the status and opportunities for additional protection of prairies in the NW, Southern and Central DNR regions. An analysis primarily of MCBS sites of Outstanding and High biodiversity significance resulted in detailed prioritization of opportunities for private or public prairie protection focused on the highest quality prairies.

Langhei Prairie in Pope County and Butternut Valley Prairie in Blue Earth County are two prairie sites surveyed by MCBS that are becoming Scientific and Natural Areas (SNAs).

Native Prairie Bank agreements were completed in Houston, Lac Qui Parle, Murray, Swift, and Pipestone counties.

Plant ecologist Fred Harris prepared an ecological evaluation and presented a landscape area located in western Yellow Medicine County for consideration as a future SNA for approval by the Commissioner's Advisory Committee.

An easement on a prairie site in Lac Qui Parle County was approved as part of a Doris Duke grant for conservation. The site is located adjacent to Plover Prairie and Lac Qui Parle WMA in western MN. A video of the area was made by DNR's Division of Information and Education and will be released on DNR's website.

Ecological Resources is using MCBS data in discussions with the DNR Wildlife Division regarding prioritization of conservation action related to the Working Lands projects.

The results of the MCBS survey were presented to the Pipestone County Board. The meeting was also attended by Pipestone County planning/GIS staff and members of the Friends of Pipestone National Monument. The county staff were interested in how to use the GIS polygons on their website.

Southern Minnesota
Progress continues on the conservation and management of the Franconia Bluffs Scientific and Natural Area and adjacent lands along the St Croix River that include many sites of biodiversity significance identified by MCBS.

A special event celebrating the new Seminary Fen SNA marked the conservation as a natural area of another site surveyed by MCBS.

Plant ecologist Fred Harris made a presentation to the Native Plant Society (NPS) entitled "Rare plants in temporary pools on bedrock Outcrops: Recent discoveries on some of southwest Minnesota's most scenic and threatened habitats." Over 80 people attended and the presentation was summarized in an article published in the NPS Spring 2008 newsletter.

In June, plant ecologist Fred Harris led a tour that included Blue Mounds State Park and a prairie bank site. He led another for staff of the USFWS, Rock County, and members of the public from Luverne to view rare plants in rock pools at Touch the Sky National Wildlife Refuge. Ecologist Nancy Sather conducted a wildflower hike in Lyon County's Garvin Park, made a presentation about environmental history at Southwest Minnesota State University, and led field trips to fens in Murray and Cottonwood counties.

Wright County is using MCBS sites of biodiversity significance as one of the resources to develop a proposed resource land protection policy for the county as part of its land-use planning and land owner assistance process.

Northern Minnesota

Manitou Collaborative: MCBS's northern coordinator, Lawson Gerdes, served as the Ecological Resources representative on the DNR's NE Adaptive Forest Management Team associated with the Collaborative.

Sand Lake Seven Beavers Collaborative: The northern coordinator, Lawson Gerdes led the development of a guiding document (goals, objectives, strategies) for the collaborative and presented a draft to full collaborative. She helped to develop a fire protection and prescribed fire strategy, assisted with the identification of areas for white pine diversity plantings, finalization of the Big Lake patch management project, and reviewed a proposal for adding DNR harvest units to a fragmented area called East River patch.

Plant ecologists cross-walked the Ontario Classification Types to Minnesota native plant communities and provided other professional advice on the native plant communities relevant to the considerations of the Old Growth Lowland Conifer Task Force.

Northern plant ecologists participated in joint site visits with foresters in Outstanding and High-ranked Sites of biodiversity as related to implementation of the state forest management plans. One example of a discussion about action was related to a jack pine-black spruce-balsam fir stand on the Cloquet River due to the rarity of this type.

Plant ecologists provided comments on the 10-year stand exam list for the DNR's State Forest Plan being developed for the Chippewa Plains-Pine Moraines subsections**.**

Information on MCBS data and procedures was provided to the Superior National Forest (SNF) Monitoring Program coordinator to assist in developing a Forest-wide Inventory and Mapping protocol, as part of a USFS Region 9 Resource Inventory pilot project.

Plant ecologist Chel Anderson participated in the review and commentary of the SNF project areas *Glacier* and *Clara* where management actions are implemented as outlined in the Forest Plan.

Botanist Lynden Gerdes provided a one-day *Huperzia* (fir-mosses) field identification workshop to biologists from the SNF. The group observed species morphological characteristics and discussed how to confidently identify the various species.

Northern staff led a field trip of SNF biologists to assess the survival potential of a population of the state endangered orchid, auricled twayblade (*Listera auriculata),* that was heavily covered by debris from the recent blow down.

Northern staff assisted decisions regarding DNR land asset management and land exchanges. For example one ecologist reviewed a list of parcels of state land proposed for sale or exchange with the county and commented that an 80-acre parcel on the list contained designated old-growth pine.

Staff assisted with interpretation of the Red Lake Peatlands by helping to write a descriptive document and leading part of a field tour by LCCMR members on the boardwalk at Red Lake.

There is a current effort to develop management plans for the Scientific and Natural Areas found in the peatland region. As requested by the NW Ecological Resources staff, plant ecologist Norm Aaseng made a presentation regarding the history of the survey of the patterned peatlands and protection at a meeting of knowledgeable individuals interested in the peatland region. Gerda Nordquist and Steve Stucker have also provided information on birds and mammals as related to the management planning process.

Norm Aaseng provided comments on Beaches WMA Ditching Restoration in the Palmville Project.

Plant ecologists met with the Itasca County Land Department to exchange ideas about potential High Conservation Value Forests as related to their forest certification.

Information about survey results in Itasca County was provided as part of planning for the recent easements that are part of the Forest Legacy project.

Staff met with St. Louis County land department staff to deliver and interpret data on native plant communities in SLC, for their county NPC mapping project.

The northern coordinator, Lawson Gerdes, met with Brian Kernohan with Forest Capital Partners (FCP) to discuss information collected by the Survey that might assist their planning as they implement SFI forest certification standards. FCP is an investment firm that acquires and manages large-scale investment-grade forest in North America.

Staff met with the Potlatch biologist to relate 2007 survey results on Potlatch lands, including the location of a new population of bog adder's-mouth (*Malaxis paludosa*) and high quality locations of the rare native plant community, jack pine woodlands.
The northern coordinator later met with Potlatch regarding jack pine woodland issues and the potential for alternative management ideas for this fire-dependent system

Staff provided feedback to the Encampment Forest Association (North Shore Highlands) on their ongoing planning process regarding conservation of lands surrounding the Encampment Forest Association property.

Information related to MCBS sites between Duluth and Two Harbors was provided by plant ecologist Ethan Perry to help plan the route of the Superior Hiking Trail.

Plant ecologist Rebecca Anderson reviewed the McCarthy Beach State Park management plan and provided information on the landscape context of the park in the region. She had previously mapped the native plant communities in the park.

Aquatic plants

MCBS continues to conduct rare aquatic plant and nongame fish surveys in lakes in many parts of the state. Based on this information staff developed a draft list of "quality lakes" for each Ecological Classification System (ECS) Subsection. Primary consideration for this draft list included the presence of high quality aquatic plant communities, presence of rare aquatic plant species, intact shoreline/degree of alteration of the lakeshed. Other factors considered were the diversity of aquatic plant species, presence of unique aquatic communities, presence of a suite of rare aquatic plant species at one lake, absence of exotic and disturbance species, amount of lakeshore development, alteration of the lake, and general assessment of the lake.

The aquatic botanist, Karen Myhre, delivered reports that include plant species lists for 1,528 lakes surveyed by MCBS to date to the DNR central office for inclusion in the statewide lake files bank maintained by Fisheries. DNR Fisheries Area offices directly received data for aquatic plant species observed by MCBS for the lakes in their areas. For example, files were provided for the 90 lakes surveyed in the Finland Fisheries Area. That area office also received assistance in the identification of the rare plant, small white waterlily (*Nymphaea leibergii*). Area fisheries managers responded that the data will assist with both their identification skills related to the uncommon aquatic plants and with considerations related to aquatic plant management, including chemical treatments of lakes and rare species locations.

Karen assisted with Eco Resources aquatic plant training workshops in June 2009. She provided mounted specimens of rare aquatic plant species and presented an update on "Minnesota's Rare Aquatic and Shoreline Vascular Plant Species 2009" and collecting guidelines: "Rare Aquatic Plant Collection Guidance" and "Guidance on Documenting and Collecting Rare Plants".

MCBS also provided information to DNR Fisheries about northeastern aquatic plant species to inform the Sentinel Lake project (that includes point-intercept vegetation surveys). This also included the identification of several rare species: broadleaf-water milfoil *(Myriophyllum heterophyllum)* and discussion of potential monitoring of the rare species, sheathed pondweed *(Stuckenia vaginata),* that has a population at one of the Sentinel Lakes.

Final reports for Cross and Pokegema Lake were sent to the Pokegama Lake Association Lake Improvement Committee along with information about the rare aquatic plant species, Walter's barnyard grass (*Echinochloa walteri*), and suggestions for a management plan.

The Aitkin Water Planning Task Force received MCBS aquatic plant data for their use as they update their water plan (also for use by several other lake and watershed groups).

Final lake reports for the north and south basins of Sand Lake, Cass County were provided to the president of the Sand Lake Association.

Publications and web products

Welby Smith, author of the 2008 DNR book, *Trees and Shrubs of Minnesota* made multiple presentations on the book to groups such as the Native Plant Society, Landscape Associations, and bookstores. His years of technical research and data compilation included data from other MCBS botanists. The excellent photos, text and graphics resulted in a highly successful publication.

Plant ecologist, Fred Harris was instrumental in completing and distributing the MCBS 2007 report *Native plant communities and rare species of the Minnesota River Counties* and a companion compact disk to agencies, organizations and interested individuals of the region. This interpretive report is being used in colleges in the Minnesota River area for instruction in biology and ecology classes and by others to help determine conservation priority areas along the river.

Chel Anderson, MCBS plant ecologist, is a co-author of the research article *A six-step approach for identifying and prioritizing potential research natural areas, Superior National Forest* found in the October 2007 issue of the Natural Areas Journal (Vol. 27, No.4).

MCBS ecologist Norm Aaseng was an author of a native plant community classification paper published in Applied Vegetation Science, *Vegetation classification, mapping, and monitoring at Voyageurs National Park, Minnesota: An application of the U.S. National Vegetation Classification* (Faber-Langendoen, Don; Aaseng, Norm; Hop, Kevin; Lew-Smith, Michael, & Drake, J. Applied Vegetation Science 10: 361-374, 2007).

Now available on the DNR website: *A handbook for collecting relevé data in Minnesota* describes the current practices of DNR plant ecologists for collection of vegetation plot

data using the relevé method. The handbook is formatted such that the user can easily print a booklet version from a PDF. Also on the web are portions of the three volumes of Minnesota's native plant community field guides.

Rare Species Guide (DNR web): Many MCBS staff wrote or reviewed text related to the individual rare species accounts presented on the DNR web site. For example Welby Smith wrote drafts for 54 rare plants with assistance from Karen Myhre for rare aquatic plants, and Gerda Nordquist reviewed and edited text for Eastern Pipistrelle *(Pipistrellus subflavus*) and Gray Wolf *(Canis lupus).*

Lynden Gerdes and Lawson Gerdes co-authored an article on the first occurrence of Algae-like pondweed (*Potamogetan confervoides*) in the state for presentation on the MCBS web page. They both also reviewed a paper entitled "Occurrences of the Liverwort *Frullania selwyniana* on the Superior National Forest" authored by J. Janssens and J. Greenlee.

The national organization, NatureServe, has collaborated with National Geographic on a project called *Landscope* that has a web/GIS interface. As a preliminary step in developing a larger product, MCBS staff wrote *Minnesota's Landscape and Ecosystems* for presentation on the site that will hopefully be followed by additional content.

Staff provided feedback to DNR Forestry's Ecological Land Classification Program (ECS) on drafts of the silvicultural interpretations of several forested native plant community classes. They also provided photography of native plants to the ECS program and reviewed a field guide to plant identification for species frequently found in the forested native plant communities of the DNR's native plant community field guides.

Tom Klein worked with bryologist Jan Janssens on developing field guide booklets related to the identification of mosses and liverworts that were used at the field workshop in spring 2009.

Staff wrote the following articles that appeared in DNR's *Minnesota Conservation Volunteer:*
-Bog adder's-mouth (*Malaxis paludosa)* was featured in an article, *Elusive orchids,* in the July-August 2007 issue written by MCBS plant ecologist/botanist Erika Rowe.

-The *Walks in the old woods* article in the November-December 2007 issue of the featured field tours and interpretation by MCBS plant ecologist Chel Anderson.

-Steve Stucker, MCBS ornithologist, authored a Minnesota profile on Upland Sandpiper *(Bartramia longicauda)* for the March-April 2008 issue.

-Welby Smith, author of the DNR book, *Trees and shrubs of Minnesota*, co-authored a related article *Wildly adaptable trees* (along with Jan Wolff) that appeared in the September-October 2008 issue.

-Appearing in the November-December 2008 issue: *Mapping home ground* by botanist-plant ecologist Nancy Sather.

-*Rock pools on the prairie* by botanist-plant ecologist Fred Harris and the Minnesota profile on the Golden-winged Warbler by ornithologist Steve Stucker appeared in the March-April 2009 issue. Steve also was interviewed in the article related to the forthcoming Breeding Bird Atlas project.

Plant ecologist Fred Harris provided extensive information on rare resources to Linda Cody for her article *Blowin in the wind* that featured the results of MCBS in the discussion of wind power in the Prairie Coteau published in __*SCAPE,* journal of the Minnesota Chapter of American Society of Landscape Architects Fall 2007. http://www.masla.org/scape/documents/SCAPE-fall07-nature.pdf

All staff contribute to written Ecological Evaluations completed for the highest priority sites for conservation identified in their work areas. These included Dinner Creek in Becker County, Cloquet River in St. Louis County, and the Nopeming Unconformity site outside Duluth. The Sisseebakwet Lake Ecological Evaluation (Itasca County) was presented at the Commissioner's Advisory Committee (CAC), which recommended that the SNA Program work on acceptance of a donation of some private land that was part of the area in the evaluation. Another example is an evaluation prepared by Erika Rowe for a site near Lester Lake in Hubbard County that was presented to the CAC.

In the Northeast an ecological evaluation was prepared for the Upper Swamp River in response to a potential Forest Certification process suggesting that the site might be an example of a proposed High Conservation Value Forest. Chel Anderson also wrote evaluations for Horshoe Bay, Pike Mountain, and Andy Swamp Hardwoods, all in northeastern MN.

Staff coordinated with the Native Plant Society and the Bell Museum to and several were main presenters for two symposia, one featuring the North Shore Highlands and another the Tallgrass Aspen Parklands held at the museum in April 2008 and 2009. Popular follow-up field trips to natural areas in both regions were led by MCBS staff in the summer.

A poster was presented at the annual meeting of the American Society of Mammalogists in Brookings, SD, entitled *Activity patterns of migratory bats in Minnesota* and prepared by MCBS staff Gerda E. Nordquist, Kelly L. Pharis, and Christi A. Spak.

A poster featuring Minnesota Division of Ecological Resources prairie activities was presented at the North American Prairie Conference held in August 2008 at Winona State University.

The "Making a Great Lake Superior" conference held in Duluth in October, 2007 was interdisciplinary and cross-cultural; bringing scientists, managers, economists, educators, citizens and policy-makers together to address the issues and challenges of preserving

and managing Lake Superior and the Lake Superior Basin. MCBS presented the results of the Survey in the Lake Superior Basin in an exhibit that displayed MCBS sites, native plant communities and associated species, and provided materials on Survey methods, the native plant community classification, and the high quality lakes assessment.

Dan Wovcha finalized agreements for the proposed publication of a new book on the natural history of Northwestern MN.

Public Television (Channel 17) featured a story produced in collaboration with St John's University and the College of St Benedict entitled "If A Road Runs Through It" that relates the story of the challenges that rapid change and development have brought to the Avon Hills area of Stearns County. The Avon Hills Forest Scientific and Natural Area (SNA) dedication in May 2008 was a highlight of the program, with the Schellinger family, former landowners of the SNA, as major participants in the presentation. MCBS surveyed this site and recommended it as an SNA, with plant ecologist, Mike Lee providing ongoing assistance during the SNA acquisition process.

Plant ecologist Ethan Perry took part in a radio interview with John Latimer of KAXE in Grand Rapids where he talked about the MCBS process and what products are made available to the public.

V. TOTAL TRUST FUND PROJECT BUDGET:

Staff-fulltime: $1,400,000 6 ecologists, 2 botanists, 2 data managers, 1 information officer
Travel $100,000

TOTAL TRUST FUND PROJECT BUDGET: $1,500,000

Explanation of Capital Expenditures Greater Than $3,500

All LCMR expenditures are for Personnel and travel

VI. OTHER FUNDS & PARTNERS:

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. This funding request does not include funding for these partners.

	General Fund	RIM General	Heritage Enhancement	SWG*	LCMR
B. Other funds 08-09	373,000	181,400	1,125,000	400,000	
C. Past spending 06-07	373,000	181,400	1,125,000	439,000	1,000,000

*State Wildlife Grants (Federal Funding that requires matching funds).

D. Time: MCBS is proposed for completion in 2021. Future requests for funding from the Minnesota Legislature and other cooperators are anticipated.

VII. DISSEMINATION:

The Natural Heritage Information System is the major repository of data collected by MCBS. Descriptions of the major component databases of this information system are available through the DNR website listed on page one. MCBS procedures, updates, recent maps and links to related data are also presented on the DNR website. Many GIS datasets are delivered through the web and though agreements with the requesting agency and the DNR's Natural Heritage and Nongame Research Program. For data on locations or rare features, a data request form is also available via the web: http://www.dnr.state.mn.us/eco/nhnrp/nhis.html

MCBS invests considerable time in publishing and distributing results of the Survey 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 maps, reports, field guides and digital media. Increasingly products are available on the DNR web, including GIS shape files of native plant communities and MCBS sites, native plant community field guides, guides to sampling techniques such as the vegetation plot data collection using the relevé method. The MCBS web site is updated with new information and has links to associated resources. http://www.dnr.state.mn.us/eco/mcbs/index.html

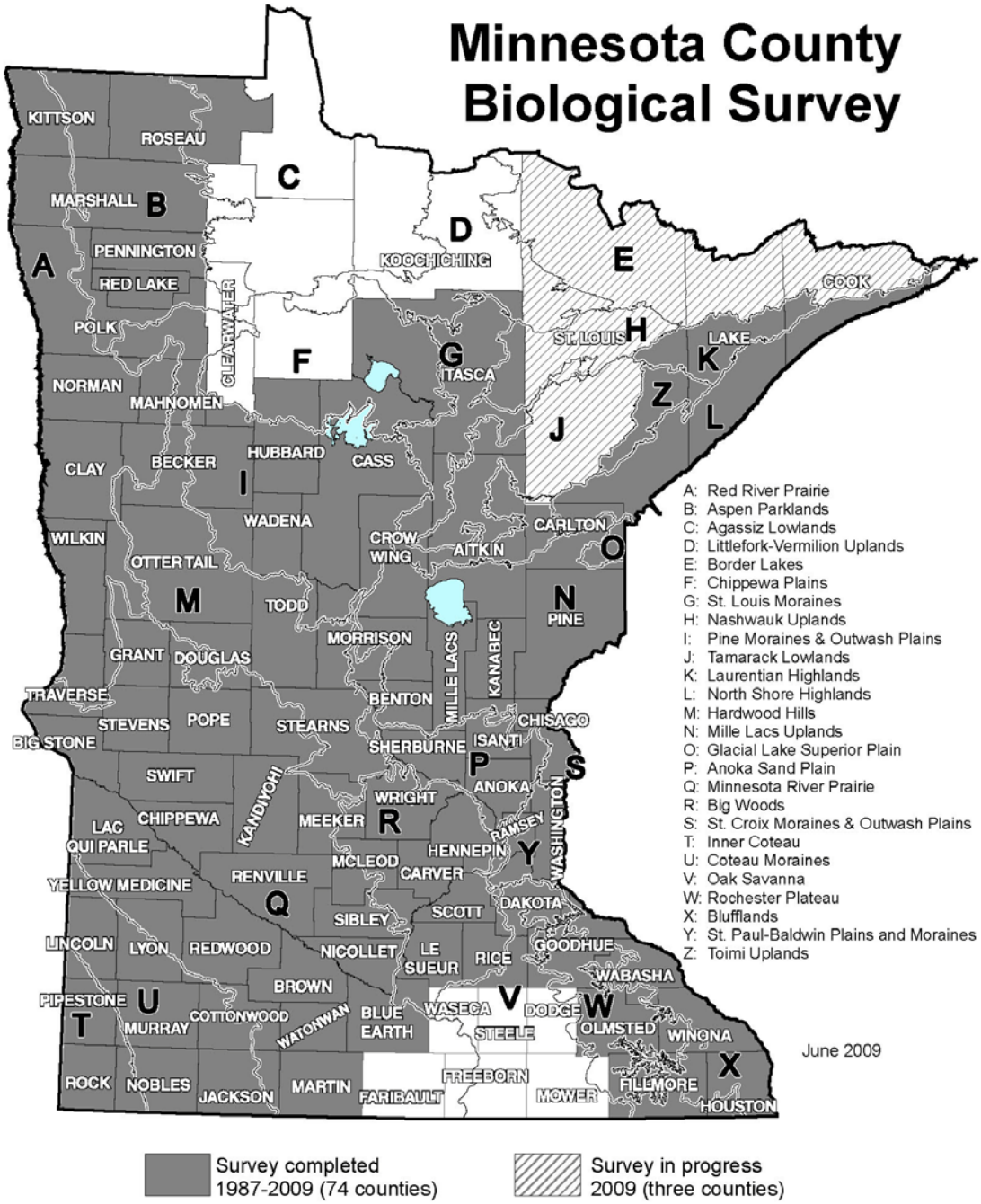
Staff make presentations that describe the Survey goals, methodologies and results to a wide range of audiences that include county boards, local planning groups, citizen advisory groups, other biologists, land managers and students. MCBS staff provide local planners with ecological interpretations related to important sites of biodiversity identified during the Survey to assist with management plans. Staff led 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, MN. 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 delivers data as part of NatureServe and also shares data with cooperators at colleges and universities and with others in a particular ecological region where surveys are ongoing or completed.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than January 2008, October 2008, and March 2009. A final workprogram report and associated products will be submitted between June 30 and August 1, 2009 as requested by LCCMR.

IX. RESEARCH PROPOSALS: N/A


Minnesota County Biological Survey
KITTSON
ROSEAU
MARSHALL
PENNINGTON
RED LAKE
POLK
NORMAN
MAHNOMEN
CLEARWATER
KOOCHICHING
COOK
ST. LOUIS
LAKE
ITASCA
CLAY
BECKER
HUBBARD
CASS
WADENA
CARLTON
WILKIN
CROW WING
AITKIN
OTTER TAIL
TODD
PINE
MORRISON
MILLE LACS
KANABEC
GRANT
DOUGLAS
TRAVERSE
BENTON
STEVENS
POPE
STEARNS
CHISAGO
BIG STONE
SHERBURNE
ISANTI
SWIFT
ANOKA
KANDIYOHI
WRIGHT
CHIPPEWA
MEEKER
RAMSEY
WASHINGTON
LAC QUI PARLE
HENNEPIN
MCLEOD
CARVER
YELLOW MEDICINE
RENVILLE
DAKOTA
SCOTT
SIBLEY
LINCOLN
LYON
REDWOOD
NICOLLET
LE SUEUR
RICE
GOODHUE
WABASHA
BROWN
PIPESTONE
WASECA
DODGE
OLMSTED
WINONA
MURRAY
COTTONWOOD
WATONWAN
BLUE EARTH
STEELE
ROCK
NOBLES
JACKSON
MARTIN
FARIBAULT
FREEBORN
MOWER
FILLMORE
HOUSTON
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: Nashwauk 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 2009
Survey completed
1987-2009 (74 counties)
Survey in progress
2009 (three counties)

Attachment A: Budget Detail for 2007 Projects
Final report June 30, 2009
Proposal Title: *Minnesota County Biological Survey*

Project Manager Name: Carmen Converse

Trust Fund Appropriation: $ *1,500,000*

2007 Trust Fund Budget	**Result 1 Budget:$550,000**	**Amount Spent**	**Balance**	**Result 2 Budget: $500,000**	**Amount Spent**	**Balance**	**Result 3 Budget: $450,000**	**Amount Spent**	**Balance**	
	Field Surveys			*Information System Expansion*			*Data Distribution and Interpretation*			
BUDGET ITEM										**TOTAL FOR BUDGET**
PERSONNEL: Wages and benefits										
botanist	**61,000**	**56,704**	**4,296**	**40,000**	**55,214**	**-15,214**	**30,000**	**21,314**	**8,686**	**133,232**
botanist	**60,000**	**32,257**	**27,743**	**40,000**	**64,252**	**-24,252**	**30,000**	**33,923**	**-3,923**	**130,432**
Info Officer							**130,000**	**132,699**	**-2,699**	**132,699**
data manager				**120,000**	**131,214**	**-11,214**				**131,214**
data manager				**130,000**	**64,965**	**65,035**				**64,965**
Plant ecologist	**56,000**	**52,750**	**3,250**	**30,000**	**45,011**	**-15,011**	**60,000**	**31,445**	**28,555**	**129,206**
Plant ecologist	**61,000**	**62,665**	**-1,665**	**30,000**	**40234**	**-10,234**	**60,000**	**50,945**	**9,055**	**153,844**
Plant ecologist	**60,000**	**51,476**	**8,524**	**40,000**	**51,843**	**-11,843**	**50,000**	**17,051**	**32,949**	**120,370**
Plant ecologist	**40,000**	**40,059**	**-59**	**20,000**	**38,088**	**-18,088**	**25,000**	**5,712**	**19,288**	**83,859**
Plant ecologist	**40,000**	**43,060**	**-3,060**	**20,000**	**41,042**	**-21,042**	**30,000**	**10471**	**19,529**	**94,573**
Plant ecologist	**72,000**	**41,433**	**30,567**	**30,000**	**68,409**	**-38,409**	**35,000**	**18,011**	**16,989**	**127,853**
SALARIES	**450,000**	**380,404**	**69,596**	**500,000**	**600,272**	**-100,272**	**450,000**	**321,571**	**128,429**	**1,302,247**
Travel expenses in Minnesota	**100,000**	**196,945**	**-96,945**							**196,945**
COLUMN TOTAL	**550,000**	**577,349**	**-27,349**	**500,000**	**600,272**	**-100,272**	**450,000**	**321,571**	**128,429**	**1,499,192**