BOARD OF WATER AND SOIL RESOURCES

Native Vegetation Establishment and Enhancement Guidelines

Program Specifications and Guidance
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Section 1: Purpose and Applicability

Native plants and plant communities play an essential role in sustaining environmental and human health, providing wildlife habitat, and adding resiliency to our landscapes. The purpose of these guidelines is to assist resource professionals and landowners across Minnesota in the successful establishment and management of restoration and other conservation projects. The guidelines are also designed to develop consistency among state programs; to avoid the use of invasive species; and to ensure that plantings function at a high level and meet project goals. This guide is updated periodically, as new research and field experience become available.

Specifications and Guidelines

"Specifications" are requirements for seed and plant sourcing that apply to many BWSR-funded programs. Most BWSR programs that involve establishment and management of vegetation are subject to these requirements, which are incorporated in each grant agreement. **For nearly all projects that have a habitat or water quality focus, native vegetation is required. There are maximum source distances for native seed and plants, and planting of state noxious weeds is prohibited for all projects.**

"Guidelines" are the best practices recommended for establishing and maintaining native vegetation. BWSR grant recipients are expected to review these practices, and encouraged to adapt them to meet the needs and site conditions of each project.

Sections

The guide includes the following sections, all of which can be viewed and downloaded from the BWSR webpage.

Section 1 – Purpose, applicability to BWSR program, exceptions, applicability to other state programs, benefits of native vegetation and principles for use

Section 2 – General Planning Considerations applicable to all types of native vegetation, including seed sourcing requirements

Section 3 – Project site preparation, planting and management

Section 4 – Guidance by Project Type: a series of factsheets for specific project types such as lakeshores, wetlands and forests

Applicability to BWSR Programs

The specifications within this document apply to BWSR-funded programs that include establishment and management of vegetation, as further referenced in the relevant BWSR grant agreements. Environmentally suitable native annual, biennial and perennial plant species will help projects meet legislative requirements and will provide multiple landscape benefits.

Specific Program Requirements

Exceptions

The following exceptions apply to projects funded under Clean Water Fund programs and Conservation Contracts programs and Living Landscapes (habitat-focused) programs:

- **Non-native, non-invasive perennial crops, hay crops or forage crops** may be used:
  - As part of a drinking water protection strategy in a vulnerable or highly-vulnerable DWSMA as designated by the Department of Health or in a Township Well Testing high-priority area as determined by the Department of Agriculture;
  - In buffers, borders, grass waterways or other areas likely to be exposed to pesticides or part of agricultural production;
  - For soil stabilization, erosion prevention and carbon sequestration in an agricultural production setting;
  - On fields that will be hayed, grazed or harvested.
- **Project Size Limits for Approvals:** For the exceptions above, if the project area is under 20 acres in size, the exception may be approved by local conservation staff. If the project area is 20 acres or larger, or for any exceptions not listed here, grantees must request approval from BWSR's Board Conservationists or Clean Water Specialists.
- **Cover crops** used to improve soil health and/or water quality are allowed without a maximum acreage limit.
- **Temporary cover** is allowed without a maximum acreage limit when needed to stabilize project sites prior to the installation of structural conservation practices.
- **Cultivars of native species** may be allowed in urban stormwater plantings if they accomplish similar or greater ecological functions, help achieve aesthetic goals and do not pose an invasive or other environmental risk.
- Some **cultivars of native trees and non-native lawn alternatives** are allowed under Lawns to Legumes program, including white clover, self-heal varieties and creeping thyme.

Prohibition

Use of species on the State Noxious Weed List is prohibited in all projects. Non-native species must not pose a risk to native plant communities.

Applicability to Other State Programs

As noted above, these guidelines have been adopted or referenced by several state conservation and restoration programs.

- The Lessard-Sams Outdoor Heritage Council makes recommendations for projects funded under the **Outdoor Heritage Fund**, one of four funds created by the Clean Water, Land and Legacy Amendment. The fund's enabling statute requires annual evaluations of restoration and enhancement projects relative to whether they meet BWSR's guidelines and project goals (Minn. Stats. § 97A.056, sub. 10).
- The enabling statute for the **Clean Water Fund** (also established by the Legacy Amendment) and annual CWF appropriations to BWSR provide for restoration evaluations, using the guidelines as criteria (Minn. Stats. § 114D.50, subd. 6).
- The Legislative-Citizen Commission on Minnesota Resources (LCCMR) recommends projects for funding by the **Environment and Natural Resources Trust Fund (ENRTF).** Applicants for ENRTF funding must provide information on how restoration efforts will use and follow the guidelines to ensure ecological integrity and pollinator enhancement. According to LCCMR requirements, restoration projects must "use native plant species according to the Board of Water and Soil Resources' native vegetation establishment and enhancement guidelines and include an appropriate diversity of native species selected to provide habitat for pollinators throughout the growing season as required under Minnesota Statutes, section 84.973." Any exceptions to these guidelines for (non-BWSR) ENRTF projects must be made by LCCMR.

Many other state and federal agencies provide guidance and/or requirements for native and non-native plant selection and management, summarized in Table 1.1.

Table 1.1 State and Federal Programs: Relationship to BWSR Guidelines

Agency	Relationship to BWSR Guidelines
Department of Natural Resources – Native Plant Communities https://www.dnr.state.mn.us/npc/index.html	Guidance for identifying relevant plant communities for restoration or conservation practices; guide planning of restoration projects; seed mixes.
Department of Natural Resources – MNTaxa: Minnesota vascular plant checklist https://www.dnr.state.mn.us/eco/mcbs/plant_lists.html	Reference used to identify native, non-native and invasive plants for all conservation projects.

Agency	Relationship to BWSR Guidelines
Department of Transportation - roadside seed mixes http://www.dot.state.mn.us/environment/erosion/vegetation.html	MnDOT standards apply to all MnDOT sponsored or funded roadside and right-of-way projects and may also be used on county or township road projects. May overlap in some cases with BWSR guidelines.
MN Department of Agriculture – Minnesota Noxious Weed Law https://www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list	Regulatory: official, updated list of state prohibited and controlled noxious weeds. Referenced in BWSR guidelines.
NRCS practice standards – Field Office Technical Guide https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/	NRCS practice standards are used for most BWSR-funded projects. NRCS Standard 643, Restoration of Rare and Declining Natural Communities, is used in RIM and CWF projects. Other NRCS standards commonly used in restoration include 327, Conservation Cover, and 657, Wetland Restoration. BWSR guidelines for seed and plant source sequence should be used in conjunction with NRCS practice standards.

Benefits of Native Vegetation

Native plants and the plant communities that they evolved in and support, provide a wide range of ecological and human services. In this document we are using the following definitions for the terms native plant and native plant community.

Native Plant – Native plants are plant species that were growing in Minnesota's biomes when European immigrants first arrived in this state. These plant species, along with the mammals, birds, fish, insects, and other living things, help to make each biome unique (MDNR).

Native Plant Community – a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms**.** These groups of native plant species form recognizable units, such as oak savannas, pine forests, or marshes, that tend to repeat over space and time.

The following information is a summary of key benefits of native vegetation.

Environmental Quality Benefits:

- Providing the base of food webs and nutrient cycles
- Removal of nutrients and pollutants, providing protection for air and water resources
- Carbon sequestration by drawing carbon into aboveground biomass, as well as below ground into root systems and the soil
- Providing fuels for biochar creation

- Water infiltration and groundwater recharge through the creation of pore space within soil
- Water interception, absorption, and filtration by leaves, stems and roots
- Slope stabilization provided by extensive root systems
- Prevention of soil erosion and sedimentation caused by water and wind
- Soil heath promoted by stabilizing soils, adding organic content through root and vegetative decomposition, and by supporting diverse microorganism populations
- Evapotranspiration (releasing excess water through stems and leaves to decease water volume within stormwater practices)
- Cooling and temperature moderation of air, soil and water
- Limiting flood impacts by slowing flood waters
- Healthy nutrient cycling and food chain support

Native Wildlife Habitat Benefits:

- Energy and nutrients for entire food webs via energy flows and nutrient cycles
- Pollinator habitat and food sources, supporting hummingbirds, bees, moths, butterflies, and other insects
- Host plants for a wide variety of insects
- Food sources (nectar, fruit, seed, forage, etc.) for mammals, birds, arthropods, and other animals
- Shelter and nesting habitat for insects, birds, and other animals
- Aquatic habitat for a wide range of insects, fish, birds and other animals in lakes, rivers and wetlands

Resiliency Benefits

- Preservation of biodiversity (the variety of life and its processes)
- Suitability to local conditions
- Providing connectivity between essential habitats
- Adapt to climate extremes e.g., drought and flooding
- Ability to adapt through genetic adaptation, succession and dispersal
- Creating competition for invasive species (displaced plants)

Human Services Benefits

- Regional character and identity (sense of place)
- Climate cooling from landscape cover e.g., tree and shrub canopies, grassland
- Landscape aesthetics
- Human physical and mental health benefits from experiencing and interacting with healthy ecosystems
- Low maintenance once established
- Educational opportunities
- Medicinal needs
- Food security

Cultural Values

- Build reciprocity into land stewardship (e.g., acknowledgement of plants and animals as relatives and living beings)
- Focus on relationship building with one another and other living beings, be a good relative.
- Restoration of plants for traditional uses
- Community-based and Tribal involvement (e.g., seek and respect Tribal input, make resources available for Tribal entities)
- Cultural revitalization of traditional land-based practices (e.g., cultural burning, harvesting and propagating plants)
- Provide more opportunities and access for hunting, fishing, and gathering of plants for under-resourced, underrepresented, and disadvantaged people.

Rue anemone
Image: Dan Shaw

Principles for Establishing and Managing Resilient and Biodiverse Landscapes

The following information summarizes guiding principles for increasing the resiliency and biodiversity of landscapes. These principles are intended as big-picture concepts to frame ecosystem protection and management work and to express the value of this work in communicating with Minnesota residents and other partners. The guiding principles have been reviewed by the conservation community every few years since 2013 to ensure they reflect the current approaches of a wide range of professionals.

Public Engagement

1. **Engage Communities:** Landscapes have evolved through human interaction and stewardship for thousands of years. Making connections with a wide range of partners including conservation organizations, tribal nations, community groups, schools, and individual residents can strengthen the planning, resiliency and long-term stewardship of projects. The establishment and management of native vegetation and protection of wildlife species also has cultural significance and plays an important role in building relationships with the land.
2. **Engage with Individual Residents:** Individuals can make a significant different for the health of landscapes through their own planting efforts, volunteering, advocating for healthy landscapes, and supporting conservation organizations. We need the public engaged in establishing native plant diversity, supporting at-risk wildlife, and supporting landscape stewardship.

Restored Wetland
Image: BWSR

Prioritization

3. **Strategic Site Selection:** Work with project partners and local communities to identify the services or functions that are most beneficial for an individual landscape and where projects should be located to best provide those services or functions. In many cases, this involves restoring vegetation assemblages to promote animal habitat, buffering water resources (both ground and surface waters) and restoring natural processes such as nutrient cycling. Also consider linear areas between larger habitats that provide travel corridors for wildlife. Select sies that are feasible for accomplishing project goals. In some cases, areas with high nutrients such as pastures or agricultural

stormwater ponds may not be favorable for restoring high diversity native plant communities.

4. **Make Landscape Connections:** Establish strong connections through landscapes. Create habitat corridors and decrease landscape fragmentation by restoring prairie, forest, savannas, and wetlands. Create a network of soil health systems by expanding conservation practice adoption across farms. Connected landscapes build resiliency and provide refugia for pollinators and other at-risk species.

Collaboration

5. **Involve a wide range of partners** such as tribal nations, federal, state and local governments, non-profits, private companies, consultants, politicians, members of the press, and residents.
6. **Work Towards Weaving Traditional Knowledge and Western Science** – Build reciprocal relationships with tribal communities that have knowledge of how their ancestors managed the land for thousands of years. Treat this knowledge as a gift and don't expect this to be given, a solid and respectful relationship must be built first. This can provide a deeper understanding and appreciation for traditional land-based practices that may be incorporated into contemporary land management. "Two-eyed seeing" is a Mi'kmaq concept of learning to see from one eye with the strengths of Indigenous knowledge and learning to see from the other eye with Western knowledge. Then learning to use both eyes together for the benefit of all.
    - **Protect and Restore Plant Species for Traditional Uses** – Climate change is affecting plants and ecosystems the Ojibwe, Dakota and other indigenous peoples have relied on and maintained relationships with for centuries. Plants were used for subsistence (e.g., wild rice, arrowhead, ostrich fern, Jerusalem artichoke, prairie turnip, and hazelnut), for ceremonial purposes and medicine (e.g., sweetgrass, prairie sage, and white cedar), and used for utility to make baskets and other practical materials (e.g., black ash and cattail). These species along with many others are at risk and need additional protection and restoration to meet spiritual, ceremonial, medicinal, subsistence, and economic needs (GLIFWC 2024).

Project Planning

7. **Apply a Systems Approach:** Plan projects to be intact systems that fit the regional climate, soils, hydrology and plant communities. Projects should be guided by local partners familiar with ecosystems and the establishment and management methods that will result in functioning systems that provide a wide range of ecosystem benefits and support a wide range of wildlife species.

8. **Match Plant Communities to the Site:** Match your targeted vegetation to the native plant community that best fits the topography, soils, hydrology, and climate conditions (including the potential future climate) of your site. Restore natural hydrologic regimes to aquatic and wetland systems as applicable. Historic plant community information can be used as a guide for decision making. When planning projects use Minnesota DNR's Native Plant Community information as a resource, as well as collaboration with natural resource staff with expertise in local conditions and management practices. Recognize that some landscapes are highly altered resulting in novel ecosystems but they still need a thorough assessment of landscape context and site conditions. Also determine the kinds of native wildlife that live in or migrate through the area and include native plants adapted to the site that will provide food and shelter for wildlife species.

Habitat Friendly Solar Project Image: BWSR

9. **Design for Multiple Functions:** Be strategic in the selection of primary and secondary goals but remember that multiple functions, including wildlife habitat, plant diversity, food production, water storage, stormwater treatment, soil quality, carbon sequestration, energy production, and nutrient cycling can often be accomplished together. It is important to have project teams with diverse backgrounds and expertise to help reach project goals. See the BWSR Climate Resiliency Toolbox for strategies to address climate impacts.
10. **Combine Conservation Practices**: Different types of plantings and conservation projects can be combined to enhance water quality or establish a larger matrix of habitat to support wildlife. In agricultural systems, regenerative agriculture practices can be combined with native plantings in buffers, prairie STRIPS and other areas to enhance conservation benefits and improve soil health. In developed areas, rain gardens, biofiltration areas, stormwater swales, and ponds, along with urban natural areas and habitat plantings, help create a connected system of green infrastructure.
11. **Build and Maintain Biodiversity:** Ecosystems are the outcomes of millions of years of evolution and many landscapes benefit from rebuilding biological communities including microbial, fungal, floral and faunal components. The more biodiverse an area is, the better chance it has at long-term health and self-sustainability. Over the years, there will be variations in invasive species pressure, soil conditions, and climate, such as extreme drought or extreme moisture. Having a diversity of plants, wildlife, and habitats ensures that more species can adapt to these extremes and can, therefore, respond to changing environmental conditions. Diversity can be thought of at multiple scales, from microorganisms to plants to wildlife to habitat type. Diversity provides ecosystem functions that benefit people, plants, and wildlife. These same principles can be applied to agricultural systems to reduce soil erosion, maintain nutrients

necessary for growing a crop, and storing water in the soil. Filling niches with native species also prevents the establishment of invasive species. Restoring natural disturbances such as prescribed fire, grazing and water fluctuations plays a key role in maintaining diversity.

12. **Provides Habitat for Pollinators and Other Insects -** Pollinators and other insects play an essential role in supporting ecosystems by pollinating as much as 70% of flowering plants and providing food sources for a wide range of wildlife species and humans. Support insect populations by minimizing pesticide use, buffering natural areas and diverse plantings from pesticide exposure, restoring habitat complexes and wide natural corridors, increasing plant diversity, managing invasive plants, providing nesting sites and shelter, and restoring clean water sources. In developed areas, replacing lawn with native plantings can provide a wide range of landscape benefits and establish a matrix of habitat to support a diversity of pollinators. See BWSR's Pollinator and Biodiversity Toolbox for additional information.
13. **Support At Risk Plants and Animals –** There is an increasing list of plant and animal species with declining populations that need support. These include a wide range of plants and animals. Methods of supporting individual species should be considered in a wide range of landscape types. The Minnesota DNR Rare Species Guide provides status, distribution, ecology, conservation, and management of our rarest plants and animals.
14. **Incorporate Effective Water Management, Treatment, and Use -** A variety of practices including buffer strips, infiltration basins, raingardens and wetland restoration help manage water resources. Incorporate these practices in urban and rural landscapes to reduce runoff, erosion and sedimentation, recharge groundwater, improve water quality, and reduce flooding. Promote the wise use of water resources and the use of catchment systems to help ensure adequate supplies into the future.

Restored shallow marsh
Image: BWSR

15. **Preserve and Restore Soil Health -** Soils that have good soil structure, organic content and microorganism populations translate into healthy and productive ecological and cultural landscapes and play a key role in sequestering carbon.
16. **Restore Natural Disturbance regimes –** Natural disturbance is critical for maintaining and renewing ecological integrity in ecosystems. Natural disturbances vary across ecosystems but can include flooding, fire, grazing, burrows, insect herbivory, and windthrow. Ecosystems that lack natural disturbancs rapidly trend towards climax communities which are desirable across landscapes but they should never domainte as they can be low in resiliency, function, and suceptable to disease.
17. **Restore Keystone Species –** Keystone species are organism that had a significant influence on ecosystem biological, physical, and chemical processes that in turn

supported biodiversity. Examples of keystone plant species in Minnesota include oaks, willow, cherry, pines and poplar. Animals such as bison, elk, wolves, and beaver can also be keystone species.

18. **Support Food Webs –** Rebuilding native food webs acknowledges top down drivers of systems (ecosystems) structuring biological assemblages in ways that increase energy flows, nutrient cycling, and provide ecosystem services. This is the primary reason plants evolved over time to become extremely edible, from mosses to strawberries and acorns. In turn, edible vegetation allowed proper nutrient cycling to prevent eutrophication.

Project Management

Sheep grazing a solar project
Image: BWSR

19. **Build Capacity to Restore and Mimic Keystone Processes –** Keystone processes such as prescribed burning and conservation grazing are critical to the ecological integrity of many plant communities. Buildling the capacity to conduct prescribed burns and providing infrastructure for grazing should be a consideration. To do this more training should be available to conduct prescribed burns. Initiatives that support cultural burning by tribes can built capacity around the state, this may include allowing Tribes to burn on state land or other areas that may not have the capacity to burn. Additional resources are also needed to support conservation grazing. Managing landscapes with grazing, or at least mimicking grazing is critical to maximizing biological diversity. The removal of biomass through prescribed fire and conservation grazing can be valuable to prevent the eutrophication of ecosystems. Many ecosystems that do not expereince biomass harevst tend can become eutrophic and suceptable to being domianted by nitrophilic species which can often been invasive plant species.
20. **Manage Invasive Species (displaced plants) Across the Land and Water-** Invasive species are ones that can become overabundant and negatively impact ecosystems by discouraging the mutual thriving of species, eliminating important food and nesting resources, causing erosion, spreading plant diseases, and more (Wakan Tipi 2024) are effective at dispersal, giving them an advantage in adapting to climate change. Learn which species to be on the lookout for and what to do if you find them by visiting the DNR invasive species page. Removing invasive species goes hand in hand with revitalizing the ecosystem and helping diversity thrive. Plan to work in partnerships, prioritize species and manage invasive plants across landscapes.
21. **Practice Adaptive Management -** Adjust management practices based on monitoring efforts, research, and experience with successes and failures to improve the function and resiliency of plant communities. It is often beneficial to combine practices such as

water level management, prescribed burning, prescribed grazing, mowing and haying to replicate natural disturbances and promote diversity, function and resiliency.

22. **Learn from Project Experience** – Be patient! Building landscape resiliency and diversity takes time. Information about project successes, innovative practices, and traditional ecological knowledge story sharing is valuable. What practices provide the most benefits in our landscapes? What common activities are not worth the cost, or make a problem worse? BWSR's "What's Working" web page collects and shares practitioner experience about real-world outcomes.

Brown-belted bumblebee
Image: Dan Shaw