DEPARTMENT OF NATURAL RESOURCES

Minnesota Biological Survey Strategic Plan - Plant Operational Plan

Accomplishment Report 2019-2024

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Contents

Preamble

The Minnesota Biological Surveys (MBS) Strategic Plan was implemented in 2019, but the accompanying Plant Operational Plan (POP) was not formalized until 2024. Thus, this report summaries accomplishments completed largely before the POP structure and project format were adopted, but all work clearly supports the overall Strategic Plan. Most accomplishments are attributed at the project level in line with the POP, others are matched to a specific Priority Action or an overall Strategy as seemed most applicable.

This report contains high-level MBS Plants accomplishments and various examples of project-specific accomplishments or results. It is not a comprehensive account of the wide range of MBS Plants activities conducted over the five-year reporting period.

Most notably absent from this report are the countless forms of technical guidance that MBS Plants staff provide. MBS Plants staff respond to technical inquires almost daily from internal customers across all DNR Divisions (e.g.'s, Regional Ecologists, Area Wildlife Managers, Area Foresters, Park Managers, Resource Specialists, Hydrologists) and external customers across all levels of governments and the private sectors (e.g.'s, U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service, Tribal Governments, MN Department of Transportation, MN Board of Water and Soil Resources, local Units of Government, academia, private consultants and the general public of MN). Guidance takes all forms, from a simple response in an email or participation in a meeting, to comprehensive botanical or ecological support, such as publishing Ecological Evaluation reports or long-term membership on technical committees. While it is impossible to keep a full account of all these accomplishments, this is an invaluable service MBS Plants staff provides and requires at least 20%, often more, of MBS Plants' overall staff capacity.

Goal 1 – Collect Biological Data and Information

Strategy 1.1 – Conduct surveys to determine the [distribution, abundance and condition] of native and rare plants, animals, and plant communities.

Complete the Minnesota County Biological Survey

Two grants funded through the ENTRF supported completing the Minnesota County Biological Survey (MCBS) from 2019-2024; ML19 *Minnesota Biological Survey – Continuation* and ML21 *Minnesota Biological Survey: Setting A Future Course*.

Field surveys for terrestrial native plant species and communities were completed in all 87 counties in 2022.

A book was published, *Ferns and Lycophytes of Minnesota* (2023) by Welby Smith.

Hundreds of State and County record specimens and rare plant specimens were accessioned into the Bell Museum Herbarium collection. One notable highlight was a substantial increase in Bryophyte (moss) records. A large backlog of moss specimens (mosses are a particularly hard to identify taxonomic group) collected during the MCBS were identified and readied for accessioning. Other efforts with external partners resulted in over 550

new moss Element Occurrences (EO) added to the Natural Heritage Information System (NHIS) from previous observations.

Other major plant-based datasets and information provided by the MCBS project include:

- Statewide GIS map layers of Sites of Biodiversity Significance (SBS) for terrestrial natural areas of high conservation value,
- Statewide GIS map layers for state-wide relevé (plant community) plot collection,
- Statewide GIS map layers for terrestrial Native Plant Communities (NPC), with over 2 million new acres mapped during this reporting period, and
- Statewide GIS map layers of Element Occurrences (EO) for rare species.

Sustainable Plant Survey Framework

The transition to a long-term sustainable survey framework was already underway in 2019. A structure for that work was formalized in a 10-year MBS Sustainable Plant Survey Framework in 2024. Geographic survey areas following the Frameworks goals were planned for 2025 in the Tallgrass Aspen Parklands broadly and in the Anoka Sand Plain with a focus on under sampled wet prairie and prairie wetlands and in collaboration with MN PlantWatch. The first formal project following the Frameworks goals was also planned to begin in 2025; *Finalizing Surveys in Voyageurs National Park*.

Aquatic Plant Surveys

Since its inception through 2024, the aquatic plant survey portion of the MCBS:

- discovered five new State record species,
- surveyed 2,338 lakes,
- completed surveys in 52 counties, and
- collected over 5,000 aquatic plant specimens.

These data contribute to the statewide GIS map layers of Lakes of Biological Significance (LOB) for lakes of high conservation value (in collaboration with DNR's Lake Ecology Unit).

Aquatic plant surveys in Isanti, Chisago, Washington, Ramsey, Anoka, Le Sueur, and Rice counties were completed from 2019-2024. A new species to Minnesota was discovered in Washington County, *Wolffia brasiliensis*, a species of watermeal. In 2024, MBS was awarded a grant funded through the ENTRF to continue support for a portion of this work; ML24 *Improving Aquatic Plant Knowledge for Healthy Waters*.

Landscape Scale Surveys

Landscape scale accomplishments from 2019-2024 were largely delineation of, and NPC mapping within SBS's as part of completing the MCBS.

Community Scale Surveys

MBS completed two targeted relevé resampling projects, collecting data at 132 plots and distributing two reports:

- "Resampling Relevé Plots Along the North Shore and in St. Croix State Park" (2021), and
- "Documenting Long Term Change in Native Plant Communities in Southern MN State Parks and Scientific and Natural Areas through relevé Resampling" (2021).

In 2024, MBS was awarded a grant funded through the ENTRF to pursue targeted relevé sampling and resampling in support of updating the Native Plant Community Classification Guides (ML24 *Modernizing Minnesota's Plant Community Classification and Field Guides*).

MBS began a collaboration with DNR's Nongame program documenting native plant communities in ephemeral ponds habitats with known rare salamander populations (funded through the ENRTF ML23 *Modernizing Minnesota's Wildlife (and Plant!) Action Plan*). Ephemeral ponds are highly variable. Modifications on traditional relevé vegetation plot method were tested to determine an adequate sampling protocol to characterize the pond vegetation. Through 2024, 21 vegetation plots were collected across 13 ponds.

MBS completed a Land Type Phase to Native Plant Community Crosswalk in collaboration with the Superior National Forest (SNF). Data included relevé plots, Ecological Monitoring Network plots and Ecological Classification System transects. MBS collected soil pit data for soil validation of relevé plots as needed for this project. MBS also provides introductory training to SNF and other Federal agency staff on the MN NPC system as part of this collaboration.

Other examples of native plant community survey work conducted during this reporting period include:

- Prairie sites across Becker, Mahnomen, Norman, Kittson, Roseau, and Marshall counties were surveyed to update 1980-90s era MCBS data at 59 sites, including almost 3,000 acres of NPC mapping.
- The discovery and mapping of 974 acres of Dry Sand - Gravel Oak Savanna (Northern), an S1 or Critically Imperiled community in Minnesota (and 17 rare species within) during a project surveying land administered by the Office of School Trust in Kittson, Roseau, and Marshall counties.

Species & Population Scale Surveys

Rare Plant Surveys

Species Habitat Modeling

MBS developed a new data product, species habitat models (SHM), for rare plant species through a grant funded by the ENRTF (ML22 *Enhancing Natural Resource Conservation through Species Distribution Modeling*). MBS also secured the use of mitigation funding to support this work. In total through 2024, 109 SHMs were created, 344 field surveys were conducted across 23 species, within which 67 Element Occurrences were updated or discovered.

MN PlantWatch

The MN PlantWatch program was initiated in collaboration with the University of Minnesota's Landscape Arboretum (UMLA), funded by a grant from the ENRTF (ML22 *Minnesota's Volunteer Rare Plant Conservation Corps*). In 2023, MN PlantWatch trained 19 volunteers, conducted 65 surveys across 23 counties, within which 42 EOs were updated or discovered for 29 rare species. In 2024, 52 new volunteers were training, an additional 76 surveys across 26 counties were conducted, within which 71 EOs were updated or discovered for 34 rare species. MBS and the ULMA were awarded a second grant from the ENRTF (ML25 *Minnesota PlantWatch: Community Scientists Conserving Rare Plants*) to expand the program.

Other examples of rare plant species survey work conducted during this reporting period include:

- Surveys of rare species are conducted annually in High and Outstanding SBS in Southeast MN, particularly in the Blufflands.
- A focus on surveys for *Botrychium* and *Sceptridium* species. For example, surveys were completed in Nemadji State Forest in Carlton and Pine Counties. Over 50 new rare *Botrychium* records were documented.
- As of 2024, re-surveys have been completed at 27 priorities SNAs and NPBs and are in progress at 8 other sites.
- Concentrated surveys for rare plant species in the Boundary Waters Canoe Area in response to the Pagami Creek fire.
- Several seasons of rare plant surveys in Voyageurs National Park (to be continued as *Finalizing Surveys in Voyageurs National Park*).
- Concentrated rare plant (and community) surveys in Rivershore habitats, sand and gravel bar communities and adjacent floodplain forests.
- Concentrated surveys for *Tsuga canadensis*. Completed a re-census of the entire population at Hemlock Ravine SNA. Surveyed the adjacent part of Jay Cooke State Park and found three previously unreported mature trees with a few associated seedlings.

Statewide Flora

Biodiversity Foray

The first MBS Foray was conducted in 2022 based out of Lac Qui Parle State Park focused on botanical surveys and specimen collection in west-central MN. It was planned and implemented in collaboration with Bell Museum Herbarium and local SNA staff and resulted in approximately 450 plant collections. In 2023, this event was based out of Agassiz National Wildlife Refuge targeting Northwest MN. It hosted over 20 participants from four partner organizations or DNR programs. Data collection was planned to support a larger effort to identify and survey NPCs and rare plant species in remnant prairies administered by the Office of School Trust that contain aggregate resources. In 2024, this initiative became an MBS-wide Biodiversity Foray, led by MBS zoologists with Unit-wide participants. MBS Plants will plan the Foray again in 2025. These events and group workdays for data processing are fostering collaboration and peer-to-peer learning among MBS and our close partners.

Lichen Surveys

As of 2024, lichen species surveys were completed in 17 sites in Southeast MN. They resulted in the discovery of at least 14 new State record species, documented range expansions for numerous species and over 200

specimens collected for submission to the Bell Museum. Other efforts with external partners resulted in almost 1,000 new lichen EOs added to NHIS from previous observations.

A collaborative Lichen Workgroup was formed in Fall of 2024 with representatives from the DNR (MBS), the Bell Museum Herbarium, the University of Minnesota, and two private consultants with lichen expertise. That group developed priorities for 2025 surveys efforts (wet forests in Central MN) and is developing plans for a larger lichen species survey effort.

The Genus Rubus

MBS staff, in collaboration the Bell Museum Herbarium and a worldwide *Rubus* expert, conducted a concentrated effort on various data and information needs related to species in the genus *Rubus*. There was a focus on repatriating MN specimens and conducting new surveys and specimen collections, which were annotated by a genus expert. Four new State record species were found. A digital tool was created and tested for improved in-field species identification to complement traditional dichotomous keys. Group field and herbarium workdays were organized for MBS staff, fostering collaboration and peer-to-peer learning. This focus also made a species in the genus (*Rubus stipulatus*) an ideal choice as the pilot species to initiate the development of recovery plans for state-listed plant species.

Strategy 1.2 - Monitor native and rare plant and animal populations, plant communities, and landscapes to detect and measure change through time.

Landscape Scale Monitoring

Photo plot data are analyzed every three years to estimate the size and change in size of all wetlands combined and within multiple wetland categories for the Wetland Quantity Monitoring project. Those data and analysis are made available to the public. In 2024, MBS was awarded a grant from the ENTRF (ML25 *Expanding the Application of Minnesota's Wetland Monitoring Data*) to explore expanded uses of these photo data to quantify native prairie.

Community Scale Monitoring

Two grants funded through the ENTRF supported the Ecological Monitoring Network during this reporting period (ML20 *Expanding Minnesota Ecological Monitoring Network* and ML23 *Completing Installment of the Minnesota Ecological Monitoring Network*).

As of 2024, the EMN has established 464 monitoring plots. Seven NPC categories were found to be lacking in the network: Conifer dominated fire-dependent forest, Jack Pine Forest, Floodplain Forests, Bluff Prairies, two types of Wet Meadows and Northern Upland Prairies. They will be prioritized in 2025 to complete the statewide plot network. Digital data collection, data management and automated reporting systems have been developed. The EMN dataset has been integrated within the Natural Heritage Information System (NHIS). A long-term resampling plan has been developed. Lastly, initial findings were made available online. From data analyzed through 2023, 45% of EMN plots are in upland forests, 27% in open wetlands, 15% in wetland forests and 12% in upland prairies. Overall, the EMN data show clear north-south differences. Forest EMN plots in southern Minnesota have higher browse pressure than northern plots. Southern prairie EMN plots have higher non-native

species cover relative to northern prairie plots. This trend can also be seen in most other Ecological Systems. Invasive earthworm impacts are higher in mesic forests in southern Minnesota relative to northern Minnesota.

Population Scale Monitoring

MBS continued annual population monitoring for four Federally Threatened and Endangered plant species that occur in Minnesota. This work is supported by numerous partners, appropriations from the Federal Cooperative Endangered Species Conservation Fund, and the work of over 50 volunteers annually. One specialized report was completed in 2020, "Precipitation contributes to plant height, but not reproductive effort, for western prairie fringed orchid (*Platanthera praeclara* Sheviak & Bowles)": Evidence from herbarium records. MBS staff contributed information for the USFWS's 5-Year Reviews of all four species during this reporting period, as well as providing annual reports.

MBS continued annual population monitoring of *Platanthera flava var. herbiola* in collaboration with the SNA program. As of 2024, six years of full-protocol annual demographic monitoring are complete, and one year of reduced data collection is complete. Annual reports and management recommendations are provided to SNA.

MBS developed, tested and piloted monitoring approaches for *Cypripedium arietinum*.

Strategy 1.3 - Research native and rare biological diversity to address specific questions, detect patterns, and test alternatives.

Wetland Research

Funding for the Wetland Hydrology Network was awarded by the ENRTF (ML20 *Foundational Hydrology Data for Wetland Protection and Restoration*) to complete a network of 60 monitored wetlands. As of 2023, 41 hydrological monitoring stations have been installed, 20 vegetation surveys completed, and 21 soil descriptions completed. A report was made available describing hydrology and vegetation of the first 20 sites.

Prairie Management Research

Disturbance Management

The ten-year study plans were completed for the Conservation Grazing Study at the Chippewa and Caribou WMAs. A manuscript for peer-reviewed publication is currently being written. The management plan at Caribou was revised to explicitly incorporate study results in proposed activities. Eight years of the Conservation Grazing study have been completed at the HIM site.

MBS conducted several years of monitoring of *Cypripedium candidum* in 145 plots at Santee Prairie SNA and Wambach WMA to examine the impacts of cattle grazing as part of the Conservation Grazing Study.

This research spurred the development of collaborative MBS Plants/SNA research on alternate methods of controlling smooth brome.

Invasive Species Control

MBS Plants initiated monitoring to document the effectiveness of goat grazing at reducing woody shrub encroachment at Rushford Sand Barrens in collaboration with the SNA program. Several years of data collection were completed before goat grazing management was ended.

MBS Plants initiated research studying the effectiveness of different control techniques at reducing invasive smooth brome grass in native prairies (Brome Study) in collaboration with the SNA program. The five-year study plan was completed. A first round of soil sampling to measure nutrient and microbial activity in the Brome Study was also conducted. A manuscript for peer-reviewed publication is currently being written and planning for a second phase of the Brome Study is underway.

Goal 2 - Manage and Deliver Biological Information

Strategy 2.1: Support and enhance the DNR Natural Heritage Information System's data and information on native and rare plants and animals, plant communities, and ecosystems.

Data governance items are incorporated into the everyday work of MBS Plants. Many of these items are evident in aspirational goals and project milestones within the Plant Operational Plan. Example accomplishments are included here:

MBS, through the Documents Management project, has processed and securely stored many years of MCBS botanical and ecological data. MBS plant staff have greatly reduced data backlogs in recent years, especially in NPC mapping and plant specimens (Priority Action 2.1A).

MBS plants developed and released Coefficients of Conservatism for plants of the Prairie Parkland and Tallgrass Aspen Parklands Ecological Provinces of Minnesota in 2022 (Priority Action 2.1A).

MBS Plants is improving standardization of data collection and management through a multiple year project to create digital data collection applications for all major MBS Plants datasets (Priority Actions 2.1B & 2.1C). As of 2024, applications have been created for generic rare plant surveys, specimen collections, the EMN dataset, MN PlantWatch datasets, generic vegetation plots, and a variety of project specific applications. A Relevé data collection application and various improvements to existing applications are planned for 2025. Modern data collection and processing technologies have reduced data entry time and increased timeliness for data submissions.

MBS has engaged in the Department-wide effort to create Data Management Plans for all MBS assets, including plant datasets (Priority Action 2.1D).

MBS Plants has provided the Bell Museum Herbarium financial support to increase capacity for processing and accessioning plant specimens (Priority Actions 2.1E).

Strategy 2.2 - Make our data understandable and available through analysis, interpretation, and outreach.

Dissemination items are also mostly addressed within MBS Plants project plans. Actions and accomplishments can be seen in relation to individual projects within the Plant Operational Plan. MBS Plants staff engage in dissemination activities, typically in the form of technical guidance, daily. There are far too many interactions, customers and topics addressed to fully account for them. Example accomplishments are included here.

MBS Plants staff regularly contribute to reports, articles or other resources about MN's natural heritage (Priority Action 2.2A). For example, MBS Plants completed and made available online, the Plant and Fungi Watchlist in 2022. MBS Plants staff regularly update or write new Ecological Evaluations; two recently complete are Six Mile Grove (Mower Co) and Polemonium Bog (St. Louis Co). MBS Plant staff, in collaboration with the Superior National Forest, authored two site assessments for establishing Research Natural Areas in 2021. And, over 200 Rare Species Guide plant profiles were updated and improved from 2019-2024.

Articles published in the Minnesota Conservation Volunteer are one way MBS Plants reaches a wide public audience, for example, "Rare Plant Patrol," "The Phantom Plant" and "Small Wonders." MBS staff also sit down for interviews with the media. For example, a recent interview with a local radio station on a newly defined plant species', *Polemonium lacustre*, ecology and conservation considerations in MN (Priority Action 2.2B).

MBS Plants' monitoring and research projects regularly contribute new data and analyses through reports and publications as mentioned specific to each project above (Priority Action 2.2C). MBS Plants staff also contribute information through presentations and leading workshops at local and national meetings conferences. Recently, MBS Plants staff have participated in the North American Prairie Conference, Natural Areas Conference in multiple years, Biodiversity without Boundaries, and many local workshops helping teach grass species, aquatic plant species, and fern species identification.

MBS Plants, through the Calcareous Fen Technical Team, analyzed and interpreted data to support revisions of the vegetation components of the Calcareous Fen Technical Criteria. MBS also supported the SNA program in developing data driven plant species lists for SNAs statewide (Priority Action 2.2C).

In 2024, MBS was awarded a grant funded through the ENTRF to update and modernize the v2.0 NPC Classification System (ML24 *Modernizing Minnesota's Plant Community Classification and Field Guides*). This multiyear project will fulfill Priority Action 2.2D. In just the first year, a Project Coordinator was hired and has made substantial progress, including:

- a communications plan was developed and implemented for internal and external audiences,
- developing and launching an online user survey to solicit feedback on needed improvements,
- four major project teams addressing the primary grant objectives were formed and launched, and
- work to gather, prepare, and analyze data for the revision product are well underway.

Partnerships are embodied in descriptions of collaborations throughout the Plant Operational Plan and are not specifically addressed by project or priority action. MBS Plants engages in far too many active partnerships and collaborations to fully account for them here. All contribute in ways to Priority Action 2.3B. Example accomplishments are included here.

MBS Plant staff spent considerable time collaborating on the revision of the MN State Wildlife Action Plan (SWAP; Priority Action 2.3A). Accomplishments include:

- revising almost 2,000 native plant species conservation status ranks (s-ranks),
- coordinating with external experts to revise or assign over 1,000 lichen species conservation status ranks (s-ranks),
- developing MN's first plant and lichen Species of Great Conservation Need and Species of Greatest Information Needs lists,
- incorporating native plant species and native plant community conservation needs into habitat-based chapters of the revised SWAP), and
- drafting the plant and lichen Species of Great Conservation Need chapter of the SWAP.

Examples of formal or regular interactions with internal partner groups include (Priority Action 2.3F):

- participation in the Regional Ecologists staff meetings (2.3C),
- participation in the SNA Ecological Monitoring working group (2.3C & 2.3D),
- participation in the Increasing Diversity and Environmental Careers program (2.3G),
- a dedicated MBS Plants staff position on the Calcareous Fen Technical Team (2.3C & 2.3D),
- participation in the EWR Biodiversity Strategic goal team (2.3G), and
- participation in the Biometrics Discussion group (2.3C & 2.3G).

Examples of formal or regular interactions with external partner groups include:

- multiple staff participants in the Great Lakes Heritage Botanists and Plant Ecologist Workgroups (via the NatureServe network; 2.3G),
- a dedicated MBS Plants staff position for coordination with Local Technical Teams as part of implementation of the Prairie Plan (2.3C & 2.3G),
- a dedicated MBS plant staff position for coordination with the Bell Museum Herbarium, and various other forms of staff interactions as needed (2.3C, 2.3D & 2.3G),
- MBS Plants provides coordination and project participants to the Lichen Workgroup (2.3C & 2.3D),
- participation in various Peatland focused working groups (2.3C & 2.3G), and
- participation in the conservation and protection of sensitive sites throughout MN (2.3G), for example in depth technical guidance, education and outreach related to Minnesota Point and Polemonium Bog.

Other examples of MBS Plants' engagement with partners during this reporting period include (also see numerous examples in project accomplishments in previous sections):

- participation in the development of MN's first recovery plan for a State-listed plant species and project framework to support continued plan development (2.3C, 2.3D & 2.3F),
- MBS Plants is collaborating with private-entity partners to develop and release Coefficients of Conservatism for plants in the Eastern Broadleaf Forest and Laurentian Mixed Forest Provinces (2.3C), and
- MBS Plant developed rare plant surveyor tests for each ecological province to support Environmental Review through better vetting of applicants for the Qualified List of Surveyors (2.3C & 2.3F).

Goal 3 – Exemplify Operational Excellence in Our Work.

Strategy 3.1 - Enhance funding diversity and sustainability

The Plant Operational Plan was created assuming a steady, manageable, and fundable staff structure. MBS leadership intends to pursue all available funding opportunities to achieve Strategic Goals. Example accomplishments are included here.

MBS Plants developed a resampling strategy for the Ecological Monitoring Network with scenarios that account for a range of funding and project options, and multiple ways to leverage partnerships to accomplish project goals long-term (Priority Action 3.1A).

Program leadership within the EMP Section successfully pursued a Legislative increase in Reinvest in Minnesota funding (Priority Action 3.1B). As of 2024, MBS was allocated recurring salary and expense support for a portion of:

- the MBS Plant Survey Supervisor position,
- the NPC Database Coordinator position, which allowed that position to become permanent (classified) securing support for MBS's lead role partnering with DNR Forestry, Fish and Wildlife, and Parks and Trails to maintain DNR-wide NPC database, tools and applications.
- the MBS Aquatic Botanist Position, which allowed that position to become permanent (classified), securing support statewide for native aquatic plant species surveys, including documentation of rare and State-listed aquatic plant species and related technical guidance to wide audience including Counties, Watershed District, and DNR Hydrologists, and
- two MBS Senior Ecologist/Botanist positions, allowing them to become permanent (classified), securing support for survey, monitoring and research and related technical guidance with one position focused on the Prairie Provinces (and Regions 1 & 4) and the other the Laurentian Mixed Forest Provinces (and Regions 1 & 2).

MBS secured recurring General Fund support to create a permanent biometrician position in 2022 (Priority Action 3.1B), securing support in statistics and data analysis for botanical and ecologically focused survey, monitoring and research projects statewide.

MBS has secured a variety of new funding sources during this reporting period (Priority Action 3.1C). Examples are:

- MBS Plants secured the use of internal mitigation funding as extra support in the initial development of species habitat modeling for State-listed plant species (complete).
- Partnered with FAW to financially support surveying for native prairie on FAW lands administered by the Office of School Trust in Kittson, Roseau, and Marshall (complete).
- MBS has partnered with the Superior National Forest through three Cost-Share Agreements (two during this reporting period):
    - Site assessments for candidate Research Natural Areas (complete)
    - A second installment to continue Land-Type Phase to NPC crosswalk (2021-present)

MSB Plants has led, co-led or partnered to complete work for many LCCMR/ENTRF funded projects (Priority Action 3.1D). Projects led or co-lead by MBS Plants during this reporting period are:

- ML19 *Minnesota Biological Survey – Continuation* (complete)
- ML20 *Expanding Minnesota Ecological Monitoring Network* (complete)
- ML21 *Minnesota Biological Survey: Setting A Future Course* (complete in 2025)
- ML22 *Minnesota's Volunteer Rare Plant Conservation Corps* (complete in 2025)
- ML22 *Enhancing Natural Resource Conservation through Species Distribution Modeling* (complete in 2025)
- ML20 *Foundational Hydrology Data For Wetland Protection And Restoration* (complete in 2026)
- ML23 *Completing Installment of the Minnesota Ecological Monitoring Network* (complete in 2026)
- ML24 *Improving Aquatic Plant Knowledge for Healthy Waters* (complete in 2027)
- ML24 *Modernizing Minnesota's Plant Community Classification and Field Guides* (complete in 2027)
- ML25 *Minnesota PlantWatch: Community Scientists Conserving Rare Plants* (begins 2025)
- ML25 *Expanding the Application of Minnesota's Wetland Monitoring Data* (begins 2025)

There are also projects supported by LCCMR/ENRTF that provide financial support for MBS Plants work via a partner (Priority Action 3.1D).

MBS Plants has a long history of collaboration with the SNA program, both entities contributing financial support to various efforts. Example MBS projects financially supported by the SNA program to accomplish their ecological monitoring grant requirements are:

- Effectiveness of goat grazing at Rushford Sand Barrens SNA (complete)
- Re-census of Hemlock population at Hemlock Ravine SNA (complete)
- Population monitoring of *Platanthera flava var. herbiola* at Quarry Park SNA (2017 – present)
- The Brome Study (2019 – present)
- Updating rare plant species and native plant community records on SNAs and NPBs (2021 - present)
- Population monitoring of *Cypripedium candidum* as part of the Conservation Grazing Study (2021-present)
- Continuous support for monitoring populations of Federally listed species on SNA lands

MBS's collaboration with DNR's Nongame program documenting native plant communities in ephemeral ponds supports both current MN SWAP priorities and is contributing data towards the 2025 revision of MN's SWAP. This work is funded through ML23 *Modernizing Minnesota's Wildlife (and Plant!) Action Plan*.

Strategy 3.2 - Foster a program with a diverse, skilled, and adaptable staff

MBS employs a variety of mechanisms in support of Strategy 3.2. Examples for each Priority Action are included here.

Examples of project-based or large group professional development opportunities are (Priority Action 3.2A) are:

- The MBS Biodiversity Foray supports in-field peer learning, collaboration and connection. MBS Plants led events integrate Regional EWR staff and external partners.

- MBS Plants organizes 2-3 Herbarium Days each spring. The focus is for staff to help each other with difficult to identify specimens, learn new botanical skills, and generally share botanical knowledge.
- All MBS Plants staff participate in one of two large working groups that meet 3-4 times each winter. One group is focused on botanical work the other focused on ecological work. The main function of the groups is to help move MBS Plants projects forward in a coordinated and efficient way. But, they also function as a forum for getting feedback on new ideas, asking colleagues for help, and promoting staff growth and development.

MBS Plant transitioned through the retirement of the Prairie Ecologist position (Priority Action 3.2B). The position was re-hired to overlap with the previous incumbent, who took a Post-Retirement Option position. The position was also re-hired with flexibility in location, which resulted in the new staff member in the prairie region of the state (also supporting Priority Action 3.2C).

MBS Plants has supported the Increasing Diversity in Environmental Careers (IDEC) program in many ways (Priority Action 3.2E). MBS Plants hosted an IDEC intern, several staff have served as IDEC mentors, and the Plant Supervisor is an EWR representative on the inter-agency IDEC program committee. The Ecological Monitoring Network has also mentored numerous protected class intern through summer internship positions.

MBS Plants uses volunteers in many ways (Priority Action 3.2F). Volunteers have been assisting MBS monitor Federally listed plant species in MN for decades. And, in just two years, the MN PlantWatch program has substantially increased the number of volunteers MBS employs each year.