Wetland Plant Communities and Habitats

Presented by:
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West Environmental, Inc.

First things first…

"What is a Wetland?"

- NHDES Wetlands Bureau (Wt 101.88) adopted the USACE definition as defined in the "1987 Manual" as: An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetland include, but are not limited to swamps, marshes, bogs and similar areas.
Background Data

- USGS Maps
- NWI Maps
- Soil Survey
- GRANIT
- Ortho Photos
- Stereo Photos
- Natural Heritage Data
To be considered a “legal” and protected wetland in NH an area must have three conditions:

• Dominance of wetland vegetation
• Hydric (wetland) soils
• Wetlands hydrology

Size does not matter!

Plant Community Assessment
Concepts

- Wetlands support *hydrophytic vegetation*
- To evaluate whether a plant community is hydrophytic, need to determine what species are *dominant* and how many of the dominant species are *hydrophytes*

Hydrophyte

Any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content
<table>
<thead>
<tr>
<th>Indicator category</th>
<th>Symbol</th>
<th>Occurrence in Wetlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obligate wetland plants</td>
<td>OBL</td>
<td>&gt; 99%</td>
</tr>
<tr>
<td>Facultative wetland plants</td>
<td>FACW</td>
<td>67 - 99%</td>
</tr>
<tr>
<td>Facultative plants</td>
<td>FAC</td>
<td>34 - 66%</td>
</tr>
<tr>
<td>Facultative upland plants</td>
<td>FACU</td>
<td>1 - 33%</td>
</tr>
<tr>
<td>Obligate upland plants</td>
<td>UPL</td>
<td>&lt; 1%</td>
</tr>
</tbody>
</table>
Determining Hydrophytic Vegetation

- Dominance Ratio
- Prevalence Index
- Visual observation of plant species growing under prolonged inundation or saturation
- Morphological adaptations
- Experience
Dominance Ratio

Selecting Dominant Plants:

Dominant plant species are selected independently from each stratum of the plant community.

Vegetation

For each stratum below, identify every species that has at least 1% cover of the observation plot (see DEFINITIONS below).

- **STRATA**
  - **Seedlings & Herbs**: woody, less than 3.28' tall, or non woody, any height
  - **Mosses & Liverworts**: only when an important component of the community
  - **Saplings/ Shrubs**: woody, nonclimbing, less than 3 inch dbh and greater than 3.28 ft tall
  - **Trees**: woody, nonclimbing, at least 3’ dbh and any height
  - **Vines**: woody vines, climbing on trees, shrubs or saplings greater than 3.28 feet tall

<table>
<thead>
<tr>
<th>Observation Plot</th>
<th>(radius from center)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5'</td>
</tr>
<tr>
<td></td>
<td>5'</td>
</tr>
<tr>
<td></td>
<td>15'</td>
</tr>
<tr>
<td></td>
<td>30'</td>
</tr>
<tr>
<td></td>
<td>30'</td>
</tr>
</tbody>
</table>
Dominance Measure

- Dominance Measure – estimated for each species in each stratum as follows:
  
  - **Trees**: basal area (cross-sectional area at breast height (4.5”))
  - **Vines**: number of stems (at ground level) or basal area, as appropriate
  - **Other Strata**: percent area coverage (i.e. estimated peak growing season foliage)

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**Short shrubs to count in shrub layer**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamaedaphne calyculata</td>
<td>Leatherleaf</td>
<td>bogs</td>
</tr>
<tr>
<td>Kalmia angustifolia</td>
<td>Sheep laurel</td>
<td>bogs/forested wetlands</td>
</tr>
<tr>
<td>Kalmia polifolia</td>
<td>Pale laurel</td>
<td>bogs</td>
</tr>
<tr>
<td>Andromeda glaucophyllum</td>
<td>Downy bog rosemary</td>
<td>bogs</td>
</tr>
<tr>
<td>Andromeda polifolia</td>
<td>Bog rosemary</td>
<td>bogs</td>
</tr>
<tr>
<td>Myrica gale</td>
<td>Sweet gale</td>
<td>bogs</td>
</tr>
<tr>
<td>Ledum groenlandicum</td>
<td>Labrador tea</td>
<td>bogs/forested wetlands</td>
</tr>
<tr>
<td>Gaylussacia dumosa</td>
<td>Dwarf Huckleberry</td>
<td>tundra</td>
</tr>
<tr>
<td>Salix spp.</td>
<td>Dwarf willows</td>
<td>swamps/wet meadows</td>
</tr>
<tr>
<td>Spiraea tomentosa</td>
<td>Steeplebush</td>
<td>salt marshes</td>
</tr>
<tr>
<td>Borrichia frutescens</td>
<td>Sea ox-eye</td>
<td></td>
</tr>
</tbody>
</table>
Quiz Time

Cover Classes

- <1 trace
- 1-5 3
- 6-15 10.5
- 16-25 20.5
- 26-50 38
- 51-75 63
- 76-95 85.5
- 96-100 98
Hydrophytic Vegetation

- Dominant when more than 50% of the DOMINANT VEGETATION are within the range OBL through FAC on the current National List of Plant Species That Occur in Wetlands: Northeast (Region 1).
- Species with NA or NI status are reported but not included in the tally on the datasheet.

<table>
<thead>
<tr>
<th>VEGETATION</th>
<th>Stratum and Species</th>
<th>Observed Dominance</th>
<th>Relative Dominance</th>
<th>NNI Status</th>
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<tbody>
<tr>
<td>SEEDLINGS &amp; HERBS</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Osimuma cinnamomea</td>
<td>10.5/56.5</td>
<td>19</td>
<td>FACW</td>
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</tr>
<tr>
<td>Oelthera ainsifolia</td>
<td>10.5/56.5</td>
<td>19</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>Jpsistaceum canadense</td>
<td>20.5/56.5</td>
<td>37</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>Ompheila sensibilis</td>
<td>3/56.5</td>
<td>5</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Acerr rubrum</td>
<td>3/56.5</td>
<td>5</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Toxixodendron radicans</td>
<td>3/56.5</td>
<td>5</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Lycopodium obscurum</td>
<td>3/56.5</td>
<td>5</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Arealn muticulaus</td>
<td>3/56.5</td>
<td>5</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>SHRUBS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oelthera ainsifolia</td>
<td>10.5/21</td>
<td>50</td>
<td>FACW</td>
<td></td>
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<tr>
<td>Vaccinium corymbosum</td>
<td>10.5/21</td>
<td>50</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>SAKING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acerr rubrum</td>
<td>63/73 5</td>
<td>86</td>
<td>FAC</td>
<td></td>
</tr>
<tr>
<td>Finnus strabos</td>
<td>10.5/73 5</td>
<td>14</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>TREES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acerr rubrum</td>
<td>320/440</td>
<td>73</td>
<td>FAC</td>
<td></td>
</tr>
<tr>
<td>Finnus strabos</td>
<td>120/440</td>
<td>27</td>
<td>FACI</td>
<td></td>
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<tr>
<td>VINES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smilax gleua</td>
<td>6/10</td>
<td>60</td>
<td>FACU</td>
<td></td>
</tr>
<tr>
<td>Vitis nevaees-angulat</td>
<td>4/10</td>
<td>40</td>
<td>NI</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>HYDROPHYTES</th>
<th>Non-HYDROPHYTES</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>FACW</td>
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<tr>
<td>2</td>
<td>FAC</td>
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<td>4</td>
<td>FAC</td>
</tr>
<tr>
<td>1</td>
<td>FAC</td>
</tr>
<tr>
<td>0</td>
<td>FAC</td>
</tr>
</tbody>
</table>

Percent Hydrophytes (100%): 7/9 = 78%
Morphological Adaptations

Shallow roots . . . and hypertrophied lenticels

Morphological Adaptations

Buttressed bases on elm . . .

. . . and red oak
Morphological Adaptations

Multiple trunks and adventitious roots

Adventitious roots
Wetland Hydrology

- Permanent or periodic
- Inundation or soil saturation (continuous)
- For at least 5% of the growing season.
Vernal Pools

Here in April …
gone in July

Wetland Functions Evaluated

- Groundwater Recharge/Discharge
- Floodflow Alteration
- Sediment/Toxicant/Pathogen Retention
- Nutrient Removal/Retention Transformation
- Production Export
- Sediment/Shoreline Stabilization
- Wildlife Habitat
Wetland Functions Evaluated

- **Groundwater Recharge/Discharge**
  - The wetland holds surface water so it can re-enter the aquifer
  - The water is filtered through the wetland soils
  - The wetland discharges groundwater in springs to support stream flow during the dry season

- **Floodflow Alteration**
  - Wetland provides storage area for water during high rain periods
  - Wetland detains surface water for extended periods
  - Wetland slows the rate of water flow in flooding situations

- **Sediment/Toxicant/Pathogen Retention**
  - Allows particles to settle out of the water
  - Plant life traps sediment and removes pollutants from surface water

- **Nutrient Removal/Retention Transformation**
  - Wetland soils and plant life remove nutrients from surface waters protecting down stream surface water
  - Helps protect Great Bay

- **Production Export**
  - Wetlands provide food for a variety of wildlife

- **Sediment/Shoreline Stabilization**
  - Stabilizes river/pond banks with vegetation
  - Slows water flows to reduce erosion

- **Wildlife Habitat**
  - Area for birds, reptiles, and mammals to feed, live, and reproduce
  - Turtles, Beaver, Muskrat, etc.
NEW New Hampshire Method

- http://nhmethod.org/

Rare Forested Wetland Types

- Forested Wetlands (>60% tree cover) – 24
- Types include:
  - Basin Swamps - 9
  - Streamside / lakeside swamps - 3
  - Groundwater (Seepage) Swamps - 8
  - Floodplain Forests – 3
  - Vernal Pools - 2
Floodplain natural plant communities

- Swamp White Oak Floodplain Forest (S1)
- Silver Maple Floodplain Forest (S2)
- Red Maple Floodplain Forest (S2/S3)
- Vernal Floodplain Pool (S2)
- Oxbow Marsh (S3)
- Buttonbush Swamp (S3)
- Sycamore Floodplain Forest (S1)

Wetland Values Evaluated

- Recreational Value
- Educational/Scientific Value
- Uniqueness/Heritage
- Restoration Potential
What makes floodplain forests important to wildlife?

• Have unique structure that result in favorable cover and foraging habitat for many wildlife species

  • tall trees with closed canopy

• absent/sparse mid-story & shrub layers
What makes floodplain forests important to wildlife?

• Have unique structure that result in favorable cover and foraging habitat for many wildlife species
  • tall trees with closed canopy
  • absent/sparse mid-story & shrub layers
  • dense herbaceous layer
• coarse woody material
What makes floodplain forests important to wildlife?

• Have unique structure that result in favorable cover and foraging habitat for many wildlife species
  • tall trees with closed canopy
  • absent/sparse mid-story & shrub layers
  • dense herbaceous layer
  • coarse woody material

• Often contain other unique habitats
  • ephemeral wetlands
Red maple floodplain forest

Barred owl
Old oxbow vernal pool

Carolina spring beauty
Canada anemone

backwater
Structural components of floodplain forest habitats

• Tall trees with closed canopy

• Associated with floodplain forests and forested wetlands that have tall trees for nesting

• Usually nests near a river, pond or forested swamp

red-shouldered hawk (WAP)
Structural components of floodplain forest habitats

• Snags and cavity trees

Dead standing trees and live trees with cavities provide important nesting, denning, and foraging site for wildlife.
Structural components of floodplain forest habitats

• Shrub layer

- Eastern phoebe
- Provides important perch structure for birds that forage within the mid-canopy and lower forest layers

- Eastern wood-peewee

- Alder thickets provide feeding and nesting habitat for woodcock and grouse

- New England cottontail (WAP)
- Shrub thickets provide required cover and dispersal habitat for New England cottontails

- American woodcock (WAP)
Structural components of floodplain forest habitats

• Herbaceous layer
  - Provides ideal structure for birds that nest on or near the ground
  - American woodcock nest (WAP)
  - Ovenbird

• Dead and down woody material
  - Provide ideal cover and burrowing opportunities to variety of small mammals
  - Southern red-backed vole
  - Masked shrew
  - White-footed mouse

Dense herbaceous cover, fallen logs and loose soils…
Unique habitats associated with floodplain forests

- Ephemeral wetlands (vernal pools)

Some species require vernal pools for breeding:

Wood frogs aren’t adapted to deal with predation by fish

Fairy shrimp eggs require a dry period to hatch

Wood frogs* and fairy shrimp* are reliable indicators of wetlands that dry annually
Unique habitats associated with floodplain forests

• Ephemeral wetlands (vernal pools)

Some species have their best reproductive success in wetlands that lack fish

- Jefferson’s/blue-spotted salamander (WAP)

These are good indicators of vernal pool habitat, but they will breed in wetlands that aren’t vernal pools

Unique habitats associated with floodplain forests

• Ephemeral wetlands

A variety of species will use seasonal wetlands that contain an abundance of herbaceous wetland vegetation

- Northern leopard frog (WAP)
- Spring peeper
- American toad
Unique habitats associated with floodplain forests

- **Ephemeral wetlands**

  Amphibian eggs and insects provide important food to variety of other wildlife

  ![Spotted newts eating wood frog eggs](image1)

  ![Spotted turtle (WAP)](image2)

  Some turtles travel to vernal pools in spring to eat amphibian eggs and in the summer to aestivate.

- **Exposed/slumped banks**

  Steep, exposed banks provide unique nesting habitat.
Unique habitats associated with floodplain forests

- Exposed/slumped banks

Kingfishers and bank swallows require exposed, stable banks for nesting.

Vernal Floodplain pool
Three reproductive strategies of vernal pool amphibians

Strategy one:
Most amphibians migrate from upland habitats to pools in spring, mate and deposit eggs masses in the water

- blue spotted/Jefferson’s salamander
- spotted salamander
- wood frog

Eggs hatch into free-swimming larvae...

...larvae develop in pool and emerge later that year as juveniles
Three reproductive strategies of vernal pool amphibians

Strategy two:
Four-toed salamanders breed in autumn and migrate to pools in the spring, but...

- they deposit eggs in a “nest” in clumps of moist sphagnum moss
- female guards the eggs till they hatch
- larvae drop into water below to develop

3) Marbled salamanders lay their eggs in a “nest” in dry pools in autumn...

- female guards the eggs until the pool fills with water in late autumn
- larvae hatch and over-winter in the pool

- juveniles emerge the following spring or summer

Endangered in New Hampshire
Amphibians of vernal pools

• All spend the majority of the year in the uplands around the breeding pool, under logs and leaf litter

• Upland habitats provide critical feeding, over-wintering, and dispersal habitat

<table>
<thead>
<tr>
<th>Species</th>
<th>average migration distance</th>
<th>juvenile dispersal distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>spotted salamander</td>
<td>358 feet</td>
<td>max &gt;427 feet</td>
</tr>
<tr>
<td>wood frogs</td>
<td>400 feet</td>
<td>up to 8300 feet</td>
</tr>
</tbody>
</table>

Can’t have viable vernal pool communities if you don’t maintain the uplands surrounding the pools
Structural components of floodplain forest habitats

- Shrub layer

  - Gray catbird
  - Song sparrow
  - Common yellowthroat

  Provides important nesting structure for variety of birds

Wildlife of emergent marshes

- Bullfrog
- Green frog

  Years to metamorphosis:
  - Green frog = 1 full year
  - Bullfrog = 2 full years

  Adults can be found in vernal pools
Wildlife of emergent marshes

- Red spotted newt
- Juvenile newt (red eft)
- Blanding’s turtles feed, aestivate and hibernate in marshes
- Pied-billed grebes require emergent marshes with areas of open water
- Least bitterns hunt amphibians and small fish in shallow areas of emergent marshes
Buttonbush swamp with deep marsh
Wet meadows

Wet meadows are basically flooded, grassy fields.

These areas usually remain saturated for at least a portion of the year, or…