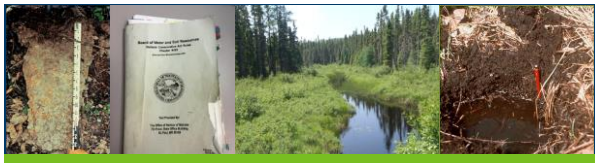


MN Wetland Professional Certification Program
Wetland Plant ID

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Professional Certification Program

1

Remaining MWPCP 2024 Courses

- Wetland Plant ID- Lino Lakes (July 16) or Cloquet Forestry Center (July 18)
- 2024 WCA Statute Changes Virtual Training- July 22
- Regional Training -Redwood Falls– August 27-28
- Introduction to Wetland Delineation & Regulations- Brainerd - September 9-13
- Introduction to Wetland Delineation &Regulations- Arden Hills- September 30-October 4
- Antecedent Precipitation Tool- St Cloud MNDOT Training Center- October 22 (2 sessions)

2

MWPCP Wetland Plant ID Agenda

- Plant ID concepts
- Common species: forbs
- Common species: grasses, sedges, rushes
- Lunch
- Common species: trees and shrubs
- Plant ID Stations
- Why this matters? -Regulatory implications of wetland plant communities
- Group Field Exercise
- Group discussion & recap

Class Portal: https://bwsr.state.mn.us/node/4681

3

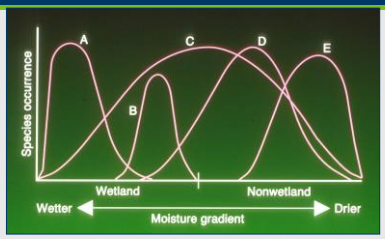
Plant Indicator Status

Wetland Indicator Status	Indicator Symbol	Definition
Obligate Wetland	OBL	Plants that almost always grow in wetlands. Estimated probability of >99% for growing in wetland.
Facultative Wetland	FACW	Plants that usually occur in wetlands. Estimated probability of 67% - 99% for growing in wetland (1%-33% in upland)
Facultative	FAC	Plants with similar likelihood of occurring in both wetland and upland. Estimated 33%-67% for growing in wetland.
Facultative Upland	FACU	Plants that sometimes grow in wetland. Estimated 1% - <33% for growing in wetland.(>67% - 99% in upland).
Obligate Upland	UPL	Plants that rarely occur in wetland. Estimated probability of <1% for growing in wetland (>99% in upland).

Hydrophytes

4

Plant Indicator Status Distributions



Indicator Status

A Obligate
FACW
C FAC
FACU
E Upland

5

The Plant ID Process

BOARD OF WATER AND SOIL RESOURCES

BWSR Academy 2018

6

Identification Steps

- Office Review
- Site Analysis
- Species Identification

7

7

Office Review

Reviewing aerial images of the site

8

8

Office Review

Determining what equipment to bring along

9

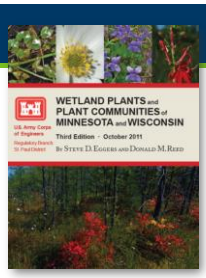
9

Office Review

Species Lists

10

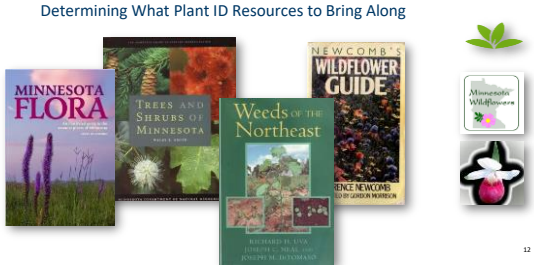
Office Review



11

Office Review

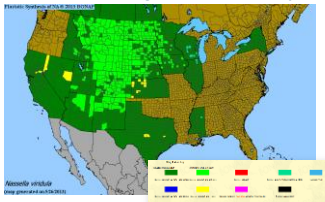
Determining What Plant ID Resources to Bring Along

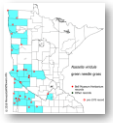


12

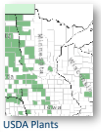
Office Review

Range Information / Maps / Atlases





MN Wildflowers



USDA Plants

http://www.bonap.org/

13

13

Site Analysis

14

14

Site Analysis

Time of Year – September

Soil – loamy, slightly rocky/gravelly

Habitat – disturbed woodland with sparse canopy

15

15

Species Identification

Grasses | Sedges | Rushes

Ferns & Allies | Vines | Shrubs | Trees

Forbs

16

16

Plant Characteristics and Identification
Learning Module

Click here to **Start!**

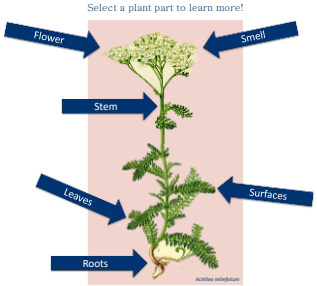
Developed by the Minnesota Board of Water and Soil Resources

May 2017

17

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

Select a plant part to learn more!



References

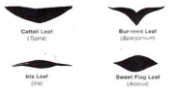
Back to Start

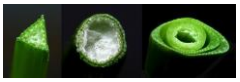
18

Stem Shape

More stem shapes

Stem shape can be distinctive between plants. For example, Sweet-Flag (*Acrous 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

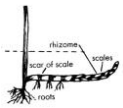
Back to all Plant Characteristics

19

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

20

Leaves

Euthamia graminifolia

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.

Onoclea sensibilis

Type | Attachment | Description of Attachment

Shape | Margins | Venation

Aster macrophyllus

Back to all Plant Characteristics

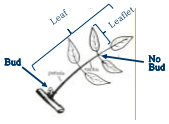
21

Leaf Type

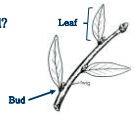
There are two types of leaves: Simple and Compound.

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

22

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

23

Description of Attachment

Perfoliate leaves of *Eupatorium perfoliatum*

Petiolate Sessile Perfoliate Clasping Sheathing

Clasping leaves of *Symphyotrichum novae-angliae*

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

Perfoliate: When the leaf goes around the stem

Sheathing: When the leaf continues down the stem

Sessile: When the leaf attaches directly to the stem

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

Back to Leaves

Back to all Plant Characteristics

24

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

25

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

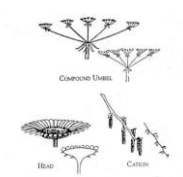
Tubular: Petals are fused together to form a tube

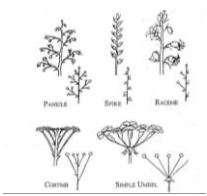
Back to Flowers

Back to all Plant Characteristics

26

Cluster Shape





Back to Flowers

Back to all Plant Characteristics

27


Cornus canadensis

Fruit and Seeds


Fragaria virginiana

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.


Cornus sibogiaperinum

Back to Flowers

Back to all Plant Characteristics

28

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

29

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 cernua*


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

30

FORBS: FAMILIES AND IDENTIFICATION

31

Forb definition

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

32

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)

33

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

34

Bugleweed
Lycopus americanus

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

NCNE	MW	GP
OBL	OBL	OBL

35

Aster Family–Asteraceae

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

36

Giant Goldenrod
Solidago gigantea

- Alternate, 3-veined leaves
- Wet sites

NCNE	MW	GP
FACW	FACW	FAC

37

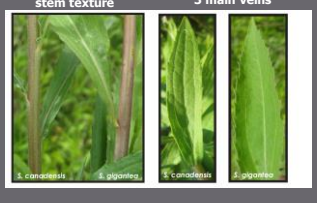
Canada Goldenrod
Solidago canadensis

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

NCNE	MW	GP
FACU	FACU	FACU

38

Goldenrods



39

Cup-plant
Silphium perfoliatum

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

NCNE	MW	GP
FACW	FACW	FAC

Leaves appear perforated by stem, forming a cup

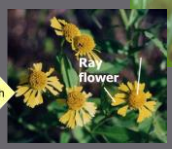
40

Sneezeweed
Helenium autumnale

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

Winged Stem

NCNE	MW	GP
FACU	FACU	FACU



Ray flower

Three teeth

41

Sawtooth Sunflower
Helianthus grosseserratus

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

Bill Summers @ USDA-NRCS PLANTS Database

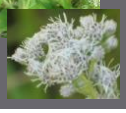
NCNE	MW	GP
FACW	FACW	FACW

42

Boneset
Eupatorium perfoliatum

- Coarsely toothed leaf
- Perfoliate
- Hairy stem

NCNE	MW	GP
FACW	OBL	FACW



43

Vervain Family- Verbenaceae

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

44

Vervain

Blue Vervain
Verbena hastata
FACW

Hoary Vervain
Verbena stricta
UPL

45

Milkweed Family- Apocynaceae

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

46

Common Milkweed
Asclepias syriaca

- Wide opposite leaves
- Milky sap

NCNE	MW	GP
UPL	FACU	UPL

47

Swamp Milkweed
Asclepias incarnata

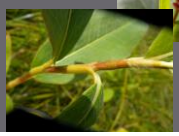
- Tapering narrow leaves
- Milky sap (less than other species)
- Wet sites

NCNE	MW	GP
OBL	OBL	FACW

48

Smartweed Family- Polygonaceae

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



49

Smartweeds

Pennsylvania Smartweed
[Persicaria pensylvanicum]
FACW

Thumbprint on leaf

Water Smartweed
[*Persicaria amphibium*]
OBL

Both at wet sites

50

Loosestrife Family- Lythraceae

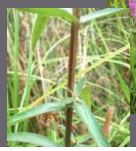
- Upper stems multi-sided, square
- Leaves opposite and stalk-less
- Flowers have 6 petals

51

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



52

Burreed Family- Sparganiaceae

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

53

Triangular leaf cross-section

Male

Female

Sparganium americannum

54

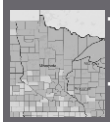
Cattail Family- *Typhaceae*

- 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.csdl.tamu.edu/FLORA/gallery.htm

55

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

56

Narrowlead 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

57

Water Plantain Family- Alismaceae

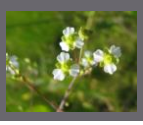
- Stout rhizomes
- Leaves from base of plant, clasping stem
- Multi-branched inflorescence
- Flowers with 3 petals

58

Water Plantain
Alisma subcordatum

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

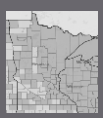
NCNE	MW	GP
OBL	OBL	OBL



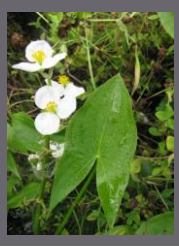
59

Broad Leaf Arrowhead
Sagittaria latifolia

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



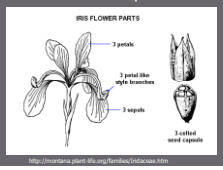
NCNE	MW	GP
OBL	OBL	OBL



60

Iris Family- Iridaceae

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



http://montana.plant-life.org/families/iridaceae.htm

61

Harlequin Blue Flag Iris

Iris versicolor

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

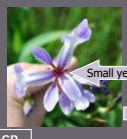
NCNE	MW	GP
OBL	OBL	OBL

62

Virginia Iris

Iris virginica

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

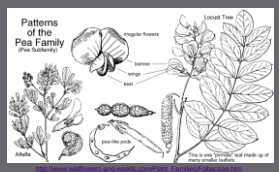


NCNE	MW	GP
OBL	OBL	OBL

63

Legume Family- Fabaceae

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



http://www.wildflowers-and-weeds.com/Plant_Families/Fabaceae.htm

64

Sweet Clover
Melitotus officinalis

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

NCNE	MW	GP
FACU	FACU	FACU

65

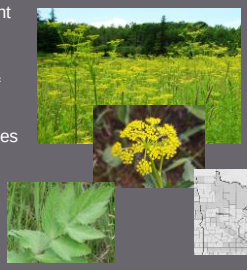
Carrot (or parsley) Family- Apiaceae

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

66

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

67

Wild Parsnip

USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions.* 3 vol. Charles Scribner's Sons, New York. Vol. 2: 637.

Golden Alexanders

USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions.* 3 vol. Charles Scribner's Sons, New York. Vol. 2: 677.

68

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)

69

70

Plant ID: Grasses-Sedges-Rushes

MWPCP BASIC PLANT ID

71

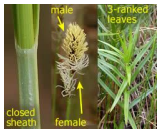
Grass like plants

72

Grass like plants

Grasses

Sedge Family



Rushes

Source: Minnesota Wildflowers
https://www.minnesotawildflowers.info/page/grasses-sedges-rushes

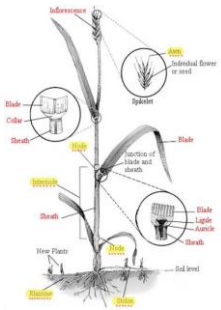
73

DEPARTMENT OF TRANSPORTATION

Grasses

74

Structure



http://www.forages.psu.edu/topics/species_variety_trials/commonpagrasses/structures.html

Panicle

Spike

Raceme

75

Bluegrasses (*Poa spp.*)

- Cool season grasses
- Narrow leaves
- Boat shaped leaf tips
- Multiple flowers per spikelet

76

Kentucky Bluegrass (*Poa pratensis*)

NCNE FACU | MW FAC | GP FACU

Fowl Bluegrass (*Poa palustris*)

NCNE FACW | MW FACW | GP FACW

77

Redtop (*Agrostis gigantea*)

NCNE FACW | MW FACW | GP FACW

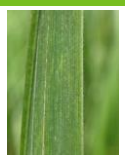
78

Canada bluejoint (*Calamagrostis canadensis*)

NCNE MW GP
OBL OBL FACW

79

Prairie Cordgrass (*Spartina pectinata*)

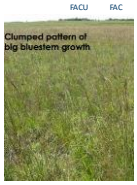


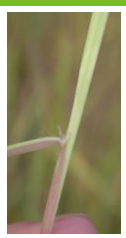
NCNE MW GP
FACW FACW FACW

80

Big bluestem (*Andropogon gerardii*)

NCNE MW GP
FACU FAC FACU





81

Switchgrass (*Panicum virgatum*)

NCNE FAC MW FAC GP FAC

82

Quack Grass (*Elymus repens*)

NCNE FACU MW FACU GP FACU

Virginia Wild Rye (*Elymus virginicus*)

NCNE FACW MW FACW GP FAC

83

DEPARTMENT OF TRANSPORTATION

Sedge Family

84

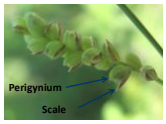
True Sedges (Carex sp.)

Source: Minnesota Wildflowers

85

True Sedges (Carex sp.)

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



86

Common Obligate Wetland Carex

Lake Sedge
Carex lacustris

Slough Sedge
Carex atherodes

Common Beaked Sedge
Carex utriculata

87

Common Wetland Carex

Awl fruited Sedge
Carex stipata
(OBL)

Tussuck Sedge
Carex stricta
(OBL)

Fox sedge
Carex vulpinoidea

NCNE	MW	GP
OBL	FACW	FACW

88

Carex pellita

Wooly sedge
Carex pellita
(OBL)

Source: Minnesota Wildflowers

89

Carex pensylvanica (Upland)

90

Sedge Family: Flat Sedges

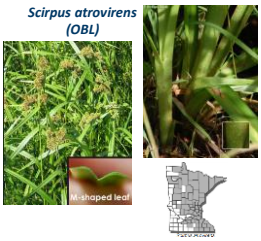
Yellow Nutsedge (*Cyperus esculentus*) FACW

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

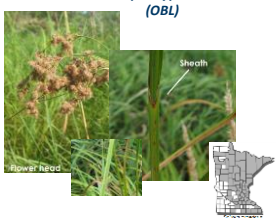
91

Sedge Family: Bulrushes

Green Bulrush
Scirpus atrovirens
(OBL)



Woolgrass
Scirpus cyperinus
(OBL)

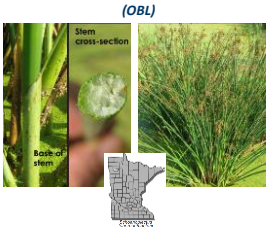


92

Sedge Family: Bulsedge and Bulrushes

River Bulrush
Bolboschoenus fluviatilis
(OBL)

Softstem Bulrush
Schoenoplectus tabernaemontani
(OBL)



93

Sedge Family: Spikerushes

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

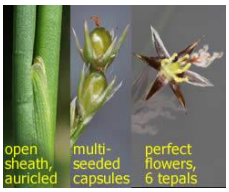
94

DEPARTMENT OF TRANSPORTATION

Rushes

95

Juncus – True Rushes



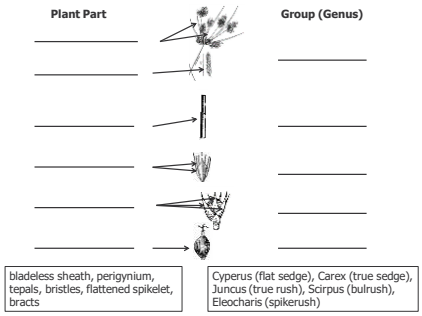
Source: Minnesota Wildflowers

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

96

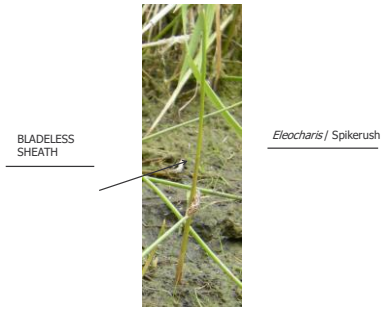
Review: Sedges and Rushes

97

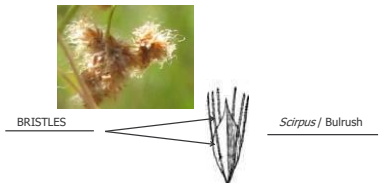


98

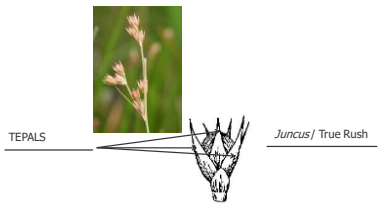
99


BLADELESS SHEATH
Eleocharis / Spikerush

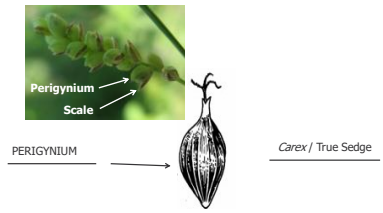
100


BRISTLES
Scirpus / Bulrush

101


TEPALS
Juncus / True Rush

102



103

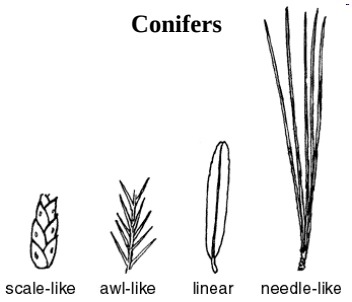
104

Conifers & Broadleaf

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

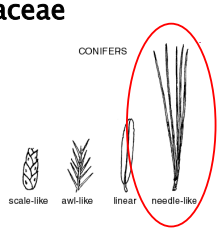
105

Conifers



106

Clustered Needles (Pines)
Pinaceae



107

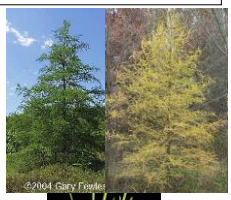
108

Tamarack

Larix laricina

NCNE	MW	GP
FACW	FACW	FACW

- Deciduous
- Needles are bunched
- Common to swamps and bogs



109

Eastern White Pine

Pinus strobus

NCNE	MW	GP
FACU	FACU	FACU

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

110

Red Pine

Pinus resinosa

NCNE	MW	GP
FACU	FACU	FACU

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

111

Jack Pine

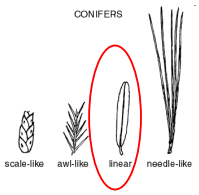
Pinus banksiana

NCNE	MW	GP
FACU	FACU	FACU

- Adapted for fire
- Serotinous cones
- Germinate best on mineral soil

112

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



113

Balsam fir

Abies balsamea

NCNE	MW	GP
FAC	FACW	FAC

- Needles continuous along stem and branches
- Needles ¾ to 1 inch and flat
- Cones are purple

114

White Spruce

Picea glauca

NCNE	MW	GP
FACU	FACU	FACU

- Short blue green needles
- Needles are born singly
- Branches slightly droop

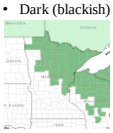
115

Black Spruce

Picea mariana

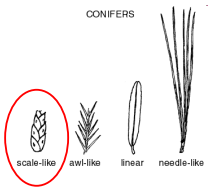
NCNE	MW	GP
FACW	FACW	FACW

- Branches short and drooping
- Needles are 4 angled with a blunt tip
- Dark (blackish) foliage



116

Scale-like Needles (White Cedar)



117

N. White Cedar

Thuja occidentalis

NCNE	MW	GP
FACW	FACW	FACW

- Spicy fragrance when crushed
- Needles turn yellow-brown in winter
- Needles are bicolored

118

Broadleaf Trees

119

OPPOSITE BRANCHING

120

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

121

Box Elder (Maple)

Acer negundo

NCNE	MW	GP
FAC	FAC	FAC

122

Ash (Oleaceae)

123

Black Ash
(*Fraxinus nigra*)

NCNE	MW	GP
FACW	FACW	FACW

Green Ash
(*Fraxinus pennsylvanica*)

NCNE	MW	GP
FACW	FACW	FAC

124

Dogwoods (Cornaceae)

125

Red-osier dogwood

Cornus alba

NCNE	MW	GP
FACW	FACW	FACW

126

Gray Dogwood

Cornus racemosa

NCNE	MW	GP
FAC	FAC	FAC

- Dull, gray twigs
- Opposite leaves
- White berries on bright red pedicels

127

Silky Dogwood

Cornus obliqua

NCNE	MW	GP
FACW	FACW	FACW

- Magenta twigs
- Opposite leaves
- Dark blue berries

128

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

129

Viburnum (Caprifoliaceae)

130

Nannyberry

Viburnum lentago

NCNE	MW	GP
FAC	FAC	FACU

131

Highbush Cranberrry

Viburnum opulus

NCNE	MW	GP
FACW	FAC	FAC

132

ALTERNATE BRANCHING

133

Birches (Betulaceae)

134

Yellow Birch

(*Betula alleghaniensis*)

NCNE	MW	GP
FAC	FAC	FACU



135

Paper Birch

(*Betula papyrifera*)

NCNE	MW	GP
FACU	FACU	FACU

136

Bog Birch

(*Betula pumila*)

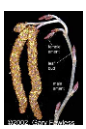
NCNE	MW	GP
OBL	OBL	OBL

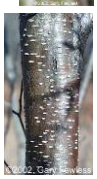
137

Speckled Alder

(*Alnus incana*)

NCNE	MW	GP
FACW	FACW	FACW





138

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

139

Elms (Ulmaceae)

American Elm

(*Ulmus americana*)

NCNE	MW	GP
FACW	FACW	FAC

140

Northern Hackberry

(*Celtis occidentalis*)

NCNE	MW	GP
FAC	FAC	FACU

141

Poplars (Salicaceae)

Balsam Poplar
(***Populus balsamifera***)

NCNE	MW	GP
FACW	FACW	FACW

Bigtooth Aspen
(***P. grandidentata***

NCNE	MW	GP
FACU	FACU	FACU

Trembling Aspen
(***P. tremuloides)***

NCNE	MW	GP
FACU	FAC	FAC

142

Cottonwood

(*Populus deltoides*)

NCNE	MW	GP
FAC	FAC	FAC

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

143

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

144

Gooseberries or Currents (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

145

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)

146

Red Raspberry

(*Rubus idaeus ssp. strigosus*)

NCNE	MW	GP
FACU	FACU	FACU

147

Steeplebush

(*Spiraea tomentosa*)

NCNE	MW	GP
FACW	FACW	FACW

- Leaves alternate
- White to orange woolly undersides

148

Meadowsweet

(*Spiraea alba*)

NCNE	MW	GP
FACW	FACW	FACW

- Alternate leaves
- Leaves not woolly

149

Buckthorn Family (Rhamnaceae)

Glossy Buckthorn

(*Frangula alnus*)

NCNE	MW	GP
FAC	FACW	FAC

- Leaf margins entire (not toothed)

150

Common Buckthorn

(*Rhamnus cathartica*)

NCNE	MW	GP
FAC	FAC	FACU

- Leaf margins with fine teeth

151

WOODY VINES

152

Grape Family (Vitaceae)

Virginia Creeper
(*Parthenocissus quinquefolia*)

NCNE	MW	GP
FACU	FACU	FACU

Woodbine
(*Parthenocissus inserta*)

NCNE	MW	GP
FACU	FACU	FAC

153

Summer Grape
(*Vitis aestivalis*)

NCNE	MW	GP
FACU	FACU	FAC

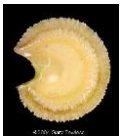
River-bank Grape
(*Vitis riparia*)

NCNE	MW	GP
FACU	FACW	FAC

154

Menispermaceae Family

Moonseed
(*Menispermum canadense*)



NCNE	MW	GP
FAC	FAC	FACU

155

Regulatory Implications of wetland plant communities

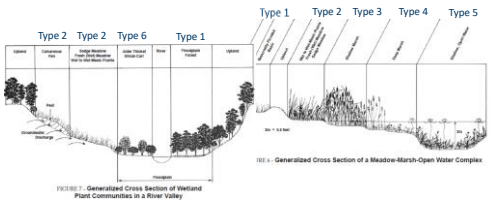
- Classified per Eggers & Reed and Circular 39
  - Soon to be include Hydrogeomorphic Method
- Classification often relates to plant community
- Some exemptions have been based on wetland type
- Regulations have been more restrictive for certain wetland types- esp. excavation
- Scope of WCA for calcareous fens
- Mitigation Site Monitoring

156

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

157

Eggers & Reed & WCA



158

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 semipermanently and permanently flooded areas.

159

Permanently and Semipermanently flooded areas

- 2009 Rule language:
- Subp. 51. **Permanently and semipermanently flooded area of a ~~type 3, 4, or 5~~ wetland.** "Permanently and semipermanently flooded area of a ~~type 3, 4, or 5~~ wetland" means the portion of a ~~type 3, 4, or 5~~ wetland below the level where the water has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

160

Permanently and Semipermanently flooded areas- Circular 39 & Eggers & Reed

	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

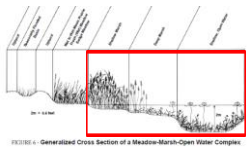
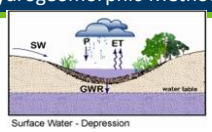


FIGURE 6. Generalized Cross Section of a Meadow-Marsh-Open Water Complex

161

permanently and semipermanently flooded areas- Hydrogeomorphic Method

HGM Class	Typical Water Regimes
Mineral Flat	All regimes except permanently flooded (Saturated most of growing season)
Organic Flat	All regimes except permanently flooded (Saturated most of growing season)
Organic Flat	Saturated
Sloped	Saturated
Riverine	Temporary Flooded
Lacustrine Fringe	Semi permanently to permanently flooded (up to 8.2')
Depression	Seasonally Flooded
Depression	Saturated
Depression	Semi permanently flooded (up to 6")



Surface Water - Depression

Lacustrine Fringe

162

Permanently and Semipermanently Flooded areas- Cowardin

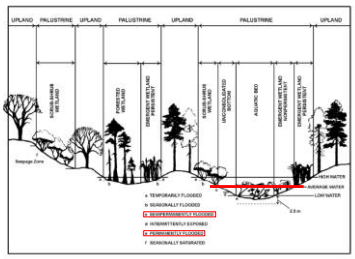


Figure 6. Distinguishing features and examples of habitats in the Palustrine System.

- Depression

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Lacustrine Fringe

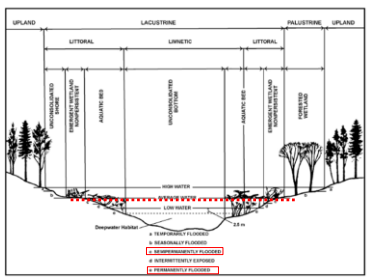

Figure 5. Distinguishing features and examples of habitats in the Lacustrine System.

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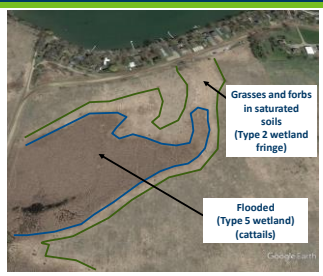
Wetland Impacts - Excavation

- 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*



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Exemptions – de minimis

- The de minimis exemption covers small impacts to wetlands typically used for driveways, culverts, small projects by landowners, etc.
- Very specific requirements depending on location in state, local area, shoreland, etc.

Table 1: Maximum de minimis exemption amounts for per MS 103G.2241 (Aug. 1, 2024)

Impacts to wetlands, **excluding** permanent and semipermanently flooded areas of wetland.	Presettlement area of state	Impact area up to (acres):	Impact area up to: (square feet):
Outside of Shoreland Wetland Protection Zone	Greater than 80 percent area	One-quarter (1/4)	10,890
	50 to 80 percent area	One-tenth (1/10)	4,356
	Less than 50 percent area	One-twentieth (1/20)	2,178
Within Shoreland Protection Zone, but beyond structure setback	Statewide	N/A	100
Within Shoreland Protection Zone and structure setback	Statewide	N/A	20 ▲(100)
Impacts to permanent and semipermanently flooded areas of wetlands	Statewide	N/A	400

▲ Increased amount shown in parenthesis my be allowed if wetland is isolated from the public water, or if permanent water runoff retention or infiltration measures are established in proximity to the impact and approved by the shoreland management authority.

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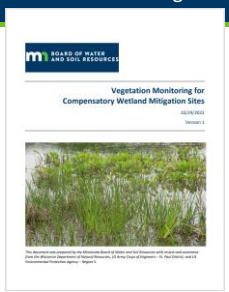
Vegetation Monitoring on Mitigation Sites



Link to Vegetation Monitoring on Mitigation Sites

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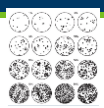
Developing Vegetation Monitoring Plan

Areal cover estimates

- Absolute and Relative cover

Species Richness

Non-natives



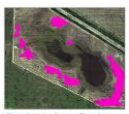


Figure 5. Mapped areas of invasive species on a compensatory mitigation

Figure 3. Formula and example for calculating percent relative cover from absolute cover estimates.

$$\frac{\text{\% Absolute Cover Species A}}{\text{Total Absolute \% Cover All Species}} (100) = \text{\% Relative Cover Species A}$$

Example:

Species	Absolute % Cover
A	30
B	40
C	80
Total	150

30/150 (100) = 20% Relative Cover Species A

40/150 (100) = 27% Relative Cover Species B

80/150 (100) = 53% Relative Cover Species C

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Vegetation Monitoring Sampling Methods

- Sampling Methods
  - Plots
  - Belt transects
  - Point-intercept
  - Meander

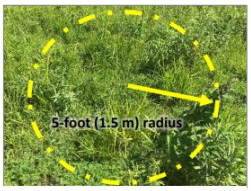

Figure 7. Example of a circular plot for the herbaceous layer.

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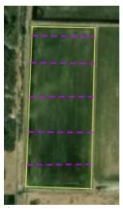
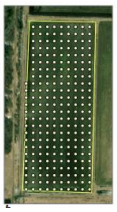
Examples of Transect Layouts

Figure 12. Examples of transect layouts for compensatory wetland mitigation sites.





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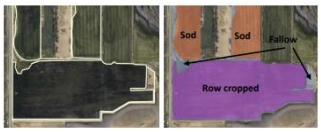
Establishing Monitoring Units

Considerations:

- Land Use
- Hydrology
- Soil Types
- Planting & seeding areas
- Management techniques
- Stressors



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Reporting Monitoring Results

Table 6. Example of summarizing relative areal cover estimates by plant community and plant group.

Community	Plant Group	% Relative Cover Estimated from Point Intercept Transects (A – F)						
		A	B	C	D	E	F	Avg
Mesic Prairie	Native	70%	95%	100%	60%	100%	60%	81%
	Introduced	30%	5%	0%	40%	0%	40%	19%
Wet Meadow	Native	85%	90%	90%	75%	100%	86%	88%
	Introduced	10%	0%	0%	10%	0%	14%	6%
	Bare/none	5%	10%	10%	15%	0%	0%	6%
Shallow marsh	Native	100%	90%	96%	59%	90%	77%	85%
	Introduced	0%	0%	4%	12%	0%	4%	3%
	Bare/none	0%	10%	0%	29%	10%	19%	12%

Table 7. Example of comparing data on vegetation metrics to previous years and performance standards.

Community	Interim 1 Performance Standards	2018	2019
Mesic Prairie	Native, non-invasive vegetation >50% relative cover	39%	66%
	≥5 native, non-invasive species	18	22
	Non-native and/or invasive species <50% relative cover	61%	34%
	Bare ground <40% absolute cover	4%	0%
Wet Meadow	Native, non-invasive hydrophytic vegetation >50% relative cover	66%	72%
	≥5 native, non-invasive species (≥2% relative cover each)	9	9
	Non-native and/or invasive species <50% relative cover	11%	10%
	Bare ground <40% absolute cover	3%	1%
Shallow Marsh	Native, non-invasive hydrophytic vegetation >50% relative cover	96%	95%
	≥2 native, non-invasive species	24	18
	Non-native and/or invasive species <60% relative cover	3%	3%
	Unvegetated areas <60% absolute cover	16%	10%

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How many plots do I need to do?

Sample Unit (plot)	Cumulative Native Species Richness
1	12
2	14
3	18
4	20
5	23
6	23
7	26
8	28
9	29

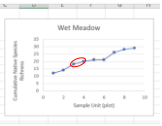

Figure 2. Example of table and resulting native species accumulation curve. The curve has not flattened out, yet the performance standard (18 native species) has been met.

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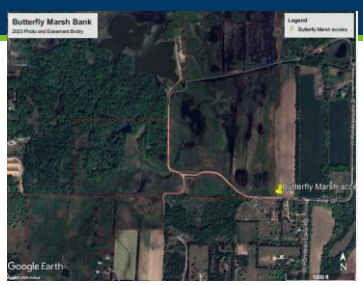

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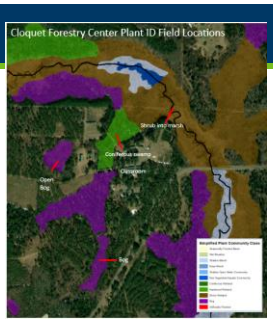

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