



Wetland Soils

In North Carolina



THE BASICS

“Soil” is a fancy word for dirt.

When you’re walking outside, there can be soil under your feet! That soil might be the same as the soil where you live or play, but wetland soil is different. The soil you find in wetlands is really wet! It is also different colors! It may be grey because it has little oxygen to create rust from iron in the soil. It may be almost black because it has a lot of dead plants inside it. That dark, wet soil is very important in a wetland. It holds lots of water. This helps stop flooding and makes a good home for plants that love water.



Soil probe

WANT TO KNOW MORE?

Where does soil come from?

Soil is the dirt under your feet outside, and it was once part of large rocks! But over hundreds and thousands of years, those rocks were **eroded** by wind, heat, snow, and ice, and the particles that broke off the rock turned into layers of soil.

Wetland soil forms the same way as other soil, but wetland soil is **hydric**, meaning it was formed under very wet conditions and has little to no oxygen. Water **saturates**, or fills all the holes in the soil, and changes the color and chemistry of it. The lack of oxygen prevents plants from breaking down, or decaying, and all those dead plants in wetland soil help it hold water (like a sponge), which prevents flooding during heavy rains. While it holds onto that water, the soil can filter out pollutants so that the water released will be cleaner than when it entered the wetland. The amount of water and the chemistry of the hydric soils determine which types of plants can survive in the wetland.



Soil pit



LET'S GET TECHNICAL

Wetland soil is formed similarly to soil found in other places, but the difference is that wetland soils are hydric and upland soils are not.

Hydric soils are those that have been saturated, flooded, or ponded with water either periodically or constantly, changing the appearance and chemistry of the soil. There are two types of wetland soils.

Mineral wetland soils are sand, silt, and clay mixtures often with some *humus*, or dead plant matter, on top. If you dig into some of North Carolina's upland soil, you'll likely notice its reddish rusty color. The rust color in soil comes from iron oxide (Fe_2O_3). Wetland soil does not have that base rust color. When wetland soil gets saturated, microbes use up all the oxygen and the soil becomes *anaerobic*. Under anaerobic conditions, iron oxide is reduced to *iron* (Fe) which removes its characteristic red/brown color. These conditions give hydric soils their base gray color. When oxygen is returned to parts of the soil, either during dry periods or at the tips of roots (rhizomes), small pockets of oxidized iron may be visible. This results in a redder secondary soil color within the base gray, forming features called *mottling* and *oxidized rhizospheres*.

Organic wetland soils like *peats* and *mucks* have accumulated so much dead, wet plant material in their upper layer that the sand and silt is almost undetectable. Dead plant material gives peats and mucks a very dark, almost black color and a somewhat greasy feel. Peat soils have identifiable plant material, whereas the material in muck soils are broken down so thoroughly that it is unidentifiable. This organic material is broken down by microbes, resulting in the release of byproducts. Depending on the type of material being broken down, the wetland soil may smell like rotten eggs. This is sometimes referred to as "swamp gas" and is caused by the breakdown of sulfuric compounds to *hydrogen sulfide* (H_2S) gas. It may seem unpleasant, but that smell means bacteria in the soil are doing their job well!

Both mineral and organic wetland soils hold enormous amounts of water. But why is this important?

- The ability of wetland soil to hold water is helpful in controlling floods. The soil can absorb large amounts of water during rainfall, rather than letting it accumulate elsewhere and cause flooding.
- If you get your drinking water from a well or spring, wetland soil helps you by filtering pollutants like sediment and chemicals out of groundwater. This is also good news for any creeks or rivers nearby, as the groundwater in wetland soils has been filtered, resulting in cleaner water flowing back into surrounding waterways.



Wetland Soil with no iron oxide



Upland soil containing iron oxide



Mottled wetland soil

SUPPLEMENTAL LINKS

Glossary: <http://www.ncwetlands.org/wp-content/uploads/NCWetlands-Glossary-of-wetland-terms.pdf>

Curriculum: 1.E.2, 1.L.1, 3.L.2, 6.L.2, 8.E.1, Chm 2.2, EEn.2.1



CITATION

North Carolina Division of Water Resources
www.ncwetlands.org

Produced by the NC Division of Water Resources with funding from US Environmental Protection Agency.