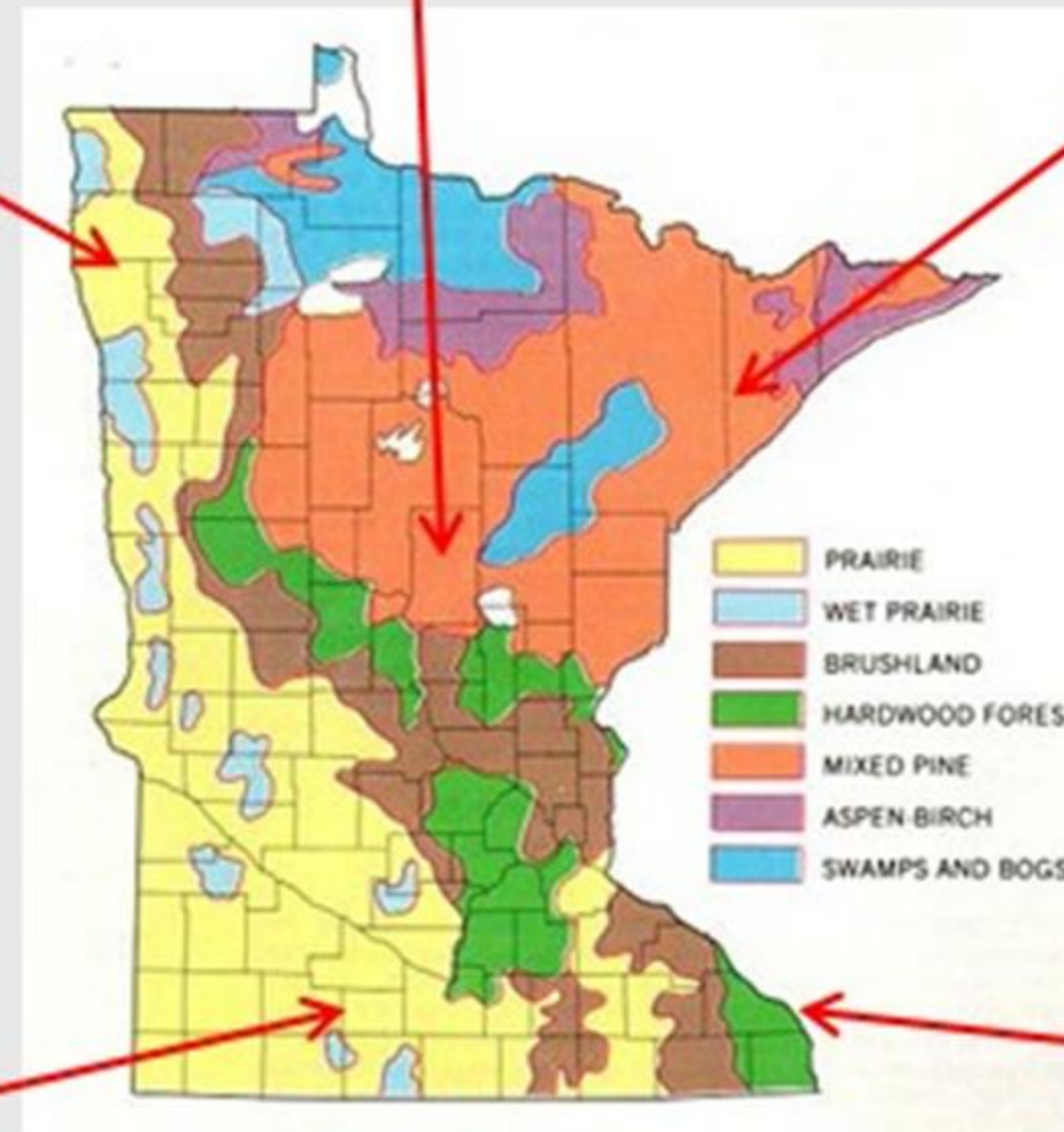
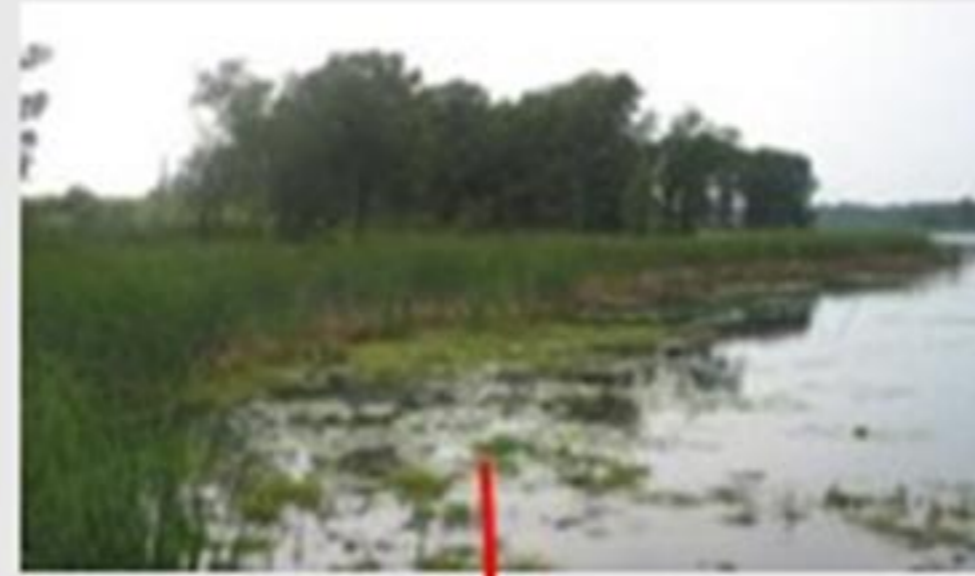




Vegetation Establishment

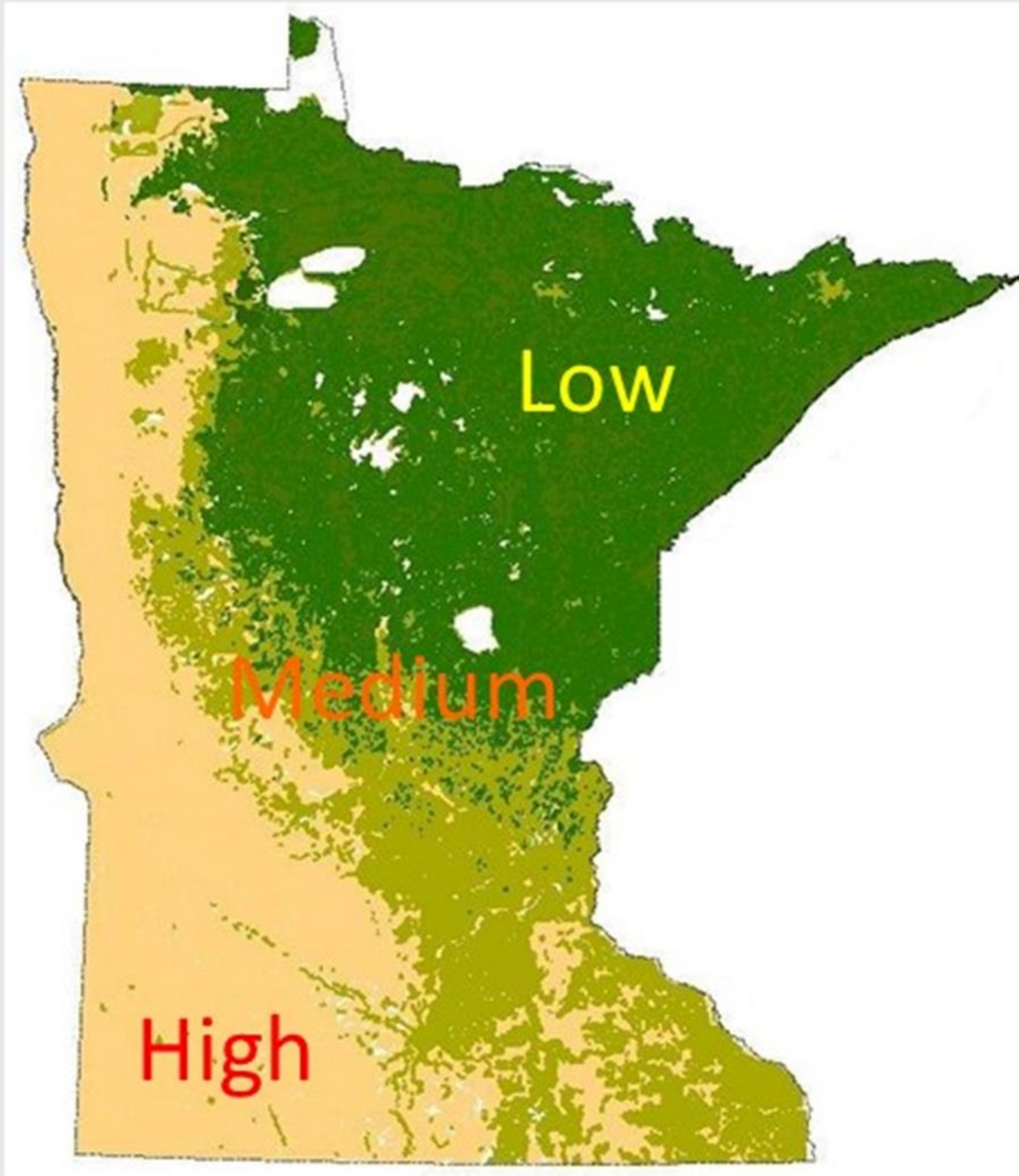
February 2nd , 2020

Many Wetland Plant Communities in MN



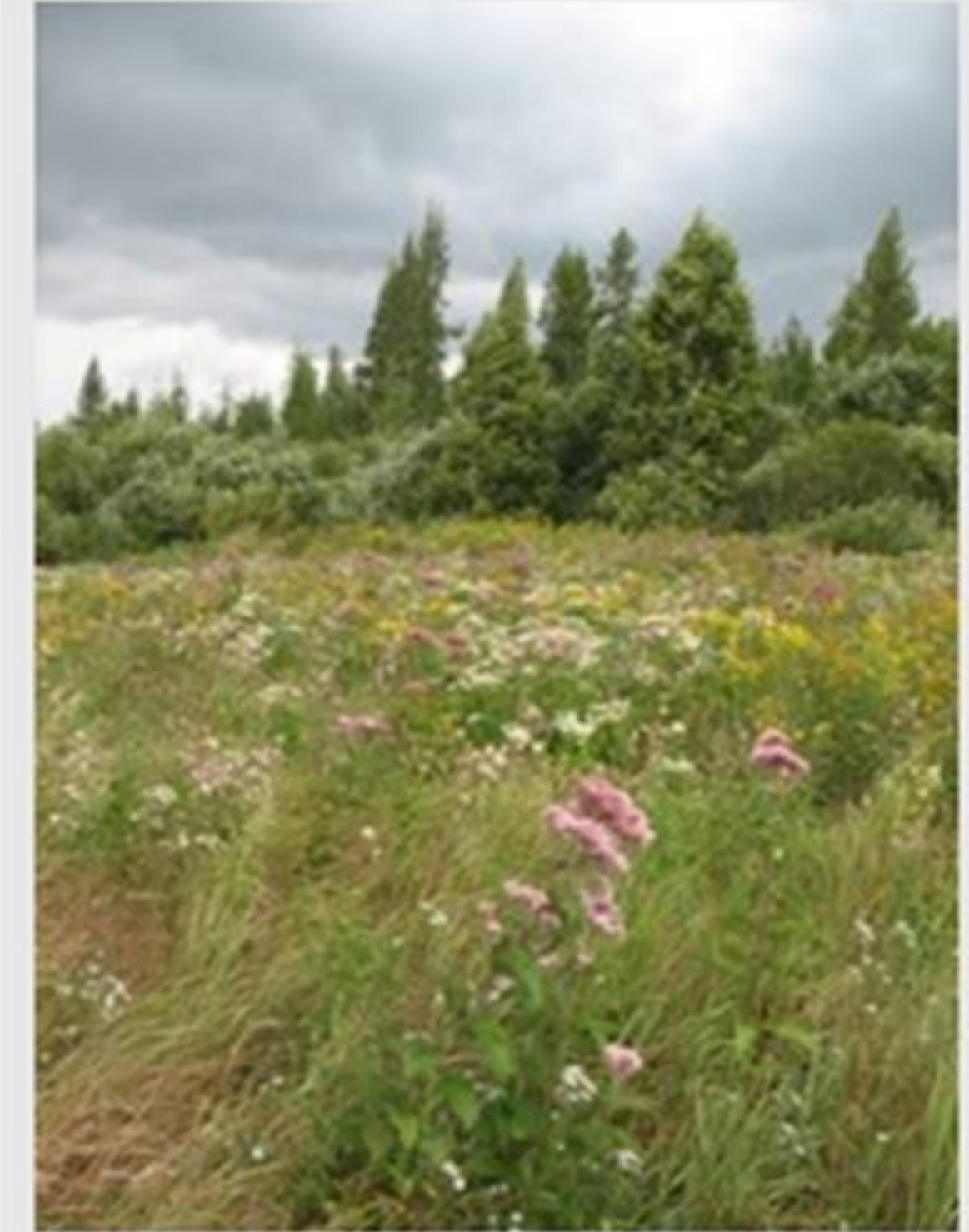
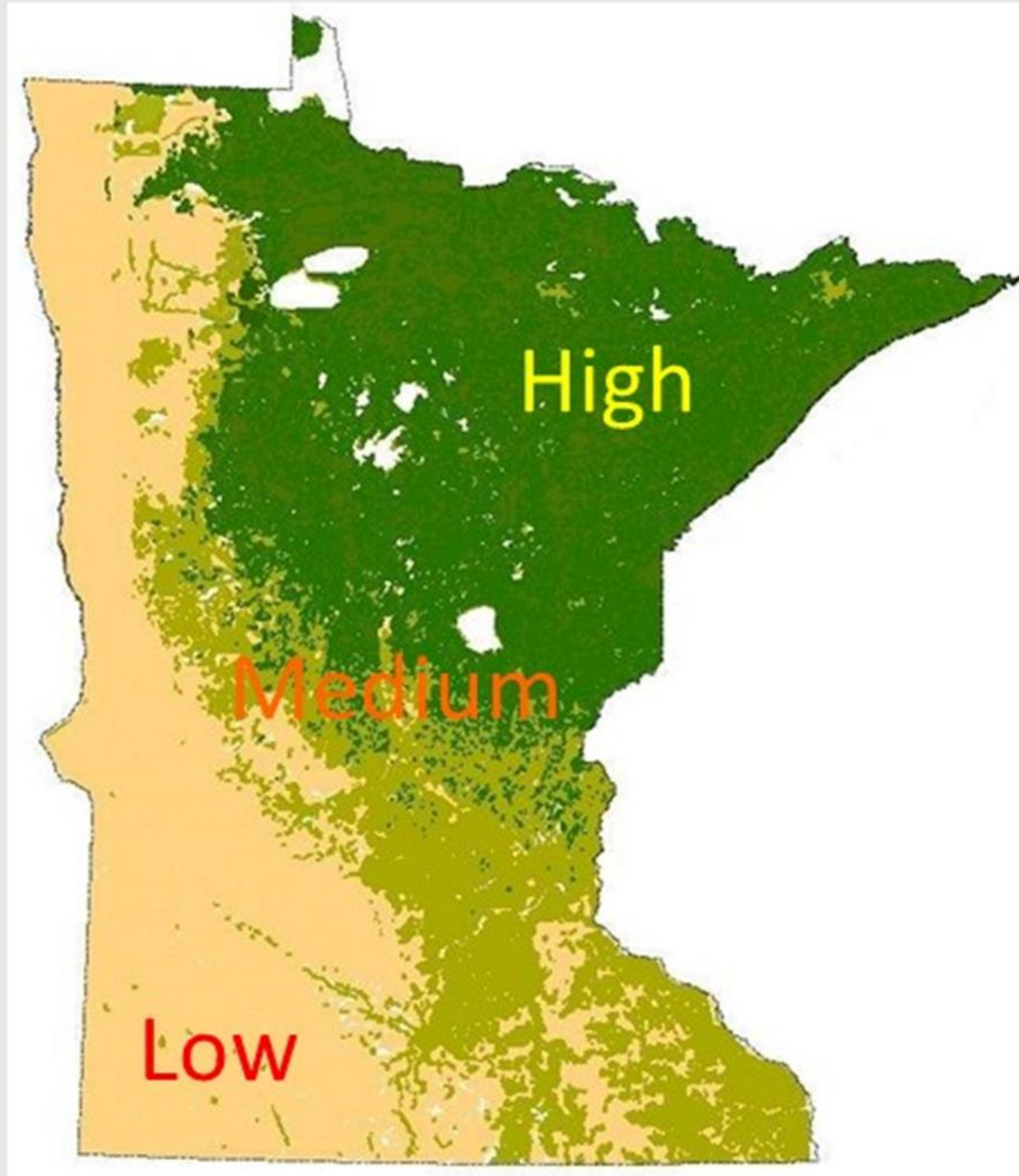
Vegetation Site Assessment

Changes
in Weed
Pressure

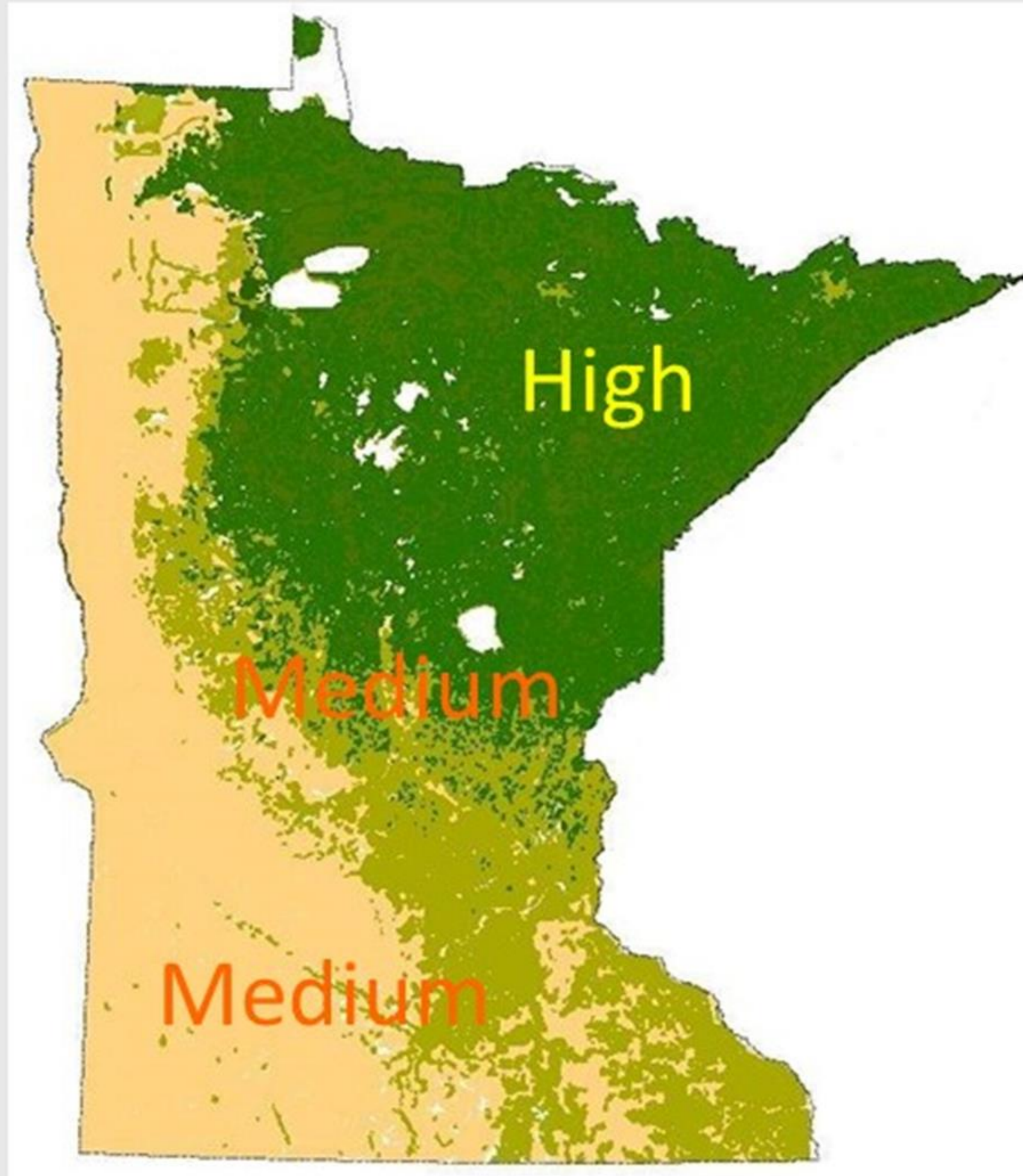


Vegetation Site Assessment

Changes
in Native
Seedbank
Potential

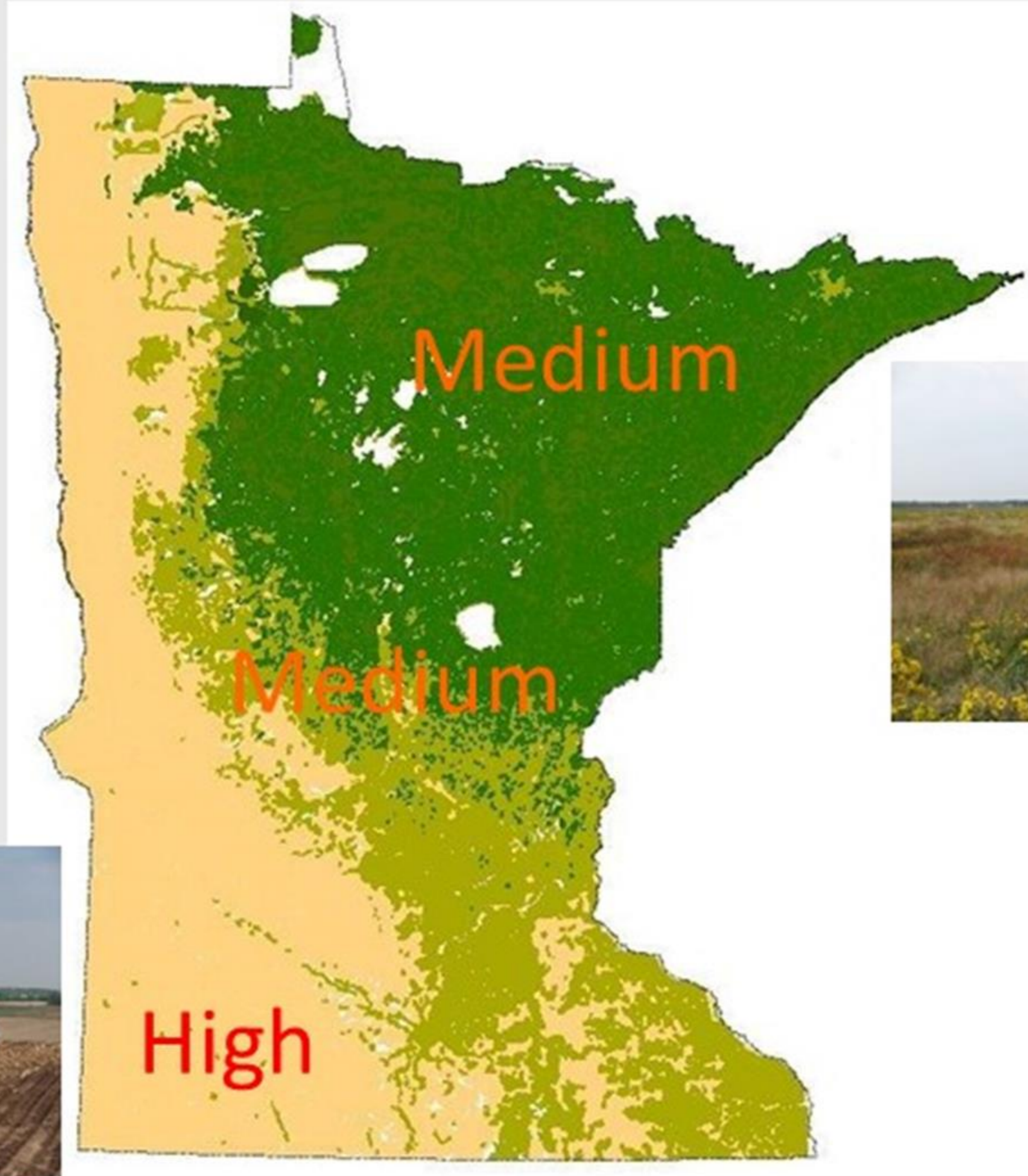


Changes in Tree and Shrub Colonization



Vegetation Site Assessment

Changes in
Installation
Cost



Existing Conditions



Project Goals



Potential Site Stressors

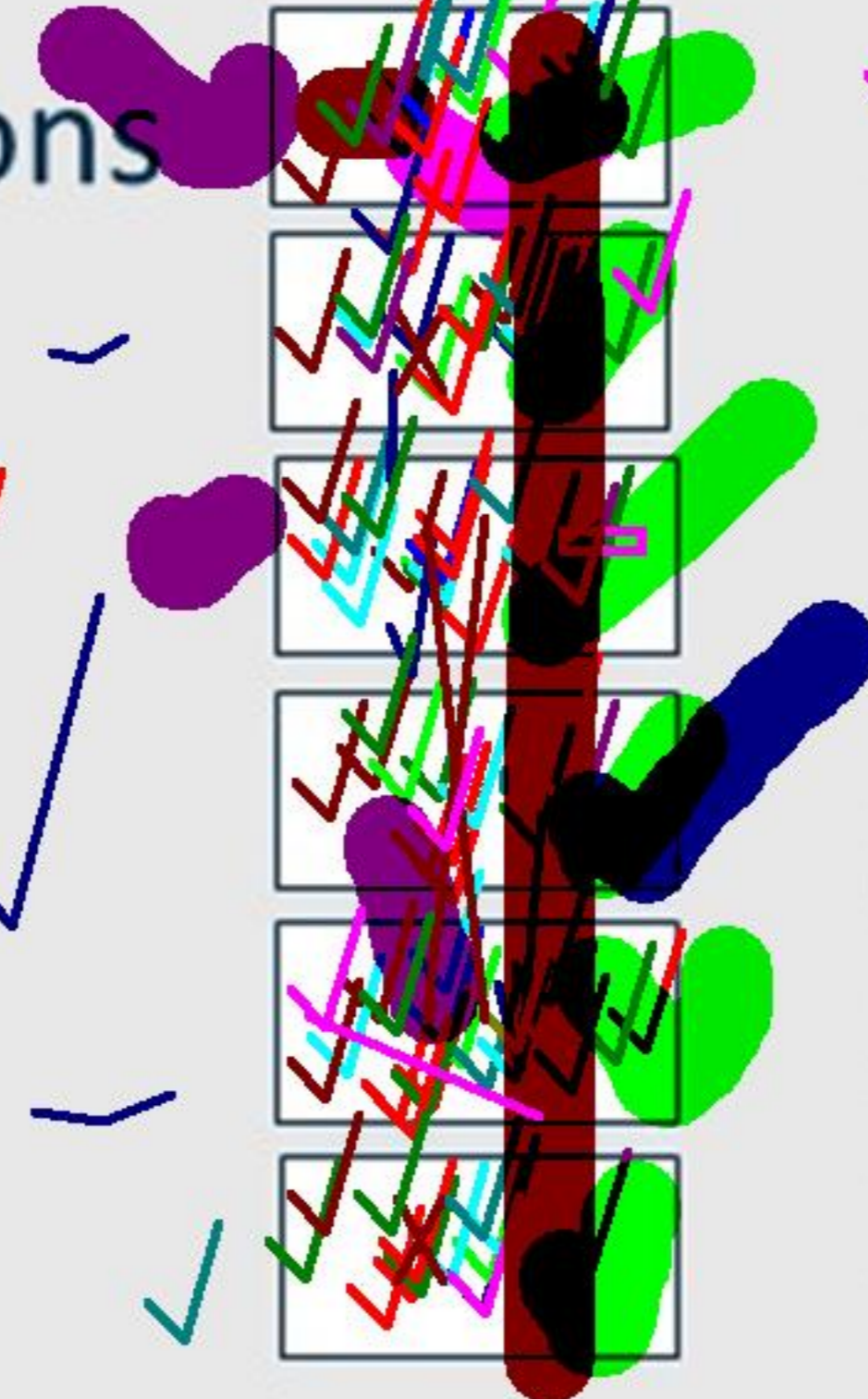
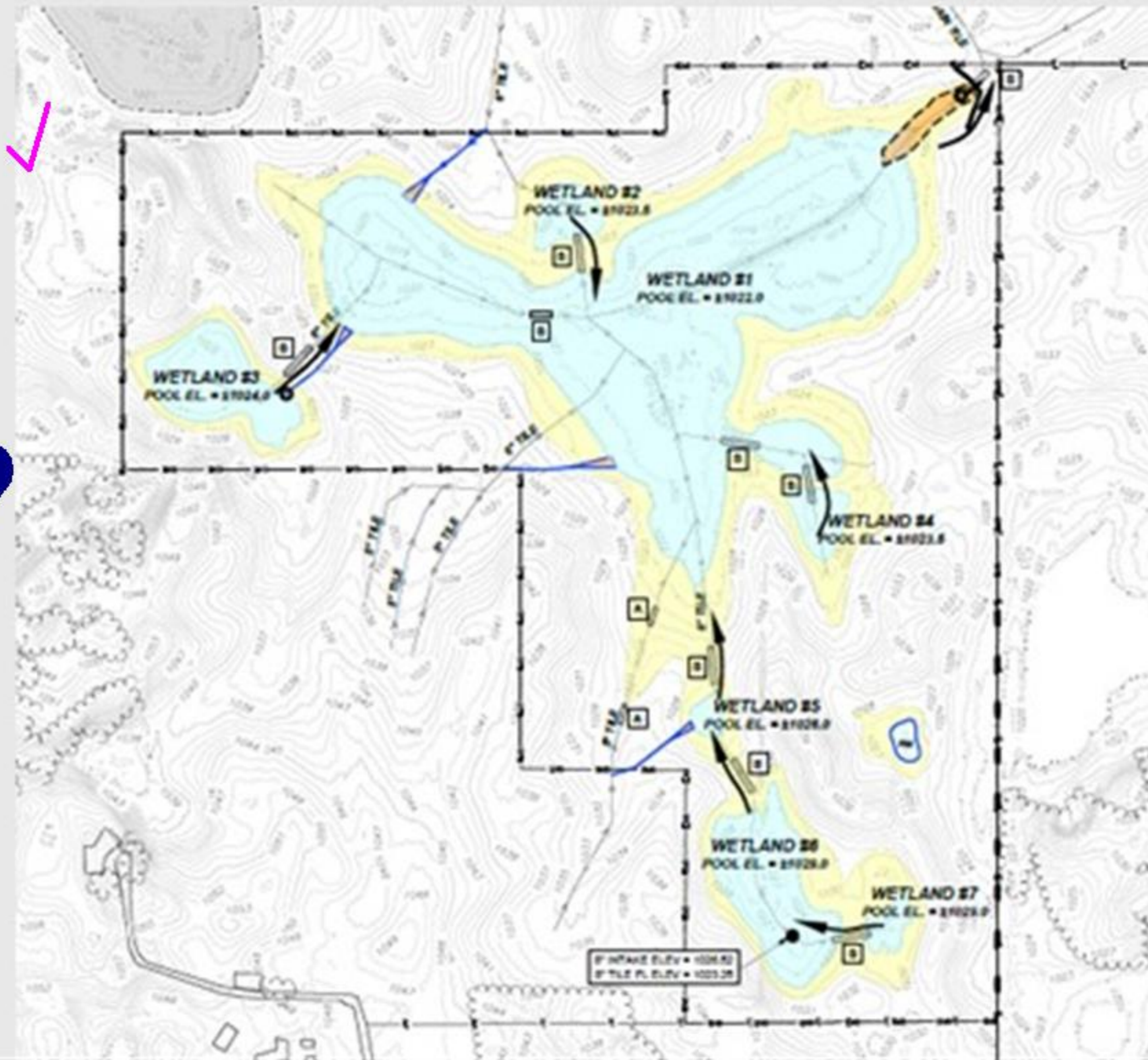
- Water Fluctuations
- High Nutrients
- Sediment
- Pollutants
- Invasive Plants
- Herbivores



Vegetation Site Assessment

Place a check by stressors that could impact vegetation establishment for the site you assessed for the engineering exercise

Water Fluctuations	✓
High Nutrients	✓
Sediment	✓
Pollutants	✓
Invasive Plants	✓
Herbivores	✓

A hand-drawn diagram of a tree with a brown trunk and branches. The branches are colored in various colors: purple, green, blue, red, and black. There are several checkmarks (✓) in various colors (red, blue, green, purple) scattered around the tree, indicating assessment points.

Assessing Existing Vegetation

- Early successional weeds
- Invasive vegetation
- Native vegetation



Vegetation Site Assessment

Is reed canary grass present in or around the site?



Vegetation Site Assessment

Are cattails present or a risk?



Vegetation Site Assessment

Cropping duration and frequency, soil types and connection to natural wetlands influences seedbank



Beltrami
County
Wetland
Restoration

Revegetation from existing seedbank



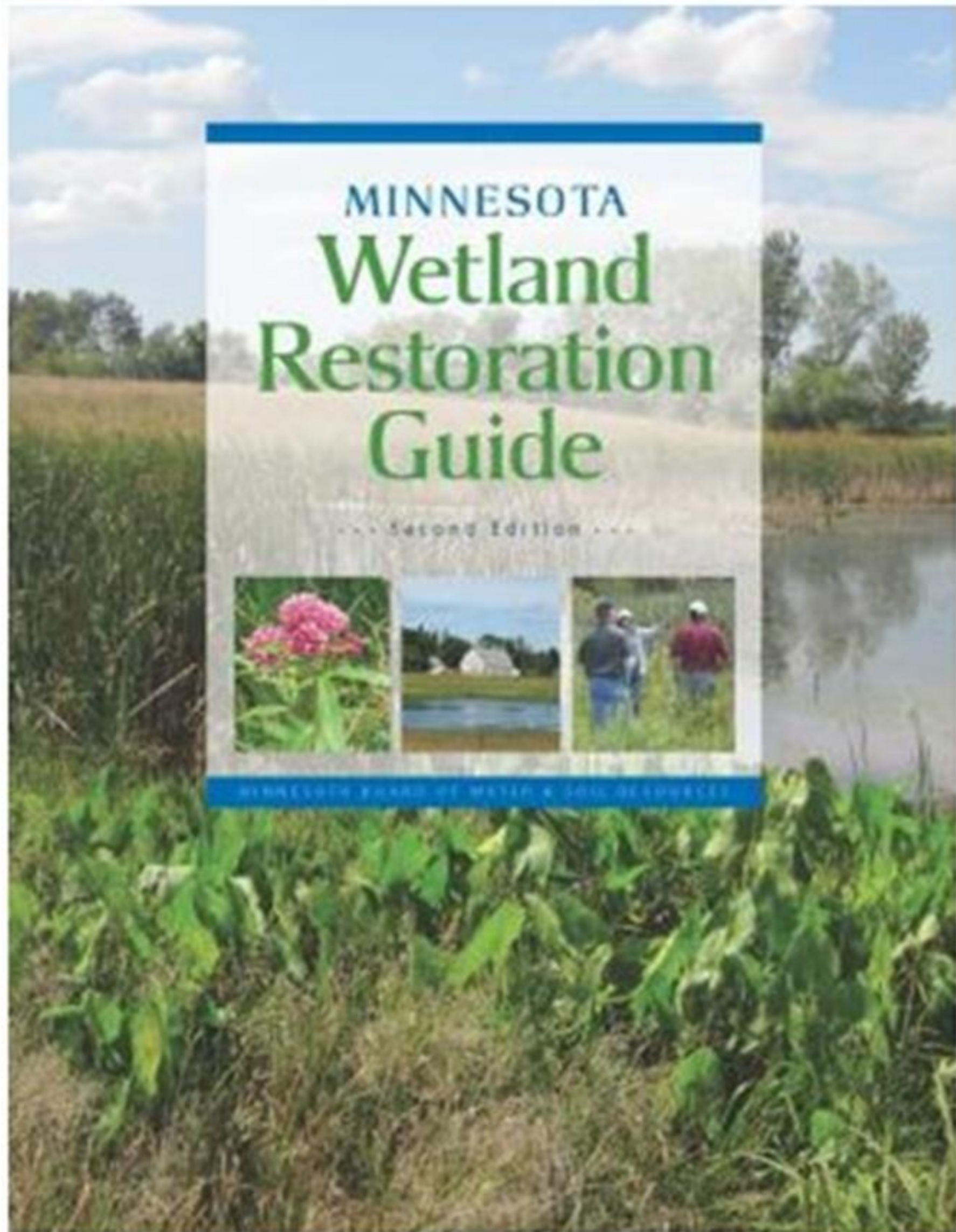
- **Benefits**

- Possibility of the closest match to native plant community
- Lowest cost

- **Limitations**

- Majority of sites have multiple factors that have impacted the native plant community

Minnesota Wetland Restoration Guide



MN Wetland Restoration Guide - [Section 5: Vegetation Establishment \(pdf\)](#)

[Section 5 - Appendices](#)

- [5-A Technical Guidance Documents - see \[Guidance Documents\]\(#\)](#)
- [5-B Invasive Species Control \(pdf\)](#)
- [5-C Project Specifications \(pdf\)](#)
- [5-D Restoration Details / Diagrams \(pdf\)](#)
- [5-E Seedbank Testing Protocol \(pdf\)](#)
- [5-F Plant Community Tables \(pdf\)](#)
- [5-G Vegetation Establishment Tables \(pdf\)](#)
- [5-H Wetland Vegetation Establishment Research Needs \(pdf\)](#)
- [5-I Plant Information Links \(pdf\)](#)
- [5-J Vegetation Plan Examples \(pdf\)](#)
- [5-K Citations \(pdf\)](#)

Additional Resources

- [MN Wetland Restoration Plant ID Guide \(pdf\)](#)
- [Seed Mixes](#)

Seed Bank Testing Protocol

Seed Bank Composition of Wetlands – Seed Emergence Methodology

Developed by Jeff Lee of Barr Engineering

- Field collection of soil samples
- Grow and document seedlings over the course of four months



Break





Seeding Considerations

Practice Standards

CRP Practice	State of MN Requirements for Vegetation Establishment
CP-23	<p>657 Standard (native species only)</p> <p>Minimum - Adjacent Upland: Herbaceous Upland: 327 – Conservation Cover, Native Grasses, Forbs and Legumes Forested Upland: 612 - Tree/Shrub Establishment</p> <p>Minimum - Wetland: Refer to Technical Note #31: 657 - Wetland Restoration</p>
CRP Practice	State of MN Requirements for Vegetation Establishment
CP-23a	<p>657 Standard (native species only)</p> <p>Minimum - Adjacent Upland: 643 - Tallgrass Prairie Specifications</p> <p>Preferred - Adjacent Upland: Refer to NRCS/BWSR Guidelines for seed mixtures benefitting monarchs and beneficial insects.</p> <p>Minimum - Wetland: Refer to Technical Note #31: 657 - Wetland Restoration</p>

Agronomy Technical Note #31



Minnesota Agronomy Technical Note # 31 *Herbaceous Vegetation Establishment Guide*

(Ver. 1.6)

INTRODUCTION

This technical note may be used to guide establishment of native and introduced plantings of herbaceous vegetation for the purposes of meeting criteria in the Minnesota Natural Resources Conservation Service Field Office Technical Guide (FOTG) Practice Standards; 327 - *Conservation Cover*, 332-*Contour Buffer Strips*, 342 - *Critical Area Planting*, 393 - *Filter Strip*, 512 - *Forage and Biomass Planting*, 598C – *Cross Wind Trap Strips*, 643 - *Restoration of Rare or Declining Natural Communities*, 645 – *Upland Wildlife Habitat Management* and 657 – *Wetland Restoration*. Other ecological science and certain engineering standards may refer to this technical note. Refer to those standards for specific practice criteria.

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Herbicide and Insecticide Carryover	8
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Seeding Rates	9
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Temporary Cover	10
Weed Control	11

Wetland Restoration: Page 35

https://www.nrcs.usda.gov/wps/cmیس_proxy/https/ecm.nrcs.usda.gov%3a443/fncmis/resources/WEBP/ContentStream/idd_70A4A371-0000-CD31-961B-36A05E49CE33/0/MN+Herbaceous_Veg_Est_Guide+FINAL-1.6.pdf

Agronomy Technical Note #31 guidance

Seed Planting Density - Wetland seed mixes shall provide seed densities ranging from 110 to 200 seeds/ft². Wet/sedge meadow seed mixes shall contain 20-30 species. Shallow emergent marsh communities may be seeded with mixes of 10-20 species. Refer to Table 21 for recommended species and optional seeding calculator on the MN NRCS Home Page at [Technical Resources/Seeding Tools](#). Higher diversity mixes will help support pollinators and other invertebrates that play a key role in the health of wetland habitats.

Recommended composition of mixes, based on seeds/ft²:

EMERGENT FRINGE		SEDGE MEADOW		WET MEADOW	
Grasses	20 – 65%	Grasses	20 – 50%	Grasses	20 – 60%
Sedges - Rushes	20 – 65%	Sedges - Rushes	40 – 70%	Sedges - Rushes	15 – 60%
Forbs	15 – 30%	Forbs	15 – 35%	Forbs	15 – 35%

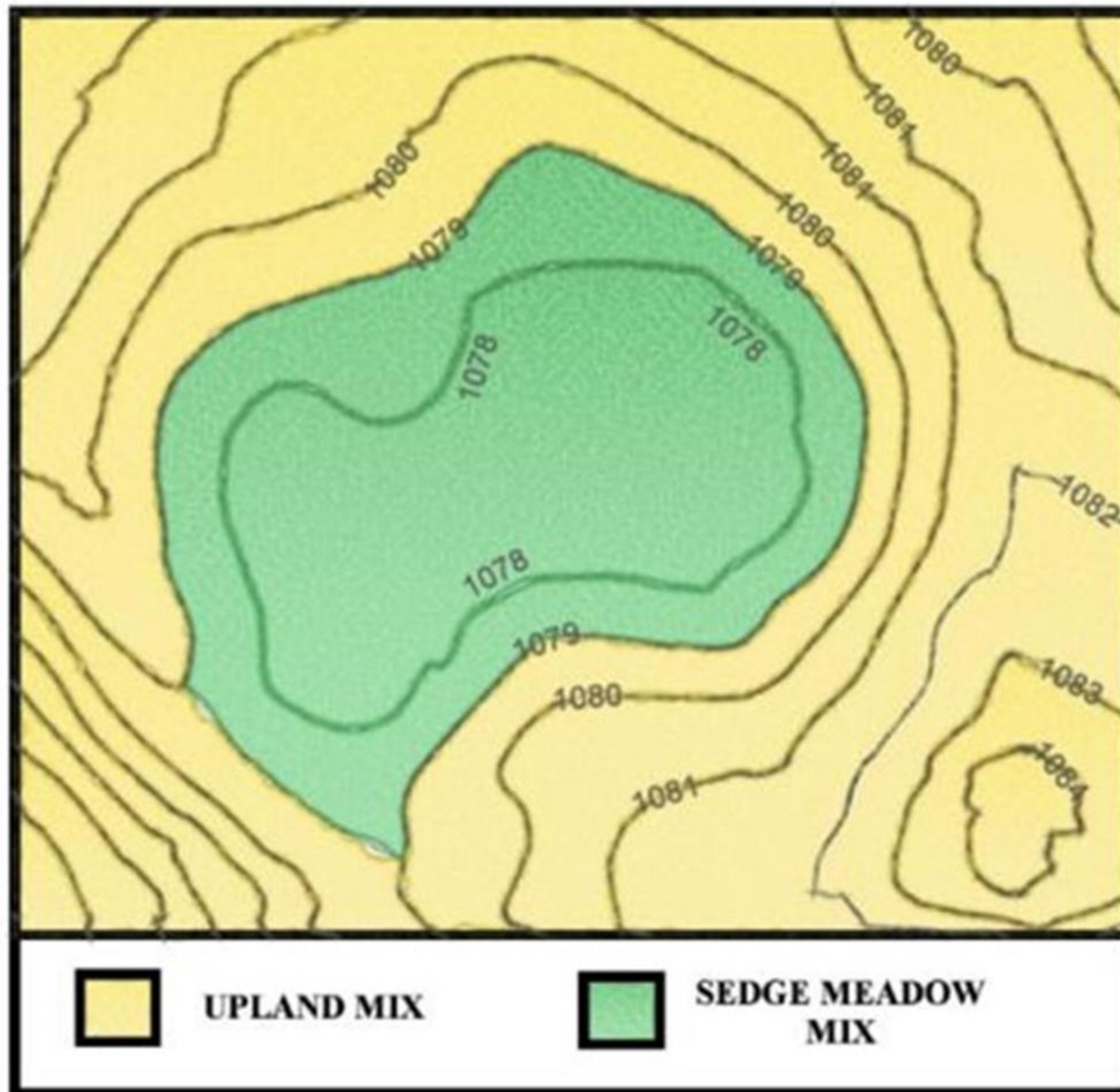
Seeding Considerations

Even small differences in elevation can create major differences in suitability for species



Seeding Considerations

It is important to consider elevation when planning seed zones





Seeding Considerations

When to use separate wetland seed mixes

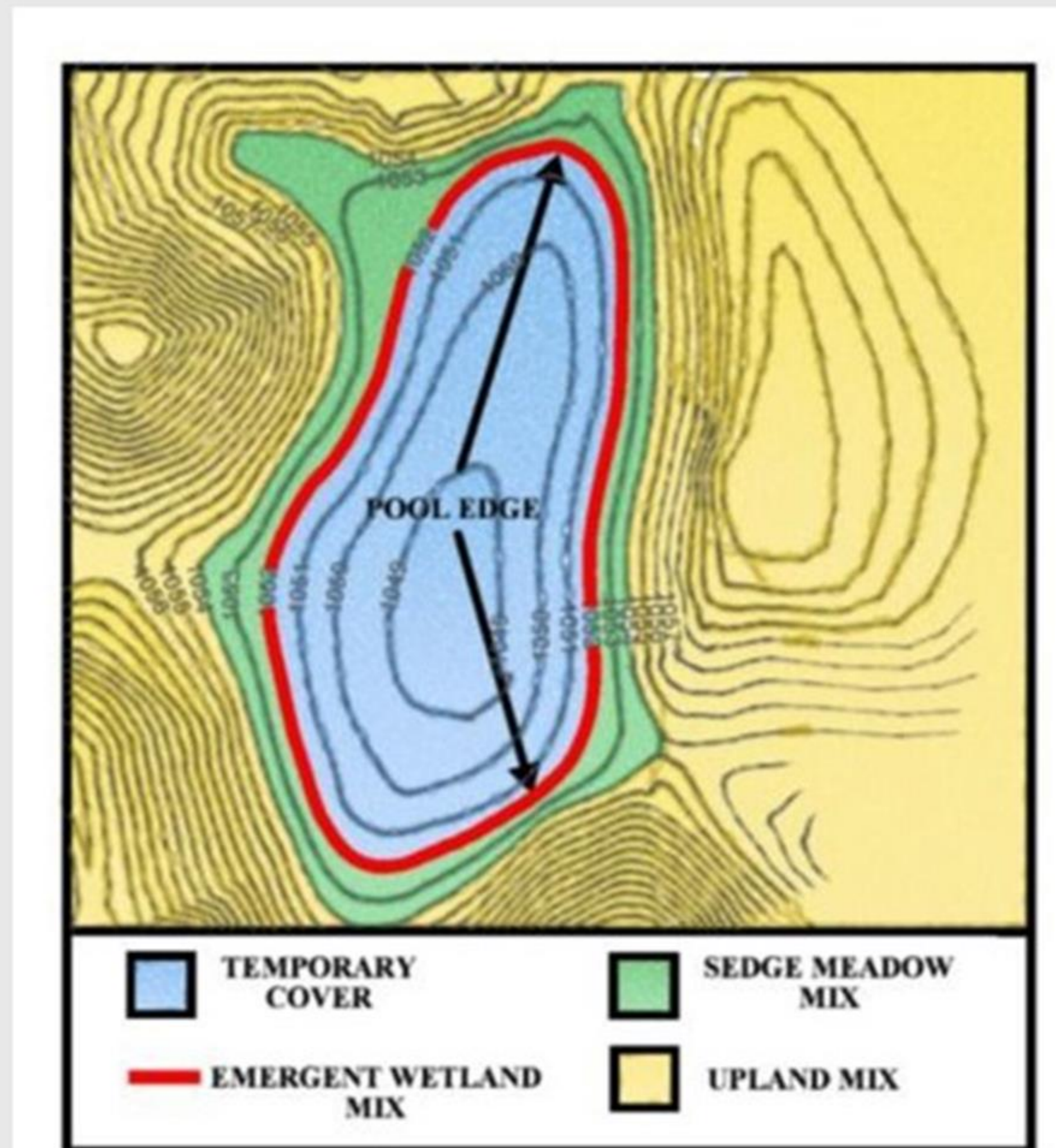
Wet meadow/Wet Prairie - When a distinct wet meadow/prairie zone is present and a low contribution from the seedbank

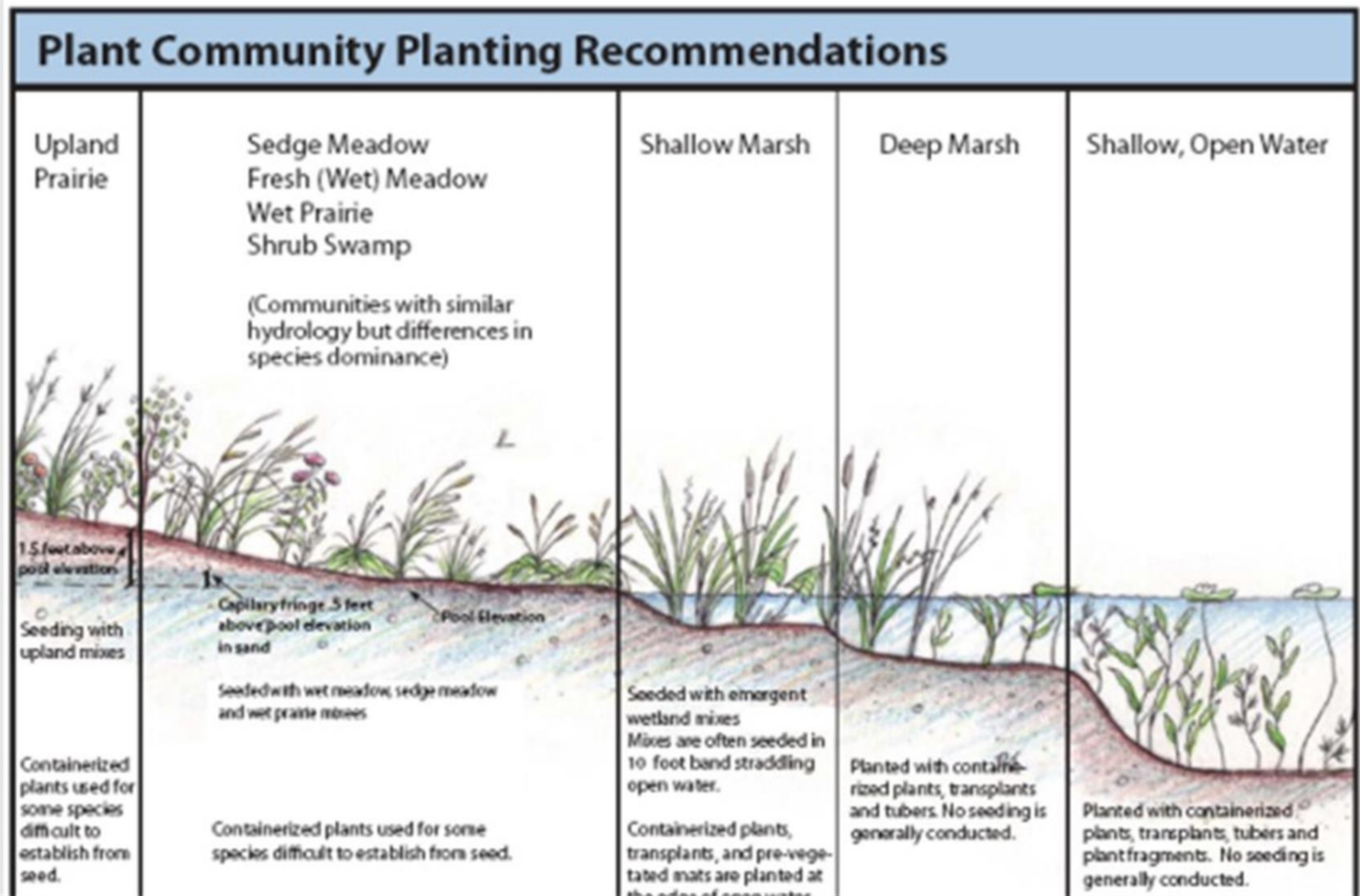
Emergent Wetland – When a seed mix is needed to provide diversity for emergent areas and compete with cattails

Deep Marsh – When a mix is needed to stabilize large areas of deep marsh to establish diversity and compete with cattails

Seeding Considerations

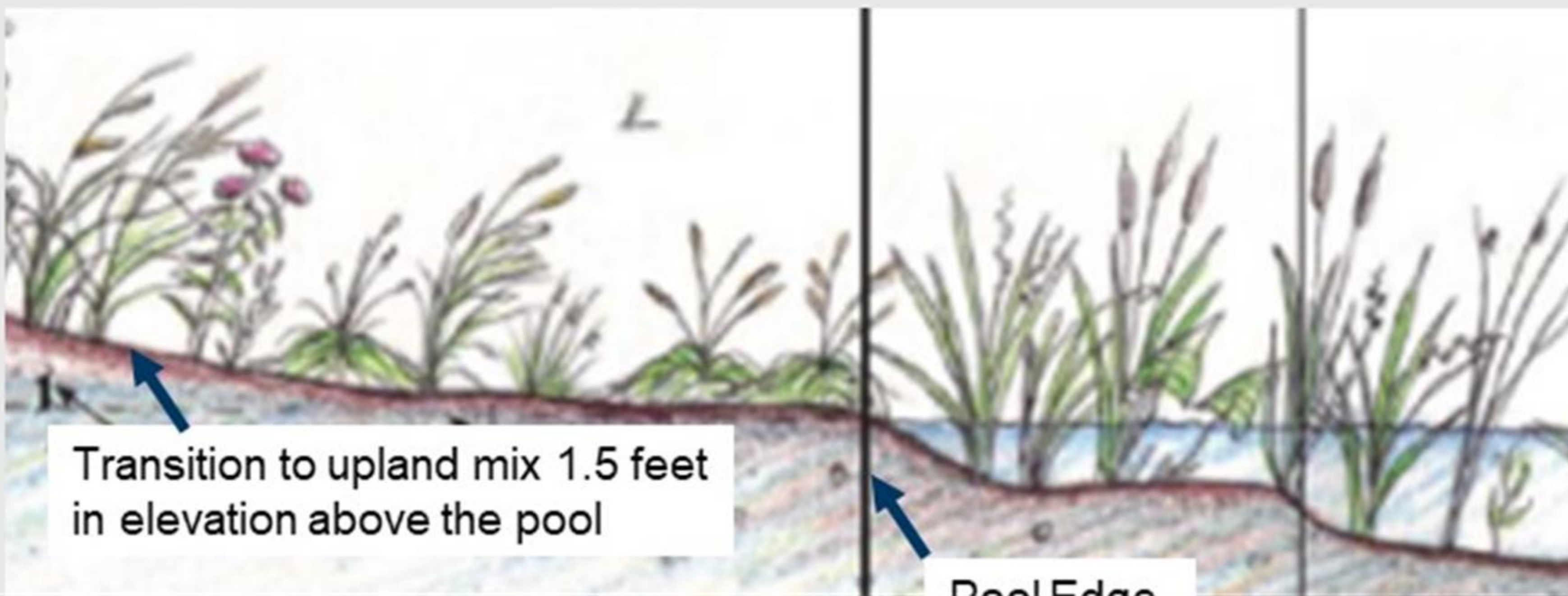
Swales, seeps and wetland soil types are also considerations



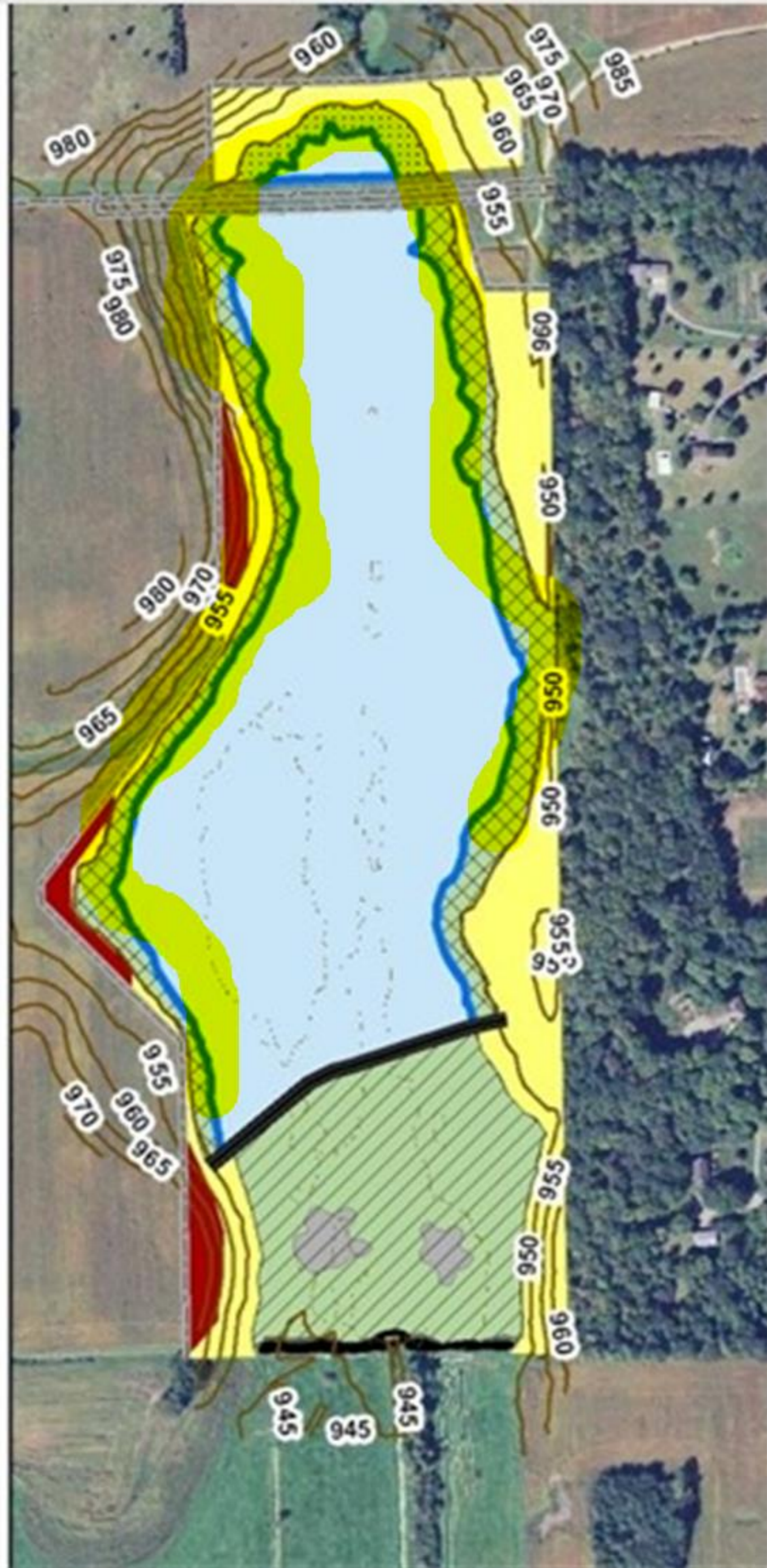


Seeding Considerations

- ❑ In some cases a narrow band of **emergent mix** (10 feet wide) is seeded straddling pool elevation. Seed will germinate and plants will grow into emergent zone
- ❑ Pool elevation to 1-2 feet in elev. above pool (or saturated soils) - seed **wet meadow mix**
- ❑ Pool elevation plus 1-2 feet and higher - seed **upland mixes**



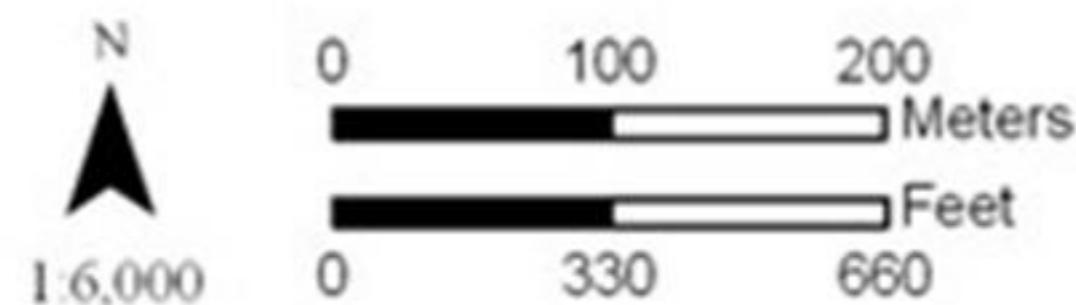
Seeding Considerations



Planting Zone Map

Legend

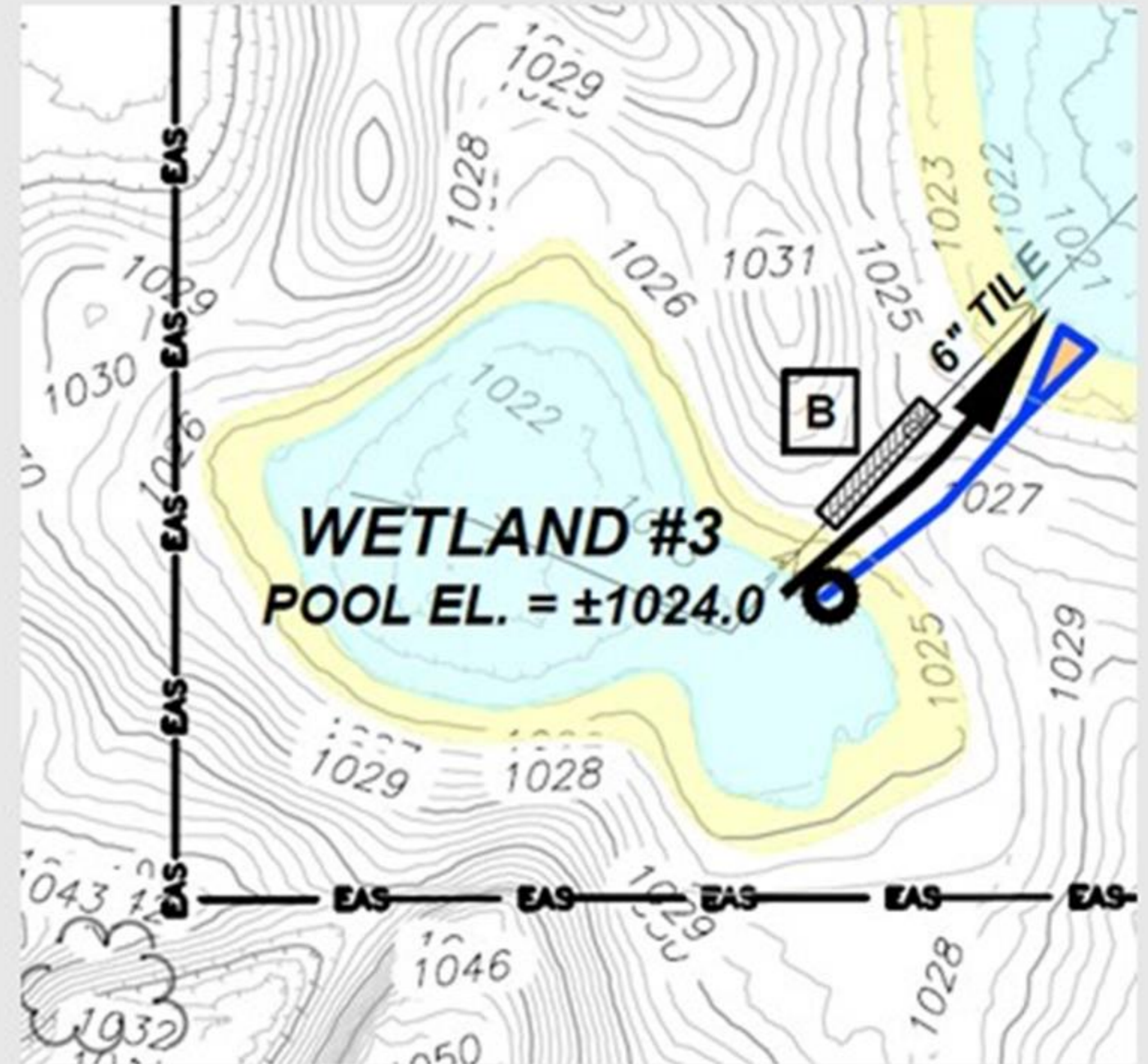
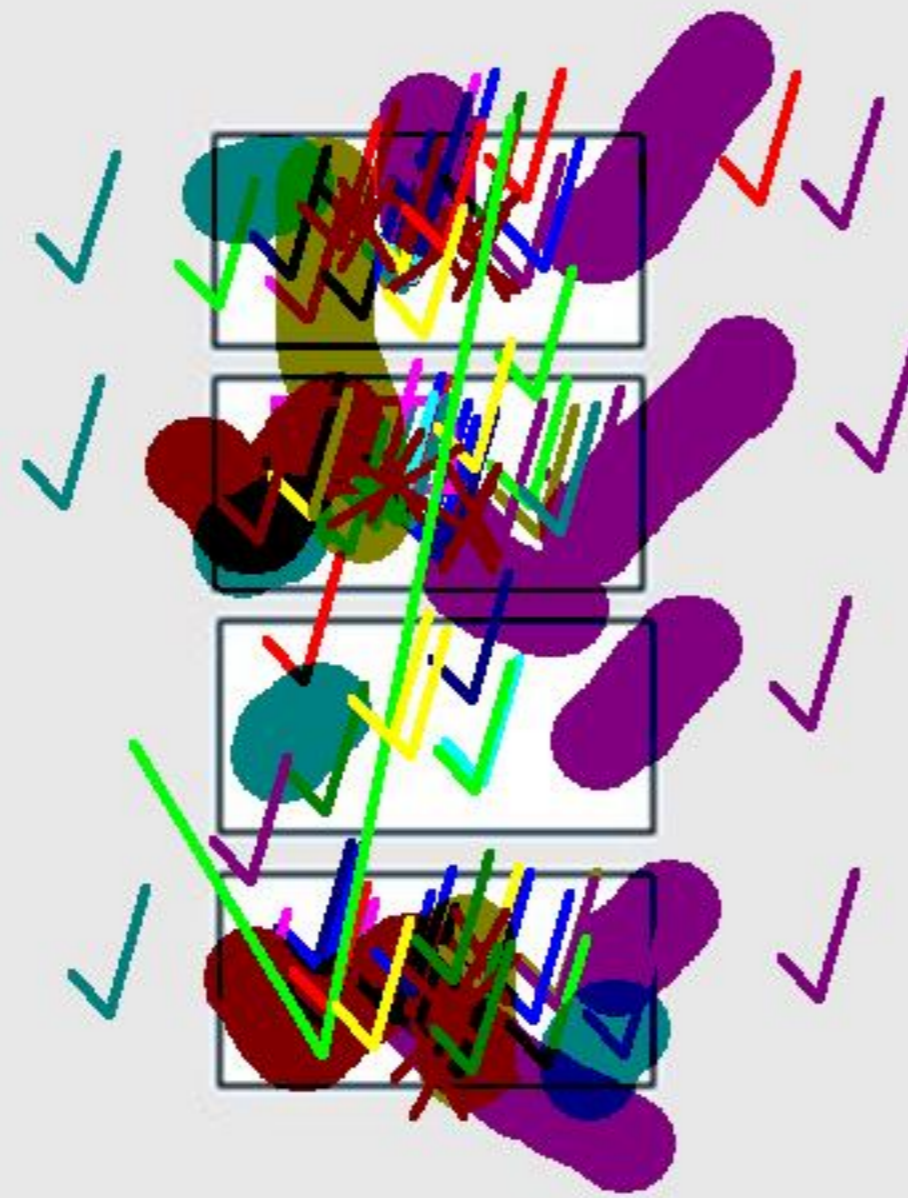
-  Embankment
 -  Pool - Zone 2 (1.5 ac) Plugs and Seed Mix 34-181
 -  Shrub Planting
 -  Marsh (26.6 ac)
 -  Scrape (area TBD)
 -  Upland Zone 3 (12.2 ac) Seed Mix 35-641
 -  Wet Meadow (15.05 ac)
- Wet Meadow Zones**
-  Zone 1A (5.8 ac) Mix 34-271
 -  Zone 1B (0.75 ac) Modified Mix 34-271
 -  Zone 1C (8.5 ac) Modified Mix 34-271



Seeding Considerations

What considerations might influence the final transition ✓
for wetland to upland seed mixes?

- Soil texture
- Hydric Soils
- Swales
- Slopes

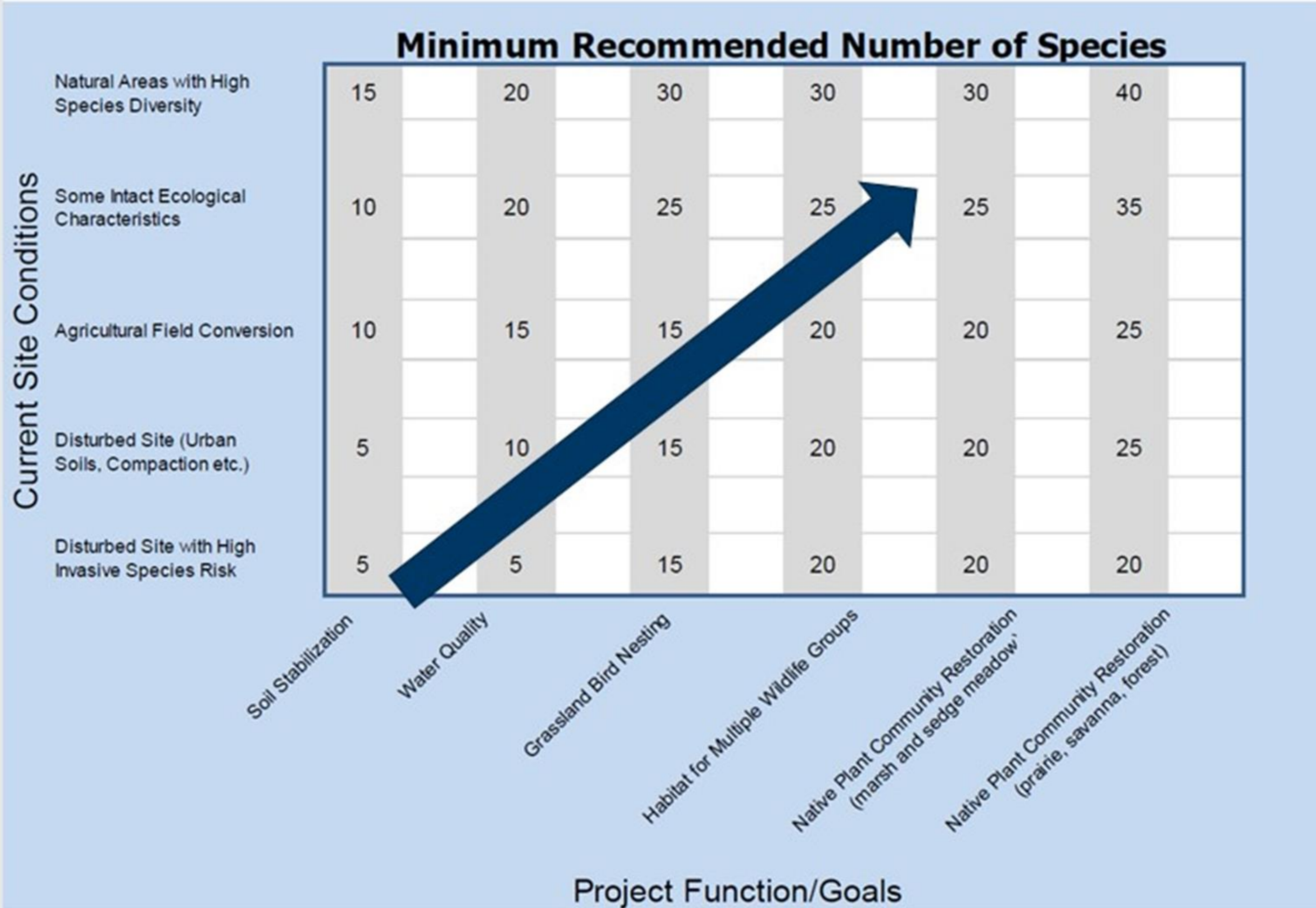


Seed Mix Design Considerations for Wetlands:

- Project Goals
- Site Stressors
- Plant Guilds
- Cost
- Diversity
- Pollinator Benefits



Seeding Considerations



Plant Guilds

- Warm Season Grasses
- Cool-season Grasses
- Sedges
- Rushes
- Forbs

Milkweeds
Asters
Goldenrods
Lobelia
Native Loosestrife
etc.



Seeding Considerations

- Fall installation – Seed is stratified naturally over winter and will germinate in spring
- Spring installation – Best time for grass species
- Mid-summer installation – not recommended

