





What is a Wetland?

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Common Wetland Names

“Backwater swamps”

“Estuary”

“Vernal Pools”

“Peatland”

“Marsh”

“Playa”

“Fen”

“Bog”

“Bayou”

“Spring Seep”

“Humedales”





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

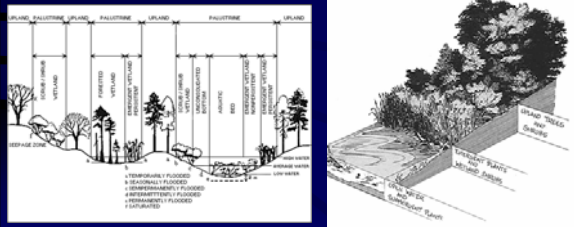
Food Security Act 1985
(Swampbuster Provision)

Jurisdictional Definition



Wetlands: Ecotones between Upland and Aquatic Systems

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



1987
Manual

What is a Wetland?

Normal
Circumstances

“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



12.5%
Always

What if
vegetation is
cleared or hwy
constructed?

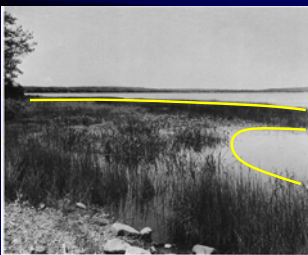
¹As per USFWS Hydrophyte List

²As per NRCS Hydric Soils Criteria

Upper Limits??

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, or 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:
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 then 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

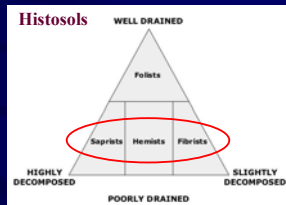
What are Hydric Soils?

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

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

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

Depends on Clay Content
(more organic required if clay)



2) Organic:

All substrates that have more organic carbon than above percentages.

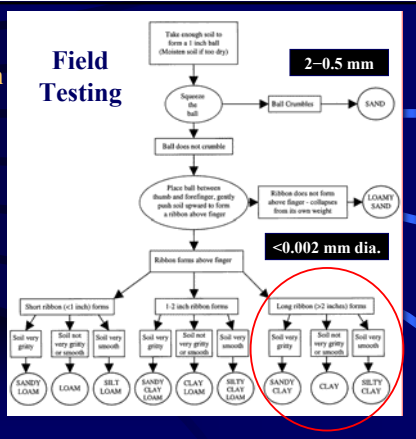


>20% organic
•Depends on flooding & clay

Textural Classification of Soils



Lab Techniques



Types of Hydric Organic Soils

NRCS Definition

1) Saprist: (Muck)

- < 1/4 Identifiable Plant Fibers
- > 1/2 Decomposed Plants
- Feels Greasy, Hands Dirty

How much identifiable Plant Material?



2) Fibrist: (Peat)



- > 1/2 Plant Fibers
- < 1/2 Decomposed
- Feel Fibers, Hands Clean

3) Hemists: (Mucky Peat or Peaty Muck)

- < 1/4 - 1/2 Plant Fibers
- > 1/2 - 3/4 Decomposed

Peaty Muck > 1/2 Fibers Destroyed after Rubbing

Mucky Peat > 1/2 Fibers Remain after Rubbing

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

Reduced Iron (Fe⁺⁺, ferrous form) Test

α-α-dipyridyl

Turns pink in the presence of ferrous iron



Anaerobic conditions

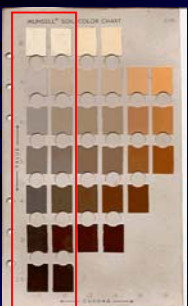
- Caveats:
- (1) the soil contains insufficient iron,
 - (2) the soil is not saturated at the time of sampling, so all iron is in the oxidized form (ferrous Fe)
 - (3) the soil is saturated but not reduced, or
 - (4) the chemical has gone bad.

http://soils.usda.gov/use/hydric/ntchs/tech_notes/note8.html

Hydric Soil Field Identifiers

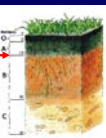
Soil Core Depth = 40 cm [16 in] COE >4 gley chart

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



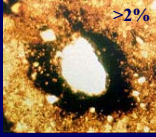
<http://www.munsell.com/>

- 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%



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 **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

"wart-like look"

Type of
General
Permit

Nationwide Permits

USACE NWP 27 and 30

Approval
usually
15-30 days

Nationwide 27: Stream and Wetland Restoration Activities

Authorizes filling and dredging of wetlands that will result in the creation, restoration, or enhancement of wetlands.

→ Does not authorize stream channelization or diversion

Nationwide 30: Moist-soil Management for Wildlife

Authorizes disking in wetlands.

Submit ENG Form 4345 to District Office

Individual Permits:

3% Denied

60
days

Requires public notice (<15 days), 15-30 day comment period (public, government agencies, NGOs), Corps considers comments, possible public hearing, decision.
