

**TITLE: 7 (d) MINNESOTA COUNTY BIOLOGICAL SURVEY-CONTINUATION**

**PROJECT MANAGER:** Carmen Converse

**ORGANIZATION:** Department of Natural Resources

**ADDRESS:** Box 25, 500 Lafayette Road  
St. Paul, Minnesota 55155

**WEB SITE ADDRESS:** [www.dnr.state.mn.us](http://www.dnr.state.mn.us)

**FUND:** Environment and Natural Resources Trust Fund

**LEGAL CITATION:** ML 2001, 1<sup>ST</sup> Special Session, Chapter 2, Section 14, Subd 7(d)

**APPROPRIATION AMOUNT:** \$800,000

**Overall Project Outcome and Results**

The Minnesota County Biological Survey (MCBS) is a systematic survey of rare biological features that began in 1987. 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 native plant communities.

MCBS has completed surveys in 57 of Minnesota's 87 counties since 1987. In this biennium, field surveys were completed in Aitkin, Carlton, Crow Wing, Kandiyohi, McLeod, Meeker and Pope counties and continued in Douglas and Itasca counties. In Cook, Lake and St. Louis counties, surveys continued in North Shore Ecological Subsection and expanded into the Laurentian Highlands and Toimi Uplands subsections. They began in Todd County and the unsurveyed portions of Becker and Otter Tail counties.

In this biennium, new records of 1,324 locations of rare features were added to the Department of Natural Resources (DNR) Rare Features Database. Since MCBS began in 1987, 14,105 new records have been added by MCBS. Since July 2001, 453 vegetation samples (relevés) were added to statewide Relevé Database, for a total MCBS contribution of 3,219 samples of the over 7,400 records now in the database. These vegetation data have been analyzed resulting in a revision of Minnesota's Native Plant Community Classification. Since 1987, sixteen species of native plants and two species and one hybrid of amphibians not previously documented in Minnesota have been recorded by MCBS.

**Project Results Use and Dissemination**

Published maps of MCBS results in 24 counties are available upon request. Digital files of native plant community and MCBS sites of biodiversity significance are available on the DNR "Data Deli" for 32 counties. (See the Division of Ecological Services on the DNR website [www.dnr.state.mn.us](http://www.dnr.state.mn.us).)

A report, *Minnesota County Biological Survey: Landscape Study Areas and Sites of Crow Wing County, MN* was delivered to Crow Wing County to assist with countywide planning.

A Compact Disk, *Survey of Biological Features in the Glacial Lakes and Moraines Landscape of West-Central Minnesota*. Biological Report No. 76 includes summaries and maps of results. Two high priority prairies identified by MCBS in this landscape have been protected as natural areas. Advice was provided to the US Fish and Wildlife Service regarding an important prairie in Meeker County.

Staff participated in DNR's Subsection Forest Resource Management Planning team for the three subsections, were members of DNR's area field teams, provided comments on the Chippewa and Superior National Forest

plans, reviewed data layers for discussion of sustainable forest management as part of the Manitou Collaborative, provided vegetation mapping for the *Lower St. Louis River Habitat Plan*, and produced reports and vegetation maps for use in State Park management.

Aquatic plant data collected at 277 lakes are available for use in Itasca County's Lake Sensitivity and Classification project designed to provide analysis of lakes to help direct zoning and planning.

A DNR publication, *Field Guide to the Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province* is in press and will also be available on the DNR website

Project proposals for potential natural areas at Myhr Creek Ridge (Cook County), Ice Ramparts (Aitkin County) and six sites in Pope and Kandiyohi counties were presented to the Commissioner's Advisory Committee resulting in their nomination as projects. Survey results were presented at seven county board meetings.

MCBS results were featured in a series of "Case Studies of communities" (see DNR website).

**Date of Report:** June 30, 2003

**LCMR Work Final Work Program Report**

**Date of Workprogram Approval:**

**Project Completion Date:** This workprogram outlines activities and products to be completed during the two year duration of this funding (ending June 30, 2003). 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.

**LCMR Work Program 2001**

**I. PROJECT TITLE: 7 (d) Minnesota County Biological Survey-Continuation**

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**Total Biennial Project Budget: \$800,000**

**\$ LCMR: \$ 800,000      \$ Amount Spent: \$800,000   =\$ Balance: \$ 0**

**Legal Citation: ML 2001, Chapter 2, Section 14, Subd 7(d)**

**Appropriation Language:** 7(d) Minnesota County Biological Survey-Continuation.

\$400,000 the first year and \$400,000 the second year are from the trust fund to the commissioner of natural resources for the eighth biennium of a 12 biennia project to accelerate the survey that identifies significant natural areas and systematically collects and interprets data on the distribution and ecology of natural communities, rare plants, and animals

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

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

<b>Result 1:LCMR Budget:</b>	<b>\$ 236,581</b>	<b>Other Funding sources:</b>	<b>\$ 820,000</b>
<b>Balance:</b>	<b>\$ 0</b>		
<b>Personnel:</b>	<b>\$ 236,581</b>		

**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. Landowner contacts and aircraft and ground surveys to assess natural area and native plant community quality and condition follow this. Ground surveys 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.

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

- 1) Mille Lacs Uplands and Glacial Lake Superior Plain subsections:** Field surveys that began in previous biennia will be completed in Aitkin, Crow Wing, (March 2002), and Carlton counties (March 2003). These counties include substantial portions of other ecological subsections.
- 2) Hardwood Hills and Minnesota River Prairie subsections:** Field surveys that began in the previous biennium will be completed in Douglas, Kandiyohi, McLeod, Meeker and Pope counties (June 2003). They will begin in Todd County and the unsurveyed portions of Becker and Otter Tail counties (including some portions of the Hardwood Hills, and Pine Moraines and Outwash Plains subsections).
- 3) North Shore Highlands subsection:** Field surveys that began in the previous biennium will continue (including portions of Cook, Lake and St. Louis counties).
- 4) Toimi Uplands and Laurentian Uplands subsections:** Field surveys will begin in these subsections that will expand work in progress in Cook, Lake and St. Louis counties.
- 5) Surveys that began in the previous biennium will continue in Itasca County.**

### **Result Status**

**Mille Lacs Uplands and Glacial Lake Superior Plain subsections:** Plant community surveys were completed in Crow Wing and Aitkin counties with final field visits to forest stands in the Rum River State Forest and to prominent bog/fen/conifer swamp complexes in the northwestern Aitkin County. Mammal surveys, completed in July and August 2001, included a very successful collaboration with staff from the Science Museum of Minnesota as part of a cooperative agreement. Surveys of Spotted and Four-toed salamanders, Wood turtles and nongame fish (Least darters and Pugnose shiners) were completed in 2002 resulting in three new locations of Spotted Salamanders and several populations of the targeted Nongame fish. Final site surveys in the Glacial Lake Superior portion of Carlton County were completed in fall 2002.

**Hardwood Hills and Minnesota River Prairie subsections (West Central Minnesota):** Site and species surveys were completed in Pope, Kandiyohi, Meeker and McLeod counties and began in Todd, and the unsurveyed portions of Otter Tail and Becker counties. Douglas County native plant community surveys were

completed but animal surveys will continue into the next biennium. The rolling topography of the Alexandria moraine portion of this landscape region contains excellent examples of surficial glacial landforms including eskers, kames and pothole lakes. This glacial landscape is one of the few areas in southern Minnesota that also supports extensive areas of native prairies and forests. Ecological evaluations were written for six important prairie and forest sites in this region. Five calcareous fens and new populations of small white lady's-slipper (*Cypripedium candidum*), American ginseng (*Panax quinquefolius*), prairie moonwort (*Botrychium campestre*) and Hill's thistle (*Cirsium hillii*) were located. A number of lakes in the region were surveyed to document the aquatic plant flora including one rare species, ditch-grass (*Ruppia maritima*). Butterfly surveys confirmed the importance of the region for grassland butterflies including Dakota skipper (*Hesperia dacotae*), arogos skipper (*Atrytone arogos*) and poweshiek skipper (*Oarisma poweshiek*). A minimal amount of data were collected in Meeker and McLeod counties due to the lack of extensive native habitat.

Survey work in Otter Tail County was well underway by June 2003 with highlights including a cluster of five calcareous fens near Seven Sister's Prairie, new populations of prairie moonwort (*Botrychium campestre*) and variants of rich fens and tamarack swamps. In Todd County, large forested areas associated with the St Croix moraine are important features along with several rich fens. The plant ecologist located many new records of plants not previously recorded for the county including *Carex livida*.

**North Shore Highlands Subsection :** Field evaluations of native plant communities and rare plants were completed in North Shore Highlands in 2003 with a continued focus on the 270 sites identified in association with 24 large Landscape Study Areas (LSAs). Each of the sites within the LSAs was evaluated by the plant ecologists for its relative biodiversity significance and was assigned a preliminary biodiversity significance rank (Outstanding, High, Moderate, Below minimum standards). Mapping of native plant communities in sites of Outstanding and High biodiversity significance is nearly completed. An example of an area containing many sites with the "Outstanding" rank is the Manitou LSA where data collected by MCBS are being used by members of the Manitou Collaborative to develop management plans. In the Manitou LSA, native plant communities were surveyed, bat and bird surveys were conducted, six remote lakes were surveyed for rare aquatic plants, and 25 relevés were collected. Some of the rare plants recorded include *Ranunculus lapponicus*, *Eleocharis nitida*, *Claytonia caroliniana*, *Scirpus pedicellatus*, *Xyris montana*, *Rhynchospora fusca*, *Juncus stygius*, *Platanthera clavellata* and *Sparganium glomeratum*. Bird surveys revealed that many sites contained populations of Black-throated blue warblers (*Dendroica caerulescens*).

Staff training sessions were held to discuss survey and sampling techniques for sparsely vegetated communities such as cliffs and the Lake Superior shoreline and to provide for a better understanding of the unique geological landscape of the North Shore that contributes to the diversity of the landscape. Over 325 vegetation samples (relevés) were collected by MCBS in the North Shore Highlands subsection, with 25 samples collected in conjunction with soil data collection by Forestry's Ecological Land Classification System (ECS) program.

Many of the North Shore Highlands' rare plant surveys focused on cliffs, gorges, inland lakes and the Lake Superior Shoreline. Some of the areas surveyed included the gorges of the Cross, Two Island, Onion, Gooseberry, Poplar, Stewart and Little Marais rivers and Nelson's Creek and Hockamin's Creek. Populations of *Asplenium trichomanes*, *Woodsia glabella*, and *Saxifraga aizoon* were found at Oberg Mountain. Along Paccini Lake Ridge, a population of *Carex woodii* was located. The population is disjunct by 75 miles from nearest plants in northwestern Wisconsin, and 150 miles from populations in Minnesota (Kanabec County). Extensive gorge and cliff habitats along the Cross River were surveyed for rare plants where collections included *Crataegus douglasi*, *Woodsia glabella*, and *Woodsia alpina*. *Arabis holboellii* and *Woodsia oregana* were collected from cliffs at Magney State Park. *Trichocolea tomentella* (a leafy liverwort) was documented in Tettegouche State Park adjacent to an intermittent drainage in a mixed swamp of birch, ash, and balsam fir. In Cook County, new locations of *Salix pellita*, *Woodsia alpina*, *Saxifraga aizoon*, and *Crataegus douglasi* were located. *Moerhingia macrophylla*, first documented by MCBS in the North Shore Highlands from a large cliff

in the Tettegouche LSA in 1999, was located at several additional sites on much smaller outcrops intermixed in the northern hardwood landscape.

As a result of the inland lake surveys of 100 lakes in St. Louis County and 35 in Lake County, *Scirpus edicillatus*, *Littorella uniflora* and *Myriophyllum tenellum* were documented. It appears that *Potamogeton alpinus* and *Myriophyllum alterniflorum* stand out as the unlisted plant species most distinctive of the aquatic flora of Northeastern Minnesota.

Collaboration with DNR's Division of Parks and recreation resulted in additional vegetation sampling as part of a "Shoreline Plant Community Inventory" that focused on quantitative sampling of Lake Superior-influenced plant communities near the shore and the impact of visitor use on those communities. Vegetation sampling included lichens and mosses and the comparison of vegetation patterns in high, moderate, and low human use areas. As a result of the vegetation sampling of 32 locations, 600 collections of mosses and lichens were made in the study area that extended from Stony Point in St. Louis County near Knife River to Horseshoe Bay near Hovland in Cook County. Some of the rare plants collected along the Lake Superior Shoreline included *Saxifraga aizoon*, *Botrychium cf. pallidum*, *Eleocharis nitida*, *Woodsia alpina*, *Draba arabisans*, *Carex flava*, *Pinguicula vulgaris*, *Euphrasia hudsoniana*, *Carex norvegica* (*C. media*), *Carex gynandra*, and *Castellija septentrionalis*. Of special note was the confirmation of a state record, Ashy witlow-grass (*Draba cana*), collected on an offshore island cliff in spring 2001.

Also in conjunction with DNR Parks, work was completed on the collection of relevés and the completion of detailed maps of native plant communities in Caribou Falls State Wayside, Crosby-Manitou State Park, Split Rock Lighthouse State Park, Jay Cooke State Park, Tettegouche State Park, and Gooseberry Falls State Park.

#### **Toimi Uplands and Laurentian Uplands subsections:**

Plant ecologists began surveys in 2003 in the Laurentian and Toimi Uplands by identifying survey sites through air photo interpretation and aerial flights. Field surveys began in June 2003. One recent highlight includes a patterned fen containing thousands of plants of *Carex michauxiana*, *C. livida*, *Arethusa bulbosa*, and *Pogonia ophioglossoides*. Surveys of 20 lakes for rare aquatic plants began in 2003.

**Animal Surveys in the Northeast:** Animal field surveys began in the spring of 2003 in the North Shore Highlands, Toimi Uplands and Laurentian Uplands. Animal biologists worked with plant ecologists, Nongame Wildlife Program staff, biologists with Grand Portage Reservation and Grand Portage Monument, the Superior National Forest, NRRI, Potlatch, and the Province of Ontario in order to develop an effective survey of this large region. The focus of 2003 surveys were bats along the North Shore, spotted salamanders (*Ambystoma maculatum*), four-toed salamanders (*Hemidactylium scutatum*) and rare breeding birds. Surveys for rare salamanders have not yet yielded rare species records. Bird surveys have resulted in numerous records of black-throated blue warblers (*Dendroica caerulescens*) and one surprising northern record of red-shouldered hawks (*Buteo lineatus*) in Cook County. Surveys for the rare Nabokov's blue butterfly (*Lycaeides idas nabokovi*) have resulted in ten new locations.

**Itasca County.** 2001 field surveys by the plant ecologist were focused on sites in the southern, southeastern and eastern portions of the county. A variety of high quality native plant communities were visited in order to build a perspective on their relative quality in the county. An ecological evaluation was prepared for one high quality site that is adjacent to Wabu Woods Scientific and Natural Area. The parcel is owned by Itasca County and there is general interest from the county in protecting at least part of the site as a natural area.

2002, air photo interpretation was completed in 11 townships in northeastern Itasca County and fieldwork was conducted in conjunction with other work on the Bear River Demonstration Forest. The Department selected a field project to identify suitable seasonal wetlands for amphibians as one of several priority projects

for the Forest. This required herp surveys in the spring of 2002 and 2003 including breeding frog surveys, salamander searches, and dip-netting for larvae followed by sampling of other physical attributes of wetlands to determine wetland suitability. Similar surveys were also conducted at McCarthy Beach State Park that is located within the Demonstration Forest. A report on the results of the amphibian surveys will be produced in December 2003.

The rare aquatic plant surveys of 277 lakes in Itasca county were completed yielding numerous locations of rare plants: *Elatine triandra*, *Sparganium glomeratum*, *Najas gracillima*, *Potamogeton vaseyi*, *Utricularia gibba*, *Myriophyllum tenellum*, and *Ceratophyllum echinatum* and material to be examined for *Eleocharis robbinsii*, *Potamogeton oakesianus*, *Eleocharis quinqueflora* and *Stuckenia vaginata*. Surveys included 20 lakes found within the DNR's Bear River Demonstration Forest. Some of the rare species found in the lakes of the Demonstration Forest included: *Littorella uniflora*, *Myriophyllum tenellum*, *Potamogeton vaseyi* and *Utricularia gibba*. Of particular note was the location of lavender bladderwort (*Utricularia resupinata*) in Kelly Lake that represents a 100 mile species range extension southwest of previously known locations.

Surveys were discontinued in Itasca County in anticipation of reduced funding beginning 1 July 2003. Notification was sent to collaborators and stakeholders in Itasca County.

**Minnesota's National Forests.** MCBS continued working with the Superior and Chippewa National Forests as part of a cooperative agreement to pursue work of mutual interest. Field work was completed in 2001 for a portion of the agreement related to the assessment of impacts of forest management on bryophyte (mosses and liverworts) species, and a report providing an updated assessment of which species of mosses and liverworts are rare on the Superior National Forest (SNF) was delivered to the Forest in June 2002 as part of a contract with J.A. Janssens. His report is entitled: *Bryophytes of the Northern Superior Uplands and the Superior National Forest: Inventory, Assessment and Recommendations for Conservation*. The cooperative agreement also provided for expanded surveys for the Four-toed salamander (*Hemidactylium scutatum*) in the two national forests in the spring of 2001 that resulted in 7 new locations on the Chippewa National Forest. Rare salamander searches in the SNF in 2003 did not reveal additional rare species records. Several staff assisted with the assessment of viability of selected species for use in National Forest planning. MCBS staff also provided training on identification of rare plants to some of the Superior National Forest staff.

Problems: Hiring of temporary field staff was especially challenging due to hiring constraints and procedural changes. This especially affected hiring of the animal survey staff, some of which are hired for no more than five weeks (for example, staff to conduct spring breeding bird surveys). One plant ecologist who has worked with MCBS for 11 years resigned in March and employment was terminated for another in June due to funding shortfalls. The transfer of responsibilities to other plant ecologists has been well executed, but the inability to replace these positions will affect the progress of the survey. In addition, the uncertainty created by the 2003 budget deficit made implementation of field surveys especially difficult in spring 2003.

<b>Result 2.LCMR Budget: \$ 411,765</b>	<b>Other Funding sources: \$ 730,000</b>
<b>Balance: \$ 0</b>	
<b>Personnel \$ 411,765</b>	

**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 and ARC/INFO 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 the Association for Biodiversity Information, the Biological Research Division of USGS, and The Nature Conservancy. Effective transfer of selected digital files using Compact Disks and the Web are being developed 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, videotapes and other photography are identified, labeled and stored at the DNR, St. Paul. Field data sheets are filed manually in preparation for archiving.

**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 reports identified in IX.

#### **Result Status:**

To date, the Survey has been completed in 57 counties. In this period, new records of 1,324 locations of rare features were added to the Rare Features Database. Since MCBS began in 1987, 14,105 new records have been added to the Rare Features Database by MCBS. During this period, 453 vegetation samples (relevés) were added to statewide Relevé Database. Since MCBS began in 1987, MCBS has contributed a total of 3,219 samples. Aquatic plant data now exists for over 800 lakes that were surveyed by an MCBS aquatic botanist in some counties. Cooperative agreements with the Bell Museum of Natural History, the Science Museum of Minnesota and St. Cloud State University have assisted with the preparation and storage of plant and animal specimens collected by MCBS.

In November 2001, four staff attended the Midwest Heritage Program Conference sponsored by NatureServe (formerly known as the Association for Biodiversity Information) in St. Louis, MO. A presentation on Minnesota's native plant community analysis and classification work was well received and plant ecologists from other states recognized that the work in MN is a national model of vegetation plot data analysis. A subsequent meeting resulted in a request for Minnesota's relevé (plot) data to be used in the development of a prototype of a national plot database. Staff also participated in technical sessions focused on implementing a new nation-wide information system for members of NatureServe, called Biotics. The DNR received an installation of this system in June 2003 and conversion of data is in progress.

Staff biologists now have access to a wide variety of organized digital natural resource files that they can use at their GIS work stations to identify potential areas for surveys. GIS specialists developed data standards for mapping and storing large data files and ArcView projects. Plant ecologists are entering site and native plant community data, primarily using ArcView to digitize thousands of polygons and are recording data in associated attribute files that contain descriptions of the quality, condition and relative importance of sites. These are used to derive some of the map products described in result #3.

GIS staff completed tutorials on ArcGIS 8.1, ESRI on-line "Migrating from ArcView GIS 3.x to ArcView 8," and module 1 of ESRI online "Introduction to Visual Basic for ESRI Software. One outcome has been the application of ArcGIS to create publication quality maps directly from digital files due to improved text formatting provided by this tool. GIS staff also attended the annual GIS meeting/training held in Duluth in 2002 to stay up to date on recent developments. Two student workers with GIS proficiency were hired and provided excellent assistance with mapping projects in 2003.

Development of a database on common animals began as a pilot project related to bird count data collected in the Twin Cities metropolitan area. This is being developed into a web-product that will enable the user to point to a specific map location in order to view a list of bird species recorded at that site by MCBS. This required review of original datasheets, field topo maps and entry into spreadsheets and ARCVIEW map files. A demonstration of this product was well received at the 2002 winter meeting of the Minnesota Ornithological Union at the Bell Museum of Natural History.

Selected staff participated in a Divisional review of proposals for accelerating enhancement of specific databases. One of the identified projects was a plant database that would more effectively store plant names and attributes such as their life form, native or non-native status etc. that could be available for queries on the DNR web site. The list of the state's vascular plants has been added to the DNR website, but other enhancements are still in progress.

Botanists reviewed plant collections at the University of MN Duluth to identify rare plant collections by other collectors that had not been recorded in the Natural Heritage Information System and these were recorded in the Rare Features Database.

Problems: Most staff took part in a two-week strike in October 2001 delaying the data management and specimen processing aspects of the project at the end of the 2001 field season. The Department converted to Microsoft that required additional staff training. Coordination of the plant database project by a contractor was ineffective and slowed progress of the development of a plant database. Aerial photo rectification of MCBS study areas in Mille Lacs Uplands, Aitkin County and the North Shore Highlands was delayed due to new training and equipment required for orthophoto rectification done by MN DNR Resource Assessment. Staff worked with Resource Assessment to resolve outstanding issues and also completed an agreement with Todd County to rectify photos at a lower cost in coordination with county GIS work.

**Result 3.LCMR Budget:      \$ 151,654    Other Funding Sources: \$ 489,910**  
**Balance:                      \$ 0**  
**Personnel:                    \$151,654**

**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 or electronically. Other 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.

**Completion Dates:** Maps displaying results of MCBS for at least five counties will be published and distributed by June 2003. A notebook (and CD) summarizing results of MCBS in the counties found mostly within the Mille Lacs Uplands subsection will be distributed to land managers by April 2003. Work will continue on a book that incorporates and interprets the results of MCBS in the Southeastern Blufflands (The Blufflands and the Rochester Plateau subsections). Publication date is dependent on the availability of funding.

#### **Result status:**

#### **Maps available on DNR Data Deli**

Native plant community and MCBS sites of biodiversity significance polygons and related metadata were made available to the public on the DNR "Data Deli" in 32 counties where surveys are completed. These include new electronic map files seven counties: Renville, Nicollet, Sibley, Blue Earth, Redwood, Pope and Benton counties. Published maps displaying MCBS results are now available for 24 counties.

**Mille Lacs Uplands subsection:** Final mapping and data management activities focused on the delivery of a notebook (and CD) summarizing results of MCBS in the counties found mostly within the Mille Lacs Uplands. A CD was not completed due to the departure of one of the plant ecologists assigned a major role in the production. However, copies of an interim report, *Minnesota County Biological Survey: Landscape Study Areas and Sites of Crow Wing County, MN* were sent to various officials in Crow Wing County and a presentation on MCBS results was made to the county in January 2003. Crow Wing County staff expressed interest in using the MCBS information in the development of their county park system. MCBS staff also participated in a meeting of Brainerd Lakes Area Association, a group interested in minimizing negative effects to lakes from development. MCBS data will be used in this assessment. A plant ecologist presented a summary of MCBS work at the Mille Lacs County water plan committee. An ecological evaluation was prepared for Dinosaur Island, an area within Mille Lacs Wildlife Management Area that contains one of the best northern hardwood/maple basswood stands in the county. DNR Forestry and Wildlife are reviewing this area as a possible Scientific and Natural Area (SNA) registry site.

#### **Hardwood Hills and Minnesota River Prairie subsections:**

A Compact Disk, *Survey of Biological Features in the Glacial Lakes and Moraines Landscape of West-Central Minnesota*. Biological Report No. 76 includes summaries and maps of results that were also presented to the Pope and Kandiyohi county boards. Two high priority prairie landscape areas identified by MCBS have been protected as natural areas

Letters were sent to 30 landowners in **Meeker and McLeod** counties as a follow-up to surveys completed there in 2002. The US Fish and Wildlife Service was notified of an important prairie in Meeker County where the landowner expressed interest in a conservation easement.

**Renville County maps** displaying rare features and areas of significant biodiversity were presented to the Renville County Board, the county planning staff, the county housing and economic development staff and the local SWCD staff. Following the meeting, an article in the West Central Tribune (Wilmar) provided an excellent description of the MCBS work recently completed in the MN River Valley. Staff also made presentations of results at county board meetings in **Nicollet, Blue Earth, Kandiyohi, Pope, and Le Sueur**

counties. Following these presentations there was interest expressed in using data for county planning projects. MCBS was introduced to **Todd County** staff with particular interest expressed by the park planning staff.

A very successful Minnesota River Valley field trip of local citizens was led by a plant ecologist to view features associated with rock outcrops and prairies in **Redwood** and **Renville** counties. Two reporters from the West Central Tribune in Wilmar and from a paper in Bird Island attended. Highlights of the day were five-lined skinks, plains prickly pear cactus and a bald eagle nest.

An Ecological Evaluation for Cedar Mountain in **Redwood County** was prepared and distributed.

#### **North Shore Highlands and Toimi Uplands and Laurentian Uplands subsections:**

A printed report and Compact Disk version of the **Lower St. Louis River Habitat Plan** includes vegetation maps of the St. Louis River estuary. A MCBS plant ecologist collaborated with a Wisconsin DNR plant ecologist in the vegetation map preparation. The area includes all of Estuary LSA, Points LSA, and a small part of Jay Cooke State Park. It also includes tables that cross reference MN DNR vegetation types and WI DNR vegetation types with a National Classification. The St. Louis River Citizens Action Committee presented the Willard Munger Sr. award in January to five members of this collaborative group.

A report was delivered to **DNR Parks and Recreation** on the native plant communities of the shoreline of the North Shore of Lake Superior that included summaries of vegetation data collection (relevés), analysis of these data, and the resulting native plant community descriptions that included data collected on lichens and mosses, prominent organisms in these vegetation communities. Parks intends to use these data to help monitor visitor impact on these vegetation types.

**Subsection Forest Resource Management Planning** Two staff plant ecologists assisted with the development of a plan for three subsections: The North Shore Highlands, the Toimi Uplands and the Laurentian Uplands. The most recent data collected by MCBS staff was used in this process. Products included information on native plant communities, rare species, MCBS Landscape Study Areas and Sites, and ecologically important lowlands conifer areas.

**Duluth Natural Areas Program** Rare features data and native plant community classifications were used to develop guidelines for nominating sites for the Duluth Natural Areas Program. Vegetation maps, native plant community descriptions and old growth forest evaluations were used by The Nature Conservancy (TNC) to nominate two potential areas.

**Succeeding as a Land Steward Workshop** The MCBS northern coordinator participated in the planning and presentation of this workshop along with resource staff from University of Minnesota Forestry Outreach program, MN DNR Division of Forestry, Wolf Ridge Environmental Learning Center, the Community Forestry Resource Center and a private landowner/logger. They developed training materials in the form of a workbook, designed as a practical guide to collecting and interpreting useful ecological information to develop and meet stewardship goals for private landowners. This was presented at a 1½ day workshop for private landowners at Wolf Ridge Environmental Learning Center.

**Superior National Forest** Staff provided contributions to a discussion of the results of bryophyte inventory and assessment work at a Bryophyte Roundtable conducted by Jan Janssens and management implications. Botanists and ecologists from several National Forests attended. Staff also provided training related to rare plants for some of the staff of the Superior National Forest.

**Minnesota Forest Resources Council, Northeast Regional Landscape Committee** Two plant ecologists worked with the landscape assessment and monitoring workgroup during this period, primarily on the development of specific objectives and strategies for 4 of the 8 ecosystem types within the Northern Superior Uplands; the mesic white pine-red pine ecosystem, the dry-mesic white pine-red pine ecosystem, the jack pine-black spruce ecosystem, and the aspen-birch spruce-fir ecosystem types. The ad hoc committee includes other representatives from DNR and from Boise Cascade, Potlatch, Minnesota Forest Industries, TNC, St. Louis County, NRRI etc. The group is conducting and interpreting analyses of existing forest conditions and developing recommendations for management goals and objectives in the various ecosystem types. MCBS staff also participated in the review of the MFRC existing timber harvesting and forest management guidelines, a review required by the Sustainable Forest Resources Act of 1995.

The northern coordinator worked with Natural Resources Research Institute (NRRI) on a regional committee that is characterizing the **Range of Natural Variability (RNV)** as it relates to existing forest conditions in the Northern Superior Uplands Ecological Section. The RNV model helps guide the development of collaborative goals and objectives for desired future forest conditions for sustainable forest management in the Northern Superior Uplands (e.g. State Forest Regional management planning, Manitou Collaborative, Wolf Ridge ELC management plan, MN FRC Northeast Landscape Planning).

**Manitou Collaborative** The MCBS North Shore staff continued to work with natural resource staff from TNC, Lake County, and MN DNR Divisions of Fisheries, Wildlife and Forestry to establish collaborative resource goals and objectives for the Manitou area. The collaborative also works with the DNR Division of Minerals, minerals developers, and private landowners in the area. MCBS assisted the collaborative in integrating and interpreting MCBS terrestrial and aquatic species data, and visited the site with staff from NRRI and Lake County to discuss native plant community classification and management issues. The northern coordinator assisted with the development of two proposals submitted by Lake County Forestry to the Lake Superior Coastal Program fund that received funding. The focus of these proposals is sustainable forest management in the Manitou area; one for the restoration of conifers and the other for northern hardwoods management. MCBS plant ecologists provided guidance to contractors and a university students engaged to provided additional mapping of the area.

**Spatial Analysis Project** The northern coordinator worked with the spatial analysis technical team to implement work plans designed to improve understanding of past, present, and future forest landscape conditions as a guide for forest planning and management strategies in Minnesota.

## **Itasca County**

The **Itasca County** MCBS plant ecologist was interviewed about survey work in the county by KAXE radio (Grand Rapids) on July 31, 2001. The 25-minute interview focused on the flora of the county and the recent discovery by the ecologist of a population of Western Jacob's ladder (*Polemonium occidentale* ssp. *lacustre*) in southeastern Itasca County. An article on Western Jacob's Ladder was prepared and placed on the DNR web site in January 2002. An ecological evaluation was prepared for **Itasca County-owned lands** that are adjacent to Wabu Woods SNA. The lands to the north and east of the SNA are likely candidates for some kind of natural area status, possibly as a county-level Outstanding Natural Area.

**Itasca County Lake Sensitivity and Classification Project** Staff attended a technical meeting of this county group that is preparing a data analysis project to assist with County zoning and planning decisions. MCBS data are being provided to the project for the 100 lakes selected by the county for the project.

Staff made contacts to stakeholders in Itasca County after the decision was made to discontinue work in the county due to reduced funding.

## Other activities

**Field Team Participation.** Three plant ecologists are representatives on the newly formed DNR "Field Teams" in Sauk Rapids, the North Shore and Sandstone. Participation includes suggestions for forest management alternatives, review of OHV trails, etc.

**Proposed Scientific and Natural Area (SNA) projects** were presented to the Commissioner's Advisory Committee for Myhr Creek Ridge (Cook County) and Ice Ramparts (Aitkin County) and six areas in Pope and Kandiyohi counties. All projects were approved. Staff also prepared information related to Myhr Creek Ridge and made a well-received presentation to the Cook County Board of Commissioners where the proposed SNA was discussed.

**Sustainable Forest Management Certification** Staff prepared materials related to the forest certification process and began discussions with Forest Industry representatives concerning how to incorporate MCBS findings into the certification process.

**Conservation Biology Meeting-Duluth, MN.** Two posters related to MCBS work in northeastern MN were presented at the international conference of the Society for Conservation Biology June 2003 in Duluth, MN: 1) *Synthesizing aquatic, wetland and terrestrial biodiversity assessments for conservation action in the North Shore (Lake Superior) Highlands.* 2) *Vegetation of Lake Superior rocky shores in Northeastern Minnesota: composition, diversity, significance and threats.*

MCBS delivered six reports to the DNR Division of **Parks and Recreation** to assist in their resource management: *Native plant communities and rare plants of George G. Crosby-Manitou State Park and Caribou Falls Wayside, Native plant communities and rare plants of Gooseberry Falls State Park, Native plant communities and rare plants of Split Rock Lighthouse State Park, Survey of Biological Features within Forestville/Mystery Cave State Park and Ecological Area, Survey of Biological Features in Carley State Park, Wabasha County Minnesota* and *Survey of Biological Features in the Minnesota Valley State Recreational Area.*

**Native plant community classification.** In collaboration with the Natural Heritage and Nongame Research Program and the Ecological Land Classification Program, MCBS staff contributed to the completion of the first volume of a three-volume key to the revised statewide native plant community classification (Version 2.0). MCBS contributed to the collection of relevé data, database design and maintenance, and the analysis and writing of keys and fact sheets. This publication, *Field Guide to the Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province* is in press and will also be available on the DNR website in fall 2003. MCBS staff participated in two meetings organized by the Division of Forestry to review the keys and to discuss future training and management guidelines needs in order to integrate these products into Forestry management. A poster, *Minnesota's native plant community classification* was presented at the 2<sup>nd</sup> Annual Forest and Wildlife Research Review meeting in January 2003 (Duluth, MN) and at the Society for Conservation Biology international meeting in Duluth, MN in June 2003. Staff also attended the annual meeting of the Ecological Society of America in Madison, Wisconsin (August 2001). They presented Minnesota's native plant community analysis and classification procedure to a national workshop of plant ecologists discussing the national classification and vegetation plot data analysis

The state record of **Spotted Salamander** (*Ambystoma maculatum*) was published in the *Hepetological Review* 33(4) 2002 page 315.

MCBS staff contributed data and comments for the conservation plan; *The Superior Mixed Forest Ecoregion: a conservation plan* that was prepared by The Nature Conservancy and The Nature Conservancy of Canada. November 2002.

MCBS was featured on Minnesota Public Radio (21 November, 2002) in an interview by Tim Post that included a discussion of the Survey's role in the identification of the state's best natural areas. Much of the piece was recorded in Sedan Prairie Scientific and Natural Area, a site identified in Stearns County by MCBS that since has been dedicated as a SNA.

**V. TOTAL LCMR PROJECT BUDGET:**

All LCMR Results: Personnel: \$ 800,000

TOTAL LCMR BUDGET: \$ 800,000

A.) ATTACHMENT A

**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). Past funding of MCBS stimulated various other cooperative survey efforts that included work with the Minnesota Army National Guard (Camp Ripley), the U.S. Forest Service (Chippewa and Superior National Forests), The Nature Conservancy, Aitkin County, Cass County, Olmsted County, Stearns County, the Metropolitan Airport Commission, the U.S. Fish and Wildlife Service, the National Park Service and the DNR's Divisions of Parks and Recreation and Forestry.

**Budget History**

	FY88-89	FY90-91	FY92-93	FY94-95	FY96-97	FY98-99	FY00-01
<b>LCMR</b>	\$171,500	\$150,000	\$1,000,000	\$900,000	\$900,000	\$1,200,000	\$1,600,000
<b>TNC</b>	\$171,500						
<b>GEN</b>		\$300,000	\$300,000	\$300,000	\$300,000	\$436,000	\$470,400
<b>RIM</b>		\$170,000	\$169,000	\$156,000	\$164,000	\$172,000	\$183,150
<b>Nongame</b>		\$100,000	\$80,000	\$80,000	\$69,000	\$70,300	\$104,200
<b>Totals</b>	\$343,000	\$720,000	\$1,549,000	\$1,436,000	\$1,433,000	\$1,878,300	\$2,357,750

Total=\$9,717,050

**B. Current and Future Spending:**

Funding Source	FY02-03
<b>LCMR</b>	<b>\$800,000</b>
<b>GEN</b>	<b>\$479,600</b>
<b>RIM</b>	<b>\$190,010</b>
<b>Nongame</b>	<b>\$ 70,300</b>
<b>Heritage Enhancement</b>	<b>\$1,300,000</b>
<b>TOTAL</b>	<b>\$2,839,910</b>

Future requests for funding will be made of the Minnesota Legislature and other local or regional cooperators.

**C. Project Partners:** 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).**

**D. Time:** Future funding will be requested from the Minnesota Legislature (Through the LCMR process, the general fund, the Nongame Wildlife Program), and other local or regional cooperators with the goal of completing the Survey by 2017.

## **VII. DISSEMINATION:**

The Natural Heritage Information System is the major repository of data collected by MCBS. *A user's guide to the Minnesota Natural Heritage Information System* is provided to those requesting data along with a user request form. Brief 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. GIS datasets are delivered to selected users (such as a county planning boards) through agreements with the requesting agency and the DNR's Natural Heritage and Nongame Research Program.

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. MCBS staff also make presentations that describe the Survey goals, methodologies and results to a wide range of audiences that include county boards, local planning groups, citizen advisory groups, other biologists, land managers and students. Staff also lead or participate in technical workshops and field trips to exchange ideas on survey methodology.

MCBS staff provide assistance with the local planning and ecological management of important sites of biodiversity identified during the Survey through interpretation and distribution of information. Some recent examples: 1) Maps and technical assistance provided to Stearns County were useful in development of an acquisition and management plan for Quarry Park and Nature Preserve and in prioritizing sites of biodiversity significance in the county. 2) In Renville County, MCBS staff provided data and technical advice related to the rock outcrops, prairies and associated species along the Minnesota River as part of an assessment of tourism and mining issues. 3) Data collected at the High Island Creek site in Sibley County were provided to a local watershed-planning group. 4) MCBS staff participated in the landscape level planning process of the Minnesota Forest Resources Council. In addition, the management and acquisition of DNR's Wildlife Management Areas, Scientific and Natural Areas, and State Parks have benefited from native plant community and species data provided by MCBS.

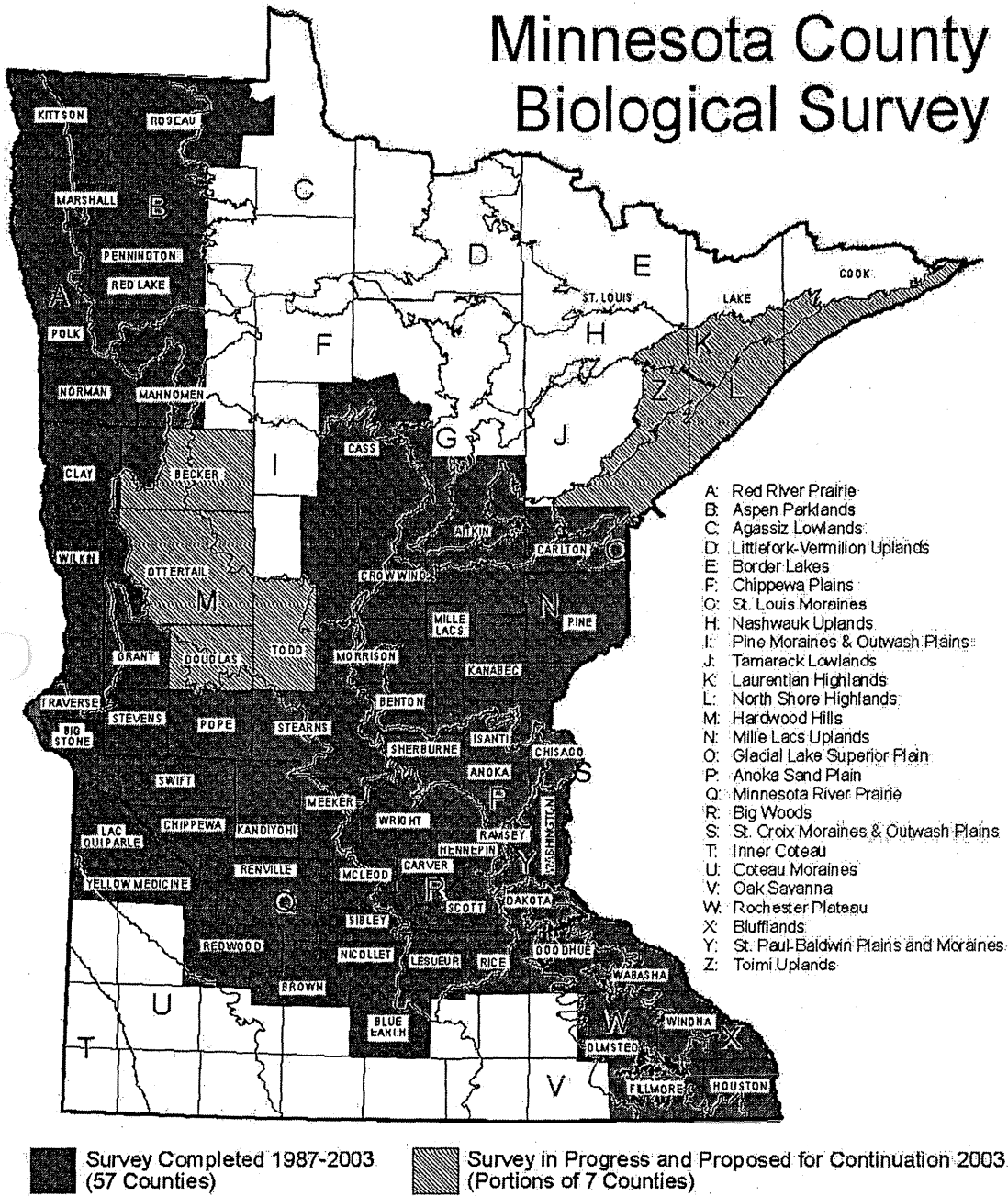
Physical collections are deposited at Minnesota repositories, primarily at the University of Minnesota's Bell Museum of Natural History and the Science Museum of Minnesota, St. Paul, MN. As part of a larger network of museums and herbaria, these cooperators are essential to the documentation and sharing of MCBS results. MCBS and museum staff meet periodically to address curatorial, data management, and interpretive needs.

MCBS delivers data as part of the Association of Biodiversity Information, an international consortium of Natural Heritage programs and Conservation Data Centers. MCBS also shares data with cooperators at colleges and universities and with others (such as counties) in a particular ecological region where surveys are ongoing or completed. In addition to rare features data, some examples of data that have been exchanged during the survey process include: Classified imagery developed through the GAP analysis project and the Forest Songbird Project, the National Wetlands Inventory data, bearing tree data, bat data (NE Bat Working Group), amphibian and reptile data (Partners in Amphibian and Reptile Conservation), bird data (Partners in Flight), vegetation plot data from numerous individuals and academic institutions in the state, lakes data collected by the DNR Section of Fisheries, and forest stand data from the DNR Division of Forestry, the Chippewa and Superior National Forests, and various counties.



VIII. LOCATION:

# Minnesota County Biological Survey



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

**IX. REPORTING REQUIREMENTS:** Periodic workprogram progress reports will be submitted not later than December 7, 2001, December 6, 2002, and March 1, 2003. A final workprogram report and associated products will be submitted by June 30, 2003, or by the completion date set in the appropriation.

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

**Attachment A.**

Wages, salaries, benefits for Eight MCBS staff	Result #1 Data collection	Balance1 6/30/03	Result #2 Information system management	Balance 6/30/03	Result #3 Data distribution & interpretation	Balance 6/30/03
4 Plant ecologist/botanists	\$153,890		\$142,052		\$ 98,648	
1 Botanist	\$ 35,712		\$ 32,965		\$ 22,892	
1 Zoologist	\$ 46,979		\$ 43,365		\$ 30,114	
2 Data entry/analysis staff			\$ 193,383			
Totals	\$236,581	\$ 0	\$ 411,765	\$ 0	\$151,654	\$ 0