



MN Wetland Professional Certification Program Wetland Plant ID




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2023 MWPCP Schedule

- WCA Regulatory Training- St Cloud MNDOT Training Facility- April 20
- Regional Training: Rochester - May 16-17
- Wetland Delineation and Regulation Basic Class: Arden Hills- June 12-16
- Floristic Quality Assessment (FQA)- MNDOT Shoreview Training Center – June 20
- Basic Wetland Plant ID- Farmington (July 18) or Brainerd (July 20)
- Wetland Delineation Refresher- Prairie Woods ELC- Spicer- August 8
- Regional Training: Fergus Falls – August 15-16
- Wetland Delineation and Regulation Basic Class: Brainerd - September 11-15



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End of the current renewal period

- Current certification renewal period ends on December 31, 2023 for all who transferred to the MWPCP from the U of MN Wetland Delineation Certification Program.
- Credit reporting deadline for this renewal period is January 1, 2024.
- Submit the [Credit Hour Reporting Form](#) with proof of attendance no later than January 1, 2024.
- Not required to submit a credit hour reporting form for MWPCP courses.
- COVID-related [temporary continuing education policies](#) will lapse at the end of 2023.



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Next renewal period

- The next credit renewal period begins January 1, 2024 and ends on December 31, 2026.
- [MWPCP Continuing Education policy](#) requires 18 credit hours of MWPCP-approved training.
- Six of those may be online training.



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MWPCP Wetland Plant ID Agenda

Morning:

- Plant ID concepts
- Plant Communities
- How to get plant lists
- Regulatory implications of wetland communities
- Common species: forbs
- Lunch

Afternoon:

- Common species: grasses, sedges, rushes
- Common species: trees and shrubs
- Group Field Exercise
- Group discussion & recap

[Class Portal: https://bwsr.state.mn.us/node/4681](https://bwsr.state.mn.us/node/4681)




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The Plant ID Process

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Identification Steps

-  Office Review
-  Site Analysis
-  Species Identification

7

Office Review



8

Office Review

Determining what equipment to bring along



9

Office Review

Species Lists



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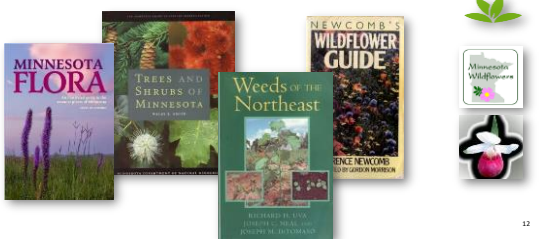
Office Review



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Office Review

Determining What Plant ID Resources to Bring Along



12

Office Review

Range Information / Maps / Atlases

Minnesota Wildflowers
http://www.bonap.org/

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Site Analysis



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Site Analysis

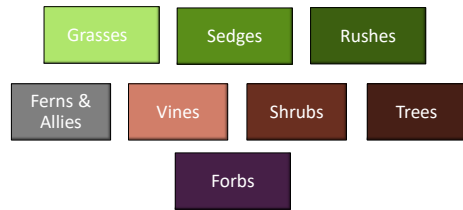
Time of Year – September

Soil – loamy, slightly rocky/gravelly

Habitat – disturbed woodland with sparse canopy

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Species Identification



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Plant Characteristics and Identification Learning Module

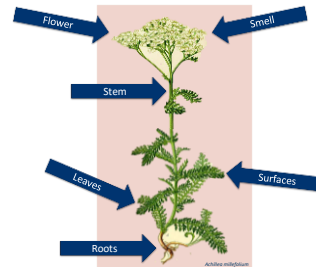
Click here to **Start!**

Developed by the Minnesota Board of Water and Soil Resources
May 2017

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Plant Characteristics are the defining features of a plant that can help identify the specific species.

Select a plant part to learn more!



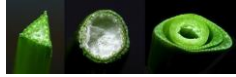
References
Back to Start

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Stem Shape

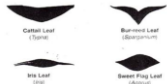
More stem shapes

Stem shape can be distinctive between plants. For example, Sweet-Flag (*Acrostichum americanus*) has a distinct oval shape with flattened sides. In early summer it can easily be mistaken for Cattail or Blue-Flag Iris.



The above stems are Sedge, Bulrush, and Grass stems. In general:

"Sedges have edges. And rushes are round. Grasses are hollow right up from the ground."



Back to Stems

Back to all Plant Characteristics

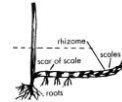
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Stems

Rhizome is a horizontal underground stem that puts out lateral shoots and roots (adventitious roots).
Example: Kentucky Blue Grass (*Poa pratensis*) and Reed Canary Grass (*Phalaris arundinacea*)



Kentucky Blue Grass (*Poa pratensis*) rhizome



Stolon is an above ground, creeping horizontal stem or runner that takes root and can put out lateral shoots to form new plants.
Example: Wild Strawberry (*Fragaria virginiana*)



Back to Stems

Back to all Plant Characteristics

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Leaves

Leaves are the site where plants make their food through a process called Photosynthesis. Leaves are very unique between plant species and can be one of the most important characteristics to identifying a plant. Leaves, themselves, have many defining characteristics. Select the characteristic below to learn more.



Acer macrophyllum



Quercus prinus

- Type
- Attachment
- Description of Attachment
- Shape
- Margins
- Venation

Back to all Plant Characteristics

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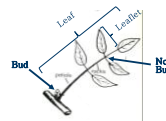
Leaf Type

There are two types of leaves: Simple and Compound.

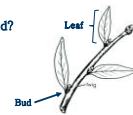


Compound leaf is a leaf consisting of several leaflets joined to a single stem.
Example: Ash tree

Simple leaf is a leaf that is joined to a single stem.
Example: River Birch



Ask yourself:
• Where is the bud?



Back to Leaves

Back to all Plant Characteristics

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Leaf Attachment

Leaf Attachment is the pattern by which leaves are attached to a stem. There are four types of leaf attachment: Alternate, Opposite, Whorled, and Basal.



Alternate: leaves are attached to the stem in an alternating pattern



Opposite: 2 leaves opposite each other at the same point



Whorled: 3 or more leaves attached at the same point around the stem



Basal: leaves at the base of the plant

Back to Leaves

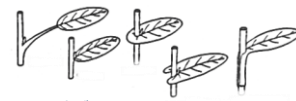
Back to all Plant Characteristics

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Description of Attachment



Perfoliate leaves of Eupatorium perfoliatum



Clasping leaves of Symphyotrichum novae-angliae

Petiolate: When there is a petiole that attaches the leaf to the stem

Sessile: When the leaf attaches directly to the stem

Perfoliate: When the leaf goes around the stem

Clasping: When the leaf clasps the stem but doesn't go all the way around the stem

Sheathing: When the leaf continues down the stem

Back to Leaves

Back to all Plant Characteristics

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Leaf Margins

More Leaf Margins

Leaf Margin is the structure of the leaf edge. The most common margins are below. Select the button to learn more types.



Entire: even, smooth throughout



Toothed: with fine serrations



Doubly Toothed: Toothed with sub-teeth



Lobed: Indented but not to the midline



Wavy: Widely wavy

Back to Leaves

Back to all Plant Characteristics

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Flower Shape



Regular: Flowers are symmetrical like the spokes on a bike wheel



Bell: The petals are fused together to form a bell shape



Indistinguishable: Cannot tell the number of petals or the male and female parts

Irregular: Flowers are not symmetrical. They usually have upper and lower lips



Tubular: Petals are fused together to form a tube

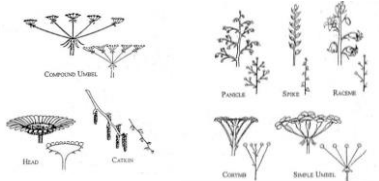


Back to Flowers

Back to all Plant Characteristics

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Cluster Shape



Back to Flowers

Back to all Plant Characteristics

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Fruit and Seeds



Corn cob (fruit)



Fruit is the ripened ovary. They can be very distinct, but not present during parts of the year. The time of fruit ripening can also give clues as to the species.



Corn cob (fruit)

Back to Flowers

Back to all Plant Characteristics

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Smell

Smells can be very distinctive. The crushed leaves or seed heads can have smells. Some examples include Sweet flag, the Mint family, and Swamp Milkweed



Sweet Flag smells like sweet lemon



Bee Balm smells like sweet mint



Swamp Milkweed smells like bubblegum



Virginia Mountain Mint smells minty

Back to all Plant Characteristics

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Surfaces

The Surfaces can be soft, rough, prickly, or hairy. There are some distinctions between species that depend on the feel of the stem or leaves. Not only can the stem and leaves have different textures but also the seeds.



Stem of Bidens coccinea



The leaves and stems of this plant are rough and hairy



Stem of Staghorn Sumac has soft hairs



Base of an Aster with glandular hairs

Back to all Plant Characteristics

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Wetland Community Mapping and Plant Lists





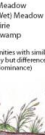




Kelly Voigt | Regional Training Conservatorist

Technical Training and Certification Program

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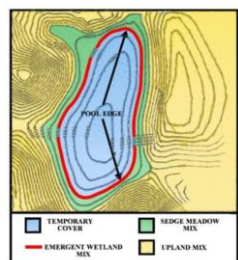
Plant Community Planting Recommendations

Upland Prairie	Sedge Meadow Fresh (Wet) Meadow Wet Prairie Shrub Swamp	Shallow Marsh	Deep Marsh	Shallow, Open Water
				
<p>Communities with similar hydrology (or differences in species dominance)</p> <p>Soils are often wetter and have higher water tables.</p> <p>Plants are often selected to tolerate standing water.</p>	<p>Soils are often wetter and have higher water tables.</p> <p>Plants are often selected to tolerate standing water.</p> <p>Plants are often selected to tolerate standing water.</p>	<p>Soils are often wetter and have higher water tables.</p> <p>Plants are often selected to tolerate standing water.</p> <p>Plants are often selected to tolerate standing water.</p>	<p>Soils are often wetter and have higher water tables.</p> <p>Plants are often selected to tolerate standing water.</p> <p>Plants are often selected to tolerate standing water.</p>	<p>Soils are often wetter and have higher water tables.</p> <p>Plants are often selected to tolerate standing water.</p> <p>Plants are often selected to tolerate standing water.</p>

Community type by landscape position

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Plan view - elevations




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Plant Community identification

- Ecological Site Descriptions
- Native Plant Communities

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Ecological Site Descriptions



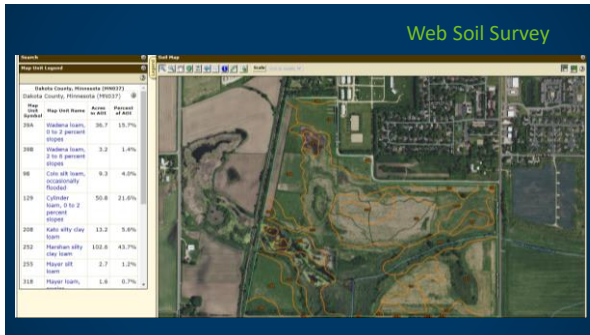
More info on Ecological Site Descriptions:
<https://www.nrcs.usda.gov/getting-assistance/technical-assistance/ecological-sciences/ecological-site-descriptions>

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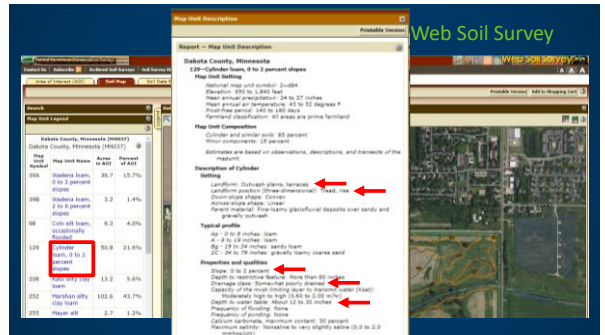


Gateway to Ecological Site Descriptions spatial data

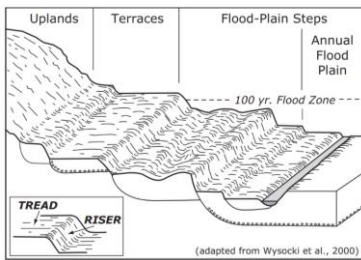
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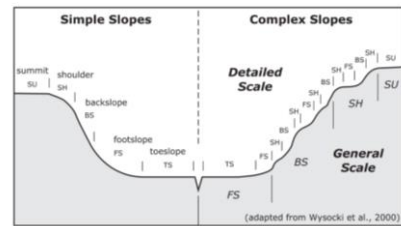
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Link to: [UC Davis Soil Data Explorer](#)

Landform Position Descriptions near streams/ivers

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Hillslope Positions

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Official Series Description
CYLINDER SERIES

Link to: [Official Soil Series Descriptions name search](#)

The Cylinder series consists of very deep, somewhat poorly drained soils on stream terraces and outwash plains. These soils formed in 24 to 40 inches of loamy alluvium overlying sand and gravel outwash. Slope ranges from 0 to 5 percent. Mean annual air temperature is about 8 degrees C (47 degrees F). Mean annual precipitation is about 710 millimeters (28 inches).

GEOGRAPHICALLY ASSOCIATED SOILS:

- Biscay--occur on slightly lower landscape positions and are saturated in the upper 30 centimeters (12 inches) of the series control section.
- Estherville--typically occur on slightly higher, more sloping terrain, do not have saturation in the series control section, and average less than 15 percent clay in the particle-size control section.
- Linder--occupy similar landscape positions but average less than 18 percent clay in the particle-size control section.
- Wadena--occur on slightly higher landscape positions and do not have saturation within the series control section.

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Ecological Site Descriptions



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Hydrology

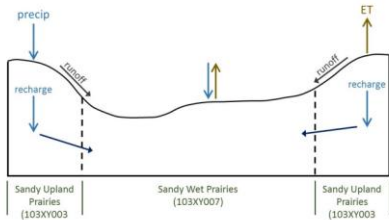


Figure 3. Hydrologic representation of a typical Des Moines Lobe (MLRA 103) Sandy Wet Prairie and associated Provisional Ecological Sites.

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Ecological Site Descriptions

groups, both totaling roughly half of a typical site, respectively. For the grasses, big bluestem and Indiangrass are the most abundant. Prairie cord grass and switchgrass (*Panicum virgatum*) are important indicators of wet prairies and can sometimes be abundant. Mid-height bunchgrasses typical of drier prairies are also present and add structural diversity, such as little bluestem (*Schizachyrium scoparium*) and prairie dropseed (*Sporobolus heterolepis*). Sedges are an important component as well, and dozens of species of *Carex* are possible. However, a few species deserve specific mention. Bicknell's sedge is the most common, especially in drier conditions. Woolly sedge, Buxbaum's sedge, and rigid sedge (*Carex tetanica*) also are common. And in wetter conditions, tussock-forming species like Hayden's sedge (*Carex haydenii*) and upright sedge (*Carex stricta*) can be present. The most abundant forbs include northern bedstraw (*Galium boreale*), Virginia mountainmint (*Pycnanthemum virginianum*), Canada anemone (*Anemone canadensis*), golden zizia (*Zizia aurea*), downy phlox (*Phlox pilosa*), and Canada goldenrod (*Solidago canadensis*). In addition, a diverse assortment of charismatic prairie forbs are common to the site. Prairie blazing star is the iconic showy forb of Loamy Wet Prairies (Eggers and

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Ecological Site Descriptions

Select a state for documents.

State:

Document Type: Document Search Recently Changed

103
Documents (1 - 25)

Document Title	Type	Pub Date	Subject	Keywords
103ES Legend		2019 2:23		

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103ES Legend

ES	ES_NAME - Number	STM Type	Soils NVC	Concept
103ES	Sandy Wet Prairies - 1033XY007003	wet prairie	8AP2A/8P23	Moderate, Wet to wet-mesic prairie. Fairly drained Endosolochs with sandy or loamy bony textures, derived from outwash parent materials, including heavy-mottled subsoils. These sites are not peated, and are located on flat and slight depressions, primarily on outwash plains and valley floors along modern river valleys. Bluffs, Garfur, Granby, Hanska, Lemon, Mayer, and Talcott are the dominant soil series. HGM criteria: recharge, Mineral Soil Fat.

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Ecological Site Descriptions



- **Benefits**
 - Will be tied to every soil map unit in the state and full state coverage, ease of identifying via WSS
 - Best fit matches to DNR Native Plant Communities are being made
- **Limitations**
 - Not fully developed, work in progress

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Plant lists

- Ecological Site Descriptions
- **Native Plant Communities**

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Native Plant Communities

Minnesota uses a hierarchical, nested ecological land classification system.

Provinces: defined by major climatic zones, native vegetation and biomes

4 provinces

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Side by side

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Native Plant Communities

Sections: defined by glacial deposits, elevation, plant distribution and regional climate.

10 sections

Section Names

- LAP - Late Agrarian Aspen Parklands
- MIM - Minnesota & Wisconsin Mesic
- MOP - N. Minnesota & Ontario Postglacial
- MDL - N. Minnesota Ditch & Lake Plains
- NSU - Northern Superior Uplands
- CGP - North-Central Glaciated Plains
- RRV - Red River Valley
- SSU - Southern Superior Uplands
- WSU - Western Superior Uplands
- PPL - Prairie Parkland

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Native Plant Communities

Subsections: defined by glacial deposits and features, surface bedrock, local climate, topography, distribution of plants

26 Subsections

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Native Plant Communities

Example: UPs14a1

Land Type Associations: defined using glacial deposits and features, bedrock types, topographic roughness, lake and stream distributions, wetland patterns, depth to groundwater, soil parent material, and pre-European settlement vegetation (291 in MN).

Upland Prairie System

- UP12 Northern Dry Prairie
- UP13 Northern Dry Savanna
- UP23 Northern Mesic Prairie
- UP24 Northern Mesic Savanna
- UP13 Southern Dry Prairie
- UP14 Southern Dry Savanna
- UP23 Southern Mesic Prairie
- UP24 Southern Mesic Savanna

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Native Plant Community

Wet Prairie (Southern)

Wet prairies on mineral soil formed in glacial depressions where drainage is impeded but flo rooting zone for most of growing season. Dor switchgrass, bluejoint, and woolly sedge. Oth Sartwell's sedge, Buxbaum's sedge, rigid sedge, marion munty grass, and wark green ourush.

Typical forbs include great blazing star, grass-leaved goldenrod, closed gentian, swamp milkweed, spotted water hemlock, autumn sneezeweed, giant sunflower, prairie loosestrife, New England aster, and great lobelia. Shrubs cover 30% or less of the area and commonly include pussy willow, Bebb's willow, slender willow, and red-osier dogwood.

Plant Community Planting Recommendations				
Wetland Prairie	Sedge Meadow Rough Blunt Meadow Red Prairie Shrub Savanna	Wetland Marsh	Clay Marsh	Shallow Open Water

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Native Plant Community Resources

System Summaries & NPC Factsheets

- Upland Forests and Woodlands
- Wetland Forests
- Upland Grasslands, Shrublands, and Sparse Vegetation
- Wetland Grasslands, Shrublands, and Marshes

<https://www.dnr.state.mn.us/npc/index.html>

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Native Plant Community Resources

System Summaries & NPC Factsheets

- Upland Forests and Woodlands
- Wetland Forests
- Upland Grasslands, Shrublands, and Sparse Vegetation
- Wetland Grasslands, Shrublands, and Marshes

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Wetland Grassland, Shrublands and Marshes

Wet Meadow/Carr System Summaries --

Class Fact Sheets

- [WMn82 Northern Wet Meadow/Carr](#) PDF
- [WMs83 Southern Seepage Meadow/Carr](#) PDF
- [WMs92 Southern Basin Wet Meadow/Carr](#) PDF
- [WMp73 Prairie Wet Meadow/Carr](#) PDF

Figure WM-1. Floristic Regions of the Wet Meadow/Carr System

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Wetland Grassland, Shrublands and Marshes

Wet Meadow/Carr System Summaries --

Class Fact Sheets

- [WMn82 Northern Wet Meadow/Carr](#) PDF
- [WMs83 Southern Seepage Meadow/Carr](#) PDF
- [WMs92 Southern Basin Wet Meadow/Carr](#) PDF
- [WMp73 Prairie Wet Meadow/Carr](#) PDF

7,8,9 = increasing wetness

Plant Community Planting Recommendations

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Wetland Grassland, Shrublands and Marshes

Wet Meadow/Carr System Summaries --

Marsh System Summaries --

Class Fact Sheets

- [MRn83 Northern Mixed Cattail Marsh](#) PDF
- [MRn93 Northern Bulrush-Spikerush Marsh](#) PDF
- [MRu94 Lake Superior Coastal Marsh](#) PDF
- [MRp83 Prairie Mixed Cattail Marsh](#) PDF
- [MRp93 Prairie Bulrush-Arrowhead Marsh](#) PDF

8,9 = most wet on scale of 1-9

Plant Community Planting Recommendations

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Wetland Grassland, Shrublands and Marshes

Wet Meadow/Carr System Summaries --

Marsh System Summaries --

Wetland Prairie System Summaries --

Class Fact Sheets

- [WPn53 Northern Wet Prairie](#) PDF
- [WPs54 Southern Wet Prairie](#) PDF

Plant Community Planting Recommendations

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[LINK](#)



[LINK](#)



[LINK](#)

Wetland Restoration Guidance:

- Minnesota Wetland Restoration Guide
- Technical Guidance Documents
- MN Wetland Restoration Plant ID Guide (pdf)

Other resources

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Seed mix information

Title: Label: Category: Any...

Approved: Wetland Wetland: Any... [Apply](#) [Reset](#)

Wetlands Seed Mix Information Download Links	Label	Seed mix category	Seed mix purpose	Seed mix region	Info Sheet Download Links
Seed Mix 01	01-02	Current State Seed Mix	Wetland	Statewide	Microsoft Word (.PDF)
Wet Mix 02	02-02	Current State Seed Mix	Wetland	Northeast	Microsoft Word (.PDF)
Wet Mix 03	03-02	Current State Seed Mix	Wetland	South & West	Microsoft Word (.PDF)
Wetland Sandbars Mix 04	04-02	Current State Seed Mix	Wetland	Statewide	Microsoft Word (.PDF)
Wetland South & West	04-03	Current State Seed Mix	Wetland	South & West	Microsoft Word (.PDF)
Wetland Northeast	04-04	Current State Seed Mix	Wetland	Statewide	Microsoft Word (.PDF)
Wetland NE	04-05	Current State Seed Mix	Wetland	Northeast	Microsoft Word (.PDF)
Wet Prairie	04-06	Current State Seed Mix	Wetland	South & West	Microsoft Word (.PDF)
Emergent Wetland	04-07	Current State Seed Mix	Wetland	Statewide	Microsoft Word (.PDF)
Wetland South and West	04-08	Current State Seed Mix	Wetland	South & West	Microsoft Word (.PDF)
Wetland South and West B&W Project	04-09	Plant Seed Mix	Wetland	South & West	Microsoft Word (.PDF)
Emergent Wetland B&W Project	04-10	Plant Seed Mix	Wetland	Statewide	Microsoft Word (.PDF)

[LINK](#)



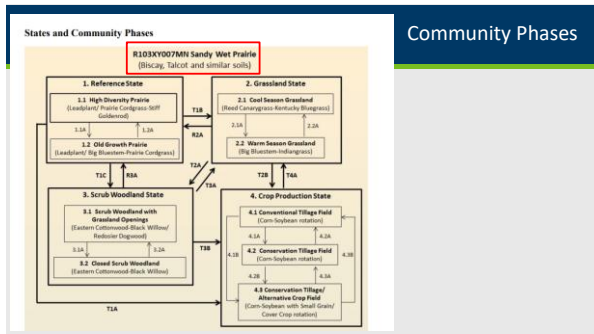
Wetland Mixes

Northeast

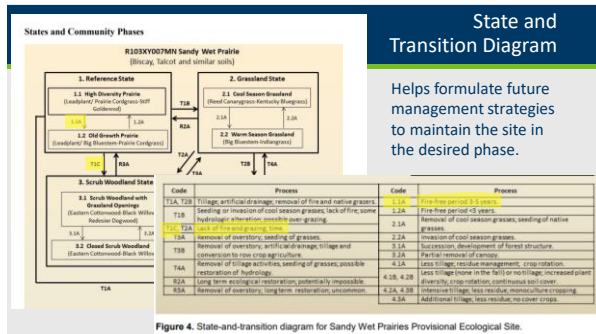
South & West

Seed mixes

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Contact info:

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Technical Training and Certification Program

Kelly.Voigt@state.mn.us


218-850-0208

Thank you!

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Regulatory Implications of wetland plant communities

- Classified per Eggers & Reed and Circular 39
- Classification relates to plant community
- Many exemptions are based on wetland type
- Regulations more restrictive for certain wetland types
- Scope of WCA for calcareous fens
- Actions Eligible for Mitigation Credit

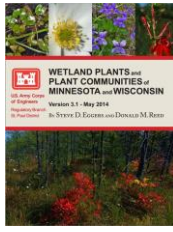


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When wetland type is a factor in WCA:

- Definition of Impact
- Exemptions:
 - Agricultural Activities
 - Drainage
 - De minimis
 - Wildlife Habitat
- Wetland Banking
 - Credit Areas
 - Performance standards
- Also could come into play:
 - Special considerations
 - Water planning
 - Local Ordinances

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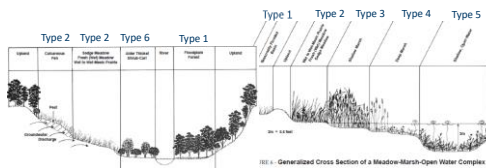


Circular 39	Eggers & Reed
1	Seasonally Flooded Basins
1	Floodplain Forests
2	Sedge Meadows
2	Fresh (wet) Meadows
2	Wet to Wet-Mesic Prairies
2	Calcareous Fens
3	Shallow Marsh
4	Deep Marsh
5	Shallow, Open Water
6	Shrub-Carr
6	Alder Thicket
7	Hardwood Swamp
7	Coniferous Swamp
8	Open Bog
8	Coniferous Bog



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Eggers & Reed & WCA



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Circular 39	Eggers & Reed	Regulatory Implications
1	Seasonally Flooded Basin	Eligible for Ag exemption A & B*
1	Floodplain Forest	Eligible for drainage exemption C2*
2	Fresh wet meadow	Not eligible for Ag exemption B. Restoration/protection an action eligible for credit (ENRV)*
2	Sedge meadow	Eligible for drainage exemption C2*
2	Wet/wet-mesic prairie	Eligible for drainage exemption C2*
2	Calcareous Fens	Outside scope of WCA. No exemptions apply. Restoration/protection an action eligible for credit (ENRV)*
3	Shallow marsh	Excavation regulated. Reduced de minimis. Not eligible for public drainage exemption. Limits to habitat exemption projects.
4	Deep marsh	Excavation regulated. Reduced de minimis. Limits to habitat exemption projects. Not eligible for public drainage exemption.
5	Shallow, open water	Excavation regulated. Reduced de minimis. Limits to habitat exemption projects. Not eligible for public drainage exemption.
6	Shrub-Carr/Alder Thicket	Eligible for drainage exemption C2*
7	Hardwood/Coniferous Swamp	Reduced de minimis. Restoration/protection of white cedar swamp an action eligible for credit (ENRV)*
8	Open/coniferous bog	Reduced de minimis.

*conditions required

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What is regulated by WCA?

What is considered Impact?

A loss in quantity, quality, or biological diversity of a wetland **caused** by draining or filling in all types or by excavation in types 3, 4, or 5.



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Calcareous Fens- Type 2



Outside of scope of WCA. DNR Jurisdiction. No exemptions apply.

- Hydrology: upwelling groundwater discharge continuously saturates organic soils, Specific soil and water chemistry (CaCo)
- Vegetation: Rarest wetland type in MN. Supports disproportionate number of T & E species: sterile sedge, beaked spikerush, hardstem bulrush, Grass of Parnassus, Kalm's lobelia, white lady-slipper, Riddell's goldenrod

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Agricultural Activities Exemption

8420.0420 Subp 2

(A) Type 1,2 Planted 6 of 10 prior to 1991

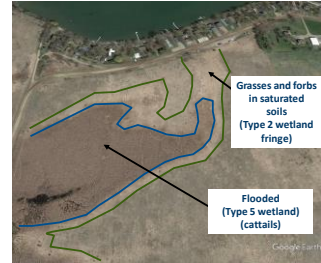
(B) Agricultural pasture land, except bottomland hardwood type 1



85

Wetland Impacts - Excavation

- **Regulated** - Excavation in permanently and semi-permanently flooded areas of Type 3, 4 or 5 wetlands
- **Not Regulated** – All other wetland types (unless excavation is too deep or spoil is put in wetland)
- Tip: *BWSR WCA Topic of the Week – Excavation in Wetlands*



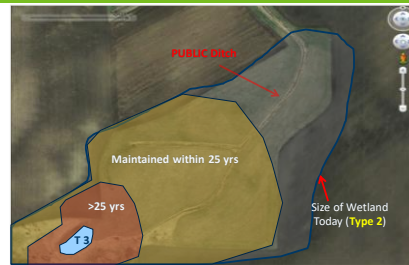
86

Private Drainage/Ditch Maintenance Illustration



87

Private VS. Public Drainage Ditch Maintenance Illustration



88

Wetland Type for de minimis

Circular 39 Classification system
- Based on hydrology and vegetation

Two groups of wetland types for de minimis:

- Types 1,2,6&7
- Types 3,4,5&8

Table 1: Base de minimis exemption amounts for all of Minnesota

Wetland Type	Exemption Amount
Types 1, 2, 4, 6, 7 (excluding white cedar and tamarack wetland and any Type 7 wetland in a 50% water source)	100,000 sq ft in all 50% counties
Types 1, 2, 4, 6, 7 (excluding white cedar and tamarack wetland and any Type 7 wetland in a 50% water source)	5,000 sq ft in non-major 50-80% counties
Types 1, 2, 4, 6, 7 (excluding white cedar and tamarack wetland and any Type 7 wetland in a 50% water source)	2,000 sq ft in non-major 80-90% counties
Types 1, 2, 4, 6, 7 (excluding white cedar and tamarack wetland and any Type 7 wetland in a 50% water source)	1,000 sq ft in major > 50% counties
Types 3, 4, 5, 8, and white cedar and tamarack wetland (excluding any Type 7 wetland in a 50% water source)	500 sq ft
Types 1, 2, 4, 6, 7	400 sq ft * (1,000 sq ft)
Types 3, 4, 5, 8, and white cedar and tamarack wetland	100 sq ft
All wetland types	20 sq ft * (100 sq ft)

*Threshold amounts shown in parenthesis may be allowed if wetland is isolated from the public water or if government water control restriction or infiltration measures are established in proximity to the impact and approved by the stewardship management authority.

89

What is a tamarack or white cedar wetland?

- Either of species is a dominant species using the dominance test (50/20 Rule)
- If no delineation has been conducted, TEP should make findings demonstrating dominance using the 50/20 rule prior to making a de minimis determination



90

Wetland Bank Performance Standards

- Performance standard: observable or measurable physical (including hydrological), chemical and/or biological attributes that are used to determine if a compensatory mitigation project meets its objectives.

- Examples:
- Vegetation
 - "85% of the site is vegetated by planted species and/or regenerated species as per approved plan by end of 5th complete growing season."
 - Hydrology
 - "Hydrology must meet wetland definition of 1987 Corps of Engineers Manual with saturation to the surface of the soil for at least 31 days of the growing season."

Table 1: Summary of Wetland Success Criteria for Phase I

Success Criteria	Phase I		
	Wet Meadow	Wooded Swamp	Shallow Marsh
Duration			
Emerging Species	5	4	5
Hydrology			
Hydrology (depth to water table)	Surface to -12"	Surface to -12"	-18" to -12"
Hydroperiod (duration within zone)	Month duration	Month duration	Month duration
Vegetation			
Wetland Indicators (% FAC or wetter)	43/52 = 79%	40/51 = 78%	30/33 = 91%
Species Composition (Native Richness)	35/52 = 70%	30/51 = 59%	19/22 = 86%
Invasive Cover (% non-native)	2%	9%	2%
Wetland/FAC	20,225/7	20,017/4	16,419/3
Tree Coverage (trees per acre)	N/A	26.48	N/A

91

Crosswalk Table and Regulatory Implications

Circular 29	Factors & Reed	Regulatory Implications
1	Seasonally Flooded Basin	Eligible for Ag exemption A & B ¹ Eligible for drainage exemption C ²
1	Floodplain Forest	Not eligible for Ag exemption B Restoration/protection an action eligible for credit (ENRV) ⁴
2	Fresh wet meadow	Eligible for drainage exemption C ²
2	Sedge meadow	Eligible for drainage exemption C ²
2	Wet/wet-mesic prairie	Eligible for drainage exemption C ²
2	Calcareous fens	Outside scope of NCA. No exemptions apply Restoration/protection an action eligible for credit (ENRV) ⁴
3	Shallow marsh	Excavation regulated ³ Reduced de minimis Not eligible for public drainage exemption Limits to habitat exemption projects
4	Deep marsh	Excavation regulated ³ Reduced de minimis Limits to habitat exemption projects Not eligible for public drainage exemption
5	Shallow, open water	Excavation regulated ³ Reduced de minimis Limits to habitat exemption projects Not eligible for public drainage exemption
6	Shrub-Carr/Alder thicket	Eligible for drainage exemption C ²
7	Hardwood/Coniferous Swamp	Reduced de minimis Restoration/protection of white cedar swamp an action eligible for credit (ENRV) ⁴
8	Open/coniferous bog	Reduced de minimis

¹ conditions required

92

FORBS: FAMILIES AND IDENTIFICATION



93

Forb definition

A forb is a broad-leaved, non-woody flowering plant with around 148 families



94

Common Families:

- Mint (Lamiaceae)
- Aster (Asteraceae)
- Vervain (Verbenaceae)
- Milkweed (Apocynaceae)
- Smartweed (Polygonaceae)
- Loosestrife (Lythraceae)
- Burreed (Sparganiaceae)
- Cattail (Typhaceae)
- Water Plantain (Alismaceae)
- Iris (Iridaceae)
- Legume (Fabaceae)
- Carrot (Apiaceae)



95

Mint Family- Lamiaceae

- 4-angled square stem typically
- Often aromatic
- Flowers in leaf axils, or heads or spikes at end of stem
- Leaves simple, opposite, sharply toothed or lobed




96

Bugleweed

Lycopus americanus

- Small 4-lobed white flowers in axils
- Similar to field mint, but not strongly scented


NCNE	MW	GP
OBL	OBL	OBL



97

Aster Family- Asteraceae

- Flowers of two types, ray and disc flowers
- Head surrounded by an involucre bract
- Fruit is an achene




Rudbeckia hirta

98

Giant Goldenrod

Solidago gigantea

- Alternate, 3-veined leaves
- Wet sites




NCNE	MW	GP
FACW	FACW	FAC

99

Canada Goldenrod

Solidago canadensis


- Stem hairy [top part esp.]
- Alternate leaves
- 3-veined
- Upland and transition areas



NCNE	MW	GP
FACU	FACU	FACU


100

Goldenrods



Disc flowers
Ray flower

stem texture 3 main veins




101

Cup-plant

Silphium perfoliatum

- Squarish stem
- Not a mint!
- Rough leaf surface



Leaves appear perforated by stem, forming a cup

NCNE	MW	GP
FACW	FACW	FAC

102

Sneezeweed

Helenium autumnale

- Yellow flowers with three teeth at the end of each ray
- Winged stem

NCNE	MW	GP
FACU	FACU	FACU

Winged Stem

Ray flower

Three teeth

103

Sawtooth Sunflower

Helianthus grosseserratus

- Stems smooth with sparse hairs
- Drooping leaves, both sides rough
- Pale leaf underside covered with short hairs

NCNE	MW	GP
FACW	FACW	FACW

Bill Sumner © USDA, NIKS PLANTS Database

104

Boneset

Eupatorium perfoliatum

- Coarsely toothed leaf
- Perfoliate
- Hairy stem

NCNE	MW	GP
FACW	OBL	FACW

Leaves joined into one

105

Vervain Family-Verbenaceae

- 4-angled square stem
- Opposite, toothed leaves
- Flowers in spikes or groups at end of stem

106

Vervain

Blue Vervain
Verbena hastata
FACW

Hoary Vervain
Verbena stricta
UPL

Fewer stouter spikes

Rounder Leaves

107

Milkweed Family-Apocynaceae

- Leaves opposite
- Milky juice in stem
- Flowers numerous in umbels at end of stem

108

Common Milkweed

Asclepias syriaca

- Wide opposite leaves
- Milky sap

NCNE	MW	GP
UPL	FACU	UPL



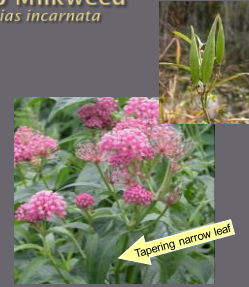
109

Swamp Milkweed

Asclepias incarnata

- Tapering narrow leaves
- Milky sap (less than other species)
- Wet sites

NCNE	MW	GP
OBL	OBL	FACW



110

Smartweed Family- Polygonaceae

- Alternate, simple leaves, Stipules joined forming a sheath (Ocrea) around stem at nodes
- Petals absent, sepals petal-like

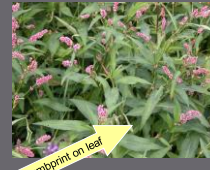


111

Smartweeds

Pennsylvania Smartweed
[*Persicaria pennsylvanicum*]
FACW

Water Smartweed
[*Persicaria amphibium*]
OBL



Both at wet sites

112

Loosestrife Family- Lythraceae

- Upper stems multi-sided, square
- Leaves opposite and stalk-less
- Flowers have 6 petals



Purple Loosestrife

Lythrum salicaria

- MN Noxious weed
- Woody square stem
- Leaves lanceolate, opposite or whorled
- Spikes of purple-red flowers

NCNE	MW	GP
OBL	OBL	OBL



113

114

Burreed Family- Sparganiaceae

- Stems erect, unbranched, round in cross section
- Leaves long and linear
- Flowers crowded in round heads with male and female flowers separate



115

Triangular leaf cross-section



116

Cattail Family- Typhaceae

- Leaves near base, in two ranks, long and strap-like
- Flowers are tiny, in large groupings, male and female portions of spike are separate
- Female flowers on bottom, male flowers on top
- Reproduce by submerged rhizome, creating mats



<http://botany.cofl.tamu.edu/ytl/CPA/gallery.htm>

117

Broadleaf Cattail *Typha latifolia*

- Broad leaves usually don't extend past spike
- Upper staminate and lower pistillate portions of the spike are continuous

NCNE	MW	GP
OBL	OBL	OBL



118

Narrowleaf and Hybrid Cattail *Typha angustifolia* and *Typha X glauca*

- Narrow Leaves extend beyond spike
- Staminate and pistillate portions of spike separate, with gap

NCNE	MW	GP
OBL	OBL	OBL



Gap in spike



119

Water Plantain Family- Alismaceae

- Stout rhizomes
- Leaves from base of plant, clasping stem
- Multi-branched inflorescence
- Flowers with 3 petals




120

Water Plantain *Alisma subcordatum*

- Leaves elliptical or egg shaped on long stalks
- White or pinkish flowers about 1/8" wide
- Found along muddy shores

NCNE	MW	GP
OBL	OBL	OBL



121

Broad Leaf Arrowhead *Sagittaria latifolia*

- Flowers grow in whorls of 3 from an un-branched stalk
- Leaf shaped like an arrow head

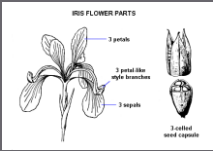

NCNE	MW	GP
OBL	OBL	OBL



122

Iris Family- Iridaceae

- Parallel veined, 2 ranked leaves
- Flowers with 6-petals





123

Harlequin Blue Flag Iris *Iris versicolor*

- Deep purple base
- Blue flower with large yellow center
- Found in the North


NCNE	MW	GP
OBL	OBL	OBL



124

Virginia Iris *Iris virginica*

- Green base
- Purple flower with small yellow center
- Found in the south

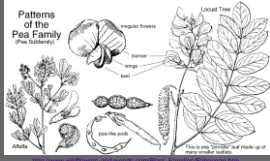


NCNE	MW	GP
OBL	OBL	OBL

125

Legume Family- Fabaceae

- Alternate leaves, pinnately divided
- Flowers irregular, 5 lobed and in racemes




126

Sweet Clover *Melilotus officinalis*

- Flowers can be yellow or white
- Leaves divided into 3 leaflets
- Non-native


NCNE	MW	GP
FACU	FACU	FACU



127

Carrot (or parsley) Family- Apiaceae

- Hollow stem
- Alternate or basal leaves, mostly compound
- Flowers in flat-topped umbels; 5 petals




128

Wild Parsnip *Pastinaca sativa*

- Contact with the plant can cause a sun-induced rash
- Compound umbel of yellow flowers
- Pinnately lobed leaves
- Tall growth habit.

NCNE	MW	GP
UPL	UPL	UPL



129

Wild Parsnip



Golden Alexanders



UGA-REC'S PLANTS Database / Britton, N.L., and A. Brown. 1913. An Illustrated Flora of the Southern United States, Central and the West. Pennsylvania: J. F. Runkle Company, Harrisburg, Pa.

UGA-REC'S PLANTS Database / Britton, N.L., and A. Brown. 1913. An Illustrated Flora of the Southern United States, Central and the West. Pennsylvania: J. F. Runkle Company, Harrisburg, Pa.

130

What family is this plant from?

- Mint (Lamiaceae)
- Aster (Asteraceae)
- Vervain (Verbenaceae)
- Milkweed (Apocynaceae)
- Smartweed (Polygonaceae)
- Loosestrife (Lythraceae)
- Burreed (Sparganiaceae)
- Cattail (Typhaceae)
- Water Plantain (Alismaceae)
- Iris (Iridaceae)
- Legume (Fabaceae)
- Carrot (Apiaceae)

131

DO NOT TOUCH!

Wild Parsnip



Poison Ivy



Water Hemlock



Poison Sumac



Nettles



132

Kentucky Bluegrass (*Poa pratensis*) **Fowl Bluegrass (*Poa palustris*)**



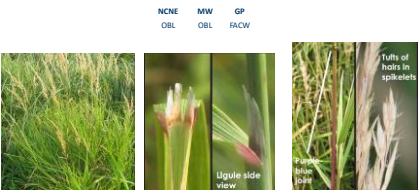
139

Redtop (*Agrostis gigantea*)



140

Canada bluejoint (*Calamagrostis canadensis*)



141

Prairie Cordgrass (*Spartina pectinata*)



142

Big bluestem (*Andropogon gerardii*)



143

Switchgrass (*Panicum virgatum*)

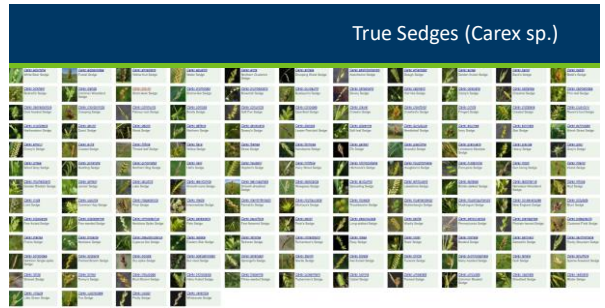


144



Sedge Family

146



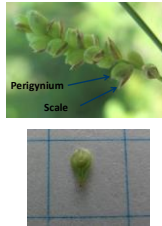
Source: Minnesota Wildflowers

147

True Sedges (Carex sp.)



- Triangular stems
- Flower heads variable
- Each achene enclosed in a sac
- Scales present



148

Common Obligate Wetland Carex

Lake Sedge
Carex lacustris



Slough Sedge
Carex atherodes



Common Beaked Sedge
Carex utriculata



149

Common Wetland Carex

Awl fruited Sedge
Carex stipata
(OBL)



Tussuck Sedge
Carex stricta
(OBL)



Fox sedge
Carex vulpinoidea



150

Carex pensylvanica (Upland)



151

Sedge Family: Flat Sedges

Yellow Nutsedge (*Cyperus esculentus*) FACW

- Perennial (not native to MN)
- Leaves light green
- Spikelets are bright yellow, perpendicular to the stem
- Each spike is 5-8 cm long



152

Sedge Family: Bulrushes

Green Bulrush
Scirpus atrovirens
(OBL)



Woolgrass
Scirpus cyperinus
(OBL)



153

Sedge Family: Bulrushes

River Bulrush
Balboschoenus fluviatilis
(OBL)



Softstem Bulrush
Schoenoplectus tabernaemontani
(OBL)



154

Sedge Family: Spikerushes



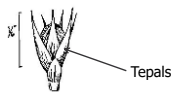
- Rounded or flattened solid/spongy stem
- Leaves reduced to sheaths
- Terminal spikelet



155



mi DEPARTMENT OF TRANSPORTATION



Rushes

156

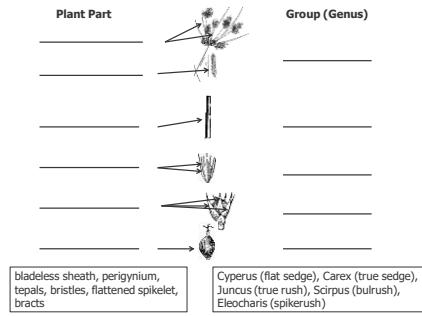
Juncus – True Rushes



- Rounded or flattened stem
- Leaves few, round or flattened
- Sheaths open, often with auricles
- Flowers with 6 tepals
- Capsules with many seeds

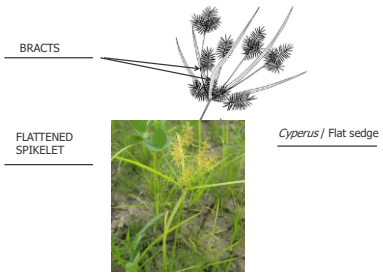
157

Review: Sedges and Rushes

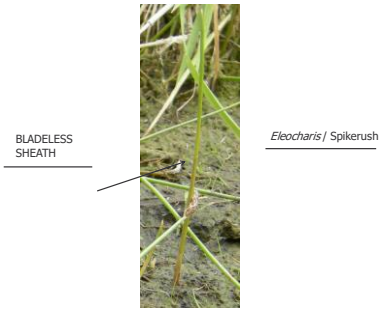


158

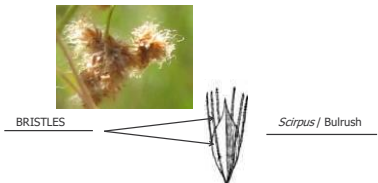
159



160



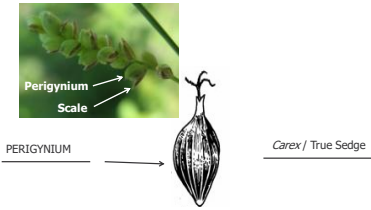
161



162



163



Thank You!

Carol Strojny
carol.strojny@state.mn.us

164

165



166

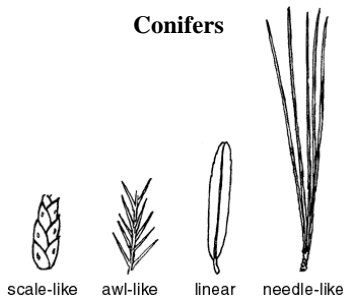
Conifers & Broadleaf

- **Conifers** – a tree that bears cones and evergreen needlelike leaves
- **Broadleaf** – a tree that bears wide flat leaves that are shed annually



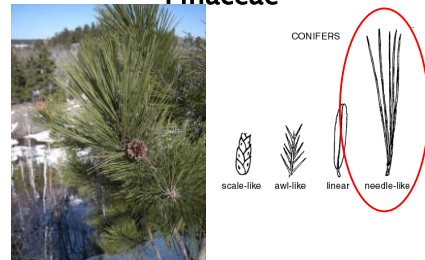
167

Conifers



168

Clustered Needles (Pines)
Pinaceae



169



Tamarack
(Larix laricina)
FACW

170

Tamarack *Larix laricina*

NCNE	MW	GP
FACW	FACW	FACW

- Deciduous
- Needles are bunched, 10-35/tuft, or singly on new shoots
- Needles 1/2 to 1"
- Male & female cones on the same tree (monoecious)
- Common to swamps and bogs



171

Eastern White Pine

Pinus strobus

NCNE	MW	GP
FACU	FACU	FACU

- 5 Needles per bunch
- Needles 2.5 to 5"
- Soft flexible needles



172

Red Pine

Pinus resinosa

NCNE	MW	GP
FACU	FACU	FACU

- 2 Needles per bunch
- Needles 4 to 7"
- Needles break cleanly when bent



173

Jack Pine *Pinus banksiana*

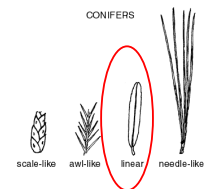
NCNE	MW	GP
FACU	FACU	FACU

- 2 needles per bunch
- Needles 1/4 to 2"
- Adapted for fire
- Serotinous cones
- Germinate best on mineral soil



174

Single Needles
(Fir, Spruce, Hemlock – still Pinaceae)





175

Balsam fir

Abies balsamea

NCNE	MW	GP
FAC	FACW	FAC

- Needles continuous along stem and branches
- Needles 3/8 to 1" and flat
- Female seed cones are purple w/ lots of resin



176

White Spruce

Picea glauca

NCNE	MW	GP
FACU	FACU	FACU

- Short blue green needles
- Needles are born singly
- 1/3 to 3/4" long
- Needles 4 sided
- Branches slightly droop

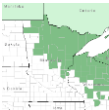




177

Black Spruce *Picea mariana*

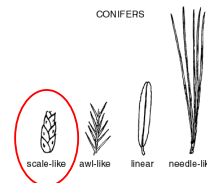
NCNE	MW	GP
FACW	FACW	FACW

- Branches short and drooping
- 1/4 to 1/2" long
- 4 angled or squarish in cross section
- Dark (blackish) foliage
- Small, egg shaped cones

178

Scale-like Needles (White Cedar)





179

Northern White Cedar

Thuja occidentalis

NCNE	MW	GP
FACW	FACW	FACW

- Spicy fragrance when crushed
- Leaves scalelike
- 1/10 (or less) to 1/4" long
- Bright green through the first winter then turn brown and woody and persist for several years.

180



<https://bwsr.state.mn.us/featured-plant-archive>

181

Eastern Red Cedar

Juniperus virginiana

NCNE	MW	GP
FACU	FACU	UPL

- 2 types of leaves, juvenile & mature
- Early season foliage: green
Late summer/winter: dark bronzy red



182

Broadleaf Trees



183

OPPOSITE BRANCHING



184

Maple (Aceraceae)



Red maple
(*Acer rubrum*)



NCNE	MW	GP
FAC	FAC	FAC



Sugar maple
(*Acer sacharum*)



NCNE	MW	GP
FACU	FACU	UPL



Silver maple
(*Acer sacharinum*)



NCNE	MW	GP
FACW	FACW	FAC

185

Box Elder (Maple)

Acer negundo

NCNE	MW	GP
FAC	FAC	FAC

Acer negundo 3 leaves from the same tree




186

Ash (Oleaceae)





187



Black Ash
(Fraxinus nigra)


NCNE	MW	GP
FACW	FACW	FACW






Green Ash
(Fraxinus pennsylvanica)

NCNE	MW	GP
FACW	FACW	FAC




188




White ash
Fraxinus americana

Stalk (petiolules) on leaflets
Long-5-10 mm



Black ash
Fraxinus nigra

None



Green ash
Fraxinus pennsylvanica

Short-1-4mm

189

Dogwoods (Cornaceae)



190


Red-osier dogwood

Cornus sericea

NCNE	MW	GP
FACW	FACW	FACW









191

Gray Dogwood

Cornus racemosa

NCNE	MW	GP
FAC	FAC	FAC

- Dull, gray twigs (brown first year)
- Opposite leaves
- White/pale blue berries on bright red pedicels



192

Silky Dogwood

Cornus amomum
Aka *Cornus obliqua*

NCNE	MW	GP
FACW	FACW	FACW

- Magenta twigs
- Opposite leaves
- Dark blue berries



193

Dogwoods

Left: **Red-Osier Dogwood** – bright red twigs, white pith, white berries
 Middle: **Gray Dogwood** – gray twigs, brown pith, white berries
 Right: **Silky Dogwood** – magenta twigs, brown pith, dark blue berries



194

Viburnum (Moschatel)



195

Nannyberry

Viburnum lentago

NCNE	MW	GP
FAC	FAC	FACU



196

Highbush Cranberry

Viburnum opulus

NCNE	MW	GP
FACW	FAC	FAC



197

ALTERNATE BRANCHING



Birches (Betulaceae)







198

199

Yellow Birch

(Betula alleghaniensis)

NCNE	MW	GP
FAC	FAC	FACU





© 2002, Gary Feeless

200

Paper Birch

(Betula papyrifera)

NCNE	MW	GP
FACU	FACU	FACU




© 2002, Gary Feeless

201

Bog Birch

(Betula pumila)

NCNE	MW	GP
OBL	OBL	OBL


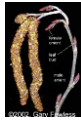


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202

Speckled Alder

(Alnus incana)


NCNE	MW	GP
FACW	FACW	FACW

© 2002, Gary Feeless


203


Oaks (Fagaceae)



N. Red Oak
(Quercus rubra)


NCNE	MW	GP
FACU	FACU	FACU






N. Pin Oak
(Q. ellipsoidalis)


NCNE	MW	GP
UPL	UPL	UPL





Bur Oak
(Q. macrocarpa)

NCNE	MW	GP
FACU	FAC	FACU







204

Elms (Ulmaceae)

American Elm

(Ulmus americana)

NCNE	MW	GP
FACW	FACW	FAC

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205

Northern Hackberry

(*Celtis occidentalis*)

NCNE	MW	GP
FAC	FAC	FACU



206

Poplars (Salicaceae)



Balsam Poplar
(*Populus balsamifera*)

NCNE	MW	GP
FACU	FACU	FACU



Bigtooth Aspen
(*P. grandidentata*)

NCNE	MW	GP
FACU	FACU	FACU



Trembling Aspen
(*P. tremuloides*)

NCNE	MW	GP
FACU	FAC	FAC



207

Cottonwood

(*Populus deltoides*)

NCNE	MW	GP
FAC	FAC	FAC

- Opposite leaves (CAP), compound
- Small, purple-black berries
- Twigs brittle due to large pith



208

Willows (Salicaceae)

(*Salix spp.*)

18 species native in Minnesota, 3 species naturalized

- Leaf width vs. length
- Upper and lower surface texture, color
- Leaf edges
- Stipules may be present



209

Gooseberries or Currants (Grossulariaceae)

(*Ribes spp.*)

9 species native in Minnesota

- Currants lack spines and bristles (1 exception), jointed stalk

- Gooseberries have spines and bristles, berry stalk not jointed



210

The Rose Family (Rosaceae)

Blackberry & Raspberry

(*Rubus spp.*)

The largest genus of woody plants in Minnesota (33 native, 2 hybrids)

- If present, prickle or bristle shape
- Leaf structure
- Cane growth pattern (both from 1st year and 2nd year canes)

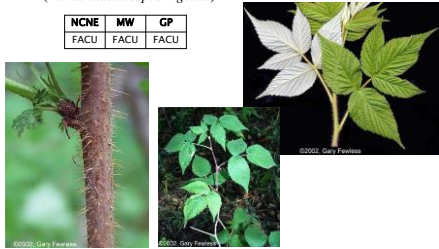


211

Red Raspberry

(*Rubus idaeus* ssp. *strigosus*)

NCNE	MW	GP
FACU	FACU	FACU



212

Steeplebush

(*Spiraea tomentosa*)

NCNE	MW	GP
FACW	FACW	FACW

- Leaves alternate
- White to orange woolly undersides



213

Meadowsweet

(*Spiraea alba*)

NCNE	MW	GP
FACW	FACW	FACW

- Alternate leaves
- Leaves not woolly



214

Buckthorn Family (Rhamnaceae)
Glossy Buckthorn

(*Frangula alnus*)

NCNE	MW	GP
FAC	FACW	FAC

- Leaf margins entire (not toothed)



215

Common Buckthorn

(*Rhamnus cathartica*)

NCNE	MW	GP
FAC	FAC	FACU

- Leaf margins with fine teeth



216

WOODY VINES

217

Grape Family (Vitaceae)

Virginia Creeper
(*Parthenocissus quinquefolia*)



NCNE	MW	GP
FACU	FACU	FACU

Woodbine
(*Parthenocissus inserta*)



NCNE	MW	GP
FACU	FACU	FAC

218

Summer Grape
(*Vitis aestivalis*)



NCNE	MW	GP
FACU	FACU	FAC



River-bank Grape
(*Vitis riparia*)



NCNE	MW	GP
FACU	FACW	FAC



219

Menispermaceae Family

Moonseed
(*Menispermum canadense*)



NCNE	MW	GP
FAC	FAC	FACU

220

Field Exercise



221