

What is a Wetland?



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Common Wetland Names

"Backwater swamps" "Peatland"

"Estuary" "Marsh"

"Vernal Pools" "Playa"



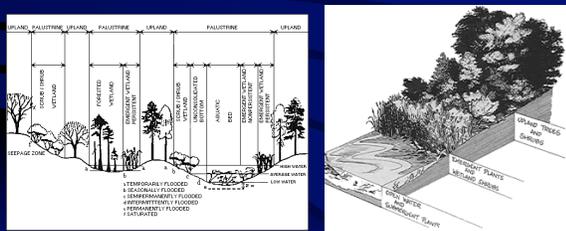
"Fen"
"Bog"
"Bayou"
"Spring Seep"



"Humedales"

Wetlands: Ecotones between Upland and Aquatic Systems

Share characteristics of upland and aquatic systems, especially near margins, yet have unique characteristics (**jurisdictional criteria**)



1987
USACE
Manual

What is a Wetland?

“Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water”

All 3 Attributes: www.nwi.fws.gov/bha/¹

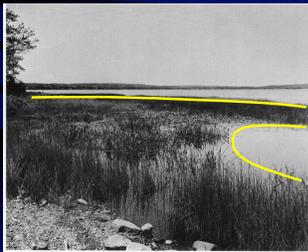
- 1) Periodically support hydrophytes¹
- 2) Substrate is a hydric soil²
- 3) Substrate is covered or saturated for $\geq 5\%$ of the growing season (website)



¹As per USFWS Hydrophyte List
²As per NRCS Hydric Soils Criteria

What is a Deepwater Habitat?

“Permanently flooded lands lying below the deepwater boundary of wetlands”



Water (*not air*) is the principal medium within which dominant organisms live

Substrate is non-soil (H₂O depth prevents emergent hydrophyte growth)

>2 m (6.6 ft) in Depth
(Non-tidal Wetlands)

What are Hydrophytes?

USACE Definition

“...macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.”



Obligate Wetland	OBL	>99%	cattail, lilies, buttonbush
Facultative Wetland	FACW	68-99%	smartweed, green ash
Facultative	FAC	33-67%	millet, cottonwood
Facultative Upland	FACU	1-32%	cocklebur, red oak
Obligate Upland	UPL	<1%	Indian grass, pines

>50% dominance of OBL, FACW, FAC⁺, FAC **+ = wetter**
- = drier

Measuring Dominance

>50% dominance of OBL, FACW, or FAC across ALL Vegetation Strata, not including FAC-

- 1) Herb – All herbaceous (non-woody) plants and woody plants <3.2 ft tall
- 2) Sapling/shrub – Woody plants > 3.2 ft tall, <3.0 inches DBH
- 3) Tree – Woody plants >3.0 inches DBH, regardless of height
- 4) Woody vine – Woody climbing plants >3.2 ft in height

Possible Dominance Response Variables: Best

Relative Occurrence, Percent Horizontal Cover, Density

50/20 Dominance Rule

1. Measure vegetation response variable (e.g., density)
2. Rank all species in the stratum from most to least abundant
3. Calculate the total density across species and compute percent dominance
4. Sum percent dominance until >50%
➔ These are the dominant species
5. Also, include any species that has >20% individual dominance
6. Repeat steps 1-4 for any other stratum present.

Combine the lists of dominants across strata.

Are >50% OBL, FACW, FAC, FAC+ ??

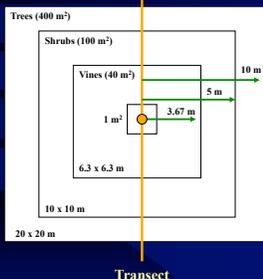
**Handout
for
Example**

Use 50/20 Rule What Plot Size & Measures of Dominance?

Herb –
Herbaceous and woody plants <3.2 ft tall

Percent Horizontal Cover
(1 m²)

Shrub –
Woody > 3.2 ft tall, <3.0 inches DBH
Density
(100 m²)



Tree –
Woody plants >3.0 inches DBH
Density
(400 m²)

Vine –
Woody vines >3.2 ft tall
Density
(40 m²)

If too dense to count, use percent horizontal cover instead of density.

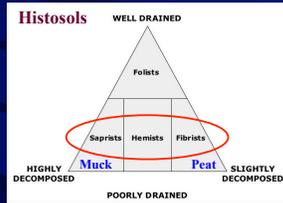
What are Hydric Soils?

NRCS Definition

“Soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation”

1) All Organic Soils

Order Histosol
(except folists)



2) Mineral soils frequently flooded for long duration.

>7 Consecutive Days, >50%

Organic vs. Mineral Soils

NRCS Definition

1) Mineral:

A) Saturated Infrequently (<30 days):

•<20% dry-weight organic carbon

B) Saturated Frequently/Long Durations:

•<18% dry-weight organic carbon if >60% of mineral portion is clay

Depends on Clay Content
(more organic required if clay)

•<12% dry-weight organic carbon if no clay

•12-18% dry-weight organic carbon if 0-59% clay



2) Organic:

All substrates that have more organic carbon than above percentages.



•Depends on flooding & clay
•>20% organic

Hydric Soil Field Identifiers

Soil Core Depth = 40 cm [16 in] COE

1) Organic Content

2) Gleying and Mottling



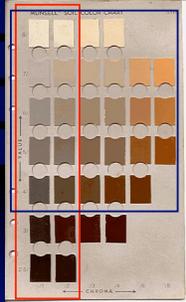
•Gray to blue-green color
•Chemicals oxidized to a reduced state
(anaerobic conditions)



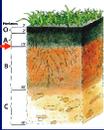
Hydric Soil Field Identifiers

Soil Core Depth = 40 cm [16 in] COE ≥4 gley chart

4) Munsell Soil Charts: Below "A" or at 10 inches

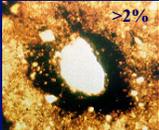


- Chroma ≤ 2 if mottled
- Chroma ≤ 1 if unmottled
- Soil must be moist (gray, dark brown-black)



5) Sulfidic Material H_2S
"Smell of Rotten Eggs"

6) Roots
Black-rust oxidized rings around root cross-sections (Rhizosphere) >2%



<http://www.munsell.com/>

Common Mineral Soil Wetlands

1) Hardwood Bottomlands



Vernal Pools



Riverine Wetlands

2) Seasonally or Intermittently Flooded Wetlands



Playa Wetlands



Moist-soil Wetlands

Common Organic Soil Wetlands

1) Emergent Marshes

2) Bogs

3) Fens

4) Deepwater Swamps









Wetland Hydrology

USACE Definition 

“...all hydrologic characteristics of areas that are periodically **inundated** or have soils **saturated** to the surface at some time during the **growing season**.”

Water influences vegetation & soils } Anaerobic
Reducing

USACE Requirement: (in most years >50%)

Flooded (or saturated) continuously for ≥5% of the growing season
(above biological zero → >5 C or 41 F at 20 inches)

Hydrologic Zones: (growing season durations)

I	Permanently inundated	100%		IV	Seasonally	12.6–25%
II	Semi-permanently	76–99%	V	Irregularly	5–12.5%	
III	Regularly	26–75%	VI	Intermittently	<5%	

Wetland Hydrology

Low Temps
Growing Season Length

www.wcc.nrcs.usda.gov/climate/wetlands.html

For wetland delineation, the growing season is estimated as:

Last date of 28 °F air temp in spring & the first date of 28 °F air temp in the fall.

GROWING SEASON DATES: Blount County 5%=12 Days

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
Beginning and Ending Dates			
Growing Season Length			
50 percent *	3/ 3 to 11/26 268 days	3/22 to 11/10 233 days	4/ 5 to 11/ 1 211 days
70 percent *	2/28 to 11/30 276 days	3/16 to 11/16 244 days	3/30 to 11/ 7 221 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

Wetland Hydrology Indicators

- 1) Visual Observations (during growing season)
- 2) River Gage and Elevation Data Topos, DEMs
<http://waterdata.usgs.gov/nwis/rt>
<http://geography.usgs.gov/>
- 3) Water Marks
- 4) Drift Lines




Wetland Hydrology Indicators

5) Deposited Litter & Sediment



6) Scoured Areas

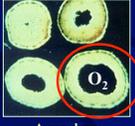


7) Plant Adaptations



Buttressing

Stem cross-section



Aerenchyma

"raised white dots"



Hypertrophied Lenticels
"warty look"

Wetland Regulation History

CWA 1972
"Navigable waters"



CWA 1975
"Included Wetlands"

Clean Water Act of 1977: Section 404

Regulates Dredging and Filling of Wetlands





Permits Issued by Army Corps of Engineers
Individual and General Permits

Environmental Impact Statement and/or
Mitigation may be Required



Food Security Act 1985
(Swampbuster Provision)

Jurisdictional Definition: 1987
Manual

Detrimental Court Decisions

1) Overturn of the Tulloch Rule

1999 Tulloch Rule stated that incidental fallback from dredging activities constituted fill. Hence, this legislation prevented the dredging of wetlands.

Overturn --- Dredging of wetlands is legal!

(under Federal Law)

2) SWANCC Decision

2003 Overturned the Migratory Bird Rule. MBR protected isolated wetlands (not navigable) because they promote interstate commerce by providing habitat to migratory birds.

Overturn --- Isolated Wetlands not protected!

(under Federal Law)

How are Wetlands Protected from Dredging?

TDEC

- In TN, wetlands are protected from dredging by water quality laws

If dredging causes **"pollution"** then it is not permitted!!



How are Isolated Wetlands Protected?

>½ Wetlands are depressional and isolated

- In TN, isolated means not connected to neighboring properties by surface or groundwater



Tennessee Legislation

Tennessee Water Quality Control Act of 1977

- Recognizes that the waters of Tennessee are the property of the state and are held in public trust
- States that people have a right to unpolluted water
- Defines "waters" of the state
- Defines pollution
- Establishes the need for permits for the alteration of the physical, chemical, radiological, biological, or bacteriological properties of waters of the state

Tennessee Department of Environment and Conservation is entrusted with enforcement.



Department of Environment & Conservation
401 Church Street, 1st Floor, L&C Annex
Nashville, TN 37243-0435
615.532.0109

Fines can be \$10,000 per day until alteration is reversed!

Water

"Waters" means any and all waters, public or private, on or beneath the surface of the ground... except those bodies of water confined to and retained within the limits of private property in single ownership which do not combine or effect a junction with natural surface or underground waters.



Pollution

"Pollution" means such alteration of...properties of the waters that will...result in harm to public health, safety, or welfare...or will result in harm, potential harm or detriment to the health of animals, birds, fish or aquatic life...



Aquatic Resources Alteration Permit (ARAP)

USED TO
AUTHORIZE THE
ALTERATION OF
SURFACE
WATERS
(STREAMS AND
WETLANDS)



<http://www.state.tn.us/environment/permits/aragps.php>
