



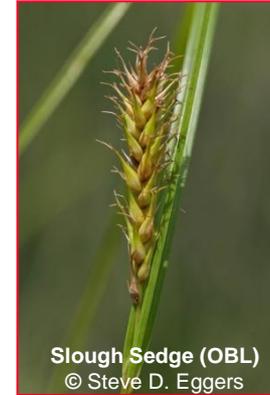
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Hydrophytic Vegetation



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Slough Sedge (OBL)
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River Bulrush (OBL)
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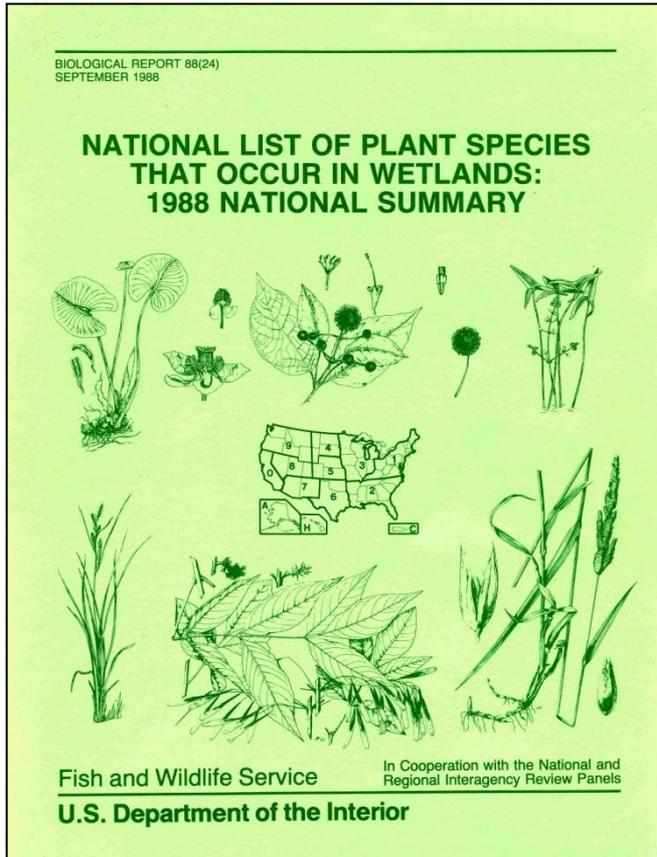


Concepts

- ✓ Wetlands are dominated by hydrophytes
- ✓ To evaluate whether a plant community is hydrophytic, we need to determine what species are dominant and how many of the dominant species are hydrophytes



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National List of Plant Species that Occur in Wetlands (1988)



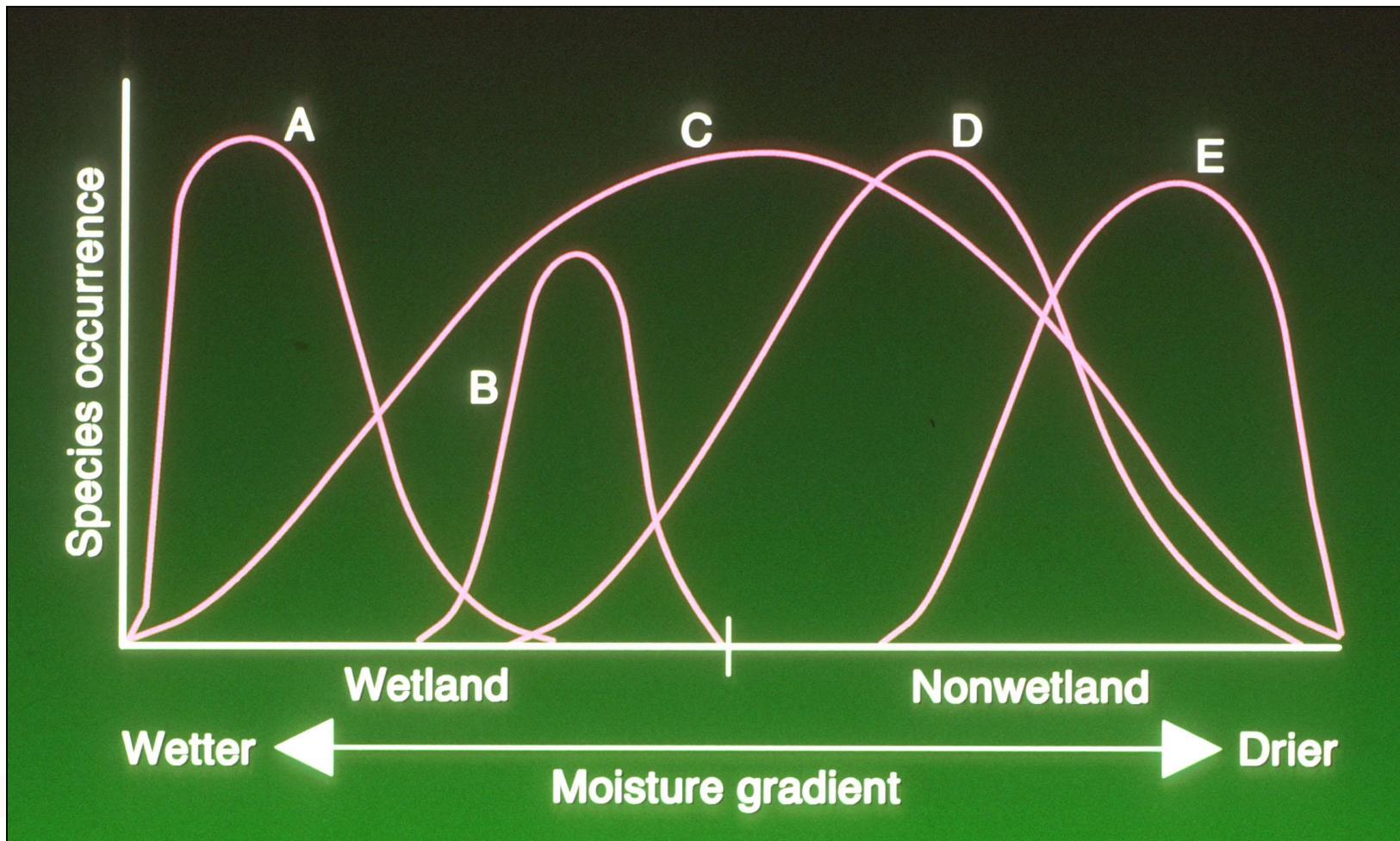
Plant Indicator Status

Represents the probability of occurrence in wetlands:

<u>Indicator category</u>	<u>Symbol</u>	<u>Occurrence in Wetlands</u>
Obligate wetland plants	OBL	> 99%
Facultative wetland plants	FACW	67 - 99%
Facultative plants	FAC	34 - 66%
Facultative upland plants	FACU	1 - 33%
Obligate upland plants	UPL	< 1%

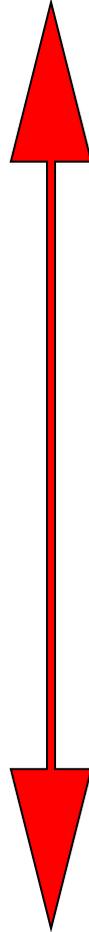


Plant Distributions





Wettest



OBL
FACW+
FACW
FACW-
FAC+
FAC

Hydrophytes

FAC-
FACU+
FACU
FACU-
UPL

Non-Hydrophytes

Driest



Indicator Status: Drop (+) and (-)

- ✓ (+) and (-) are dropped for the facultative categories
- ✓ (+) and (-) were not based on ecological data; rather, used as tiebreakers
- ✓ FAC- species go to FAC for now
- ✓ Update to *National List of Wetland Plants* will also drop (+) and (-)
- ✓ *National List of Wetland Plants* will ultimately determine if FAC- species should be FAC or FACU



Wettest

OBL

FACW

Hydrophytes

FAC

FACU

Non-Hydrophytes

UPL

Driest



Notes on Indicator Status

- ✓ **National List of Plant Species that Occur in Wetlands (1988)**
 - a. If a species is not on the list, generally assume it is **UPL**
(advisory: hundreds of nomenclature changes since 1988. Nomenclature rather than **UPL** could be a reason for absence on 1988 list)
 - b. **NI** = reviewed but given no indicator status
 - c. **NO** = no known occurrence in that region in 1988
 - d. For **NI**, **NO** --- apply indicator status of adjacent region
 - e. If **NI** or **NO** is not listed in adjacent region, consult 1996 national list of plant species that occur in wetlands
(St. Paul District Guidance)

If your field observation is that individual FACU, NI or NO species are functioning as hydrophytes, then use Chapter 5 “Problematic Hydrophytic Vegetation”



Update of National Wetland Plant List

- ✓ All FAC- species will be “red-flagged” for scrutiny by regional panels to determine if FAC or FACU is the appropriate indicator status





Indicator Status



Common Milkweed
(UPL)

Asclepias



Swamp Milkweed
(OBL)



Reed Canary Grass – FACW



RCG occasionally occurs in uplands – is it a true hydrophyte??

RCG fits perfectly within the concept of a FACW species as it occurs in wetlands 67-99% of cases

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



OBL Species



Cattail



**Cardinal
Flower**



Lake Sedge



White Lady's-slipper

Photos by Steve D. Eggers



FACW Species



Giant Goldenrod



**Amer. Red
Raspberry**



Red-osier Dogwood

Photos by Steve D. Eggers



FAC Species



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Quaking Aspen



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Eastern Cottonwood

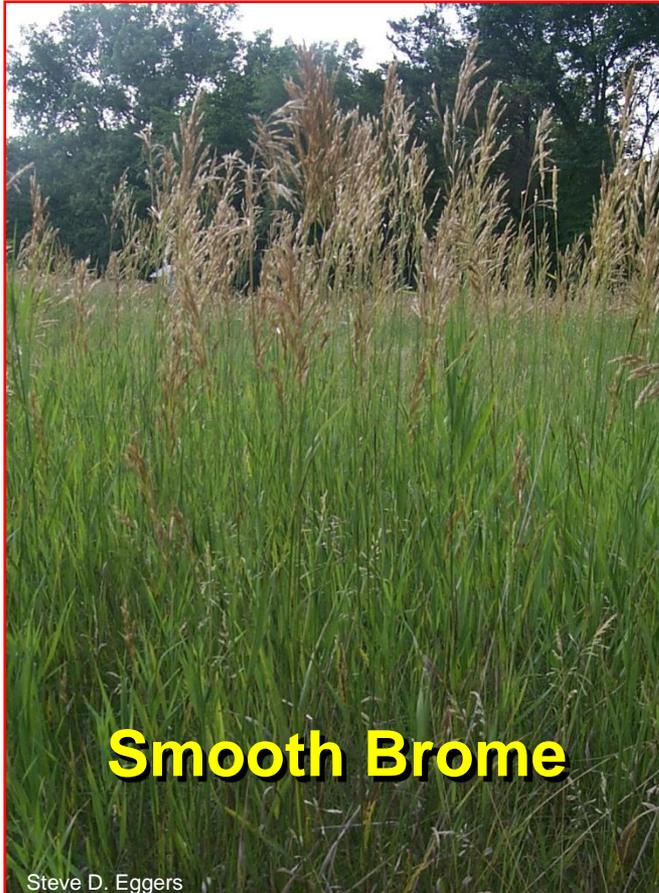


FACU Species





UPL Species

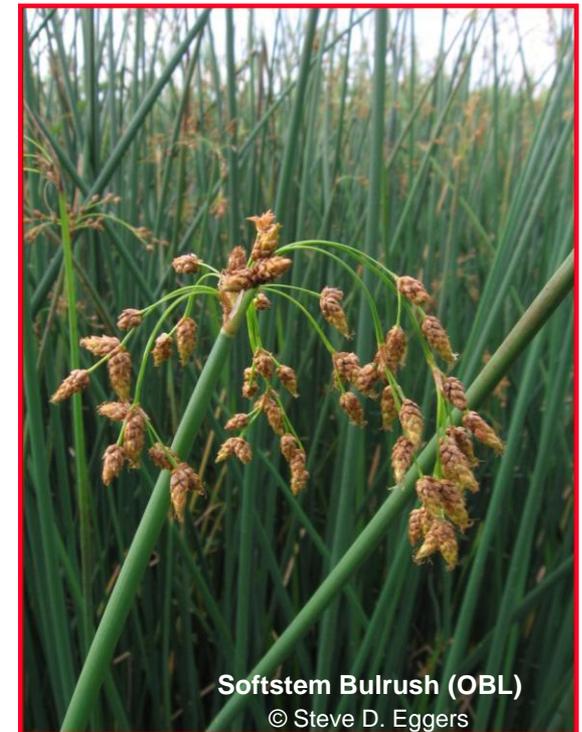




Determination of Hydrophytic Vegetation

Four indicators, sequenced*

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





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

A photograph of a forest with many trees and a grassy floor covered in fallen leaves. The trees are mostly thin and have green leaves, with some showing yellowing. The ground is covered in a mix of green grass and brown fallen leaves.

How many strata?

Determine dominants of each stratum separately



Measures of Plant Dominance

- ✓ Percent areal cover
- ✓ Stem density
- ✓ Basal area (trees)

Using percent areal cover is recommended:
It can be used for both 50/20 Rule
and Prevalence Index

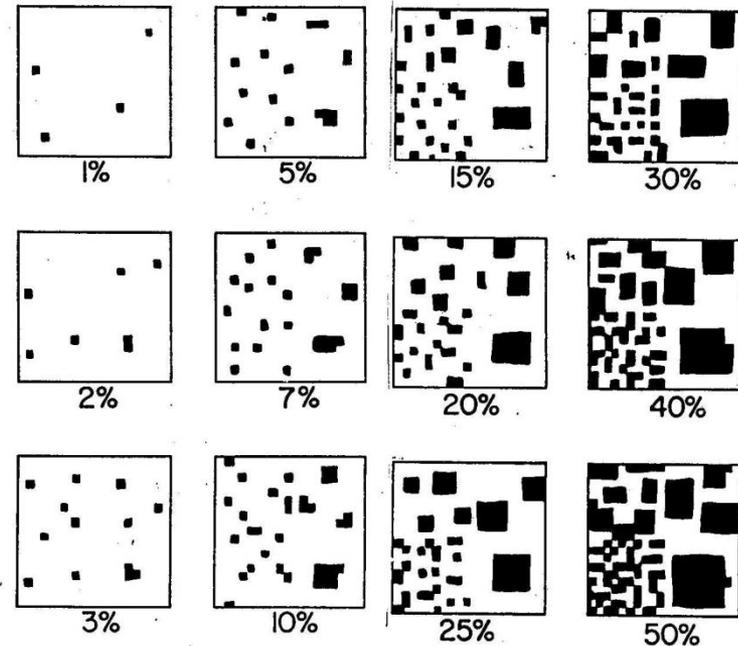


Percent Areal Cover

✓ “Areal” is an adjective of area – use for % plant cover

~~“Aerial”~~ Cover

ESTIMATES OF PERCENT COVER



“Absolute Cover” = Actual Cover

Vegetation Sampling

No mandated technique: any approved method can be used

- ✓ **Sample at least one point in each plant community**
- ✓ **Do not position plots such that they overlap into a different plant community (-ties)**
 - a. **Use an elongated, rectangular plot of the same square footage as a circular plot**

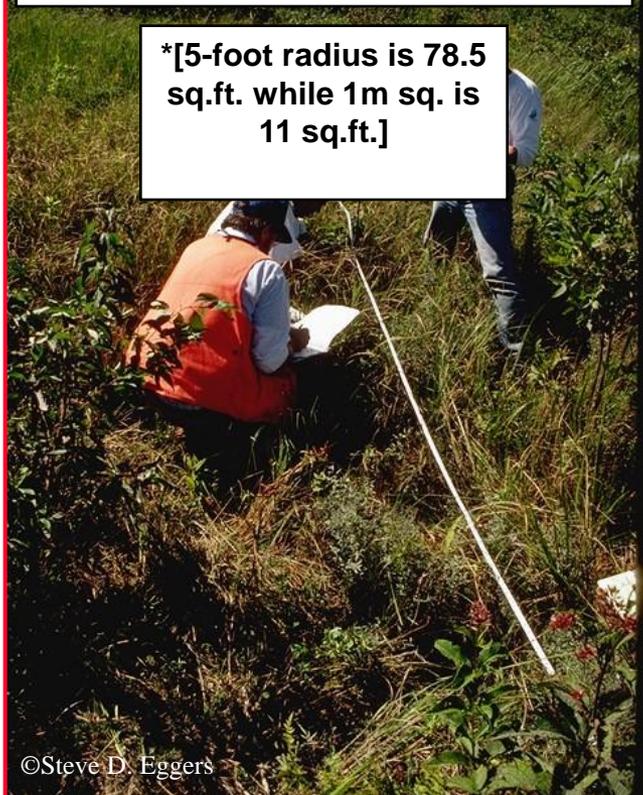
For example, a 15-foot radius circular plot is equivalent in coverage to a 10-foot by 71-foot rectangular plot



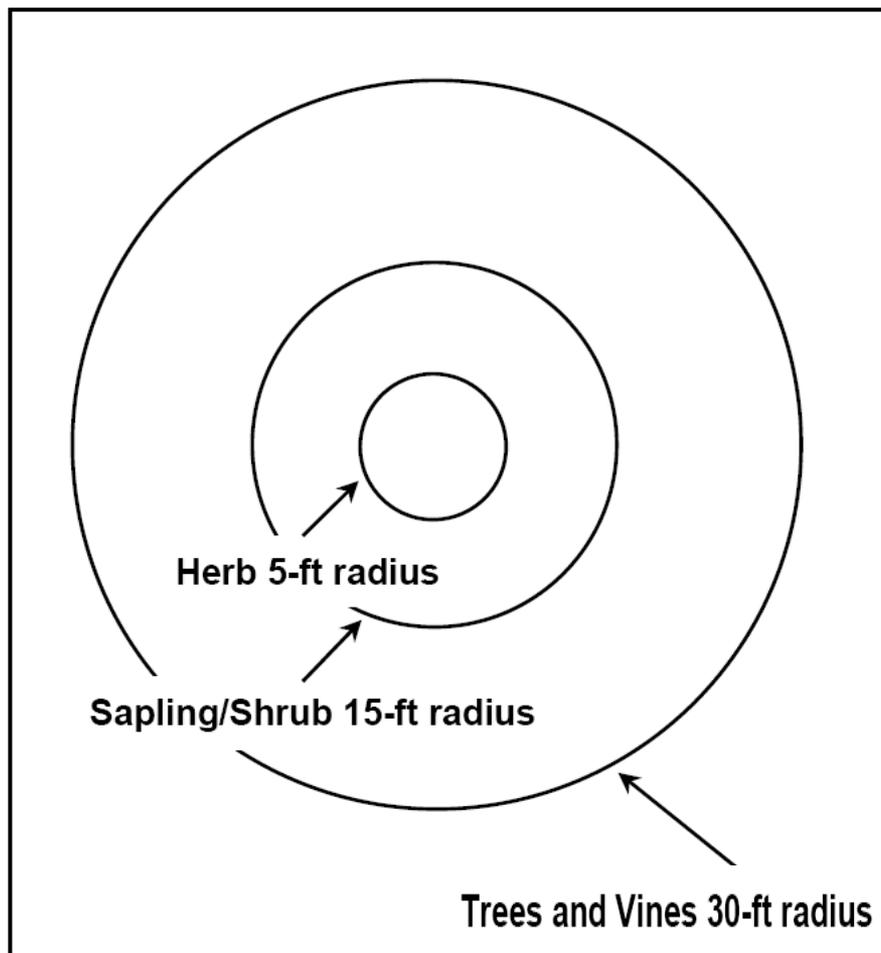
Vegetation Sampling

**Option: Three to seven
1m sq. plots for herbs***

***[5-foot radius is 78.5
sq.ft. while 1m sq. is
11 sq.ft.]**

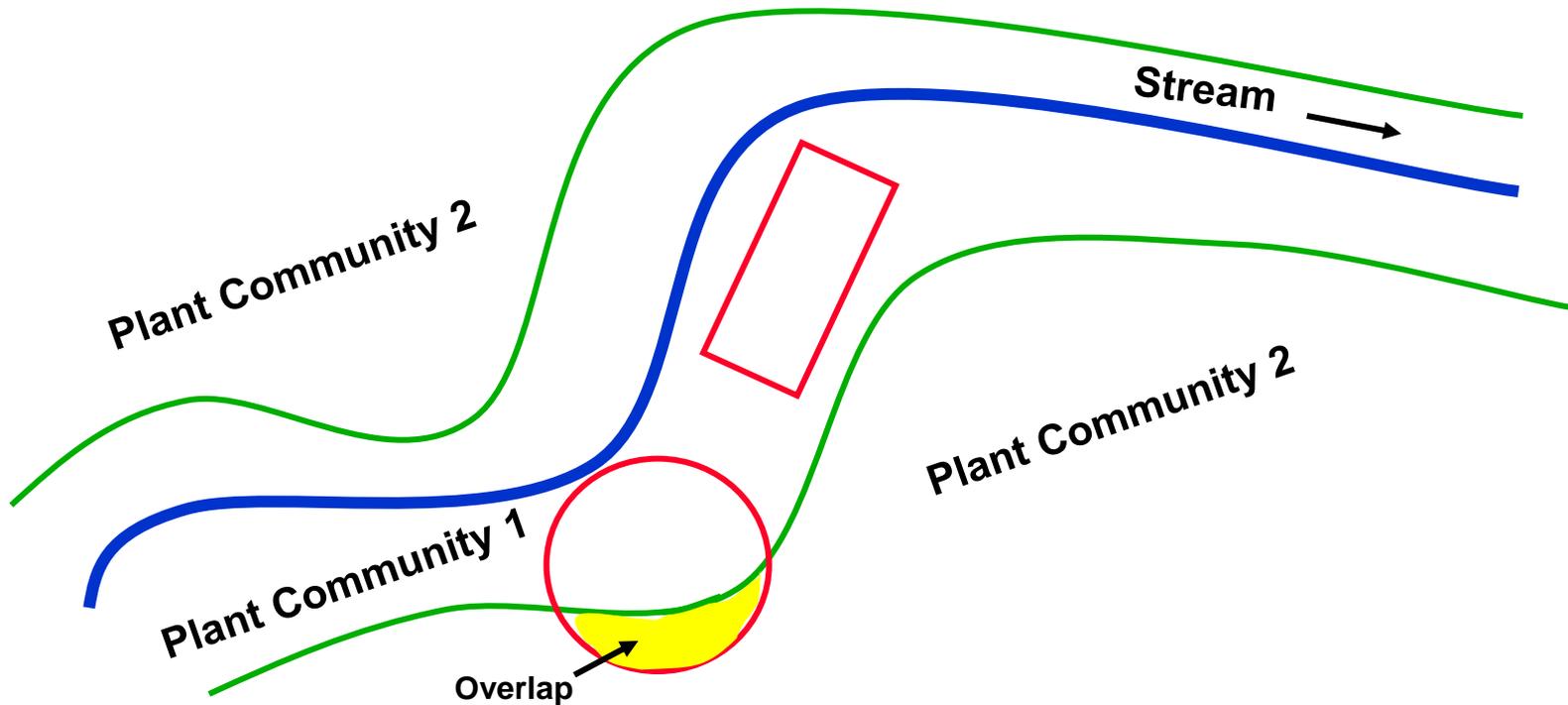


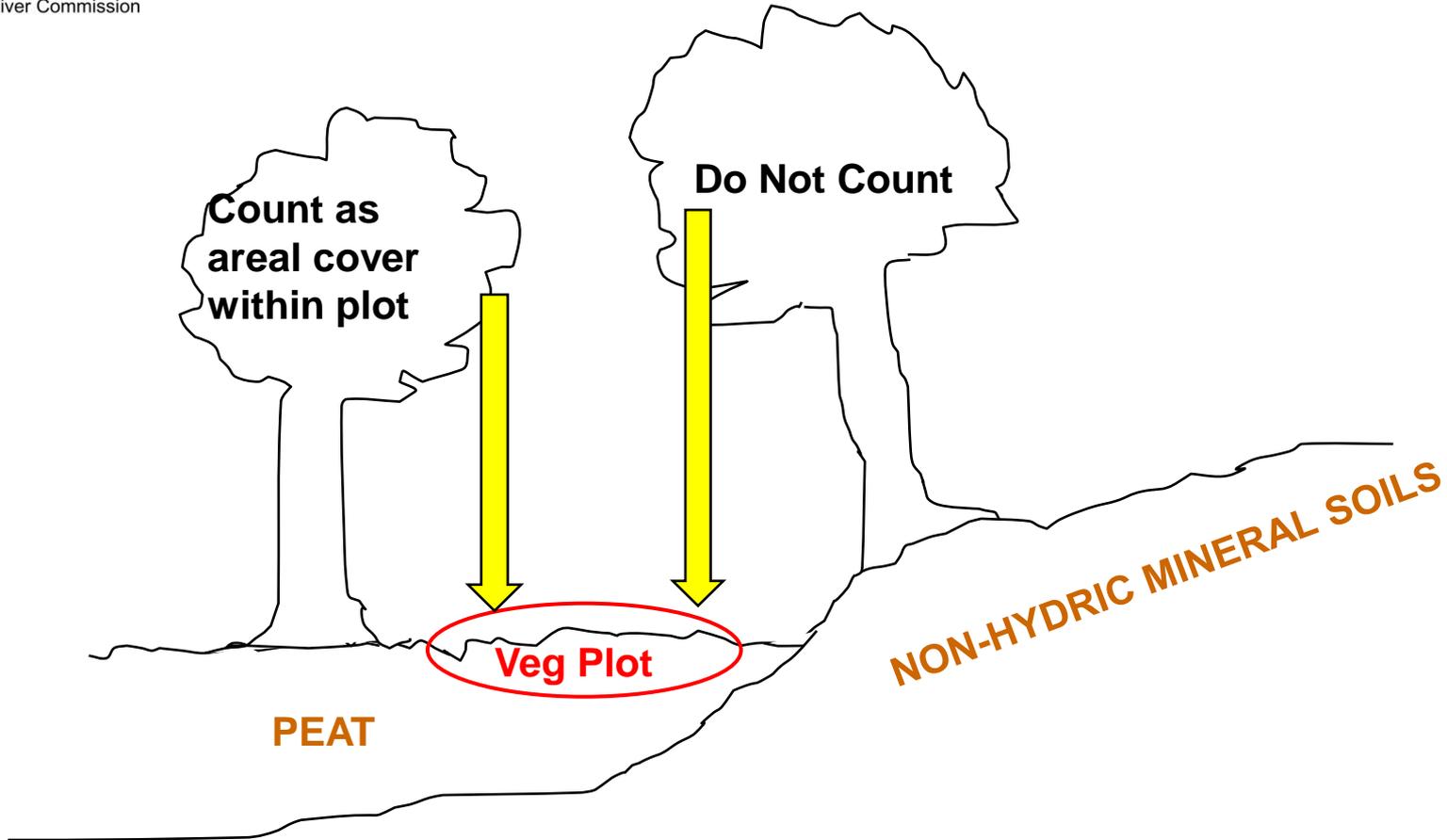
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Adjust Vegetation Plot Shape as Needed

If circular plot would overlap two different plant communities then use rectangular plot of same square footage





To contribute to areal cover, a plant does not have to be rooted in the plot, but does have to be within the same plant community

Hydrophytic Vegetation Sequence

1. Apply the Dominance Test (“50/20 Rule”)

- a. If the 50/20 Rule is met, the vegetation is hydrophytic
- b. If 50/20 Rule is not met but indicators of hydric soils and wetland hydrology are **BOTH** present, Proceed to Step 2.

(Be aware of problem areas and atypical situations – see Chapter 5)

2. Prevalence Index

- a. If the PI is ≤ 3.0 , the vegetation is hydrophytic
- b. If this is not met, go to Step 3.

3. Morphological Adaptations

- a. If >50% of individuals of a FACU species exhibit morphological adaptations, assign FAC status and recalculate Steps 1 and 2 above.



Step 1: Apply Dominance Test ("50/20 Rule")

Stratum must have $\geq 5\%$ cover to contribute a dominant species

Determine dominants for each stratum separately

A species dominant in 2 or more strata is counted two or more times

Cover for each stratum may exceed 100% due to overlapping layers
(e.g., spikerush 10", lake sedge 28", cattail 60" in height)





“50/20 Rule”

For each vegetation layer separately:

- ✓ List the plant species in descending order of abundance
- ✓ Sum the total areal cover
- ✓ Multiply by 50%
- ✓ Add plant species in descending order of percent cover until 50% is reached
- ✓ Multiply the total areal cover by 20%
- ✓ Any individual species remaining comprising at least 20% of total cover is also a dominant [no summing of percent cover for the 20% part]



Selection of Dominant Plants

If there is a tie, bring in all that have the same percent cover

<u>Species Present</u>	<u>% Cover</u>	<u>Total</u>
* <i>Cornus foemina</i>	25 -----	25
* <i>Spiraea alba</i>	20 -----	45
* <i>Cornus amomum</i>	20	
<i>Rhamnus frangula</i>	10	
<i>Toxicodendron vernix</i>	<u>5</u>	
	80	
* Selected as dominants		80 x .50 = 40.0 80 x .20 = 16.0



Tree Stratum

Species A: 60% cover }
Species B: 50% cover } 110
Species C: 40% cover — Also a dominant
Species D: 30% cover — Non-dominant
Total: 180

$$180 \times .50 = 90$$

$$180 \times .20 = 36$$



Determine dominants by stratum! Don't mix strata

~~Species A (tree): 33 percent cover
Species B (tree): 20 percent cover
Species C (herb): 15 percent cover
Species D (herb): 10 percent cover
TOTAL: 78 percent cover~~

~~$78 \times .50 = 39$~~

~~$78 \times .20 = 15.6$~~



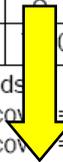
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ance Test Example

Stratum	Species Name	Wetland Indicator Status	Absolute Percent Cover	Dominant?
Herb	<i>Impatiens capensis</i>	FACW	15	Yes
	<i>Geranium carolinianum</i>	UPL	7	Yes
	<i>Toxicodendron radicans</i>	FAC	5	No
	<i>Lonicera tatarica</i>	FACU	2	No
	<i>Glyceria striata</i>	OBL	2	No
	<i>Parthenocissus quinquefolia</i>	FACU	1	No
	<i>Arisaema triphyllum</i>	FACW	0.5	No
	<i>Carex laxiflora</i>	FACU	0.5	No
			Total cover	33.0
		50/20 Thresholds: 50% of total cover = 16.5% 20% of total cover = 6.6%		
Sapling/shrub	<i>Carpinus caroliniana</i>	FAC	35	Yes
	<i>Carya ovata</i>	FACU	10	No
	<i>Acer saccharum</i>	FACU	5	No
	<i>Quercus rubra</i>	FACU	5	No
			Total cover	55.0
		50/20 Thresholds: 50% of total cover = 27.5% 20% of total cover = 11.0%		
Woody vine	<i>Quercus bicolor</i>	FACW	40	Yes
	<i>Fraxinus pennsylvanica</i>	FACW	17	Yes
	<i>Ulmus americana</i>	FACW	10	No
	<i>Carya ovata</i>	FACU	8	No
			Total Cover	75.0
		50/20 Thresholds: 50% of total cover = 37.5% 20% of total cover = 15.0%		
Hydrophytic Vegetation Determination	Total number of dominant species across all strata = 5. Percent of dominant species that are OBL, FACW, or FAC = 80%. Therefore, this community is hydrophytic by Indicator 1 (Dominance Test).			

50/20



The woody vine stratum failed to meet the minimum 5% cover so the single species, *Toxicodendron radicans*, is not included as a dominant in the determination of hydrophytic vegetation.

¹ A stratum with less than 5 percent cover is not considered in the dominance test, unless it is the only stratum present.

Why not just say any species with 20% or more areal cover is a dominant?

It would result in technical errors, for example:

- ✓ **None of the plant species present has 20% cover (a floristically diverse site or a recently disturbed site)**
- ✓ **One plant species has 20% cover and 5 others have 18% cover (all should be dominants)**
- ✓ **Total cover for that stratum is >100% (if total cover is greater than 100%, it would take more than 20% cover for a species to meet the “20” portion of the “50/20 Rule”)**



Dominance Test for Hydrophytic Vegetation:

More than 50% of the dominant species are OBL, FACW, or FAC

Procedure: Divide the number of dominants that are FAC or wetter by the total number of dominants. Then multiply by 100.

Example: 3 of 5 dominants are FAC or wetter = 60%



Step 2: Apply Prevalence Index (if needed)

Uses the same percent cover data as that for the 50/20 Rule !!

PI is a weighted average by indicator status:

% cover of all OBL spp.	x 1	
% cover of all FACW spp.	x 2	$\frac{B}{A} = PI$
% cover of all FAC spp.	x 3	
% cover of all FACU spp.	x 4	
<u>% cover</u> of all UPL spp.	<u>x 5</u>	
A	B	

Divide sum of weighted cover value by sum of actual cover.
If $PI \leq 3.0$ then veg is hydrophytic.



Step 2: Apply Prevalence Index (if needed)

- ✓ At least 80 percent of total cover must be correctly identified to the species level
- ✓ Species used must have an assigned indicator status
- ✓ Advantage of PI vs. “50/20 Rule”: PI is more comprehensive as it uses the cover of all plant species vs. a few dominants
- ✓ Disadvantages of PI vs. “50/20 Rule”: (1) requires more time; and (2) requires greater plant identification skills

Prevalence Index Example

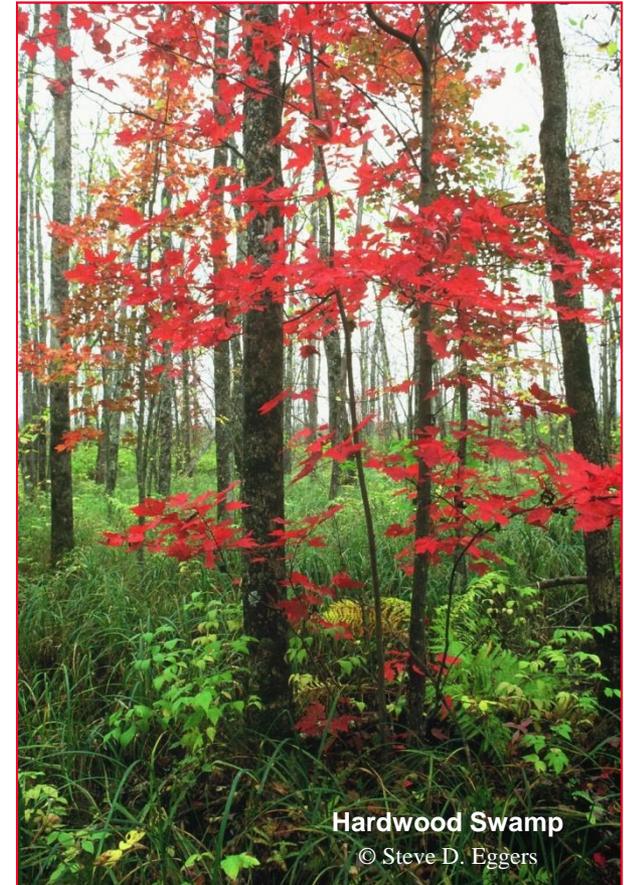
Indicator Status Group	Species name	Absolute Percent Cover by Species	Total Cover by Group	Multiply by: ¹	Product
OBL species	<i>Glyceria striata</i>	2	2	1	2
FACW species		15 0.5 40 17 10	82.5	2	165
FAC species	<i>Toxicodendron radicans</i> ² <i>Carpinus caroliniana</i>	6 35	41	3	123
FACU species	<i>Lonicera tatarica</i> <i>Parthenocissus quinquefolia</i> <i>Carex laxiflora</i> <i>Carya ovata</i> ² <i>Acer saccharum</i> <i>Quercus rubra</i>	2 1 0.5 18 5 5	31.5	4	126
UPL species	<i>Geranium carolinianum</i>	7	7	5	35
Sum			164 (A)		451 (B)
Hydrophytic Vegetation Determination		Prevalence Index = $B/A = 451/164 = 2.75$ Therefore, this community is hydrophytic by Indicator 2 (Prevalence Index).			
¹ Where OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5. ² This species was recorded in two or more strata (see Table 2), so the cover estimates were summed across strata.					

A = 164 B = 451
B/A = 2.75
Veg is hydrophytic



Vegetation Fails Dominance Test but Meets PI

- ✓ Not expected to be frequent occurrence
- ✓ Exception: when percent of dominants FAC or wetter is exactly 50%
(the hydrophytic vegetation criterion is more than half of all dominants are FAC or wetter)
- ✓ Exception: Dominant(s) are FACU but numerous non-dominants are FACW or OBL



Hardwood Swamp
© Steve D. Eggers



Step 3: Morphological Adaptations

- ✓ **Confirm that morphological feature is present mainly in potential wetland area and is also not present on same species in the surrounding non-wetlands**
- ✓ **For each FACU species with morphological adaptations, record percent of individuals with this feature**
- ✓ **If more than 50 percent have the morphological feature, consider it a hydrophyte with FAC status**
- ✓ **Recalculate the 50/20 Rule and/or Prevalence Index**

VEGETATION – Use scientific names of plants.

<u>Tree Stratum</u> (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status		Dominance Test worksheet:																
1. _____	_____	_____	_____		Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): _____ (A)																
2. _____	_____	_____	_____																		
3. _____	_____	_____	_____																		
4. _____	_____	_____	_____																		
				_____ = Total Cover	Total Number of Dominant Species Across All Strata: _____ (B)																
<u>Sapling/Shrub Stratum</u> (Plot size: _____)					Prevalence Index worksheet:																
1. _____	_____	_____	_____		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><u>Total % Cover of:</u></td> <td style="width: 50%;"><u>Multiply by:</u></td> </tr> <tr> <td>OBL species _____</td> <td>x 1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x 2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>x 3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>x 4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = _____</td> </tr> <tr> <td>Column Totals: _____ (A)</td> <td>_____ (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = _____</td> </tr> </table>	<u>Total % Cover of:</u>	<u>Multiply by:</u>	OBL species _____	x 1 = _____	FACW species _____	x 2 = _____	FAC species _____	x 3 = _____	FACU species _____	x 4 = _____	UPL species _____	x 5 = _____	Column Totals: _____ (A)	_____ (B)	Prevalence Index = B/A = _____	
<u>Total % Cover of:</u>	<u>Multiply by:</u>																				
OBL species _____	x 1 = _____																				
FACW species _____	x 2 = _____																				
FAC species _____	x 3 = _____																				
FACU species _____	x 4 = _____																				
UPL species _____	x 5 = _____																				
Column Totals: _____ (A)	_____ (B)																				
Prevalence Index = B/A = _____																					
2. _____	_____	_____	_____																		
3. _____	_____	_____	_____																		
4. _____	_____	_____	_____																		
5. _____	_____	_____	_____																		
				_____ = Total Cover																	
<u>Herb Stratum</u> (Plot size: _____)					Hydrophytic Vegetation Indicators:																
1. _____	_____	_____	_____		<input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)																
2. _____	_____	_____	_____																		
3. _____	_____	_____	_____																		
4. _____	_____	_____	_____																		
5. _____	_____	_____	_____																		
6. _____	_____	_____	_____																		
7. _____	_____	_____	_____																		
8. _____	_____	_____	_____																		
9. _____	_____	_____	_____																		
10. _____	_____	_____	_____																		
				_____ = Total Cover	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
<u>Woody Vine Stratum</u> (Plot size: _____)																					
1. _____	_____	_____	_____		Hydrophytic Vegetation Present? Yes _____ No _____																
2. _____	_____	_____	_____																		
				_____ = Total Cover																	
% Bare Ground in Herb Stratum _____																					
Remarks:																					



Class Exercise

- ✓ Given the following data, determine dominant species per “50/20 Rule”, determine whether the dominance test is met, and determine the prevalence index. Percentages refer to areal cover.

Trees: Species A (FACW) = 40%
Species B (FAC) = 20%
Species C (FACU)= 20%
Species D (OBL) = 15%

Shrubs: Species E (FACW) = 20%
Species B (FAC) = 10%

Herbs: Species F (OBL) = 55%
Species G (FACU) = 45%
Species H (FACW) = 25%
Species I (FACU)= 20%



Class Exercise

- ✓ Given the following data, determine dominant species per “50/20 Rule”, determine whether the dominance test is met, and determine the prevalence index. Percentages refer to areal cover.

Trees: Species A (FACW) = 40%
Species B (FAC) = 20%
Species C (FACU)= 20%
Species D (OBL) = 15%

Sum is 95: 50% is 47.5, 20% is 19
Species A, B and C are dominants

Shrubs: Species E (FACW) = 20%
Species B (FAC) = 10%

Sum is 30: 50% is 15, 20% is 6
Both species are dominants

Herbs: Species F (OBL) = 55%
Species G (FACU) = 45%
Species H (FACW) = 25%
Species I (FACU)= 20%

Sum is 145: 50% is 72.5, 20% is 29
Species F and G are dominants

5 of 7 dominants are FAC or wetter = 71%
Dominance test is met, vegetation is hydrophytic



Class Exercise = PI

OBL: 70 (total % cover of all OBL) x 1 = 70

FACW: 85 x 2 = 170

FAC: 30 x 3 = 90

FACU: 85 x 4 = 340

UPL: 0 x 5 = 0

270

670

670/270 = 2.48 Prevalence Index

Vegetation is hydrophytic (≤ 3.0)



Using Vegetation as a Secondary Indicator of Hydrology

Vegetation responds to hydrology;
therefore, vegetation can serve as a
secondary indicator of hydrology



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FAC-Neutral Test

The number of dominant species that are OBL and FACW exceeds the number that are FACU and UPL



Example of FAC-Neutral Test

Dominant Plant Species From All Strata:

FACW

~~FAC~~

FACU

~~FAC~~

FACW

Meets FAC-Neutral
test

Is a “test positive”
secondary indicator of
hydrology



FAC-Neutral Test

SUMMARY: When OBL and/or FACW species dominate, it is a good secondary indicator that wetland hydrology is present

Steve D. Eggers Photo



New England Aster
(*Aster novae-angliae*)



Questions?

**Also: Please take this time
to fill out your action plans**

**Contact information:
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