National Association of Wetland Managers and
Saint Mary's University GeoSpatial Services

Tribal Clean Water Act Training Module #1

Introduction to the Federal Process for Identifying Wetlands

1987 MANUAL FOR IDENTIFYING AND DELINEATING WETLANDS

Welcome!

If you have any technical difficulties during your online training experience, please send your question to Portia Osborne at portia@nawm.org or call (207) 892-3399.

Online Training Modules

Welcome

Introduction to Online Course and Optional Quiz
(10 knowledge questions)

Trainer Introduction

Training Presentation
(3 sections)

How to Access the Online Quiz and Receive a Certificate of Completion
(For use in obtaining CEUs)

Tribal Clean Water Act Training Module #1
Introduction to the Federal Process for Identifying Wetlands

Target Audience:

Tribal water quality and aquatic resources staff who want to learn more about the Federal process for wetland identification.

Learning Objectives:

By taking part in this online training, participants should be able to:

1. Understand the basics of the Corps 1987 Manual for identifying wetlands.
2. Become familiar with the three-parameter approach to wetlands identification.
3. Understand the routine method for sampling wetlands manual parameters.
4. Gain a knowledge of the regionalization of the manual, plant frequency of occurrence, hydric soil indicators and supporting documentation.
5. Be prepared for a weeklong manual field training course.

What is on the Quiz?

Ten questions related to key takeaways from the online training presentation.

This module will provide information on how to access the quiz after the presentation is complete (3 sections).

On average, the quiz takes less than 15 minutes to complete.

Trainer Introduction

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Introduction to the Federal Process for Identifying Wetlands

Section #1:

- Introduction to Wetlands and 1987 Manual.

A Wetland is defined in federal regulation as:

- "Areas that are 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 for life in saturated soil conditions."

- Commonalities among Corps, EPA, NRCS and FWS – Water/Soil/Plants!
- This is a regulatory process/method.

Photo credit: ncwetlands.org

Disclaimer:

- This webinar is based on years of experience and field application of the federal manual and is meant to provide an introduction into field sampling methods for identifying wetlands utilizing the 1987 Corps manual process.
- The 1987 manual **does not identify "waters of the United States" (WOTUS) but rather areas which qualify as a wetlands under the federal definition**.
- For any questions of manual applications or jurisdiction please contact your Corps District office or EPA Regional office.

Photo credit: ncwetlands.org

Relevant Federal Statutes

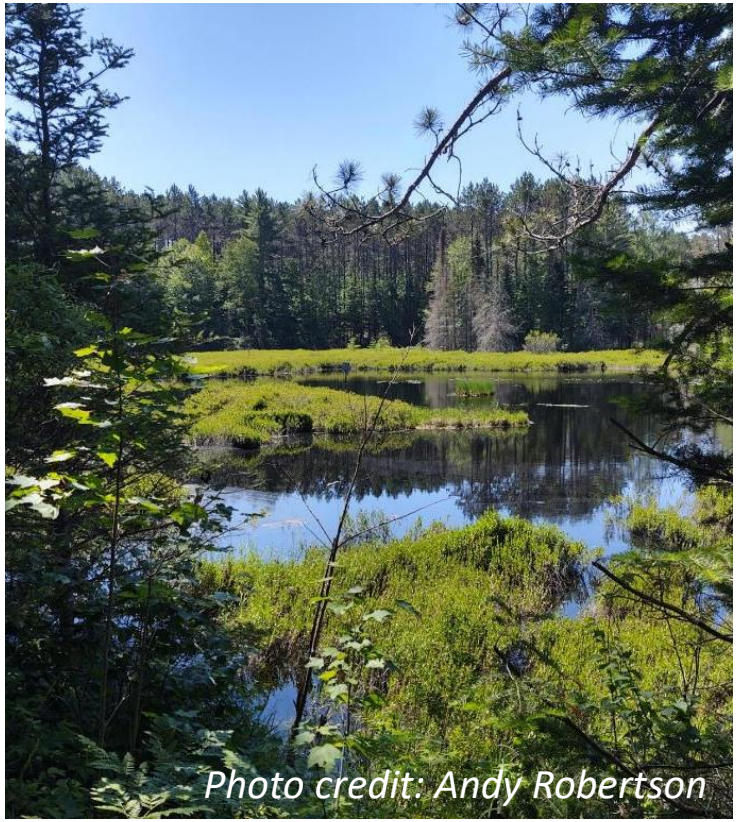


Photo credit: Andy Robertson

- Clean Water Act of 1972 and Amendments
  - Authorized EPA and the Corps to regulate certain activities in wetlands and other waters (Section 404)
- Food Security Act of 1985 and Amendments
  - Authorized NRCS to make wetland determinations under the Act's "Swampbuster" provisions

Scope of the Clean Water Act

Applies to all “Waters of the United States” (WOTUS) including these Special Aquatic Sites designated by EPA:

- **Wetlands**
- Sanctuaries and refuges
- Mudflats
- Vegetated shallows
- Coral reefs
- Riffle and pool complexes

State and Tribal Methodologies for Wetlands Determinations:

- Many States and Tribes have a regulatory framework for wetlands protection as well and employ methods to determine if an area is regulated under state law.
- While many states and tribes either use, or have a methodology similar to, the 1987 manual process it is best to check.
- For example, NJ uses the 1989 unified wetlands manual, some have employed modifications to the 3-parameter approach or incorporated regulatory applications within their manuals, other states apply an assessment methodology as part of their regulatory scheme (i.e. NCWAM and KY-WRAM)

History of Wetlands Manual Development

- Pre 1989 there were multiple methods for identifying wetlands by federal agencies including 1987 manual, EPA manual, USFWS method and food securities act (SCS/NRCS)
- 1989 a unified manual was developed by EPA, Corps, NRCS and FWS.
- Push back on the manual in 1991 resulted in the EPA and Corps adoption of the 1987 Corps manual with attendant guidance documents including hydric soils list and species frequency of occurrence in wetlands.
- Added documents include the regionalization of the manual and indicators of hydric soils tool.

Common process for complex systems!

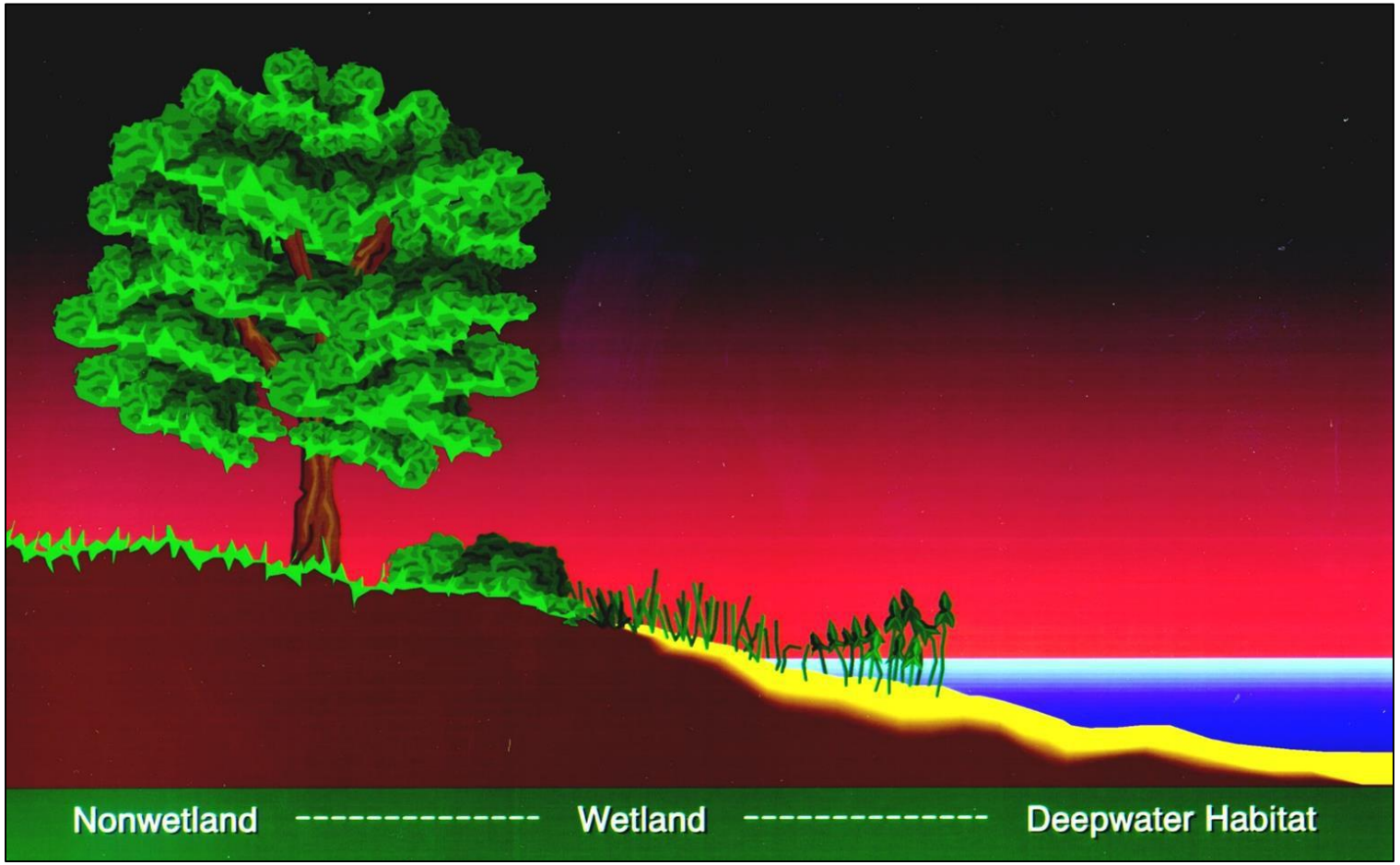
Obvious indicators of a wetland

Not as clearly a wetland system

Diagnostic Characteristics

- **Hydrophytic Vegetation**
  - Dominated by species that are tolerant of prolonged inundation or soil saturation (Hydrophyte)
- **Hydric Soils**
  - Exhibit characteristics that develop under permanent or periodic soil saturation
- **Wetland Hydrology**
  - Evidence of ongoing wetland conditions

Purpose is to Identify the Boundary Between Wetlands and Non-Wetlands

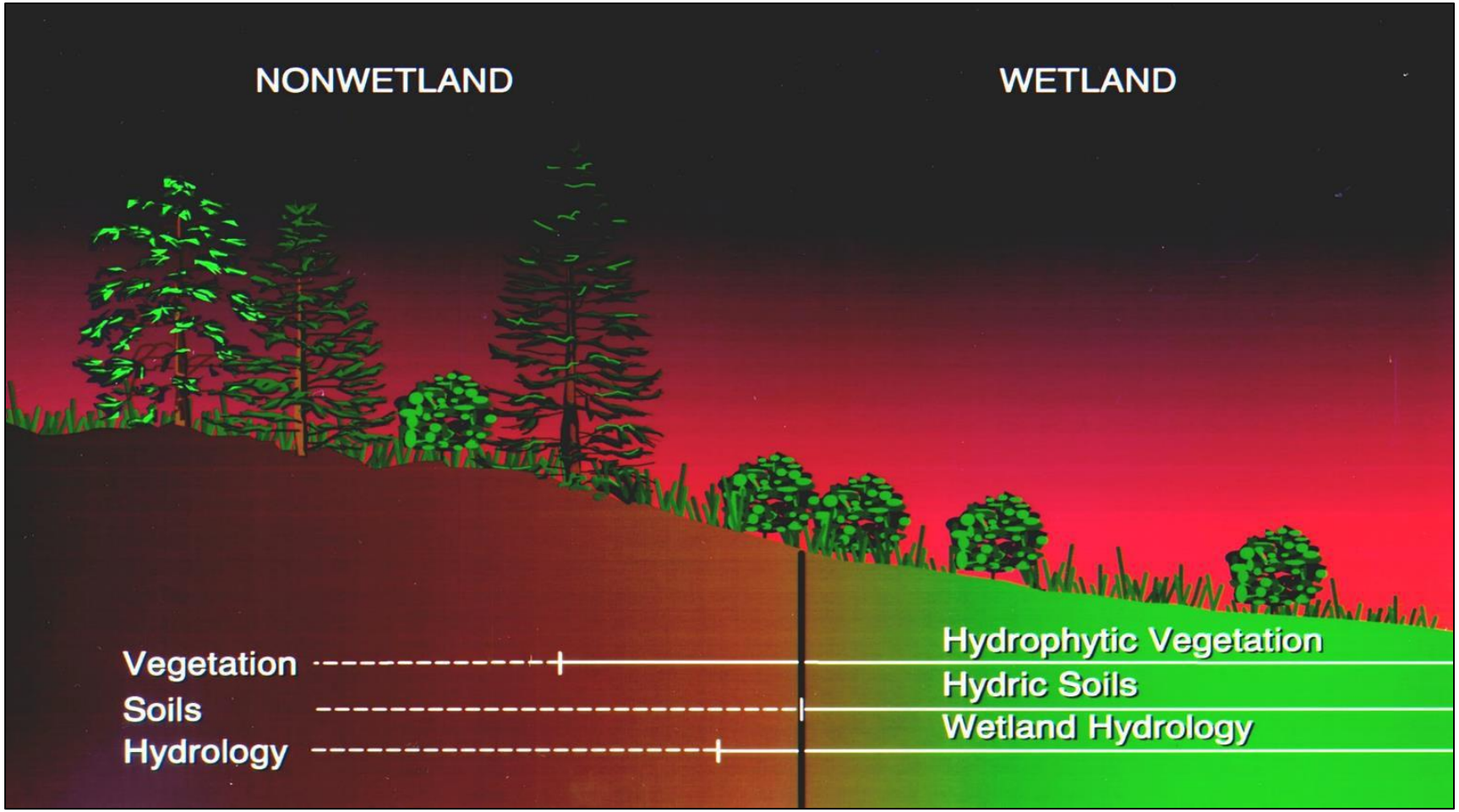


Manual Process Employs a 3 Parameter Approach to Wetlands Identification

As reflected in the definition:

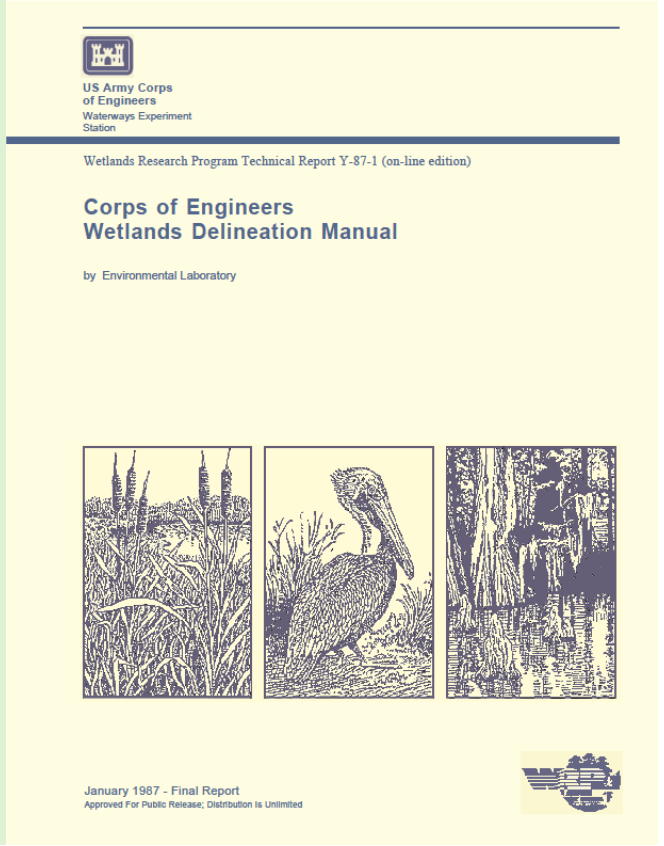
- Hydrology – “Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support”
- Vegetation – “a prevalence of vegetation typically adapted for life”
- Soils – “in saturated soil conditions”
- “Normal Conditions” analysis is part of the determination process.

The 3-Parameter Approach



National Delineation Manual Contains:

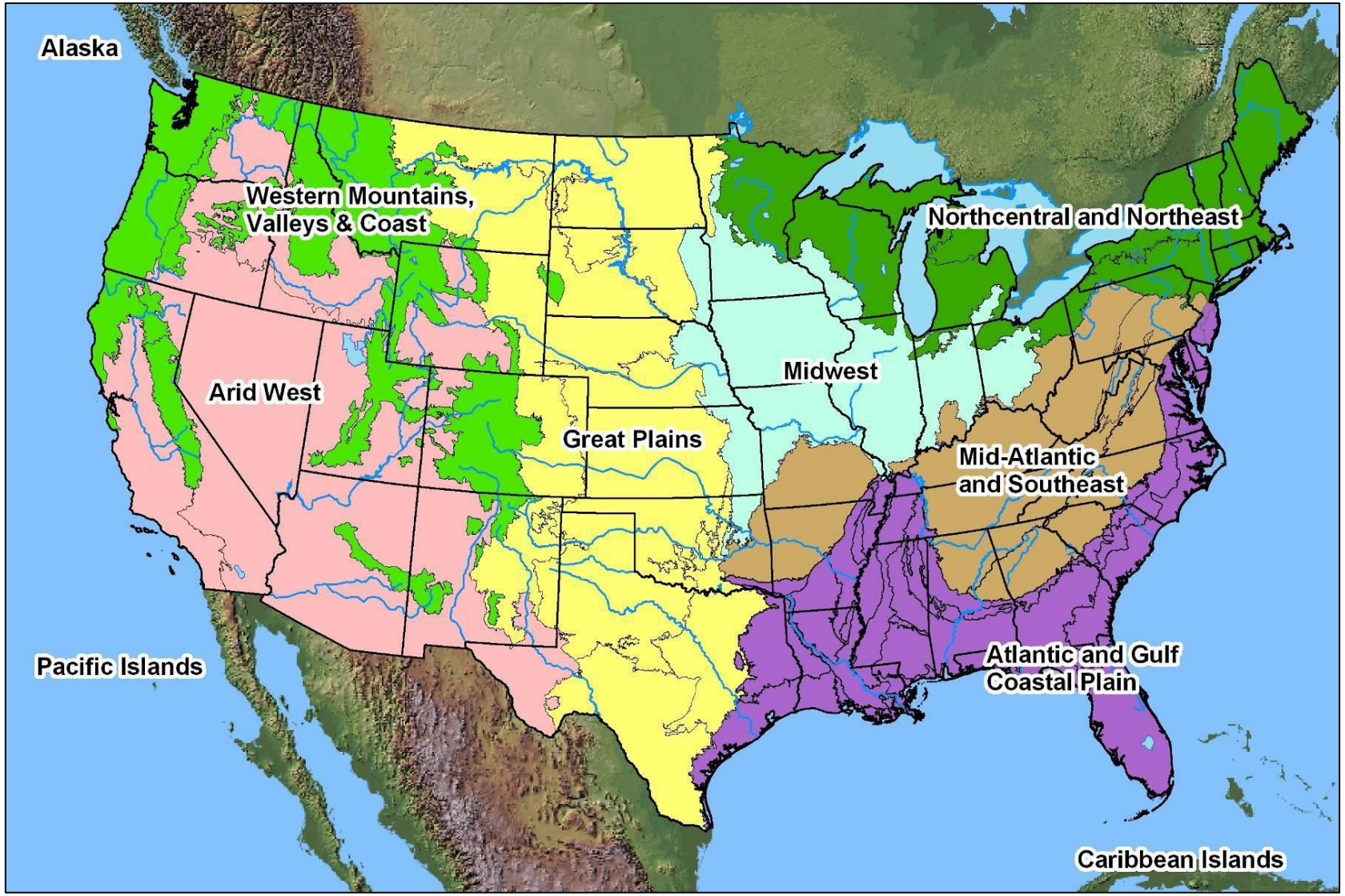
- Corps/EPA wetland definition
- Basics of three parameter approach
- General definitions of hydrophytic vegetation, hydric soils and wetland hydrology
- Preliminary data gathering (offsite sources)
- Routine and Comprehensive methods
- General guidance for Atypical Situations and Problem Areas
- Main Glossary



Regional Supplement Contains:

- Description of the Region
- Hydrophytic vegetation indicators
- Hydric soil indicators
- Wetland hydrology indicators
- Guidance for “Difficult Wetland Situations” within the region

1987 Manual Regional Supplements



Introduction to the Federal Process for Identifying Wetlands

End of Section #1:

- Introduction to Wetlands and 1987 Manual.

Introduction to the Federal Process for Identifying Wetlands (continued)

Section #2:

- Site sampling methodologies and Vegetative Dominance Analysis.

1987 Manual Determination Methods

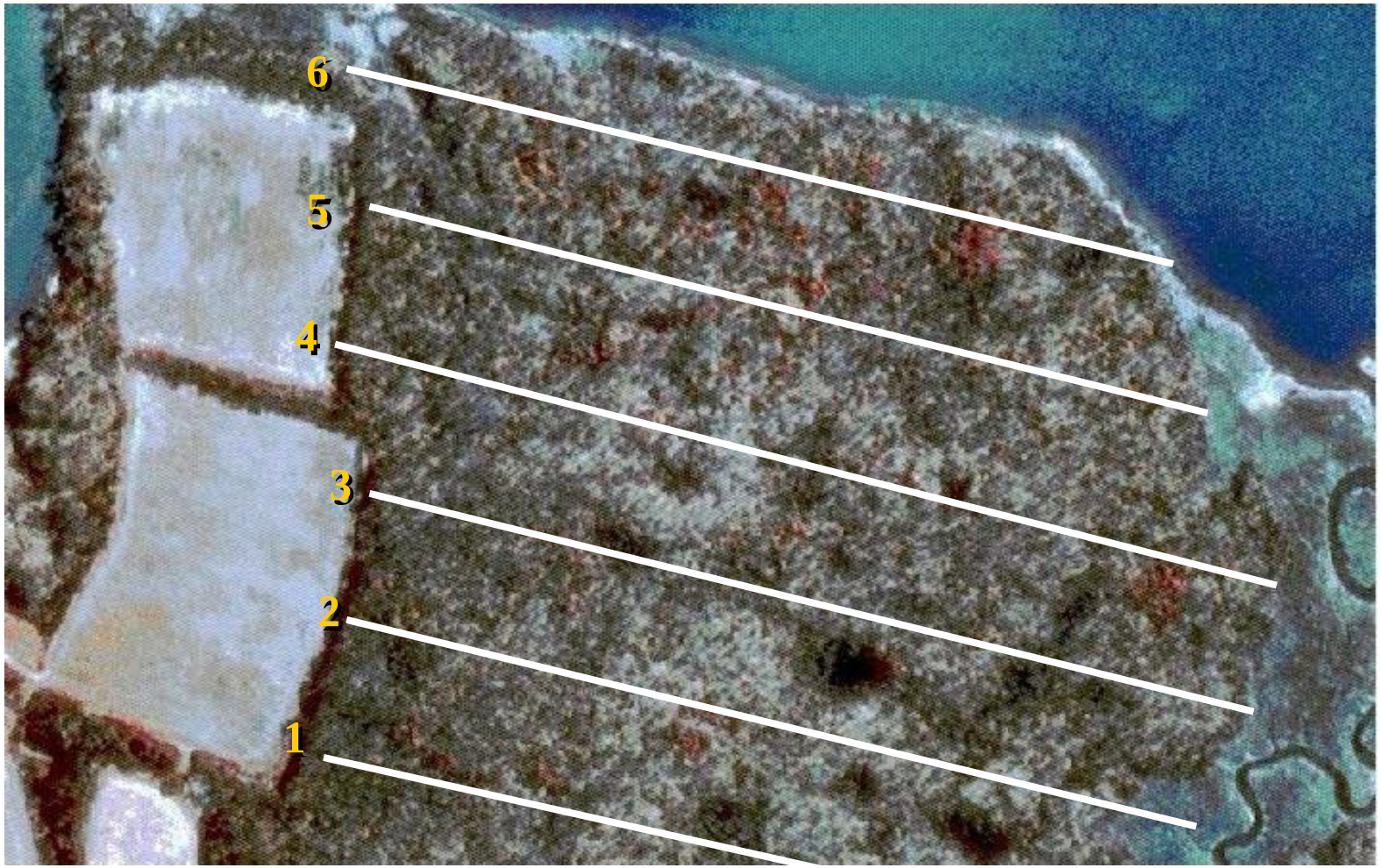
- Routine Method is recommended when:
  - Project area is small (<5 acres)
  - Plant communities are homogenous
  - Plant community boundaries are abrupt
  - Project is not controversial
- Rapid Test:
  - All dominant species across all strata are rated OBL and/or FACW (e.g., Cattail Marsh)

1987 Manual Determination Methods

Comprehensive Method:

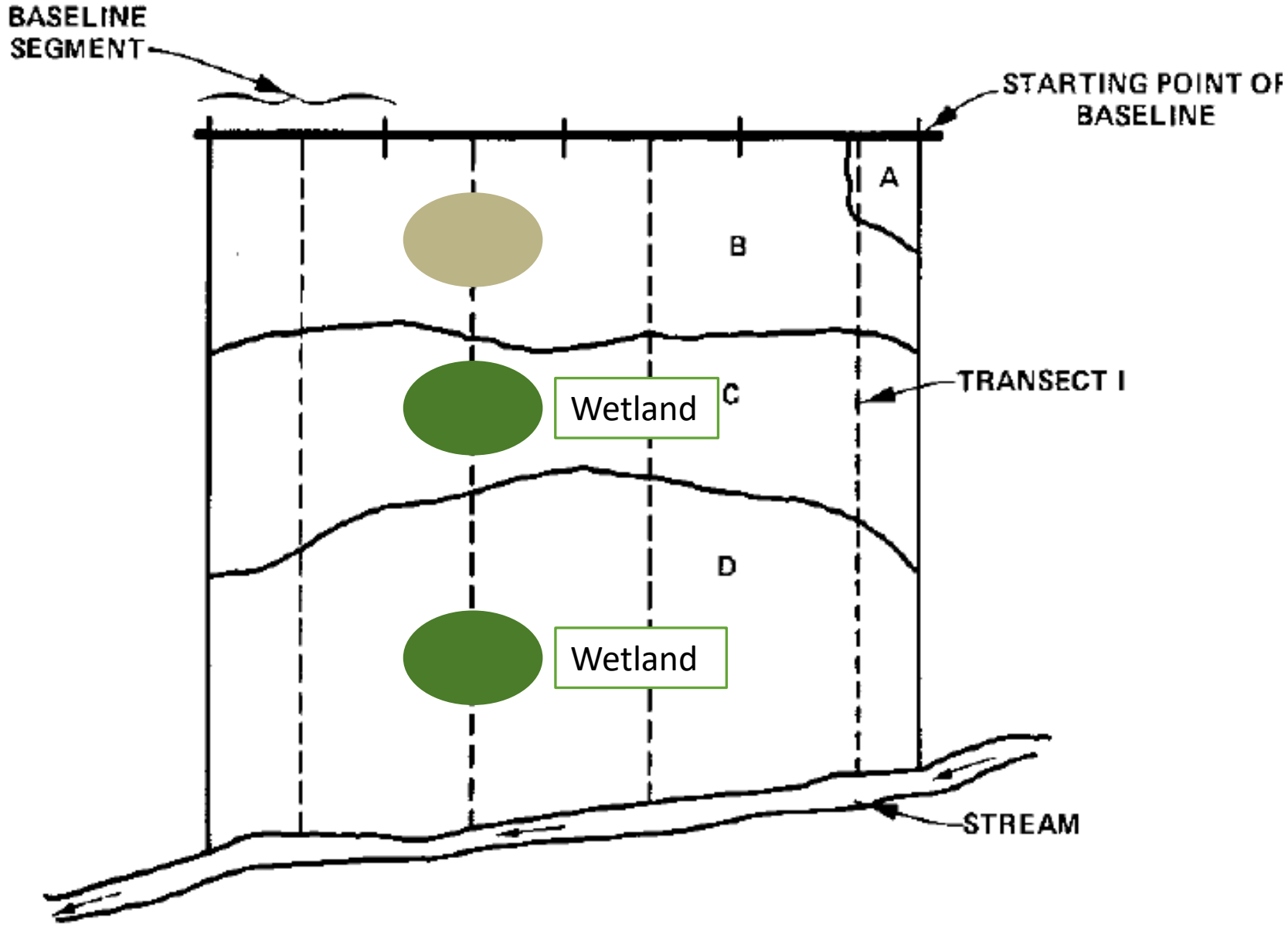
- Variable methods for vegetative sampling:
  - Quadrat Sampling Procedure
    - Plant Community Approach
    - Fixed Interval Approach
  - Point Intercept Sampling Procedure

Transect Sampling

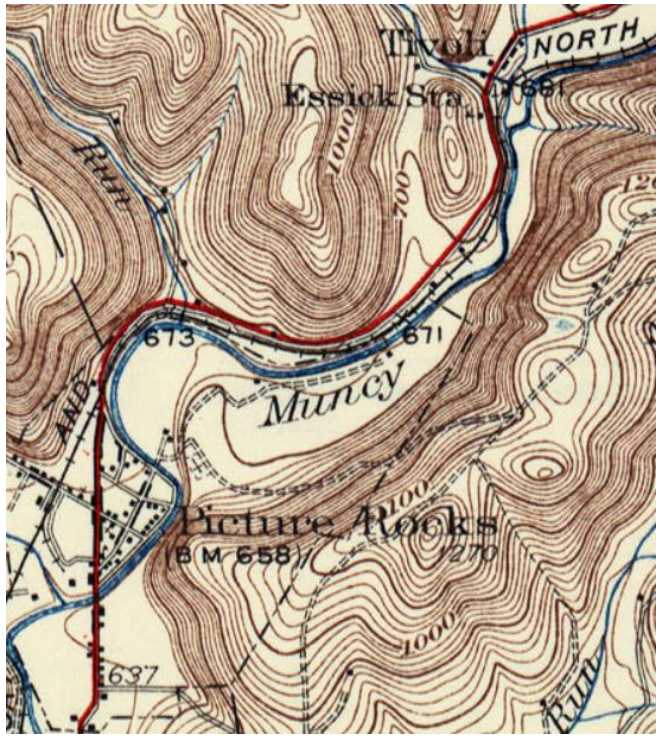


Routine Method for Areas > 5 Acres in Size:

- Determine whether normal conditions are present
- Establish an observation point in the first plant community
- Characterize soil, vegetation, and hydrology, and record on data form
- Make the wetland determination at that point
- Sample remaining points on that transect
- Determine the wetland boundary between points


BASELINE
SEGMENT
STARTING POINT OF
BASELINE
A
B
Wetland
C
TRANSECT I
D
Wetland
STREAM

Recommended Equipment and Materials:



- Base map
- Copies of data form
- Wetland plant list
- Hydric soils list
- County soil survey
- Compass
- Spade, soil auger or probe
- Measuring tape
- Munsell soil coloring book

Vegetation Strata to be Sampled:
(Check Regional Supplement for specific strata criteria)

1. **Tree stratum** – Consists of woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH)(4.5 ft), regardless of height.

2. **Sapling/shrub stratum** – Consists of woody plants less than 3 in. DBH, regardless of height.

3. **Herb stratum** – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size.

4. **Woody vines** – Consists of all woody vines, regardless of height.

Plot Sampling Sizes (Example):

- Plot sizes (*may vary with regional manual methods*)
  - Trees – 30 ft radius
  - Saplings and Shrubs – 15 ft radius
  - Herbaceous – 5 ft radius
  - Woody vines – 30 ft radius
- Sub-plots discussed
- *Absolute Percent Cover* is the preferred measure for all species
- For wetland delineation purposes, an area is considered to be vegetated if it has 5% or more total plant cover during peak growing season.

Example of Plot Sampling Sizes:

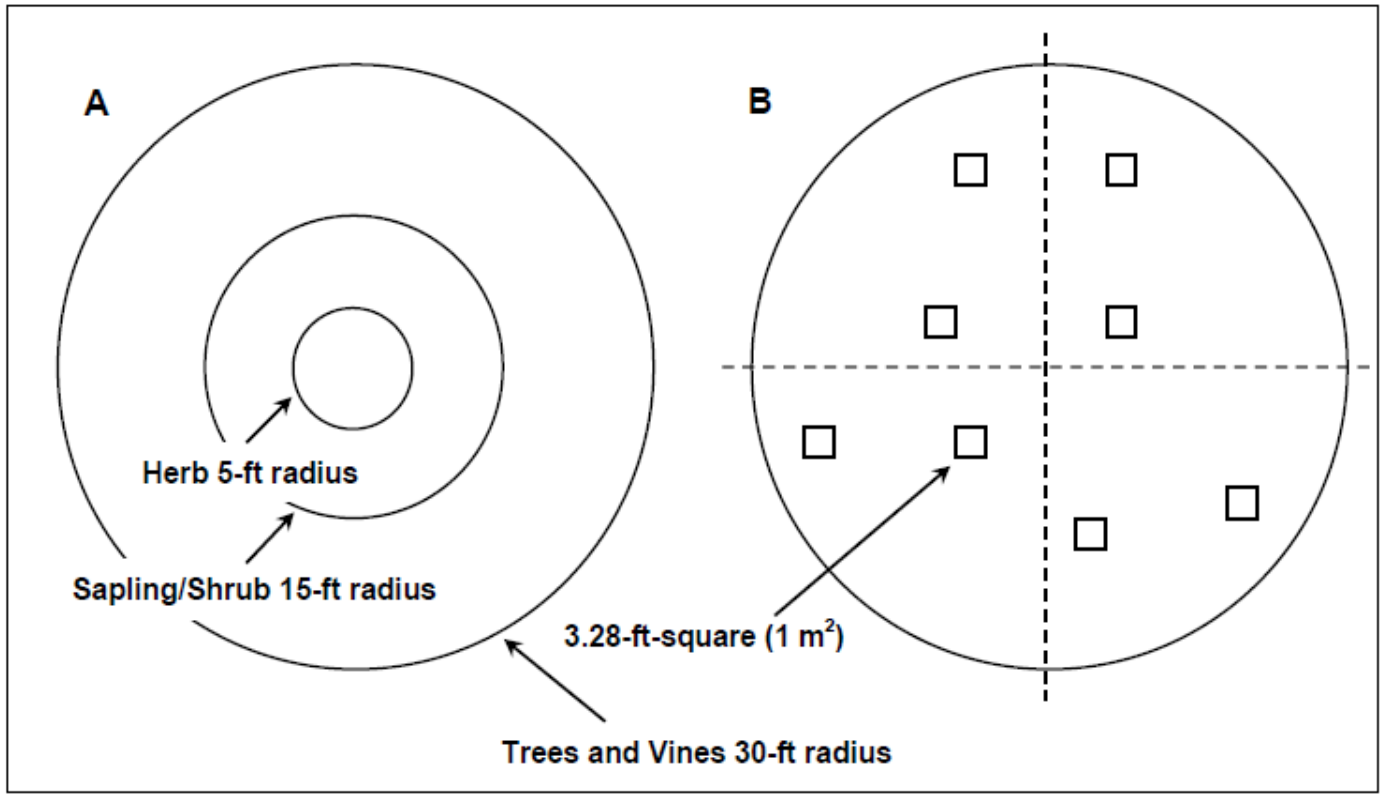


Figure 2. Examples of plot arrangements for vegetation sampling. (A) Single plots in graduated sizes. (B) Nested 3.28- by 3.28-ft (1-m²) plots within the 30-ft (9.1-m) radius plot.

Vegetative Dominance Test

Steps for Selecting Dominant Species by the 50/20 Rule:

1. Estimate absolute % cover for each species in 1st stratum.
2. Rank all species in stratum from least to most abundant.
3. Calculate total coverage of all species in the stratum (sum individual percent cover values).
4. Select plant species from ranked list, in decreasing order of coverage, until cumulative coverage of selected species exceeds 50% of total absolute coverage for the stratum.
5. Select any species that are at least 20% of the total absolute % cover in each stratum.
6. Repeat steps 1-5 for any other stratum present. Combine the lists of dominant species across all strata.

Percent Aerial Cover

Selection of Dominant Species

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 exceeded 50 percent of the total dominance measure for the stratum, plus any additional species comprising 20 percent or more of the total dominance measure for the stratum.

Plant Indicator Status

Indicator Category	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%

50/20 Rule:

Example #1

Red Maple	20%	FAC
Willow Oak	17%	FACW
Overcup Oak	12%	OBL
American Beech	5%	FACU
Total:	54%	

50/20 Rule (cont.):

Example #2

Highbush blueberry	39%	FACW
Blackhaw	10%	FACU
Winterberry	10%	FACW
American Beech	3%	FACU
Speckled Alder	2%	OBL
Total:	64%	

Basic Rule: If more than 50% of the DOMINANT SPECIES are OBL, FACW, OR FAC then the Vegetation Criteria is met (i.e., hydrophytic).

Example #1

54% cover X .5 = 27

54% cover x .2 = 10.8

Therefore, Red Maple (20; FAC), Willow Oak (17; FACW), and Overcup Oak (12; OBL) are dominants. 100% are FAC or wetter. The Basic Rule is met.

Example #2

64% cover x .5 = 32

64% cover x .2 = 12.8

Therefore, Highbush Blueberry (39;FACW) is the only dominant.

The Basic Rule is met; 100% of dominants are Fac or wetter

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: _____

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
	0 = Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling Stratum (Plot size: _____)			
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
	0 = Total Cover		

50% of total cover: _____ 20% of total cover: _____

Shrub Stratum (Plot size: _____)			
1. _____			
2. _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 0 (A)	0 (B)	

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

Example #1

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: _____

Tree Stratum (Plot size: 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	20		
2. Quercus phellos	17		
3. Quercus lyrata	12		
4. Fagus grandifolia	5		
5.			
6.			
	54	= Total Cover	

50% of total cover: 27 20% of total cover: 10.8

Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	0	= Total Cover	

50% of total cover: _____ 20% of total cover: _____

Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: 0 (A)	0 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Introduction to the Federal Process for Identifying Wetlands (continued)

End of Section #2:

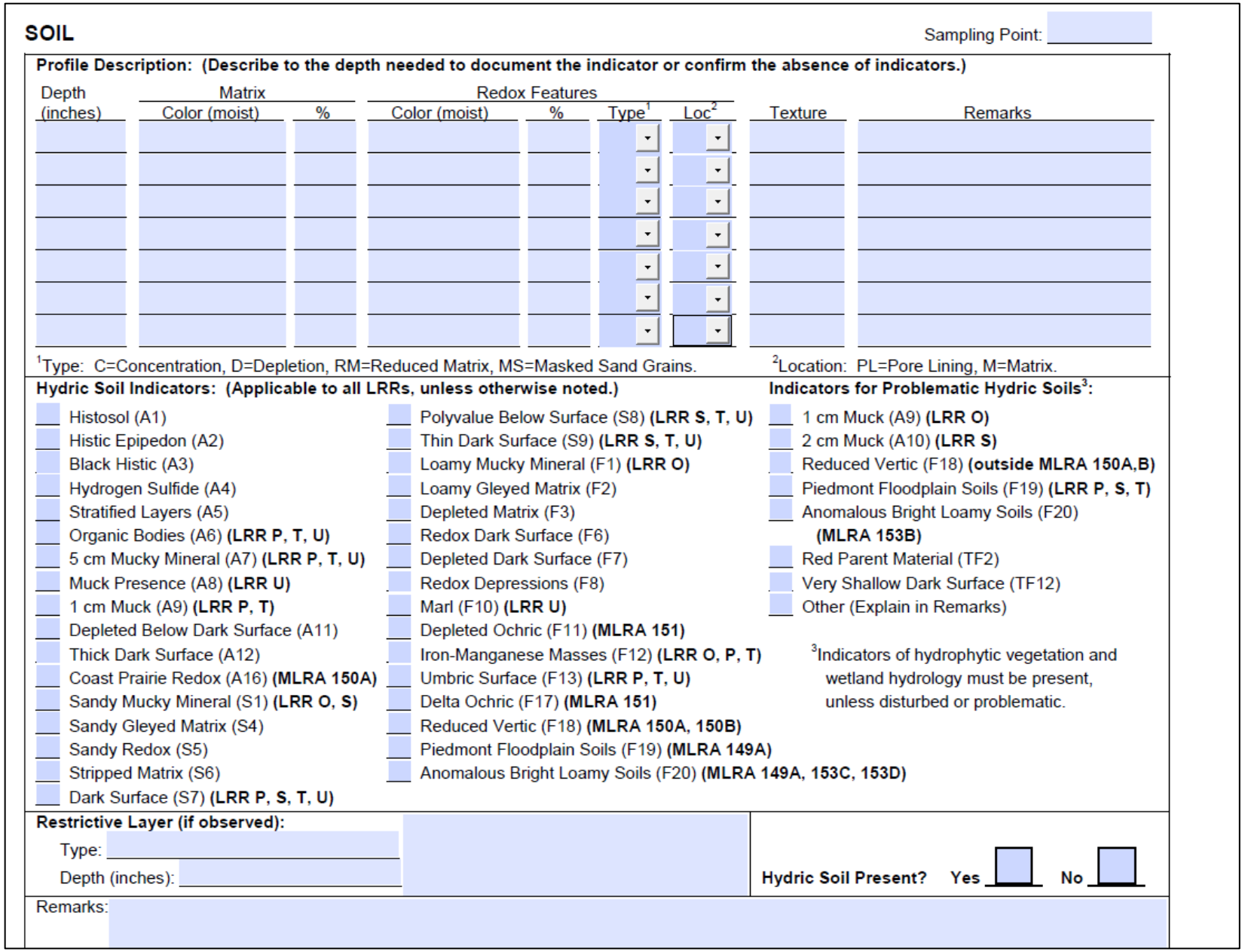
- Site sampling methodologies and Vegetative Dominance Analysis.

Introduction to the Federal Process for Identifying Wetlands (continued)

Section #3:

- Soils, Hydrology, Morphological Adaptations, Remote Data.

Soils Analysis:



SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

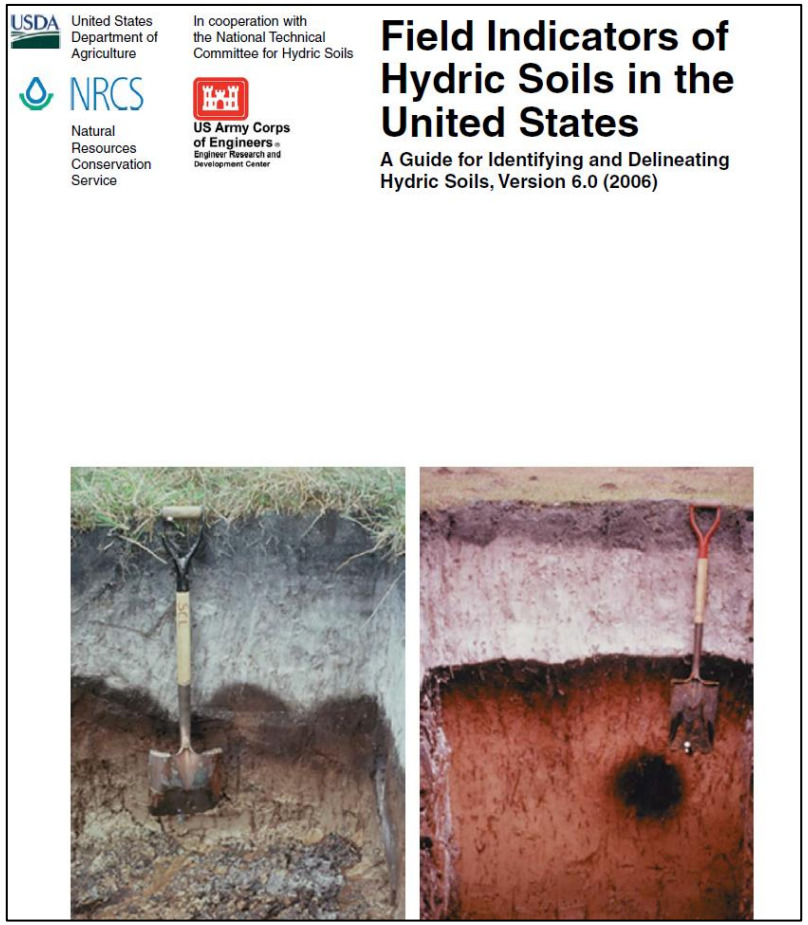
Type: _____

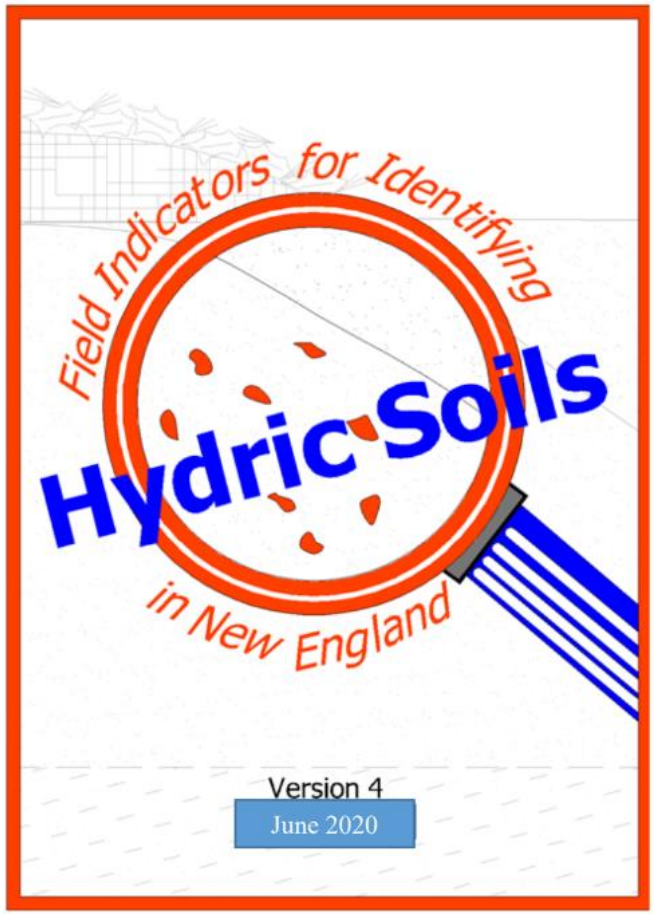
Depth (inches): _____

Hydric Soil Present? Yes ___ No ___

Remarks: _____

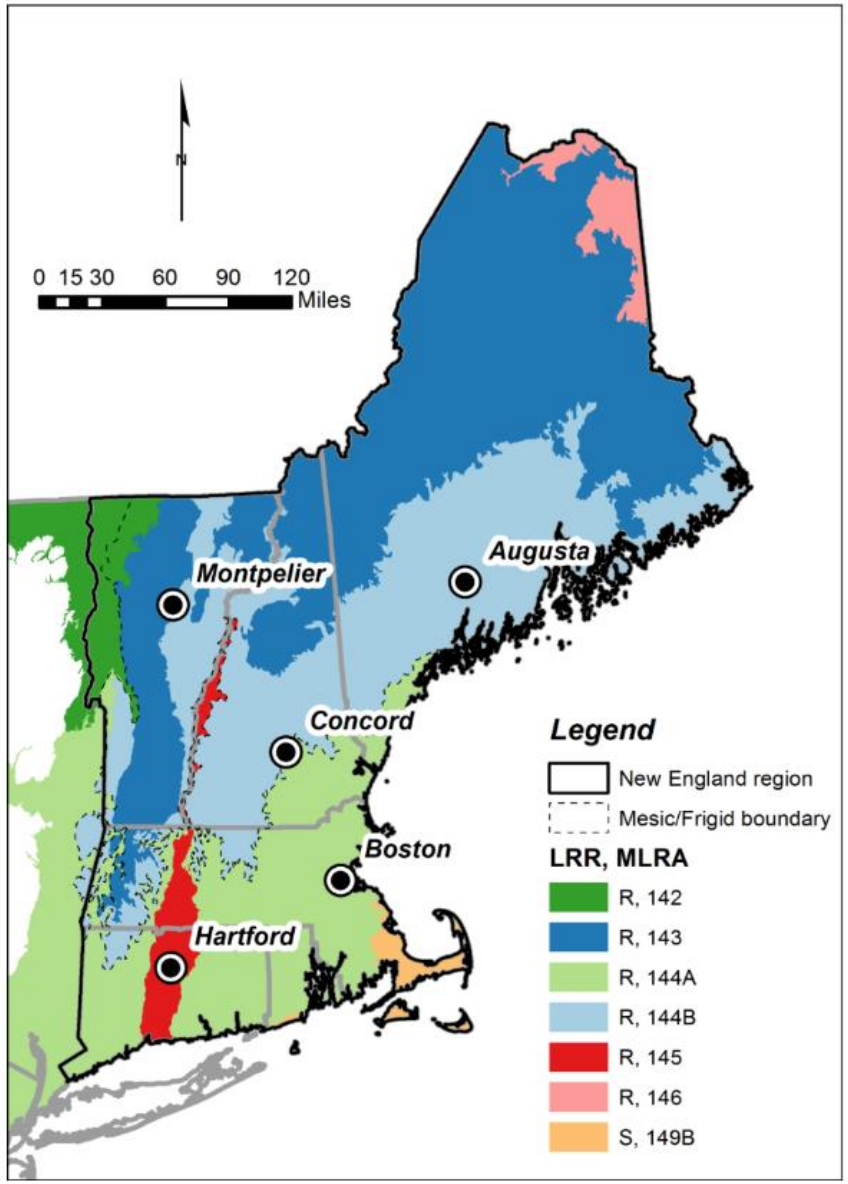
Field Indicators of Hydric Soils:





Land Resource Regions:

Figure 1: Map of Land Resource Area (LRR) and Major Land Resource Areas (MLRA).



Indicator Description:

b. Matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings.

User Notes: Redox concentrations in mineral soils that are high in content of organic matter and have a dark surface layer commonly are difficult to see. The organic matter "masks" some or all of the concentrations that may be present. Careful examination is required in order to see what are often brownish "mottles" in the darkened materials. In some instances, drying of the samples makes the concentrations (if they occur) easier to see. Dried colors, if used, need to have matrix chromas of 1 or 2, and the redox concentrations need to be distinct or prominent. In soils that are wet because of subsurface saturation, the layer directly below the dark epipedon should have a depleted or gleyed matrix. Soils that are wet because of ponding or a shallow perched layer of saturation may not always have a depleted/gleyed matrix below the dark surface layer. It is recommended that delineators evaluate the hydrologic source and examine and describe the layer below the dark colored epipedon when applying this indicator. Redox concentrations, including iron-manganese soft masses and/or pore linings, are required in soils with matrix colors of 4/1, 4/2, and 5/2.

Figure 31.—Indicator F6 (Redox Dark Surface). Prominent redox concentrations occur as soft masses and pore linings. Below the dark epipedon is indicator A11 (Depleted Below Dark Surface). Scale is in cm.

Figure 32.—Indicator F6 (Redox Dark Surface). Often, as in this soil, the redox concentrations are small (fine).

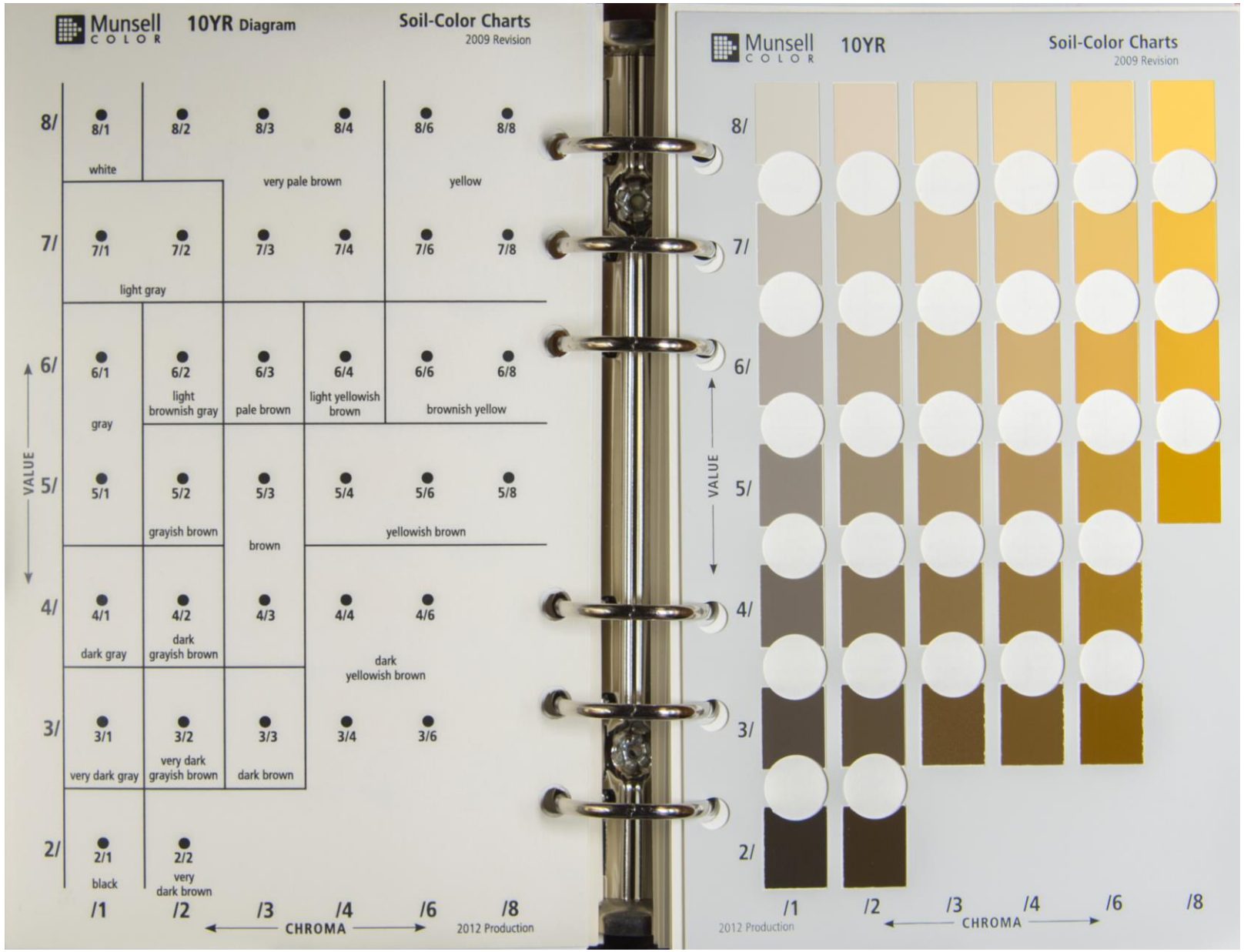
A, E, and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless the soil has common or many distinct or prominent redox concentrations occurring as soft masses or pore linings.

F7. Depleted Dark Surface. *For use in all LRRs, except for W, X, and Y; for testing in LRRs W, X, and Y.* Redox depletions with value of 5 or more and chroma of 2 or less in a layer that is at least 10 cm (4 inches) thick, is entirely within the upper 30 cm (12 inches) of the mineral soil, and has:

a. Matrix value of 3 or less and chroma 1 or less and 10 percent or more redox depletions, or
b. Matrix value of 3 or less and chroma of 2 or less and 20 percent or more redox depletions.

User Notes: Care should be taken not to mistake mixing of an E or calcic horizon into the surface layer for depletions. The "pieces" of E and calcic horizons are not redox depletions. Knowledge of local conditions is required in areas where E and/or calcic horizons may be present. In soils that are wet because of subsurface saturation, the layer directly below the dark surface layer should have a depleted or gleyed matrix. Redox depletions should have

Munsell Color Chart:



Redoximorphic features (RMFs)

"consist of color patterns in a soil that are caused by loss (depletion) or gain (concentration) of pigment compared to the matrix color, formed by oxidation/reduction of iron and/or manganese coupled with their removal, translocation, or accrual; or a soil matrix color controlled by the presence of iron" (NRCS)

Common Reduction Reactions in Soil:

$$O_2 + 4e^- + 4H^+ \rightarrow 2H_2O$$

$$2NO_3^- + 10e^- + 12H^+ \rightarrow N_2 + 6H_2O$$

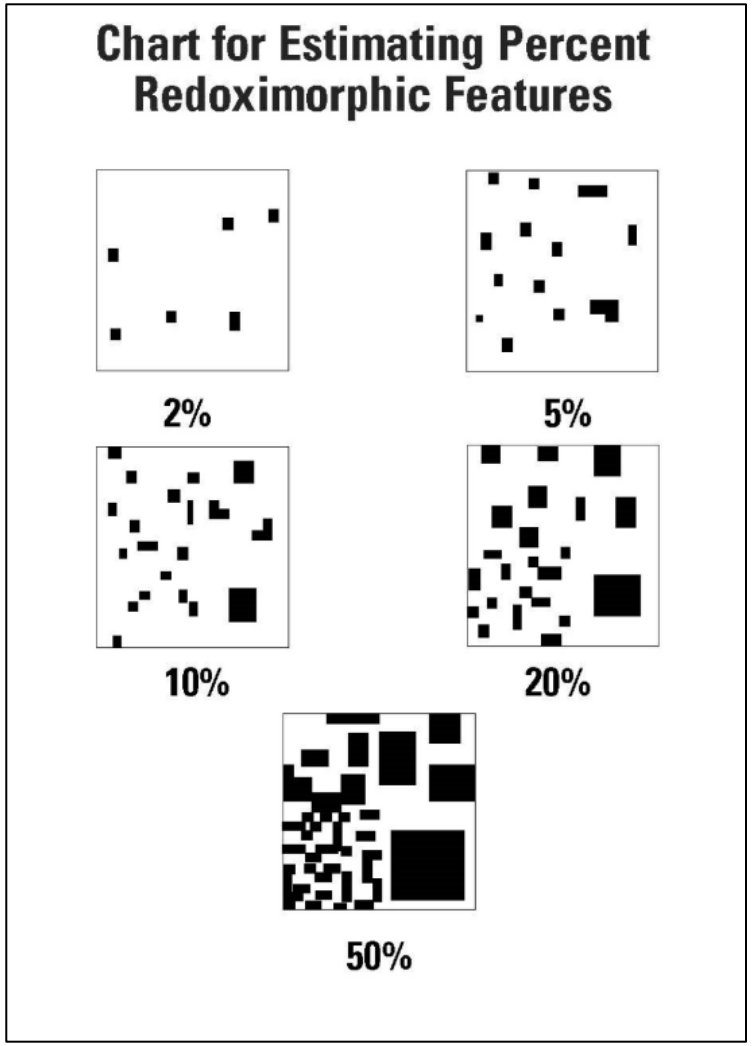
$$MnO_2 + 2e^- + 4H^+ \rightarrow Mn^{2+} + 2H_2O$$

$$Fe(OH)_3 + e^- + 3H^+ \rightarrow Fe^{+2} + 3H_2O$$

$$SO_4^{2-} + 8e^- + 8H^+ \rightarrow S^{2-} + 4H_2O$$

$$CO_2 + 8e^- + 8H^+ \rightarrow CH_4 + 2H_2O$$

Chart to help determine abundance:



Hydrology Analysis:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ___ No ___ Depth (inches): ___

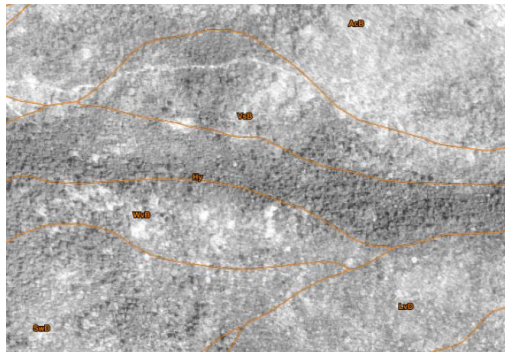
Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology Criteria:

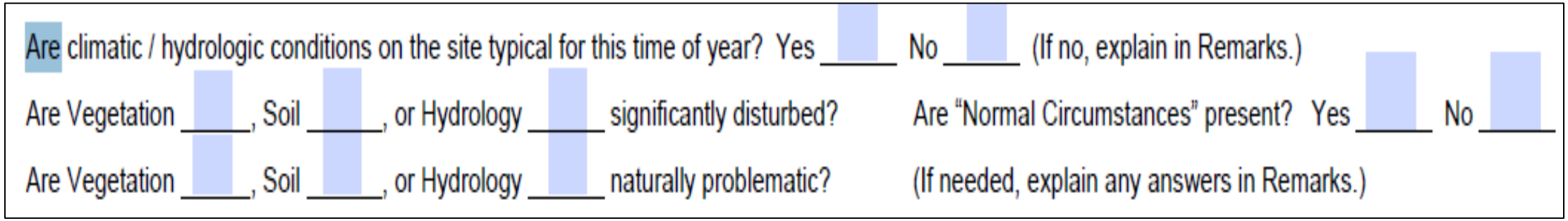


- The criteria for meeting the hydrology parameter is through either direct or secondary observation.
- These need to be noted on the data form.
- Describe any additional corroborating information in the comments section.

Normal Circumstances and Difficult to ID Wetlands

Determine if any of the 3 parameters have been altered. Is this the "new" standard or a temporal impact ? Has the alteration occurred legally?

If soils or vegetation do not meet criteria but there is evidence of hydraulic drive, then the area may be a difficult to identify wetlands. Refer to the manual and supplement sections on how to proceed.

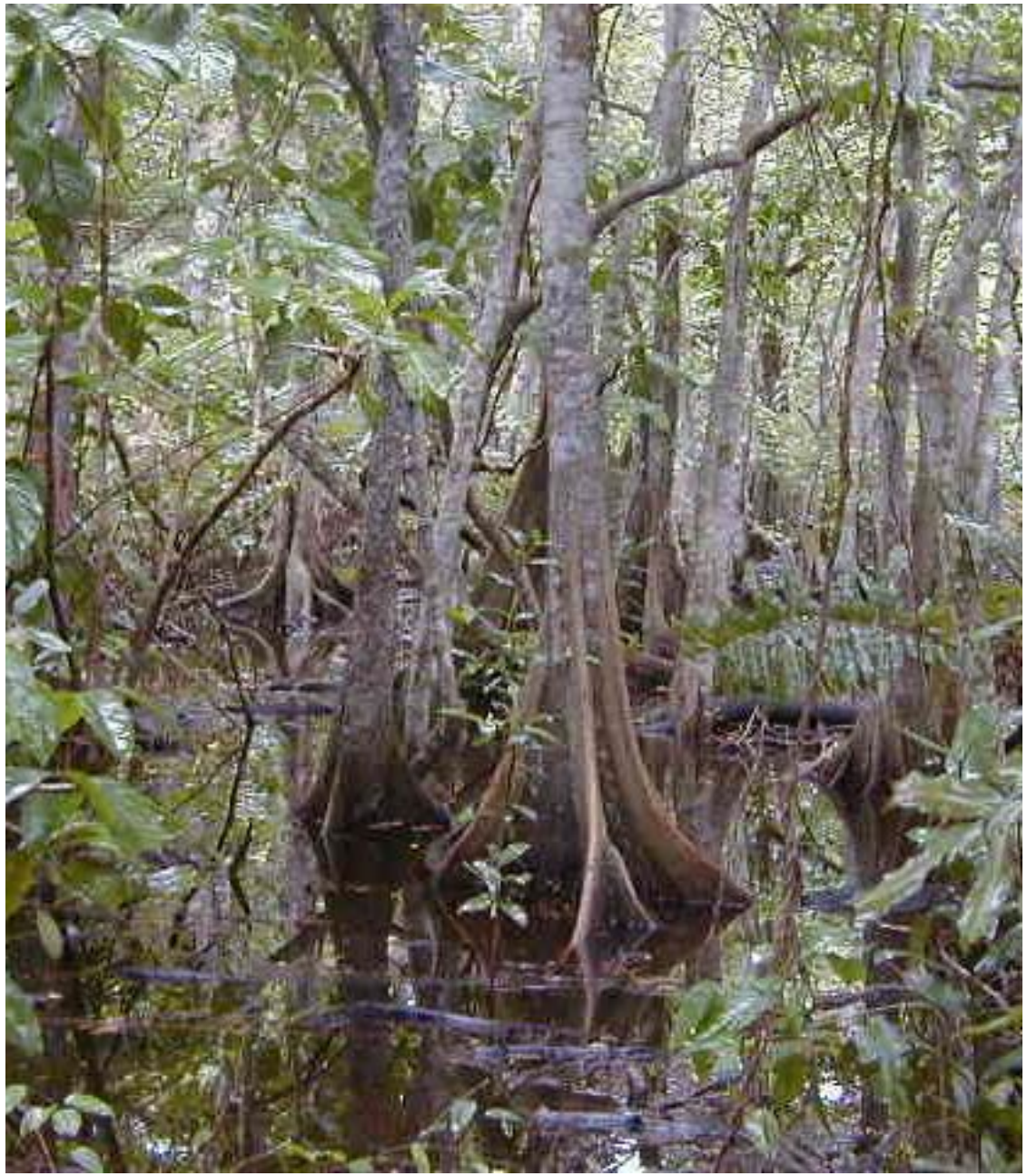


Plant Morphological Adaptations:

- Buttressed Tree Trunks
- Multiple Trunks
- Pneumatophores
- Adventitious Roots
- Shallow Roots
- Hypertrophied Lenticels
- Aerenchyma
- Polymorphic Leaves
- Floating Leaves

Buttressed Tree Trunks

Buttressed Tree Trunks



Multiple Trunks

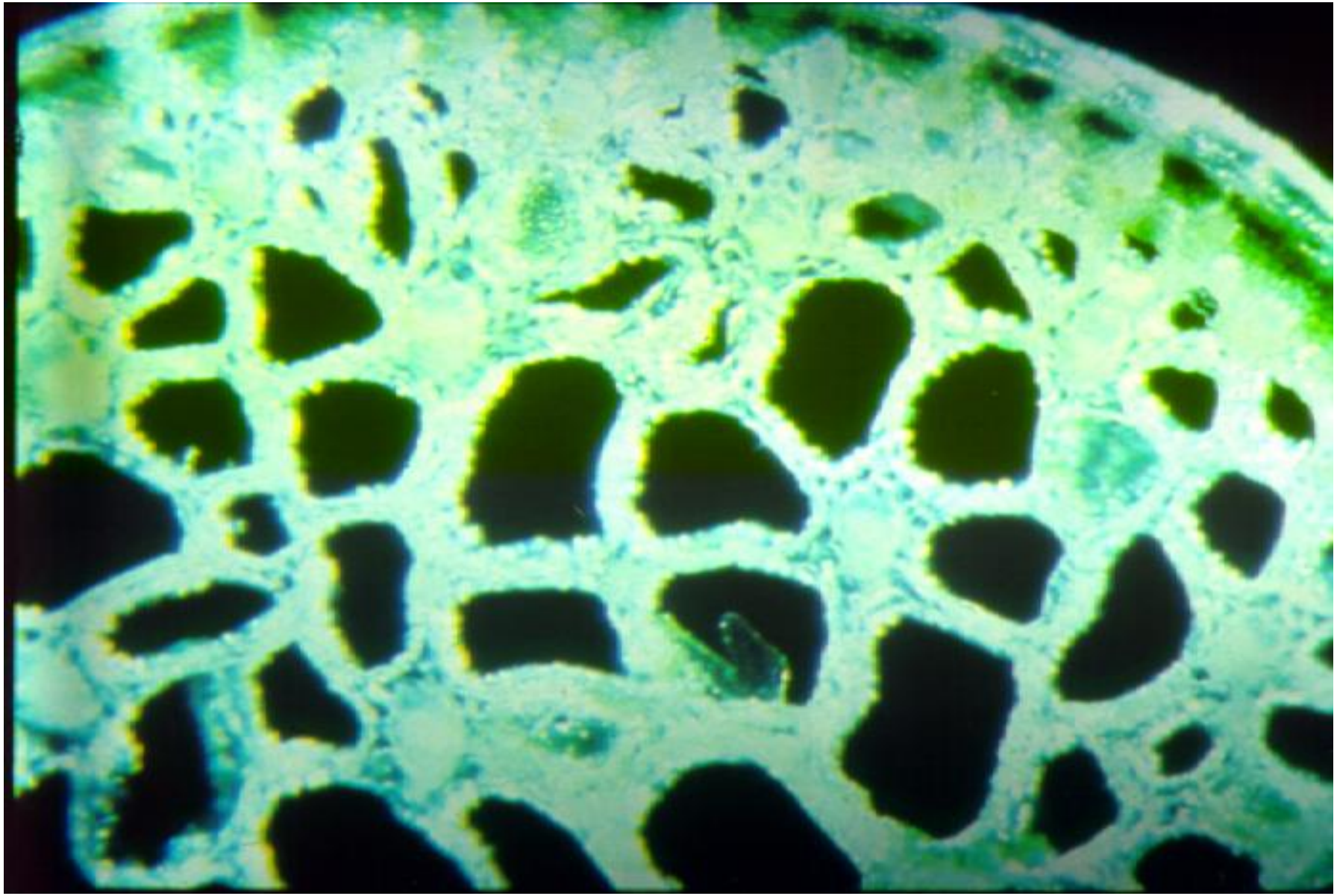

Pneumatophores


Adventitious Roots


Shallow Roots

Hypertrophied Lenticels

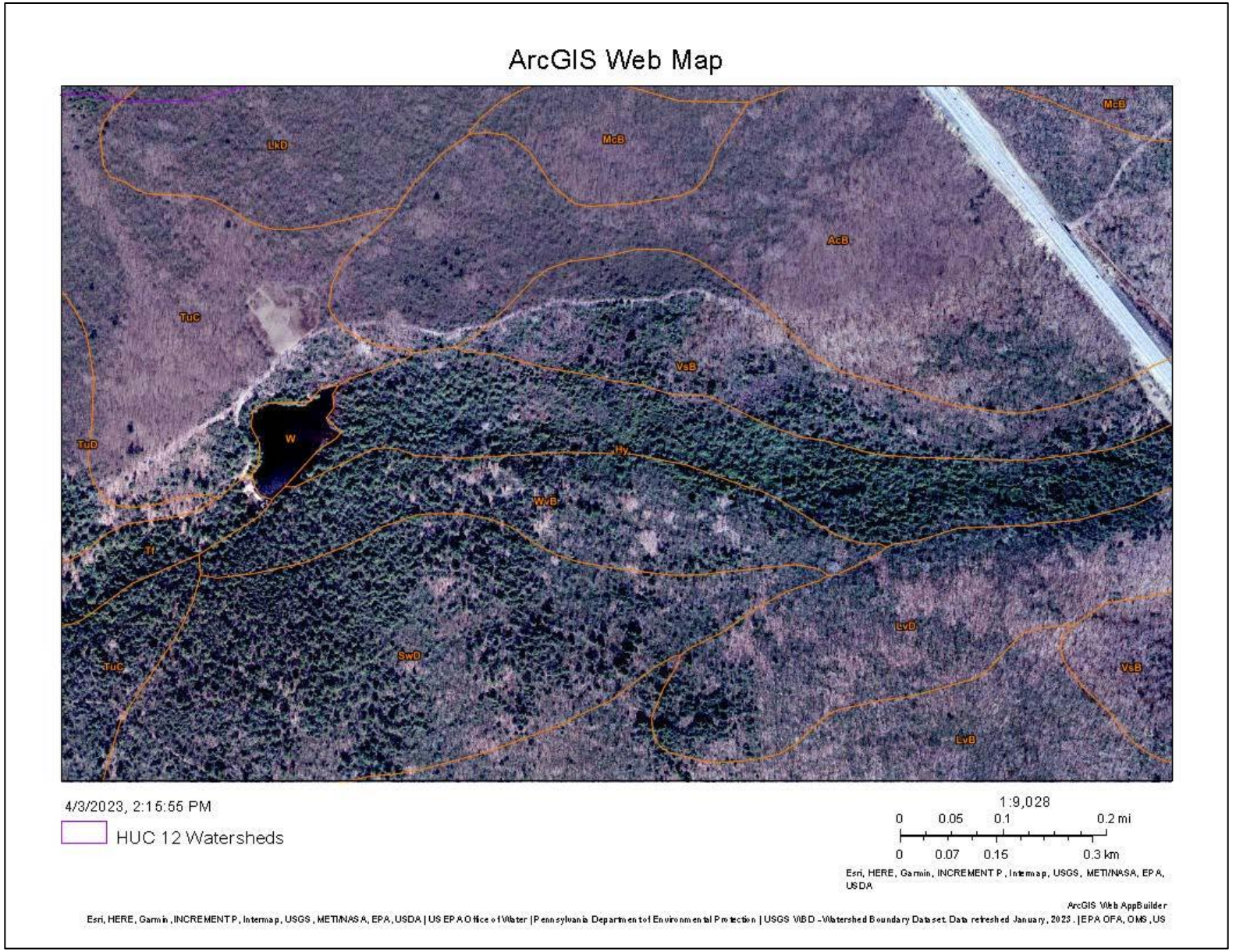
Aerenchyma



Floating Leaves

Desk Top Review of Site

- Prior to visiting a site location in the field undertaking a desk top analysis of the location can aid in designing a sampling plan as well as understanding site conditions and hydrologic drive. This analysis also can be used to support field findings and verification of sample data.
- Materials: NWI, Soil Survey, NHD, Aerial Photos (multiple years), GIS data analysis, state/local data systems, etc.


ArcGIS Web Map
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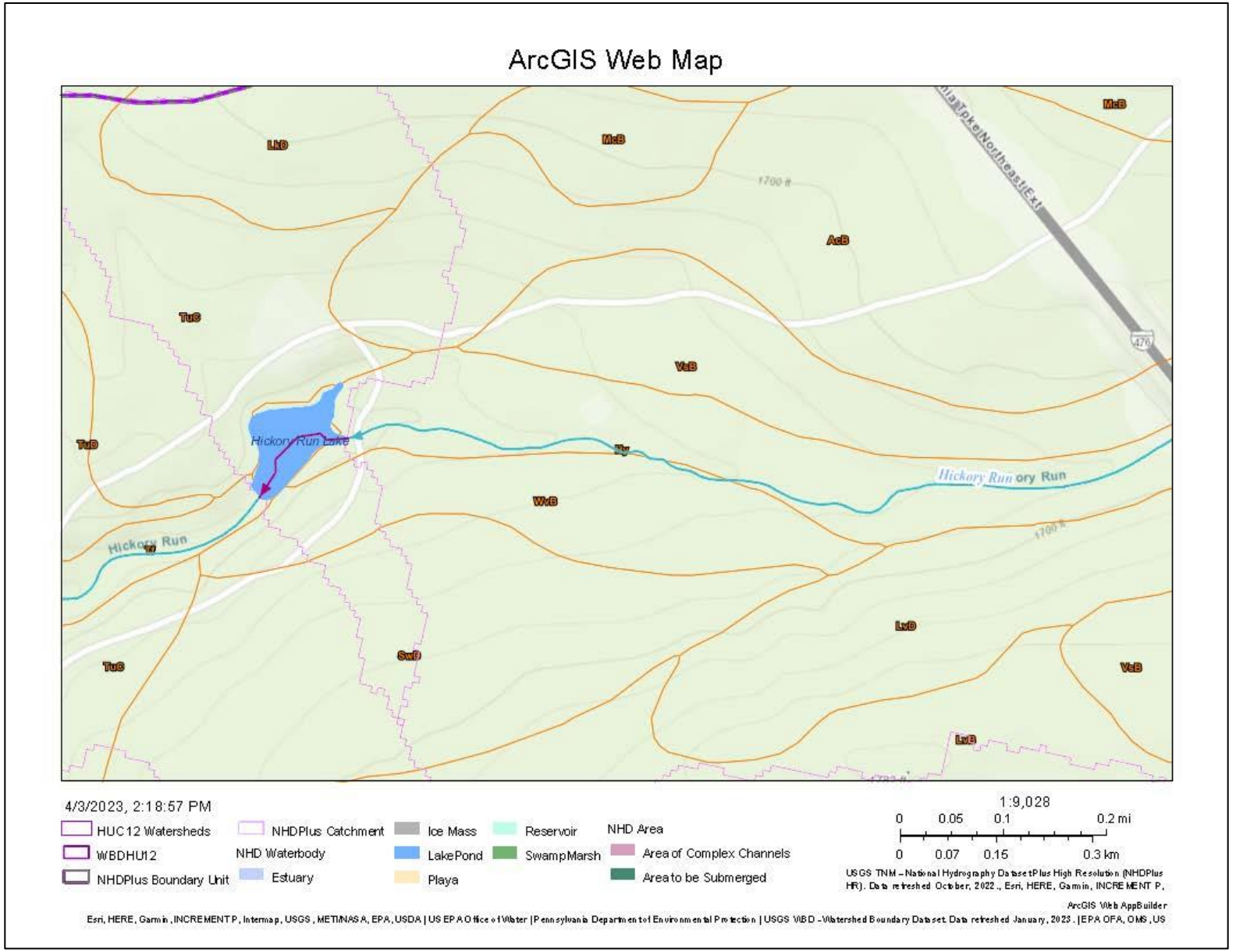
Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA | US EPA Office of Water | Pennsylvania Department of Environmental Protection | USGS WBD - Watershed Boundary Dataset. Data refreshed January, 2023. | EPA OEA, OMS, US


ArcGIS Web Map
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Hickory Run Lake
Hickory Run
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HUC12 Watersheds
WBDHU12
NHDPlus Boundary Unit
NHDPlus Catchment
NHD Waterbody
Estuary
Ice Mass
LakePond
Playa
Reservoir
SwampMarsh
NHD Area
Area of Complex Channels
Area to be Submerged
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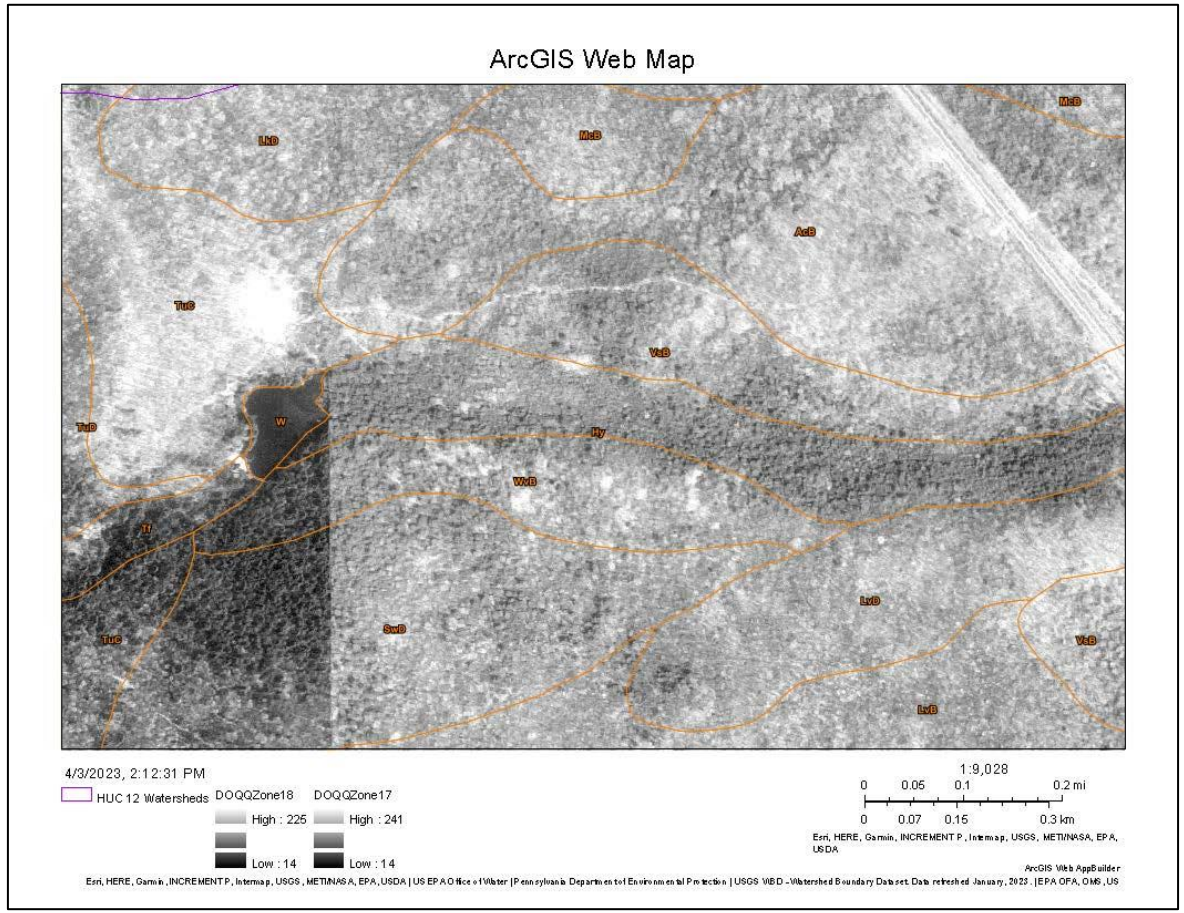
USGS TNM – National Hydrography Dataset Plus High Resolution (NHDPlus HR). Data refreshed October, 2022., Esri, HERE, Garmin, INCREMENT P,
ArcGIS Web AppBuilder
Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA | US EPA Office of Water | Pennsylvania Department of Environmental Protection | USGS WBD - Watershed Boundary Dataset. Data refreshed January, 2023. | EPA OEA, OMS, US


ArcGIS Web Map
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HUC 12 Watersheds
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High : 225
Low : 14
DOQQZone17
High : 241
Low : 14
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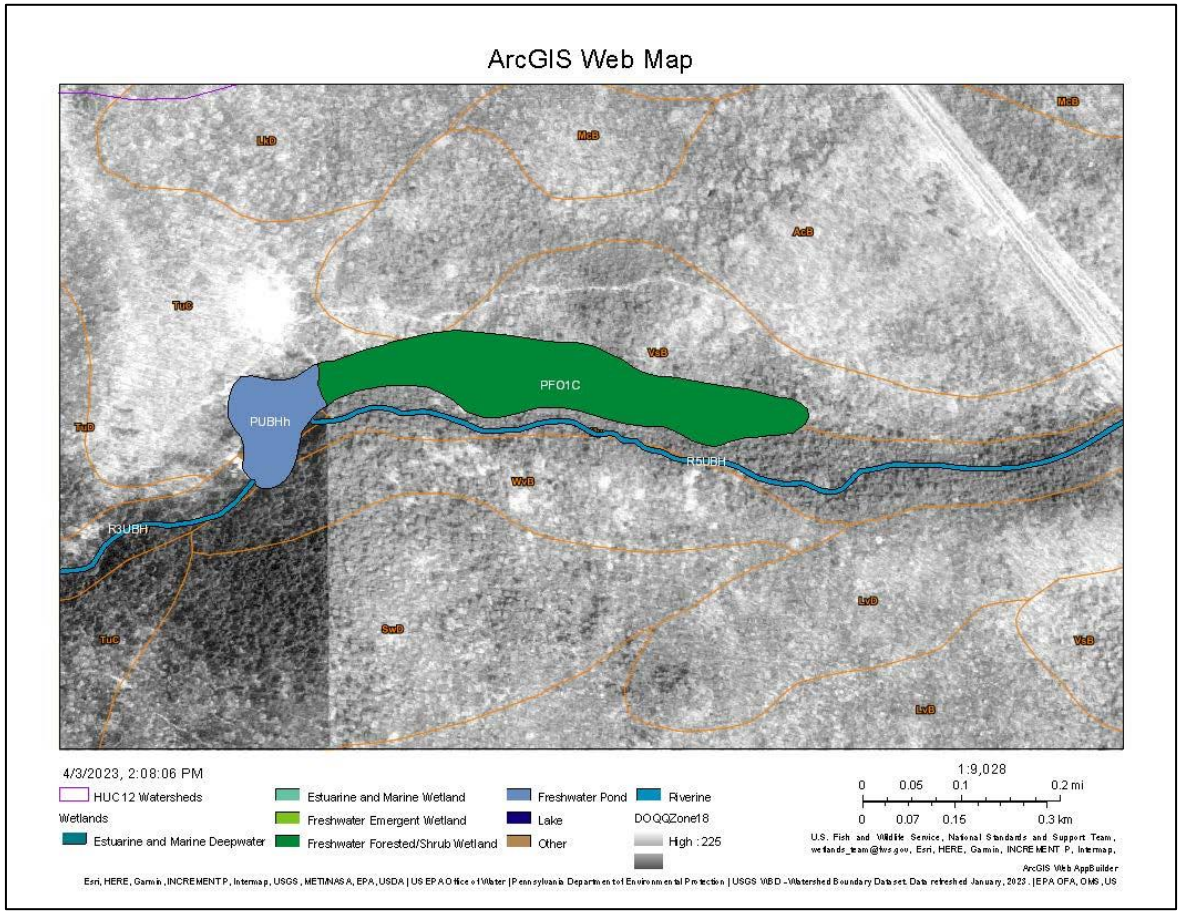
ArcGIS Web Map
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SwD
4/3/2023, 2:08:06 PM
HUC 12 Watersheds
Wetlands
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Other
Riverine
DOQQZone18
High : 225
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U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov, Esri, HERE, Garmin, INCREMENT P, Intermap,
ArcGIS Web AppBuilder
Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA | US EPA Office of Water | Pennsylvania Department of Environmental Protection | USGS WBD - Watershed Boundary Dataset. Data refreshed January, 2023. | EPA OEA, OMS, US

Data/Science/Manual

- Wetland delineations must be based on the best available information, interpreted in light of the investigator's training, experience, and professional judgment.
- Don't be a manual zombie
- Don't make it up (It's okay not to know)
- Document, document, document!
- Resource links (see PDF):
  - Wetland Delineation Manual and Regional Supplements
  - National Wetland Plant List
  - Field Indicators of Hydric Soils
  - Field Book for Describing and Sampling Soils

Introduction to the Federal Process for Identifying Wetlands (continued)

End of Section #3:

- Soils, Hydrology, Morphological Adaptations, Remote Data.

Optional Online Quiz

Thank you!

Thank you for listening to this online training from the National Association of Wetland Managers and Saint Mary's University of Minnesota Geospatial Services. We hope you found the presentation interesting and informative.

Optional Online Quiz

We invite you to take an optional online quiz for this training module. To take the quiz, you will need to return to the Online Training page on the NAWM website and select the link to the quiz for this module.

To Receive Your Certificate of Completion

In order to receive a Certificate of Completion to submit to an accrediting organization for continuing education credits or units (CEUs):

- You must complete the quiz; and
- You must receive a score of 80% or higher.

You will have the opportunity to retake the quiz one additional time if you do not pass.

Certificates of Completion

Certificates of Completion are available to you when you successfully complete the training module. Participants who both view the module presentation and complete the module quiz are eligible for a NAWM Certificate of Completion for 1.5 hours of training.

You will need to create a unique username and password in *ClassMarker* for each certificate. After completing the module quiz, you will be prompted to download your certificate.

You are responsible for sending the NAWM certificate to your accrediting organization.

Certificates are **free** for NAWM members and for tribal members and staff.

- For tribal members or tribal staff who are not a member of NAWM: if you are interested in taking the module quiz to earn a certificate, please contact Laura Burchill at the NAWM office at laura@nawm.org or (207) 892-3399.
- For non-members: there is a $25 administrative fee per certificate that must be paid before you can access the quiz.

For complete details, please return to the NAWM online training modules webpage.