1995 Project Abstract
For the Period Ending June 30, 1997
This project was supported by the Environment and Natural Resources Trust Fund

Title: Minnesota County Biological Survey - Continuation 7c

Project Manager: Carmen Converse
Organization: Department of Natural Resources
Address: Box 25, 500 Lafayette Road
St. Paul, Minnesota 55155
Web Site Address: http://www.dnr.state.mn.us
Legal Citation: ML 1995, Chpt. 220, Sec. 19, Subd. 7c
Appropriation Amount: $ 900,000

The Minnesota County Biological Survey (MCBS) is a systematic inventory of rare biological features that began in 1987 in response to the need to determine the status of biological diversity in Minnesota. The goal of MCBS is to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants, rare animals and natural communities.

Statement of Objectives

1. Systematically collect information on Minnesota's rare natural resources.
2. Expand and improve the Natural Heritage Information System in order to effectively integrate Minnesota County Biological Survey data with other natural resource data.
3. Facilitate the implementation of the findings of the Minnesota County Biological Survey by providing high quality products that promote the protection and ecological management of Minnesota's endangered natural resources.

Overall Project Results

New records of 1741 rare features were added to the Rare Features Database. Since MCBS began in 1987, surveys have been completed in 29 counties, and 8934 new records of rare features have been added to the Database. Since 1987, MCBS has documented nine species of native plants and one species of amphibian not previously recorded in the state. In cooperation with other inventory efforts, vegetation data on forested types were compiled with the goal of updating *Minnesota's native vegetation: a key to natural communities, version 1.5.* Currently over 5150 vegetation samples now reside in the Releve Database. Over 2300 of these were collected in the field by MCBS since 1987.

Project Results Use and Dissemination

The most recent publications of MCBS include nine new wall maps displaying Survey results; maps for 17 counties are now available. Over 1800 copies of the book, *Minnesota's St. Croix River Valley and Anoka Sandplain: a guide to native habitats* have been sold. It was nominated for the 1996 Minnesota Book Award in the Nature category. MCBS data were used in the evaluation process that led to the revision of the state list of endangered and threatened species that became effective 1 July 1996. Protection of natural areas identified as having high biodiversity significance continues. Meetings were held with DNR managers to discuss a map, *Priority areas of native biodiversity in southeastern Minnesota* that displays sites evaluated by MCBS. Thirty tracts identified by MCBS became Scientific and Natural Areas or additions to existing SNA's. Protection highlights include the recent establishment of Wood Rill SNA in Hennepin County and the acquisition of 4,300 acres of aspen parkland as an addition to the Caribou Wildlife Management Area in northwestern Minnesota. MCBS also provided interpretation of rare features at Seminary Fen and Bluff Creek in Carver County to enable citizens and municipalities to plan for the protection of these resources.

July 1, 1997

LCMR Final Work Program Update Report

I. Project Title: Minnesota County Biological Survey - Continuation 7c

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A. Legal Citation: M.L. 95, Chpt. 220, Sec. 19, Subd. 7c
Total Biennial LCMR appropriation: $ 900,000
Balance: $0

Appropriation Language: This appropriation is from the trust fund to the commissioner of natural resources for the fifth biennium of a proposed twelve biennium project to accelerate the county biological survey for the systematic collection, interpretation, and distribution of data on the distribution and ecology of rare plants, animals and natural communities. Data compatibility requirements in subdivision 15 apply to this appropriation.

B. Status of Match Requirement: N/A

II. Project Summary:

The Minnesota County Biological Survey (MCBS) is a systematic inventory of rare biological features that began in 1987 in response to the need to determine the status of biological diversity in Minnesota. The goal of MCBS is to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants, rare animals and natural communities.

A multi-level procedure is used in the Survey, beginning with the evaluation of existing inventory data, interpretation of air photos to identify potential natural areas, followed by an assessment of the quality and condition of selected areas using aircraft and ground survey. This is supplemented by specialized field surveys of selected rare species or groups of species. Data are entered into the DNR's Natural Heritage Information System, Minnesota's most comprehensive repository of rare features information. The information gathered by MCBS serves as a foundation for the conservation of critical components of Minnesota's biological diversity through ecological monitoring, environmental review, planning, and critical habitat acquisition. The application and development of Geographic Information Systems (GIS) and other computerized delivery systems enables MCBS to efficiently enter and manage data for distribution to organizations and agencies with diverse natural resource goals. Private and public protection and ecological management of the sites of rare resources identified by MCBS will be promoted through the distribution and interpretation of data, maps and publications.

During FY96-97, The Survey will begin in at least three counties bordering the Minnesota River (starting with Hennepin, Scott, and Carver). In the northern forested region, procedures developed in FY 94-95 to analyze existing inventory data will be refined in order to identify important areas of biodiversity. This procedure will result in the selection of landscape areas for more detailed ground inventory of selected sites of high biodiversity significance. An example of a landscape is that area encompassed by the Mille Lacs Uplands Subsection. Final selection, and extent of inventory will be ba[illegible] on analysis of existing inventory data, and availability of supplemental funding. Finally, the Survey w[illegible] be continued in Pine County, and completed in five counties now being surveyed (Fillmore, Mahnomen, Olmsted, Polk, and Wabasha).

III. Work Program Summary July 1, 1997:

MCBS is developing work plans that include surveys of counties that have close geographic correspondence with the subsections mapped as part of DNR's statewide Ecological Classification System (ECS) project. (See the map displaying the progress of MCBS as related to the ecological subsections). Since July, 1995 the status of MCBS is as follows: The surveys of Polk, Fillmore, Mahnomen, Wabasha, and Olmsted counties were completed. Surveys began in Carver, Hennepin, Le Sueur, Scott and Wright counties. Analyses of existing data, photography, and satellite imagery in the Mille Lacs Uplands and the Glacial Lake Superior Plain ecological subsections led to the expansion of field work in 1996 in counties in this targeted landscape. To accommodate the needs of the counties found in this region, those portions of Aitkin, Benton, Carlton, Crow Wing, and Mille Lacs counties that fall in adjacent subsections are being surveyed at the same time. Portions of some counties where the Survey has already been completed are also within this area, so the existing data are available for subsection summaries. In fourteen counties where MCBS has proposed or conducted surveys, presentations were made to county boards describing the Survey goal procedures and results.

New records of 1741 rare features were added to the Rare Features Database. Since MCBS began in 1987, surveys have been completed in 29 counties, and 8934 new records of rare features have been added to the Database. MCBS data were used in the evaluation process that led to the revision of the state list of endangered and threatened species that became effective 1 July 1996. Since 1987, MCBS has documented nine species of native plants and one species of amphibian not previously recorded in the state. In cooperation with other inventory efforts, vegetation data on forested types were compiled with the goal of updating *Minnesota's native vegetation: a key to natural communities* version 1.5. Currently over 5150 vegetation samples now reside in the Releve Database. Over 2300 of these were collected in the field by MCBS since 1987.

The most recent publications of MCBS include nine new wall maps displaying Survey results in Clay, Dakota, Goodhue, Fillmore, Houston, Olmsted, Rice, Wabasha and Winona counties. Published maps are now available for 17 counties where the Survey is completed. MCBS collaborated with the Chippewa National Forest and the Leech Lake Reservation to produce a series of rare plant field identification cards for species found in the Forest or in Cass County. These were distributed to 100 local land managers and other interested individuals. Over 1800 copies of the book, *Minnesota's St. Croix River Valley and Anoka Sandplain: a guide to native habitats* have been sold. It was nominated for the 1996 Minnesota Book Award in the Nature category. The book was the subject of seven focus groups. Participants reacted favorably to the book, and suggested that MCBS continue to publish similar books (a series) in regions of the state where the Survey is completed.

Protection of natural areas identified as having high biodiversity significance continues. Thirty tracts identified by MCBS became Scientific and Natural Areas or additions to existing SNA's. The recent establishment of Wood Rill SNA in Hennepin County protects one of the few remaining examples of Big Woods. One hundred and fifty years ago, Big Woods forest covered close to one-half of the county; MCBS work indicates that less than 1% of this forest remains. MCBS has also provided documentation and interpretation of rare features at Seminary Fen and Bluff Creek in Carver County to enable local citizens and municipalities to plan for the protection of these resources. At the completion of the Survey of the Paleozoic Plateau (the southeastern blufflands), meetings were held with DNR managers to discuss a map *Priority areas of native biodiversity in southeastern Minnesota* that displays sites evaluated by MCBS. A protection highlight was the acquisition of 4,300 acres of aspen parkland by The Nature Conservancy of holdings within the Caribou Wildlife Management Area in northwestern Minnesota. This provides for the consolidation of public ownership to provide for more effective management for game species such as the sharp-tail grouse, and for rare resources, such as yellow rails and Nelson's sharp- tailed sparrows. Finally, MCBS was a joint recipient of The Nature Conservancy's National *Outstanding Heritage Program Award* for 1995, with the Minnesota Natural Heritage and Nongame Research Program.

IV. Statement of Objectives:

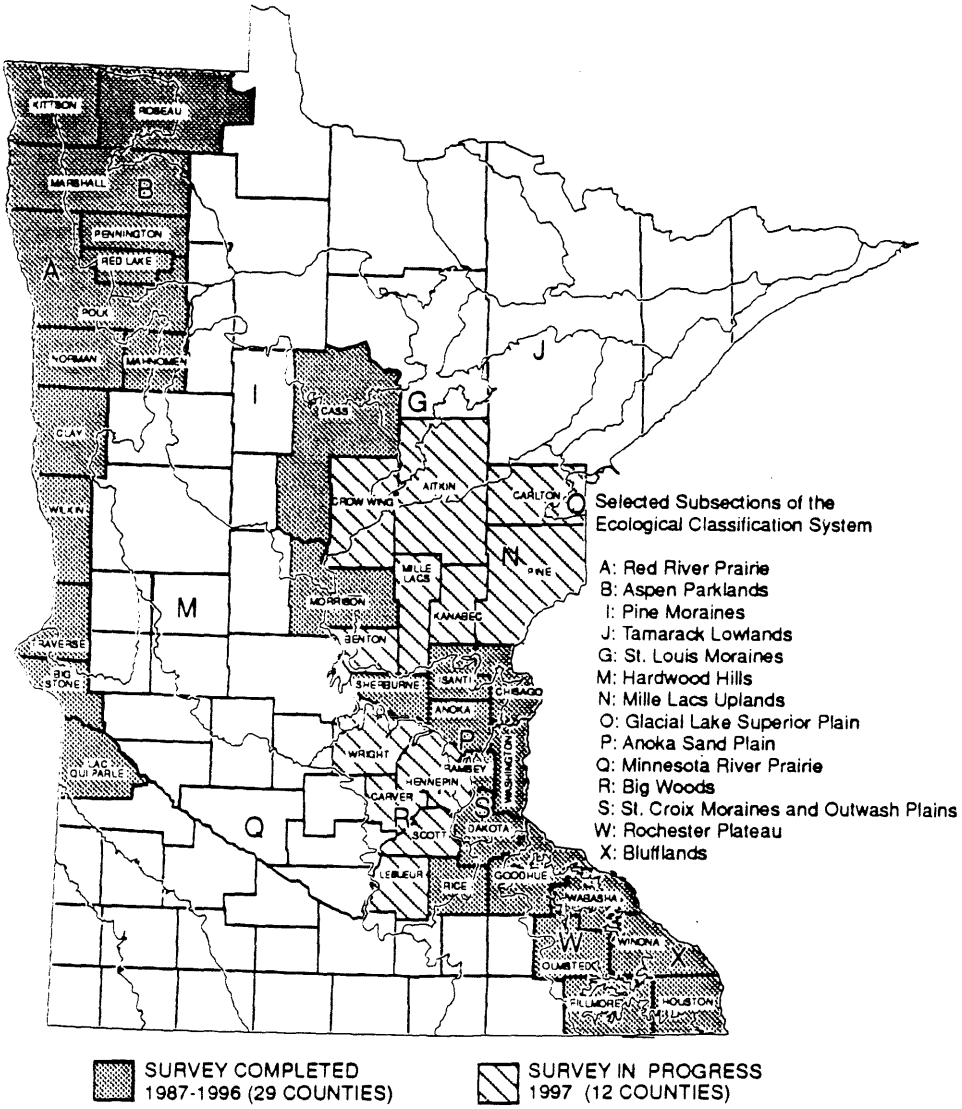
A. Systematically collect information on Minnesota's rare natural resources.
Outcome: The distribution and status of Minnesota's most endangered resources are identified providing a basis for the maintenance of the state's biodiversity through processes such as environmental review, forest and wildlife planning, appropriate urban and recreational development, and the establishment of natural areas for research and education.

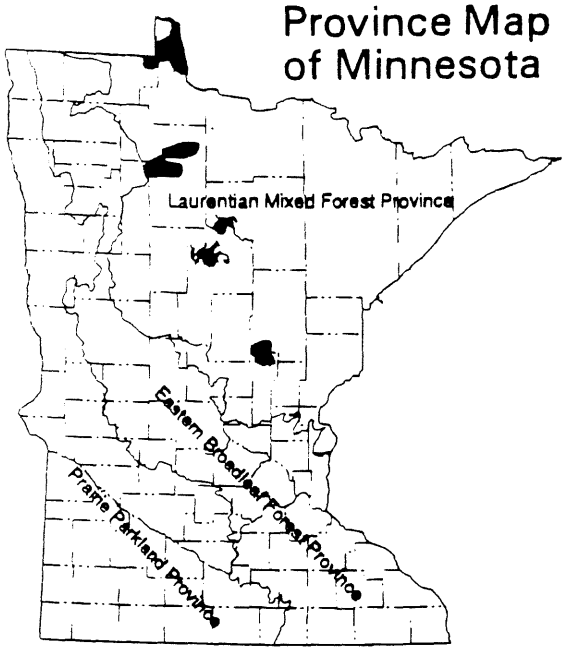
B. Expand and improve the Natural Heritage Information System in order to effectively integrate Minnesota County Biological Survey data with other natural resource data.
Outcome: Continued development of the Natural Heritage Information System allows for more effective data analysis, access to data, and appropriate tools to generate products. Diverse natural resource goals are more effectively integrated through the use of Geographic Information Systems (GIS), multi-user systems, and networks.

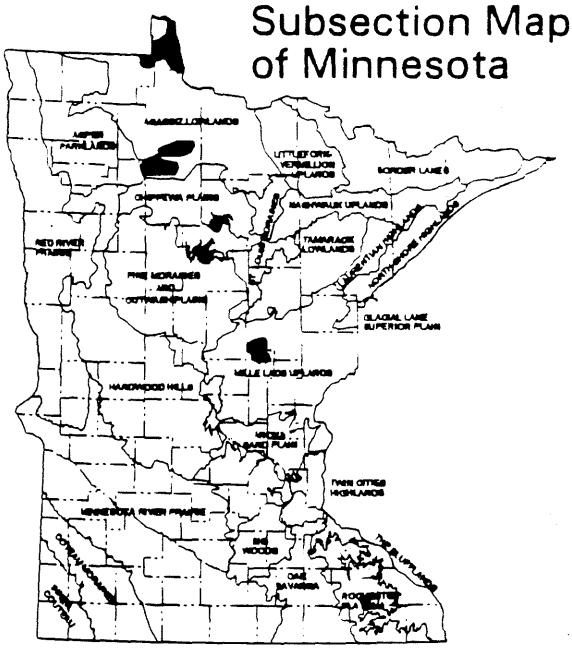
C. Facilitate the implementation of the findings of the Minnesota County Biological Survey by providing high quality products that promote the protection and ecological management of Minnesota's endangered natural resources.
Outcome: The production and distribution of standard and customized products to a diverse audience increases the understanding of Minnesota's endangered resources and biological diversity, documents results, and provides interpretive material to facilitate ecological management and conservation action.

Timetable for Completion of Objectives:

	7/95	1/96	6/96	1/97	6/97
A. Inventory of Rare Features	**********				
B. Data Management, Mapping	**********				
C. Production of maps, reports; Interpretation	**********				







Province and Subsection Maps were developed as part of DNR's Ecological Classification System and are subject to change.

V. Objectives/Outcomes

A. Title of Objective: Systematically collect information on Minnesota's rare natural resources.

A.1 Activity: Collection of data to document the distribution of rare plants, rare animals and natural communities will continue in Pine County, and be completed in five other counties where the inventories began in the previous biennium (Fillmore, Mahnomen, Olmsted, Polk and Wabasha). Surveys in at least three counties bordering the Minnesota River will begin (starting with Hennepin, Carver and Scott) and Benton County. In the northern forested region, procedures to evaluate existing natural resource inventory data will be refined and expanded in order to assist in the identification of important areas of biodiversity. Coordination with counties, U. S. Forest Service, other divisions within the Department of Natural Resources, universities, tribal governments and others will be critical to the success of this effort.

A.1.a. Context within the project: Evaluation of existing related natural resource data and systematic collection of field data are fundamental to the success of this project. Data collected as part of this objective will be managed using information management systems outlined in objective B, and will provide baseline information needed to generate recommendations, products and interpretation discussed in objective C. The distribution and status of Minnesota's most endangered resources will be identified providing a basis for the maintenance and enhancement of Minnesota's biological diversity through processes such as environmental review, forest and wildlife planning, appropriate urban and recreational development, Scientific and Natural Area and other nature preserve acquisition.

A.1.b. Methods: A multi-level survey process is followed. This consists of interpretation of aerial photography or other imagery for the identification of potential natural areas - places where the land and vegetation have not been altered significantly by human-related activities, such as cultivation, grazing, and urban development. This is followed by aircraft and ground surveys to assess natural area and natural community quality and condition. Additional specialized techniques are used during the second and third years to survey selected rare species or groups of species (e.g., vascular plants, birds, mammals, reptiles and amphibians). As a part of the process, data are incorporated from other existing surveys such as forest inventory, minerals surveys, wildlife habitat inventories, metropolitan parks surveys, soil surveys, specimens from museum collections and geographic files stored at LMIC. This typical procedure will be followed in the counties of the Minnesota River Valley, and with modifications discussed below, in the northern forested region.

In the northern forested region, (roughly the region of the Laurentian Mixed Forest Province-see map), the above method will be modified to include the development of procedures to evaluate and incorporate existing natural resource databases. This region contains some of the most extensive relevant vegetation data in the state, most notably timber stand data maintained by state, county, federal, tribal and private entities. MCBS will intensify the review of the existing data to assist with the identification of the most important areas of biodiversity in the northern forested region.

Existing forest inventory data will be analyzed using a modification and further development of GIS procedures first used in conjunction with the MCBS surveys of Roseau and Pine counties. In these counties, DNR forestry cover types were related to the Natural Community Classification used by MCBS (*Minnesota's Native Vegetation: A Key to Natural Communities version 1.5*) using computerized programs and GIS. Application of this and similar procedures in the evaluation of existing forest inventory data (counties, tribal, and U.S. Forest Service) will be tested as part of this project. The

northern forested region contains many expansive and remote areas, making efficiency in field inventory critical to the success of the inventory. This evaluation potentially will help in the selection of a targeted landscape area for more intensive air photo interpretation and field survey. An example of a landscape area is that area encompassed by the Mille Lacs Uplands Subsection (see subsection map of Minnesota's Ecological Classification System). Final selection of a targeted landscape is dependent on the outcome of the evaluation of existing data and the availability of supplemental funding.

This overall effort obviously extends beyond two years. A successful outcome will require this development phase that involves the creative use of computer and remote sensing tools, staffing of a MCBS regional office, and cooperation of other inventory entities. A coordinated regional approach will hopefully reduce duplication of effort and make the best possible use of existing information.

A.1.c. Materials: Other funding sources will be used for equipment expenditures.

A.1.d. Budget
Total Biennial LCMR Budget: $432,000
LCMR Balance: $0

A.1.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
Planning/Review existing data	**********				
Airphoto interpretation	******	******		********	
Aerial Survey	******	******		********	
Natural Community Survey	******	******		********	
Rare Plant Survey	******	******		********	
Rare Animal Survey	******	*****		********	

A.1.f. Work program Update July 1, 1997: The Survey was completed in Polk, Fillmore, Mahnomen, Wabasha and Olmsted counties. Surveys began in Carver, Hennepin, Le Sueur, Scott and Wright counties with the goal of completing the Survey in the Big Woods Subsection. As a result of the analysis of existing data and photography in the Mille Lacs Uplands and Glacial Lake Superior Plain ecological subsections, 1996-97 field work expanded in this targeted landscape area that includes Aitkin, Benton, Carlton, Crow Wing, Kanabec, Mille Lacs and Pine counties. This landscape also includes portions of counties already surveyed (Chisago, Isanti, Sherburne, Morrison, and Washington). Data from these counties will be available for subsection summaries. All of Aitkin, Benton, Carlton, Crow Wing and Mille Lacs counties, including portions in adjacent subsections, are being surveyed in order to accommodate the planning efforts in those counties. (See map of MCBS progress and DNR Ecological Classification System Subsections).

New locations of 1741 rare features identified by MCBS were added to the Natural Heritage Information System. Since the project began in 1987, the Survey has completed inventory in 29 counties and has recorded 8934 new locations of rare features. Nine species of native plants and one species of amphibian not previously documented in Minnesota have been recorded by MCBS. These species include an aquatic plant, purple bladderwort (*Utricularia purpurea*) and the four-toed salamander (*Hemidactylium scutatum*), located during a cooperative survey with the Chippewa National Forest. Much of the new data generated by MCBS assisted with the revision of *Minnesota's list of*

endangered, threatened and special concern species. The new list became effective July 1, 1996, and resulted in some modification of species targeted for survey. As part of field preparation staff are assisting with the review and data entry of existing records of species new to the list found in museums and herbaria.

Evaluation of Existing Natural Resource Data in Forested Counties

Natural resource databases that have been developed over many years by DNR and other agencies and organizations have always provided important information that is reviewed as part of the typical MCBS procedure. Vegetation data are especially abundant in the forested portion of the state. In order for this information to be of use to MCBS, several types of data were reviewed using various methods of analysis.

The first method was to develop a computer program to crosswalk the natural community types used by MCBS (as described in *Minnesota's Native Vegetation: A Key to Natural Communities version 1.5)* and the various vegetation cover types developed by the U.S.Forest Service, the National Wetlands Inventory, Cass County, Aitkin County, DNR's Division of Forestry, the Natural Resource Conservation Service, and the Bureau of Indian Affairs. Geographic Information System (GIS) procedures were used to generate sample maps displaying the results of this crosswalk from the study areas that included the Mille Lacs Uplands and Glacial Lake Superior Plain (ECS subsections) and Cass County.

The effectiveness of this procedure is still being assessed, and various problems need to be addressed. Some of the problems: The goals of other vegetation inventories and intensity of ground verification are variable, the vegetation classes are sometimes too broad or dissimilar, and the data are often old, making assessment of accuracy somewhat difficult. Most agencies were willing to share digital datasets, but acquisition was sometimes slow. Once obtained, some datasets required substantial correction for use in the crosswalk. Management of these large data files also required major data storage and backup capabilities. Finally, once sample plotted maps of the crosswalk were developed, they generated a great deal of interest from managers and planners. They appreciated seeing a map that displayed an area of land with multiple ownership that had consistently named vegetation covers at a scale useful for management. Because the veracity of the crosswalk is now being field tested, and the project was developed to assist MCBS in the selection of core areas to survey, these sample maps are not available for widespread distribution.

Other data layers that provide useful background information include the ECS boundaries at the various levels of classification, the classified satellite image of part of the region that was generated by the Natural Resource Research Institute as part of the Forest Bird Diversity Initiative, and the Bearing tree data computerized from the 1848-1890 public land survey notes. Coordination with the GAP Analysis project has yielded potentially useful vegetation layers that appear to successfully distinguish between specific forest cover types that were inadequately differentiated in past image processing projects. The use of digital orthophotoquads is now incorporated into the process in conjunction with work at St. Croix State Park. The Statewide Land Use mapping project could be of interpretive use.

Another major activity in reviewing existing data is being conducted in coordination with DNR's Ecological Classification System project and the Natural Heritage Nongame Research Program Beginning in December 1995, a plan was developed to obtain statewide vegetation samples that are

similar to releves (See *A handbook for collecting releve data in Minnesota* 1987 Draft) for analysis in order to refine the native vegetation key (see above). A summary by ECS subsection of the location of the existing 2,990 releves in the Releve Database was produced in order to determine future sampling needs. Then, over 40 additional potential sources of these vegetation samples were identified, and staff made contacts to obtain these data when possible. Project participants identified natural community types statewide where additional data collection was needed, and MCBS staff incorporated the propos collection of 240 releves into their 1996 field season plans. Two data assistants, including a conservation biology student, entered data received from cooperators, along with new data from the field season, to the Releve Database for analysis. Over 5150 releves now reside in the database with more than 2300 representing field collections by MCBS since 1987. Analyses of the forested types using standard computerized ordination programs (DECORANA and TWINSPAN) have been completed for the ECS provinces, the Eastern Broadleaf Forest and the Laurentian Mixed Forest Province. A 1998 publication of a new version of the key is anticipated.

The Mille Lacs Uplands and the Glacial Lake Superior Plain (and the northern portions of Aitkin and Crow Wing counties) continue to be the primary test areas of the effectiveness of the crosswalk, the review of multiple resource layers using GIS generated maps, and the product of releve analysis. In December 1995, staff combined the review of a photo mosaic of the Region with the above analyses of existing data to identify 47 core areas within Land Type Associations (lower level of the ECS) for survey in 1996. The intent was to select a set of core areas that represented distinctive topographic or vegetation features in each of the Land Type Associations in the Region. On aerial photographs, some areas appear fairly intact, such as the extensive wetlands north of and including part of Savanna Portage State Park. Other areas are highly fragmented by roads, development, or logging, but appear to be the least disturbed examples of the distinctive landscape feature in their respective LTA. Field work in 1996 focused on the collection of releves, but also resulted in the revision of some of the boundaries an the reduction in number of core areas from 47 to 33. Smaller sites were defined within these areas, and plant ecologists are assessing the biodiversity significance of these sites through the evaluation of natural community quality. Ecologists are also assisting with the verification of the natura community type at selected sites to provide some of the field data for verification of accuracy of the GAP analysis imagery classification project.

Cooperative Surveys

In order for the Survey to be successful, the cooperation of other inventory efforts is essential for the exchange and interpretation of data, and for logistical coordination. Some examples of recent cooperation follow:

Department of Natural Resources

* Within the DNR, a committee has recently been established to better coordinate DNR inventories. A number of meetings and two winter workshops have significantly increased the awareness of DNR inventory staff of Departmental data resources and technical skills that can be shared more effectively. Some examples of these data are the National Wetlands Inventory (Division of Waters), products of the GAP Analysis image processing project (Forestry Assessment and the USGS), and the Section of Fisheries lake data.

*Ecological Classification System. Three MCBS plant ecologists participated in delineation teams charged with creating draft ECS maps for selected areas in northern Minnesota, and two others reviewed draft maps. Refinement of the mapping of ECS Land Type Association boundaries is assisting MCBS work in northern Minnesota landscapes. The consolidation and analysis of releves that form the basis for the revision of the forested community types in the native vegetation key was coordinated with the ECS project and the Natural Heritage and Nongame Research Program.

* Division of Parks (Mille Lacs Uplands and north) and ECS. As part of a cooperative project in Savanna Portage State Park, the MCBS plant ecologist collected releves at the same locations where soils were sampled, in order to generate natural resource data useful for future Park management. The coordination of data collection for purposes of ECS development has now extended to St. Croix State Park during the 1997 field season. Projects in these two parks will hopefully establish a procedure for continued cooperative ECS and MCBS work in northern Minnesota parks.

*Division of Parks (southeast). Parks has provided substantial support for more detailed surveys in coordination with MCBS in the parks of southeastern Minnesota. Reports generated by MCBS from work in O.L. Kipp State Park, John A. Latsch State Park and Ft. Snelling State Park have been received favorably by the Division of Parks, especially where the resources information can be integrated into updated park plans. Similar reports are in progress for Whitewater State Park, Carley State Park and Forestville State Park.

* Section of Fisheries. MCBS staff conducted a training session for DNR Fisheries staff on the identification of turtles and rare aquatics plants at the Fisheries 1996 annual meeting, and at two additional workshops in Aitkin and Wright counties. The goal was to increase the ability of Fisheries staff to identify rare aquatic plants and other plants that are not routinely identified in Fisheries lake surveys. At this point, it seems to be most efficient to have a trained botanist and zoologist conduct rare aquatic species surveys, because they have adequate time to search and focus on this group. For example, the MCBS botanist conducting rare plant surveys in Crow Wing and Aitkin counties recorded over 200 new locations of rare aquatic plants in 237 lakes. However, the Fisheries lake data files and field staff have been good sources of potential lakes to search for rare aquatic plants, and several Fisheries staff have increased their ability to report rare species locations.

*Division of Forestry. MCBS staff are working with Forestry to generate a product for the GAP Analysis project. For MCBS this involves field checking of polygons (vegetation types) to verify the classification generated by computerized image processing. The MCBS plant ecologist and proposed Northern Minnesota MCBS coordinator share office space with Forestry Assessment in Grand Rapids to improve coordination of surveys in this region.

*Section of Wildlife. MCBS is providing data for a proposed database: "Wildlife of Minnesota-an ecosystem-based database and description." MCBS staff also provided training in the reptiles and amphibians of shallow lakes at the Wildlife annual meeting in May 1997. The Nongame Wildlife program staff continue to supplement MCBS surveys, provide advice for possible sites of rare resources, and provide interpretation of MCBS findings at the completion of the Survey in a Region.

*Division of Minerals. MCBS staff provided significant data and interpretation for a related project "Glacial Lake Agassiz Beach Ridges: Mining and Protection".

Other Agencies, Organizations

* MCBS completed a successful cooperative agreement with the Chippewa National Forest that included sharing of office space, and resulted in a joint publication, and the establishment of communications pathways to convey recommendations for Research Natural Areas being considered as part of the National Forest Planning process now in progress.

* An October meeting with the Forest Biologist from the Superior National Forest provided an opportunity to exchange ideas how we could coordinate our inventory efforts as the Survey plans for additional work in Northern Minnesota. A pilot project to identify and evaluate potential natural areas in 18 Land Type Associations in the Superior National Forest, including representative ecosystems is underway through cooperative funding provided by DNR, the Forest Service and The Nature Conservancy.

* The U.S. Fish and Wildlife Service provided housing for the animal field survey staff while they worked in Polk County during the 1995 field season in exchange for some field work on their property..

* A soils and vegetation sampling field workshop was held near International Falls so that representatives from the DNR's ECS project, MCBS, Voyageurs National Park and Boise Cascade Ecosystem Project could share ideas about sampling methodology. The outcome was that participants agreed that some data sharing and analysis was possible based on our mutual understanding of the vegetation sampling methods. Releve data collected by ECS, MCBS and at Voyageurs National Park was used in the data analysis related to the revision of the native vegetation key.

*Cooperative vegetation surveys continue in Voyageurs National Park (MCBS, The Nature Conservancy, USGS, and the National Park Service). The collection of releves has already been of benefit to the vegetation analysis conducted as part of the Natural Community key revision. The proposed detailed vegetation map of the Park will provide a prototype for the feasibility of similar products in other parts of northern Minnesota.

* Olmsted County provided the use of vehicles and computer facilities as part of a cooperative agreement.

* MCBS staff have provided information on locations for additional research by colleges and universities for projects including grazing of native prairies, Louisiana waterthrush research, savanna restoration, and additional soils and vegetation work (releves) on a number of dry prairies in southeastern Minnesota of interest to researchers at St. Olaf College.

* A moss identification was held in Carlton County for MCBS botanists and others collecting releve data in natural communities where wetland mosses are often a major component of the vegetation. A demonstration of how mosses are recorded in releves will hopefully lead to higher quality data collection in releves.

B. Title of Objective: Expand and improve the Natural Heritage Information System in order to effectively integrate Minnesota County Biological Survey data with other natural resource data.

B.1: Activity: The Natural Heritage Information System continues to expand through the addition of new and updated data on the distribution of rare natural features located by MCBS. Existing information networks and Geographical Information Systems (GIS) are being improved to provide for increased access to data and for flexibility in the display and integration of data to meet diverse needs of users. In addition, the computerization of other incidental data collected during the Survey supplements the goals of this and related projects (e.g., original public land survey records, vegetation databases).

B.1.a. Context within the project: Databases that make up the Natural Heritage Information System are used to manage rare features information collected in objective A. Geographic Information Systems (GIS) and other information networks are used to exchange data needed for analysis in objective A. Examples include DNR Forest inventory data, and the University of Minnesota herbarium database. The Natural Heritage Information System allows for effective access to data, and provides tools to generate products described in objective C. Diverse natural resource goals can be more effectively integrated through use of multi-user systems, GIS and vegetation databases. The ability to produce custom reports, maps and species checklists for distribution to organizations (e.g., environmental consulting firms, Upper Great Lakes Biodiversity Task Force), academic institutions, and agencies (e.g., Metropolitan Council, County Planning Commission, U.S. Fish and Wildlife Service, DNR Parks) is enhanced by the application of these advanced data management systems.

B.1.b. Methods: All data collected by MCBS are entered into the related map, manual and computerized files that make up the Natural Heritage Information System. Data collected by MCBS are entered into the following computerized databases: Rare features (geographic), Releve´ (vegetation samples), County flora check-list, MCBS site, Eagle, Colonial waterbird, bat concentration and Bearing tree (from Public Land Survey notes 1847-1907). Locations of rare features are mapped on U.S.G.S. topographic maps, and both site and rare features data are digitized using an ARC/INFO GIS. The structure of the Information System has been recently improved to provide for more efficient data management through the use of related databases, networks, laptop computers, multi-user systems and GIS. Continued development of these systems is essential to achieve MCBS goals.

All plant and animal specimens are identified, prepared for permanent storage and deposited in appropriate repositories at the University of Minnesota. Photographic vouchers are identified, labeled and stored at the DNR, St. Paul. Field data sheets are filed manually in preparation for archiving. Color slides, video tapes, and other photography are catalogued. All MCBS data are indexed for accession in order to easily produce maps and reports.

B.1.c. Materials: Other funding sources will be used for equipment expenditures.

B.1.d. Budget:
Total Biennial LCMR Budget: $ 288,000
LCMR Balance: $ 0

B.1.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
Data entry and analysis of new MCBS records	**********				
Multi-user and GIS system development	**********				
Integration of MCBS data within DNR and with other agencies and organizations	**********				
Field survey forms archived	**********				

B.1.f. Work Program Update July 1, 1997: New locations of 1741 rare features were added to the Natural Heritage Information System's Rare Features Database. Since 1987, the Survey has contributed 8934 new records of rare features to this database. MCBS has collected over 2300 releves (vegetation samples) to the Releve Database that now contains over 5150 vegetation samples. A major effort continues to redesign portions of the Site database, where information is tracked on each of the sites identified as a potential natural area. Related databases are being designed in order to incorporate information being developed as part of the ECS project, and to expedite GIS capabilities. Major progress has been made on an attribute database related to the GIS that briefly describes the natural community found within a polygon, and the sources of information used to determine its type (cross-walk, air photo interpretation, Forestry stand data etc.). Now in the test phase, this database is intended to speed up the mapping process, especially in the northern counties. Two plant ecologists are learning to use ARC/VIEW in order to participate in the data analysis described in Objective A, and in order to assist with data delivery. As part of a cooperative agreement, Olmsted County provided facilities for the digitizing of a portion of the results of the survey in the county. A copy of the rare features database will reside on the county's GIS system at the completion of the Survey in 1996.

GIS digital files are increasingly the subject of data requests. One example is the use of MCBS GIS files of sites and rare features as part of a multi-state effort to generate a Regional map of the Northern Tallgrass Prairie that displays areas of conservation priorities. Another example is the transfer of data in GIS format to Anoka County and the City of Chanhassen. Requests for digital files of the original public land survey data (bearing trees) have resulted from the enthusiastic response following selected distribution of computer-generated maps to counties and individuals. One individual who received a bearing tree map responded in a letter, " I can hardly describe the pleasure which the very beautiful (the blues and reds from intense to dilute, the cleanness, compactness of the whole), *Original Land Survey Bearing Trees Crow Wing County* brings to these not very interesting winter days." Recently maps generated from bearing tree data have been used in the assessment of the white pine resource in Minnesota. The delivery of digital information necessitates good user documentation, so that the data are properly interpreted. An example of this is the documentation of the bearing tree data that describes the data compilation process and provides suggestions to the user for data analysis (*Minnesota's Bearing Tree Database* Biological Report No. 56).

MCBS continues to rely on the University of Minnesota for the curation of plant and animal specimens. MCBS staff participated in a focus group as part of the strategic planning process for the James Ford Bell Museum of Natural History, the current repository for most animal specimens collected by MCBS. A MCBS data manager and student on a contract assisted part-time with the mounting of plant

specimens at the University of Minnesota St. Paul herbarium. The University of Minnesota -Duluth provided access to their collection for the review of new and existing data on rare plants and county record plants for addition to the Natural Heritage Information System.

C. Title of Objective: Facilitate the implementation of the findings of the Minnesota County Biological Survey by providing high quality products that promote the protection and management of Minnesota's endangered natural resources.

C.1. Activity: The recent increase in awareness of environmental issues related to endangered resources has resulted in greater demands by the public and natural resource professionals for interpretation of the ecological information collected by MCBS. Production of customized data summaries and maps of rare features, along with both technical and popular reports that summarize and interpret the survey results, is an essential response to meet the needs of this diverse audience.

C.1.a. Context within the project: Products, interpretation, and recommendations discussed here are only possible because of the data collected and managed in objectives A and B. The distribution of results in standard formats in combination with the production of customized computer products, documents the survey results that serve as a benchmark, increases the public's awareness of Minnesota's endangered resources and biological diversity, and provides tools to facilitate conservation action.

C.1.b. Methods: MCBS produces maps, technical and popular reports that describe methodology and survey results. Whenever possible, results are generated 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 needed, biologists also prepare written conservation and management recommendations for selected high quality sites in response to requests from within and outside the agency. Other requests are coordinated through the standard environmental review and data request procedures of the Natural Heritage and Nongame Wildlife programs.

C.1.c. Materials: Other funding sources will be used for equipment expenditures.

C.1.d. Budget
Total Biennial LCMR Budget: $ 180,000
LCMR Balance: $ 0

C.1.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
Complete technical and popular reports	**********	**********	**********		
Produce maps	**********	**********	**********		
Site recommendations/ environmental review	*****	*****	******		

C.1.f. Work Program Update July 1, 1997:

Publications

* Maps of rare features in Clay, Dakota, Fillmore, Goodhue, Houston, Olmsted, Rice, Wabasha, and Winona counties were published and are now being distributed. Limited copies of computer-generated maps were previously distributed for Rice and Goodhue counties, but local resource managers expressed a desire for archival quality maps. This indicates that the durability of plotter paper used to generate GIS maps remains problematic. It also indicates that the capacity of local GIS facilities to use data layers to generate their own maps is still being developed. Published maps now exist for 17 counties surveyed by MCBS.

* Three reports were published as a result of cooperative agreements with the Division of Parks and Recreation to intensify inventory in selected parks: *Inventory of Biological Features in Fort Snelling State Park and Inventory of Natural Communities and Rare Plants in Minnehaha Regional Park* (Biological Report No. 54. October, 1995); *Inventory of Biological Features in O.L. Kipp State Park* (Biological Report No.55. August 1996); and I*nventory of Biological Features in John A. Latsch State Park* (Biological Report No. 57. June 1997).

* The September 1995 issue of the *Herpetological Review* referenced the new Minnesota range extensions of the four-toed salamander (*Hemidactylium scutatum)* and the Blue-spotted X Jefferson's salamander (*Ambystoma laterale X jeffersonianum*) that were documented due to MCBS efforts in northern Minnesota.

* A two-page fact sheet *Maple-Basswood Forests of Hennepin County: A threatened habitat* was distributed by plant ecologists during their survey work in the county during the 1995 field season. It was well received by landowners and local units of government possibly because of its format, brevity and interpretive style.

* As an outcome of the cooperative work between MCBS, the Chippewa National Forest, and the Leech Lake Reservation, a series of laminated field identification cards were developed containing color photos and descriptions of 36 rare plant species found in the Forest and in Cass County. (Minnesota Department of Natural Resources, Chippewa National Forest and Leech Lake Reservation. 1996. *Rare plants field guide: Chippewa National Forest and Cass County*). These were distributed to 100 local natural resource managers and other interested individuals. The response upon their receipt was enthusiastic. A subsequent survey indicated that the effectiveness of the cards in the identification of new locations of plants is yet to be substantiated, but they may have succeeded in increasing managers awareness of these species.

* Over 1800 copies of *Minnesota's St. Croix River Valley and Anoka Sandplain: a guide to native habitats* have been sold, and the book was nominated for the Minnesota Book Award (1996) in the nature category. In a letter from Ramsey County Parks and Recreation, Greg Mack commented, "I have reviewed the book and think it is a great guide for our planning and nature interpretive staff. I know that we will put it to good use." Others indicate that they plan to use the book and maps for nature center and school courses in regional biodiversity. In order to assess the effectiveness of this publication seven focus groups were held to solicit opinions on the publication. Most of the comments were favorable in terms of writing style, graphics, historical information and detailed information about individual natural communities, and many expect that this is the first of a

series of similar statewide publications. The comments and criticisms given in the group have been compiled and will assist in the development of products for the Aspen Parkland, Red River Prairie and Paleozoic Plateau ECS units where the Survey is now completed.

* A publication describing the public land surveys and the utility of the bearing tree database was completed and is sent as metadata with bearing tree data requests. (Almendinger, J.C. 1997. *Minnesota's bearing tree database*. Biological Report No. 56. Minnesota Department of Natural Resources, St. Paul, MN 23 pp.).

* Information and interpretation from MCBS was integrated into DNR Division of Forestry's *Metro Forest Resources Plan 1995*.

* Information and interpretation was provided to the Division of Minerals to be integrated into into publications related to the Clay County Beach Ridges Forum. (Minnesota Department of Natural Resources. 1997. *Clay County Beach Ridges Forum for gravel mining and prairie protection.* and *The Beach Ridge landscape in Clay County*).

* Selected staff contributed to the review of a map published by the North Central Forest Experimental Station [Albert, D.A. 1995. *Regional landscape ecosystems of Michigan, Minnesota, and Wisconsin: a working map and classification. (Fourth Revision: July 1994)* No.Central For. Exp. Stat. Gen.Tech. Rpt. NC-178. 250 pp.]

*Information and interpretation was provided to The Nature Conservancy for use in several publications: Faber-Langendoen, D. and Midwest State Natural Heritage Program Ecologists. 1996. *Terrestrial vegetation of the Midwest United States*. From, *International classification of ecological communities: terrestrial vegetation of the United States;* Drake, J. and D. Faber-Langendoen 1997. *An alliance level classification of the vegetation of the Midwestern United States*. 397 p.; Ostlie, W.R. and T.M. Faust. 1996. *An assessment of biodiversity in the Lake Agassiz Interbeach area: An ecoregion within the Great Plains*. 138 p.; The Great Plains Program of The Nature Conservancy. 1997. *The status of biodiversity in the Great Plains*. (3 volumes).

Presentations Staff participated in nearly 100 informational meetings or field trips concerning the progress, methodology, and outcomes of MCBS. Some examples follow:

* MCBS was a featured program on the Minnesota State Lottery's televised *Environmental Journal.* Two Scientific and Natural Areas identified by MCBS as important areas of biodiversity, and consequently designated as SNA's, were the focus of the show. The contrast between the prairie communities found at Lost Valley Prairie SNA and the forested communities of Falls Creek SNA demonstrated the variability of the landforms and native vegetation in Washington County. A second program, filmed in 1997 at Lake Maria State Park in Wright County, featured the use of recorded playbacks of hawk calls to record observations of rare red-shouldered hawks.

* Seminary Fen, identified as one of the best remaining calcareous fens in the Twin Cities metropolitan area was the subject of a radio interview (*Environmental Journal*), a newspaper article *(Minneapolis Star and Tribune*) and a television interview on *Almanac,* all with participation of MCBS staff ecologists.

* Presentations were made describing MCBS procedures and/or findings to 14 county boards: Aitkin, Benton, Blue Earth, Carlton, Carver, Crow Wing, Houston, Kanabec, Le Sueur, Mille Lacs, Sibley, Scott, Stearns and Wright counties. Interest was expressed in having areas identified for parks, and some indicated interest in receiving digital data at the completion of the Survey. Notification of the Survey's work in Hennepin County was delivered to the county board in a letter as requested.

* A poster entitled *Patterns in the distribution of special concern mammal species in the conterminous 48 United States* was jointly presented by Gerda Nordquist (MCBS) and Gordon L. Kirkland at a meeting of the American Society of Mammalogists held in Grand Forks, ND.

*A new portable display describing MCBS was produced in spring 1997. (*The Minnesota County Biological Survey-Discovering Biological Diversity in Your Community*). It features a simple description of MCBS methodology, definitions of natural communities and rare species, and how Minnesota's landscape has changed since the Public Land Surveys of the late 1800's.

Protection and Management Activities

* Thirty tracts in sites recommended by MCBS have become Scientific and Natural Areas or additions to existing SNA's. Examples include: The Wood Turtle Preserve (Goodhue), Spring Creek Bluffs (Goodhue), Lake Alexander Woods (Morrison), Zumbro Falls Woods (Wabasha), Sandpiper Prairie (Norman), Mound Prairie (Houston), Red Wing Bluffs (Goodhue), Gully Fen (Polk) and Wood Rill (Hennepin). Ecologists led the Commissioner's Advisory Committee on a field tour of the Wood Rill site that protects one of the few remaining examples of Big Woods. Oı hundred and fifty years ago Big Woods forest covered close to one-half of the county; MCBS work indicated that less than 1% of this forest remains.

* Within the Aspen Parkland of Kittson County, The Nature Conservancy acquired about 4,300 acres of holdings within the Caribou Wildlife Management Area. These were transferred to DNR in order to consolidate the previously checkerboard public ownership. MCBS staff surveyed this area from 1990-1992 as part of the survey of Kittson County, and MCBS ecologists worked extensively with other Wildlife Section staff and TNC to ensure that this expansive Parkland ecosystem was protected. The parkland supports a complex of wetlands, brush prairie, and oak and aspen openings that are unique to northwestern Minnesota and adjacent Canada. These habitats support moose, deer, sharp-tailed grouse, and rare birds, including sharp-tailed sparrow, yellow rail, and marbled godwit. Fire is an integral process in the effective functioning of this ecosystem. Consolidation of this WMA will provide for more cost-effective management, and consequently will provide recreational opportunities for a variety of individuals ranging from birdwatchers to hunters.

* A good example of a calcareous seepage fen identified in Olmsted County is being considered by the county and the landowner for protection following MCBS evaluation, written recommendations and a field tour led by the MCBS ecologist.

* A map, *Priority areas of native biodiversity in southeastern Minnesota* version 24 June 1997. was compiled by MCBS staff who conducted field work in the region between 1990 and 1996. This map was displayed, and supporting information about sites on the map were distributed at two meetings with DNR managers in spring, 1997. These meetings generated ideas concerning

protection and management of these areas. Using GIS, a composite map of theses areas combined with DNR Forest Inventory data is proposed for use during the next timber management planning cycle in southeastern Minnesota.

* MCBS staff participated in the Northern Tallgrass Prairie Habitat Preservation Area Technical Advisory Group to continue to make recommendations to the US Fish and Wildlife Service concerning possible tracts to consider for preservation through partnerships, cooperative efforts, landowner incentives, management agreements, acquisition of fee title and through easements in prairie lands. A draft Environmental Impact Statement for this project is under review as of 1 July 1997. MCBS also provided information for various other regional assessments of the northern tallgrass prairie (The Great Plains Program of The Nature Conservancy. 1997. *The status of biodiversity in the Great Plains: Great Plains landscapes of biological significance*. 133p. And Ostlie, W.R. and T.M. Faust. 1996. *An assessment of biodiversity in the Lake Agassiz interbeach area: An ecoregion within the Great Plains* 138 p.).

* MCBS staff participated in a meeting to discuss a ten-year timber management plan in the Moose Lake area. They also participated in discussions concerning forest management practices in the Nemadji State Forest.

* Staff presented the preliminary results of MCBS work and a discussion of important rare features in Fillmore County to Regional DNR staff at one occasion, and to the Forest Resource Center staff and Division of Forestry staff concerning a land exchange at another.

* The project, Deliver Ecological Information and Technical Assistance to Local Governments (6n) has provided a valuable follow-up to the MCBS inventory in the Greater Twin Cities metropolitan area. Some examples include: (1) Assistance in planning for the Mississippi River Regional Bike Trail, (2) Assistance in park planning in the East Bethel area of Anoka County, (3) Assistance to Sherburne County with their County Parks and Open Space Plan (4) Contribution to the forestry stewardship plan for the Cannon River Wilderness Park in Rice County (5) Presentation to the Local River Planning group for the Lower Zumbro River in Wabasha County. This overall project demonstrates the effectiveness of a regional ecologist that is capable of providing interpretation and technical assistance to local governments and citizens interested in protection of natural areas.

* In coordination with the above project, MCBS staff provided ecological interpretation of the rare features found at Seminary Fen and Bluff Creek (Carver County) at meetings and field trips that had participation from local citizens, the City of Chanhassen, DNR, LCMR, the Minnesota Land Trust, and the Friends of the Minnesota Valley.

* MCBS staff led members of the Orono planning commission through a big woods site proposed for golf course development.

* MCBS staff cooperated with Northern States Power, Wright County and the City of Monticello to develop ideas for the protection of one of the last large prairie and oak savanna remnants along the Mississippi River above St. Anthony Falls.

* Staff participated in meetings and field trips to evaluate the process of Research Natural Area designation as part of the Forest Planning process now in progress in the Superior and Chippewa National Forests. One outcome is preliminary survey work in 18 areas in the Superior National Forest as described in A.

* The state list of endangered, threatened and special concern species was revised during this time and data collected by MCBS contributed to the creation and evaluation of the proposed new list. The new list became effective 1 July, 1996.

VI. Evaluation:

MCBS can be evaluated by its ability to:

A. Develop and refine a cost effective inventory methodology.

B. Coordinate with other DNR inventories and with other agencies and organizations using cooperative agreements and data networks.

C. Demonstrate a significant acceleration of data collection as compared to methodology used prior to 1987.

D. Identify the highest quality natural areas and rare species habitats and provide documentation leading to public or private acquisition, enrollment in land conservation programs (e.g., RIM, Prairie Landscape Reserve Program, SNA dedication, private land registry, Research Natural Areas, County Natural Areas).

E. Increase data integration and access to the Natural Heritage Information System through multi-user systems, networks, and GIS.

F. Produce GIS layers of rare features and areas of significant biodiversity. Publish maps, technical and popular reports to increase public understanding of Minnesota's endangered resources.

VII. Context within field: LCMR recommended partial funding for the establishment of the Natural Heritage Program in FY 1978-79. The Natural Heritage and Nongame Wildlife programs share responsibility for the statewide documentation of the locations of rare features. Much of the data that first populated the Rare Features database of this System were generated from review of collections of plant and animal specimens stored in museums and herbaria. Increasing pressure for land development and lack of information to adequately evaluate impacts to natural features necessitated the accelerated inventory of MCBS in order to ensure the protection of the state's biological diversity. As a result of a systematic inventory, the relative importance of natural areas can be assessed. Increased knowledge of the status and distribution of rare species leads to more informed natural area acquisition, and appropriate resource development and management decisions. The pilot phase of MCBS in FY 1988-89 was supported by LCMR with matching private dollars, and has received ongoing support (see budget history).

Data collected by MCBS are entered into The Natural Heritage Information System. This System is managed by the Natural Heritage and the Nongame Wildlife programs, providing for the long-term maintenance and distribution of data generated by the MCBS. These programs are also responsible for environmental review of projects involving rare species, DNR's research and monitoring of rare features, and coordination of these efforts with other agencies and institutions. They are also responsible for coordinating recommendations for revisions to the state list of endangered, threatened and special concern species, and provide technical assistance for issues concerning rare ecological features. (e.g., old growth forests, calcareous fens, DNR regional plans, recovery teams for Federally-protected species). Since 1987, MCBS has provided most of the new inventory data on rare features.

Since MCBS began in 1987, over 6000 locations of rare features have been documented in 24 counties. This represents 32% of the Rare Features database of the Natural Heritage Information System. In the counties surveyed, MCBS data accounts for over 50% of the total records. Most previous surveys that reliably documented Minnesota's significant biological features were conducted for a variety of objectives and were limited in scope, so therefore do not collectively provide for a uniform statewide perspective. However, data from these surveys are useful and are reviewed as part of the MCBS procedure, along with data from other resource inventories (e.g., soils, geology, timber, wildlife). This is especially apparent in Northern Minnesota where there is extensive related natural resource information maintained by numerous agencies and organizations.

Past funding of MCBS stimulated various other cooperative inventory efforts with MCBS that have included surveys of rare features. Examples: the Minnesota Army National Guard (Camp Ripley), the U.S. Forest Service (Chippewa National Forest), the DNR's Division of Parks and Recreation. Coordination with various other LCMR-recommended projects that collect relevant data is anticipated for this biennium: Minnesota's Forest Bird Diversity Initiative (7d), Base Maps for 1990's (7e), Completion of statewide Land Use Update-Continuation (7f). Coordination with Federal endangered species work, DNR Parks surveys, and DNR's Ecological Classification System development is also likely. Other current resource inventory projects within the DNR, in northern counties, on tribal lands, within the Lake Superior basin, along the Mississippi and Minnesota River potentially will yield relevant data.

Several other Midwestern states have conducted inventories similar to MCBS (Wisconsin, Illinois, Michigan, Missouri). MCBS has adapted and expanded upon their survey techniques such that now MCBS is recognized nationally as a model county survey. A national network of rare features data is now being established through the Association For Biodiversity Information (a consortium of Natural Heritage programs and Conservation Data Centers) and the National Biological Survey. Selected data from the Natural Heritage Information System will become part of this network. Natural Heritage programs exist in the 50 U.S. states, and in several Canadian provinces. Past close coordination of these programs in terms of data collection protocols, and data and mapping standards will expedite this process, and ensure that data access and security issues are properly addressed.

The usefulness of data generated by MCBS is best demonstrated locally. MCBS has already generated data that will be used in various other projects recommended by LCMR. [e.g. Local Grants (4e), Tri-county Leech Lake Watershed project (5c), Blufflands Landscape (5d), Accelerated Landscape Management Activities in Whitewater Watershed (5p), Deliver Ecological Information and Technical Assistance to Local Governments (6n), and Environmental Indicators Initiative (7a)]. Other examples are documented in past progress reports delivered to LCMR.

VIII. Budget Context:

Budget History

	FY88-89	FY90-91	FY92-93	FY94-95
LCMR	$171,500	$150,000	$1,000,000	$900,000
The Nature Conservancy	171,500			
General Fund		300,000	300,000	300,000
Reinvest in Minnesota General		170,000	169,000	156,000
Nongame Wildlife Program		100,000	80,000	80,000
TOTALS	$343,000	$720,000	$1,549,000	$1,436,000

Supplemental Funding	FY96-97
Reinvest in Minnesota-General	$169,000
General Fund	300,000
Nongame Wildlife Program	80,000
TOTAL	$549,000

IX. Dissemination: All physical specimens of plants and animals are deposited in repositories located at the University of Minnesota, St. Paul. MCBS data stored in the Natural Heritage Information System is available by contacting the Natural Heritage Program. A brochure describing the access procedure and data request form are presently available. Integration of data, including GIS files within the DNR network is underway, as are national efforts. GIS files can be transferred outside of the DNR through a license agreement. Reports and maps will continue to be submitted to the Legislative Library and distributed directly to targeted agencies, organizations, academic institutions and individuals for which mailing lists are maintained. Notices of public information events and the availability of products are sent to local media. Results of the Survey are also published in various popular and technical journals. Previous progress reports to LCMR document selected presentations and products, and continuation of similar efforts is anticipated.

X. Time: Additional funding through the trust fund will be requested in the next biennium (FY 98-99). At the current level of funding, the proposed completion of the MCBS is 2015.

XI. Cooperators:

University of Minnesota, Department of Plant Biology
Anita Cholewa, Curator of the Herbarium

Objective B
All specimens of plants collected by MCBS are deposited in the University of Minnesota herbarium in St. Paul. Dr. Cholewa supervises university staff that mount specimens, and enter label data into the

herbarium database. MCBS has contributed funds for the mounting of some of the MCBS specimens, but most of the long-term operational expenses are paid by the University. MCBS plant ecologists and botanists use the herbarium to assist with the verification of specimens, and Dr. Cholewa has provided for staff access to the herbarium and direction as to the appropriate use of the facility. This effort represents a small portion of her time, yet the cumulative costs of long-term maintenance of the herbarium are significant.

University of Minnesota
James Ford Bell Museum of Natural History
Scott Lanyon, Director

Objective B
Most animal specimens collected by MCBS are deposited at the Bell Museum. MCBS has provided assistance in the preparation of specimens using methodology approved by the museum staff. The museum staff has provided for access to the collection, and assumes responsibility for the long-term curation of the collection. As with the herbarium, the cumulative costs of curation are significant.

Rochester-Olmsted County Planning Department
Philip H. Wheeler, Planning Director

A Memorandum of Understanding between the South Zumbro Watershed Joint Powers Board and the DNR has been prepared. The contributions of the Watershed that remain from FY94-95 are summarized below, and details are available upon request:

Objective A
Two vehicles are provided to MCBS for use in Olmsted County survey work. MCBS staff is provided access to the Rochester-Olmsted County GIS.

Objectives B and C
The Planning Department will digitize MCBS results for Olmsted County and produce 400 copies of Olmsted County maps displaying the MCBS results from their GIS.

XII. Reporting Requirements: Semiannual six-month work program update reports will be submitted not later than January 1, 1996, July 1, 1996, January 1, 1997, and a final six-month Work Program update and final report by June 30, 1997.

XIII. Required Attachment

1. **Qualifications:** See attached
2. **Project Staff Summary:** See attached