



MN Wetland Professional Certification Program Wetland Delineation Methods

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Agenda

Day 1 (9-5)

- Introductions
- 3 parameters of a Wetland
- Wetland Delineation Methods
- Critical Definitions of Wetlands
- Wetland Classification systems
- Wetland Functions
- Wetland Hydrology Indicators
- Top of Data Sheet & Hydrology Indicators Field Exercise

Day 2 (9-5)

- Quiz
- Web Resources for Wetland Professionals
- Antecedent Precipitation Exercise
- Offsite Hydrology Methods
- Soil Concepts
- Hydric Soil Indicators
- Web Soil Survey Exercise
- Soil Texture Lab & Field Exercise along Landform

Day 3 (9-5)

- Wetland Vegetation
- Vegetation Sampling Plot Field Exercise
- Submitting Wetland Delineation Reports
- Wetland Delineation Field Exercise & Class summary

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Hydrophytic Vegetation Indicators and Determination

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Outline

- Hydrophytic Vegetation Definition
 - Define Hydrophyte
 - What makes a plant a hydrophyte
 - Why it matters
- Hydrophytic Vegetation Indicators
 - Indicator status
 - Field indicators
 - Dominance
- Determining Hydrophytic Plant Community
 - Rapids Test
 - 50/20 Rule
 - Prevalence Index
 - Morphological Adaptations

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Hydrophytic Vegetation Definition

Wetland definition includes the language: "...and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

1987 Manual says in a wetland, "The prevalent vegetation consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions described above. Hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions."

Hydrophytic Vegetation: Hydrophytic vegetation is defined herein as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.

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Hydrophytic Vegetation Definition

What Is a Hydrophyte

Hydro	=	Water
Phyte	=	Plant

OR

Any plant that is adapted to grow in water or in wet habitats



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Hydrophytic Vegetation Definition

- What makes a plant a hydrophyte?.....ADAPTATIONS!
 - Morphological adaptations ----> visible changes/growth habits
 - Reproductive adaptations ----> changes in how the reproduce
 - Physiological adaptations ----> internal chemical process changes

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Morphological Adaptations

List of Examples

- Buttressed tree trunks
- Multiple trunks
- Pneumatophores
- Adventitious roots
- Shallow roots
- Hypertrophied lenticels
- Aerenchyma
- Polymorphic leaves
- Floating leaves

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Morphological Adaptations



Buttressed bases

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Examples

Multiple Trunks



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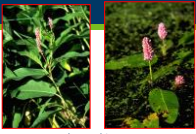
Examples

Shallow Roots - Adventitious Roots

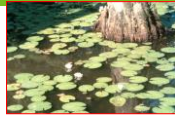


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Morphological Adaptations



Polymorphic Leaves
Water Smartweed (*Persicaria amphibia*)



Floating leaves



Aerenchyma Tissue for Oxygen Transport

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Reproductive Adaptations



Overcup oak seedlings tolerate shallow inundation

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Why Hydrophytes Matter

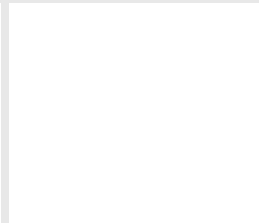
- They have adapted to life in saturated/ponded/anaerobic conditions
- A prevalence of hydrophytes in a plant community indicates the area likely experiences a period of ponded or saturated soils such that they out compete the non-hydrophytes
- The vegetation component in wetland delineation requires each species be classified as a hydrophyte or non-hydrophyte, and then apply to the community as a whole



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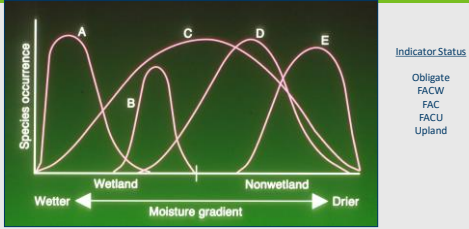
What about bryophytes?

- Bryophytes are not vascular plants.
- Sphagnum is listed as bog plant community but does not have an indicator status



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Plant Indicator Status Distributions



Indicator Status
 Obligate
 FACW
 FACU
 FACU
 Upland

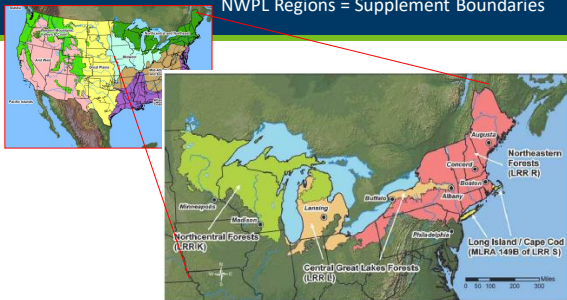
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NWPL Regions = Supplement Boundaries



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NWPL Regions = Supplement Boundaries



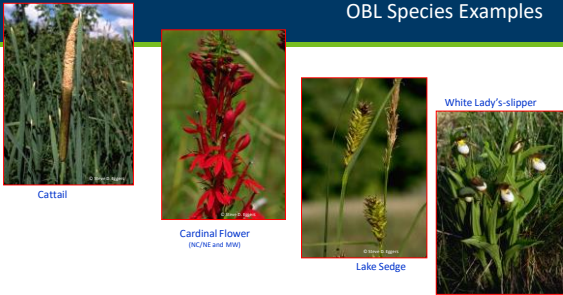
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Indicator Status Trust



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OBL Species Examples



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FACW Species Examples



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FAC Species Examples



Yellow Birch



Plains Cottonwood

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FACU Examples



Canada goldenrod



Black Cherry

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UPL Species Examples



Smooth Brome
(INC/NE, GP)



Common Milkweed
(INC/NE, GP)



Butter and Eggs

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Reed Canary Grass - FACW



Is RCG a true hydrophyte because it occasionally occurs in uplands?

RCG fits well within the concept of a FACW species as it usually occurs in wetlands, but may occur in non-wetlands

The fact that RCG occasionally occurs in uplands is why it wasn't assigned an OBL indicator status

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Indicator Status

Plant species is not on the list...



Malus sylvestris (crab apple)



- Using incorrect name or synonym?
- Searching under most current scientific name? (some have changed)
- If still not on the list then **species is UPL**

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From Individual to the Community

Vegetation Component Focus is on plant communities and not individual plants



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From Individual to the Community

How do I determine if it's a Hydrophytic Community?



Delineation relies heavily on FIELD based INDICATORS applied to the whole veg community

Field Indicators for Hydrophytic Vegetation relies on the dominance or prevalence of hydrophytes in the community

** Data collection/sampling is required to demonstrate/prove the veg community is dominated by hydrophytes for an indicator to be met.

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Vegetation Strata (layers of vegetation)



Trees: woody plants 3 inches or more DBH (regardless of height)

Saplings/Shrubs: woody plants less than 3 in. DBH and taller than 3.28 feet (1 m)

Herbaceous: all non-woody plants including herbaceous vines, regardless of size, and woody plants less than 3.28 feet (1 m) in height

Woody Vines: all woody vines greater than 3.28 feet (1 m) in height

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Bryophyte?

- Show pic of club moss
- What about sphagnum moss?
- Doesn't need soil
- Used in classification
- Relationship to hydrology
- Shouldn't show up at data sheets
- N/I

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Vegetation Strata

Trees: woody plants 3 inches or more DBH regardless of height

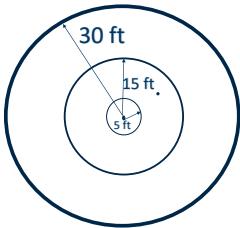
Shrubs/Saplings: woody plants less than 3 inches DBH and taller than 1 meter (3.28 feet) in height

Herbaceous: all non-woody plants regardless of size AND woody plants less than 1 meter (3.28 feet) in height



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Typical Vegetation Sampling

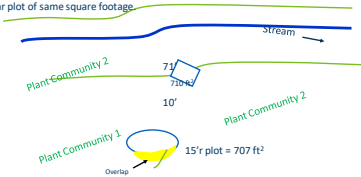


5 ft Herbaceous; 15 ft Shrub/Sapling; 30 ft Tree/Woody Vine

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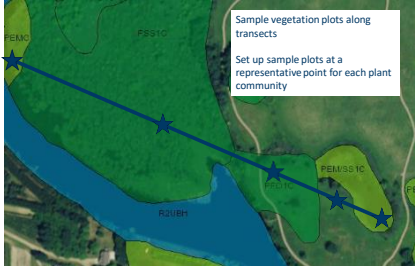
Vegetation Sampling Adjustments

Circular plot overlaps two different plant communities?
Then use rectangular plot of same square footage



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Determining Dominance- Sampling



5/30/2024

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Determining Dominance- Sampling

• Within plots relative abundance of a species is used as the metric for determining dominance

• Typical abundance measures include:

- basal area for tree species
- **percent areal cover**
- stem density
- frequency based on point-intercept sampling.

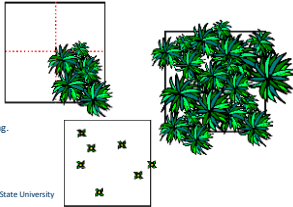


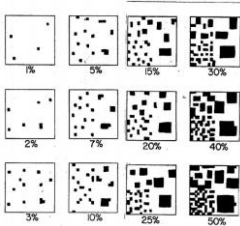
Photo Credit: © 2007 Mark V. Wilson and Oregon State University

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Determining Dominance- Sampling

ESTIMATES OF PERCENT COVER

Percent Areal Cover



- Estimate can vary from person to person
- Almost **NEVER** adds up to 100%...sometimes more; sometimes less
- Is recommended method for determining cover
- Used by 50/20 Rule
- Used by Prevalence Index
- Is different that Absolute Cover = Actual or Total cover

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Determining Dominance- Sampling

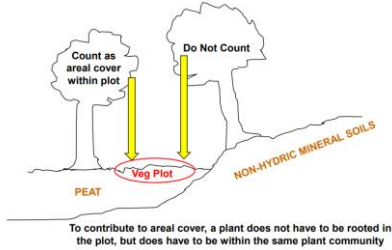


Photo credit USACE

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Determination of Hydrophytic Vegetation

Sequence of Field Indicators

1. Rapid Test
2. Dominance Test ("50/20 Rule")
3. Prevalence Index
4. Morphological Adaptations



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Determining Hydrophytic Vegetation

The procedure for using hydrophytic vegetation indicators is as follows:

1. Apply Indicator 1 ([Rapid Test for Hydrophytic Vegetation](#)).
2. Apply Indicator 2 ([Dominance Test](#)).
 - a) If the plant community fails the dominance test, but indicators of hydric soil and wetland hydrology are both present, proceed to step 3.
3. Apply Indicator 3 ([Prevalence Index](#)).
4. Apply Indicator 4 ([Morphological Adaptations](#)).
 - a) If none of the indicators is satisfied, then hydrophytic vegetation is absent unless indicators of hydric soil and wetland hydrology are present and the site meets the requirements for a problematic wetland situation

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Hydrophytic Plants – Rapid Test



All dominant species across all strata are rated OBL or FACW, or a combination of these two categories, based on a visual assessment

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1. Rapid Test for Hydrophytic Vegetation



All dominant species are rated OBL or FACW, or a combination of the two, based on a visual assessment
Example:
95% areal cover by reed canary grass (FACW)

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Hydrophytic Plants – Dominance Test

- Dominance Test AKA 50/20 Rule
 - Used to determine which species are dominant in each strata (layer of veg)
 - Once dominate species are identified their percent cover does not matter; all treated equally
 - Example: Tree Strata may have low number of species compared to Shrub Strata, but may still have a dominant component.
- IF greater than 50% of the dominant species across all strata are OBL, FACW, or FAC, THEN hydrophytic plant community exists
 - Example: 5 dominant species are identified. 3 dominant species are FACW and 2 dominants are FACU. MEETS CRITERIA FOR HYDROPHYTIC PLANT COMMUNITY; 3/5>=.6 or 60% FACW dominants

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Hydrophytic Vegetation – Dominance Test

50/20 Rule How To:

1. Estimate absolute percent cover of each species in first stratum
2. Rank species from most to least abundant
3. Calculate the total percent cover of all species (usually not 100 percent) in that stratum
4. Calculate 50% of total cover
5. Calculate 20% of total cover
6. Begin at top of list and add percent covers together until 50% threshold is met
7. Continuing after last species in 50%, next identify species that ALONE meet or exceed 20% threshold
8. Repeat for each stratum

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Hydrophytic Vegetation – Dominance Test

50/20 Rule Example

Species	% Cover	
Species a	45	$120 \times 50\% (0.50) = 60$
Species b	30	$120 \times 20\% (.20) = 24$
Species c	25	
Species d	10	Species a + Species b = 75 --- <u>Together</u> exceed 50%
Species e	5	
Species f	5	Species c = 25 --- <u>individually</u> meet/exceed 20%
<hr/>		
Total Cover	120	Species a, b, and c are dominant

Note: if species percent cover is a tie, include both

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Hydrophytic Vegetation – Dominance Test

50/20 Example #2

Species A: 55%	Tied; count both	125	Dominants
Species B: 35%			
Species C: 35%			
Species D: 25%			
Species E: 20%			
Species F: 10%			
<hr/>			
TOTAL : 180			
$180 \times 0.50 = 90$			
$180 \times 0.20 = 36$			

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Wetland Delineation Reports

- Field Notes
- Basic Report Components
- Report Contents
- Field Review
- Non-Routine Wetland Delineations

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Guidance

Delineation Method	Review of offsite mapping resources	Site Visit	Sampling Approach	Complete Field Data Forms	Field Staking of Wetland Boundaries
Routine Level 1	Yes	Sometimes	Offsite	No	No
Routine Level 2	Yes	Yes	Onsite, qualitative	Yes	Yes
Comprehensive	Yes	Yes	Onsite, quantitative	Yes	Yes

WCA Application Type Examples	Commonly Used Delineation Method
Temporary impact under No-Loss	Routine Level 1
Banking application: pre-application scoping	Routine Level 1
Banking application: full application	Routine Level 2
Road Program Wetland Impact Documentation—Road project through a large continuous wetland	Routine Level 1
Road Program Wetland Impact Documentation—Scattered wetlands within construction corridor	Routine Level 2
Replacement plan	Routine Level 2
Enforcement actions	Routine Level 2 or Comprehensive
Wetland boundary approval (no project application)	Routine Level 2
Agricultural exemption determination (8420.0420, Subpart 2A)	Routine Level 1

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Take Good Field Notes

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Introduction

- Who did you do this for?
 - Developer, public entity
- Where is the project
 - General location and size of project area
 - General description of plant communities: Wooded, meadow, urban etc...
- Why are you doing it?
 - Identify wetlands on potential development site
 - Identify wetlands in road corridor
- When did you do it?

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Methods

- Level 1 or 2?
- Off site aerial review?
- Monitoring data?
- Reference wetlands?
- Problem area or atypical procedures?

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RESULTS and Discussion

Describe wetlands AND uplands

- Wetland Type – Circular 39, Cowardin, Eggers & Reed
- Dominant Vegetation for each community/type

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Text Examples

Wetland Type &Vegetation:

“Wetland 1 is a Type 3 (PEMC/F) with an interior shallow marsh community surrounded by a fringe of wet meadow.

Dominant vegetation in the shallow marsh includes broadleaf cattail, and water plantain.

The wet meadow fringe include reed canary grass, with a few scattered willow shrubs.”

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Text Examples

Soils:

“Soils in the wetland consisted of a deep layer of organic sapric material overlying fine sand consistent with the mapped soil unit. Indicator A1 (histosol) was observed in the wetland.

Adjacent upland soils lacked the organic surface layer and consisted of high chroma loamy fine sand over sand. No hydric soil indicators were observed in the upland.”

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Report Components – Figures

1. Site Location
2. National Wetland Inventory (NWI)*
3. Soils
4. Public Waters Inventory (PWI)*
5. Wetland Boundary Map



*often combined

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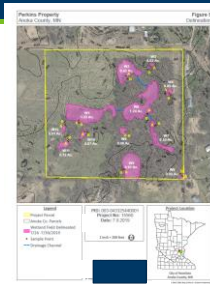
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Report Components – Maps | Site Location



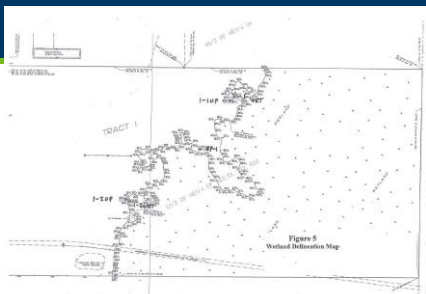
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Identify all aquatic resources



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Figure 5 Wetland Delineation Map



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Data Forms

- Completely filled out
- Correspond to sample locations indicated on a map
- Remember that sample locations should be representative
- Not needed if doing a Routine Level 1
- Do a complete job, but keep in mind that these are field assessments, not a scientific study, spend a reasonable amount of time.

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Field Review

Who should conduct site review?

- At least 1 member of TEP
- LGU may request assistance from TEP (SWCD and BWSR) or other tech. prof.
- Corps invited/coordination
- Delineator invited (but does not need to be present)

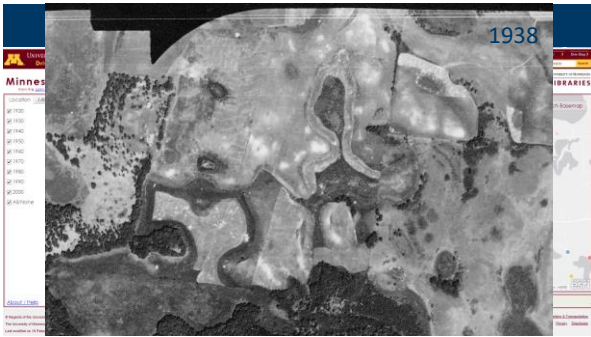


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MINNESOTA WETLAND PROFESSIONAL CERTIFICATION PROGRAM
CORE CURRICULUM

- **Critical Definitions**
- **Classification Systems & Functions**
- **Wetland Delineation**

- **Vegetation** – hydrophyte, Dominance
- **Soil** – hydric indicators
- **Hydrology**- inputs/outputs, indicators, monitoring



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What is a Wetland?

Definition: Those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.



Hydrology + Vegetation + Soil = Wetland

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3-Parameter/ Indicator Approach

1. **Soils** –Historic conditions, may not reflect current condition.
2. **Hydrology** –Current condition, but heavily influenced by recent climate conditions
3. **Vegetation** – Somewhere between

The 87 Manual requires 3 parameters because no one source typically gives the answer in all situations



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Land Resource Regions

• Regions dictate which indicators are used and how they are used

- a) The indicator descriptions in this guide are abbreviated versions of the full descriptions found in the Regional Supplements to the Corps of Engineers Wetland Delineation Manual (Great Plains, North-Central/North-East, Midwest). Users are encouraged to reference the full descriptions and user notes found in those documents.
- b) An indicator is applicable statewide unless otherwise indicated below the indicator description.



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Land Resource Regions

• Regions dictate which indicators are used and how they are used



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Wetland Delineation Types

ROUTINE

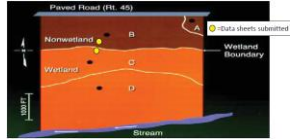
- **Level 1** - Onsite Inspection Unnecessary
- **Level 2** - Onsite Inspection Necessary
- **Level 3** - Combination of Levels 1 and 2



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Sampling Location Should Be Representative

- Representative of soil changes (from upland to wetland)
- Representative of vegetation changes
- Representative of hydrology indicator changes
- Representative of landscape changes



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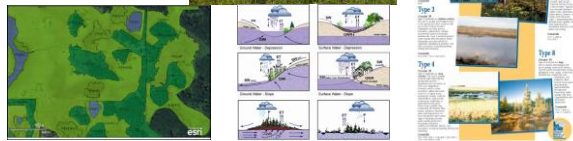
Critical Definitions

- Wetlands
- Growing Season
- Atypical Situations
- Problem Areas
- Normal Circumstances

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Wetland Classification Systems in MN

- Circular 39
- Cowardin et al.
- Eggers & Reed
- Hydrogeomorphic Method



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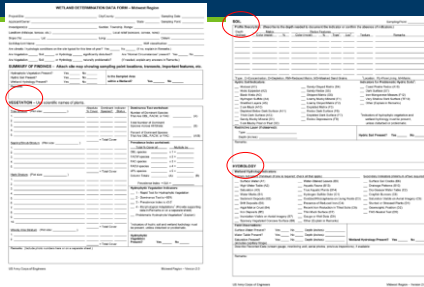
Research Data Sources

- Aerial Photos (current and historic)
- Soil map (Web Soil Survey)
- Topographic\LiDAR
- NWI Map (updated version in MN)
- DNR Protected Waters Map



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It's all about the documentation!



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Soil

- Basics of Soil
 - Soil formation
 - Landscape position
- Soil Properties
 - Texture
 - Color
- Hydric soil develop
- Web Soil Survey
 - Interpreting soil reports
- Hydric soil indicators
 - All
 - Fine
 - Sandy
- Common soil indicators



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Hydrology

...“inundated or saturated by surface or ground water at a frequency and duration”

- Technical standard of 14 or more consecutive days of flooding or ponding;
- Water table 12 in. or less below soil surface;



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Hydrology Indicators

Evidence that there is continuing hydrology and confirms that an episode of inundation/saturation occurred recently.

Wetland hydrology indicators are divided into two categories:

- Primary – provide stand-alone evidence of a current or recent hydrologic event; and
- Secondary – provide evidence of recent hydrology when supported by one or more other hydrology indicators.



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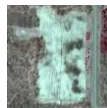
Hydrology Indicator Groups



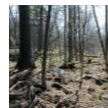
Group A – direct observation of water



Group B – evidence of flooding/ponding



Group C – evidence of current or recent saturation.

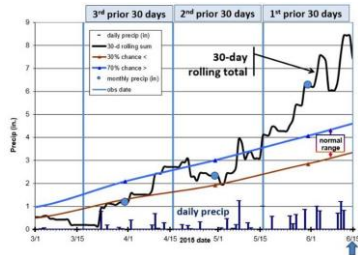


Group D – Landscape and veg. characteristics that indicate contemporary wetland conditions.

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Antecedent Precipitation

To better interpret the data collected or observation made in the proper context.



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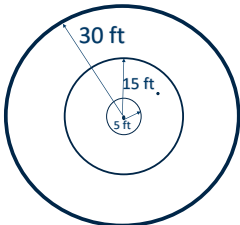
Overview of Wetland Vegetation

- **Hydrophytic Vegetation Definition**
 - Define Hydrophyte
 - What makes a plant a hydrophyte
 - Determine why matters
- **Hydrophytic Vegetation Indicators**
 - Field indicators
 - Indicator status
 - Dominance
- **Determining Hydrophytic Plant Community**
 - Rapid Test
 - 50/20 Rule
 - Prevalence Index
 - Morphological Adaptations

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Vegetation Sampling



5 ft Herbaceous; 15 ft Shrub/Sapling; 30 ft Tree

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Determining Hydrophytic Vegetation

The procedure for using hydrophytic vegetation indicators is as follows:

1. Apply Indicator 1 (Rapid Test for Hydrophytic Vegetation).
2. Apply Indicator 2 (Dominance Test).
3. Apply Indicator 3 (Prevalence Index). This and the following step assume that at least one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present.
4. Apply Indicator 4 (Morphological Adaptations).

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VEGETATION - Use scientific names of plants.				Sediment Test worksheet The Ave. C _{org} , FAC or FAC including FAC-1
Test Stratum (PHI code)	Indicator	Dominance Indicator	Prevalence Index worksheet	
1				Sediment Test worksheet The Ave. C _{org} , FAC or FAC including FAC-1 (A)
2				
3				
4				
Percent of Dominant Species The Ave. C _{org} , FAC or FAC				Prevalence Index worksheet C _{org} C _{org} of _____ M _{Hydro}
1				
2				
3				
Percent of Dominant Species The Ave. C _{org} , FAC or FAC				Hydrophytic Vegetation Indicators Dominance Test in 20th Prevalence Index in 12 of Vegetation Adaptations (Phase supporting species presence in an adjacent stratum) Intermediate Hydrophytic Vegetation (if any)
1				
2				
3				
Indicators of hydroly soil and wetland hydrology must be present, unless otherwise indicated.				Hydrophytic Vegetation Present? Yes No
1				
2				
3				

Hydrophytic Veg.

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Wetland Delineation Reports

- Field Notes
- Basic Report Components
- Report Contents
- Field Review
- Non-Routine Wetland Delineations

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Final Thoughts?

- Questions (last chance!)