2005 Project Abstract
For the Period Ending June 30, 2007

TITLE: Minnesota County Biological Survey
PROJECT MANAGER: Carmen Converse
ORGANIZATION: Department of Natural Resources (DNR)
ADDRESS: Box 25, 500 Lafayette Road
St. Paul, Minnesota 55155
WEB SITE ADDRESS: http://www.dnr.state.mn.us/eco/mcbs/index.html
FUND: Environment and Natural Resources Trust Fund
LEGAL CITATION: ML 2005, First Special Session, Chap. 1, Art. 2, Sec. 11, Subd. 8a.

APPROPRIATION AMOUNT: $1, 000,000
Overall Project Outcome and Results
This appropriation continued and accelerated the ongoing effort to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants, rare animals, and native plant communities in each county of the state. At the end of this phase, surveys have been completed in 65 of Minnesota's 87 counties. Data from these surveys reside in the Department of Natural Resource's (DNR) Natural Heritage Information System (NHIS). Since 1987, MCBS has added 15,543 new records of rare features to the NHIS. The DNR's 'Data Deli' is a web site location where users with Geographic Information System (GIS) capabilities have access to various digital natural resource map layers. Currently over 35,511 polygons of native plant community types and complexes and 7,063 sites mapped by MCBS now reside in this location. Native plant communities are also documented by 8,756 vegetation plot samples recorded in DNR's Releve Database. Sixteen species of native plants, and two species and one hybrid of amphibians not previously documented in Minnesota have been recorded by MCBS.

Project Results Use and Dissemination
A three volume series of native plant community field guides was completed in 2005 with the publication of two final volumes: *Field guide to the native plant communities of Minnesota: The Eastern Broadleaf Forest* and *Field guide to the native plant communities of Minnesota: The Prairie Parkland and Tallgrass Aspen Parklands Provinces.* All three volumes are available through Minnesota's Bookstore. The field sampling handbook, *A handbook for collecting relevé data in Minnesota,* and portions of the native plant community field guides are posted on the DNR website. Training sessions were conducted statewide in the use of the field guides.

Featured use of data: 1) A report, *Headwaters Site*, prepared from field data and associated resources, describing the ecological resources of a nearly 40,000 acre area at the headwaters of the St Louis River is being used by the Sand Lake Seven Beavers to inform collaborative management planning for the area; 2) Surveys resulted in private land protection on high quality prairies in western Murray County; 3) Issues related to Forest Certification, biofuel development and off-road vehicle issues reference MCBS data; and 4) A preliminary list of "Quality Lakes of Minnesota" was prepared based largely on the results of rare aquatic plant and nongame fish data.

LCMR 2005 Work Program

Date of Report: June 30, 2007
LCMR Final Work Program Report
Date of Workprogram Approval: June 14, 2005
Project Completion Date: This workprogram outlines activities and products to be completed during the two-year duration of this funding (ending June 30, 2007). 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-continuation

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Location: Surveys will be continued in Becker County, the Toimi Uplands and the Laurentian Uplands ecological subsections. Surveys will begin in the remaining portion of the Pine Moraine and Outwash Plains ecological subsection not yet surveyed (Wadena County and portions of Hubbard and Clearwater counties). Surveys will also begin in the eight counties of southwestern MN (Lincoln, Lyon, Pipestone, Murray, Cottonwood, Rock, Nobles, and Jackson counties (See also attached map).

Total Biennial Project Budget: $1,000,000	**LCMR Appropriation: $1,000,000**
	Minus Amount Spent: $ 1,000,000
	Equal Balance: $ 0

Legal Citation: ML 2005, First Special Session, Chap. 1, Art. 2, Sec. 11, Subd. 8a.

Appropriation Language: Minnesota County Biological Survey-continuation

$500,000 the first year and $500,000 the second year are from the trust fund to the commissioner of natural resources for the tenth biennium to accelerate the 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

Overall Project Outcome and Results

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IV. OUTLINE OF PROJECT RESULTS:

Result 1: Field Surveys

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. This begins with the review of existing related natural resource data by plant ecologists, botanists and zoologists, and incorporation of relevant data into electronic databases, often using Geographic Information Systems. 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. The interpretation of aerial photography or other imagery for the identification of potential ecological landscapes and sites for survey follows the review of existing data. This is followed by landowner contacts and aircraft and ground surveys to assess natural area and native plant community quality and condition. Ground surveys also include the collection of vegetation samples using relevés (as described in *A handbook for collecting relevé data in Minnesota* 1987 Draft) in coordination with other sampling (soils, water chemistry etc.), when possible. 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). Regional coordination with other divisions within the DNR, universities, counties, municipalities, tribal governments, watershed districts, federal natural resource agencies, conservation organizations, corporations, individual landowners and others is critical to the success of data consolidation and field surveys.

Summary Budget Information for Result 1: **LCMR Budget: $ 500,000**
Balance: $ 0

Completion Dates:

1) Hardwood Hills subsection and Pine Moraines and Outwash Plains subsection: Field surveys will be completed in Becker County and in the remaining unsurveyed portion of the Pine Moraines and Outwash Plains subsection.

2) Toimi Uplands and Laurentian Uplands subsections: Field surveys will be completed in these subsections.

3) Southwestern MN: Field surveys will be completed in at least four of the following counties: Lincoln, Lyon, Pipestone, Murray, Cottonwood, Rock, Nobles, and Jackson counties.

Final Report Summary June 30, 2007 (see also status map).

1) Hardwood Hills subsection and Pine Moraines and Outwash Plains subsection: Field surveys were completed in Becker County and in the southern portion of Clearwater County (the remaining unsurveyed portion of the Pine Moraines and Outwash Plains subsection). Animal surveys were completed in Becker, Hubbard and Wadena counties. Surveys of native plant communities and MCBS sites continued in Hubbard and Wadena counties in 2007.

2) Toimi Uplands and Laurentian Uplands subsections: Field surveys in the Toimi Uplands and Laurentian Uplands were completed.

3) Southwestern MN: Surveys were completed in Lyon, Rock, Nobles and Pipestone counties and are proposed for continuation in Murray, Cottonwood, Jackson and Lincoln counties in 2008.

Two plant ecologists were hired in 2007 to fill vacancies that resulted from the departure of Bruce Carlson (now a regional plant ecologist for Ecological Resources) and Tim Whitfeld who reduced his hours of work due to his PhD program in Plant Biology at the University of Minnesota. Training for the two new ecologists took place during the 2007 field surveys, with their focal areas in northern Minnesota.

Hardwood Hills subsection and Pine Moraines and Outwash Plains subsection-Highlights

A site bordering the Toad River in the south-central part of Becker County contains an unusual seepage feature. A narrow band (50-100 meters wide) of sedge meadow and marsh along the river is bordered upslope by a somewhat broader band of tamarack-black spruce swamp with seeps containing dense patches of Marsh arrowgrass *(Triglochin palustris)*. One large spring with especially striking upwelling groundwater is located on the top of a narrow ridge with 10-meter slopes on both sides. All of the emerging groundwater is iron-stained. Water chemistry data, vegetation samples and bryophyte (mosses and liverworts) samples were collected in 2007 to help better understand this seepage community and several similar areas encountered in the region.

Sites adjacent to Straight Lake and Little Mantrap Lake (Becker County) were surveyed for bryophytes resulting in the collection of several state listed species.

In Wadena County, Lyons State Forest contains high quality jack pine woodlands. Alluvial forests and wetlands in good condition border portions of the Crow Wing, Shell and Leaf rivers.

In Hubbard County, the Lester Lake site contains cedar, black spruce and black ash forests and many seepage communities.

A botanical highlight was the discovery of six new populations of the diminutive rare orchid, Bog adder's-mouth (*Malaxis paludosa)*. In two field seasons, MCBS botanists have located 12 of the total 17 populations known in the state due to their targeted surveys of moss-covered hummocks within forested peatlands. An article, *Elusive orchids,* in the Minnesota Conservation Volunteer (July-August 2007) written by MCBS plant ecologist/botanist Erika Rowe features this search. A note on the new locations of bog adder's-mouth was also presented on the DNR website.

Additional locations of rare plants recorded these subsections included rock sandwort (*Minuartia dawsonensis*), Cooper's milk vetch (*Astragalus neglectus*), Hill's thistle (*Cirsium hillii*), White adder's-mouth *(Malaxis monophyllos)*, Ram's-head lady's-slipper *(Cypripedium arietinum),* Clustered bur-reed *(Sparganium glomeratu),* Northern oak fern *(Gymnocarpium robertianum)*, and Marsh arrowgrass (*Triglochin palustris*).

Prior to MCBS, Becker, Wadena and Hubbard counties had not been well surveyed for vascular plants. As a result, over 200 county records (plants not previously documented

in the county by herbarium collections) were collected in 2006, providing valuable baseline data for the distribution of these species in the state.

Animal surveys were completed in the four counties, including searches for rare mammals, birds, reptiles, amphibians, fish, tiger beetles and jumping spiders. Although no new records of rare terrestrial small mammals were recorded, zoologists documented 27 new county records (species not previously documented in a county), contributing to an improved understanding of the distribution of the state's common fauna. Night foraging bat surveys were conducted and northern myotis, a species of special concern, was recorded in all four counties.

Bird surveys successfully recorded 95 new locations of rare species as summarized in the table below. Common Terns *(Sterna hirundo)* were documented nesting (55+ adults and 36 nests) at Cotton Lake in Becker County. The only previous nesting evidence at this site recorded 8 adults and 4 young in 1992 and 3 nests were observed in 1963.

Species	Becker	Clearwater	Hubbard	Wadena	Total	
American Bittern	8		2	10	20	
Northern Goshawk	1				1	Confirmed nest
Red-shouldered Hawk	17	4	4	1	26	
Yellow Rail	1			5	6	
Common Moorhen	1				1	
Sandhill Crane	4		7	18	29	
Upland Sandpiper	4				4	
Marbled Godwit	3				3	
Wilson's Phalarope	1				1	
Common Tern	1				1	Confirmed nesting colony
Nelson's Sharp-tailed Sparrow	1		1	1	3	
Total:	42	4	14	35		

Although not listed as a rare species, one of the most notable bird records was of Black-billed Magpies *(Pica hudsonia)* in Clearwater and Wadena counties. Magpies were observed inhabiting the level terrain of hayfields and grazed pastures interspersed with scattered farm groves and stands of lowland conifers. Observations of a total of 18 adult magpies at seven locations in Clearwater County included at least two apparently active nests and one old nest. The Clearwater County records represent an eastward extension of the known breeding range of Black-billed Magpies by 25-30 miles, while the Wadena County records are approximately 50 miles southeast of the nearest magpies, with nesting records in western Becker County.

Targeted amphibians and reptiles included spotted salamander *(Ambystoma maculatum)*, four-toed salamander *(Hemidactylium scutatum)*, western hog-nosed snake *(Heterodon nasicus)*, and Blanding's turtle *(Emoydoidea blandingii)*. Rare species locations were recorded only in Wadena County and included three locations of eastern hog-nosed snake *(Heterodon platirhinos)* and one location of Blanding's turtle. Also of interest were locations of spiny softshell *(Apalone spinifera)* in Hubbard and Wadena counties.

Toimi Uplands and Laurentian Uplands subsections Highlights

Exchange of data with the Superior National Forest (SNF) continued in northeastern Minnesota. Additional GIS coverage of SNF was acquired for further assessment of sites in the Headwaters Landscape which includes large old and young forest patches. According to the SNF Plan, the remaining large old patches in the Headwaters Landscape (90% of those that existed during SNF Plan analysis) will be maintained with at least 60% canopy. Preliminary data from MCBS sites were provided to the SNF and routine communication with their field biologists continues.

Examples of sites surveyed in these subsections include: The Nip Jack Headlands, the Greenwood Landscape, 100 Mile Swamp (coordinated with the USFS-Aurora), Leauna Lake (coordinated with private landowners), and Wolf Lake.

MCBS ecologists reviewed possible additional locations on state lands of a rare native plant community, the white cedar-yellow birch forest type and prepared a summary of the issues and possible stresses to this forest type.

Locations of 23 rare species were recorded at over 60 new locations. Some of these rare plant populations documented during field work included: Calypso (*Calypso bulbosa*), Michaux's sedge (*Carex michauxiana*), New England sedge (*Carex novae-angliae*), Carolina spring-beauty (*Claytonia caroliniana*), Ram's-head lady's-slipper (*Cypripedium arietinum*), Neat spike-rush (*Eleocharis nitida*), Few-flowered spike-rush (*Eleocharis quinqueflora*), Autumn fimbristylis (*Fimbristylis autumnalis*), Northern comandra (*Geocaulon lividum*), Bog rush (*Juncus stygius*), Creeping juniper (*Juniperus horizontalis*), Small-flowered woodrush (*Luzula parviflora*), One flowered muhly (*Muhlenbergia uniflora*), Small white waterlily (*Nymphaea leibergii*), Club-spur orchid (*Platanthera clavellata*), Small shinleaf (*Pyrola minor*), Sooty-colored beak-rush (*Rhynchospora fusca*), Cloudberry (*Rubus chamaemorus*), Clustered bur-reed (*Sparganium glomeratum*), Humped bladderwort (*Utricularia gibba*), and Montane yellow-eyed grass (*Xyris montana*).

Itasca County Highlights

MCBS began surveys in Itasca County in 2001 but they were discontinued after the 2002 field season due to a funding reduction. Surveys resumed in 2006 due to the recent interest in the aquatic plant data that MCBS had previously collected in over 100 Itasca County lakes, and in response to a request for data to inform the Forest Legacy Program that was beginning to be implemented in some parts of the county. Staff provided data related to the native plant communities and rare plants within some of the "Candidate Forest Legacy Areas."

Notable plants documented that were either county records or new rare species locations included: Least moonwort *(Botrychium simplex* var. *simplex),* Fairy slipper *(Calypso bulbosa),* Neat spike-rush *(Eleocharis nitida),* Helleborine *(Epipactis helleborine)* (a non-

native species), Northern comandra *(Geocaulon lividum),* Northern St. John's wort *(Hypericum boreale),* White adder's mouth *(Malaxis monophyllos var. brachypoda),* Small green wood orchid *(Platanthera clavellata),* Tall white bog orchid *(Platanthera dilatata),* Small yellow water crowfoot *(Ranunculus gmelinii),* Lapland buttercup *(Ranunculus lapponicus),* Clustered bur-reed *(Sparganium glomeratum),* (*Torreyochloa pallida* var. *fernaldii),* and Barren strawberry *(Waldsteinia fragarioides).*

Southwestern Minnesota Highlights

In June 2006, Fred Harris, a botanist/plant ecologist experienced in prairie plant communities and associated rare plants resumed employment with MCBS. Due to his previous experience with the program, he was able to efficiently perform all of the varied responsibilities assigned to a plant ecologist, resulting in very productive field surveys in southwestern Minnesota and excellent communication with stakeholders in the region.

Highlighted sites

The "Great Oasis" located in Murray County historically supported a forest community instead of prairie because the extensive wetlands surrounding the "Oasis" protected it from the once widespread prairie fires. (Extensive drainage of the region has virtually eliminated the wetlands). MCBS bird surveys verified that the remaining forest provides habitat for birds typically found in the more heavily forested portion of the state, such as Yellow-bellied Sapsucker *(Sphyrapicus varius)*, Scarlet Tanager *(Piranga olivacea)*, and Blue Grosbeak *(Guiraca caerulea).*

Also in Murray County, a large complex of sites in the Chanarambie Creek Valley west of Chandler was surveyed for native plant communities, rare animals and rare plants. This landscape contains high quality dry hill prairies and associated rare plants and animals such as the Dakota skipper *(Hesperia dacotae)*, and the rare grass, red three-awn *(Aristida purpurea var. longiseta).* It provides habitat for numerous birds including Swainson's Hawk *(Buteo swainsoni)*, Upland Sandpiper *(Bartramia longicauda)*, Loggerhead Shrike *(Lanius ludovicianus)*, Grasshopper Sparrow *(Ammodramus savannarum),* and Blue Grosbeak *(Guiraca caerulea)*. Most remarkable in the Chanarambie Creek Valley is the location of only one wet-mesic prairie in the valley where they were once widespread, yet this location is of exceptionally high quality.

In Pipestone County a large grassland bordering South Dakota contains a population of the state endangered Chestnut-collared Longspur *(Calcarius ornatus).*

Two sites in Lincoln County with large expanses of prairie habitat support populations of the rare Prairie vole *(Microtus ochrogaster).*

Examples below identify some of the state and federal managed areas that MCBS documented to support rare native habitats:
Pipestone County: Terrace Wildlife Management Area (WMA), Altona WMA, and Woodstock WMA, Prairie Coteau Scientific and Natural Area (SNA) contain important prairie habitats.

Rock County: Blue Mounds State Park is a very important site for high snake diversity with good populations of Western foxsnake *(Elaphe vulpina)* and Lined snakes *(Tropidoclonion lineatum)*. Touch the Sky National Wildlife Refuge includes numerous rock outcrop habitats for many rare plants.
Cottonwood County: Expandere WMA, Lake Augusta Waterfowl Production Area (WPA), Jeffers Petroglyph Historical Site, Rock Ridge SNA, Des Moines River WPA and neighboring lands have important native plant communities.
Lyon County: Garvin County Park is a priority area especially due to its forests and populations of Snow trillium *(Trillium nivale)*. Other sites include Camden State Park, Prairie Marshes WMA and the small but floristically significant White Prairie WMA.

Native Plant Community and Rare Plant Highlights
Vegetation data were collected documenting the composition of narrow bands of native hardwood forests in the southwestern part of the state. Several new populations of Snow trillium (*Trillium nivale*), a rare plant associated with this forest habitat, were located, often on private lands.

Over ten new locations of calcareous seepage fens were located in Jackson, Cottonwood, Murray and Pipestone counties. Some of the associated rare plants recorded include Hair-like beak-rush *(Rhynchospora capillacea)*, Few-flowered spike rush *(Eleocharis pauciflora)*, and Marsh arrowgrass *(Triglochin palustris)*.

In Pipestone and Lincoln counties, dry hill prairies support populations of a Great Plains species, Western white prairie clover *(Dalea candida var. oligophylla)*. Prairie Coteau SNA is one of the few sites providing habitat for this plant.

Numerous sites containing Sioux Quartzite rock outcrop communities were the focus of surveys, especially in the spring of 2007. Outcrop communities in Rock and Pipestone counties support populations of the rare plant, Wolf's spikerush *(Eleocharis wolfii)*. This is the first time that this species has been documented in southwestern Minnesota, and only two previous locations were known to occur in the state. Another rarely encountered plant of rock outcrop pools, Hairy waterclover *(Marsilea vestita)*, was documented at eight new locations which included Pipestone National Monument, Pipestone WMA and private lands. Other plants associated in Minnesota primarily with outcrops were documented at a number of new locations: Buffalo grass (*Buchloe dactyloides)*, Plains prickly pear *(Opuntia macrorhiza)*, Water hyssop (*Bacopa rotundifolia)*, Mudwort *(Limosella aquatica)*, Tumble grass *(Schedonnardus paniculatus)*, Short-pointed umbrella sedge *(Cyperus acuminatus)*, Slender plantain *(Plantago elongata)*, Blackfoot quillwort *(Isoetes melanopoda)*, Pigmyweed *(Crassula aquatica)*, Wolf's spikerush *(Eleocharis wolfii)*, Mud plantain *(Heteranthera limosa)*, and Larger water starwort (*Callitriche heterophylla)*.

Eared gerardia *(Agalinis auriculata)* and new locations of Prairie bush clover *(Lespedeza leptostachya)* were recorded in Cottonwood County. Populations of Small white lady's-slipper *(Cypripedium candidum)* were located in prairie wetland habitats in Pipestone, Murray and Lyon counties.

In 2007 a survey was organized for volunteers to participate in the search for the rare plant Prairie moonwort *(Botrychium campestre)*. This small fern is visible for about two weeks in dry prairies in early spring and most often is found buried beneath the prairie mulch. MCBS botanists and their volunteers located seven new populations in the Prairie Coteau counties.

Animal Survey Highlights

Mammal surveys in Southwestern Minnesota were highlighted by several new locations of Prairie vole *(Microtus ochrogaster)*, Western harvest mouse (*Reithrodontomys megalotis)*, and Northern grasshopper mouse *(Onychomys leucogaster)*, and documentation of the very rarely encountered Least weasel *(Mustela nivalis)*.

Bat detectors were used to collect data primarily on seasonal bat activity in the regions, providing some baseline data in ongoing discussions of impacts of windpower facilities on bat populations.

Breeding bird survey results were exceptional, with documentation of 145 of the 150 species potentially breeding in the region. Eleven state listed species were recorded, including the state endangered Henslow's Sparrow *(Ammodramus henslowii),* state endangered Chestnut-collared Longspur *(Calcarius ornatus)*, state threatened Loggerhead Shrike *(Lanius ludovicianus),* and state threatened Wilson's Phalarope *(Ophalaropus tricolor)*.

Amphibian and reptile surveys resulted in documentation of the rare Blanding's turtle *(Emydoidea blandingii)*. In addition, several new county records were documented including the Great Plains Toad *(Bufo cognatus),* Spiny softshell turtle *(Apalone spinifera)*, Western foxsnake *(Elaphe vulpina),* and Red-bellied snake *(Storeria occipitomaculata)*. Hybrids of American and Canadian toads were observed.

Rare fish surveys resulted in 28 new locations of the Topeka shiner *(Notropis topeka)*, a federally endangered species, in Murray, Nobles, Pipestone and Rock counties. The Plains topminnow *(Fundulus scaidicus)*, a state special concern species, was found at 16 sites in Nobles, Pipestone and Rock counties, including one site in the Kanaranzi Creek watershed where it had not been reported since 1974. The Red shiner *(Cyprinella lutrensis)* was found at 11 sites in Pipestone and Rock counties.

Butterfly and moth surveys were conducted in 2006 and 2007. New locations were documented for the threatened Dakota skipper *(Hesperia dacotae),* the special concern Regal fritillary *(Speyeria idalia)*, the special concern Poweshiek skipper *(Oarisma powesheik),* and the Phlox moth *(Schinia indiana)*. However, most of these species were found in dramatically lower abundances than in the recent past, indicating a need for monitoring of this group of invertebrates.

Rare Aquatic Plant Survey Highlights- Statewide

To date, the MCBS aquatic botanist has surveyed for rare aquatic plants at 1370 lakes in 38 counties and has developed lists of all aquatic plants observed at each of these lakes.

Lists of aquatic plants from 1,245 locations (primarily lakes) were analyzed in January 2006 using a standard vegetation ordination package, as a possible first step in the development of a classification of lakes based on aquatic plants. In the summer of 2006 rare aquatic plant surveys were conducted in 125 lakes in 16 counties (Hubbard, Wadena, Clearwater, Becker, Otter Tail, Itasca, St. Louis, Lake, Beltrami, Stevens, Grant, Yellow Medicine, Lac qui Parle, Lyon, Sherburne, and Anoka). These surveys included plant and water chemistry data collection from 25 selected lakes that represent the extremes of the ranges of acidity and alkalinity found in Minnesota's lakes.

Rare aquatic plant highlights

Paired scapes bladderwort *(Utricularia geminiscapa)* was first located in Minnesota in 2004 and three additional records were found in Becker County (2005) and in Itasca and Lake counties in 2006.

Lavender-flowered bladderwort *(Utricularia resupinata)* was found in shallow water in silt over sand at Meander Lake and Arrowhead Lake in St. Louis County.

The Slender water Naiad *(Najas gracillima)* was found growing in Lovelace Lake and two small-unnamed lakes in Clearwater County, in McCarty Lake in Hubbard County and in Pine Lake in Itasca County.

Humped bladderwort *(Utricularia gibba)* was found at Twenty Lake, Hirts Lake, Dead Lake and Lilypad Lake in Hubbard County; Upper Camp Lake, Teapail Lake, Lovelace Lake and an unnamed lake north of Waptus Lake in Clearwater County; Fish Lake in Anoka County; and Finn Lake in Wadena County.

Leafless water milfoil *(Myriophyllum tenellum)* was located in sandy substrate at Arrowhead Lake in St. Louis County.

Widgeon grass *(Ruppia cirrhosa)* was located at Mineral Lake and Alkali Lake in Otter Tail County and Big Lake in Grant County.

Sea Naiad *(Najas maritima)* was found at Mineral Lake in Otter Tail County.

Beautiful pondweed (*Potamogeton pulcher)* was recorded at Allen Lake in Itasca State Park in Clearwater County in 2007. This is the second recorded location in the state, with the first location found in 1921 near Taylors Falls. This species reaches the very northern extent of its range in MN.

Result 2. Information System Expansion

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: 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), animal aggregations and bearing tree information (from Public Land Survey notes 1847-1907). Locations of native plant communities are mapped at the scale of U.S.Geological Survey 1:24,000 topographic maps using ARC/VIEW and ARC/GIS and these 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. The collection and management of data continues to improve through the use of industry-standard relational databases, networks, laptop computers, multi-user systems, global positioning systems, various data recorders, and GIS. 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. 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, documentation, specialized formats, data synthesis and analysis, and interpretation.

All plant and animal specimens are identified, vouchers 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. Photographic vouchers, color slides, digital images, and other digital media are stored at the DNR, St. Paul. Field data sheets are filed manually in preparation for archiving.

Summary Budget Information for Result 2: **LCMR Budget: $ 253,000**
Balance: $ 0

Completion Dates: Data from all areas typically are entered into the Information System following each summer field season. Periodic summaries of progress in data entry, data analysis and information system developments will be provided in the periodic status reports.

Final Report Summary June 30, 2007 Since July 2005, 841 new records of rare features were added to the Department of Natural Resources Rare Features Database. Since MCBS began in 1987, 15,543 new records have been added by MCBS. Since July 2005, 340 vegetation samples (relevés) were added to the statewide Relevé Database, for a total MCBS contribution of 3,859 samples of the 8,756 total records in the database.

Since July 2005, polygons of 921 MCBS sites of Biodiversity Significance and 8,957 polygons of native plant communities or community complexes were added to the dataset that resides on DNR's "Data Deli." Statewide, MCBS has added a total of 7,063 MCBS site polygons and 35,511 native plant community polygons since 1987.

With the completion of the new native plant community classification (version 2.0) and the publication of the field guides, a "core database" in the DNR has been developed to store field observations of native plant communities described in version 2.0. MCBS native plant community data continue to be routinely recorded as polygon data. In the "core database", these polygon data are additionally converted to point data to enable quick access to these data. The Divisions of Forestry, Ecological Resources, Fish and Wildlife, and Parks and Recreation are now using this database.

Karen Myhre, the MCBS aquatic botanist, worked with a programmer to pair water chemistry data from lakes with aquatic plant species recorded for the lake, in order to determine water chemistry preferences, ranges, means, etc. for each species based on a fairly large number of occurrences. This is new information for Minnesota, based on a large number of samples (1370 lakes have been surveyed statewide). For example, it appears that Common Naiad *(Najas flexilis)* occurs at a wide range of alkalinity values whereas Slender Water Naiad *(Najas gracillima)* occurs only at very low alkalinity values [0-50 parts per million (PPM)].

Bat call analysis and identification from ANABAT recordings included ~20,000 bat calls recorded at Blue Mounds State Park and Talcot Lake WMA during the 2006 field season, and about ~2,200 bat calls recorded at Tamarac National Wildlife Refuge in 2005.

Plant and animal collections submitted to the J. F. Bell Museum of Natural History and the Insect Collection at the University of Minnesota, and the Science Museum of Minnesota continue to be processed by MCBS staff using standard museum protocol for accession.

As part of a project to improve access to a DNR standard list of plant names and synonymy for the entire state, plant ecologist Norm Aaseng coordinated efforts with the Minnesota Herbarium (Bell Museum), resulting in a loan of the Minnesota portion of the herbarium database of plant collections to MCBS in order to verify some of the county plant distribution data. The standard plant names project was also related to the development by the Pollution Control Agency of a list of plants used in their "Floristic Quality Assessment for Minnesota Wetlands" (May 2007).

A data management position with GIS responsibilities that is part of the Natural Heritage Information System (funded by other sources than LCMR) was filled in March 2007 after the departure of Shannon Flynn, who had considerable knowledge of MCBS spatial data and procedures. Jared Cruz, the new GIS specialist has assumed primary responsibility for the management and delivery of MCBS spatial files.

Native plant community names recorded on maps in the old version 1.5 of the native plant community classification were crosswalked to the new version 2.0 in two southeastern counties so that both versions now are available on the DNR's Data Deli website associated with spatial datasets.

Staff began the transition from use of ArcView 3.3 to ArcGIS 9.0 necessitating the installation of ArcGIS and training of staff.

Web-based visualization tools such as GoogleEarth, ArcMap, NorthStar Mapper, and Conservation GeoPortal are being assessed for their utility in providing interactive, web-based delivery of MCBS products.

Many photographic slides from previous surveys have been scanned for digital storage, and new images from current surveys are recorded and stored digitally. More than 1,500 digital images of rare and common plants were made available to DNR staff using the intranet. A new database for storage and retrieval is required before wider release of images on the web.

The transition is underway from an older database storing locations of rare features to a newer version called BIOTICS, a data system that is part of an international network, called NatureServe. Extensive reviews of species population and habitat data were used to transform over 2,000 records from the old database into the new database system. Minnesota ranks in the top five of similar state and provincial programs in the NatureServe network accomplishing this task.

Updates to the MCBS site database and to the vegetation (Relevé) database are needed for better integration of information systems and improved data delivery. The recent departure of the programmer working in the Division of Ecological Resources has delayed this update.

Result 3. Data Distribution and Interpretation

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.

Procedures: MCBS results are often directly accessible using the DNR website that includes the Data Deli and AniMap, and other results are generated as summaries directly from the Natural Heritage Information System upon request. Summary reports and maps for special projects or geographic areas are distributed to other agencies and organizations (schools, libraries, nature centers, universities, county boards, planning boards, consulting firms) as hard copies, digital media, or through the web. MCBS publishes books, field guides and digital media that transform data into interpretive and training tools.

Ecologists and biologists provide technical assistance in various ways. They prepare written conservation and management recommendations for selected high quality sites and representative ecological landscapes in the form of ecological evaluations. Technical assistance also includes participation in planning teams, and consultation with local governments, public land managers, organizations and individuals to help achieve local management goals that sustain ecological systems, native plant communities and native habitats for rare species.

Summary Budget Information for Result 3: **LCMR Budget: $ 247,000**
Balance: $ 0

Completion Dates: Maps displaying results of MCBS for the at least two counties (or subsections) will be available on the DNR website by January 2006, two more by March 2006 and 4 more by June 2007. Two field guides to native plant communities will be completed by January 2006. Updates on technical assistance activities will be recorded in each of the periodic status reports.

Final Report Summary June 30, 2007

Maps
Since July 2005, the DNR website has been updated so that GIS map files containing polygons of MCBS sites and native plant communities are now available for public use for an additional seven counties and the North Shore Highlands subsection.

Field Guides
The final two volumes of a three book series based on a new native plant community classification were published: *Field guide to the native plant communities of Minnesota: The Eastern Broadleaf Forest* (2005), and *Field guide to the native plant communities of Minnesota: The Prairie Parkland and Tallgrass Aspen Parklands Provinces* (2005) All three volumes are available through Minnesota's Bookstore. Portions of the field guides are posted on the DNR website.

The field guides are based on a new native plant community classification created from analyses of plot data (relevés) primarily collected and managed by MCBS. *A handbook for collecting relevé data in Minnesota,* describes the field methodology used to collect these data. A user-friendly booklet format was posted on the DNR website along with field forms for use by anyone interested in collecting relevés.

A technical paper is in process for submission to a professional journal detailing the methods used to analyze the plot (relevé) data to derive the new classification. Plant ecologist, Dan Wovcha made a presentation at the September 2006 national meeting of the Natural Areas Association in Flagstaff, AZ on how the native plant community classification is being used in management and planning in Minnesota.

Training sessions were held for DNR managers and others on the use of the field guides and how relating management options to native plant communities and related natural

processes. A presentation on the new native plant community classification was made at the Woodland Advisors Program in March 2006 with a focus on the ecological systems of the North Shore Highlands and related forest management concepts.

AniMap

Data on common animals are now available from AniMap for 55 counties for mammals, 65 counties for breeding-season birds, and 17 counties for amphibians and reptiles. This web product provides lists of animal species by geographic area or state management unit and locations statewide for individual species. The information is made available to the public via the DNR website. Revisions to this site is in progress.

Conservation Action and Management for Biodiversity

MCBS sites of High and Outstanding Biodiversity Significance have been the focus of several natural area protection projects. Examples in the Twin Cities metropolitan area include Hastings Sand Coulee, Twin Lakes, the Franconia St. Croix River Corridor, sites adjacent to Cedar Creek Natural History Area and Sandhill Crane Natural Areas.

In Southwestern MN, MCBS identified a number of high quality private prairies that are now enrolled in the Prairie Bank Program, including portions of the Chanarambie Creek complex in Murray County.

Fred Harris, the MCBS plant ecologist who surveyed native plant communities in most of the counties bordering the Minnesota River, provided suggestions for the LCCMR project Rock Outcrops designed to assist with the purchase of conservations easements on quality sites bordering the Minnesota River.

In Stearns County, Avon Hills SNA was dedicated in 2007 and protection of St Wendel's Swamp is in progress. A MCBS site near Rockville includes lands recently donated to the county by private landowners interested in rare features. This site will become a county park that will include management of rare features. (See article in the St Cloud Times "Couple's gift could lead to new Riverside Park" January 4, 2006). Stearns County has incorporated the native plant communities as identified on the Minnesota County Biological Survey Map series no. 19 (1999) map of the county into their open space cluster development district process.

A MOU was signed for Dinosaur Island Natural Areas Registry Site in Mille Lacs Wildlife Management Area to focus management of the area to maintain elements of biodiversity.

Bird Conservation Minnesota (BCM) received funding from several sources to produce a Breeding Bird Atlas (BBA) in Minnesota with a plan for the project scheduled for completion in September 2007. Due to his extensive knowledge of birds of the state and experience in surveys, Steve Stucker, MCBS ornithologist, is on a technical committee charged with developing recommendations for the data collection, data management, and data handling required to provide a state-wide, all species, breeding bird atlas using data collected by citizen scientists.

Steve Stucker is also on the technical committee that reviews and approves nominations of sites as part of Minnesota's Important Bird Areas, a national project of the National Audubon Society.

Several ecologists participated in a site conservation planning process led by The Nature Conservancy (TNC) that was completed in early 2007 for selected ecological focal areas found generally within the Eastern Broadleaf Forest Province. These intersect areas where MCBS has conducted surveys such as the Avon Hills, Brainerd Lakes, Glacial Lakes, and Lake Alexander Areas of central Minnesota and the Root River area of southeastern Minnesota. Tim Whitfeld and Fred Harris participated on the Glacial Lake team and provided comments on current management actions, future concerns and monitoring needs.

Staff continue to work with TNC (Northeast) to facilitate delivery of updated MCBS data and strategize approaches for incorporating MCBS data and interpretations into conservation in the northeast in relationship to TNC's Superior Mixed Forest ecoregional plan and Heart of the Continent/ Border Lakes partnership. MCBS met to discuss Climate Change (Landis) project objectives and model parameters (especially related to refugia and water resources) and applicability of MCBS data.

Plant ecologist, Erika Rowe presented an Ecological Evaluation that includes descriptions of two sites in Becker and Otter Tail counties collectively called "Cooks Lake" to the Commissioner's Advisory Committee (CAC). The CAC approved the site as a candidate for a potential SNA.

Biofuels and Local Prairie Ecotypes

To date, MCBS has mapped about 150,00 acres of remaining native prairie statewide, representing less than 1% of the prairie recorded at the time of the public land surveys that were completed about 100 years ago. The recent attention on prairie loss, restoration opportunities and biofuel potential resulted in many requests for comments related to these issues. MCBS ecologists with extensive experience in the field evaluation of prairie quality provided insights related to the composition and ecological functions of the prairie ecosystem to help inform decisions about these issues. Especially as related to biofuels, perspectives were provided regarding the potential loss or degradation of native prairie by conversion of prairie pastures to monocultures, the impact of use of cultivars and non-natives adjacent to native prairie, how to best retain the integrity of the all elements of the prairie habitat if seeds/propagules were harvested for biofuel and restoration purposes. The sustainability of groundwater, potential accelerated spread of exotic species, and continued prairie fragmentation were also related as ecological concerns.

Quality Lakes
A preliminary list of "quality lakes" was developed as a subset of the 1370 lakes surveyed by MCBS aquatic botanist, Karen Myhre. The biological diversity significance of these lakes was based on high quality aquatic plant communities, presence of rare aquatic plant species, intact shoreline and degree of alteration of the watershed. Other factors considered were: the diversity of aquatic plant species; presence of unique aquatic plant communities; presence of a suite of rare aquatic plant species; absence of exotic and disturbance species, the amount of lakeshore development and alteration of the lake; and general assessment of the lake. This list was presented at a stakeholders meeting to review ideas for prioritizing Aquatic Management Area acquisitions, and has been the focus of discussions with various other groups, including The Nature Conservancy, to address the need for conservation of an array of "reference lakes" of high biodiversity significance in MN and in the upper Great Lakes region of the country.

Sand Lake Seven Beavers Collaborative
The MCBS northern coordinator/plant ecologist, Lawson Gerdes, continued to provide strategic and technical support as the Division of Ecological Resources representative on this natural resource collaborative that includes representatives from the county, the DNR, the Superior National Forest (SNF) and the Nature Conservancy (TNC). The collaborative is discussing ways to manage a large ecological landscape in northeastern MN that includes the headwaters of the St Louis River, encompasses a four-township area and has multiple ownership, in order to sustain the ecological functions and biodiversity attributes of the area. The *Headwaters Site* ecological evaluation, written Chel Anderson and Ethan Perry March 2007, was based on MCBS evaluation of the area and consolidation of related ecological information is being used to inform their discussion of protection and management planning for this nearly 40,000 acre area.

Manitou Collaborative
The Manitou Collaborative is focusing on management planning for another large landscape in northeastern MN. The participants include: Lake County Forestry, the SNF, TNC, DNR Divisions of Forestry, Wildlife and Ecological Resources, along with Potlatch and Wolf Ridge Environmental Learning Center. Representatives of this group took part in a field review of multiple stands within a proposed large patch management area to determine existing conditions, and to discuss landscape objectives and management options to maintain composition and structure consistent with native plant community dynamics. The *Ninemile Lakes and Ridges* Ecological Evaluation prepared by MCBS plant ecologist Mike Lee, includes consideration of biodiversity issues and processes in this landscape for consideration by the collaborative.

Subsection Forest Resource Management Planning (SFRMP)
Several MCBS staff participated in the DNR's Subsection Forest Resource Management Planning (SFRMP) due to the intersection of state forestlands with many MCBS sites. Two plant ecologists, Lawson Gerdes and Chel Anderson, were members of the core team that prepared the Laurentian, Toimi and North Shore subsection plan (NSH) completed in 2007. They attended core team meetings, reviewed annual harvest plans and additions, reviewed public comments and presented a portion of the training session for

75 DNR staff (forestry, wildlife, fisheries, ecological services) where plan implementation was described. MCBS also coordinated the transfer of relevant data and interpretations between Ecological Resources staff and NSH SFRMP planning team. GIS data layers provided by MCBS included polygons of MCBS native plant communities and sites of biodiversity significance. Northeast staff participated in site visits with staff from other DNR divisions to selected stands identified during the planning process that express attributes requiring consideration of a variety of management options. As an example, one site had a significant upland white cedar component with advanced regeneration which is a feature of interest for forest management and biodiversity conservation in northeastern Minnesota. During the field visit, the group collected vegetation data (relevés) and discussed potential management options in order to revise recommendations for management action.

Information was also provided to the Border Lakes SFRMP Team regarding MCBS sites.

Data recently collected by MCBS in the Chippewa Plains and the Pine Moraines & Outwash Plains subsections were also delivered to a new team established to prepare a plan for these subsections.

MCBS reviewed and provided comments to the revision of *DNR's Interdisciplinary Forest Management Coordination Policy* for the Divisions of Ecological Resources, Wildlife and Forestry.

DNR Forest Certification

MCBS staff participated in the DNR process that resulted in dual forest certification of the DNR in December 2005. They provided responses to standards and criteria, and participated in field audits in Aitkin, Sandstone, Grand Rapids, Deer River and Two Harbors. Three MCBS plant ecologists were selected for the DNR's internal certification audit team. They took the required training and participated in meetings and field visits in conjunction with the formal surveillance audit conducted in October 2006. Staff have been a part of discussions of how MCBS data will be used to identify high conservation value forests [Forest Stewardship Council (FSC) Corrective Action Request (CAR) 2005.14] and samples of representative ecosystems (FCS CAR 2005.6).

Forest Certification in Clearwater and Lake Counties

MCBS staff also communicated with Clearwater County and Lake County foresters or land commissioners as to how MCBS data and interpretations could be used in addressing County Forest Certification issues.

Off Highway Vehicle (OHV) planning

In the northeast two ecologists were members of OHV planning teams as related to trails on state lands. This included an OHV planning team for state forests and scattered state lands in and near the Superior NF (Cook, Lake, St. Louis counties), a Duluth/Carlton field team, Sandstone field team and a Cloquet Valley State Forest team.

In addition, one ecologist represented the Division of Ecological Resources on the team established to coordinate OHV trail evaluation with the Superior National Forest process. She also was on a North Shore field team evaluating a North Shore State Trail feasibility study to assess OHV use of an existing snowmobile trail.

In Becker County, some targeted surveys of MCBS sites in North and South Round Lake Townships were conducted to help inform a project proposing a new 70-mile long Off Road Vehicle (ORV) trail.

Superior National Forest (SNF)
MCBS staff have continued to work with SNF biologists in MCBS sites that intersect the SNF project areas. For example MCBS Landscape Study Areas (LSAs) named Dragon and Eighteen are within the SNF Inga South Project Area. Northeast MCBS staff provided technical assistance to the Whyte Project and to the Mid-Temperance Project planning teams. For example, 18 MCBS Sites lie within Whyte project area, so their biodiversity significance was discussed in relationship to management.

MCBS staff completed drafts of ecological evaluations for areas containing some of the MCBS sites of Outstanding Biodiversity Significance and SNF candidate Research Natural Areas (cRNA) as identified in the SNF plan, that also have adjacent state land. These ecological evaluations provide details related to the ecological significance of these landscapes.

Minnesota Pollution Control Agency
Northeast staff provided technical guidance and interpretation of MCBS data for the Great Lakes Basin Plan update, including information regarding the access to MCBS sites, native plant communities, rare species, and relevé locations.

Norm Aaseng and others helped to standardize plant names for a project needed by the Pollution Control Agency as part of their development of a product for wetland evaluation: "Floristic Quality Assessment for Minnesota Wetlands".

Other Examples of Technical Assistance:
MCBS staff participated in the planning process associated with the Comprehensive Wildlife Conservation Strategy which outlines a state plan for survey, research and management for animal species of greatest conservation need. The plan was completed in fall 2005 providing additional guidance for MCBS animal surveys.

The Lake Superior Binational Program identified "Important Habitat in the Great Lakes Basin" and published a map of the region that includes MCBS Sites of Outstanding and High biodiversity significance. This map is available from Ann McCammon-Soltis amsoltis@glifwc.org

MCBS reviewed documents that outline conservation and restoration goals related to the St Louis River estuary and provided input to the St. Louis River Citizens Action Committee Habitat Group.

In order to continue to collect and promote collection of high quality data on vascular plants, several staff participated in workshops on groups of plants that are especially difficult to properly identify. One workshop focused on the genus *Rubus* (blackberries and raspberries). The MCBS aquatic botanist provided her expertise in two aquatic plant identification workshops. As a follow-up to one session, she provided DNR fisheries researcher with data on the distribution of subterminally-fruited bulrush (*Schoenoplectus subterminalis*) following his participation in the Brainerd aquatic plant identification training. He was speculating that eggs of Northern pike were attaching to the very fine grassy leaves of this species of plant and wanted to know more about where the plant was found.

Prior to release for public review, MCBS biologists provided additional comments on the revision of the state endangered and threatened species list.

Staff reviewed selected species that are to be presented as part of the Division of Ecological Resources "Rare Species Guide", a web-based interactive database.

Staff provided Becker County planning staff with preliminary data (current as of January 2007) for a zoning project working to identify land for recreation, preservation, and development.

Two plant ecologists attended Tamarac National Wildlife Refuge's habitat and wildlife management plan revision meeting (2 days). As a follow-up they provided a written summary of considerations for plant communities and animals and sent this to Tamarac NWR.

Staff provided comments on the DNR's Guidelines for Woody Biomass harvest as related to forests, brushlands and open lands.

Plant ecologist, Nancy Sather participated on a southern regional DNR team to discuss woody vegetation in the prairie.

MCBS and DNR Parks prepared an agreement and began work on mapping the native plant communities in McCarthy Beach State Park.

Data on the status of the Ottoe skipper in MN were provided to a Canadian recovery planning process for that species.

Selected Presentations and Field tours

NatureServe, an international entity supporting the national information system used by MCBS to distribute data relevant to national issues, held a Midwest regional meeting in Illinois in March, 2007. Due to the scarcity of prairie in Minnesota and the state's strong promotion of renewable energy, Carmen Converse was asked to organize and lead a session related to the impact of biofuels on biodiversity protection in the Midwest.

A co-authored (DNR, TNC) oral presentation on Manitou large patch project (se also the Manitou Collaborative) was presented at a joint state meeting of the Society for Conservation Biology, Society for American Foresters, and The Wildlife Society and American Fisheries Society in late February, 2006.

Staff contributed to a co-authored (DNR, TNC) oral presentation entitled *Collaborative modeling to support biodiversity conservation across ownership boundaries: The Manitou forest modeling project in Minnesota* that was presented at an international Conservation Biology meeting held in San Jose, California in June 2006.

In Itasca County, Ethan Perry presented the status of the Itasca County Survey to the County Land Department and participated in the LCCMR tour of the Sugar Hills site in relationship to discussions about Forest Legacy.

Three presentations were made at the "Million Acres Conference for Woodland Owners" in February 2006. One described MCBS goals and procedures, another provided an overview of the amphibians and reptiles of the forested landscape and the third was a plant identification workshop featuring plants typical of mesic hardwood and fire-dependent forests.

The Natural Resources Continuing Education program at Bemidji State University featured a presentation by MCBS that focused on surveys and data use in northern MN.

The Public Television show "Venture North" filmed an episode at Prairie Marshes Wildlife Management Area featuring MCBS in southwestern Minnesota. Robert Dana, prairie ecologist and lepidopterist, provided the commentary, along with direction to film the Phlox moth *(Schinia indiana)* on it host plant (*Phlox pilosa*).

A poster describing MCBS along with associated plant and animal museum specimens and collecting materials were displayed at the Bell Museum of Natural History during the "Touch the Sky" exhibit of the Southwestern MN photography of Jim Brandenburg.

The Minnesota Native Plant Society featured a presentation on MCBS in February, and a Symposium in March 2007 entitled *Minnesota portion of the Prairie Coteau* held at the Bell Museum of Natural History. Most of the presenters were MCBS ecologists, with presentations ranging from the historic events that have shaped the region to the relationships of insects and plants of the region. The event was well-attended and the Bell has encouraged the Society to continue coordinating their annual symposium with the museum.

Robert Dana and Nancy Sather made presentations about the natural history and resources associated with the Aspen Parkland at a symposium at the University of MN Crookston.

The natural resources of the Des Moines watershed of Southwestern MN were the subject of a presentation to the local watershed coordinators in the region.

A Native Plant Society field trip in June 2007 to the Pipestone area led by MCBS ecologists was featured in a recent article, *Blowin' in the Wind* found in the fall 2007 issue of *_scape*, a publication of the Minnesota Chapter of the American Society of Landscape Architects.

Fred Harris led the 5th annual Minnesota River Field Tour to view granite outcrops and prairie in Renville and Redwood counties.

In the Southwest, plant ecologists led field surveys with botanists from the Missouri office of the National Park Service at Pipestone National Monument, conducted a field tour with a representative from the Rock County Soil and Water Conservation District, and another tour that included DNR foresters as part of a workshop focused on improving the understanding by MCBS plant ecologists of floodplain and upland forests native to southwestern Minnesota.

In coordination with the State Wildlife Action Plan team and the Minnesota Zoo, Tom Klein provided graphics for a workbook (Minnesota's Wild and Rare) for children featuring some of Minnesota's wildlife species of greatest conservation need. This was presented at the opening of the updated MN Trail at the Zoo.

V. TOTAL LCMR PROJECT BUDGET:

All Results: Personnel: $ 950,000
All Results: Travel $ 50,000

TOTAL LCMR PROJECT BUDGET: $ 1,000,000

Explanation of Capital Expenditures Greater Than $3,500
All LCMR expenditures are for Personnel and travel

VI. OTHER FUNDS & PARTNERS:

A. Project Partners: Repositories at the University of Minnesota, J. F. Bell Museum of Natural History and the Science Museum of Minnesota will provide resources for the curation of specimens collected by MCBS.

B. Other Funds being Spent during the Project Period based on FY04-05 amounts as of January 2004:

Other funding sources FY05-06	Amount
General Fund	$ 373,000
RIM General	$ 181,000
Heritage Enhancement	$ 1,012,400
TOTAL	**$ 1,566,400**

C. Required match: N/A

D. Past Spending:

	FY88-89	FY90-91	FY92-93	FY94-95	FY96-97	FY98-99	FY00-01	FY02-03	FY04-05
LCMR	$171,500	$150,000	$1,000,000	$900,000	$900,000	$1,200,000	$1,600,000	$800,000	$900,000
TNC	$171,500								
GEN		$300,000	$300,000	$300,000	$300,000	$436,000	$449,400	$479,600	$373,000
RIM		$170,000	$169,000	$156,000	$164,000	$172,000	$173,500	$190,010	$181,400
Nongame		$100,000	$80,000	$80,000	$69,000	$70,300	$104,200	$70,300	
Heritage Enhance								$1,300,000	$1,012,400
SWG*									$429,500
Totals	$343,000	$720,000	$1,549,000	$1,436,000	$1,433,000	$1,878,300	$2,327,100	$2,839,910	$2,896,300

Total=15,422,610

* State Wildlife Grants (Temporary Competitive Federal Funding)

E. 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. A data request form is also available via the web: http://www.dnr.state.mn.us/ecological_services/nhnrp
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 routinely sent published products, including maps, reports, field guides and digital media. 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.

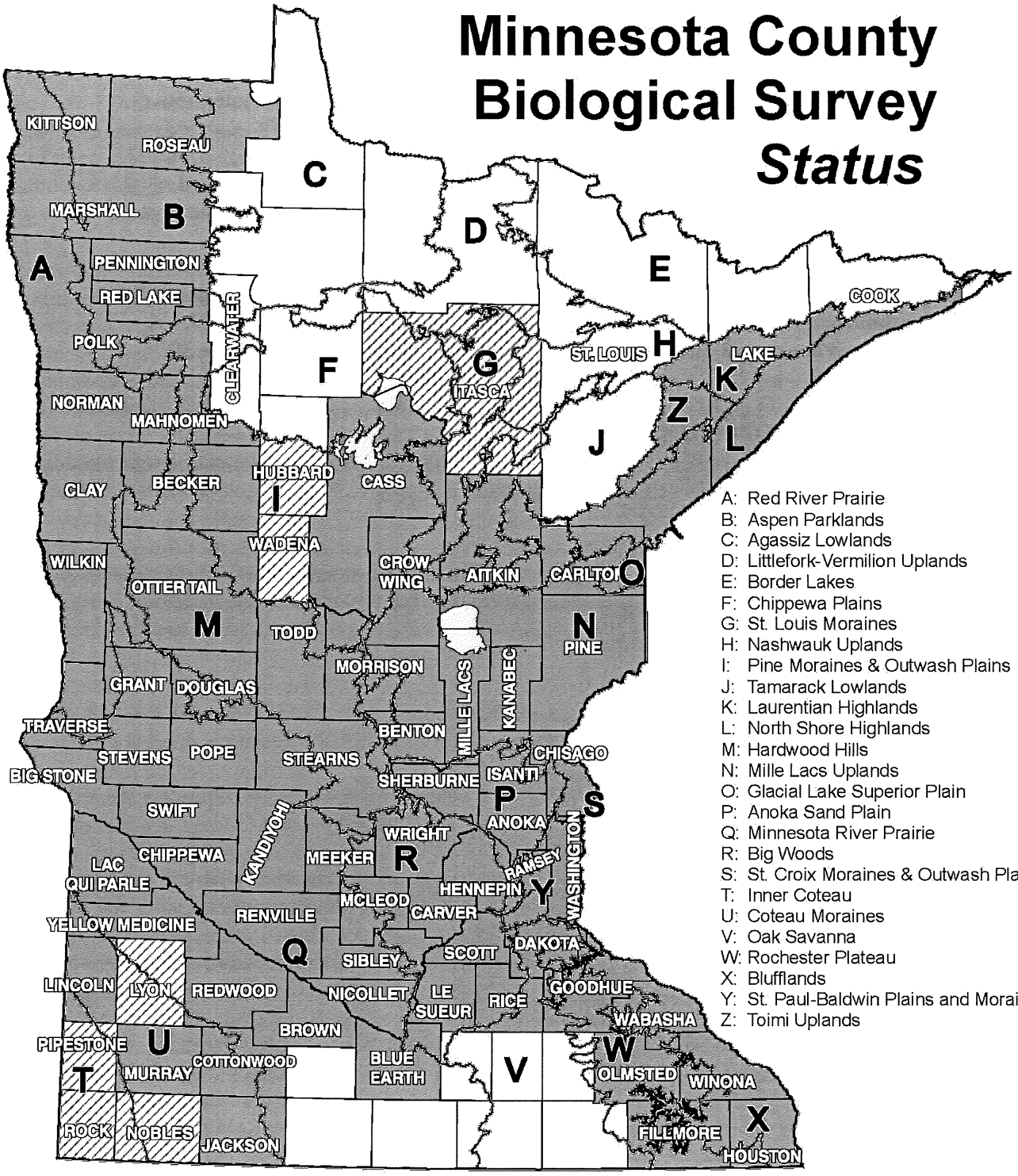
Physical collections are deposited at Minnesota repositories, primarily at the University of Minnesota's J.F. Bell Museum of Natural History and the Science Museum of Minnesota, St. Paul, MN. As part of a larger network of museums and herbaria, these cooperators are essential to the documentation and 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 workprogram progress reports will be submitted not later than January 2006, October 2006, and March 2007. A final workprogram report and associated products will be submitted by June 30, 2007.

IX. RESEARCH PROPOSALS: N/A

Minnesota County Biological Survey *Status*



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

Survey Completed 1987-2007

Survey in Progress 2007

June 2007

Attachment A: Budget Detail for 2005 Projects

Proposal Title: *Minnesota County Biological Survey-Continuation*

Project Manager Name: Carmen Converse

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

2005 LCMR Budget	Result 1 Budget:$500,000	Amount Spent	Balance	Result 2 Budget: $253,000	Amount Spent	Balance	Result 3 Budget: $247,000	Amount Spent	Balance	
	Field Surveys			*Information System Expansion*			*Data Distribution and Interpretation*			
BUDGET ITEM										**TOTAL FOR BUDGET**
PERSONNEL: Staff Expenses, wages, salaries,benefits										
botanist	**80,000**	**62,919**		**20,000**	**35,628**		**12,424**	**19,404**		**117,951**
botanist	**73,000**	**56,297**		**20,300**	**47,434**		**14,700**	**15,122**		**118,853**
Info Officer (.9FTE)							**123,800**	**130,073**		**130,073**
data manager				**129,700**	**120,242**			**2,043**		**122,285**
Plant ecologist	**76,000**	**65,608**		**21,000**	**22,222**		**25,000**	**21,423**		**109,253**
Plant ecologist	**76,000**	**57,726**		**21,000**	**32,015**		**23,744**	**24,175**		**113,916**
Plant ecologist	**63,000**	**51,190**		**18,000**	**23,123**		**21,240**	**27,106**		**101,419**
Plant ecologist	**82,000**	**56,049**		**23,000**	**23,004**		**26,092**	**50,463**		**129,516**
SALARIES	**450,000**	**349,789**	**0**	**253,000**	**303,668**	**0**	**247,000**	**289,809**	**0**	**943,266**
Travel expenses in Minnesota	**50,000**	**56,734**								**56,734**
COLUMN TOTAL	**500,000**	**406,523**	**0**	**253,000**	**303,668**	**0**	**247,000**	**289,809**	**0**	**1,000,000**