Properties of Hydric Soils & Disturbed Soils

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ISCA

Soil Formation

Climate

Organic Matter

Topography/ Landscape Position

Parent Material

Time

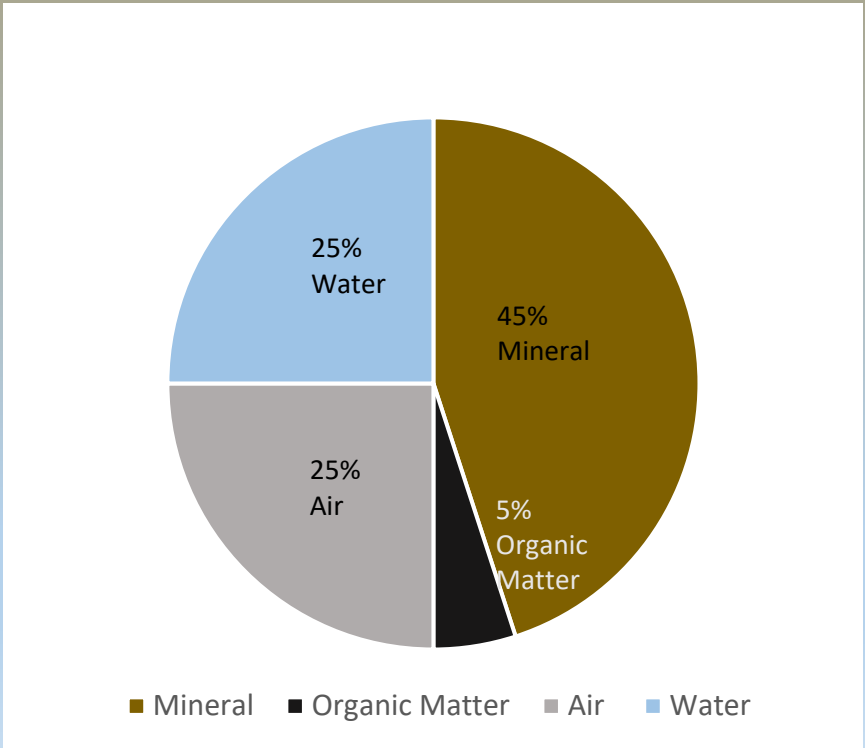
Basic Soil Components

"Textbook" Ideal Soil Contains:

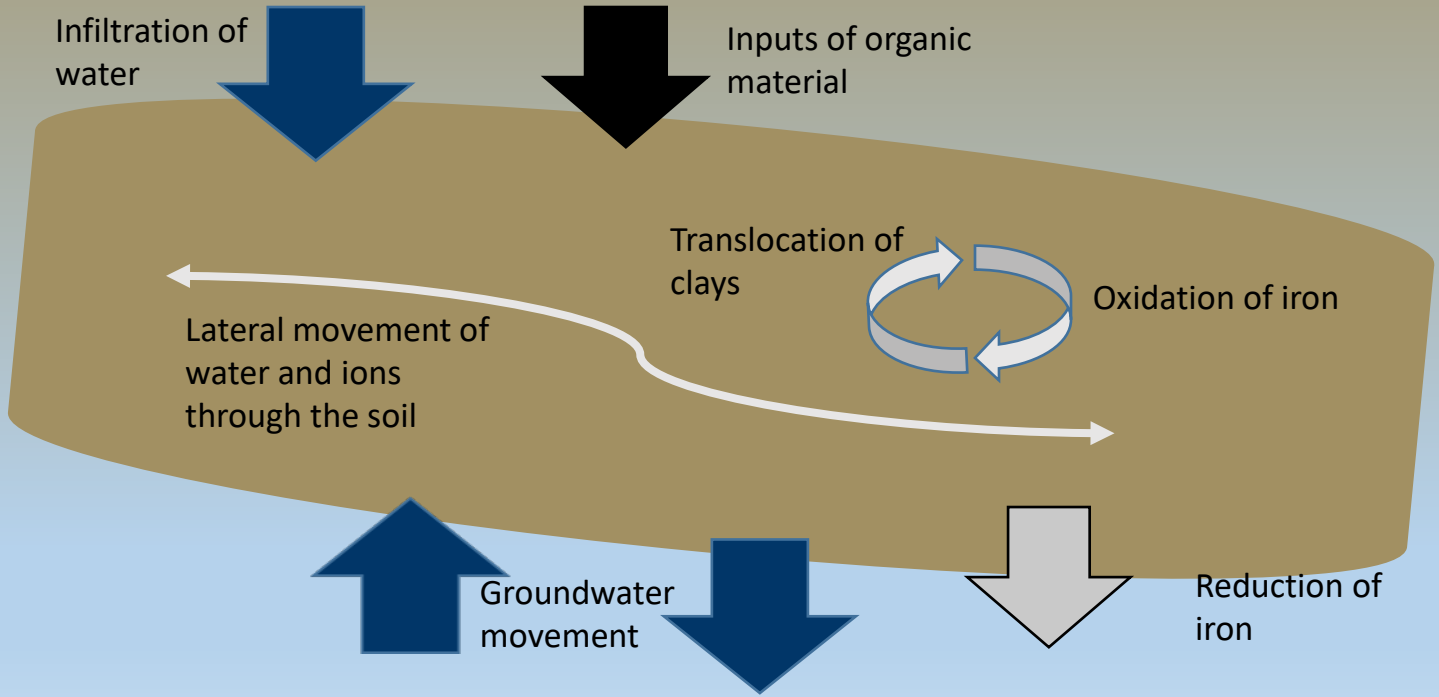
- 50% Solids
- 50% Pore Space

Solid half- mineral and organic

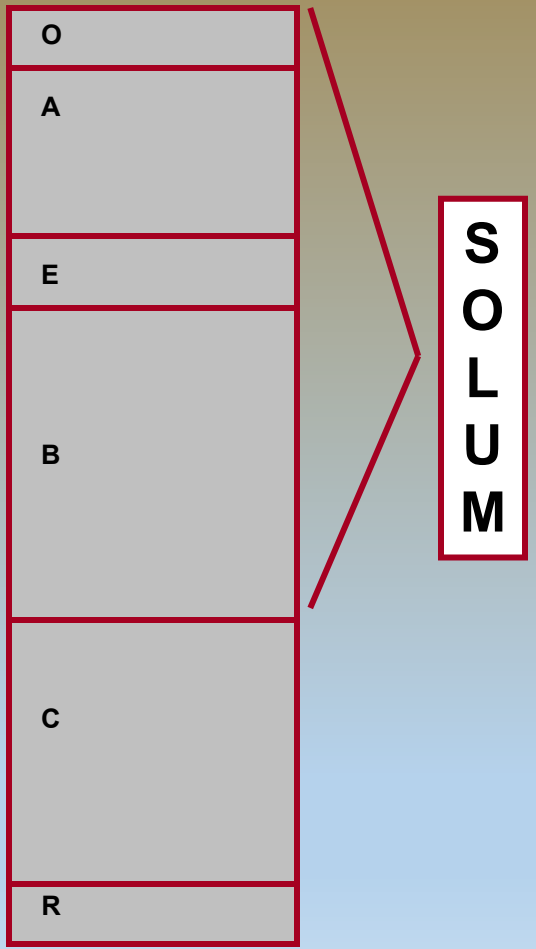
Pore space half- air and water



Soil Changes



Soil Horizons



Master Horizons

O = organic (not always present)

A = mineral surface/topsoil

E = subsurface/leached layer

B = subsoil/clay accumulation

C = little or no soil development

R = bedrock (often very deep)

L = limnic material

Can have horizon combinations, i.e. – AB, BC, E and B, & others

Subordinate Distinctions within Master Horizons

Example Horizons

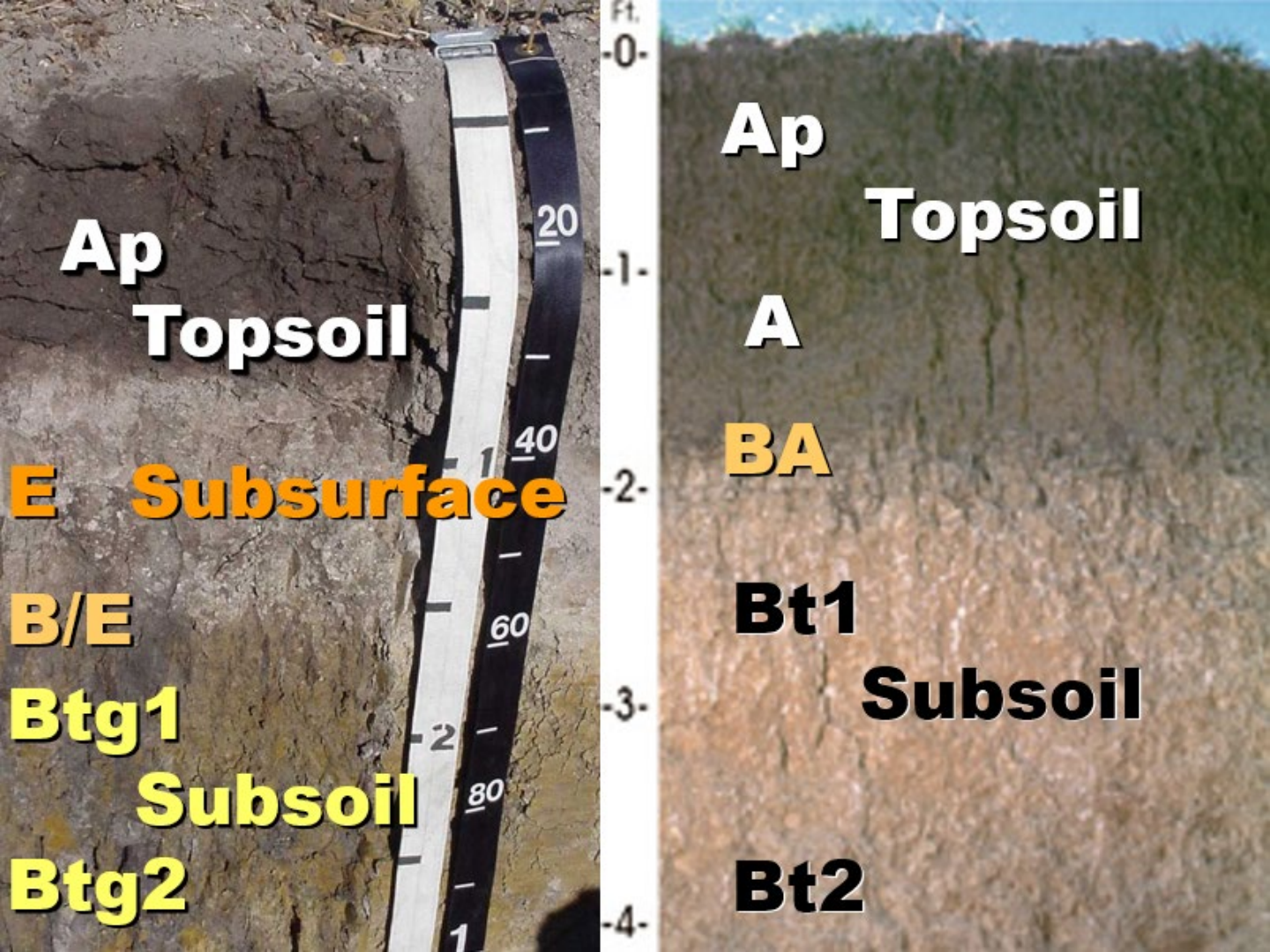
p – tillage or other disturbance --------- Ap

r – weathered or soft bedrock ---------- Cr

t – accumulation of clay ---------- Bt

w – weak soil development ---------- Bw

x – fragipan (brittle layer) ---------- Bx


Ap
Topsoil
E Subsurface
B/E
Btg1
Subsoil
Btg2
Ft.
-0-
-1-
-2-
-3-
-4-
20
40
60
80
Ap
Topsoil
A
BA
Bt1
Subsoil
Bt2

Hydric Soil Terms

Hydric Soil 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**

Hydric Soil Criteria: The main purpose for the criteria is to create Hydric Soil Lists

Hydric Soil Lists: the interpretive rating of whether a soil has a probability of being hydric (compared to the estimated soil properties in soil survey with the Hydric Soil Criteria)

Hydric Soil Indicators: primarily morphological indicators used for field identification of hydric soils.

Hydric Soil: a soil that meets the definition; presence of one (or more) of the indicators is evidence that the definition has been met

Organic Soils

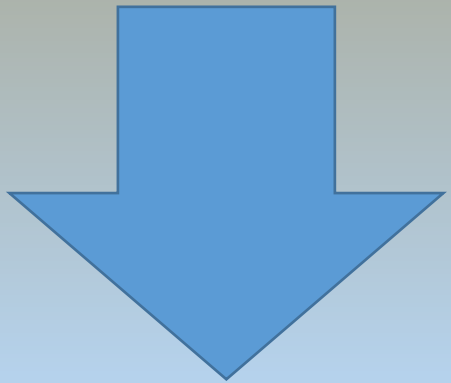
- From Hydric Soil Criteria: All Histosols are hydric (except Folists which are organic material on rock/gravel)
- Consist of decomposed organic material
- Histosols have at least 16 inches of decomposed organic material (>20%) in the upper 32 inches, or any thickness over bedrock
- Organic influenced layers contain varying amounts of organic matter

Organic Soils

Organic Matter ≥ 20%

Types

- Fibric
- Hemic
- Sapric



Level of Decomposition of Organic Matter

Mineral Soils

- Organic Matter < 20%
- Mineral Soils are hydric if:
  - Meets one or more Field Indicators of Hydric Soils
  - Meets the definition of a hydric soil

When delineating- the wetland boudnary will likely be a mineral soil

Hydric Soil Determination

Start with Soil Survey…

but don’t end there!

A map unit is identified and named according to the taxonomic classification of the ***dominant soils****. Within a taxonomic class there are precisely defined limits for the properties of the soils.* ***On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena.*** *Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class.* ***Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes****. Consequently,* ***every map unit is made up of the soils or miscellaneous areas for which it is named, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.***

Hydric Soil Determination

1903A – Muskego and Houghton Mucks

HYDRIC

792B – Bowes Silt Loam

NOT HYDRIC

523A – Dunham Silty Clay Loam

HYDRIC

290C2 – Warsaw Silt Loam

NOT HYDRIC

Hydric Soil Determination

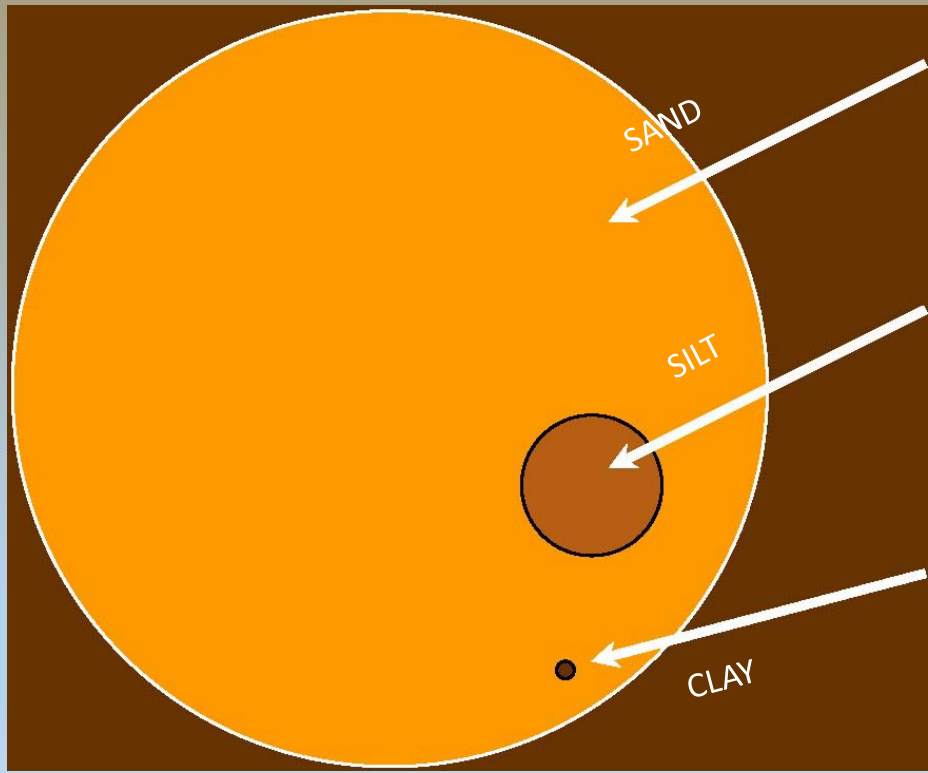
Focus on:

- Texture
- Color
- Redox Features

Soil Texture

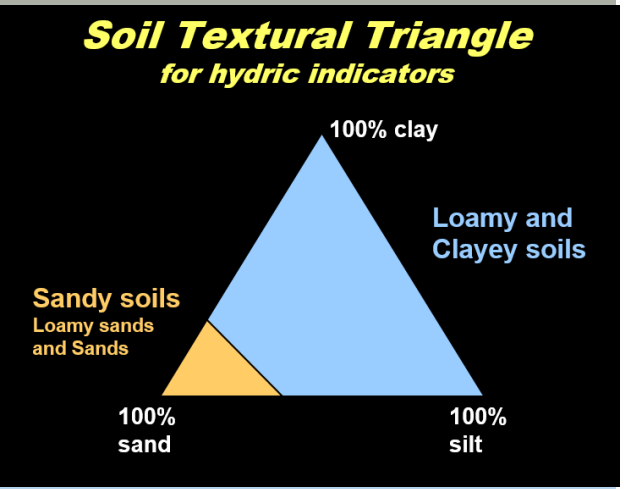
Mineral component

- Clay < 0.002 mm
- Silt 0.002 to 0.05mm
- Sand 0.05 to 2mm
- Course Fragments/ Gravel >2mm



Soil Texture

Texture Triangle



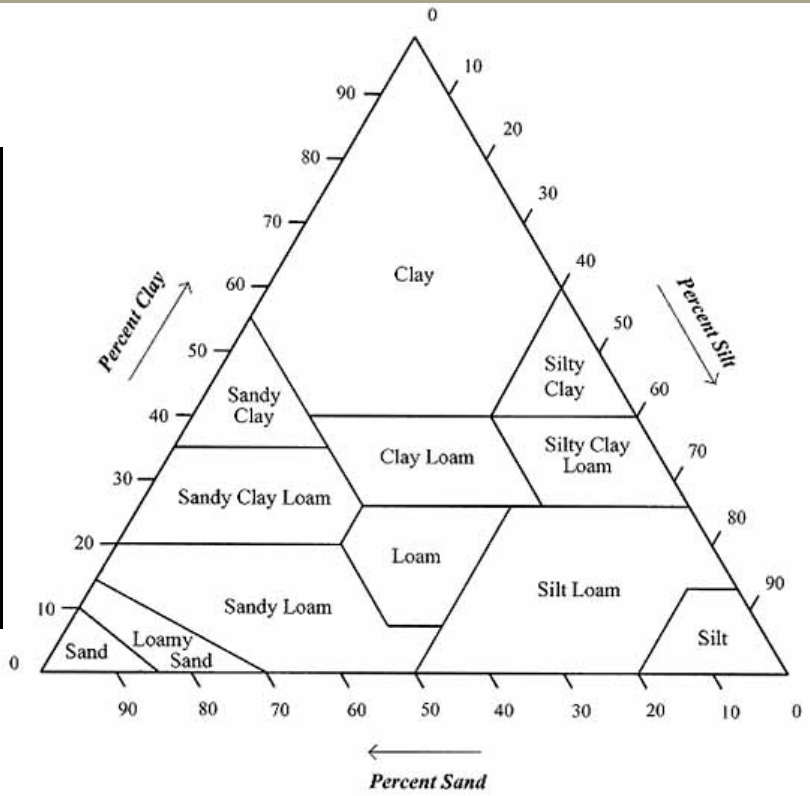
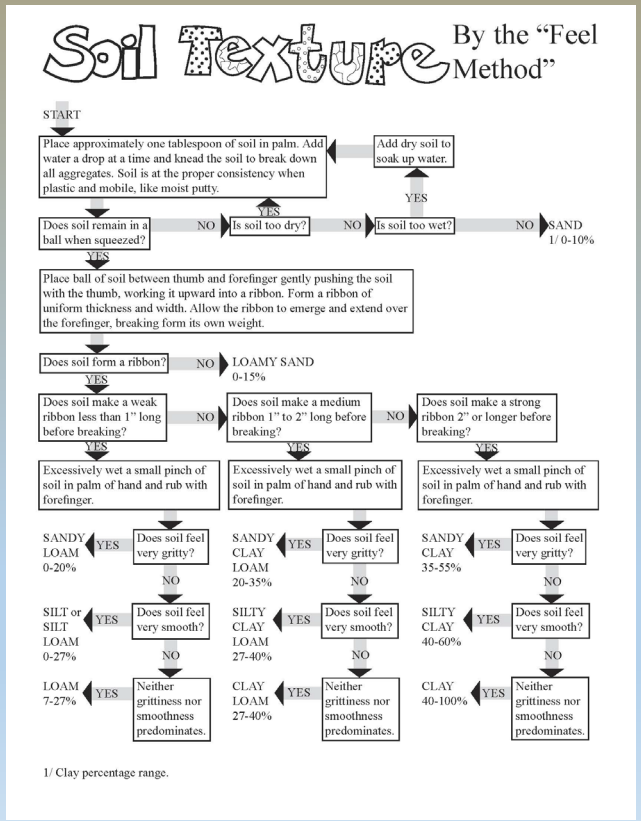


Figure 4 - Textural triangle illustrating the twelve USDA soil classifications.

Soil Texture



Soil Color

HUE

VALUE

CHROMA

Adopted Munsell color notation 1949


HUE
Based on the five spectrums of the rainbow:
Red
Yellow
Green
Blue
Purple

VALUE

Darkness of color

10/0 - pure white

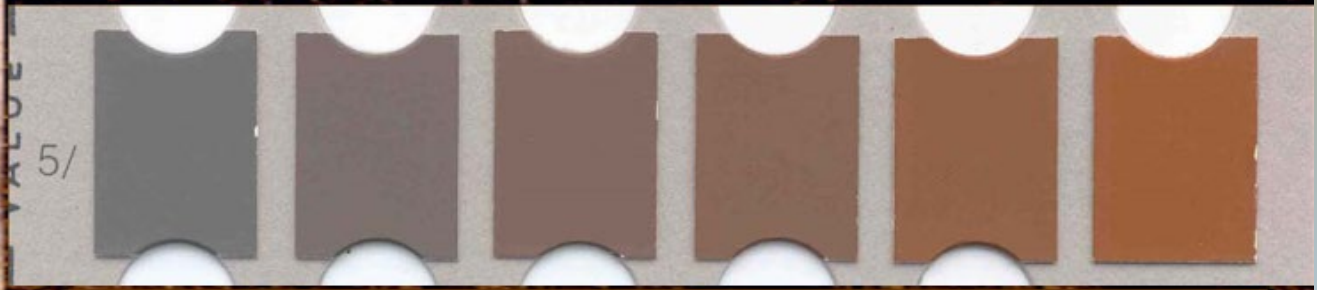
5/0 - “gray”

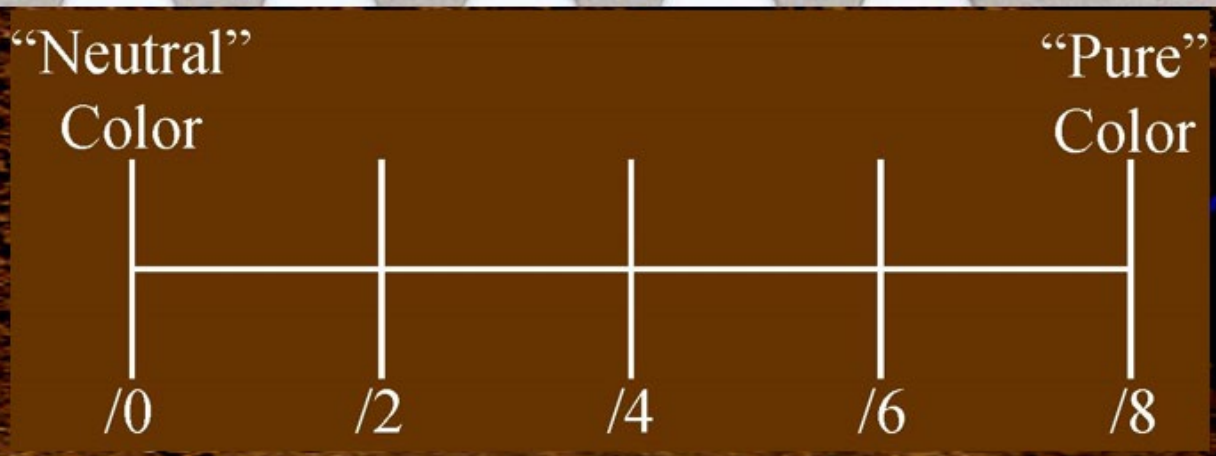
0/0 - pure black

CHROMA

Increasing grayness

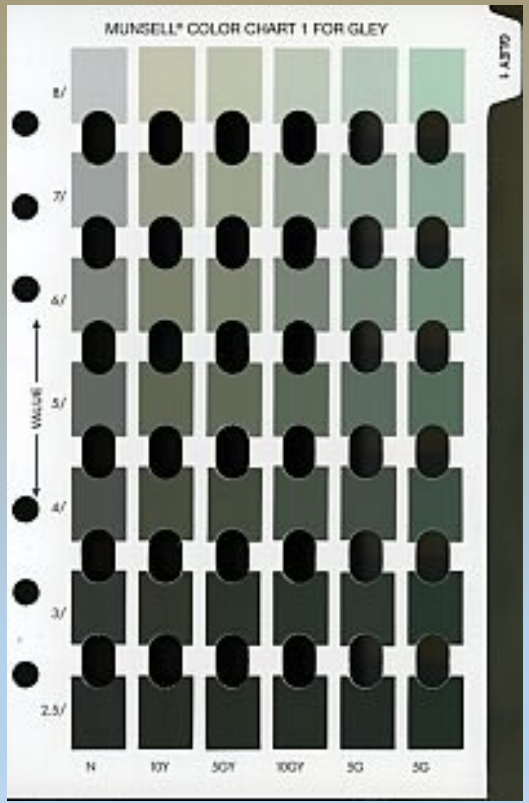
Increasing strength of color





Gley Pages

HUE



VALUE

CHROMA

Redoximorphic Features

Reduction or Oxidation of Iron

Iron Reduction

- Iron depletion due to saturated conditions
- Gray colors

Iron Oxidation

- Iron “rusting” due to exposure to water and oxygen fluctuations
- Orange colors

Redoximorphic Features

Reduction

- Can occur in A horizon, but difficult to see
- Organic matter can mask color of reduced iron
- Dig deep! Look beneath topsoil layer
- Means saturation near or at the surface…for long periods

Oxidation

- Can be found in A horizon or beneath
- Means iron is oxidizing - fluctuating groundwater

Problem Soils: Altered Soils & Disturbed Sites

Disturbed Soil

Evidence of Altered Soils

- Inverted soil horizons
  - buried A horizon
- Debris in soil profile
- Abrupt boundaries
- Loss of soil structure
- Compaction

Artificial Hydric Soils

- Hydrologic modification
- Soil modification
- Diverted water, permanently flooded areas, excavation, grading
- Examples- constructed wetland or stormwater basin

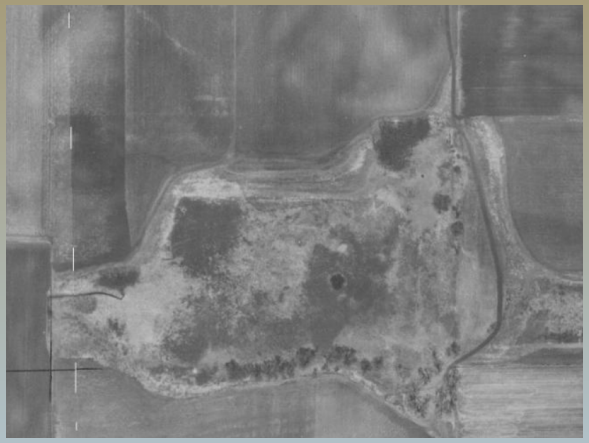
Drained

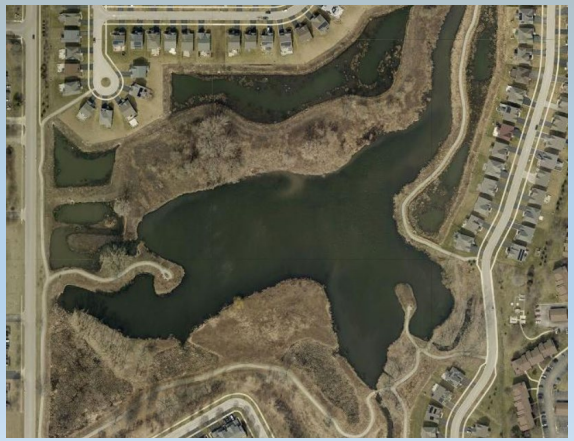
- Drained or otherwise cut off from hydrology
- Examples- drain tiles, storm sewers, levees, dams
- Soil with a hydric soil indicator is hydric regardless of hydrologic alteration

Soil Buried by Fill

Historic Hydric Soil

Impacts over time





Summary:

Hydric Soil Determinations

- Evidence of anaerobic conditions near the surface
- Focus on texture, color, and redox

Hints

- Color soils in sunlight, using moist sample, don't wear sunglasses
- Check below a thick dark surface
- Look at where you are on a landscape (think about soil forming factors)
- Not sure? Dig a pit

Questions?

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