

## 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”

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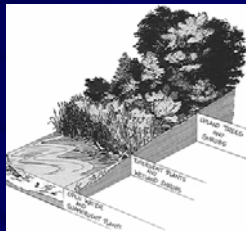
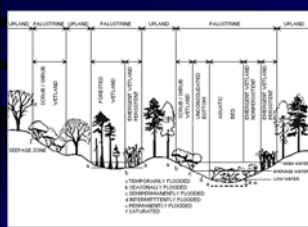
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## Wetlands: Ecotones between Upland and Aquatic Systems

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




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1987  
USACE  
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/](http://www.nwi.fws.gov/bha/)<sup>1</sup>

- 1) Periodically support hydrophytes<sup>1</sup>
- 2) Substrate is a hydric soil<sup>2</sup>
- 3) Substrate is covered or saturated for  $\geq 5\%$  of the growing season (website)

What if vegetation is cleared or hwy constructed?

<sup>1</sup>As per USFWS Hydrophyte List  
<sup>2</sup>As per NRCS Hydric Soils Criteria

12.5%  
Always

Upper Limits??




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## 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 (H<sub>2</sub>O depth prevents emergent hydrophyte growth)

**>2 m (6.6 ft) in Depth**

(Non-tidal Wetlands)

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## 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<sup>+</sup>, FAC**

+ = wetter  
- = drier

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## 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** <sup>Best</sup>

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## 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

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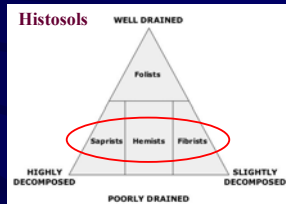
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## What are Hydric Soils?

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%

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# Organic vs. Mineral Soils

NRCS Definition

## 1) Mineral:

- A) Saturated Infrequently (<30 days):
  - <20% dry-weight organic carbon

- B) Saturated Frequently/Long Durations:

- Depends on Clay Content (more organic required if clay)
- <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



## 2) Organic:

All substrates that have more organic carbon than above percentages.



•Depends on flooding & clay  
•>20% organic

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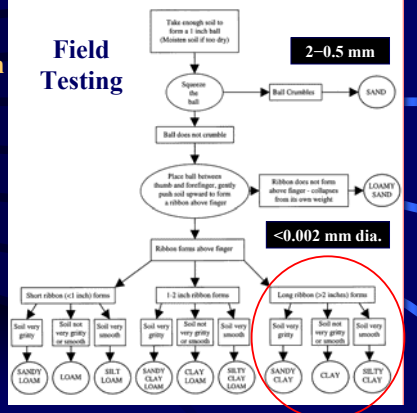
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# Textural Classification of Soils



Lab Techniques

## Field Testing




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# 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)

- > 1/4 Plant Fibers
- < 1/4 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

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## 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)

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## Hydric Soil Field Identifiers

Reduced Iron ( $Fe^{++}$ , ferrous form) Test  
 **$\alpha$ - $\alpha$ -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](http://soils.usda.gov/use/hydric/ntchs/tech_notes/note8.html)

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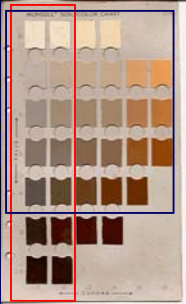
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## Hydric Soil Field Identifiers

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

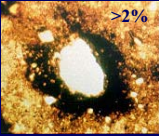
**4) Munsell Soil Charts:** Below "A" or at 10 inches



- 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/>

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## Common Mineral Soil Wetlands

### 1) Hardwood Bottomlands



Vernal Pools



Riverine Wetlands

### 2) Seasonally or Intermittently Flooded Wetlands



Playa Wetlands



Moist-soil Wetlands

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## Common Organic Soil Wetlands

### 1) Emergent Marshes

### 2) Bogs



### 4) Deepwater Swamps

### 3) Fens




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## 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  $\geq 5\%$  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%

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Low Temps

## Wetland Hydrology

### Growing Season Length

[www.wcc.nrcs.usda.gov/climate/wetlands.html](http://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			
Temperature			
Probability	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.

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## 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

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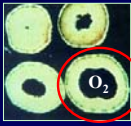
## Wetland Hydrology Indicators

- 5) Deposited Litter & Sediment 
- 6) Scoured Areas 
- 7) Plant Adaptations
 




Buttressing

Stem cross-section



Aerenchyma

"raised white dots"



Hypertrophied Lenticels  
"warty look"

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## 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

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## Nationwide Permits

Type of General Permit	USACE NWP 27 and 30	Approval usually 15-30 days
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**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  
 Requires public notice (<15 days), 15-30 day comment period (public, government agencies, NGOs), Corps considers comments, possible public hearing, decision.

60 days

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## 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 inter-state commerce by providing habitat to migratory birds.

Overturn ⇒ **Isolated Wetlands not protected!**

(under Federal Law)

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## Detrimental Court Decisions

### 3) Rapanos vs. United States Non-navigable tributaries

**2006**      **Jurisdictional**      **Adjacent = Surface water connection**

Guidance: June 2007

- Traditional navigable waters and adjacent wetlands
- Non-navigable waters that are relatively permanent and their adjacent wetlands

→ 3 months flowing water

**Significant Nexus**

- Non-navigable waters that are ephemeral and their adjacent wetlands
- Wetlands not directly adjacent to non-navigable water that is relatively permanent
  - Flow characteristics and functions of the tributary
  - Hydrologic and ecological factors

59% of tributaries: intermittent or ephemeral

Overturn ⇒ Small Washes, Swales, Ditches not protected!

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## Clean Water Restoration Act

<http://www.ducks.org/Page3253.aspx>

**Protect isolated wetlands and non-navigable intermittent waters that are deemed ecologically important**



**Bills:**

• Jim Oberstar (MN)	H.R. 2421	22 May 2007
• Russ Feingold (WI)	S. 1870	25 July 2007

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## 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



State Wetland Laws: <¼

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## 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, I&C Annex  
Nashville, TN 37243-0455  
615.532.0109

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

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**"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.

## Water



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## 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...



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# Aquatic Resources Alteration Permit (ARAP)

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



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

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