Using the NTCHS Indicators of Hydric Soils, Ver. 7.0

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Learning Objectives

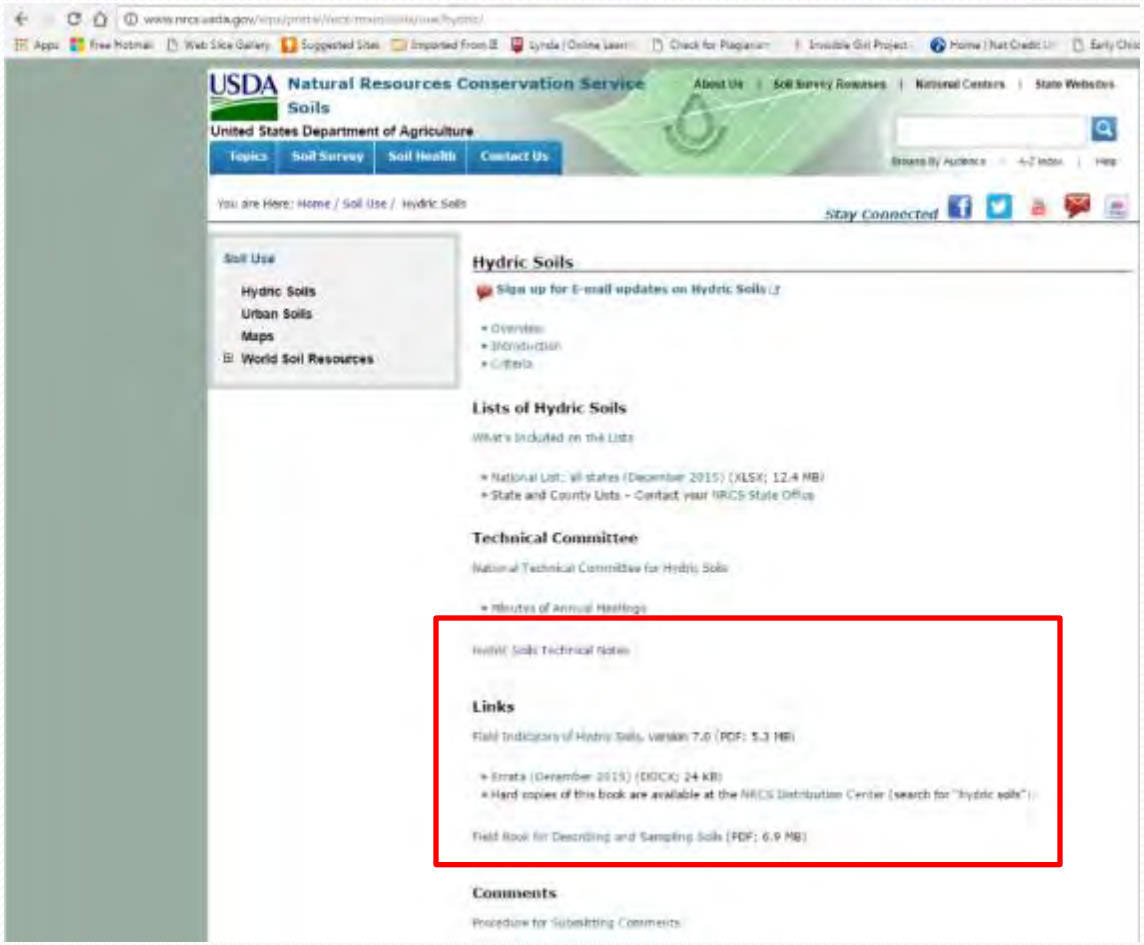
- Explain general guides for using the NTCHS Indicators in the field
- Recall the definitions of importance
- List important caveats to the guides
- Review the general structure of the indicators
- Provide a few common indicators as examples

What You'll Need

- Review the Technical Notes from the USDA *Hydric Soils* site
- Download *Field Book for Describing and Sampling Soils* Ver. 3.0
- NTCHS Indicators of Hydric Soils Ver. 7.0
- Soil description form from COE Regional Supplement

NTCHS Indicators of Hydric Soils Ver. 7.0 (w/errata)

http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/



How to get the Indicators Book

- Download the PDF file, OR request a hard copy from the USDA *Hydric Soils* site
- Download the errata sheet and make the corrections by hand.
  NOTE: The Field Indicators publication is being revised to reflect errata and other updates and should be available in late 2016 or early 2017.

Glossary of Terms and Guides Used With Soil Descriptions

Textures:

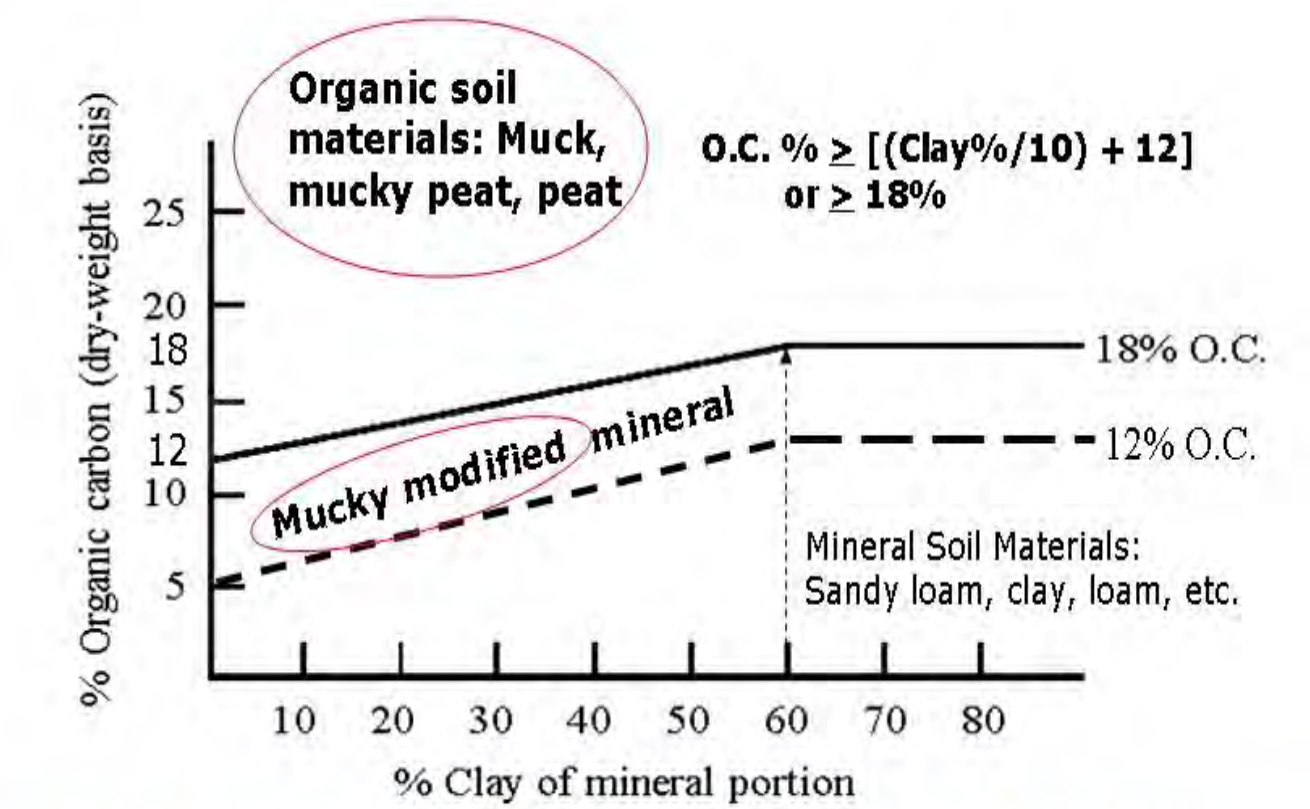
- **Organic Soil Material:** An O horizon. Light brown to black in color, rotting organic matter smell, holds water like a sponge, with very low bulk density after squeezing water out. Water runs out clear or stained like tea.
- **Muck:** Highly decomposed organic soil material. Usually black (value 2.5 or 2), greasy with few visible fibers. Most mineral grains cannot be felt when texturing. Bulk density is very low (~ 1/3 of normal subsoil clod of similar size). When saturated, dark water may be squeezed out of a hand-held sample. Leaves a black stain on creases in your hands.

Glossary

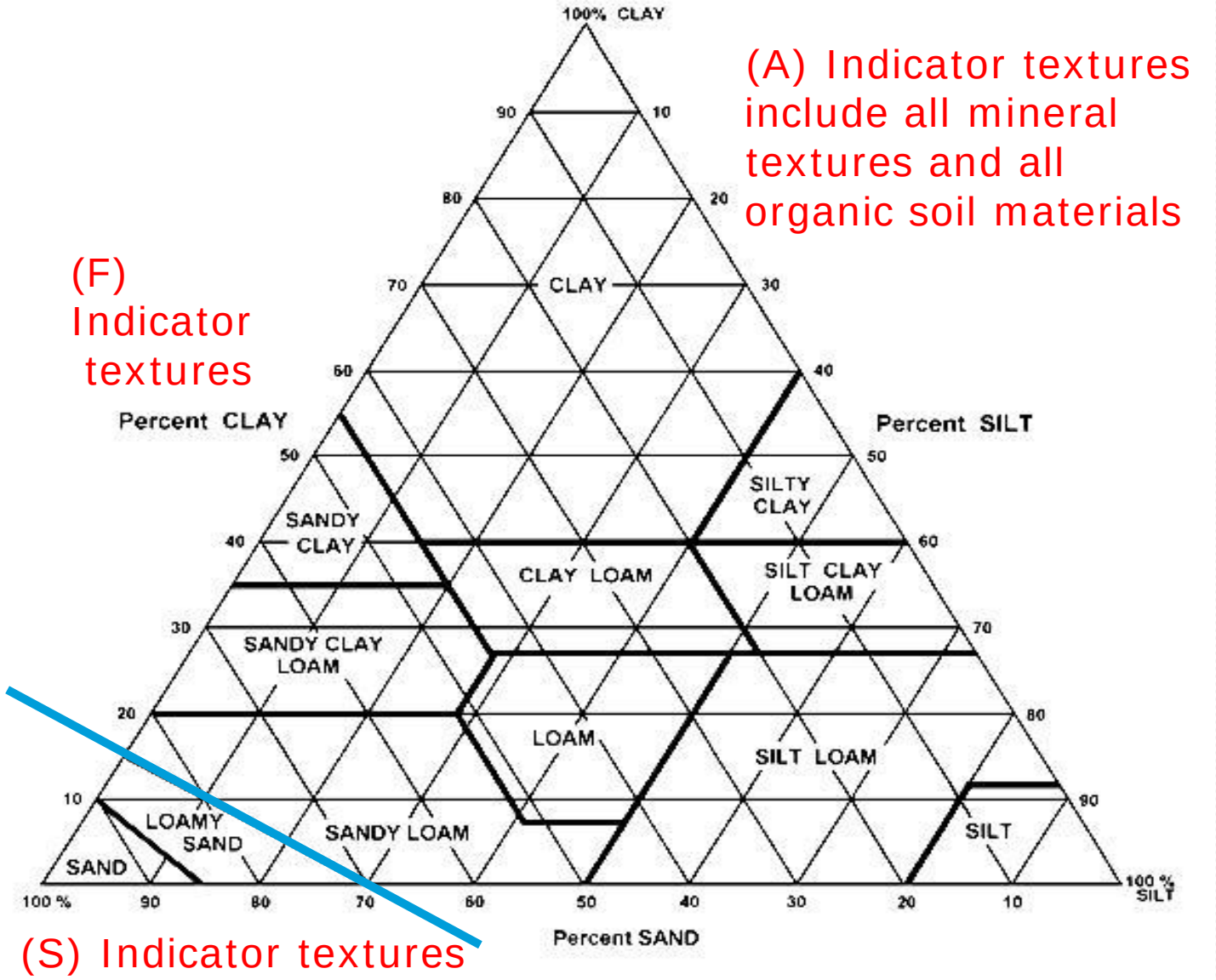
Textures:

- **Mucky-modified mineral textures:** Dark (value 3 or less), but sand grains are easily felt. May be light in density (~1/2 of a mineral clod of similar size). Few if any fibers.

Organic, Mucky Modified Mineral, and Mineral Textures

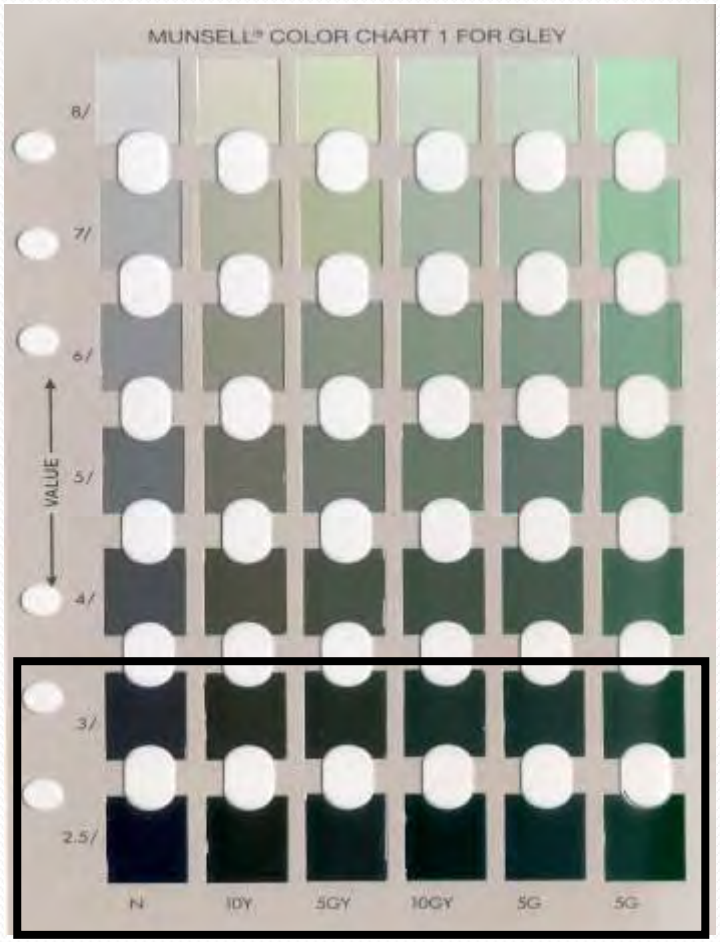


Textures circled in red are proof-positive indicators of hydric soils



Munsell® Colors Indicating High OC Accumulation in Wetland Soils

Gley page



Any Hue (page)

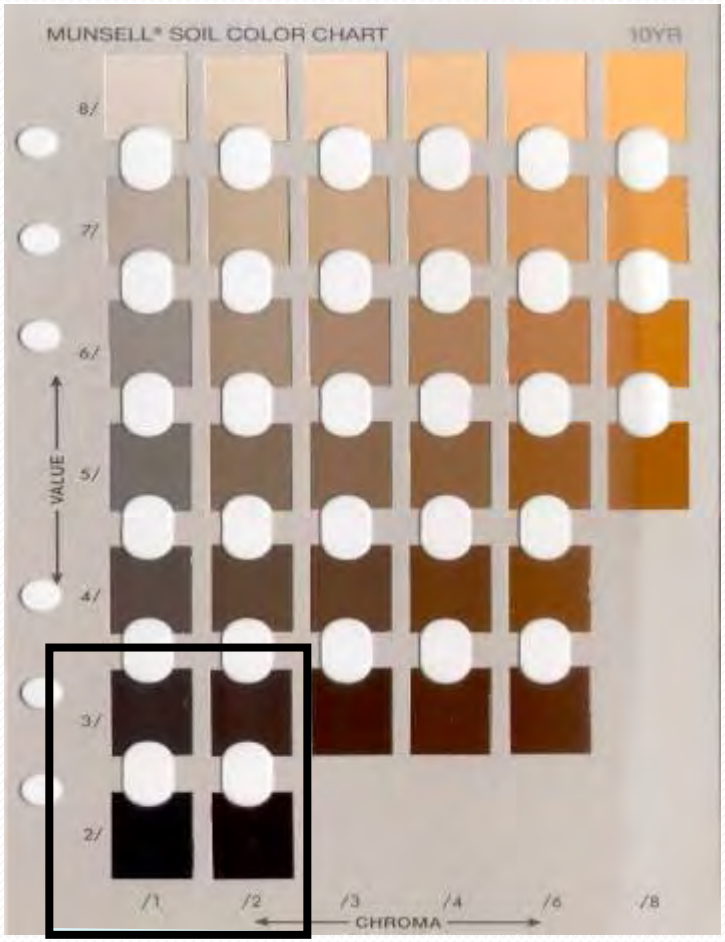


Fig. 1 - Difference in Hue (Contrast)

To determine the "difference in hue“ between two colors, record the color of the matrix and the redox features, then count the number of intervals difference in hue on the wheel.

For example hues of 5Y and 5YR differ by four intervals, and so their difference in hue is counted as "4."

Hue of N is zero hues different than any other hue.

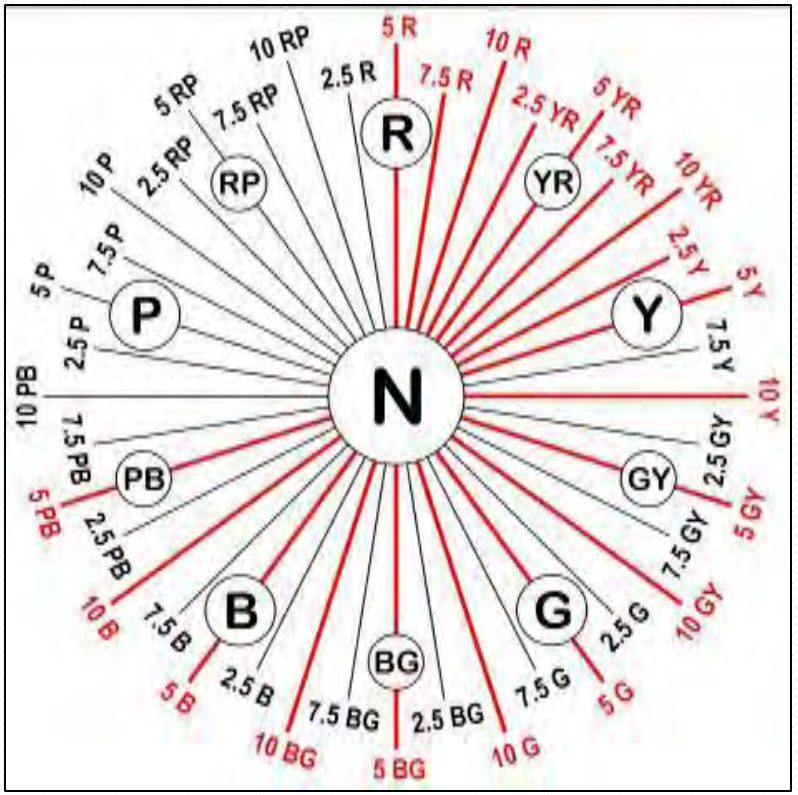


Table 1 - Distinct and Prominent Contrast (Other contrasts are “Faint”)

Hue difference (see Fig. 1)	Value Difference		Chroma Difference
0	> 2	or	> 1
1	> 1	or	> 1
2	> 0	or	> 0

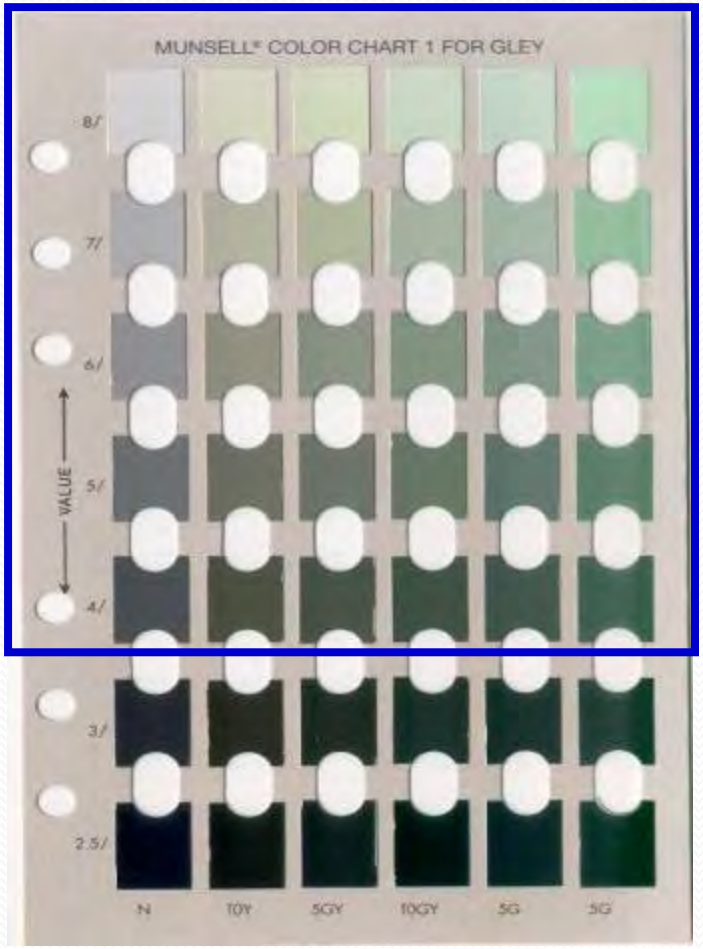
The value of one of the compared colors must be > 3 or the chroma > 2

Landforms

- **Closed Depression:** Any area larger than a tree-tip pit where water ponds on the surface.
- **Floodplain:** A low-lying level area periodically-exposed to water flowing above a channel.
- **Swamp:** An area where water ponds and woody plants grow.
- **Marsh:** An area dominated by herbaceous plants in association with shallow water or daily tides.

Gleyed Matrix Colors

- Matrix value of ≥ 4 on any Munsell® Gley page.



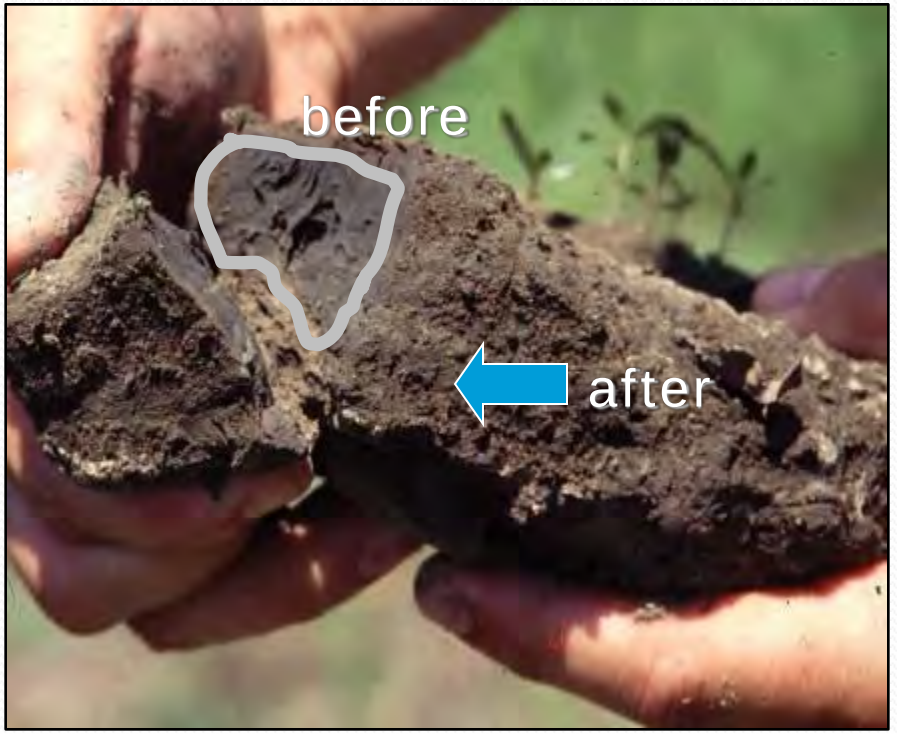
Depleted Matrix Colors

For any Color Book Hue:

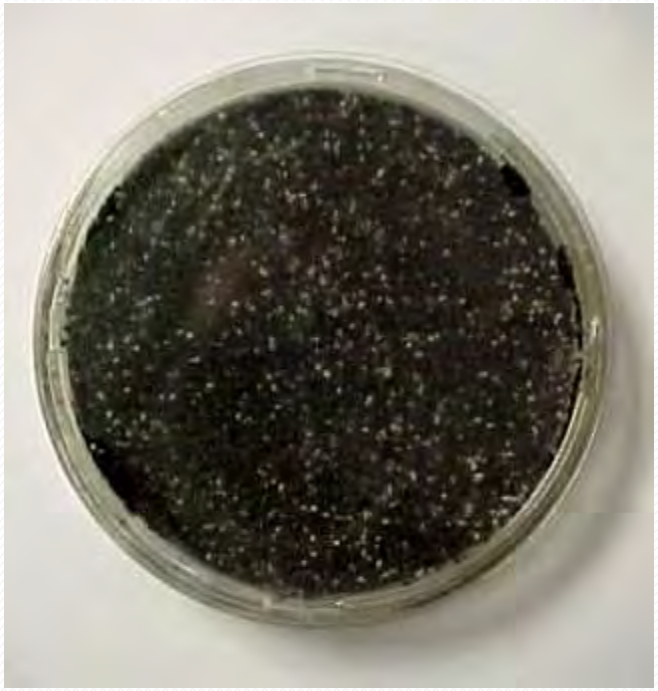
- For A and E horizons, matrix colors inside both boxes need ≥ 2% distinct or prominent uncemented redox concentrations.
- For B and C horizons, only matrix colors inside the blue box need ≥ 2% distinct or prominent uncemented redox concentrations.

Reduced Matrix Colors

- When soils have high value, low chroma in-situ but the color changes rapidly when first exposed to gaseous O^2, proving that reduced Fe is present. These matrices are found in soil layers that are extracted from beneath the water table.



70% Coated Grains Required in Surface of most Sandy Indicators

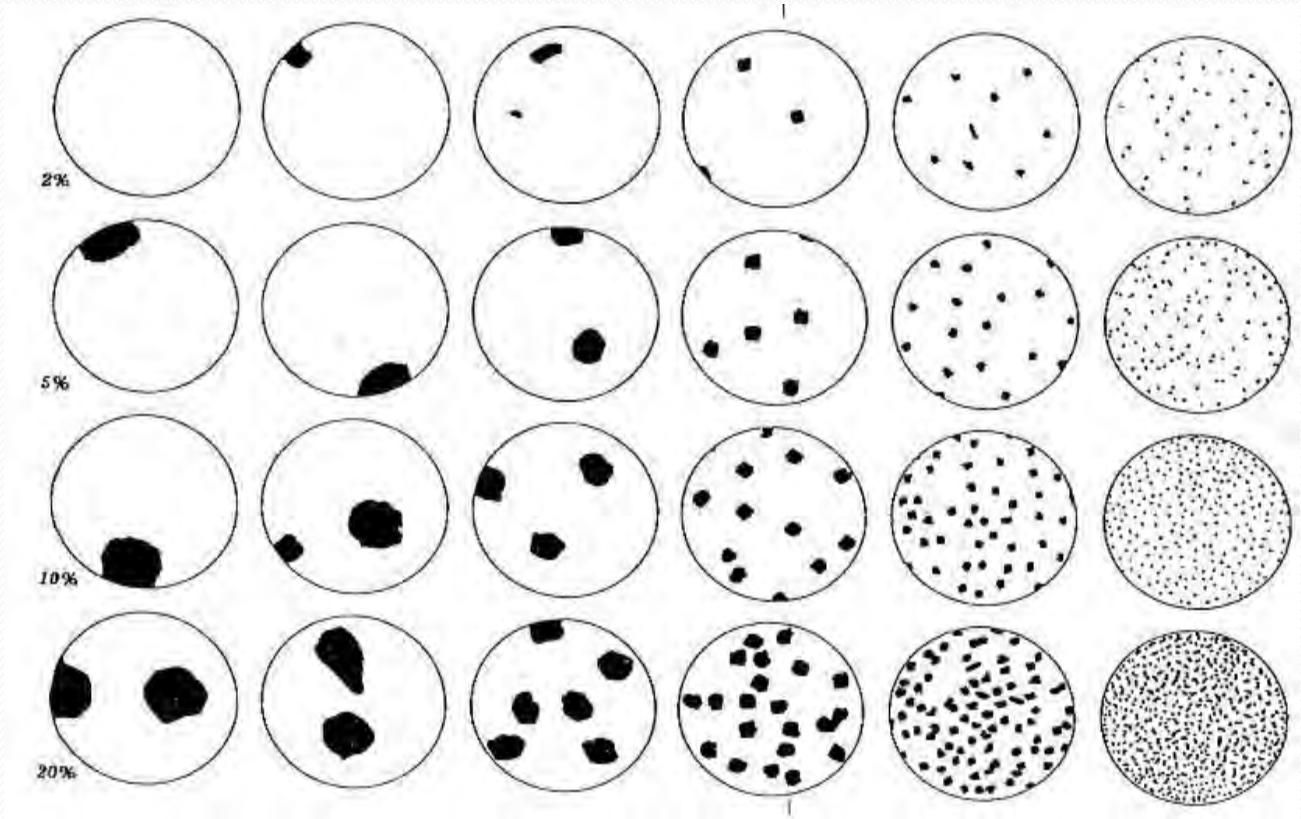


70% of grains coated, covered, or masked by organic material

50% of grains coated, covered, or masked by organic material. The norm in upland sandy soils in the Coastal Plains.

Estimating Percent by Volume

Stoops, G. 2003. *Guidelines for Analysis and Description of Soil and Regolith Thin Sections.* Soil Sci. Soc. Am. Madison, WI. 184pp.



Soil Plug Extraction Procedure

- Remove duff (loose leaves and needles not held by hyphae or roots) by gently raking them away.
- Dig a hole to at least 30-cm. If still in an O or A horizon, continue to dig 10 cm past the bottom of the deepest O or A horizon. A peat auger may be needed to auger to 80 cm in wet Histosols.
- Tile-spade extraction of soil is better than augering. Use pruners to cut through roots rather than pulling the soil out of a heavily-rooted soil. Clear off any loose soil that smears across the slice. Lay a cm-ruler next to the extracted soil slice, and take pictures of the soil and site.
- Read colors of horizons immediately, then identify and record a full soil description. Re-read the colors a second time to see if they have changed.

Soil Plug

Important Indicator Caveats (p1)

- Indicator Layers: Some indicator layers require an upper (1) and lower (2) part. Natural horizons can be arbitrarily split to meet the requirements of both part (1) and (2).
- Soils may meet one or more indicator.
- Specific to LRR and MLRA.

Source: http://soils.usda.gov/survey/geography/mlra/index.html

Layers Vs. Horizons

Important Indicator Caveats (p2)

- For all A soils except A16, material above the indicator layer must be chroma 2 or less, or the part with chroma > 2 must be ≤ 15 cm. This is to allow for recent sediment accumulation, natural or by human activity.
- For all S soils except for S6, all material above the indicator layer must be chroma ≤ 2.
- For all F soils except for F8, F12, F19, F20 and F21, all material above the indicator layer must be chroma ≤ 2, or the material with chroma > 2 must be 15 cm or less thick.

Important Indicator Caveats (p3)

- In organic and F textures, the indicator layer typically begins in the upper 30 cm or less. In S textures, indicator layer typically begins in the upper 15 cm or less. Related to capillary rise.
- Some indicators allow two different sets of morphologic properties. A2, S9 and F3 are examples where the thickness of the indicator varies by what depth it is found in the soil.
- Check the Indicators book for additional glossary and special rules.

Galbraith's General Groups

1. Indicators that target organic soil materials (very high OC)
2. Mucky modified mineral textures at surface (high OC)
3. Very dark colored surface soils directly over a gray subsoil (dark over gray)
4. Surface layers with redox features indicate ponding or very shallow water tables (redox or gray at surface)
5. Gray subsurface layers indicate long term saturation/reduction (gray in subsurface)
6. Young deposits are exceptions and require less evidence of being hydric (young deposits)
7. Unusual soil/landscape properties are exceptions and require less evidence of being hydric (problem PM/problem setting)

A11 Depleted Below Dark Surface

- A11 has a layer (1) with loamy/clayey soil material with value ≤ 3 and chroma ≤ 2, or if sandy material ≤ 3 and chroma ≤ 1 and ≥ 70% of the sand grains masked with soil organic material. No minimum thickness.
- Layer (2) is ≥ 15 cm thick with a depleted or gleyed matrix that has ≥ 60% chroma ≤ 2, and starts ≤ 30 cm of the surface.

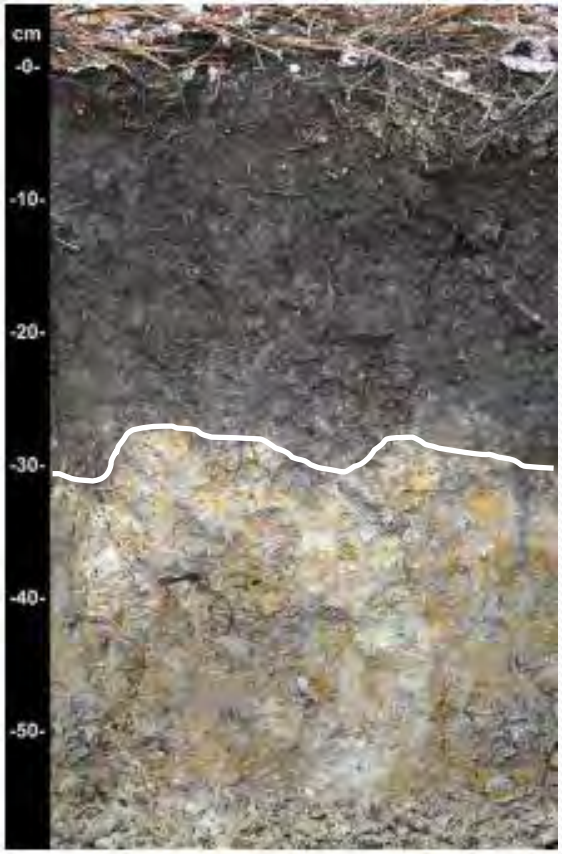


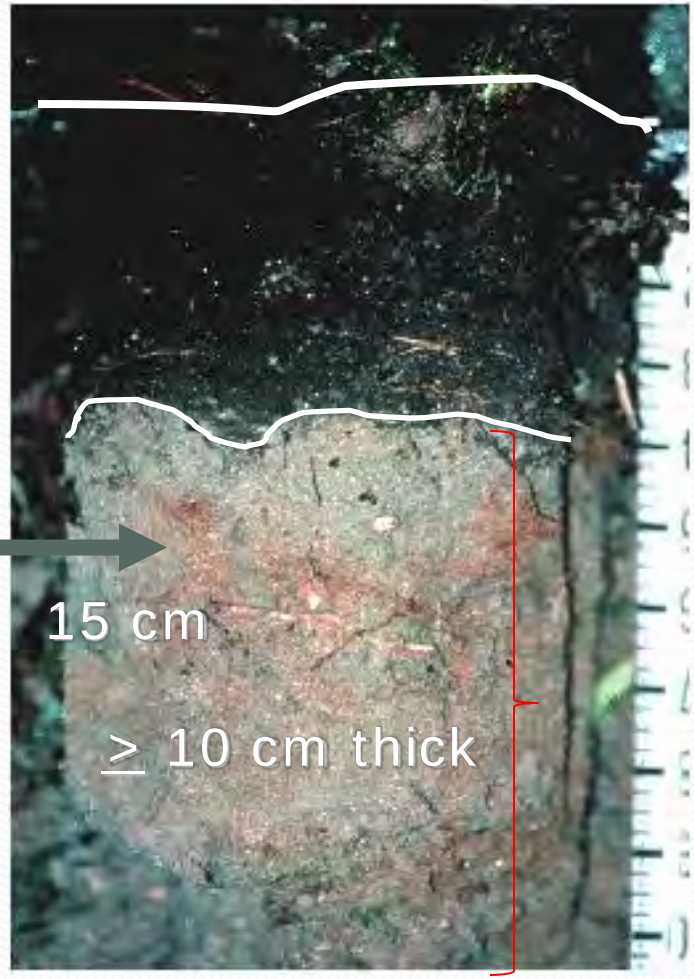
Figure 16.—Indicator A11 (Depleted Below Dark Surface).

NTCHS FI book, V. 7.0

S5 Sandy Redox

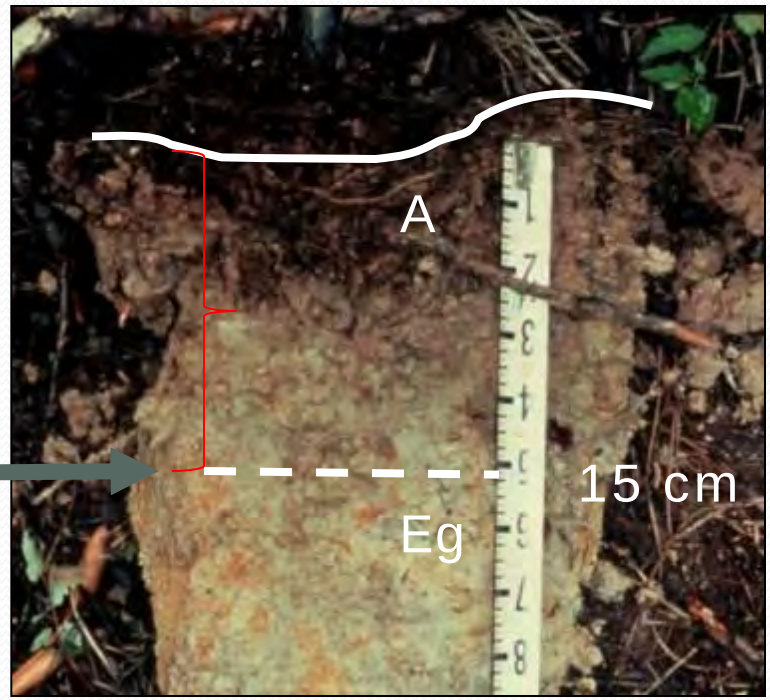
This soil also meets
S1 Mucky Modified Mineral.

S5 is a layer starting ≤ 15 cm of the soil surface that is ≥ 10 cm thick, and has a matrix with ≥ 60% chroma ≤ 2, with ≥ 2% distinct or prominent redox concentrations as soft masses and/or pore linings.



F3 Depleted Matrix (a) (DM in upper 15 cm)

- Has saturation near the surface with a depleted matrix with chroma ≤ 2 in ≥ 60% of the volume.
- Depleted matrix is ≥ 5 cm thick entirely within 15 cm of the soil surface. Means the top is no deeper than 10 cm.
- This is Indicator part (a).



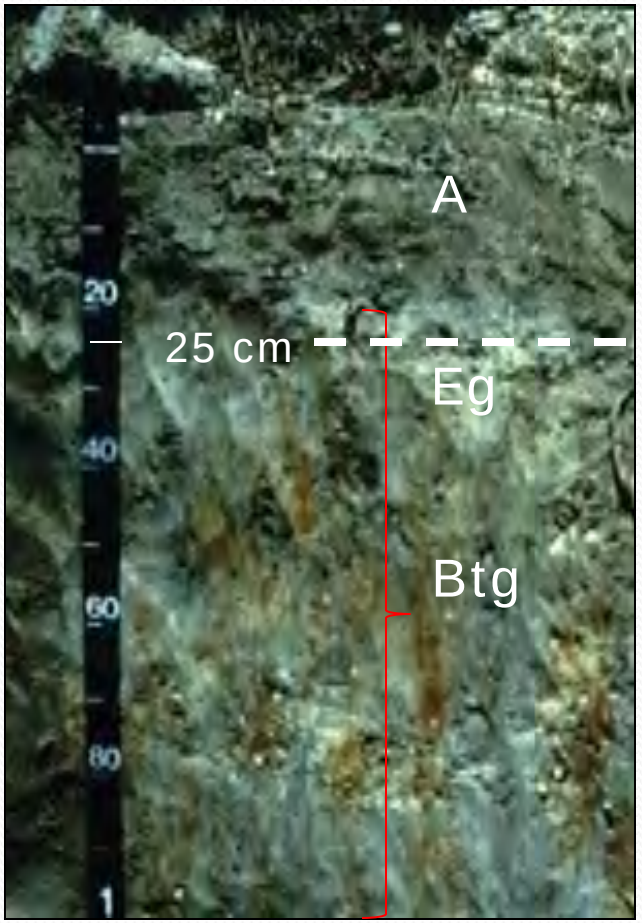
(a)

4

F3 Depleted Matrix (b) (DM starts within 25 cm)

5

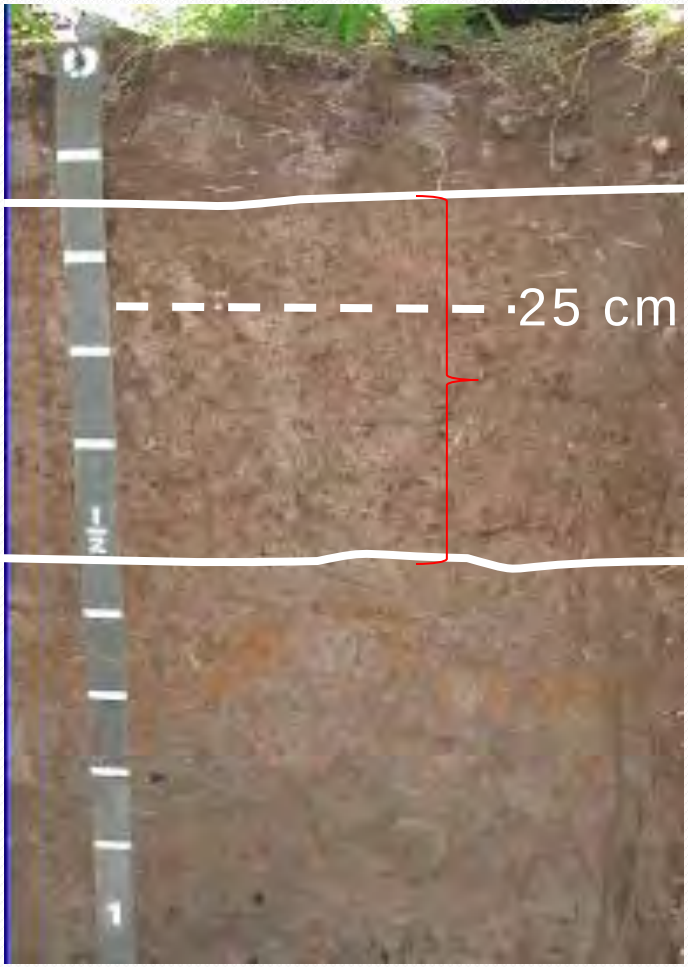
- Depleted matrix with chroma ≤ 2 in ≥ 60% of the volume. The depleted matrix is ≥ 15 cm thick that starts within 25 cm of the soil surface, indicating saturation from a lower level.
- This is probably the most commonly used indicator in the USA.
- This is Indicator part (b)



F19 Piedmont Flood Plain Soils

MLRA 149A and 148 of Northern Piedmont, also Southern Piedmont and Coastal Plain floodplains subject to deposition from Piedmont sediments. Possibly in all of LRR N, S, T and P, documentation needed.

- F19 occurs on active floodplains, meaning there are thin strata, buried horizons, or weakly developed subsoils.
- F19 has a mineral layer at least 15 cm thick starting within 25 cm of the soil surface with a matrix (60 percent or more of the volume) chroma < 4 and ≥ 20% distinct or prominent redox concentrations as soft masses or pore linings.



Picture from: Castenson, K. L. 2004. Hydromorphology of Piedmont Floodplain Soils. M.S. thesis. Univ. of Maryland, College Park.

Questions?