

Wetland Ecology and Attracting Amphibians



Presented by:

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WETLAND STATUS AND TRENDS

- **95% Freshwater; 5% Estuarine or Marine**
- **Overall 50% loss of wetlands (9% to 90%)**
 - Urban and Rural Development
- **2006 Report- First Time Net Wetland Gain**



WETLAND STATUS AND TRENDS Virginia

- 40-42% lost since 1780's
- From 7% to 4.5% of Virginia's Landmass
- 83% Palustrine Wetlands
- 16% Estuarine Wetlands



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WHAT ARE WETLANDS

- Wetlands are transitional areas between aquatic (lakes and ponds) and terrestrial ecosystems
- Wetlands are not necessarily wet all the time
- They may be vegetated or not
- Occur along waterbodies or in isolation (surrounded by upland)
- Form in depressions, in flat areas, on slopes – wherever water is present in the soil for extended periods on a recurring basis
- May be naturally formed or artificially created
- Occur in saltwater and freshwater environments



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THREATS

- Development
- Invasive Species
- Global Climate Change
- Subsidence
- Sea-level rise
- Natural succession
- Hydrologic alterations
- Sedimentation
- Erosion
- Biotic factors
- Saltwater intrusion
- Drainage for agriculture
- Channelization
- Landfills
- Reservoir construction
- Timber harvesting
- Peat mining
- Oil and gas extraction
- Surface mining
- Groundwater extraction
- Waste disposal
- Urbanization
- Impoundments

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WETLAND DEFINITIONS

- **Federal**
 - U.S. Army Corps of Engineers
 - U.S. Fish and Wildlife Service
 - Natural Resources Conservation Service
 - National Research Council
- **Virginia**



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U.S. Army Corps of Engineers (1977)

- Those areas that are inundated or saturated by surface water 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. Wetlands include swamps, marshes, bogs and similar areas.



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WETLAND TYPES

- Bog
- Fen
- Mire
- Peatland
- Pocosin
- Pothole
- Slough
- Playa
- Wet Meadow
- Muskeg
- Morass
- Swamp
- Marsh
- Carolina Bay

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ISOLATED WETLANDS

- **Vernal Pools**
- **Pocosins**
- **Carolina Bays**
- **Bogs**
- **Fens**



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WETLAND CLASSIFICATION

- **Vegetation Life Form**
 - Cowardin (1979) – **Classification of Wetlands and Deepwater Habitat of the United States.**
 - www.fws.gov/nwi/Pubs/Reports/Class_Manual/class_titlepg.htm
- **Functional Systems**
 - **Hydrogeomorphic (HGM) – Brinson 1993**
 - <http://el.erdc.usace.army.mil/wetlands/hgmhp.html>

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WHERE ARE WETLANDS

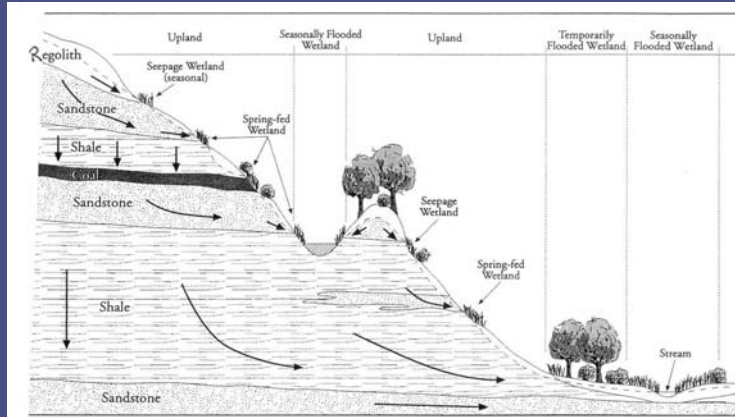
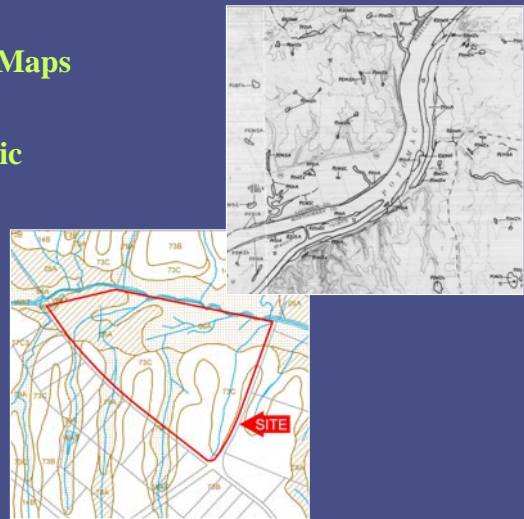


Figure 2.8. Wetlands form on the landscape wherever there is at least a seasonal excess of water accumulating or being discharged. (Source: Tiner and Burke 1995)

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WETLAND IDENTIFICATION TOOLS

- National Wetland Inventory (NWI) Maps
- Soil Survey Maps
- USGS Topographic Maps
- Floodplain Maps



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WETLAND IDENTIFICATION TOOLS

- **Color Infrared Aerial Photographs**



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WETLAND IDENTIFICATION TOOLS

- **U.S. Army Corps of Engineers 1987 Wetland Delineation Manual**
 - <http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf>
 - **Three Parameter Approach**
 - Hydrology
 - Hydrophytic Vegetation
 - Hydric Soils



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HYDROLOGY

- **Hydroperiod – depth, duration and frequency (wetland signature)**
- **Climate**
- **Geomorphology**
- **Biota**
- **Water Budget**

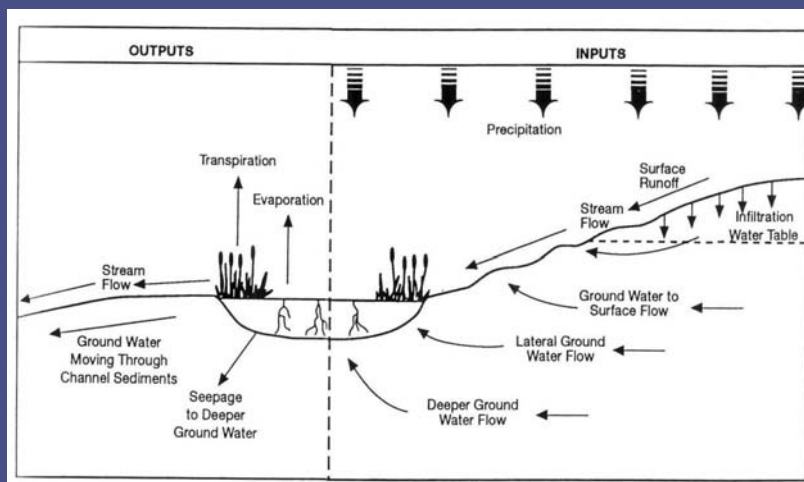
$$\Delta V/\Delta t = P_n + S_i + G_i - ET - S_o - G_o \pm T$$



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HYDROLOGY (NON-TIDAL)



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HYDROLOGY: Indicators

Primary



Inundation and Saturation



Watermarks



Drainage Patterns



Drift Lines

Secondary



Oxidized Root Channels



Water-stained Leaves

HYDROPHYTIC VEGETATION

- **Hydrophyte** – any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excess water content.
- **National List of Plant Species that Occur in Wetlands**
 - Obligate Wetland (OBL) – 99%
 - Facultative Wetland (FACW) – 67-99%
 - Facultative (FAC) – 34-66%
 - Facultative Upland (FACU) – 1-33%



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HYDROPHYTIC VEGETATION

- **National List of Plant Species That Occur in Wetlands**
 - Virginia – Region 1 – Northeast



Arrowhead, Arrow Arum,
and Pickerelweed (OBL)



Cinnamon Fern (FACW)



Cardinal Flower
(OBL)

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HYDROPHYTIC VEGETATION: Useful Links

- **National List of Plant Species That Occur in Wetlands: Northeast (Regional 1).** U.S. Department of the Interior, Fish and Wildlife Service, Washington D.C. 20240. Also referred to as Reed 1988.
<http://www.fws.gov/nwi/Plants/plants.htm>
- **USDA PLANTS Database**
<http://plants.usda.gov/>
- **Digital Atlas of Virginia Flora**
http://www.biol.vt.edu/digital_atlas/



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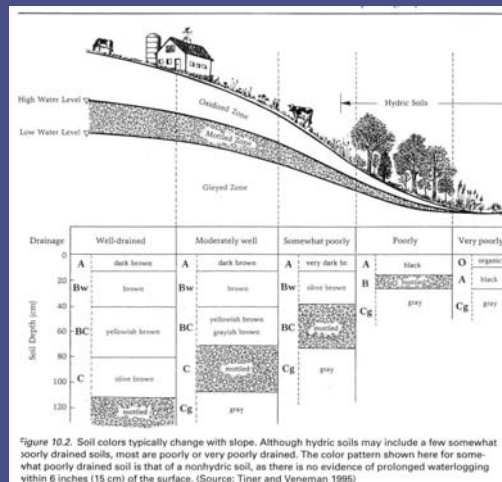
HYDRIC SOILS

- Definition - “a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.



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HYDRIC SOILS



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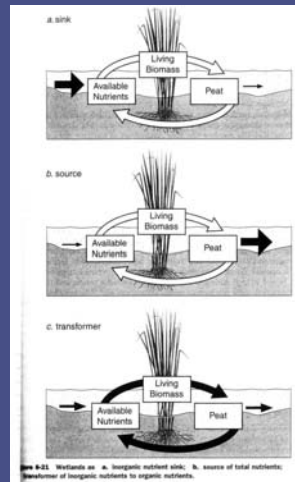
HYDRIC SOILS: Useful Links

- **Hydric Soils List. National Technical Committee for Hydric Soils, Natural Resources Conservation Service, P. O. Box 2890, Washington, D.C. 20013**
<http://soils.usda.gov/use/hydric/intro.html>
- **Soil Taxonomy, A Basic System of Soil Classification for Making and Interpreting Soil Surveys, Natural Resources Conservation Service, P. O. Box 2890, Washington, D.C.**
<http://soils.usda.gov/technical/classification/taxonomy>
- **Field Indicators of Hydric Soils in the Mid-Atlantic United States, Mid-Atlantic Hydric Soils Committee. (Excerpts from Field Indicators of Hydric Soils in the United States, Version 5.0)**
www.epa.gov/reg3esd1/hydricsoils/book.htm

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BIOGEOCHEMISTRY

- **Chemical Transformation in Wetlands**
 - Nitrogen
 - Iron/Manganese
 - Sulfur
 - Carbon
 - Phosphorus



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WETLAND FUNCTIONS AND VALUES

- **Function:** generally considered to be those processes or group of processes (physical, chemical, biological) that occur within wetlands regardless of how humans value those processes (Value Neutral)
- **Value:** features or characteristics of a wetland that society deems to be useful or desirable
 - Cultural background
 - Education
 - Scientific knowledge
 - Landownership
 - Regional differences



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WETLAND FUNCTIONS

- **Transpiration**
- **Photosynthesis**
- **Decomposition**
- **Denitrification**
- **Net Primary Production**
- **Hydroperiod**
- **Groundwater Flow**
- **Evapotranspiration**
- **Source or Sink of Nutrients**



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WETLAND VALUES

- Hydrology
- Water Quality
- Habitat
- Nutrient Cycling and Food Chain Support
- Socio-Economic

Examples

Flood Protection

Erosion Control

Nutrient/Pollution Removal

Fish & Wildlife Habitat

Recreation, Aesthetics, Education

Commercial (fisheries, timber, pelts, berries/mints/wild rice)



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WETLAND FAUNA: Aquatic Macroinvertebrates



Worms



Sowbugs



Scuds



Crayfish



Clams



Snails



Fly Larvae



Beetles



True Bugs



Dragonfly Larvae



Caddisfly Larvae



Mayfly Larvae

WETLAND FAUNA: Mammals



Nutria



Beaver



Muskrat

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WETLAND FAUNA: Birds



Great Blue Heron



Least Bittern



Greenbacked Heron



Wood Duck

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WETLAND FAUNA: Herps



Wood Frog



Northern Red Salamander



Queen Snake



Bog Turtle

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ATTRACTING AMPHIBIANS

- 27 species of frogs and toads (13 in NOVA)
- Salamanders - 10% (55) of world's species; (11 found locally)
- T&E Species
 - Mabee's salamander
 - Tiger salamander
 - Shenandoah salamander
 - Barking treefrog



John Pickering/www.discoverlife.org

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WHY AMPHIBIANS?

- **Good indicator of environmental health**
- **Keep pest populations under control**
- **Carnivorous – slugs, beetles, cutworms, flies, grasshoppers, Gypsy moths, sowbugs, pill bugs, centipedes, millipedes, mole crickets, ants and earwigs. Larger female toads eat Japanese beetles and June bugs.**
- **Loss of habitat**
- **Population/species decline**



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WOODLAND POOLS



- **Create plant community that reflects local hydrological conditions.**
- **Submerged aquatic plants are important egg laying sites and provide cover for frogs and tadpoles**



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LARVAE TO SALAMANDER

- Life span ~ 40 years



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TADPOLE TO FROG



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TADPOLE TO FROG



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CREATING A VERNAL POOL

- **Mosquitoes??**
 - Eaten by salamander, dragonfly and damselfly larvae among others
 - Dragonflies and swallows during day and bats at night



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BUILD A POND

- Dig shallow holes, line with waterproof plastic
- Some permanent water with depth at least 6 feet
- Terrace the perimeter
- No steep edges/provide logs to allow a way out
- Plant native vegetation to provide food and cover
- Preferably fishless



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AMPHIBIAN HABITAT

- Wildlife corridor
- Dense foliage close to ground provides cover
- Leaf piles provide winter cover
- Prevent death in window wells by placing a log for a way out.
- Do not purchase or move frogs or toads to your backyard



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SIDE YARD MARSH/BOG

- **Divert your roof rainwater to make a side yard marsh**
- **Put in location to prevent fertilizers and pesticides motor oil, cigarette filters, pet waste**



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LOCAL WETLANDS TO VISIT

- **Complex and viable/vital habitat**
- **Get off the boardwalk**
- **Visit at different seasons**

Mason Neck
Huntley Meadows
Battlecreek Cypress
Belle Isle
Hickory Hollow
Julie J. Metz
Sunrise Valley Nature Preserve



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Links

- <http://www.enature.com/fieldguides/>
- http://www.nwf.org/FrogWatchUSA/frogs_state.cfm?showstate=va
- <http://www.loudounwildlife.org/>
- <http://fwie.fw.vt.edu/VHS/>
- <http://www.dgif.virginia.gov/wildlife/frogsurvey/>
- <http://www.dgif.virginia.gov/vbwt/>
- <http://www.amphibianark.org/>
- <http://www.pwconserve.org/> - Feb 4th



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Questions



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