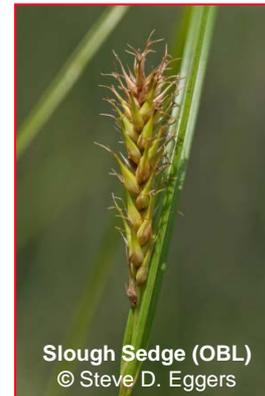




# Chapter 2: Hydrophytic Vegetation



River Bulrush (OBL)  
© Steve D. Eggers



Slough Sedge (OBL)  
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By Steve Eggers, Senior Ecologist

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# Wetland Definition

Wetlands are areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a **prevalence of vegetation typically adapted for life in saturated soil conditions**



BIOLOGICAL REPORT 88(24)  
SEPTEMBER 1988

# NATIONAL LIST OF PLANT SPECIES THAT OCCUR IN WETLANDS: 1988 NATIONAL SUMMARY



Fish and Wildlife Service

In Cooperation with the National and  
Regional Interagency Review Panels

**U.S. Department of the Interior**

## Plant List

### 1988 List

*and the Nation*



# Plant Indicator Status

| <u>Indicator Category</u>  | <u>Symbol</u> | <u>Occurrence<br/>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%                              |

**NO LONGER USE (+) AND (-)**



**Wettest**

**OBL**

**FACW**

**Hydrophytes**

**FAC**

---

**FACU**

**Non-Hydrophytes**

**UPL**

**Driest**



# Plant Lists

## If a plant is not listed:

- ✓ Using an incorrect name  
or a synonym
  - ✓ Check the “Synonymy” section  
of the plant list

**OR**

- ✓ It is UPL



## Notes on Indicator Status

- ✓ **National List of Plant Species that Occur in Wetlands (1988)**
  - a. **NI** = reviewed but given no indicator status
  - b. **NO** = no known occurrence in that region in 1988
  - c. For **NI, NO** --- apply indicator status of adjacent region

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



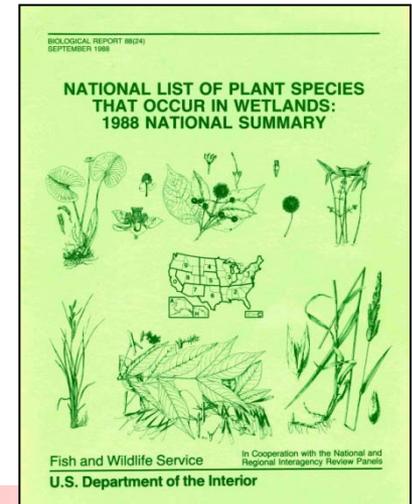
# Basic Rule for Hydrophytic Vegetation:

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



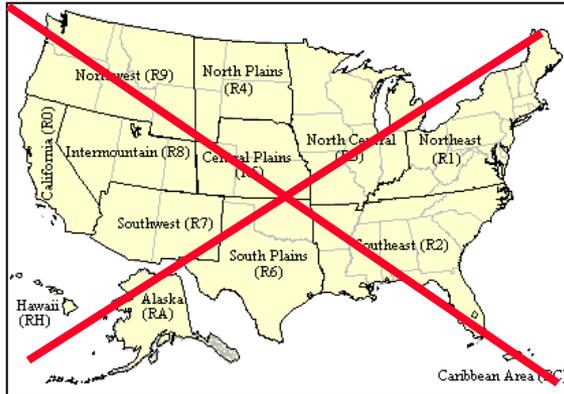
# Update: National Wetland Plant List

- ✓ Responsibility for list transferred from USFWS to Corps via MOA Dec 2006
- ✓ National Tech. Committee for Hydrophytic Vegetation formed in 2007
- ✓ Regional plant panels formed in 2008
- ✓ Corps publication Jul 2008: *Concepts and Procedures for Updating the National Wetland Plant List*
- ✓ Panels drafted a new plant list in 2009
- ✓ Public notice: summer 2010 (estimate)
- ✓ Comments incorporated by regional plant panels
- ✓ Revised plant list completed in 2011 (estimate)

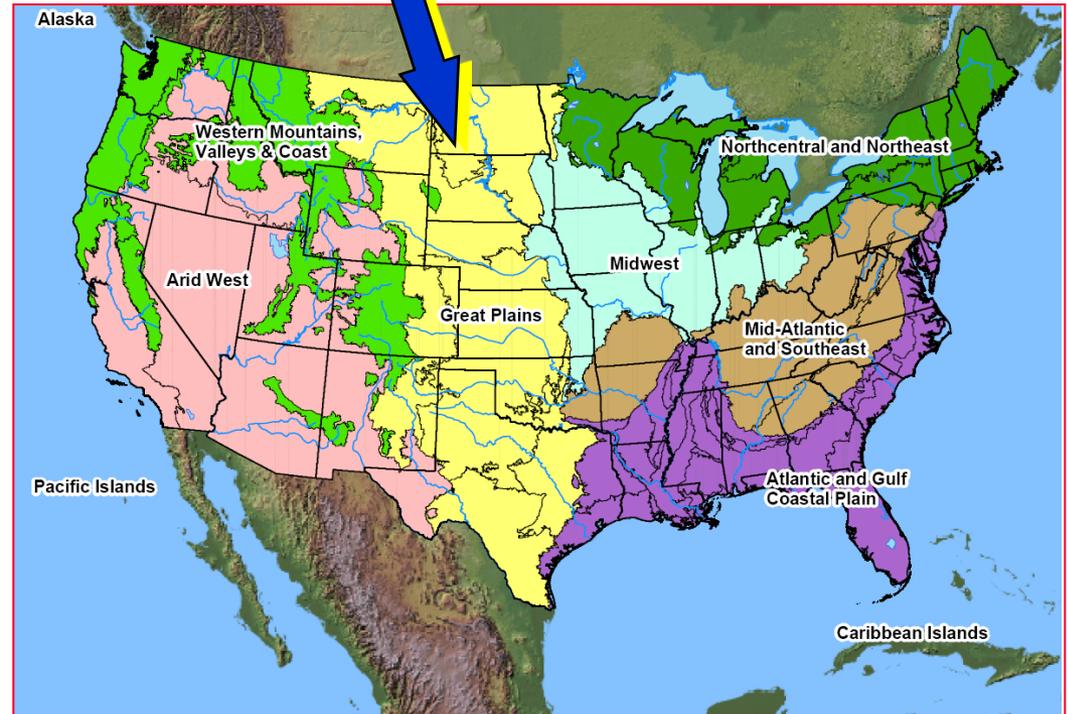




# Updated Plant Lists Will Use Same Boundaries as the Supplements



Current lists organized by USFWS Regions



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# 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



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# **Determination of Whether a Plant Community is Hydrophytic**

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# 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



# Measures of Plant Species Dominance

- ✓ Percent cover
- ✓ Stem density
- ✓ Basal area





# Percent Areal Cover

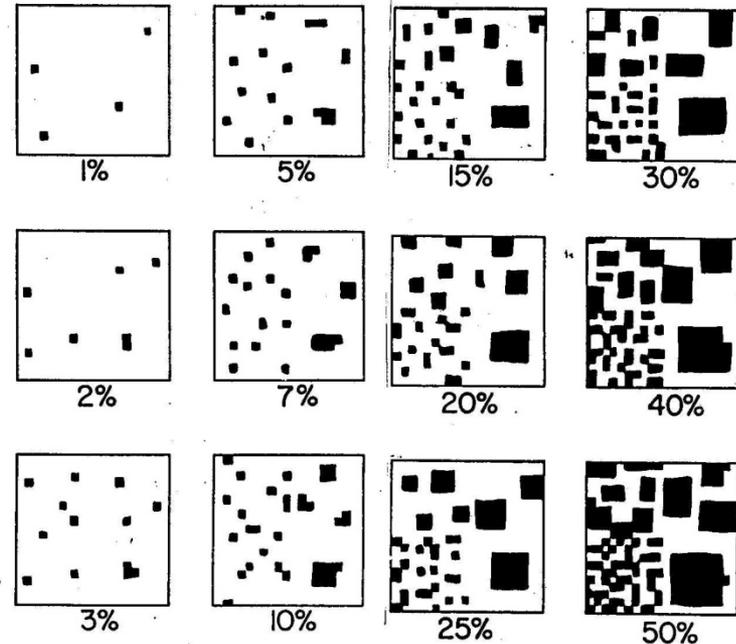
✓ “Areal” is an adjective of area – use for % plant cover

~~“Aerial”~~ Cover

ESTIMATES OF PERCENT COVER

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

“Absolute Cover” = Actual Cover





# Basal Area

**Cross-sectional area of a tree trunk measured  
4.5 feet above ground**

**Example: Basal Area Factor (BAF) prism of 10**

**Counted 4 green ash and 3 silver maples as “in”**

**Gr. Ash -  $4 \times 10 \text{ BAF} = 40 \text{ sq.ft. of basal area/acre}$**

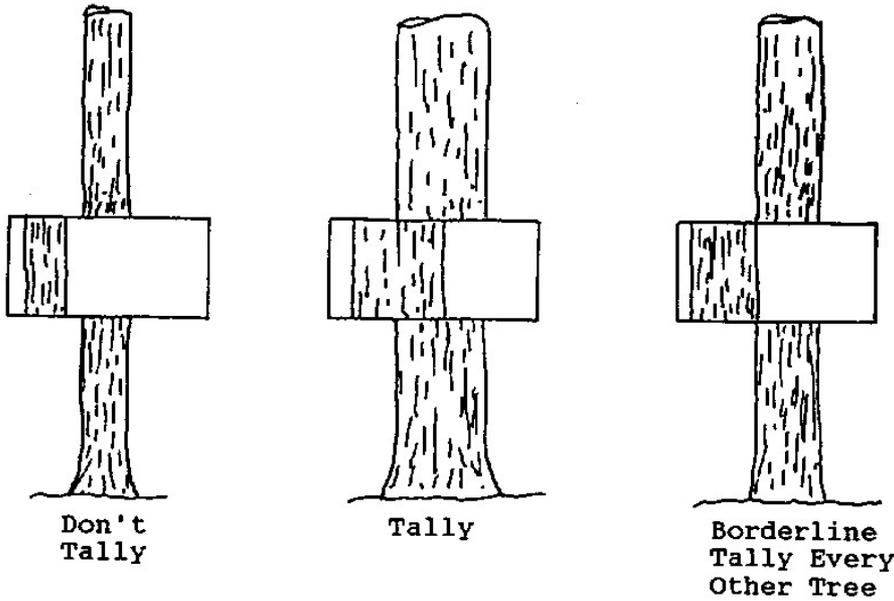
**S. Maple -  $3 \times 10 \text{ BAF} = 30 \text{ sq. ft. of basal area/acre}$**

**Note: only count live trees**

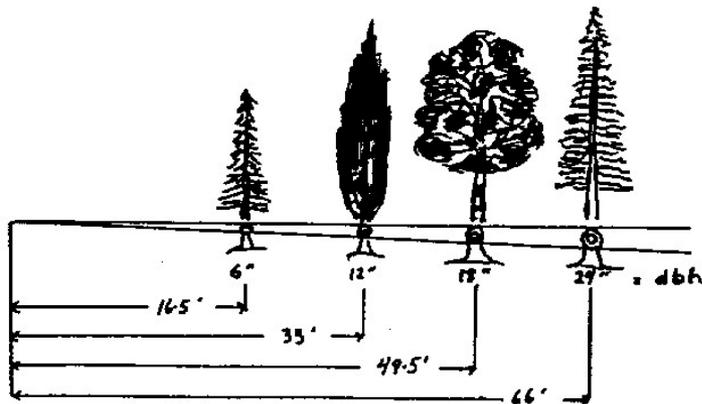
**Advantages: plotless, speed**



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View through a BAF prism.



Limiting distance for trees of differing size using a 10 BAF prism or a 1:33 angle gauge.

# Use of a Basal Area Prism

and the Nation

# 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**

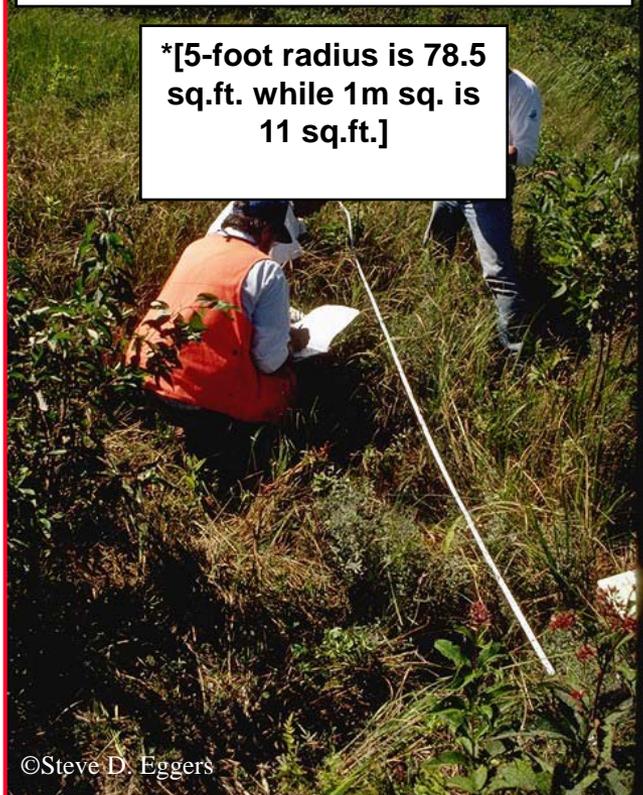
**For example, a 15-foot radius circular plot is equivalent in coverage to a 10-foot by 71-foot rectangular plot**



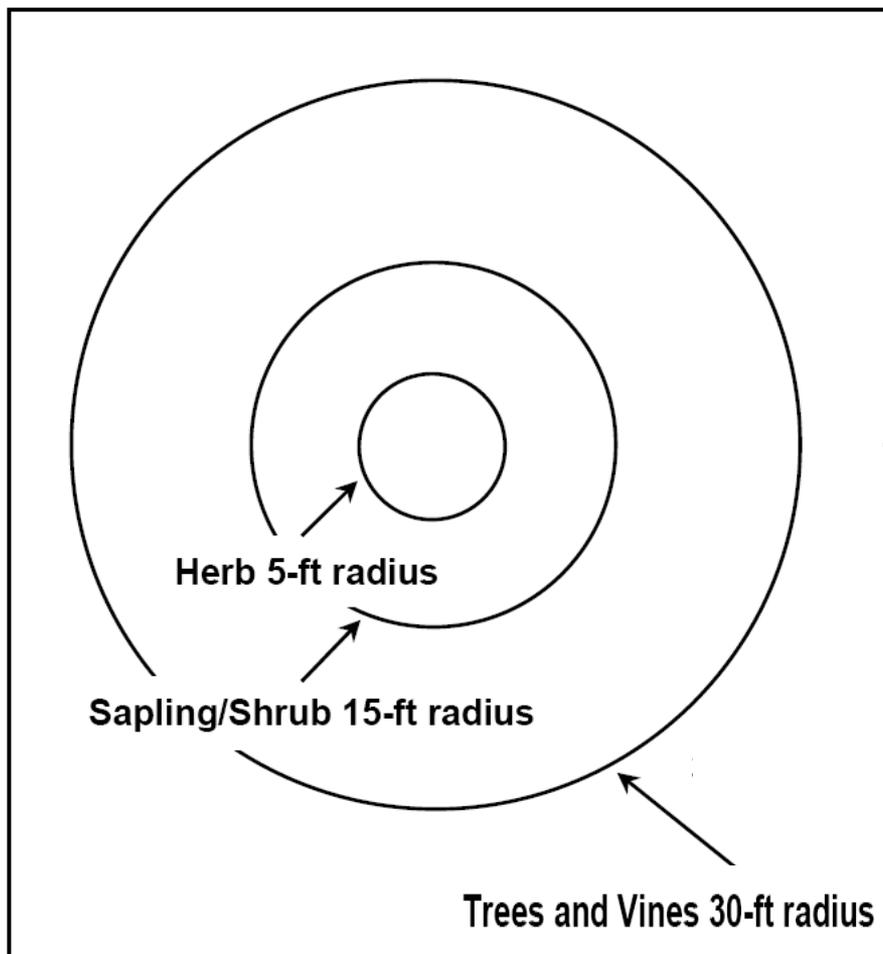
# Vegetation Sampling

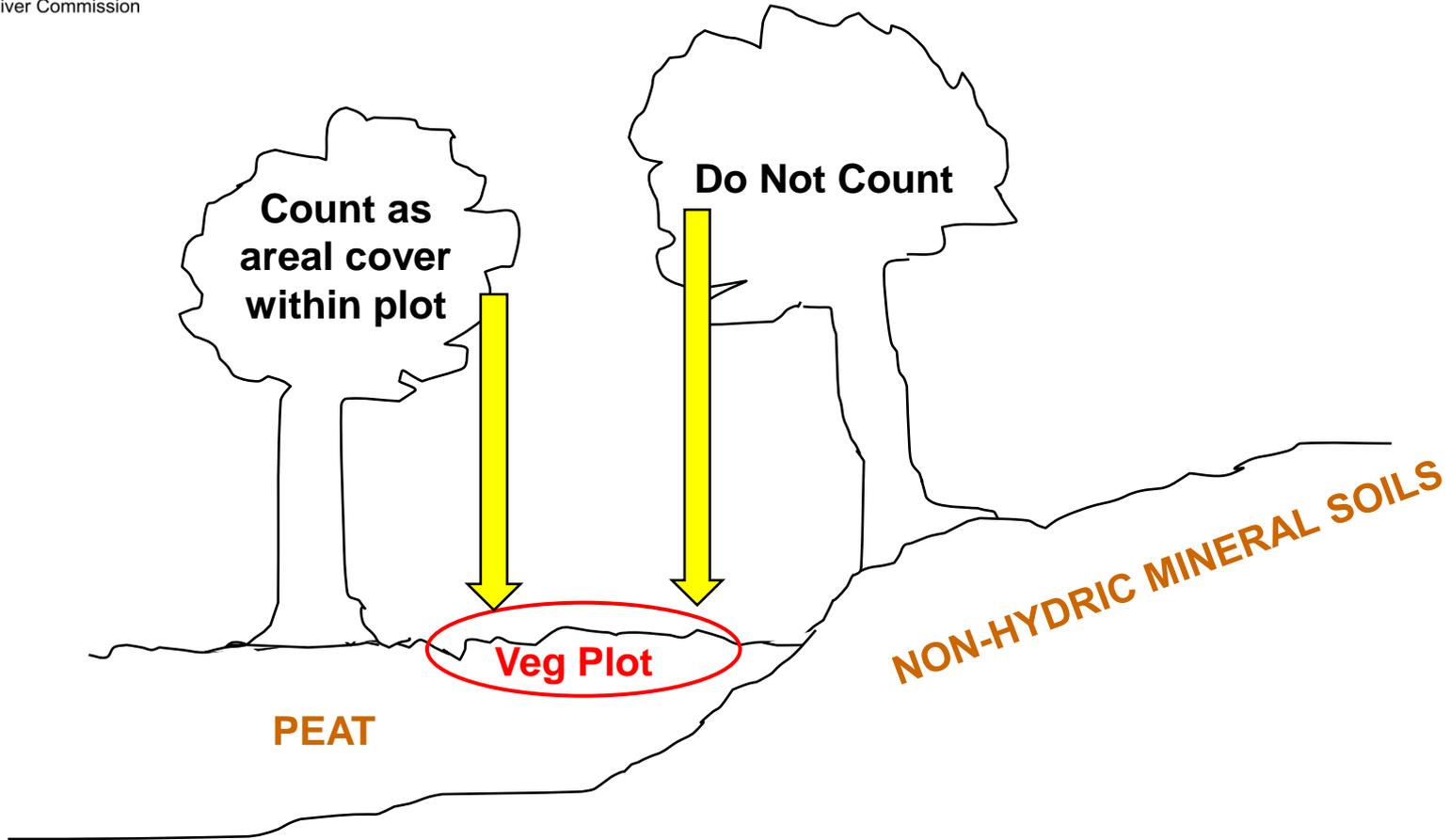
**Option: Seven 1m sq.  
plots for herbs\***

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



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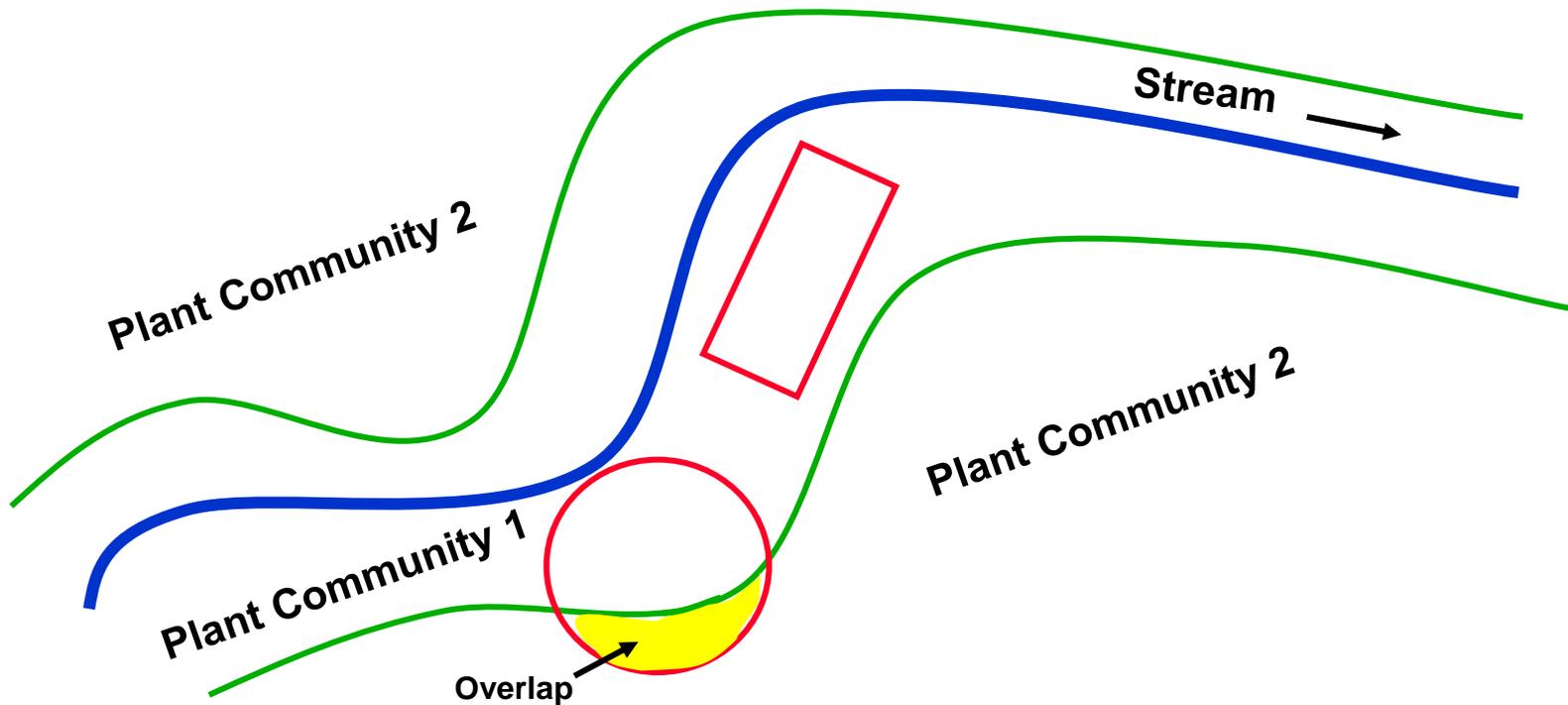




**To contribute to areal cover, a plant does not have to be rooted in the plot, but does have to be within the same plant community**

# Adjust Vegetation Plot Shape as Needed

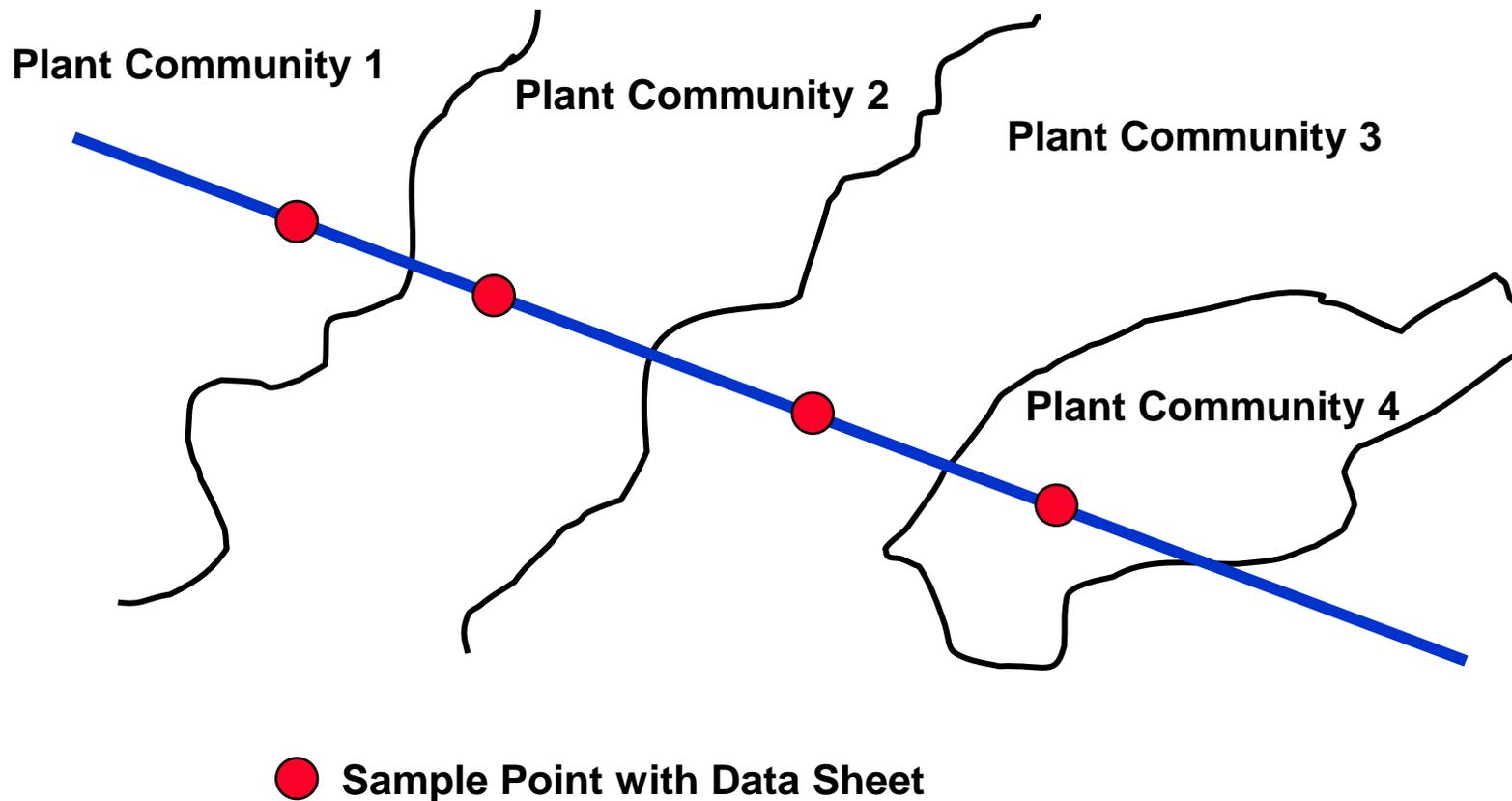
If circular plot would overlap two different plant communities then use rectangular plot of same square footage



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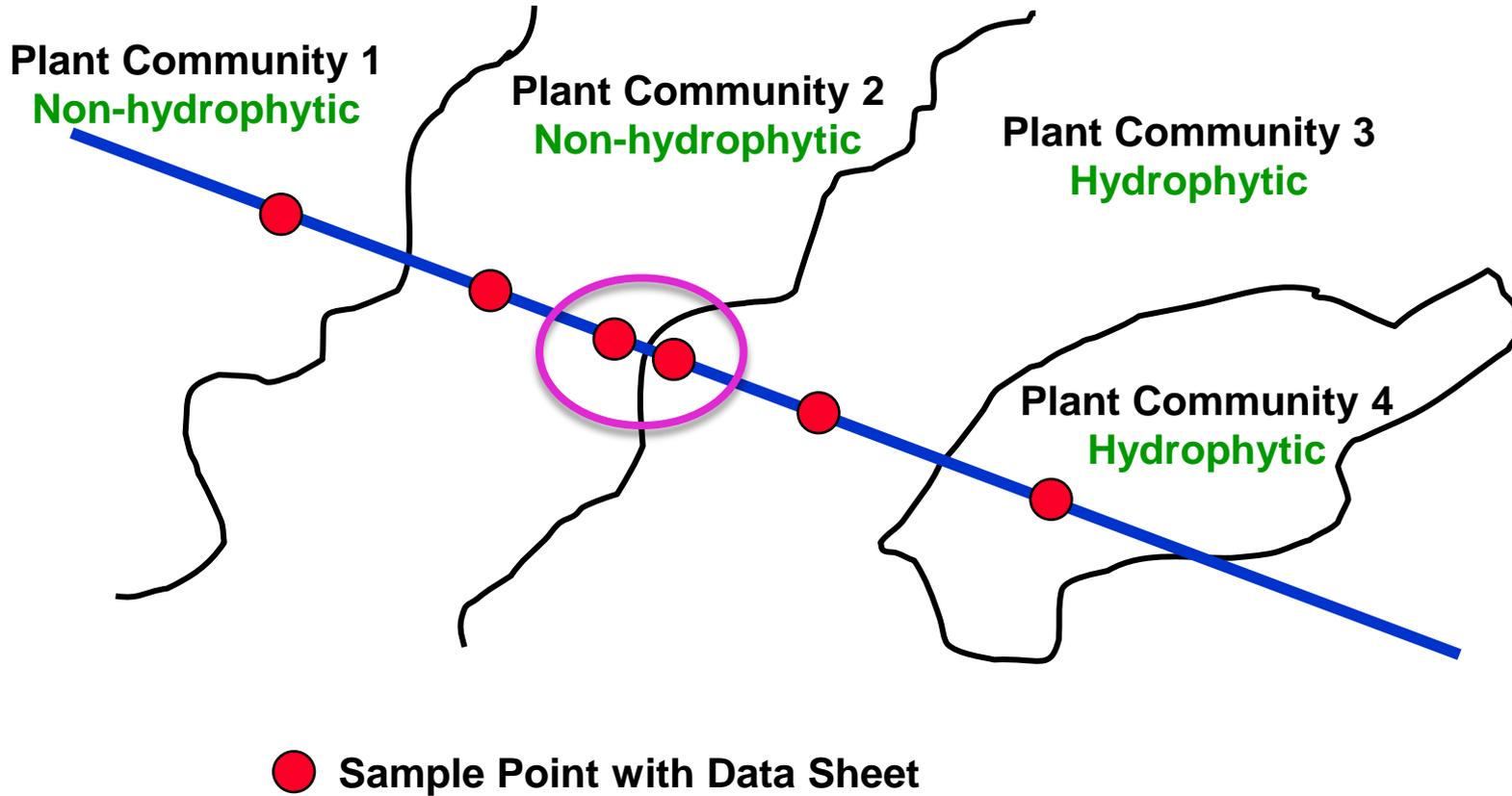


# Sample Along Transects





# Sample Along Transects



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# Determination of Hydrophytic Vegetation

**Four indicators, sequenced:**

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



# 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)

# Hydrophytic Vegetation Sequence

## 2. 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 3.  
(Be aware of problem areas and atypical situations – see Chapter 5)

## 3. Prevalence Index

- a. If the PI is  $\leq 3.0$ , the vegetation is hydrophytic
- b. If this is not met, go to Step 4.

## 4. Morphological Adaptations

- a. If >50% of individuals of a FACU species exhibit morphological adaptations, assign FAC status and recalculate Steps 2 and 3 above.

## **Step 2: 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%
- ✓ Those plant species that immediately exceed this 50% threshold are dominants
- ✓ Multiply the total areal cover by 20%
- ✓ Any remaining species comprising at least 20% of total cover is also a dominant

# Why not just say any species with 20% 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”)



# Selection of Dominant Plants

For the shrub stratum:

| <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>      | 15             |   |
| <i>Rhamnus frangula</i>     | 10             |   |
| <i>Toxicodendron vernix</i> | <u>5</u>       |   |
|                             | 75             |   |
| * Selected as dominants     |                | $75 \times .50 = 37.5$ $75 \times .20 = 15.0$ |



# 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> | 5              |                                    |
|                             | <u>80</u>      |                                    |
| * Selected as dominants     |                | 80 x .50 = 40.0    80 x .20 = 16.0 |

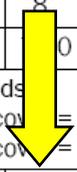


Dance Test Example

| 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:<br>50% of total cover = 16.5%<br>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:<br>50% of total cover = 27.5%<br>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                     |                 |
|                                      | 50/20 Thresholds:<br>50% of total cover = 37.5%<br>20% of total cover = 15.0%   |                          |                        |                 |
| Woody vine                           | <i>Toxicodendron radicans</i>   | FAC                      | 1                      | No <sup>1</sup> |
| Hydrophytic Vegetation Determination | Total number of dominant species across all strata = 5.<br>Percent of dominant species that are OBL, FACW, or FAC = 80%.<br>Therefore, this community is hydrophytic by Indicator 1 (Dominance Test). |                          |                        |                 |

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 50/20 Rule

50/20 Rule



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



# Review for 50/20 Rule

**Step 1:** Determine dominants from each stratum

**Step 2:** List the indicator status of all dominants

**Step 3:** Are more than 50 percent of the  
dominants FAC or wetter?

If yes, community meets hydrophytic veg criteria

If no, and indicators of hydric soils and wetland hydrology are present, go to the Prevalence Index



# Vegetation Fails Dominance Test but Meets PI

- ✓ **Example: 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)**
- ✓ **Example: Dominant(s) are FACU but numerous non-dominants are FACW or OBL**



# Step 3: 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> |                    |
| <u>A</u>                       | <u>B</u>   |                    |

Divide sum of weighted cover value by sum of actual cover.

If  $PI \leq 3.0$  then veg is hydrophytic.



## Step 3: 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: <sup>1</sup> | Product |
|--|--|--|----------------------|---------------------------|---------|
| OBL species  | <i>Glyceria striata</i>  | 2  | 2                    | 1                         | 2       |
| FACW species   |  | 15<br>0.5<br>40<br>17<br>10  | 82.5                 | 2                         | 165     |
| FAC species  | <i>Toxicodendron radicans</i> <sup>2</sup><br><i>Carpinus caroliniana</i>  | 6<br>35  | 41                   | 3                         | 123     |
| FACU species   | <i>Lonicera tatarica</i><br><i>Parthenocissus quinquefolia</i><br><i>Carex laxiflora</i><br><i>Carya ovata</i> <sup>2</sup><br><i>Acer saccharum</i><br><i>Quercus rubra</i> | 2<br>1<br>0.5<br>18<br>5<br>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 = $B/A = 451/164 = 2.75$<br>Therefore, this community is hydrophytic by Indicator 2 (Prevalence Index). |                      |                           |         |
| <sup>1</sup> Where OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5.<br><sup>2</sup> This species was recorded in two or more strata (see Table 2), so the cover estimates were summed across strata. |  |  |                      |                           |         |



## Step 4: 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<br>% Cover | Dominant<br>Species? | Indicator<br>Status |                     | <b>Dominance Test worksheet:</b>  |
|---|---------------------|----------------------|---------------------|---------------------|---|
| 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: _____) |                     |                      |                     |                     | <b>Percent of Dominant Species That Are OBL, FACW, or FAC:</b> _____ (A/B)  |
| 1. _____  | _____               | _____                | _____               |                     | <b>Prevalence Index worksheet:</b><br><u>Total % Cover of:</u> _____ <u>Multiply by:</u> _____<br>OBL species _____ x 1 = _____<br>FACW species _____ x 2 = _____<br>FAC species _____ x 3 = _____<br>FACU species _____ x 4 = _____<br>UPL species _____ x 5 = _____<br>Column Totals: _____ (A) _____ (B)<br><br>Prevalence Index = B/A = _____   |
| 2. _____  | _____               | _____                | _____               |                     |   |
| 3. _____  | _____               | _____                | _____               |                     |   |
| 4. _____  | _____               | _____                | _____               |                     |   |
| 5. _____  | _____               | _____                | _____               |                     |   |
|   |                     |                      |                     | _____ = Total Cover |   |
| <u>Herb Stratum</u> (Plot size: _____)          |                     |                      |                     |                     |   |
| 1. _____  | _____               | _____                | _____               |                     | <b>Hydrophytic Vegetation Indicators:</b><br><input type="checkbox"/> Dominance Test is >50%<br><input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup><br><input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)<br><input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)<br><br><sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. |
| 2. _____  | _____               | _____                | _____               |                     |   |
| 3. _____  | _____               | _____                | _____               |                     |   |
| 4. _____  | _____               | _____                | _____               |                     |   |
| 5. _____  | _____               | _____                | _____               |                     |   |
| 6. _____  | _____               | _____                | _____               |                     |   |
| 7. _____  | _____               | _____                | _____               |                     |   |
| 8. _____  | _____               | _____                | _____               |                     |   |
| 9. _____  | _____               | _____                | _____               |                     |   |
| 10. _____                                       | _____               | _____                | _____               |                     |   |
|   |                     |                      |                     | _____ = Total Cover |   |
| <u>Woody Vine Stratum</u> (Plot size: _____)    |                     |                      |                     |                     |   |
| 1. _____  | _____               | _____                | _____               |                     | <b>Hydrophytic Vegetation Present?</b> Yes _____ No _____   |
| 2. _____  | _____               | _____                | _____               |                     |   |
|   |                     |                      |                     | _____ = Total Cover |   |
| % Bare Ground in Herb Stratum _____             |                     |                      |                     |                     |   |
| Remarks:  |                     |                      |                     |                     |   |

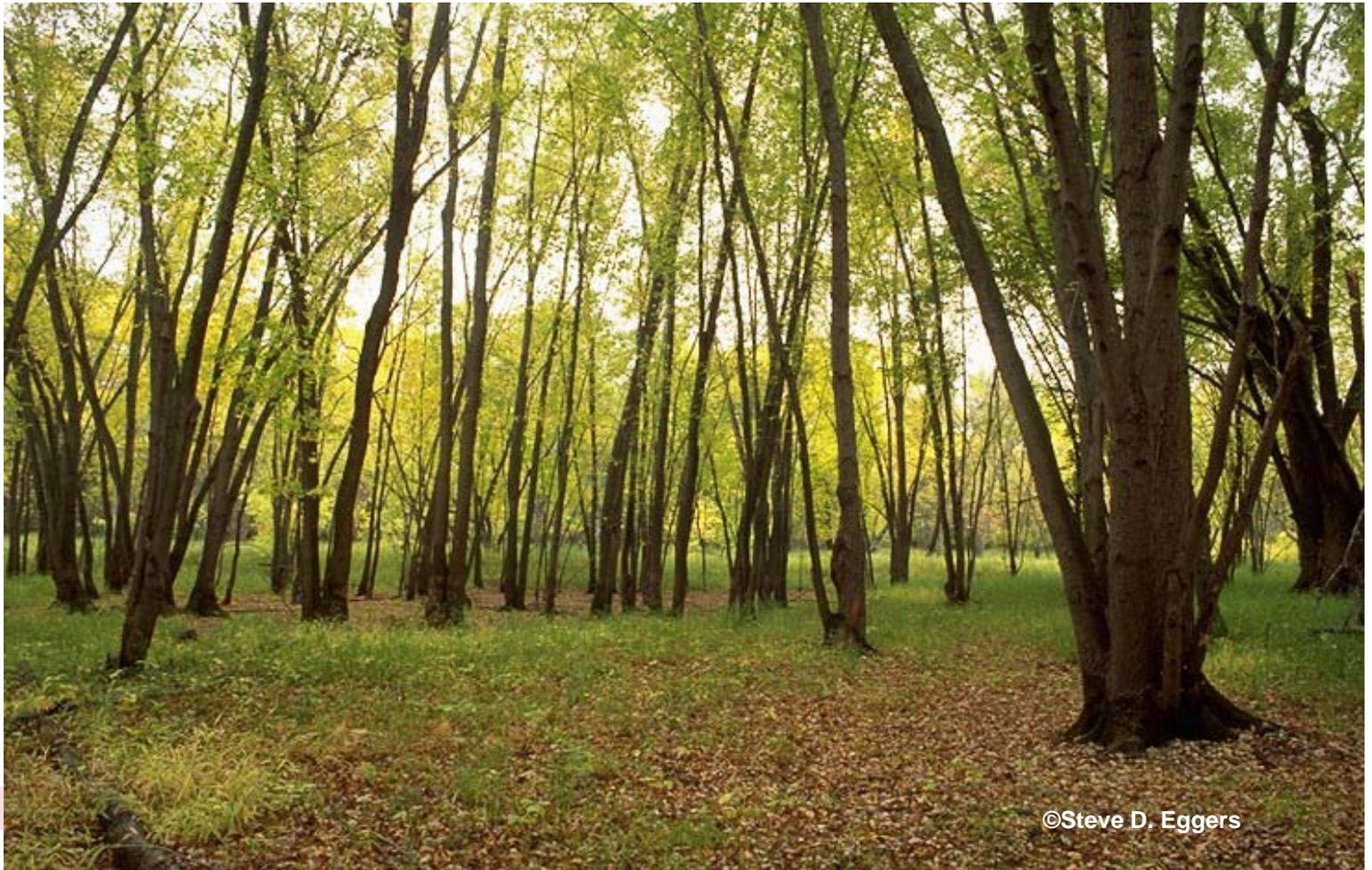


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# Class Exercise

## ✓ Rapid Dominance Test



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April 2010



# 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) = 30%  
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) = 30%  
Species C (FACU)= 20%  
Species D (OBL) = 15%

**Sum is 105: 50% is 52.5, 20% is 21  
Species A and B 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 6 dominants are FAC or wetter = 83%  
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:** 40 x 3 = 120

**FACU:** 85 x 4 = 340

**UPL:** 0 x 5 = 0

---

280

700

**700/280 = 2.5 Prevalence Index**

**Vegetation is hydrophytic ( $\leq 3.0$ )**