2003 Project Abstract
For the Period Ending June 30, 2005

FINAL REPORT

TITLE: 08a Minnesota County Biological Survey-Continuation
PROJECT MANAGER: Carmen Converse
ORGANIZATION: Department of Natural Resources (DNR)
ADDRESS: Box 25, 500 Lafayette Road
St. Paul, Minnesota 55155
WEB SITE ADDRESS: www.dnr.state.mn.us
FUND: Environment and Natural Resources Trust Fund
LEGAL CITATION: ML 2003, Ch. 128, Art. 1, Sec. 9, Subd. 08a
APPROPRIATION AMOUNT: $900,000

Overall Project Outcome and Results
MCBS has completed surveys in 60 of Minnesota's 87 counties since 1987. In this biennium, field surveys were completed in Douglas, Todd and Otter Tail counties and in the North Shore Highlands subsection.

New records of 597 locations of rare species were added to the DNR Rare Features Database. Since MCBS began, 14,702 new records of rare features have been added. Since July 2003, 300 vegetation samples (relevés) were added to the statewide Relevé Database, for a total MCBS contribution of 3,519 samples of the 8,375 database records. Polygons of 1,649 MCBS sites of Biodiversity Significance and 10,161 polygons of native plant communities or complexes were added to the dataset that resides on DNR's "Data Deli". Statewide, MCBS has added a total of 6,142 site and 26,554 native plant community polygons. Canada rice grass *(Oryzopsis canadensis)* was documented for the first time in the state. Since 1987, MCBS has recorded seventeen species of native plants and two species and one hybrid of amphibians not previously documented in Minnesota.

Project Results Use and Dissemination
Eleven MCBS county maps were added to the DNR website.

The first of a three volume series of field guides was published: *Field guide to the native plant communities of Minnesota: The Laurentian Mixed Forest Province.*

AniMap, an interactive web mapping tool, displays animals survey data collected by MCBS.
http://www.dnr.state.mn.us/ecological_services/mcbs/index.html

Information delivered: Brainerd Lakes Area Conservation Collaborative, Morrison County Land Use planning, Lake County Land Department, St Louis County, Todd County Open House, county boards in Becker, Douglas, and Otter Tail counties. Participation in planning teams for DNR Forestry and Off Highway Vehicles.

Selected conservation actions: Participation in the Sand Lake/Seven Beavers and the Manitou Collaboratives. Natural areas recommended included Lake Christina, Mountain Mint Prairie and Spruce Hill. Part of a MCBS site in Crow Wing County received a DNR conservation easement; a prairie site in Kandiyohi County was enrolled in the Prairie Bank Easement program.

Date of Report: June 30, 2005
Final LCMR Work Program Report
Date of Work Program Approval: June 25, 2003
Project Completion Date: This workprogram outlines activities and products to be completed during the two-year duration of this funding (ending June 30, 2005). 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: 08a Minnesota County Biological Survey-Continuation

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Total Biennial Project Budget: $900,000

LCMR Appropriation: $900,000
Minus Amount Spent: $900,000
Equal Balance: $0

Legal Citation: ML 2003, Ch. 128, Art. 1, Sec. 9, Subd. 08a

Appropriation Language: 8 (a) Minnesota County Biological Survey

$450,000 the first year and $450,000 the second year are from the trust fund to the commissioner of natural resources for the ninth 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

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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, parks 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 following field seasons to survey selected rare species or groups of species (e.g., plants, birds, mammals, reptiles, amphibians). 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: $ 342,000**
Balance: $ 0

Completion Dates: (See also map under IX. Location organized by Ecological Classification System subsection boundaries):

1) Hardwood Hills subsection and Pine Moraines and Outwash Plains subsection. Field surveys that began in the previous biennium will be completed in Douglas, Todd, and the unsurveyed portion of Otter Tail counties (including some portions of the Minnesota River Prairie subsection). Surveys will continue in Becker County.

2) North Shore Highlands subsection: Field surveys that began in the previous biennium will be completed in the subsection (including portions of Cook, Lake and St. Louis counties).

3) Toimi Uplands and Laurentian Uplands subsections: Field surveys that began in the previous biennium will be completed in these subsections (including portions of Cook, Lake and St. Louis counties).

Final Report Summary June 30, 2005
Field surveys were completed in Douglas, Todd, and Otter Tail counties and in the North Shore Highland subsection excluding Grand Portage Indian Reservation. Surveys continue in Becker County and in the Toimi Uplands and Laurentian Uplands subsections of Northeastern Minnesota.

Highlights from the Hardwood Hills and Pine Moraines and Outwash Plains:
There have been few previous botanical surveys of these counties. Consequently, plant ecologist/botanists collected a high number of county records (plants having no previous documentation from the county in the James Ford Bell Museum herbarium). These collections were submitted to the herbarium and contribute to the documentation of the distribution of the state's plant species. Over 300 of the plant collections made in Todd, Becker and Otter Tail counties were county records. These included records of relatively uncommon species of raspberry (*Rubus semisetosus* and *R. wheeleri*). In addition, populations of rare terrestrial plants were located including Small white lady's slipper (*Cypripedium candidum*), Ram's head orchid (*C. arietinum*), Prairie moonwort (*Botrychium campestre*), White adder's mouth (*Malaxis monophyllus),* Ginseng (*Panax quinquefolius*), Hill's thistle (*Cirsium hillii*), and Snow trillium (*Trillium nivale*).

Aquatic vegetation surveys were focused on locating new populations of rare aquatic plants. Surveys of 172 lakes in Becker, Otter Tail, Douglas and Todd counties were completed. New locations were recorded of the following rare species: American shore plantain (*Litttorella uniflora*), Humped bladderwort *(Utricularia gibba*), Large-sheathed pondweed (*Stuckenia vaginata*), Wigeon grass (*Ruppia cirrhosa*) and Sea naiad (*Najas marina*).

These surveys also included observations on lake quality, water clarity, shoreline development and landscape context. Based on these criteria, a few of the most outstanding lakes in terms of aquatic vegetation in Becker, Douglas, Otter Tail and Todd counties include: Annie Battle, Big Sugarbush, Chippewa, Coal, East Annelaide, Elbow, Fairy, Hanson, Head, Heilberger, Hungry, Greenwater, Jim, Johnson, La Belle, Le Homme Dieu, Little Eng, Maple, Moon, Moses, South Arm Lida, Spring, Tilde, Tumuli North Ten Mile, and White Earth. Ten of these outstanding lakes also contained populations of the following nongame fish species: pugnose shiners, least darters, blacknose shiner, blackchin shiners and banded killifish.

One of the more impressive results of the animal surveys was the documentation of over 50 new locations of rare fish, including Pugnose shiner (*Notropis anogenus*) and Least darter (*Etheostoma microperca*). Other notable records of fish species included Rainbow darter (*Etheostoma caeruleum),* Northern hogsucker (*Hypentelium nigricans)*, and Weed shiner (*Notropis texanus).* Small mammal surveys documented Prairie voles (*Microtus ochrogaster*) from four sites in Todd and Douglas counties. Bird surveys resulted in 180 new locations of rare birds, mostly recorded during the breeding season. These included Red-shouldered Hawk (*Buteo lineatus*), Cerulean Warbler (*Dendroica cerulea*), Marbled Godwit (*Limosa fedoa*), Yellow Rail (*Coturnicops noveboracensis*) and Nelson's Sharp-tailed Sparrow (*Ammodramus nelsoni*).

Staff met twice with White Earth Reservation Biologists to provide an update on the Survey progress and to secure permission to conduct surveys on Tribal Lands.

Fred Harris, a MCBS plant ecologist most recently working in Otter Tail County, accepted a position with Great River Greening at the end of the 2003 field season. His contributions to the understanding of the state's native flora and plant communities have been outstanding and the program will miss his excellent work.

Highlights from the North Shore Highlands, Toimi Uplands and Laurentian Uplands: Plant ecologists and botanists completed surveys in the North Shore Highlands Subsection. Their field surveys were conducted to determine sites of Biodiversity Significance, locate rare plants, collect relevés and record field observations on the native plant communities to assist with mapping. The work was focused within large areas (Landscape Study Areas-"LSAs"), previously selected using remote sensing and other natural resource data. Toimi Uplands and Laurentian Uplands surveys of sites and native plant communities will be completed by the close of the 2005 field season. In June 2005, a field plan was implemented that included three weeks of coordinated team-work by five plant ecologist/botanists that will be partially supported by helicopter transfer to remote areas.

As an example of the results of site surveys, a large site in Lake County revealed the location of a rich fen complex that features water tracks, Great gray owls (*Strix nebulosa*), Sandhill cranes *(Grus canadensis)* and rare plants including sundews (*Drosera anglica* and *D. linearus*), Bog rush (*Juncus stygius)* and Michaux's sedge (*Carex michauxiana).*

Aquatic vegetation surveys of 218 lakes in the three subsections were focused on locating new populations of rare aquatic plants. Eighty-one of these lakes were sampled as part of a participating agreement Superior National Forest. Forty-one of the lakes were considered to be of outstanding quality in terms of aquatic vegetation. A few examples include: Cabin, Caribou, Dragon, Four Mile, Mic Mac, South Wigwam, Stone, Toohey and Wanless. New locations of rare aquatic plants included Awlwort (*Subularia aquatica*), Vasey's pondweed (*Potamogeton vaseyi),* Leafless water milfoil (*Myriophyllum tenellum*), Yellow-eyed grass (*Xyris montana*), Grass-like water plantain (*Alisma gramineum*).

In terms of other rare plants, Canada rice grass *(Oryzopsis canadensis)* was documented for the first time in Minnesota in the Laurentian Landscape Study Area. Other rare plant locations included Small-flowered wood rush *(Luzula parviflora)*, Small shinleaf (*Pyrola minor*), Coastal sedge *(Carex exilis)*, Sooty-colored beak-rush *(Rhynchospora fusca)*, Lapland buttercup *(Ranunculus lapponicus),* and the largest population recorded in the state of One-flowered muhly grass (*Muhlenbergia uniflorum).*

Animal surveys were completed in the three subsections. Field data recorders were utilized for more efficient entry of bat and anuran (frog calls) survey data. These data were transferred directly into permanent databases at the end of the field season, thereby reducing data entry time. Herpetofaunal surveys focused on documenting rare salamanders and locating and evaluating forest wetlands. Site visits included collection and identification of salamander larvae as part of the search for the rare Four-toed salamander (*Hemidactylium scutatum*) and Spotted salamander (*Ambystoma maculatum*). No new locations of either species were discovered. Habitat parameters, such as pH, temperature, water-depth and water clarity were collected at each site to evaluate wetland quality for amphibians.

Surveys for rare small mammals have resulted in an expansion of the known ranges of two species, Smokey shrew (*Sorex fumeus*) and Rock vole (*Microtus chrotorrhinus*) and two new locations of Eastern heather voles (*Phenacomys ungava*). Bat surveys were conducted in a variety of forest habitats using an Anabat bat detector. This detector was also used to record the spring and fall migration of bats along the shore of Lake Superior. Over 100,000 bat call files were recorded using this system and review of calls to assess the bat activity and species composition is ongoing. A highlight thus far from the bat survey work has been the location of the northernmost location of hibernating Eastern pipistrelle (*Pipistrellus subflavus*) in a natural cave in North America.

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. Databases include: rare features (geographic), relevé (vegetation samples), county fauna and flora checklists, MCBS site, animal aggregations and bearing tree (from Public Land Survey notes 1847-1907). Locations of rare features are mapped at the scale of U.S.Geological Survey (USGS) 1:24,000 topographic maps, and both site and rare features data are digitized using ARC/VIEW GIS. The structure of the Information System continues to be improved to provide for more efficient data management through the use of related databases, networks, laptop computers, multi-user systems, global positioning systems, and GIS. MCBS cooperates in DNR's efforts to develop data and mapping standards, as well as national efforts, including NatureServe, the Biological Research Division of USGS, and The Nature Conservancy. Delivery of digital information using compact disks and the web continue to be improved in coordination with The Division of Ecological Services and others in the DNR. 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, prepared for permanent storage and deposited in appropriate repositories at the Bell Museum of Natural History at the University of Minnesota and the Science Museum of Minnesota. Photographic vouchers, color slides, digital images, videotapes and compact disks are labeled and stored at the DNR, St. Paul. Field data sheets are filed manually in preparation for archiving.

Summary Budget Information for Result 2: **LCMR Budget: $ 333,000**
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.

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Since July 2003, new records of 597 locations of rare features were added to the Department of Natural Resources (DNR) Rare Features Database. Since MCBS began in 1987, 14,702 new records have been added by MCBS. Since July 2003, 300 vegetation samples (relevés) were added to statewide Relevé Database, for a total MCBS contribution of 3,519 samples of the 8,375 records. MCBS also entered 342 relevés from other sources including wetland samples from the University of Minnesota and relevés collected by the Ecological Land Classification Program (DNR Forestry). These vegetation data were used in the verification of Minnesota's Native Plant Community Classification (version 2.0).

MCBS currently stores many spatial files in a Geographic Information System (GIS). Polygons and associated attribute files are one of the more frequently requested items. These exist for the "MCBS Sites of Biodiversity Significance" and for the native plant communities mapped by MCBS. Since January 2004, 1,649 polygons of MCBS Sites of Biodiversity Significance were added to the statewide dataset that resides on DNR's "Data Deli" and are accessible to users with GIS capabilities. During this same period 10,161 polygons of native plant communities representing 170 native plant community types or complexes were added to the statewide dataset with locations in 13 counties. These are also accessible on the Data Deli. http://deli.dnr.state.mn.us/. Since the Survey began, polygons of 6,142 sites and 26,554 native plant communities or complexes have been placed on the Data Deli.

Plant ecologists mapped over 11,000 additional polygons of native plant communities within sites of Outstanding and High Biodiversity Significance for much of the survey area in the North Shore Highlands. These polygons are currently undergoing quality control procedures prior to release on the DNR Data Deli.

Due to the growing use of the Native Plant Community classification version 2.0, MCBS and representatives from other Divisions met to develop a Department-wide "core database". This database would include a limited number of fields where observers from various Divisions record data from native plant community field observation points. Departmental field staff now record data in notebooks, on forms or on hand-held data recorders, usually in association with a GPS reading or other geographic "point" reference. A core database would enable someone, for example, from the Division of Parks and Recreation to view data related to a native plant community location collected by a forester and easily transfer the dataset. Participating programs would also utilize the standard statewide list of vascular plants. Ideally, all data would be available on ARCVIEW Quick Themes.

Staff attended a meeting of the Interagency Information Cooperative (IIC). Other participants in the meeting were from other DNR divisions, the University of MN, NRRI and Potlatch Corporation. The meeting was an open discussion of data available on the IIC and data that should be made available on the IIC. The above "core database" of native plant community observations, vegetation samples, and rare species locations were some of the databases that are part of the Natural Heritage Information System identified as possible resources.

The Information System where data from MCBS is stored was upgraded to a new version called BIOTICS. The first update using this system has been released within the DNR and to licensed users. MCBS biologists and data entry staff now enter data using this new system. This work is in collaboration with the Natural Heritage and Nongame Research Program.

A project to convert slides for incorporation into a digital image database was a major activity during this period. MCBS will soon be able to provide digital images, often requested by the public and consultants, without the risk of losing the original image (too often the case with slide loans). Biologists have been managing this project and have been contributing slides. Over 13,000 slides are now in digital format.

A statewide list of vascular plants is being updated for use in MCBS vegetation sampling and analysis, preparation of plant collections, for tracking county records and as a standard list for web users. Most recently, it is proposed as a reference list for use in wetland quality assessment, as part of collaboration with the Minnesota Pollution Control Agency. In the design of this list, staff have considered the taxonomy used by the Flora of North America, NatureServe's BIOTICS, PLANTS 2002, Kartesz 2004, BONAP 1988, and the standard list for the collection at the J.F. Bell Museum of Natural History herbarium. It also includes the DNR's most recent taxonomic work on aquatic and woody plants.

The re-organization of the plant collection at the J.F. Bell Museum herbarium has been completed providing for improved storage of plant specimens. During this period, over 900 plant collections, mostly of rare species and county records were verified and prepared for submission to the herbarium.

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 usually generated as summaries directly from the Natural Heritage Information System. Standard reports and maps are distributed to other agencies and organizations (schools, libraries, nature centers, universities, county boards, planning boards, consulting firms) as hard copies, compact disks, through the web or other

electronic delivery. Other data requests are coordinated through the standard request procedures of the Natural Heritage and Nongame Research Program.

Ecologists and biologists provide technical assistance and prepare written conservation and management recommendations for selected high quality sites and representative ecological landscapes in response to requests from within and outside the agency. This includes providing documentation for the highest quality sites often proposed for management as natural areas. Technical assistance includes consultations with local governments, public land managers, organizations and individuals concerning the integration of rare feature protection with other land management goals.

Summary Budget Information for Result 3: **LCMR Budget: $ 225,000**
Balance: $ 0

Completion Dates: Maps displaying results of MCBS for at least three additional counties will be available on the DNR website by October 2004 and two more by March 2005. A compact disk summarizing results of MCBS in Toimi Uplands, Laurentian Highlands, and North Shore Highlands will be distributed to land managers by June 2005. Updates on technical assistance activities will be recorded in each of the periodic status reports.

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Product Delivery:
Since July 2003, eleven county maps displaying results of MCBS were made available on the DNR website (Brown, Chippewa, Kandiyohi, Kittson, McLeod, Mille Lacs, Morrison, Redwood, Swift, Wright and Yellow Medicine counties).

AniMap, an interactive mapping tool that displays data collected by MCBS on common animals, was launched on the DNR's web site. Animap allows the user to obtain lists of common animals by location and statewide records for individual species.

Several notable plant findings were highlighted on the MCBS website, and the new native plant community classification (version 2.0) was presented.
http://www.dnr.state.mn.us/ecological_services/mcbs/index.html

A new list of calcareous fens was updated and placed on the DNR web site. MCBS plant ecologists and data management staff worked to ensure that the most current and accurate list was presented based on recent surveys.
http://www.dnr.state.mn.us/ecological_services/index.html

The first volume in a series of statewide field guides organized by Minnesota's Ecological Provinces was distributed: *Field guide to the native plant communities of Minnesota: The Laurentian Mixed Forest Province,* Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. (2003) MNDNR St Paul, MN. The guide is currently being sold at

the Minnesota Bookstore. The DNR Division of Forestry ECLC conducted training sessions for DNR staff on how to use the field guide. The two final volumes on the Eastern Broadleaf Forest and Prairie Parkland and Tallgrass Aspen Parklands provinces will be published in 2005 and 2006. MCBS staff has assumed the primary role in the writing, formatting, review and publication of these field guides.

The MCBS ornithologist worked with Nongame Wildlife staff on a publication on the status of Red-shouldered Hawks. Stucker, S.P., P.S. Perry, and K.R. Woizeschke. 2004. *Notes on the Breeding Distribution of Red-shouldered Hawks in Minnesota.* The Loon 76:3-8.

Other publications/products included:
Minnesota County Biological Survey Biological Report No. 78 (2003). *Native Plant Communities of Jay Cooke State Park (Compact Disk)* was delivered to the Division of Parks and Recreation for use in Park planning and management.

Minnesota County Biological Survey Biological Report No. 80 (Oct 2003) *Salamander Surveys in the Superior National Forest.* Delivered to the Superior National Forest.

Minnesota County Biological Survey Biological Report No. 81 (Nov 2003) *Small Mammal Surveys in the Pike Mountain Area. St. Louis County, Minnesota.* Delivered to the Superior National Forest.

Minnesota County Biological Survey Biological Report No. 82 (2003). *Compilation of Baseline Data to Monitor Forest Amphibians in the Bear River Demonstration Forest, 2002-2003.*

Minnesota Department of Natural Resources, Division of Ecological Services. Biological Report No.84 (2005) *Aquatic Plant Surveys of Selected Lakes within the Superior National Forest (Compact Disk.* Delivered to the Superior National Forest. It includes locations of rare aquatic plants, lists of common aquatic plants species found in the lakes surveyed, and excellent photos of the lakes and rare aquatic plants that will serve as a training tool for Forest biologists.

Due to several requests for a series of reports completed for the Superior National Forest, a compact disk, *Bryophytes of the Northern Superior Uplands and the Superior National Forest: inventory, assessment, and recommendations for conservation* was prepared that includes three reports from 2002 and 2003.

A compact disk of the loose-leaf notebook, *A Summary of Priority Areas of Significant Native Biodiversity in Southeastern Minnesota* was prepared for limited distribution due to a number of requests for copies.

The Environmental Systems Research Institute, Inc. (ESRI) published a book that contains an exemplary map from each state that was generated using one of their Geographic Information System products. From an array of maps submitted from Minnesota, they selected a MCBS map entitled: *Sites of Biodiversity Significance in the*

Glacial Lakes and Moraines Landscape of Minnesota as Determined by the Minnesota County Biological Survey 2002 for inclusion in the book entitled *GIS in State Government Volume 1* (2005) ESRI.

A compact disk summarizing data collected by MCBS along the Minnesota River is in progress. It will include maps, current and historical landscape discussion and summaries of MCBS sites, native plant communities and other highlights from MCBS surveys in the region. This is now scheduled for completion in January 2006.

A compact disk summarizing data collected by MCBS in the three NE subsections has been delayed until the completion of surveys in the Toimi Uplands and Laurentian Uplands.

A feature article on the Minnesota County Biological Survey was published in the 4 September 2003 issue of *The Christian Science Monitor* based on an interview and field survey with Mike Lee (MCBS plant ecologist).

Articles featuring MCBS appeared in several periodicals: 2 April 2004. King, T. *County's biological survey makes some unusual discoveries.* Todd County Courier Vol. 16, Number 19 and14 May 2004. King, T. *Survey takes inventory of the state's vast ecosystems.* The Land Vol. 23 Number 10 and The Land 27 May 2005. Kveno, Kristin. *Surveying this summer to preserve and discover.*

Technical assistance-Forest Issues:
Two plant ecologists participated in the DNR Forestry planning process for the North Shore Highlands, Toimi Uplands and Laurentian Uplands and worked to integrate biodiversity conservation and management recommendations related to stands found within MCBS sites of Outstanding and High biodiversity significance. The DNR team prepared a Strategic Direction Document in December 2004 and conducted a series of open houses for public review. MCBS staff prepared responses to issues related to MCBS that were raised during the public comment period. Finally, in 2005 the core team developed a process for "joint site visits" by DNR staff to stands where there remained questions by Divisions as to appropriate management. MCBS staff are reviewing the list of stands proposed for such visits and are prepared to participate in some site visits.

Northeast plant ecologists organized and led a June field review for some of the DNR Division directors in Rota Landscape Study Area to provide an opportunity for discussion of the new native plant community classification, the value of MCBS sites and review of forest management practices. The group visited Spur End Fen and a White Cedar – Yellow Birch Forest to discuss the ecology of these communities and management issues and options as it relates to the Northeast Forestry planning process.

As part of another DNR Forestry Subsection Planning team effort in east-central Minnesota, a plant ecologist and herpetologist from MCBS spent a field day with the area forester and wildlife manager in conifer stands proposed for harvest within a MCBS High Biodiversity Significance Site that contains habitat suitable for the rare Four-toed

salamander. At one location where the rare salamanders had been found, the herpetologist was able to show the group egg masses, nesting sites, and an adult female Four-toed salamander. Subsequent field discussion focused on how to structure a sale so that impacts to salamanders are limited and the group developed workable suggestions for revising the draft, *Forest guidelines for protecting rare salamanders.*

MCBS prepared a summary of MCBS field survey status for the DNR Forestry subsection planning process that began in March 2005 for the Pine Moraines and Chippewa Plains.

A presentation was made to a sub-group of Minnesota Forest Industries to explain the concept of Sites of Outstanding and High Biodiversity Significance and the relationship to DNR Forestry Planning.

The MCBS northern coordinator continued to represent the Division of Ecological Services at meetings of the Sand Lake/Seven Beavers Collaborative and the Manitou Collaborative, two private/public efforts to develop sustainable management plans for large landscapes that include sites of biodiversity significance identified by MCBS. The Sand Lake/Seven Beavers Collaborative most recently discussed complimentary management ideas for state lands that are adjacent to candidate Research Natural Areas identified in the Superior National Forest Plan. The Manitou Committee most recently discussed the results of landscape modeling to compare various management scenarios related to patch size. The Manitou Committee includes: Lake County Forestry, The Superior National Forest, The Nature Conservancy, DNR Divisions of Forestry, Fish and Wildlife and Ecological Services, Potlatch Corporation, and Wolf Ridge Environmental Learning Center.

Staff met with Superior National Forest (SNF) biologists to field review selected SNF old growth and other older forest stands, in the Dragon Landscape Study Area (LSA) that are proposed for treatment as part of the SNF *Inga-Isabella* Project Area Analysis. Staff requested and reviewed *Inga-Isabella Watershed Analysis* report for information relevant to MCBS work in Dragon LSA. Staff also periodically exchanged information with the SNF staff, primarily regarding rare species, invasive plant species, and unique areas.

MCBS staff visited several stands in the SNF *Dunka Project Area* (MCBS Slate LSA and Shamrock Lake area) with SNF staff. The group discussed management of stands in context of maintaining dry-mesic white pine-red pine landscape ecosystem pathways, native plant community growth stages, soils, biodiversity significance and achieving Forest goals of restoring conifers within stands in the project area. They discussed sharing data from the Natural Heritage Information System to use in evaluations.

Two plant ecologists provided a one-day field-training workshop for the SNF botanists and monitoring crew. Topics included plant identification, rare species issues and related management issues.

In collaboration with SNF biologists, MCBS organized a successful January 2005 meeting for the exchange of information regarding respective surveys in northeastern Minnesota. One of the focal presentations was related to the rare aquatic plant surveys conducted by MCBS in selected lakes in the SNF as part of a Participating Agreement with the Forest Service.

Several MCBS plant ecologists met with SNF foresters and biologists to address comments and suggestions related to the utility of the recently released DNR product, *Field guide to the native plant communities of Minnesota: The Laurentian Mixed Forest Province.* The Forest Service comments have been considered in the design of the next published field guide for the Eastern Broadleaf Forest and for a forthcoming version of the guides to be presented on the DNR web site.

A plant ecologist represented the Division of Ecological Services in the DNR's Off Highway Vehicles (OHV) identification process in one of the first areas to be evaluated in the state. He provided input on some of the following topics: MCBS sites of Biodiversity Significance, wetland concerns, riparian issues, locations of rare species, old growth and large patch forests, and natural forests with a significant pine component. Recently, he also assumed responsibility for representation of Ecological Services on the Cloquet Valley State Forest OHV team. He recently assisted with the writing of a draft cooperative management plan for an OHV trail routed through an old growth stand in Pine County.

Staff continued to provide input on development of policy and procedures for Forestry, Fish & Wildlife, and Ecological Services Coordination policy and on the 2005 Forest Certification process for the DNR.

A plant ecologist with expertise in peatland communities participated in the DNR team reviewing the effects of decorative (spruce) treetop harvest on wetlands.

MCBS continued an agreement with Potlatch for permission to survey on Potlatch lands, for exchange of Potlatch ownership and forest inventory data, and to ensure communication of Survey results to assist with forest certification and the monitoring of unique sites and biological communities. The MCBS northern coordinator presented a program on the "Identification and Conservation of Unique Biological Communities" to 30 resource supervisors, managers and procurement foresters as part of Potlatch's annual Environmental Management System training.

Data Delivery Counties:
Presentations on MCBS progress were made to county boards in Becker, Cook, Douglas, and Otter Tail counties and plant ecologists met with St. Louis County land management staff.

The MCBS northern coordinator attended a stakeholders meeting of Lake County Land Department in Two Harbors as the county embarks on a Forest Stewardship Council (FSC) forest certification assessment of the Lake County Land Department forest management operations.

MCBS provided GIS files of native plant communities and Sites of Biodiversity Significance that were used by the Brainerd Lakes Area Conservation Collaborative (BLACC) in a recent report by the Collaborative. Goals of the BLACC were 1) to identify the environmental stresses on the Brainerd Lakes Area, 2) to share information with and propose strategies to local decision-makers and community leaders, 3) to clarify roles of all conservation organizations in carrying out strategies, and 4) to be a resource to decision-makers and community leaders.

MCBS Biodiversity Significance maps of Kanabec, Pine, Mille Lacs, Kanabec, Isanti, and Chisago counties were displayed at a DNR open house held in Mora.

The Morrison County map of MCBS sites and native plant communities was presented at the Morrison County Land Use planning meeting.

A MCBS presentation was featured at an open house related to the Todd County Parks and Open Space Plan. The presentation was given three times as one of three concurrent sessions and was well received.

The Itasca County Lake Sensitivity Project received MCBS data collected on rare and common aquatic plants to use in their monitoring process.

A plant ecologist led a field tour of St. Wendel's Bog, a MCBS site recommended as a Scientific and Natural Area (SNA). The group included members of the Stearns County Park staff, County Park Board and selected County Commissioners. The result is that the site is being recommended for a SNA. Staff participated in ongoing discussions with landowners and personnel from St Cloud State University and the county in response to ecological questions related to the proposed SNA here and at the nearby Avon Hills in Stearns County.

Three sites of high natural area quality were presented to the Commissioner's Advisory Committee and approved to pursue as potential Scientific and Natural Areas: Lake Christina (Douglas and Otter Tail counties), Mountain Mint Prairie (Meeker County) and Spruce Hill (Douglas County).

A prairie site in Kandiyohi County was recommended by MCBS for conservation action and was enrolled in the Prairie Bank Easement program.

A portion of a MCBS Site in Crow Wing County at the headwaters of the Nokasippi River now has a DNR conservation easement

Other technical assistance:
The MCBS ornithologist served as the DNR liaison for the Important Bird Area (IBA) project. He participates in the technical review of proposed IBAs, and completed the documentation for an IBA in northwestern Minnesota in the Tallgrass Aspen Parklands Province, an area where MCBS has completed bird surveys.

A plant ecologist represented the Division of Ecological Services on the North Shore DNR field team and worked with other staff on issues such as the Swamp River Bridge project and road development issues that would have impact on sites of biodiversity significance identified by MCBS.

Plant ecologists provided comments as part of the review process of the Lake Superior Basin plan and made suggestions as to how MCBS data might be used in the implementation phase.

The plant ecologist working in Douglas County sent letters to landowners thanking them for providing access to their land (67 letters) that included more detailed species lists when requested.

Information on the state record grass collection, *Oryzopsis canadensis,* was sent to Mary Barkworth, grass authority and lead author on a portion of the *Flora of North America* taxonomic series (Missouri Botanical Garden). Several duplicate collections of *Carex novae-angliae* were provided to the Michigan Herbarium as requested by Tony Reznicek, a *Carex* authority and author for the genus for the *Flora of North America.*

A plant ecologist contributed to and reviewed draft DNR scoping document for management of state lands at Horseshoe Bay (North Shore). She also participated in two, half-day site visits to show others around the lakeside portion of the site, and identify, and explain the significance of the natural area.

Staff wrote and provided editorial assistance with the DNR web-based guide to Minnesota's endangered and threatened plants and animals to be featured on the DNR website.

Staff provided substantial recommendations on the revisions to the state list of endangered, threatened, and special concern species.

The MCBS animal survey coordinator participated in the Department's MNGAP/MNWRAP project as a technical consultant for mammals. This included a compilation of information on the distribution and habitat associations for bats in Minnesota and review of final maps and habitat models for all mammals.

The MCBS animal survey coordinator also participated in the Comprehensive Wildlife Conservation Strategy initiative as a Technical Team member. She attended monthly meetings where the team developed a list of animals of greatest conservation concern and a habitat-threats matrix. Other Survey staff provided MCBS data files and assisted with technical review as related to species and to ecological subsections.

The animal survey coordinator and her survey work with bats was featured on Andy Dahl's program, *Amazing Wild Minnesota.*

Plant ecologists participated in a Wolf Ridge Environmental Learning Center sponsored "round table" discussion on natural resource professions with twenty-five Wolf Ridge naturalists and regional natural resource professionals.

Several MCBS staff attended a meeting in LaCrosse, WI of representatives from states in the Midwest region that work with programs affiliated with NatureServe (a national consortium of programs that manage and deliver data on rare features). A MCBS plant ecologist gave a presentation on Minnesota's new native plant community classification, developed from field data collected and analyzed by MN DNR ecologists. This was well received by the other plant ecologists working in the Midwest.

The Michigan Natural Features Inventory, prompted by the success of MCBS' survey process, visited Minnesota in March 2005 to learn more about the program.

Staff attended the Annual Forest Wildlife Research Review at the University of Minnesota, Duluth and presented a poster *Synthesizing aquatic, wetland and terrestrial biodiversity assessments for conservation action in the north shore (Lake Superior) highlands.*

V. TOTAL LCMR PROJECT BUDGET:

All LCMR Results: Personnel: $ 900,000

TOTAL LCMR PROJECT BUDGET: $ 900,000

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

VI. PAST, PRESENT AND FUTURE SPENDING:

A. Past Spending: LCMR recommended partial funding for the establishment of the Natural Heritage Program in FY 78-79. The pilot phase of MCBS in FY 88-89 was supported by LCMR with matching private dollars, and has received ongoing support (see budget history below).

Budget History

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

Total=$12,526,310

B. Current Spending:

Funding Source	FY04-05
LCMR	**$900,000**
GEN	**$397,427**
RIM	**$157,573**
Heritage Enhancement	**$1,100,000**
TOTAL	**$2,555,000**

C. Required Match (if applicable): None

D. Future Spending:
Future requests for funding to continue the Survey will be made of the Minnesota Legislature and other local or regional cooperators.

Vll. Project Partners:

A. Partners Receiving LCMR Funds: None

B. Project Cooperators: Repositories at the University of Minnesota, Bell Museum of Natural History and the Science Museum of Minnesota will provide resources for the curation of specimens collected by MCBS.
(Museum staff costs are not part of LCMR Project).

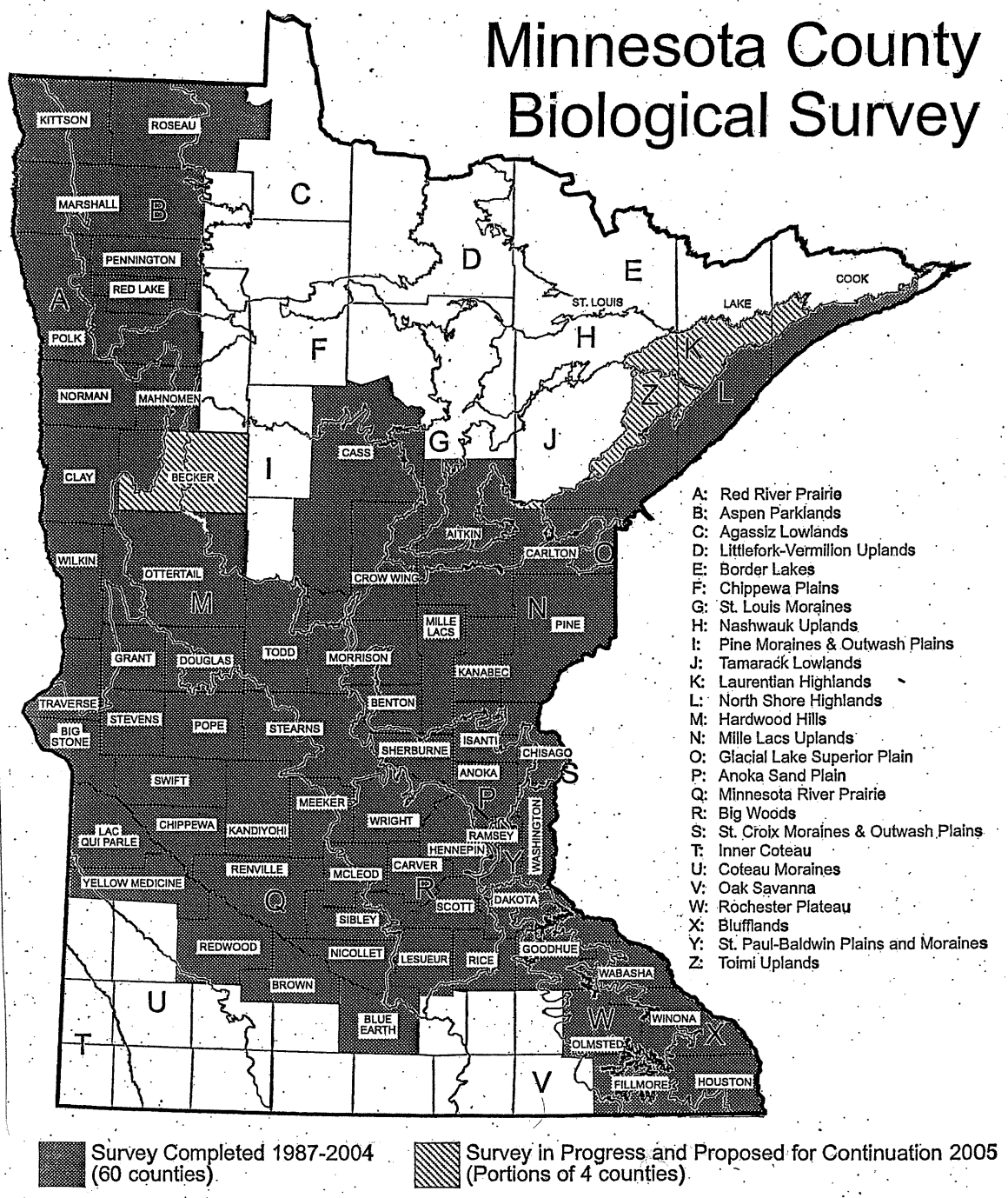
VIII. DISSEMINATION:

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 web site listed on page one. MCBS procedures, updates, recent maps and links to related data are also presented on the DNR web site. 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 keys and compact disks. Staff makes 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 provides local planners with ecological interpretations related to important sites of biodiversity identified during the Survey to assist with management plans. Staff led or participated in technical workshops and field trips to exchange ideas on survey methodology.

Physical collections are deposited at Minnesota repositories, primarily at the University of Minnesota's Bell Museum of Natural History and at 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, an international consortium of Natural Heritage programs and Conservation Data Centers. MCBS also shares data with cooperators at colleges and universities and with others in a particular ecological region where surveys are ongoing or completed.



The subsection map was developed as part of DNR's Ecological Classification System and is subject to change.

X. REPORTING REQUIREMENTS: Periodic workprogram progress reports will be submitted not later than January 2004, October 2004, March 2005. A final workprogram report and associated products will be submitted by June 30, 2005.

Xl. RESEARCH PROPOSALS: N/A

Attachment A: Budget Detail for 2003 Projects - Summary and a Budget page for each partner

Proposal Title: *Minnesota County Biological Survey 8(a)*

Project Manager Name: Carmen Converse

LCMR Requested Dollars: **$** *900,000*

2003 LCMR Proposal Budget	**Result 1 Budget:$342,000**	**Amount Spent** *06/30/05*	**Balance**	**Result 2 Budget: $333,000**	**Amount Spent** *06/30/05*	**Balance**	**Result 3 Budget: $225,000**	**Amount Spent** *06/30/05*	**Balance**	
	Field Surveys			*Information System Expansion*			*Data Distribution and Interpretation*			
BUDGET ITEM										**TOTAL FOR BUDGET**
PERSONNEL: Staff Expenses, wages, salaries – *Be specific on who is paid $, to do*	botanist (.5FTE)			botanist (.5 FTE)			botanist (.5 FTE)			**51,428**
PERSONNEL: Staff benefits – *Be specific; list benefits for each person on a separate*	ornithologist			ornithologist			ornithologist			**140,296**
				data manager			data manager			**125,632**
	Plant ecologist			Plant ecologist			Plant ecologist			**127,972**
	Plant ecologist			Plant ecologist			Plant ecologist			**106,262**
	Plant ecologist			Plant ecologist			Plant ecologist			**109,746**
	Plant ecologist			Plant ecologist			Plant ecologist			**117,884**
	Plant ecologist			Plant ecologist			Plant ecologist			**120,780**
COLUMN TOTAL	**$**	**342,000**	**0**		**333,000**	**0**		**225,000**	**0**	**900,000**

Minnesota County Biological Survey

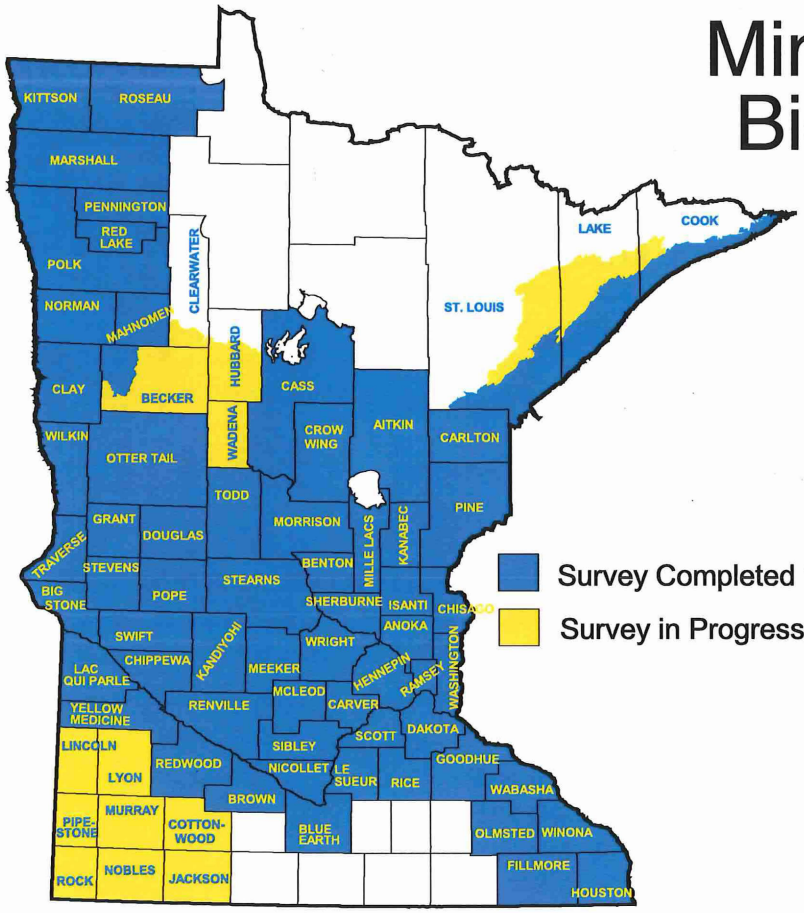
What is the Minnesota County Biological Survey? The Minnesota County Biological Survey (MCBS) began in 1987 as a systematic survey of rare biological features. The goal of the Survey is to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants, rare animals, and native plant communities.

How is it done? First, MCBS staff evaluates known natural resources information. This is followed by an assessment of the quality and condition of selected areas using air photos, classified satellite imagery and ground surveys. Surveys follow to document selected rare species or groups of species. Data are entered into the Department of Natural Resources' Natural Heritage Information System (NHIS) and made available to customers in various formats, including maps, publications, compact disk, GIS and other data files. Data from MCBS are increasingly accessible via the DNR's website: *http://www.dnr.state.mn.us/ecological_services/mcbs/index.html*

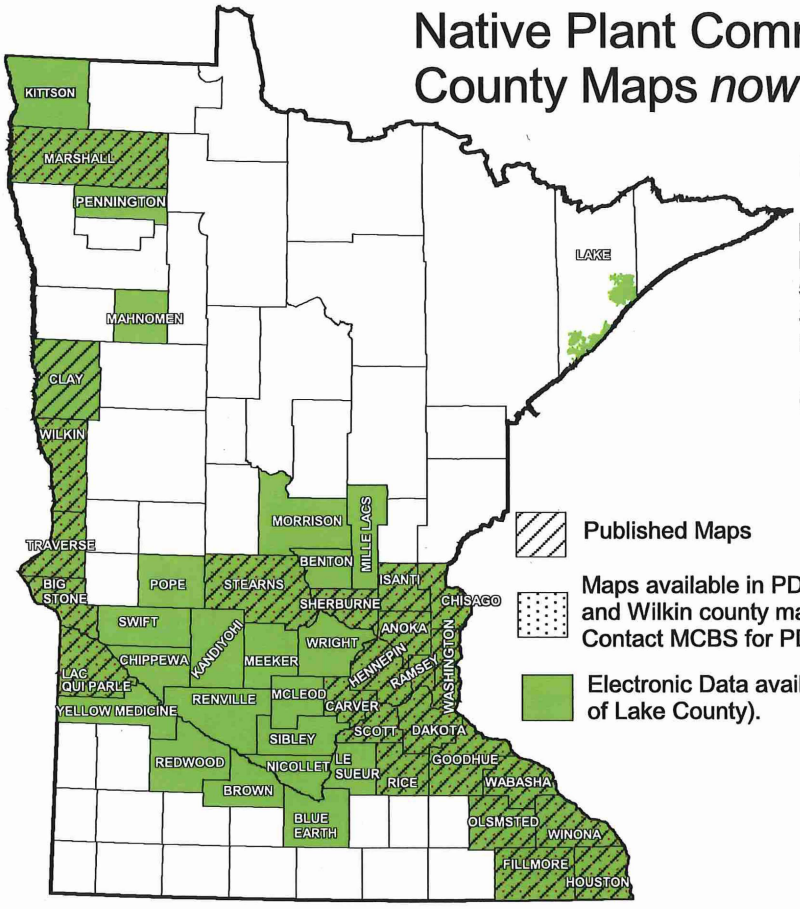
for additional information contact:
Carmen Converse, MCBS Supervisor
carmen.converse@dnr.state.mn.us

Native prairie in the Prairie Coteau, Pipestone County

Minnesota County Biological Survey *Status*



Native Plant Community and Rare Species County Maps *now available!*



For a free published map contact:

Minnesota County Biological Survey
Minnesota Department of Natural Resources
500 Lafayette Rd., Box 25
St. Paul, MN 55155
Phone: (651) 296-2835

(Please leave your request, name and address on voice mail)

Published Maps

Maps available in PDF format. Carver, Hennepin, Scott, Stearns, Traverse, and Wilkin county map PDFs are available directly via the MCBS website. Contact MCBS for PDFs of all the other counties in this category.

Electronic Data available on the DNR Data Deli (including portions of Lake County).