Wetland Identification and Plant Community Assessment Techniques and Skills

Presented by:
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West Environmental, Inc.

First things first…

”What is a Wetland?

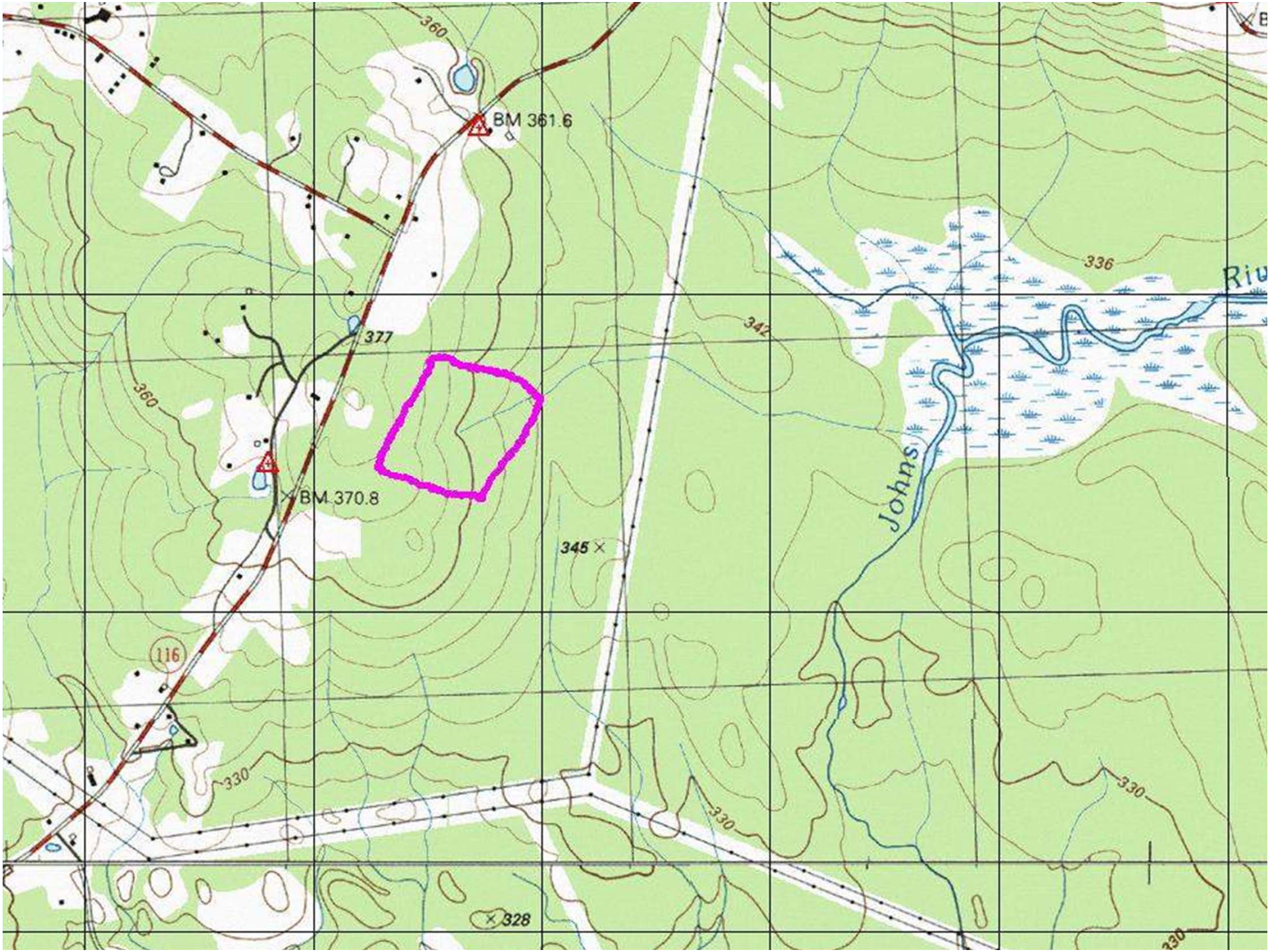
- NHDES Wetlands Bureau (Wt 101.88) adopted the USACE definition as defined in the “1987 Manual” as: **An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically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

WETLAND DELINEATION STANDARDS

- US Army Corps of Engineers Wetlands Delineation Manual, Technical Report Y- 87-1 (January, 1987).
- Field Indicators for Identifying Hydric Soils in New England Version 3. NEIWPCC Wetlands Work Group NO MORE Those Soils Guys changed it again!!
- National List of Plant Species That Occur in Wetlands: Northeast (Region 1). U.S. Fish and Wildlife Service (May 1988).
- Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish & Wildlife Service (1979).
- Code of Administrative Rules. Wetlands Board, State of New Hampshire (Current).

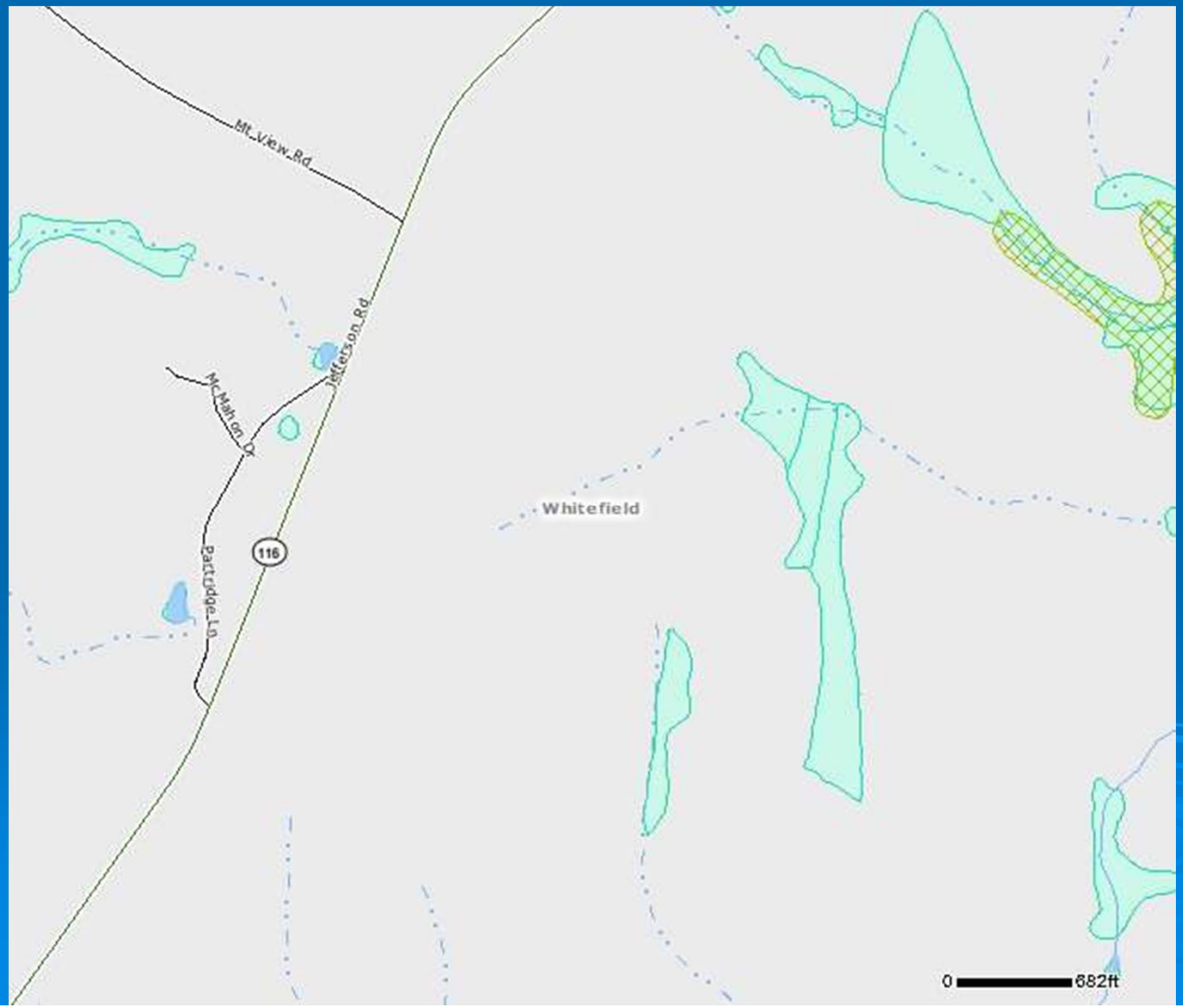
Background Data

- USGS Maps
- NWI Maps
- Soil Survey
- GRANIT
- Ortho Photos
- Stereo Photos
- Natural Heritage Data

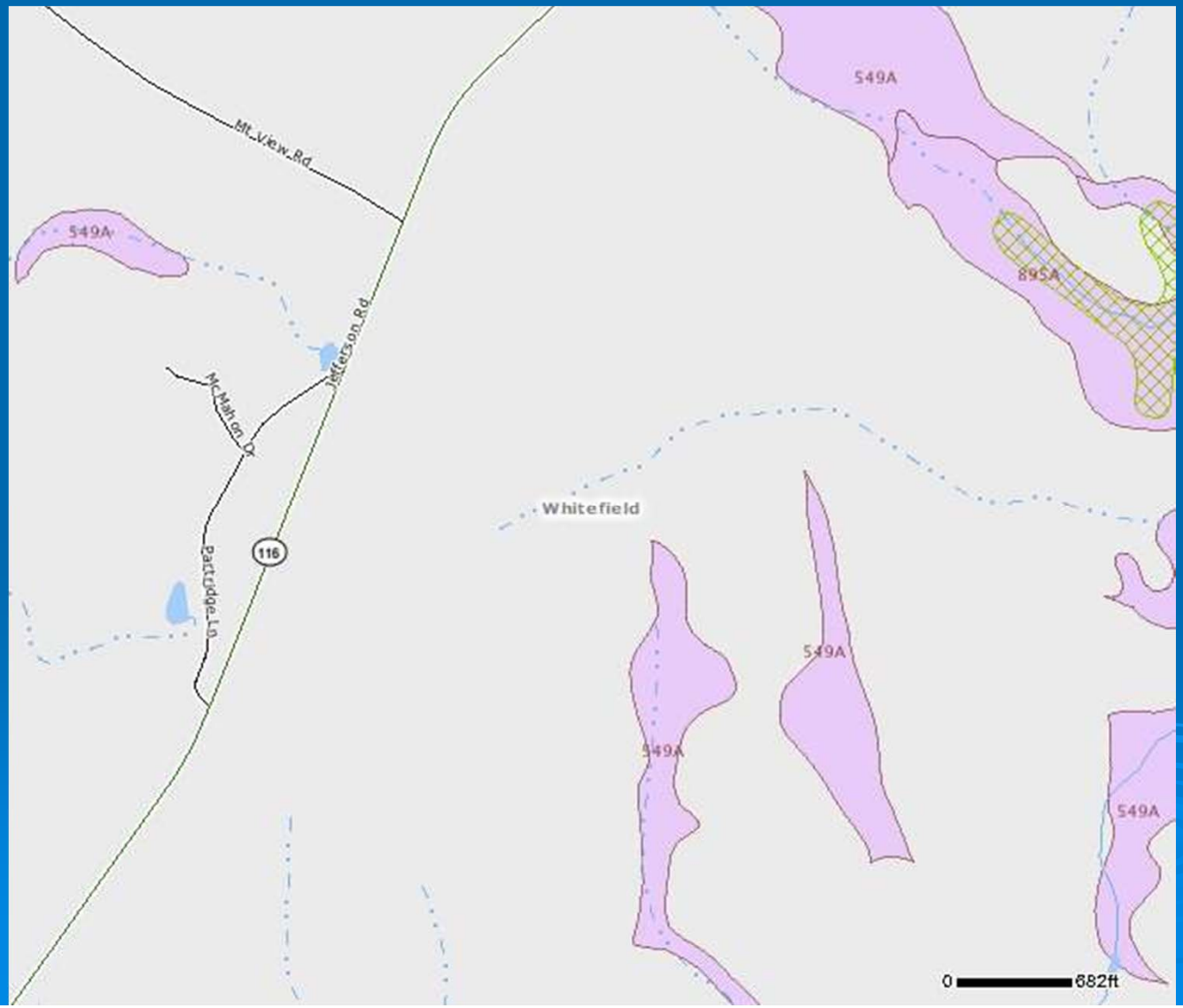

360
BM 361.6
377
360
BM 370.8
345
342
336
Johns
116
330
330
330
328


116

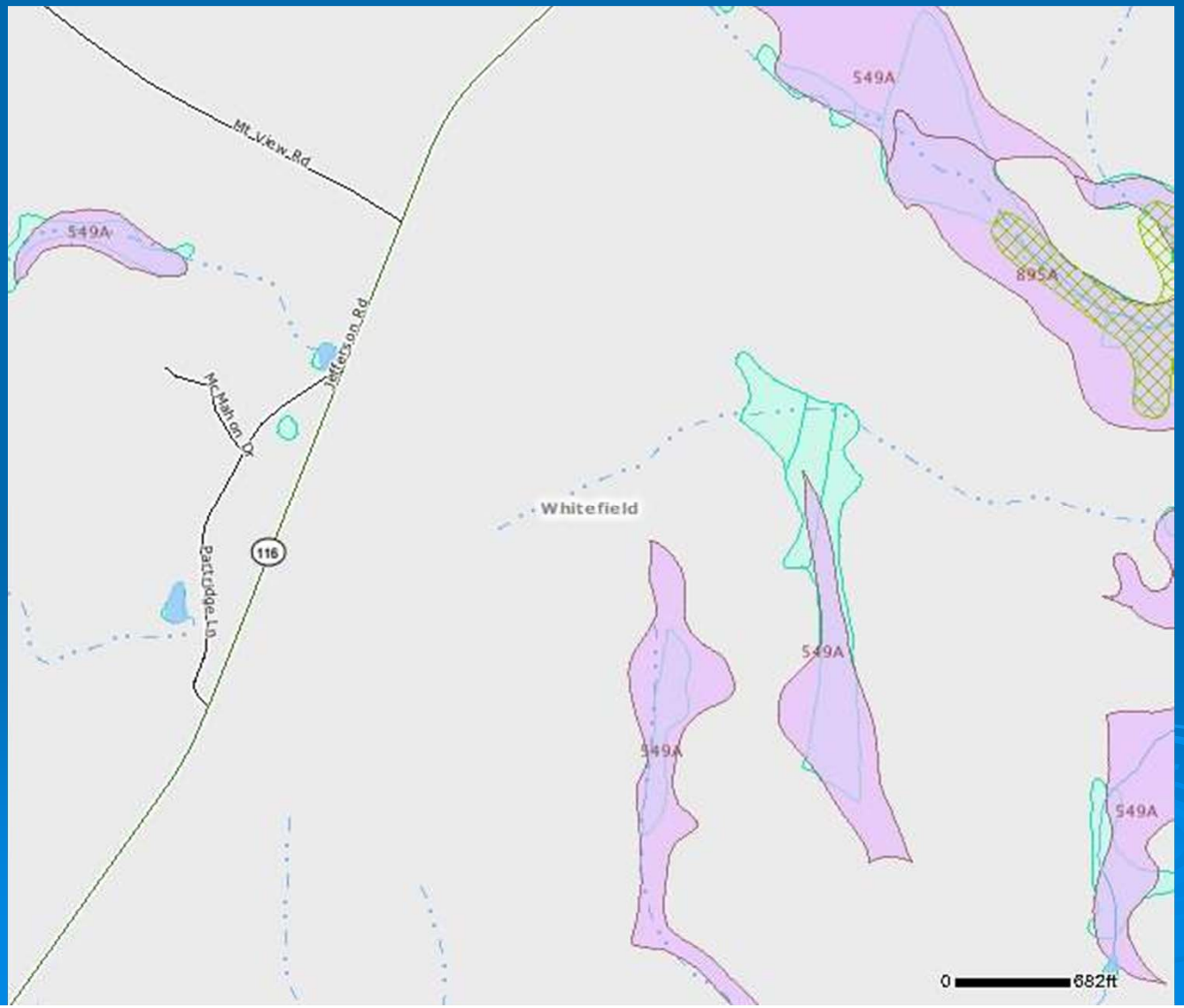
National Wetlands Inventory (NWI) Map



Hydric Soils



NWI & Hydric Soils



Aerial Photo Sources for NH

- Federal
  - USDA
- County
  - Farm Service Agencies
  - University of NH – Cooperative Ext.
  - Natural Resources Conservation Service
- State
  - NH Office of State Planning
  - NH Dept. of Resources & Economic Dev.
  - Transportation Department
  - Regional Planning Agencies

Other Sources

- Aerial Survey & Photo

  PO Box 659, Norridgework, ME 04957

- Eastern Topographics

  Route 28, PO Box 947, Wolfeboro, NH 03894

- Cartographics Associates

  PO Box 267, Littleton, NH 03561

- Col-East, Inc.

  PO Box 347, Harriman & West Airport, North Adams, MA 01247

- The Map Store

  University of Main, 130 Nutting Hall, Orono, ME 04469

- John E. O'Donnell & Assoc.

  81 Main Street, Auburn, ME 04210

- James Sewall Co.

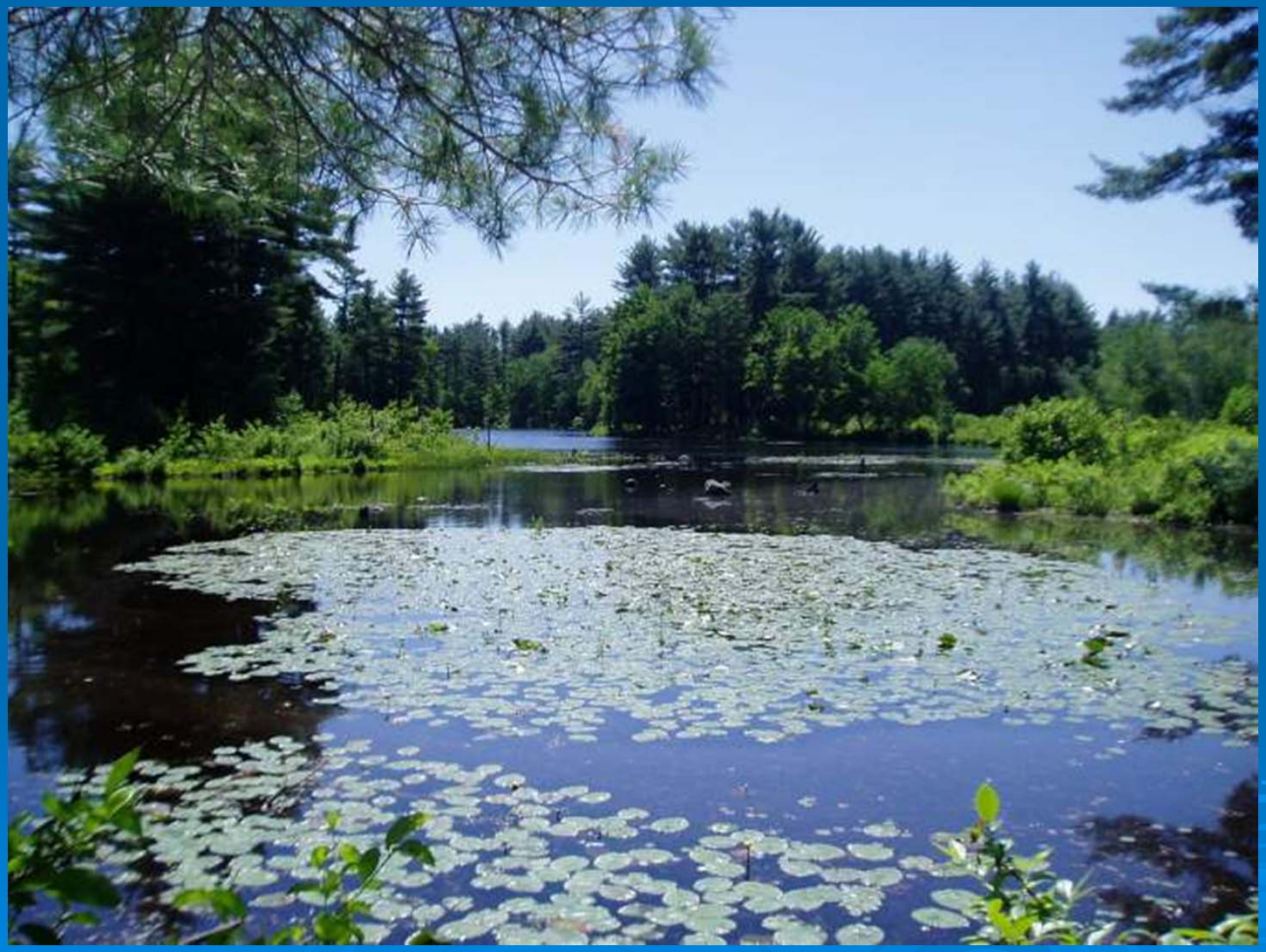
  PO Box 433, Old Town, ME


022-024-000
I-95
Winnicut Rd
Lovering Road
018-062-000


MAR.31, 2006
500
24931-3-53
Little Massabesic Lake
Sucker Brook
Hooksett Road
Little Massabesic Brook
Auburn School
Auburn Post Office
Eaton Road
Raymond Road
Auburn Town Hall
©2008 COL-EAST NORTH ADAMS, MA
1-800-FLY-TOPO


0
500 Feet

Plant Community Assessment



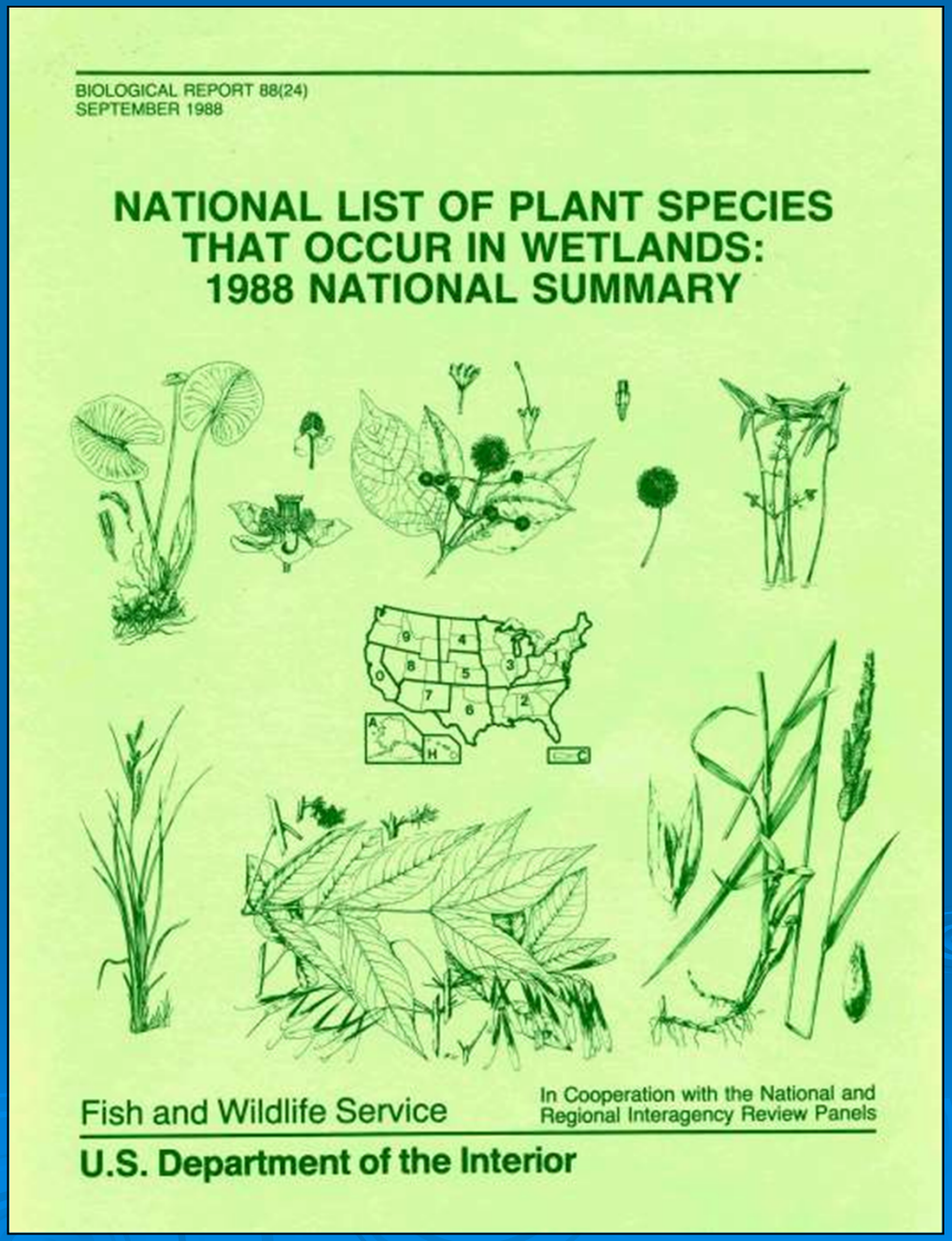
Concepts

- 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

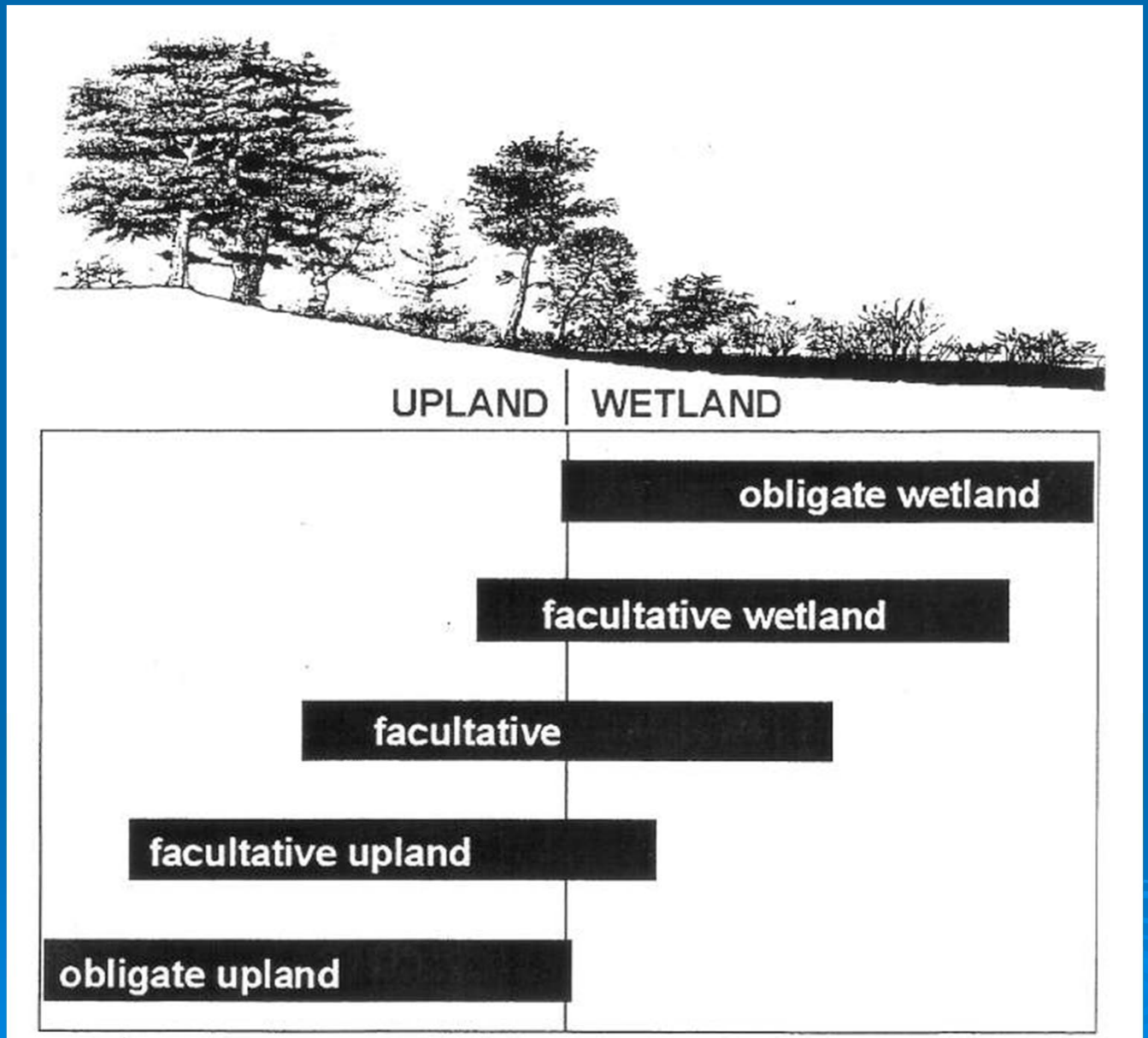
Any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content

Plant Lists


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

Wetland Indicator Status

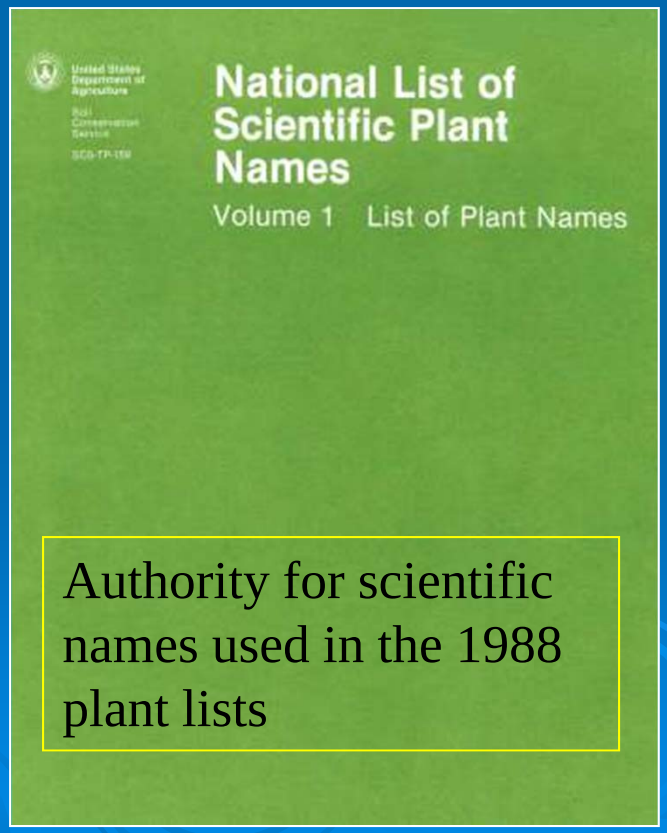
Indicator category	Symbol	Occurrence in Wetlands
Obligate wetland plants	OBL	> 99%
Facultative wetland plants	FACW	67 - 99%
Facultative plants	FAC	34 - 66%
Facultative upland plants	FACU	1 - 33%
Obligate upland plants	UPL	< 1%


UPLAND
WETLAND
obligate wetland
facultative wetland
facultative
facultative upland
obligate upland

Plant Lists

If a plant is not listed on the plant list:

- Using an incorrect name or a synonym
  - Check the “Synonymy” section of the plant list
- Lacking information to include on plant list
- It is UPL and not listed



Authority for scientific names used in the 1988 plant lists

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**

Observation Plot (radius from center)
5'
5'
15'
30'
30'

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)

Short shrubs to count in shrub layer

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

Quiz Time

Typical Dominance Measures per Stratum

- Trees – basal area, percent cover
- Saplings/Shrubs – percent cover
- Herbs – percent cover
- Lianas (vines) – percent cover, stem counts

- REMEMBER – determining relative dominance of species within the same stratum

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

Selection of Dominant Species

The “50/20 rule”:For each stratum in the plant community, dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50 percent of the total dominance measure for the stratum, plus any additional species that comprises 20 percent or more of the total dominance measure for the stratum.

Selection of Dominant Plants

For the sapling/shrub stratum:

Species Present	% Cover	Relative Cover	Cumulative Total
* *Cornus foemina*	25	33	33
* *Spiraea alba*	20	27	60
* *Cornus amomum*	15	20	80
Rhamnus frangula	10	13	93
Toxicodendron vernix	5	7	100
	75	100	

* Selected as dominants

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.

Prevalence Index

- Weighted averages rather than dominance ratio
- Use percent cover or frequency data (e.g., point intercept)
- Must use same method for all strata
- Uses all plant species, not just dominants
- Must be able to identify majority of plants

Weights per Indicator Status

- OBL = 1.0
- FACW = 2.0
- FAC = 3.0
- FACU = 4.0
- UPL = 5.0

Calculating Prevalence Index

$$PI = \frac{1(OBL)+2(FACW)+3(FAC)+4(FACU)+5(UPL)}{(OBL+FACW+FAC+FACU+UPL)}$$

VEGETATION Stratum and Species	Observed Dominance	Relative Dominance	DOM	NWI Status
SEEDLINGS & HERBS				
Osmunda cinnamomea	10.5/56.5	19	x	FACW
Clethra alnifolia	10.5/56.5	19	x	FAC+
Maianthemum canadense	20.5/56.5	37	x	FAC-
Onoclea sensibilis	3/56.5	5		-----
Acer rubrum	3/56.5	5		-----
Toxicodendron radicans	3/56.5	5		-----
Lycopodium obscurum	3/56.5	5		-----
Aralia nudicaulis	3/56.5	5		-----
SHRUBS				
Clethra alnifolia	10.5/21	50	x	FAC+
Vaccinium corymbosum	10.5/21	50	x	FACW
SAPLINGS				
Acer rubrum	63/73.5	86	x	FAC
Pinus strobus	10.5/73.5	14		-----
TREES				
Acer rubrum	320/440	73	x	FAC
Pinus strobus *shallow roots	120/440	27	x	*FACU
VINES				
Smilax glauca	6/10	60	x	FACU
Vitis novae-anglae	4/10	40		NI

HYDROPHYTES

0	2	4	1
OBL	FACW	FAC	*OTHER

NON-HYDROPHYTES

1	1	0
FAC-	FACU	UPL

Hydrophytes Subtotal (A): 7

Non-hydrophytes Subtotal (B): 2

PERCENT HYDROPHYTES (100A/A+B): 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

FACU-dominated Wetlands

- Examine all vegetation, not just dominants
- Look for morphological adaptations
- Hydrologic evidence
- Scientific literature on individual species or communities, e.g., hemlock swamps

Hemlock Swamp

Wetland Hydrology

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

Are Normal Circumstances Present

- Ditching
- Impoundments
- Disturbed Soils
- Disturbed Vegetation

How wet is wet?

- Hydroperiod (“hydrologic regime”)
  - Duration
  - Frequency
  - Timing
    - Seasonality of wetness
- Depth of saturation

Primary Indicators

- Surface Water
- High Water Table
- Soil Saturation
- Water Marks
- Sediment Deposits
- Drift Deposits/lines
- Iron Deposits
- Inundation visible on aerial imagery

Continued

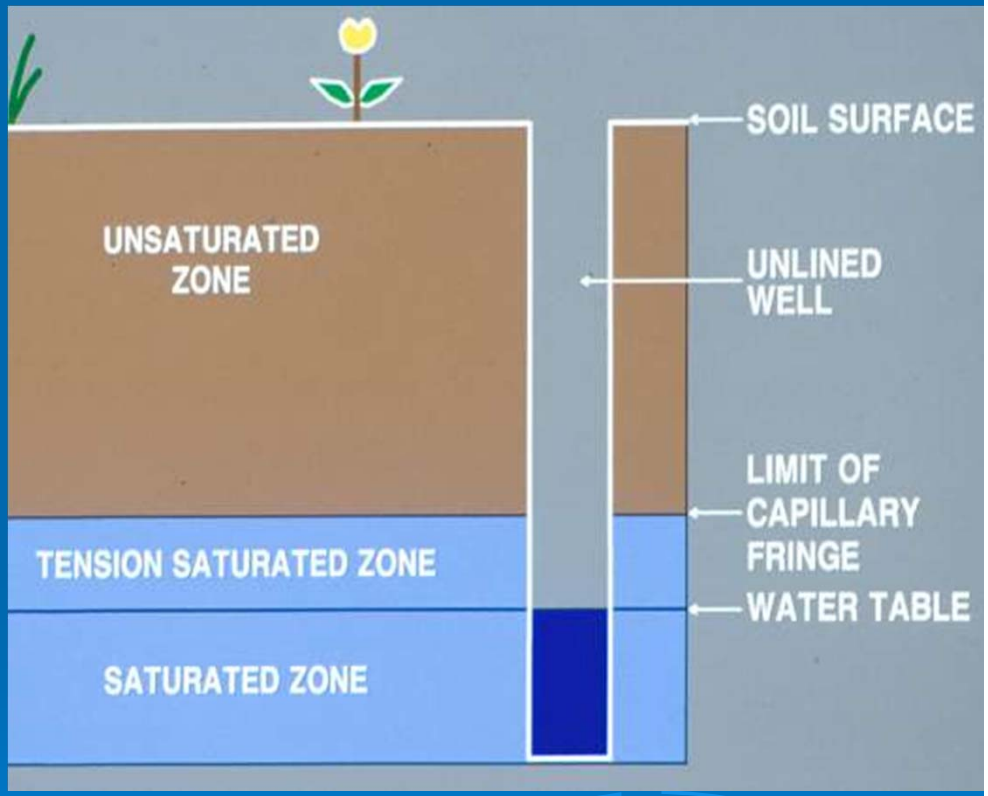
- Water- Stained Leaves
- Hydrogen Sulfide Odor
- Oxidized Rhizospheres on Living Roots
- Presence of Reduced Iron
- Thin Muck Surface
- Algal Mat or Crust
- Aquatic Fauna
- Sparsely vegetated concave surface

Field Indicator of Wetland Hydrology: Visual Observation of Inundation

Field Indicator of Wetland Hydrology: Visual Observation of Soil Saturation

Capillary Fringe

- A zone immediately above the water table in which water is drawn upward by capillary action.
- Water is at less than atmospheric pressure.



Field Indicator of Wetland Hydrology: Surface-Scoured Areas

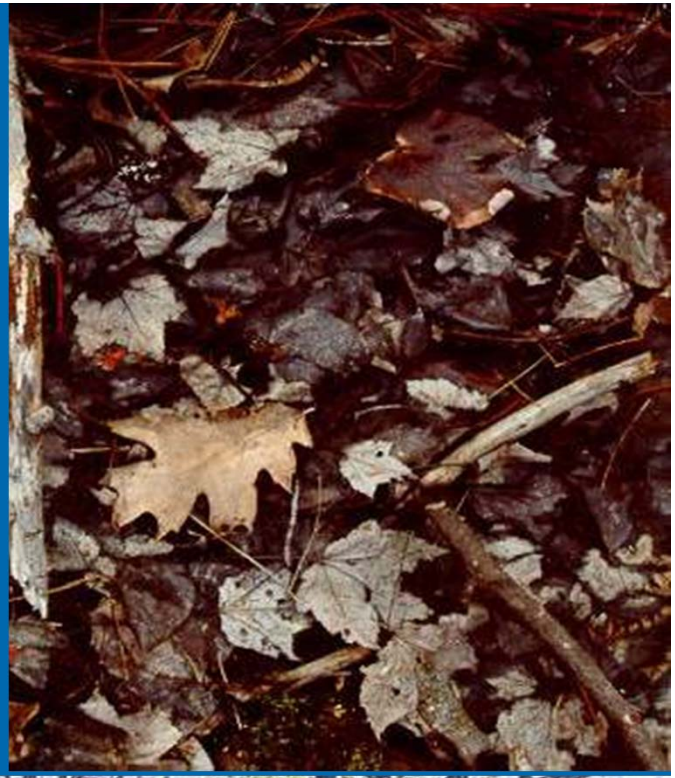
- The absence of leaf litter from the soil surface is, at times, an indication of surface scouring.
- Occurs along floodplains where overbank flooding erodes sediments (e.g., at the bases of trees).
- Trees, shrubs and persistent herbaceous plants reclining in the direction of water flow are indicators of surface scour.

Field Indicator of Wetland Hydrology: Drift Lines

- Found adjacent to streams or other sources of water flow in wetlands.
- parallel to the direction of water flow.
- Drift lines provide an indication of the minimum portion of the area inundated during a flooding event; the maximum level of inundation is generally at a higher elevation than that indicated by a drift line.

Field Indicator of Wetland Hydrology: Water-stained leaves

- The physical appearance of leaves resulting from the continued presence of water and anaerobic processes will often darken leaf surfaces.



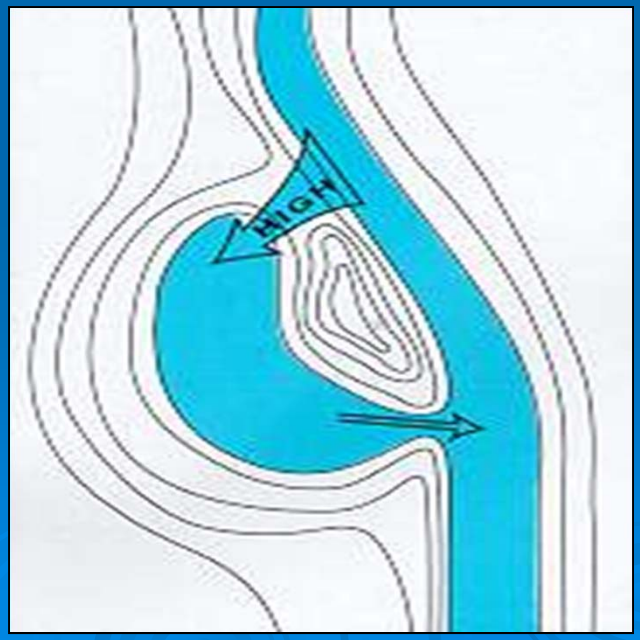
Field Indicator of Wetland Hydrology: Sediment Deposits

- Thin layers, coatings, or depositions of mineral or organic matter on plants,, stems or trunks after inundation.
- Provide an indication of the minimum inundation level.
- When sediments are primarily organic (e.g., fine organic material and algae), the detritus may become encrusted on or slightly above the soil surface after the water dries.

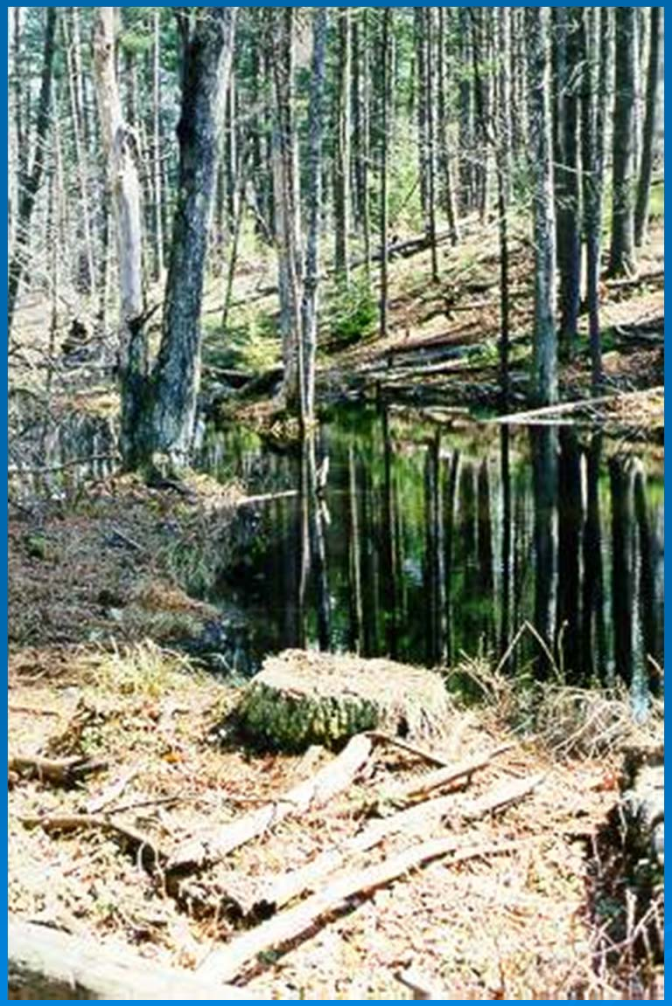
Field Indicator of Wetland Hydrology: Oxidized Rhizospheres

- Oxidized zones around living roots and rhizomes (rhizospheres).
  - Plants transport oxygen to their root zones.
- Look for iron oxide concretions (orangish or reddish brown in color) forming along the channels of living roots and rhizomes.

Oxidized root channels must be associated with live roots.


HIGH

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

Wetland Functions Evaluated

- 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.

Wetland Values Evaluated

- Recreational Value
- Educational/Scientific Value
- Uniqueness/Heritage
- Restoration Potential

NEW New Hampshire Method

- http://nhmethod.org/

Prime Wetland Requirements

1. Wetland vegetation soils and hydrology
2. At least 50% very poorly drained soils
3. Generally over 2 acres in size
4. May include Smaller wetlands with rare species

Town Flag	Species or Community Name	Listed? Federal	Listed? State	# reported last 20 yrs Town	# reported last 20 yrs State
Whitefield					
	Natural Communities - Palustrine				
	Northern white cedar - balsam fir swamp	--	--	Historical	26
	Northern white cedar seepage forest	--	--	Historical	8
**	Poor level fen/bog system	--	--	1	29
	Plants				
	Ciliated Aster (*Symphyotrichum ciliolatum*)	--	T	Historical	12
	Climbing Fumitory (*Adlumia fungosa*)	--	E	Historical	18
**	Green Adder's Mouth (*Malaxis unifolia*)	--	T	1	56
	Hidden Sedge (*Carex umbellata*)	--	E	Historical	12
	Loesel's Twayblade (*Liparis loeselii*)	--	T	Historical	24
	One-leaf Orchis (*Amerorchis rotundifolia*)	--	E	Historical	1
	Thin-leaved Alpine Pondweed (*Potamogeton alpinus*)	--	E	Historical	7
	Wapato (*Sagittaria cuneata*)	--	E	Historical	12
	Vertebrates - Mammals				
**	American Marten (*Martes americana*)	--	T	1	144
	Vertebrates - Birds				
**	Common Loon (*Gavia immer*)	--	T	1	274
**	Northern Harrier (*Circus cyaneus*)	--	E	1	11
**	Rusty Blackbird (*Euphagus carolinus*)	--	SC	1	8
	Invertebrates - Butterflies & Moths				
	Graceful Clearwing (*Hemaris gracilis*)	--	--	Historical	8
Wilmot					
	Plants				
	Slender Blue Flag (*Iris prismatica*)	--	E	Historical	11
	Vertebrates - Birds				
	Least Bittern (*Ixobrychus exilis*)	--	SC	Historical	4
	Vertebrates - Reptiles				
**	Smooth Green Snake (*Opheodrys vernalis*)	--	SC	1	51
Wilton					
	Plants				
	Giant Rhododendron (*Rhododendron maximum*)	--	T	Historical	13
	Vertebrates - Reptiles				
**	Wood Turtle (*Glyptemys insculpta*)	--	SC	3	164

Listed? E = Endangered T = Threatened SC = Special concern M = Monitored

Flags
**** = Highest importance
*** = Extremely high importance
** = Very high importance
* = High importance

These flags are based on a combination of (1) how rare the species or community is and (2) how large or healthy its examples are in that town. Please contact the Natural Heritage Bureau at (603) 271-2214 to learn more about approaches to setting priorities.

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