SEASONAL HIGH WATER TABLE INDICATORS – FLORIDA HYDRIC SOIL INDICATORS

ACT PRESENTATION 3
SEPTEMBER 2013

David Hammonds, Environmental Manager
Florida Department of Health
Division of Disease Control and Health Protection
Bureau of Environmental Health
Onsite Sewage Programs
850-245-4570

Much of the material used in this presentation is originally from Wade Hurt, Soil Scientist at the University of Florida.

2

SHWT Issues

- Familiarity with redoximorphic processes and recognizing their morphological expressions in soils facilitates onsite determination of depth to soil saturation or the probability of inundation.

3

Hydric Soil Indicators (HSI)

- Are seasonal high water table indicators
- Must be used for the first 12 inches of any evaluation
- Can be used at any depth to determine SHWT
- "Hydric" status of soil is not regulated by DOH
- "Hydric" just means that the SHWT is within a specific distance from the soil surface

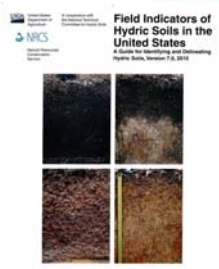
4

An Introduction to Florida Hydric Soils and Hydric Soil Terminology

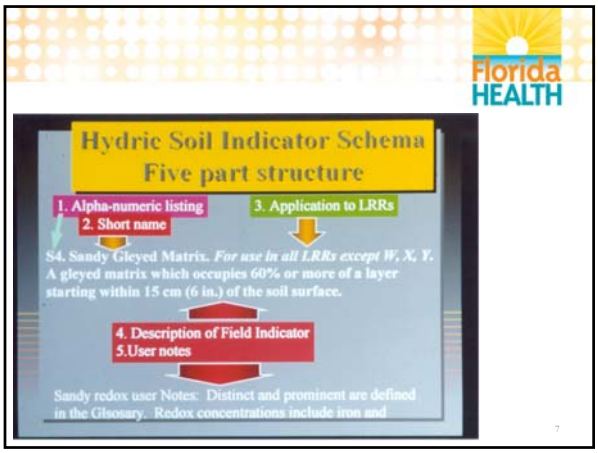
5

Field Indicators of Hydric Soils in the US

- This lecture pertains to the publication *Field Indicators of Hydric Soils in the US,* Version 7.0, 2010



6



Regionalization of Hydric Soil Indicators

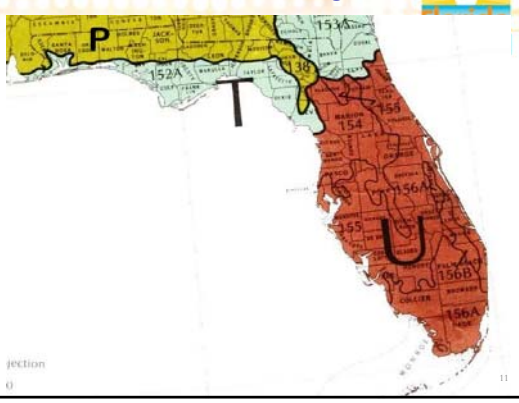
- The National Technical Committee for Hydric Soils (NTCHS) has approved each of the indicators for use in specific regions of the US (USDA, SCS. 1981). Most are based on Land Resource Regions (see next slide). Some are based on the smaller Major Land Resource Areas (MLRAs).
- Appendix 1 in *Field Indicators of Hydric Soils in the US* is a listing of the indicators approved for use in each LRR.
- A prime example of regionalization: Only the "presence" of muck is required in LRR U (South FL), as one goes North, 1 cm is required in LRRs P and T.

A Word About the Field Indicators

- *Not all field indicators can be used in all areas.*
- *Florida has three "Land Resource Regions" (LRRs)*
- *Make sure that the indicator you are attempting to use is allowed in the particular LRR.*
- **Following slide has Florida's LRRs.**

10

Florida Land Resource Regions



11

Basic Terms of Importance

- **There are some basic terms used throughout that should be explained. These terms will be defined here because they are used in the definitions of many of the indicators.**
  - **Depleted Matrix – Used in Indicators A11, A12, F3 and F12.**
  - **Gleyed Matrix – Used in Indicators A11, A12, S4 and F2.**
  - **Reduced Matrix – Used in Indicators A11, A12, S4, F2, F3 and F12.**
  - **70% masked by organic matter - Used in Indicators A5, A11, A12, S7, S8 and S9.**

12

Depleted Matrix

- For loamy and clayey soil material (and sandy soil material for application of Indicators A11 and A12), a depleted matrix refers to the volume of a soil horizon or subhorizon from which iron has been removed or transformed by processes of reduction and translocation to create colors of low chroma and high value.
- Note that A, E and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless common or many, distinct or prominent redox concentrations as soft masses or pore linings are present. (continued next slide)

13

Depleted Matrix (continued)

- In some places the depleted matrix may change color from a gray to reddish upon exposure to air (oxidation of Fe that was in solution), at which time it is termed a Reduced Matrix.
- This phenomena is included in the concept of depleted matrix.
- See later slide for description of Reduced Matrix.

14

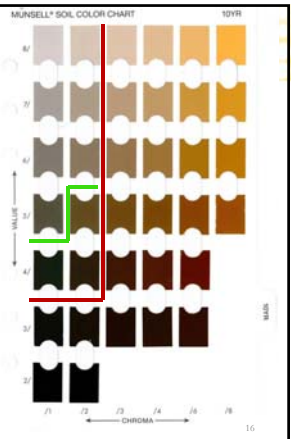
Depleted Matrix

- The following combinations of value and chroma identify a ***DEPLETED MATRIX***:
  - 1. Matrix value 5 or more and chroma 1 with or without redox concentrations as soft masses and/or pore linings; or
  - 2. Matrix value 6 or more and chroma 1 or 2 with or without redox concentrations as soft masses and/or pore linings; or
  - 3. Matrix value 4 or 5 and chroma 2 and has 2 percent or more distinct or prominent redox concentrations as soft masses and/or pore linings; or
  - 4. Matrix value 4 and chroma 1 and has 2 percent or more distinct or prominent redox concentrations as soft masses and/or pore linings.

15

Depleted Matrix

- The range of colors for the depleted matrix is value 4 or more and chroma 1 or 2; ***HOWEVER***, colors of value 4 and chroma 1 or 2 and value 5 and chroma 2 must have redox concentrations.



16

Depleted Matrix Note:

- **ANY SANDY MATERIAL DEEMED A DEPLETED MATRIX *MUST HAVE REDOX CONCENTRATIONS* REGARDLESS OF VALUE AND CHROMA.**

17

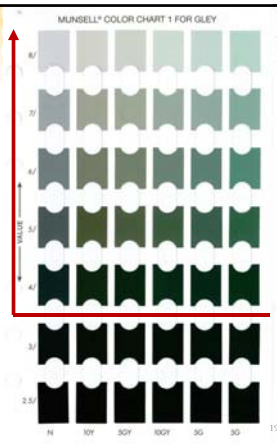
Gleyed Matrix

- Soils with a gleyed matrix have the following combinations of hue, value, and chroma and the soils are not glauconitic (*no glauconite in Florida*):
  - 1. 10Y, 5GY, 10GY, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value 4 or more and chroma is 1; or
  - 2. 5G with value 4 or more and chroma is 1 or 2; or
  - 3. N with value 4 or more; or
  - In some places the gleyed matrix may change color upon exposure to air (reduced matrix). This phenomena is included in the concept of gleyed matrix.

18

Gleyed Matrix

- The range of colors for the GLEYED MATRIX is value ≥4 on either of the two gley color charts.



19

Depleted Depleted Gleyed

4/1, 4/2, 5/2 with ≥2% RC

V≥5 & C=1, or V≥6 and C≤2 with or without RC

Value ≥4 on Gley Charts

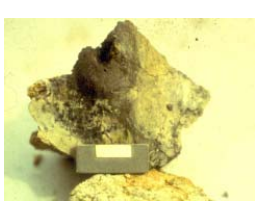
20

Reduced Matrix

- A reduced matrix is a matrix that upon initial exposure fits the color requirements of either a depleted matrix or a gleyed matrix but changes color (redder hue) when exposed to air for about 30 minutes (Vepraskas. 1994).
- In the next slide a soil (left photo) with a depleted/gleyed matrix upon initial exposure was air dried for 7 days (right photo). This is a classic example of a "reduced matrix." The most reduced areas turned the reddest after exposure. Some hue changes occurred after 30 minutes but the change was more dramatic after 7 days. The white bar in both photos is 1 cm long.

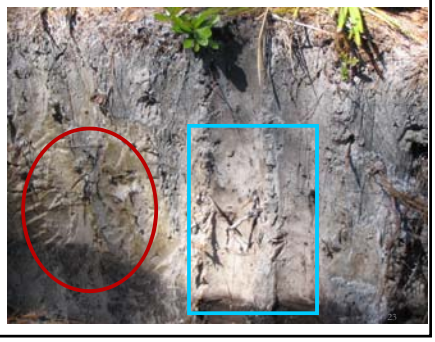
21

Reduced Matrix



22

- Reduced matrix: Note "rusted" areas on left where the soil was exposed to air. Area to right has been scraped and oxidation is now gone.



25

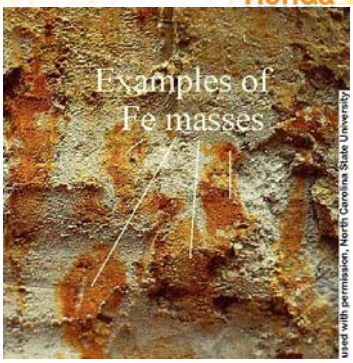
Additional Critical Terms/Issues

- Soft masses
- Redox depletion
- 70% masked (with organic material)
- Moist Color
- Colors between chips

24

Soft Masses

- Soft Masses- Noncemented redox concentrations, frequently within the soil matrix, that are of various shapes and cannot be removed as discrete units.



Soft masses (red areas) and Redox Depletion (gray area) along root channel

70% Masked with Organics

- ***Must observe natural (undisturbed) sample.***
- ***70% criterion is for use with 10X or 15X hand lens.***
- ***Viewed with naked eye, the soil must appear to be almost 100% masked.***
- ***See next slide for example.***

70% Masked with Organic Material

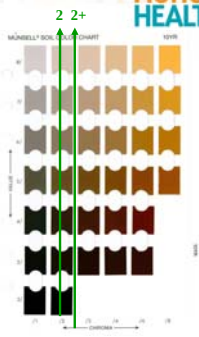
Organic carbon content of the samples is about 2%, 3%, and 4 % for the 50, 60 and 70 %, respectively (via use of hand lens).

Moist Color

- All color requirements (hue, value, and chroma) are for *moist color only*. If dry, moisten to record color; if wet, allow to dry to moist state. This picture shows moist soil (L) and dry soil (R). Features are usually more readily identifiable in moist state; they may be missing if soil is too wet (let dry).

Colors between chips

- Soil colors specified in the HSI do not have decimal points listed; however, colors do occur between Munsell (Gretag/Macbeth. 2000) chips. *Soil colors are not rounded to qualify as meeting an indicator.* For example: a soil matrix with a chroma between 2 and 3 should be listed as having a chroma of 2+. This soil material does not have a chroma 2 and would not meet any indicator that requires a chroma 2 or less.



Hydric Soils

- Several Federal agencies, the Department of Environmental Protection and Army Corps of Engineers use the term "Hydric Soils" to define wetlands.
- *DOH does not define hydric soils nor exert regulatory control because the soil may be hydric in nature. DOH uses HSI solely for SHWT indicators.*
- *To DOH, a hydric soil simply means that it has a higher SHWT or possibly inundated.*

31

Hydric Soils to Other agencies:

- Different soil textures have different requirements for SHWT depth in order to be classified as hydric.
- Textures of LFS and coarser must have SHWT within 6"; LVFS and finer must have SHWT within 12" for the soil to be hydric.
- *Hydric soil determinations have ramifications for other agencies, not DOH.*

32

DOH and Hydric Soil Indicators

- *For DOH purposes, HSI are used solely as indicators of the seasonal high water table.*
- *Must use ONLY the HSI for the first 12" of soil, cannot use non-hydric indicators.*
- *HSI can be used at any depth to determine the SHWT of the soil.*
- *If the site evaluation indicates a soil is "hydric" it only means the SHWT of the soil in question meets the criteria for the soil to be termed "hydric" by use of the indicators.*

33

DOH and Hydric Soil Indicators

- ***Must use HSI exactly as written in standards***. Some of the standards are very exacting. Use the current Field Indicators of Hydric Soils in the U.S. handbook for full descriptions, not just cheat sheet.
- ***Ensure all observations validate the conclusion.***
- ***THOROUGHLY DOCUMENT ALL SITE CONDITIONS AND SOIL PROFILES.***

34

Sample Observation

- Always look at samples that have a natural face by breaking the soil open.
- When determining if a color is dark enough to meet standards (e.g., the indicator S7, Dark Surface), do not touch the sample. Break open and make observations on natural surface. Touching the sample with objects (like your finger) can change the sample by moving the organic carbon.

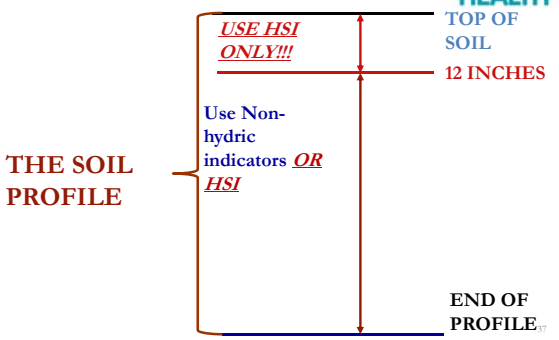
35

When to use Hydric Soil Indicators

- ***The top 12 inches of any soil.***
- ***When soil has been filled, the indicators must still be used. Indicators can form in fill.***
- ***Underneath fill.***
- ***Can be used within the entire soil profile. The only part of the HSI that will not be met is "depth to indicator" which does not matter because DOH is not trying to identify a hydric soil, only determine the SHWT.***

36

Which SHWT Indicators to Use?



LOOKING FOR HSI

- For DOH OSTDS purposes, we measure the depth to the indicator from where we begin the soil profile.
- Whether the soil is actually hydric or not is unimportant to DOH because we only use HSI as indicators for SHWT, not to determine hydric status of the soil.

Depth from which to Measure?

- Depths used in making hydric soil determinations are measured from the very top of the material upon which standing
  - nationwide when applying indicators A1, A2 (Soil Survey Staff. 1999), and A3 and
- In the remaining LRRs for all soil materials, depths used in making hydric soil determinations are measured from the muck or mineral surface (underneath any fibric and/or hemic material) except for application of A1, A2, and A3.

Depth from which to Measure

- The soil to the right has hemic soil material (texture of mucky peat) approximately 9 cm thick directly underlain by sandy mineral soil material. For hydric soil indicator application in Florida, the depth from which to measure would be from the sandy mineral surface.

40

DOH USE

- All indicators are measured from the soil surface, which includes all horizons that were made from the soil forming process, or fill material. Remember that Peat (Fibric material) or Mucky Peat (Hemic material) at the surface or in a deeper layer is not an indicator unless it conforms to HSI A1, A2 or A3.

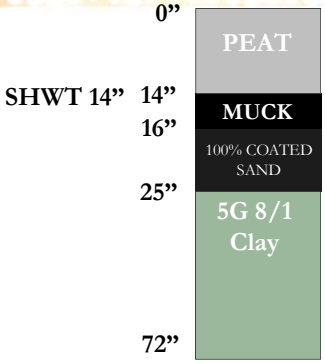
41

DOH USE

- We still must use USDA NRCS methodology.
- Must use Hydric Soil Criteria correctly.
- To not use correct methodology would mean that the SHWT may be misidentified.

42

OSTDS USE



HYDRIC SOIL INDICATOR MEASUREMENT

STARTS @ 14”
In other words, this is where to start the first 12 inch thickness. SHWT still 14 inches below top of grade.

43

Where do you start looking for indicators?

44

45

Indicator Presence

- Gather all information from site, including surface water bodies, swales, ditches, etc.
- Where hydrologic modifications have been made, make note of them.
- Hydrologic modifications must be taken into account.
- ***Fully document the soil observations and state which indicators are present and use to determine SHWT.***

46

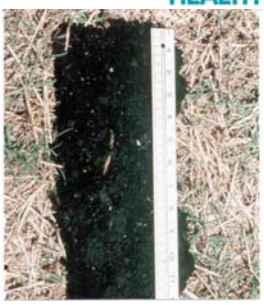
Hydric Soils with the following 8 hydric soil indicators have seasonal saturation to the soil surface: Most are inundated above the surface.

- These are:
- A1 (Histosols), A2 (Histic Epipedon), A3 (Black Histic), A4 (Hydrogen Sulfide), A7 (5 cm Mucky Mineral), A8 (Muck Presence), A9 (1 cm Muck), F10 (Marl)

47

Inundated soils or at least saturation to the surface.

- The soil to the right is an example of a hydric soil indicator that has saturation to the surface or inundated above the surface. It has the indicator A3 (Black Histic).

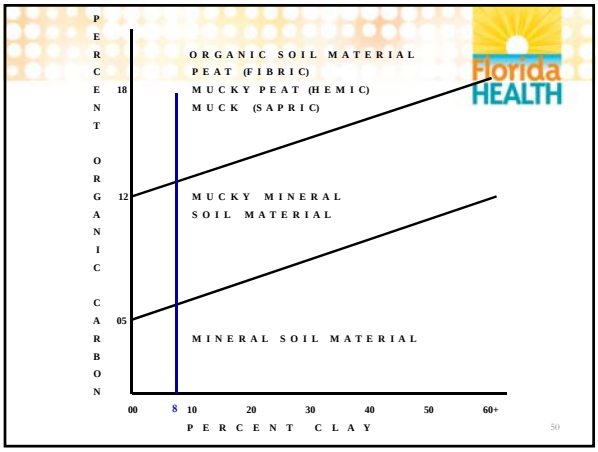


48

Soils and Organic Carbon Content

- Many HSI require exacting amounts of organic carbon. The exact requirements for muck is a minimum of 12 percent organic carbon if the soil contains 0 percent clay and 18 percent if the soil contains 60+ percent clay. Soils with an intermediate amount of clay require intermediate amounts of organic carbon. The exact requirements for mucky mineral are between 5 and 12 percent organic carbon if the soil has 0 percent clay and between 12 and 18 percent organic carbon if the soil contains 60+ percent clay. Once again, soils with an intermediate amount of clay require intermediate amounts of organic carbon

49



50

Estimating Organic Carbon Content By Use Of The Near-Saturated Soil Rub Test

- This is NOT the same procedure used in Mineral Texturing

51

The Near-Saturated Soil Rub Test

- **Used when laboratory analysis has not been performed**
- ***Near-saturated means that water can be squeezed from the sample, is not just "moist" as in mineral texturing***
- **Rub sample with slightly firm pressure between thumb and forefinger (light, quick rubs)**

52

Near-Saturated Soil Rub Test

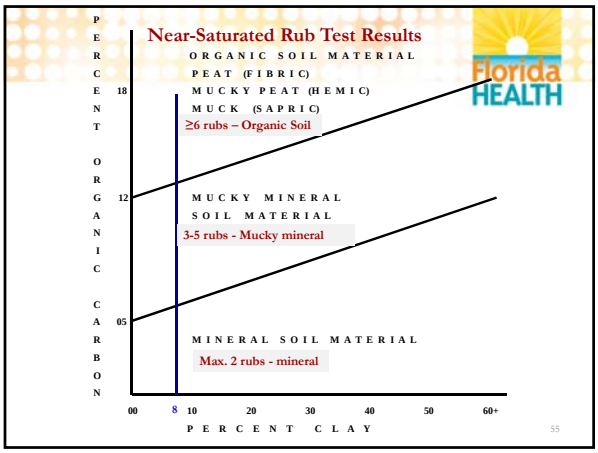
- **If, after two light quick rubs, the soil feels either gritty (if dominated by sand) or slick [plastic] (if dominated by silt or clay), the soil is neither mucky mineral or muck; it is mineral. If, after 3 more light quick rubs, the soil feels either gritty (if dominated by sand) or slick [plastic] (if dominated by silt or clay), the soil is not muck; it is mucky mineral. Only after not feeling gritty or slick [plastic] after five light quick light rubs should a soil be considered to be a muck (organic soil material beginning at six rubs).**

53

Organic Soil Texture Hints

- **Water squeezed from Peat (Fibric material-least decomposed) will be almost colorless.**
- **Water squeezed from Mucky Peat (Hemic material-intermediate decomposition) will be brown to reddish in color.**
- **Water squeezed from Muck (Sapric material-maximum decomposition) will be black.**

54



Types of Indicators

- There are three different texture-based groupings of Hydric Soil Indicators (HSI). The publication *Field Indicators of Hydric Soils in the US* (Version 7.0, 2010) is the current reference. Any statement in this lecture such as "see glossary" refers to this publication.
- "A" Indicators - (All soils, regardless of texture)
- "S" Indicators - (Sandy textured soils: LFS and more coarse soil material only)
- "F" Indicators - (Fine textured soils: LVFS and finer soil material only)

56

The "A" Hydric Soil Indicators

These are used for All soil textures

"A" Indicators

- Used for All soil textures. All mineral layers above any of the layers meeting an "A" Indicator(s), have dominant chroma 2 or less, or the layer(s) with dominant chroma of more than 2 is less than 15 cm (6 inches) thick. In addition, nodules and concretions are not redox concentrations.

58

Summary of the Florida "A" indicators

- Many of the "A" indicators require exacting amounts of organic carbon (e.g. muck, 70% masked, etc.). It may be best to obtain samples of soils with known amounts of organic carbon for calibration or work with a local wetland scientist familiar with your region. ***Over estimating the amount of organic carbon in a soil is the norm.***

59

The "S" indicators

These are used ONLY for Sandy soil textures of Loamy Fine Sand (LFS) and coarser

"S" Indicators

- All mineral layers above any of the layers meeting an S Indicator(s), except for Indicator S6 have dominant chroma 2 or less, or the layer(s) with dominant chroma of more than 2 is less than 15 cm (6 inches) thick. In addition, nodules and concretions are not redox concentrations.

61

Summary of the "S" indicators

- These indicators are to identify hydric soils that occur in Sandy soil material and are used ONLY for soil textures of Loamy Fine Sand (LFS) and coarser
- The entire soil does not have to be sandy, just the part of the soil as required by each specific indicator. This material feels gritty. S6 (Stripped Matrix) and S7 (Dark Surface) are not easily identified. It may be best to work with a local soil scientist familiar with your region.

62

Mineral Soil Textures using the "S" HSI

- From Coarsest to Finest:
- Very Coarse Sand (VCOS), Coarse Sand (COS), Sand (S), Fine Sand (FS), Very Fine Sand (VFS), Loamy Coarse Sand (LCOS), Loamy Sand (LS), Loamy Fine Sand (LFS)

63

The "F" Indicators

For Loamy/Clayey Materials

Indicators for Loamy/Clayey Materials ("F" indicators)

- ***These are soil materials with USDA textures of loamy very fine sand (LVFS) and finer.*** **All mineral layers above any of the layers meeting a Florida "F" Indicator(s), except for Indicators F8 and F12, have a dominant chroma of 2 or less, or the layer(s) with a dominant chroma of more than 2 is less than 15 cm (6 inches) thick.**

65

Note on the F Indicators

- **These indicators are used to identify hydric soils that occur in loamy/clayey soil material. The entire soil profile does not have to be loamy or clayey, just the part of the soil as required by each specific indicator. This material does not feel gritty. F6, F7, F10 and F13 are difficult to easily identify. It may be best to work with a local wetland scientist familiar with your region.**

66

Mineral Soil Textures using the "F" HSI

- From coarsest to finest:
- Loamy very fine sand (LVFS); Coarse Sandy Loam (COSL); Sandy Loam (SL); Fine Sandy Loam (FSL); Very Fine Sandy Loam (VFSL); Loam (L); Silt Loam (SIL); Silt (SI); Sandy Clay Loam (SCL); Clay Loam (CL); Silty Clay Loam (SICL); Sandy Clay (SC); Silty Clay (SIC); Clay (C)

67

Redox Concentrations in Hydric Soils

Different Requirements from Non-Hydric Soils

THE FOLLOWING REDOX CONCENTRATIONS (OXIDIZED FORMS) OF IRON (Fe), AND MANGANESE (Mn) MUST BE USED WHEN EMPLOYING THE HYDRIC SOIL INDICATORS. (CONTEMPORARY REDOXIMORPHIC FEATURES)

69

Mineral	Value/Chroma		Hue
Mn:	≤2	≤2	2.5YR to 5Y
Fe/Mn masses	3	3	2.5YR to 5Y
Fe:	≥4	≥4	2.5YR to 5Y

- Note: Redox concentrations having a hue of 10R or redder would indicate relict wetness. This applies to hydric and non-hydric soils.
- Note that gley colors are depletions, not concentrations. The gley charts would not be used to identify redoximorphic concentrations.
- Note for Mn: except on flood plains of the Florida Panhandle, redoximorphic Mn is relatively unimportant.

70

SUMMARY OF REDOXIMORPHIC FEATURES

71

- ***REDOXIMORPHIC FEATURES MUST HAVE DISTINCT OR PROMINENT CONTRAST WITH THE MATRIX AND HAVE DIFFUSE BOUNDARIES (EXCEPT WHERE A SPECIFIC INDICATOR DICTATES OTHERWISE)***

72

NODULES AND CONCRETIONS:

- Nodules are cemented or hardened plinthite. Concretions are similar except for the presence of visible, concentric layers around a point or line. Both have sharp boundaries and except as noted in the HSI, do not count as a redoximorphic feature.

73

The 11 Dominant Hydric Soil Field Indicators used in Florida

We will focus on these 11 indicators, but you need to know how to recognize ALL HSI

Florida's Dominant Indicators

- A5 Stratified Layers
- A6 Organic Bodies
- A7 5 cm Mucky Mineral
- A8 Muck Presence
- A9 1 cm muck
- S5 Sandy Redox
- S6 Stripped Matrix
- S7 Dark Surface
- S8 Polyvalue Below Surface
- S9 Thin Dark Surface
- F2 Loamy Gleyed Matrix

75

A5. Stratified Layers

- ***For use in all of Florida.*** **Several (≥3) stratified layers starting within the upper 15 cm (6 inches) of the soil surface. At least one of the layers has value 3 or less with chroma 1 or less or it is muck, mucky peat, peat, or mucky modified mineral texture. The remaining layers have chroma 2 or less. Any sandy material that constitutes the value 3 or less and chroma 1 or less layer must have at least 70 percent of the visible soil particles masked with organic material when using a 10X or 15X hand lens. Observation without a hand lens appears to be close to 100 percent masked.**

76

A5. Stratified Layers user notes

- **User Notes: Use of this indicator may require assistance from a trained soil scientist with local experience. The minimum organic carbon content of at least one layer of this indicator is slightly less than required for indicator A7 (which is a mucky modified mineral texture). An undisturbed sample must be observed. Individual strata are dominantly less than 2.5 cm (1 inch) thick. (continued next slide)**

77

A5. Stratified Layers user notes

- **A hand lens is an excellent tool to aid in the identification of this indicator. Many alluvial soils (soils formed by flowing water deposition) have stratified layers at greater depths; these soils do not meet this indicator. Many alluvial soils have stratified layers at the required depths but lack chroma 2 or less; these do not meet the requirements of this indicator.**

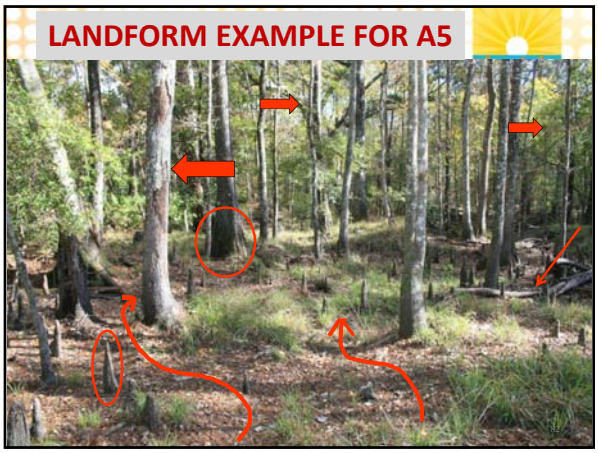
78

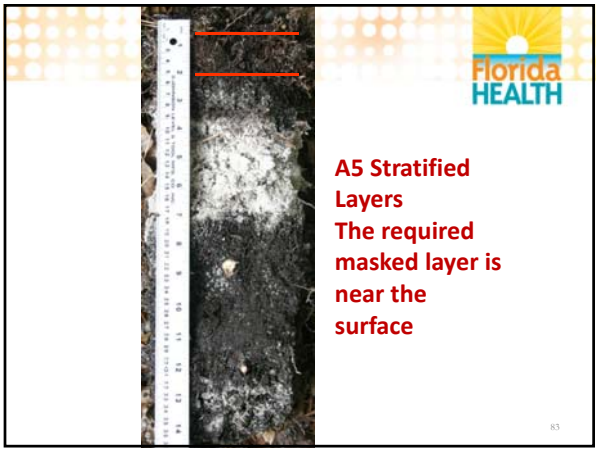
Indicator A5 (Stratified Layers) in sandy materials (right). Scale is inches. Indicator A5 in loamy material (left). Scale is inches (R) and cm (L)

Loamy Sandy

- Indicator A5 -
- The required 70% masked layer (near 100% by naked eye) is between 1 and 2 inches

- Indicator A5 - Stratified Layers: the required masked layer is the near surface. The layer with redox concentrations is too thin to meet the requirements of S5 (Sandy Redox).


LANDFORM EXAMPLE FOR A5


Florida
HEALTH
A5 Stratified Layers
The required masked layer is near the surface
83


Florida
HEALTH
Pit where previous plug was dug.
(A6 Organic Bodies also present)
84

A6. Organic Bodies

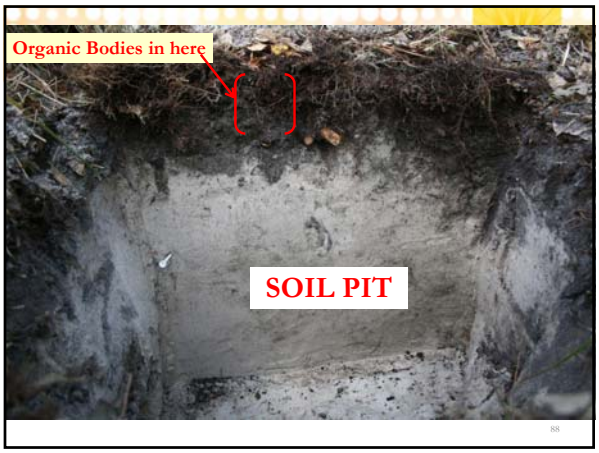
- ***For use in all of Florida.*** **Presence of 2% or more organic bodies of muck or a mucky modified mineral texture, approximately 1 to 3 cm (0.5 to 1 inches) in diameter, starting within 15 cm (6 inches) of the soil surface.**
- **Organic Bodies User Notes: Organic bodies are typically found at the tips of fine roots. The content of organic carbon in organic bodies is the same as in the Muck or Mucky Texture Indicators. The Organic Bodies indicator includes the indicator previously named "accretions" (Florida Soil Survey Staff, 1992). The size of the organic body is not critical, however the organic carbon content is. (cont. next slide)**

85

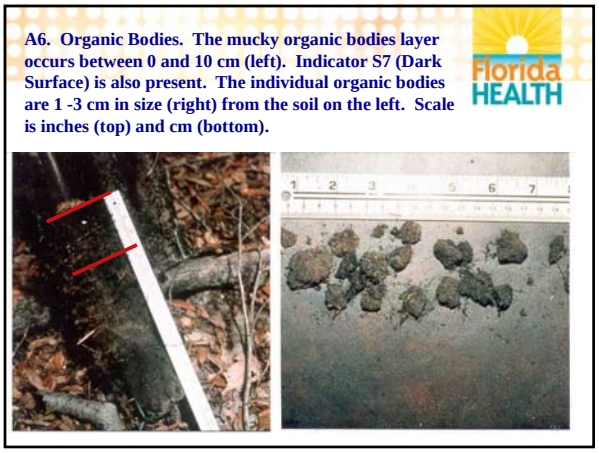
A6. Organic Bodies –User notes

- **The bodies are commonly 1 to 3 cm (0.5 to 1 inch) in diameter, and the organic carbon requirement in the organic bodies must meet those of muck or mucky modified. Many organic bodies lack the required amount of organic carbon and do not meet this indicator. Organic bodies of hemic material (mucky peat) and/or fibric material (peat) do not meet the requirements of this indicator, nor does material consisting of partially decomposed root tissue.**

86


Organic Bodies in here
SOIL PIT


Florida HEALTH
Organic bodies adhering to small feeder roots


A6. Organic Bodies. The mucky organic bodies layer occurs between 0 and 10 cm (left). Indicator S7 (Dark Surface) is also present. The individual organic bodies are 1 -3 cm in size (right) from the soil on the left. Scale is inches (top) and cm (bottom).
Florida HEALTH

Indicator A6 states that the size of organic bodies are about 1-3 cm. Sometimes they are smaller. Scale is inches. This indicator is easy to identify. Bodies that adhere to roots and qualify for A6 feel greasy and will float in water; bodies that adhere to roots and fail to qualify for A6 feel gritty.

91

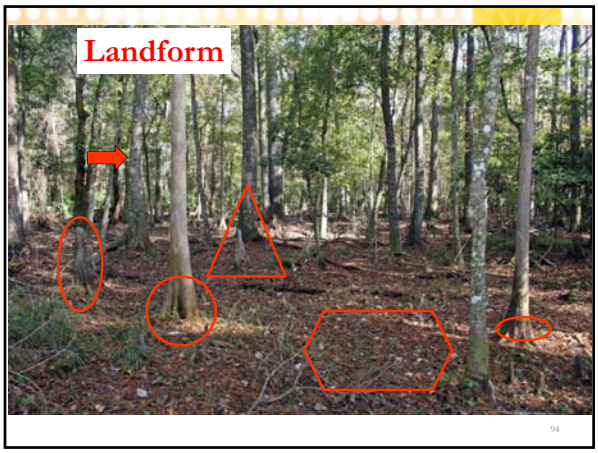
A6 Organic Bodies

92

A7. 5 cm Mucky Mineral

- *For use in all of Florida.* A mucky modified mineral surface layer 5 cm (2 inches) or more thick starting within 15 cm (6 inches) of the soil surface.
  - User Notes: "Mucky" is a USDA texture modifier for mineral soils. The organic carbon content is at least 5 and ranges to as high as 18 percent. The percentage requirement is dependent upon the clay content of the soil; the higher the clay content, the higher the organic carbon requirement. An example is mucky fine sand, which has at least 5 percent organic carbon but not more than about 12 percent organic carbon. Another example is mucky sandy loam, which has at least 7 percent organic carbon but not more than about 14 percent organic carbon.
  - When soils with this indicator are saturated or nearly saturated individual soil particles are not visible nor can they be felt, however, after 2 rubs with slightly firm pressure and within 5 rubs individual soil particles can be felt.

93



Florida HEALTH

A7 5cm Mucky Mineral Begins at the surface and ends about 2.5 inches

Florida HEALTH

Indicator A7 (5 cm Mucky Mineral) about 10 cm thick. Indicator S7 (Dark Surface) is also present. Scale is inches (R) and cm (L).

A8 (Muck Presence), A9 (1 cm Muck)

- Because the only difference between these two indicators is the required thickness of muck, these indicators are presented together (note different LRR use).
- A8. Muck Presence. *For use in LRR U.* A layer of muck with value 3 or less and chroma 1 or less starting within 15 cm (6 inches) of the soil surface.
- A9. 1 cm Muck. *For use in LRRs P and T.* A layer of muck 1 cm (0.4 inches) or more thick with value 3 or less and chroma 1 or less starting within 15 cm (6 inches) of the soil surface.

97

User Notes for the Muck Indicators

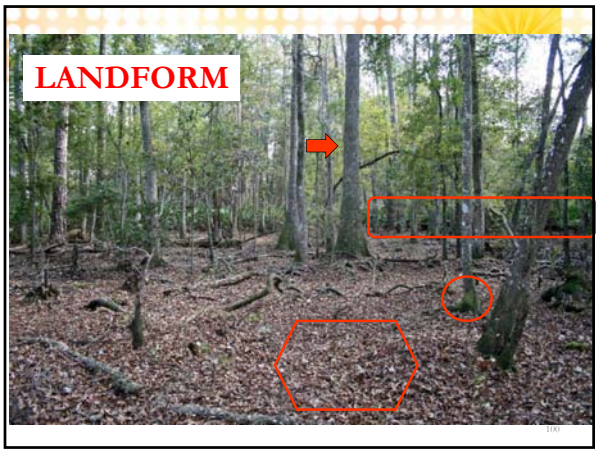
- These indicators require a mere presence (A8) or minimum muck thickness of 1 cm (A9). Normally this expression of anaerobiosis is at the soil surface; however, it may occur at any depth within 15 cm (6 inches). Muck is sapric soil material with at least 12 to 18 percent organic carbon. Organic soil material is called muck (sapric soil material) if virtually all of the material has undergone sufficient decomposition to limit recognition of the plant parts. (continued next slide)

98

User Notes for the Muck Indicators

- Hemic (mucky peat) and fibric (peat) soil materials do not qualify. Generally muck is black and has a "greasy" feel; sand grains should not be evident. Hydric soil indicator determinations are made below the leaf or root mat; however, root mats that meet the definition of hemic or fibric soil material are included in the decision making process for Mucky Peat, Peat, or the 2 Histic Indicators (A1, A2, A3). See the glossary for the definition of muck. See organic soil material in the glossary for organic carbon requirements.

99



Muck begins at 5 inches in the profile

The pit shows recent erosional deposition over the muck

This could be Indicator A8 or A9. This soil also has Indicator S7 (Dark Surface). Muck is about 3 cm thick and the dark surface is 18 cm thick. Scale is inches (R) and cm (L).

103

S5. Sandy Redox

- *For use in all of Florida.* A layer starting within 15 cm (6 inches) of the soil surface that is at least 10 cm (4 inches) thick, and has a matrix with 60% or more chroma 2 or less with 2% or more distinct or prominent redox concentrations as soft masses and/or pore linings.
- Sandy Redox User Notes: Distinct and prominent are defined in the Glossary (Appendix A). Redox concentrations include iron and manganese masses (reddish mottles) and pore linings (Vepraskas 1992). Included within the concept of redox concentrations are iron/manganese bodies as soft masses with diffuse boundaries. Common (2 to <20%) to many (≥20%). (continued next slide)

104

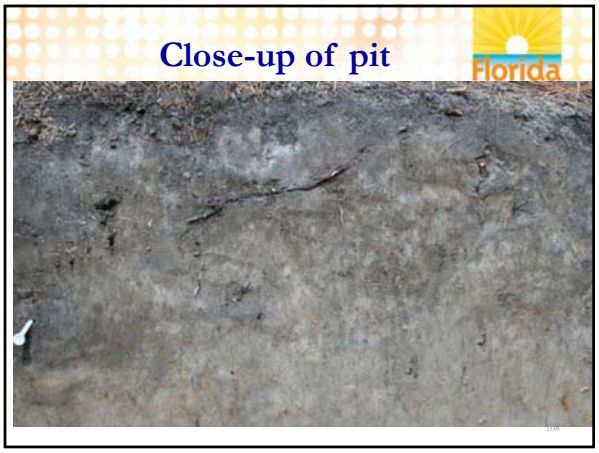
S5. Sandy Redox

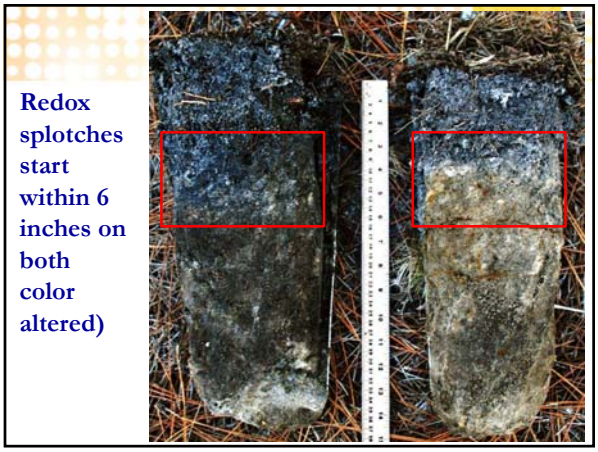
- (2 percent or more) redox concentrations (USDA Natural Resources Conservation Service, 2002) are required. If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible (Figures 22/23 in Field Indicators of Hydric Soils in the US, Version 7.0).
- This is a very common indicator of hydric soils and is often used to identify the hydric/nonhydric soil boundary in sandy soils.

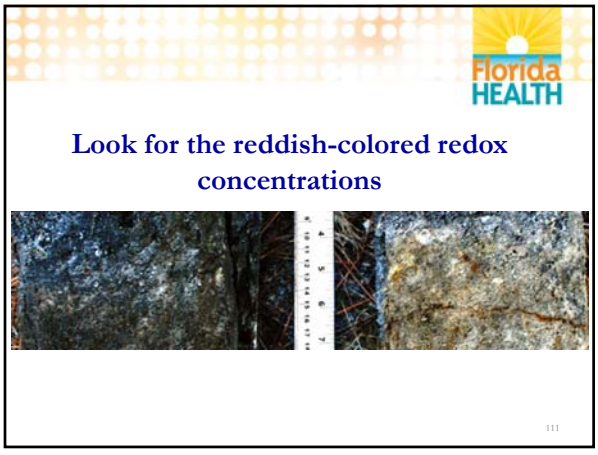
105

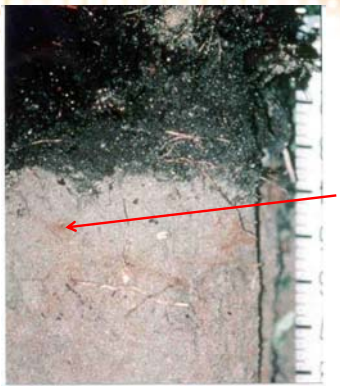

LANDFORM


SOIL PIT with Sandy Redox (S5)


Close-up of pit
Florida


Redox splotches start within 6 inches on both color altered)


Look for the reddish-colored redox concentrations



Indicator S5 (Sandy Redox). The redox concentrations are reddest in the center (near a pore) and diffuse into the matrix. They occur below a depth of about 10 cm. Scale is inches.

112

Another example of Indicator S5 (Sandy Redox). The redox concentrations may exist in any value matrix from to gray as shown here to black. Knife blade is 6 inches long.

113

Sandy Redox

(note how difficult the redox concentrations are to see)

114

Note: Where the matrix has V≤3 and C≤1, redox concentrations may have sharp (not diffuse) boundaries. This is due to masking by the organic material.

115

High Chroma in dark sands

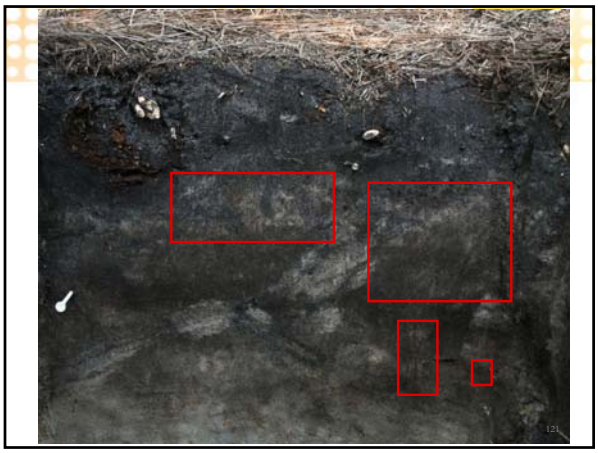
116

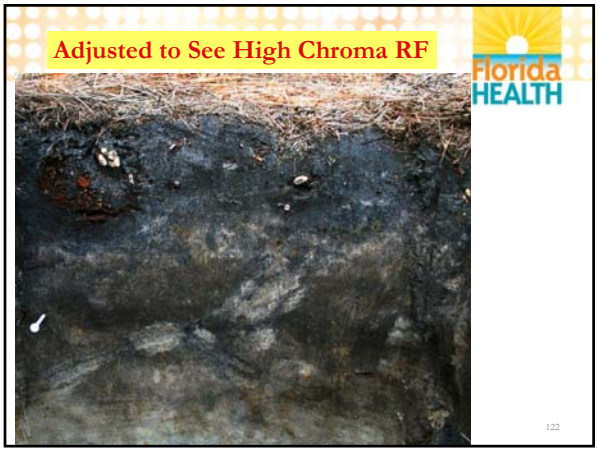
High Chroma in dark sands

117

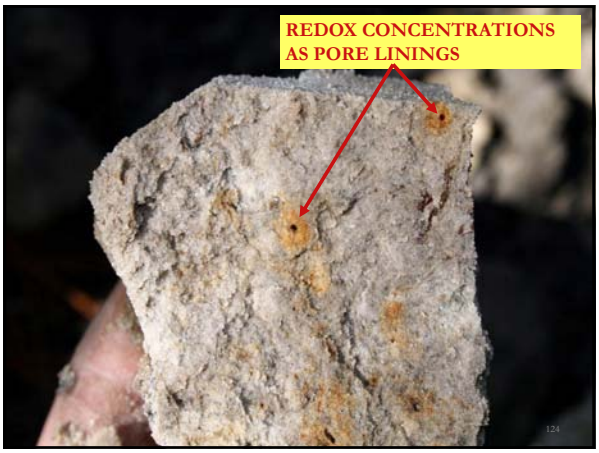

SANDY REDOX (also look in hole)
Florida
HEALTH


Sandy Redox
Florida
HEALTH
04/12/2010
120




Adjusted to See High Chroma RF
Florida HEALTH


Florida HEALTH
Sandy Redox



S6. Stripped Matrix

- ***For use in all of Florida.*** **A layer starting within 15 cm (6 inches) of the soil surface in which iron-manganese oxides and/or organic matter have been stripped from the matrix and the primary base color of the soil material has been exposed. The stripped areas and translocated oxides and/or organic matter form a faintly contrasting pattern of 2 or more colors with diffuse boundaries. The stripped zones are 10 percent or more of the volume and are rounded.**

S6. Stripped Matrix User Notes

- **User Notes: This indicator includes the indicator previously named "polychromatic matrix" as well as the term "streaking." Common or many areas of stripped (uncoated) soil materials are required. The stripped areas are typically 1 to 3 cm (0.5 to 1 inch) in size but may be larger or smaller (figure 24, Hydric Soil Field Indicators, Version 7.0). Commonly, the stripped areas have value of 5 or more and have chroma of 1 and/or 2 and unstripped areas have chroma of 3 and/or 4.**

S6. Stripped Matrix User Notes continued

- The matrix may not have the material with 3 and/or 4 chroma. The mobilization and translocation of oxides and/or organic matter is the important process and should result in splotchy coated and uncoated soil areas. This may be a difficult pattern to recognize and is more evident when observing a horizontal slice.

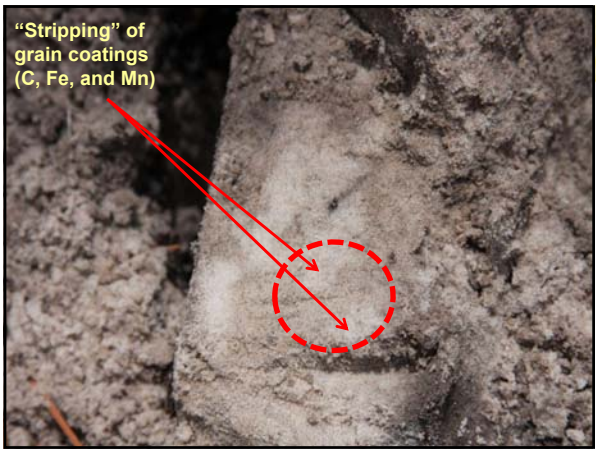
127

Indicator S6 (Stripped Matrix). The knife blade is pointing to a perfect example of a stripped splotch. This morphology is the results of microbes eating a dead root (dark spot near the center of the splotch), thereby releasing electrons which reduce oxides in the splotch and leave the splotch totally stripped and reduced at the time of its production.

128

Indicator S6 (Stripped Matrix). The knife blade is six inches long. This is another very good example of the diffuse splotches that are a requirement for the indicator.

129

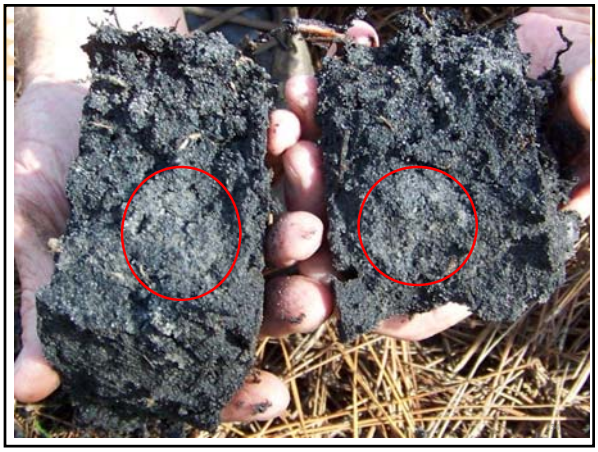

"Stripping" of
grain coatings
(C, Fe, and Mn)


Florida
HEALTH
Stripped
Matrix
131


05/20/2008
Florida
HEALTH
Stripped
Matrix
132

- The following slide shows Stripped Matrix in a dark horizon
- Note lighter colors in the center of the stripped areas and gets progressively darker as you move away from the center. This is the stripped matrix.
- DO NOT DOCUMENT ONLY THE DARK MATRIX AND A GRAY COLOR. MUST DOCUMENT ALL THE SUBTLE GRAYS (FAINT CONTRAST) IN THE SAMPLE, AS THIS IS THE STRIPPED AREA.

133

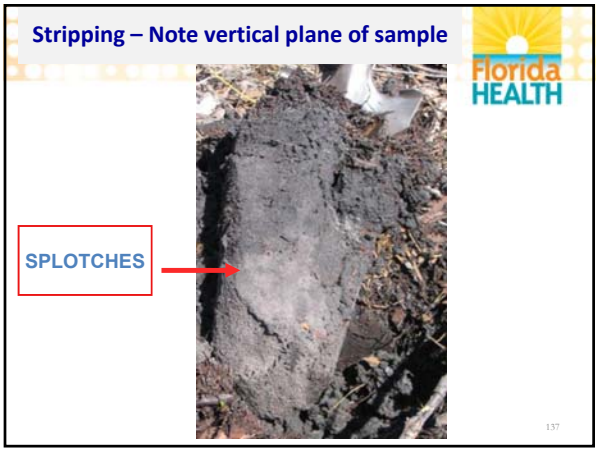


Stripped Matrix

- Be careful when looking for this. *Stripping is often missed when using a bucket auger (next slide).* Use a Sharpshooter-type shovel. A pit would be better, or even using a backhoe (if available) to dig a trench or pit.
- *AREA CLOSEST TO SURFACE WHERE CRITERIA IS MET IS THE SHWT IF NO OTHER INDICATOR IS PRESENT ABOVE IT.*
- *If other SHWT indicators are higher in the profile, must use them.*

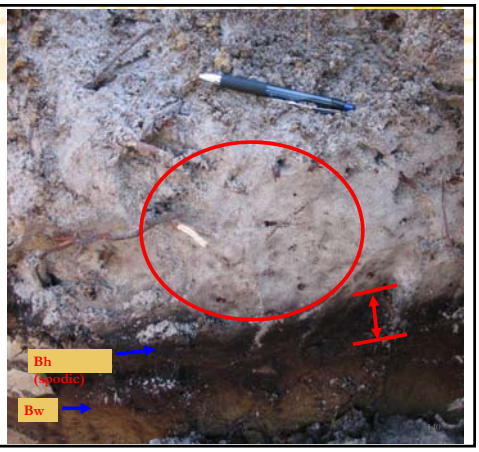
135


STRIPPED MATRIX


Stripping – Note vertical plane of sample
Florida HEALTH
SPLOTCHES


Stripped Matrix (and a little Fe)
Florida

Stripped matrix over spodic



COATED (REDDER) AND UNCOATED (LIGHTER) SAND GRAINS (*NOT STRIPPED MATRIX, HAS SHARP BOUDARIES*)

S7. Dark Surface

- ***For use in all of Florida.*** **A layer 10 cm (4 inches) thick starting within the upper 15 cm (6 inches) of the soil surface with a matrix value 3 or less and chroma of 1 or less. Using a 10X or 15X hand lens, at least 70 percent of the visible soil particles must be masked with organic material. Observation without a hand lens appears to be close to 100 percent masked. The matrix color of the layer immediately below the dark layer must have the same colors as those described above or any color that has chroma of 2 or less.**

142

S7. Dark Surface User Notes

- **The organic carbon content of this indicator is slightly less than required for "mucky." An undisturbed sample must be observed. A 10X or 15X hand lens is an excellent tool to help aid this decision. Many wet soils have a ratio of about 50 percent soil particles that are covered or coated with organic matter and about 50 percent uncoated or uncovered soil particles, giving the soil a salt and pepper appearance. Where the percent of coverage is less than 70 percent, a Dark Surface indicator is not present.**

143

Indicator S7 (Dark Surface). The dark surface is 17 cm thick. Scale is inches (R) and cm (L). A 10X or 15X hand lens (www.forestry-suppliers.com) is a tool to help make this decision.

Remember 70% Masked Criteria

- The picture on the right is sandy soil material with (clockwise from top) 50, 60, and 70% masked with organic material. Organic carbon content of the samples are about 2, 3, and 4 % respectively. Must view undisturbed sample.
- The next slide shows a soil that has Indicator S7 (right) and a soil that lacks Indicator S7 (left).

145

Landform for S7

S7 Dark Surface

The required masked material starts at the mineral surface and extends to a depth of about 7 inches.

148

Pit from which plug came in previous slide

149

S8. Polyvalue Below Surface

- ***For use in LRRs T and U.*** **A layer with value 3 or less and chroma 1 or less starting within 15 cm (6 inches) of the soil surface. Using a 10X or 15X hand lens, at least 70 percent of the visible soil particles in this layer must be masked with organic material. Observation without a hand lens appears to be close to 100 percent masked. Immediately below this layer, 5%-100% of the soil volume has value 3 or less and chroma 1 or less and the remainder of the soil volume (if any) has value 4 or more and chroma 1 or less to a depth of 30 cm (12 inches) or to the spodic horizon, whichever is less.**

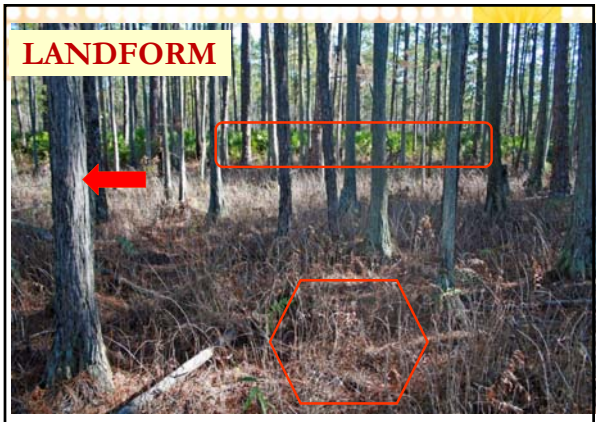
150

Polyvalue Below Surface User Notes

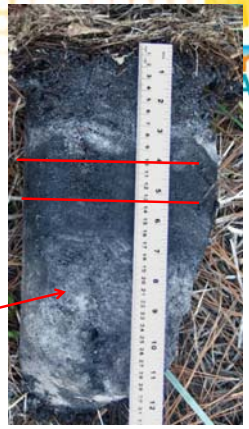
- User Notes: This indicator describes soils with a very dark gray or black surface or near surface layer less than 10 cm (4 inches) thick underlain by a layer where organic matter has been differentially distributed within the soil by water movement. The mobilization and translocation of organic matter results in splotchy coated and uncoated soil.

151

LANDFORM

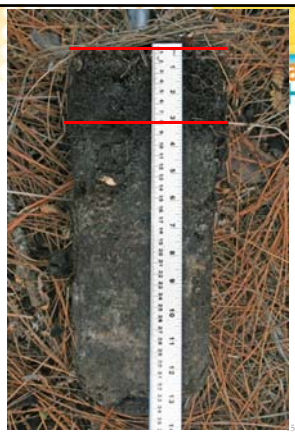


152



153

S8 Polyvalue Below Surface
70% masked layer begins at surface to about 3". Splotchy underneath, meets color requirements (Note S5 begins below 5")



Florida HEALTH

S8 LANDFORM

155

Florida HEALTH

S8 Polyvalue Below Surface
70% masked area is between 2-3 inches. All other requirements met.

156

Pit from which plug was taken

S8 LANDFORM

Florida HEALTH

Pit from area from landform in previous slide

S8 Polyvalue Below Surface
The required dark layer is at
0 inches; above that is fibric and hemic material

160

S9. Thin Dark Surface

- ***For use in LRRs T and U.*** **A layer 5 cm (2 inches) or more thick within the upper 15 cm (6 inches) of the surface, with value 3 or less and chroma 1 or less. Using a 10X or 15X hand lens, at least 70 percent of the visible soil particles in this layer must be masked with organic material. Observation without a hand lens appears to be close to 100 percent masked. This layer is underlain by a layer(s) with value 4 or less and chroma 1 or less (dark gray or blacker) to a depth of 30 cm (12 inches) or to the spodic horizon, whichever is less. See user notes next slide.**

161

S9. Thin Dark Surface User Notes

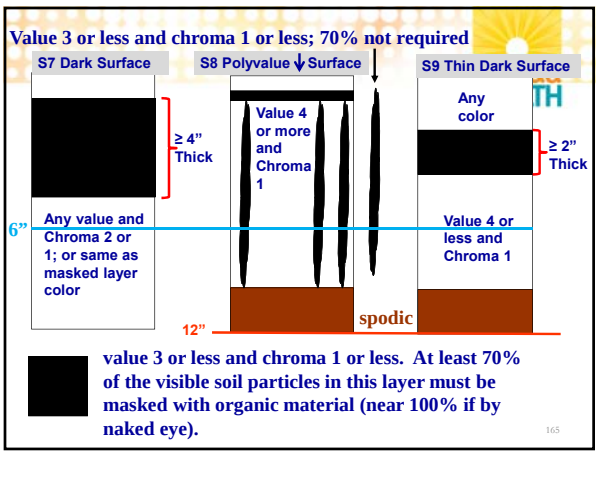
- **Thin Dark Surface User Notes: This indicator describes soils with a very dark gray or black near-surface layer at least 5 cm (2 inches) thick underlain by a layer where organic matter has been carried downward by flowing water. The mobilization and translocation of organic matter results in an even distribution of organic matter in the eluvial (E) horizon. The chroma 1 or less is critical because it limits application of this indicator to only those soils which are depleted of iron. This indicator commonly occurs in hydric Spodosols; however, a spodic horizon is not required.**

162

S9 Thin Dark Surface
The dark layer is between 0.5 and 3 inches; a spodic occurs at about 7 inches

163

Differentiation between Indicators S7, S8 and S9



165

Sample Observation

- Always look at samples that have a natural face.
- When determining if a color is dark enough to meet standards (e.g. the indicator S7 Dark Surface), do not touch the sample. Break open and make observations on natural surface. Touching sample with objects can make a sample darker by moving the organic carbon.

166

F2. Loamy Gleyed Matrix

- *For use in all of Florida.* A gleyed matrix that occupies 60% or more of a layer starting within 30 cm (12 inches) of the soil surface.
- Loamy Gleyed Matrix User Notes: Gley colors are not synonymous with gray colors. *Gley colors are those colors that are found on the gley pages (Gretag/Macbeth. 2000). They have hue N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB, with value 4 or more.* The gleyed matrix only has to be present within 30 cm (12 inches) of the surface. Soils with gleyed matrices are saturated for a significant duration, this is why no thickness of the layer is required. See glossary for the definition of gleyed matrix. Note there is no required thickness of the gleyed matrix. This is because any amounts of gleying within the upper 12 inches would indicate a very wet soil that is reduced for long periods.

167

Indicator F2 (Loamy Gleyed Matrix). The gleyed matrix begins (left photo) at a depth of about 18 cm. Indicator F3 (Depleted Matrix) also occurs between the gleyed matrix and the surface layer. On the right, the gleyed matrix starts at the soil surface. Scale is inches.

168

Landform for F2 Loamy Gleyed Matrix

F2 Loamy Gleyed Matrix
Requires gleyed matrix that occupies ≥60% of a layer starting within 12 inches of soil surface. Colors must appear on Gley Charts and have Value ≥4.

170

Remainder of the Field Indicators (Not on test)

171

S4. Sandy Gleyed Matrix

- *For use in all of Florida.* A gleyed matrix which occupies 60% or more of a layer starting within 15 cm (6 inches) of the soil surface.
- Sandy Gleyed Matrix User Notes: Gley colors are not synonymous with gray colors. Gley colors are those colors that are found on the gley page (Gretag/Macbeth, 2000). They have hue N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value 4 or more. The gleyed matrix only has to be present within 15 cm (6 inches) of the surface. Soils with gleyed matrices are saturated for a significant duration; this is why no thickness of the layer is required. See the glossary for the definition of gleyed matrix. *Note there is no required thickness of the gleyed matrix.* This is because any amounts of gleying within the upper 6 inches would indicate a very wet soil that is reduced for long periods.

172

Indicator S4 (Sandy Gleyed Matrix). The gleyed matrix begins at the soil surface. Scale is inches (R) and cm (L).

173

A1. Histosol

- Histosols (*For use in all LRRs*) or Histels (*For use in LRRs with permafrost).* Classifies as a Histosol (except Folist) or as a Histel (except Folistel).
- Histosol User Notes: In a Histosol, typically 40 cm (16 inches) or more of the upper 80 cm (32 inches) is organic soil material. Organic soil materials have organic carbon contents (by weight) of 12 to 18 percent, or more, depending on the clay content of the soil. These materials include muck (sapric soil material), mucky peat (hemic soil material), and peat (fibric soil material). See Keys to Soil Taxonomy (2007 for complete definition. Histels are similar to Histosols except they are underlain by permafrost.

174

Indicator A1 (Histosols). Muck (sapric soil material) is more than 1 meter thick. Scale is feet (R) and meters (L). This soil has an organic carbon content of 17 percent in the upper 30 cm and 23 percent to a depth of 1 meter. The field estimated percent organic carbon content (by experienced soil scientists) was 40 percent in the 2 layers.

175

A2. Histic Epipedon

- *For use in all Florida LRRs.* A histic epipedon (according to Soil Taxonomy) underlain by mineral soil material with a chroma of 2 or less.
  - Histic Epipedon User Notes: Most histic epipedons are surface horizons 20 cm (8 inches) or more thick of organic soil material. Aquic conditions or artificial drainage are required. See Keys to Soil Taxonomy (2007) for complete definition.

176

Indicator A2 (Histic Epipedon). Proof of aquic conditions is required. Generally, Histosols have more than 16 inches of organic soil material and Histic epipedons have 8 to 16 inches of organic materials.

177

A3. Black Histic

- *For use in all LRRs.* A layer of peat, mucky peat, or muck 20 cm (8 inches) or more thick starting within the upper 15 cm (6 inches) of the soil surface having hue 10YR or yellower, value 3 or less, and chroma 1 or less underlain by mineral soil material with a chroma of 2 or less.
  - Black Histic User Notes: Unlike indicator A2 this indicator does not require proof of aquic conditions or artificial drainage. It identifies a subset of Histic Epipedon that is always hydric. See glossary for definitions of peat, mucky peat, and muck. See Figure 2 (organic soil material) in the glossary for organic carbon requirements.

178

Indicator A3 (Black Histic). Proof of aquic conditions is not required. Scale is inches (R) and cm (L).

179

A4. Hydrogen Sulfide

- *For use in all LRRs.* A hydrogen sulfide odor within 30 cm (12 inches) of the soil surface.
  - Hydrogen Sulfide User Notes: This "rotten egg smell" indicates that sulfate-sulfur has been reduced and therefore the soil is anaerobic. In most hydric soils, the sulfidic odor is only present when the soil is saturated and anaerobic. Most often this indicator occurs in wet marshes. Remember the reduction sequence (O - N - Mn - Fe - S). Sulfur is last which means that all the other have already been reduced. This indicator is often misidentified. There are other odors produced in soils (mercaptans); just because the soil has an odor, it does not have to be hydrogen sulfide.

180

Indicator A4 (Hydrogen Sulfide) would most likely occur here. Anaerobic conditions would probably occur in this salt marsh throughout the year.

181

A11 Depleted Below Dark Surface

- *For use in all of Florida.* A layer with a depleted or gleyed matrix that has 60% or more chroma 2 or less starting within 30 cm (12 inches) of the soil surface that has a minimum thickness of either:
- a. 15 cm (6 inches), or
- b. 5 cm (2 inches) if the 5 cm (2 inches) consists of fragmental soil material.
- Loamy/clayey layer(s) above the depleted or gleyed matrix must have value 3 or less and chroma 2 or less. Any sandy material above the depleted or gleyed matrix must have value 3 or less, chroma 1 or less, and at least 70% of the visible soil particles must be masked with organic material and using a 10X or 15X hand lens, at least 70 percent of the visible soil particles must be masked with organic material. Observation without a hand lens appears to be close to 100 percent masked.

182

Indicator A11 (Depleted Below Dark Surface).

This indicator is similar to F3 (Depleted Matrix). Because darker colored surface horizons imply more wetness, A11 indicates hydric conditions if the depleted matrix occurs within 30 cm whereas F3 indicates hydric conditions if the depleted matrix occurs within 25 cm.

183

A12 Thick Dark Surface

- *For use in all LRRs.* A layer at least 15cm (6 inches) thick with a depleted or gleyed matrix that has 60% or more chroma 2 or less starting below 30cm (12 inches) of the surface. The layer (s) above the depleted or gleyed matrix must have value 2.5 or less and chroma 1 or less to a depth of at least 30cm (12 inches) and value 3 or less and chroma 1 or less in any remaining layers above the depleted or gleyed matrix. Any sandy material above the depleted or gleyed matrix using a 10X or 15X hand lens, must have at least 70 percent of the visible soil particles masked with organic material. Observation without a hand lens appears to be close to 100 percent masked.

184

Thick dark surface

185

Indicator A12 (Thick Dark Surface). A depleted matrix is below the mollic epipedon (left photo). Deep observation is often necessary (right photo)

186

F3. Depleted Matrix

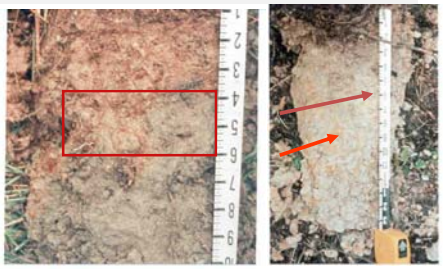
- *For use in all of Florida.* A layer with a depleted matrix that has 60% or more chroma 2 or less that has a minimum thickness of either:
  - a. 5 cm (2 inches) if 5 cm (2 inches) is entirely within the upper 15 cm (6 inches) of the soil, or
  - b. 15 cm (6 inches) and starts within 25 cm (10 inches) of the soil surface.
    - Depleted Matrix User Notes: A depleted matrix requires a value of 4 or more and chroma 2 or less. Redox concentrations including iron/manganese soft masses and/or pore linings are required in soils with matrix colors of 4/1, 4/2, and 5/2. A, E and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless common or many, distinct or prominent redox concentrations as soft masses or pore linings are present. See glossary for the complete definition of depleted matrix. The low chroma matrix must be due to wetness and not a relict or parent material feature.

187

Indicator F3 (Depleted Matrix). The chroma is 1 (right photo). Redox concentrations are present but not required. The chroma is 2 (left photo). Redox concentrations are present as required.

188

Indicator F3 (Depleted Matrix). The chroma is 1 within a depth of about 10 to 15 cm (left photo). Redox concentrations are absent. Scale is inches. The chroma is 2 below a depth of about 15 cm (right photo). Redox concentrations are present as required. Scale is inches.



189

F6. Redox Dark Surface

- *For use in all of Florida.* A layer at least 10 cm (4 inches) thick entirely within the upper 30 cm (12 inches) of the mineral soil that has:
- a. matrix value 3 or less and chroma 1 or less with 2% or more distinct or prominent redox concentrations as soft masses or pore linings, or
- b. matrix value 3 or less and chroma 2 with 5% or more distinct or prominent redox concentrations as soft masses or pore linings.

190

Redox Dark Surface User Notes:

- This is a very common indicator used to delineate wetlands in soils with dark-colored surface layers. *Redox concentrations in high organic-content mineral soils with dark surfaces are often small and difficult to see. The organic matter masks some or all of the concentrations that may be present. Careful examination is required to see what are often brownish redox concentrations in the darkened materials. See next slide.* If the soil is saturated at the time of sampling, it may be necessary to let it dry at least to a moist condition for redox features to become visible.
- Soils that are wet because of ponding or have a shallow, perched layer of saturation may have any color below the dark surface. It is recommended that delineators evaluate the hydrologic source and examine and describe the layer below the dark-colored epipedon when applying this indicator.

191

Note: Where the matrix has V≤3 and C≤1, redox concentrations may have sharp (not diffuse) boundaries. This is due to masking by the organic material.

192

Indicator F6 (Redox Dark Surface). Prominent redox concentrations as soft masses and pore linings are present (left photo). Below the dark epipedon is indicator A11 (Depleted Below Dark Surface). Scale is cm. Often, as in this soil (right photo), the redox concentrations are small (fine).

F7. Depleted Dark Surface

- *For use in all of Florida.* Redox depletions, with value 5 or more and chroma 2 or less, in a layer at least 10 cm (4 inches) thick entirely within the upper 30 cm (12 inches) of the mineral soil that has:
  - a. matrix value 3 or less and chroma 1 or less and 10% or more redox depletions, or
  - b. matrix value 3 or less and chroma 2 and 20% or more redox depletions.
  - Depleted Dark Surface User Notes: Care should be taken not to mistake mixing of an E or calcic horizon into the surface layer as depletions. In soils which are wet due to subsurface saturation, the layer immediately below the dark surface should have a depleted or gleyed matrix. Redox depletions should have associated microsites redox concentrations that occur as Fe pore linings or masses within the depletion(s) or surrounding the depletion(s). This is not purported to be a commonly used indicator, but this may be because depletions in a black matrix are often hard to see.

194

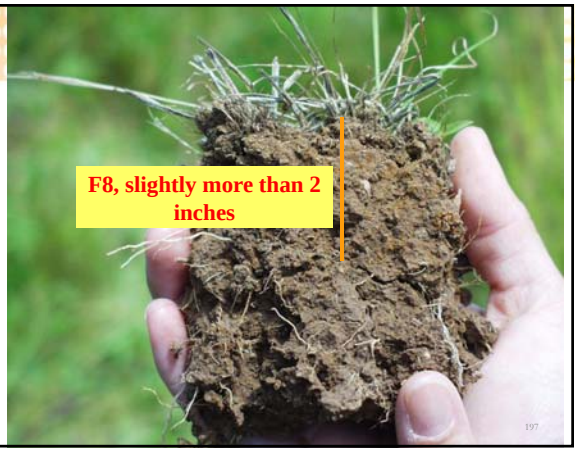
Indicator F7 (Depleted Dark Surface). Depletions as they occur within a dark surface layer. Scale is inches. Depletions are difficult to see by many. Sometimes they are more readily seen if the soil is allowed to dry.

195

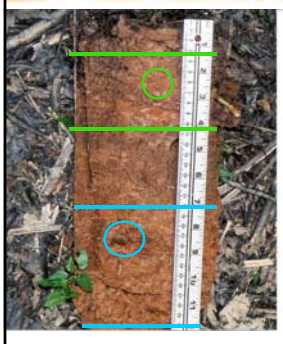
F8. Redox Depressions

- *For use in all of Florida.* In closed depressions subject to ponding, 5% or more distinct or prominent redox concentrations as soft masses or pore linings in a layer 5 cm (2 inches) or more thick entirely within the upper 15 cm (6 inches) of the soil surface.
- This indicator is restricted to depressional landforms.
  - Redox Depressions User Notes: This indicator occurs on landforms such as: vernal pools, playa lakes, rainwater basins, "Grady" ponds, and potholes. It does not occur in micro-depressions (approximately ≤ 1m) on convex or plane landscapes. This indicator is a common indicator adjacent to constructed lake and non-saline playas.

196



197



Indicator F8 (Redox Depressions). A layer at least 5 cm thick within the upper 15 cm with at least 5% redox concentrations in a matrix with any color is required. The areas between the green (upper 2) bars and the blue (lower 2) bars meet the indicator by having more than 5% redox concentrations of iron and redox concentrations of iron/manganese, respectively. Scale is cm (L) and inches (R).

198

F10. Marl (new info highlighted)

- *For use in LRR U.* A layer of marl with a value ≥5 and chroma <2 starting within 10 cm (4 inches) of the soil surface.
  - Marl User Notes: Marl is a limnic material deposited in water by precipitation of $CaCO_3$ by algae as defined in Soil Taxonomy (USDA, NRCS, Soil Survey Staff. 1999). It has a Munsell value ≥5 and chroma <2 and reacts with dilute HCl to evolve CO_2. Marl is not the carbonatic substrate material associated with limestone bedrock. Some soils have materials with all the properties of marl except they lack the required Munsell value. These soils are hydric if the required value is present within 10 cm (4 in) of the soil surface. Normally marl is the soil surface. No thickness is required. This indicator is known to occur only in south Florida.

199

Indicator F10 (Marl). This indicator is known to occur only in south Florida. Scale is cm.

200

F12. Iron/Manganese Masses

- *For use in LRRs P and T.* On flood plains, a layer 10 cm (4 inches) or more thick with 40% or more chroma 2 or less, and 2% or more distinct or prominent redox concentrations as soft iron/manganese masses with diffuse boundaries. The layer occurs entirely within 30 cm (12 inches) of the soil surface. Most commonly Iron/manganese masses have value and chroma of 3; sometimes they are black.
- The thickness requirement is waived if the layer is the mineral surface layer.
- Note landform restriction (floodplains).

201

Iron/Manganese Masses User Notes:

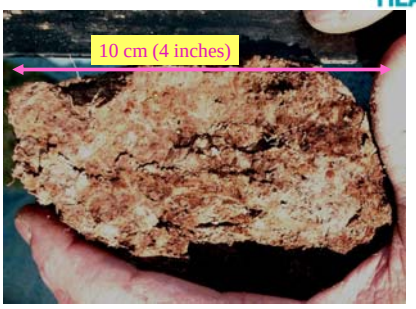
- These iron/manganese masses are usually small (2 to 5 mm in size) and have a value and chroma 3 or less. They can be black. The low matrix chroma must be the result of wetness and not be a weathering or parent material feature. The low matrix chroma must be due to wetness and not be a relict or parent material feature. Iron/manganese masses should not be confused with the larger and redder iron nodules associated with plinthite (USDA, NRCS, 1998a) or with concretions that have sharp boundaries. This indicator occurs on flood plains of rivers such as the Apalachicola, Congaree, Mobile, Savannah, and Tennessee Rivers.
- It can be any thickness if it is the mineral surface layer. This indicator is a common indicator on flood plains.

202

Indicator F12. (Iron/Manganese Masses) in a 40 percent depleted (gray) matrix. Scale is inches.

203

F12. Iron/Manganese Masses



204

F13. Umbric Surface.

- *For use in all Florida.* In depressions and other concave landforms, a layer 25 cm (10 inches) or more thick starting within 15 cm (6 inches) of the soil surface in which the upper 15 cm (6 inches) must have value 3 or less and chroma 1 or less, and the lower 10 cm (4 inches) of the layer must have the same colors as above or any other color that has a chroma 2 or less.
  - Umbric Surface User Notes: Thickness requirements may be slightly less that those required for an umbric epipedon. Microlows are not considered to be concave landforms. Umbric surfaces on higher landscape positions, such as side slopes dominated by Humic Dystrudepts, are excluded. This indicator is only rarely used to delineate wetlands in the LRRs indicated; most often it occurs in slightly wetter ecosystems than the delineations drawn most often by F3 and F6.

205

Indicator F13 (Umbric Surface). This umbric surface is about 30 cm. thick (green bar). Scale is inches.

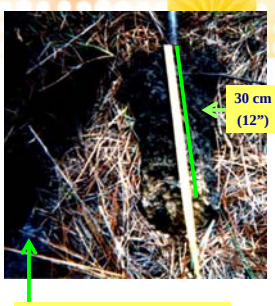
206

Problem Hydric Soil?

Starting within 30 cm (12 in.) this soil has a matrix that is more than 60% chroma 3 and 4. It has, however, the NTCHS Indicators F13 (Umbric Surface) and F6 (Redox Dark Surface) above the high chroma matrix.

Water stabilized within 10 cm (4 in.) of the surface after excavation.

The only "problem" with this hydric soil is that one might pay too much attention to the high chroma matrix at 30 cm and ignore the fact that 2 HS indicators have been met.



Glistening shows reduced iron oxidizing as it is exposed to air on the surface of the water in the pit.

207

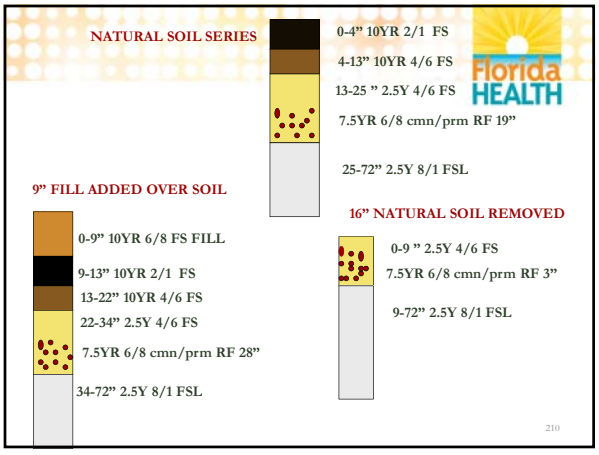
Combining HSI

It is permissible to combine certain hydric soil indicators if all requirements of the indicators are met except for thickness. The most restrictive requirements for thickness of layers in any indicators used must be met. Not all indicators are possible candidates for combination. For example, indicator F2 (Loamy Gleyed Matrix) has no thickness requirement and is not a candidate for combination.

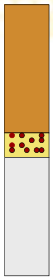
208

WHERE THE NATURAL SOIL SURFACE HAS BEEN ALTERED BY THE ACTION OF MAN VIA SOIL ADDITION OR REMOVAL, THE INDICATORS *MUST BE JUDGED* USING NATURAL SOIL SURFACE CRITERIA, ACCOUNTING FOR WHAT WAS ADDED OR REMOVED

209



210



0-35" 10YR 6/8 FS FILL

35-38" 2.5Y 4/6 FS WITH 7.5YR 6/8 CMN/PRM RF

38-72" 2.5Y 8/1 FSL

NATURAL SOIL REMOVED AND FILL MATERIAL PUT IN PLACE

211

REDOX FEATURES MAY FORM IN FILL MATERIAL AND EXTRA CARE MUST BE TAKEN DURING THEIR EVALUATION.

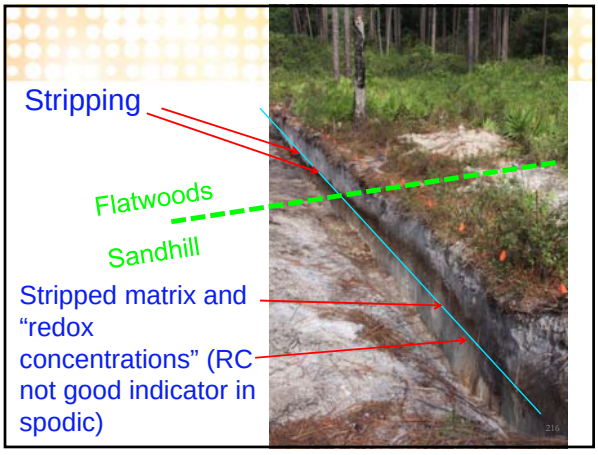
212

213

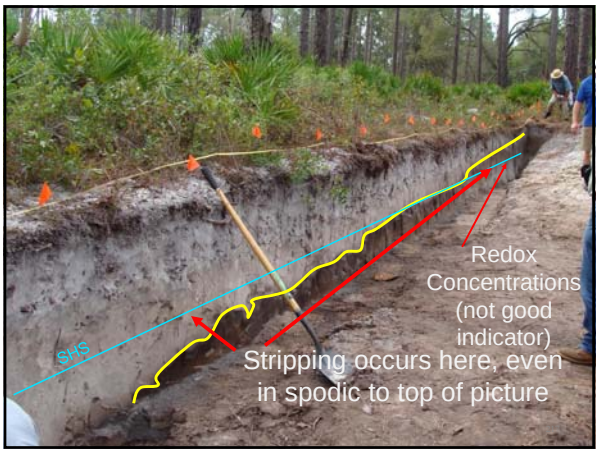
Soil Pits

214

215



216



QUESTIONS???

Florida HEALTH

Summary

Florida HEALTH

- **Soil iron varies with geography**
  - **Some soils have more iron**
  - **Some soils have less**
  - **Peninsular and Coastal FL has less while the panhandle has more**
  - **Many hydric soil indicators are based on iron reduction**

219

Summary

- Soil iron varies with wetness
  - Iron is reduced when soils are saturated and ample Organic Matter is present for iron reduction
  - Low chroma colors indicate iron reduction
  - Many hydric soil indicators require low chroma due to the reduction of iron

220

Summary

- Soil OM varies with geography
  - Climate varies with geography
  - Plant and bacterial activity controlled by temperature

221

Summary

- Soils vary in textural class
  - Some hydric soil indicators are written exclusively for sandy soils (S indicators)
  - Other hydric soil indicators are written exclusively for loamy and clayey soils (F indicators"
  - The rest of the hydric soil indicators are for all textures (A indicators)

222

Summary

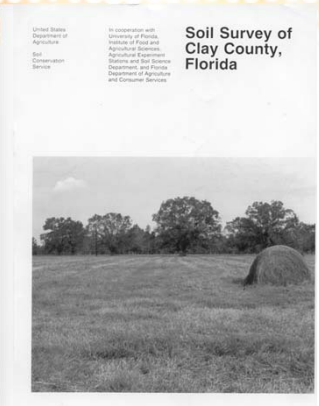
- **When using the hydric soil indicators, pay attention to:**
  - **Land Resource Region (LRR) in which site is located**
  - **Textural class of the portion of soil being evaluated**
  - **Soil colors must be in their *moist state* and compared to a fairly new and clean Munsell ® color book on a bright day with the sun to your back**

223

Website for Hydric Soil Field Indicators, Version 7.0, 2010

- **ftp://ftp-fc.sc.egov.usda.gov/NSSC/Hydric_Soils/FieldIndicators_v7.pdf**

224



Hydric Soil List: Most hydric soil lists are created by a soil scientist based on local experience and knowledge.

225

Clay County, Florida

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating
8:				
Sapelo fine sand	Sapelo, hydric	20	Flats	Yes
	Rutlege	3	Depressions	Yes
	Albany	10	Knolls	No
	Sapelo, nonhydric	67	Flatwoods	No
9:				
Leon fine sand	Leon, hydric	10	Flats	Yes
	Lynn Haven	3	Flats	Yes
	Sapelo, hydric	3	Flats	Yes
	Leon, nonhydric	70	Flatwoods	No
	Sapelo, nonhydric	14	Flatwoods	No
11:				
Allanton and Rutlege mucky fine sands, depressional	Allanton	45	Depressions	Yes
	Rutlege	35	Depressions	Yes
	Surrency	5	Depressions	Yes
	Sapelo, hydric	5	Flats	Yes
	Leon, nonhydric	10	Flatwoods	No
12:				
Surrency fine sand, depressional	Surrency	80	Depressions	Yes
	Leon, hydric	3	Flats	Yes
	Meggett	3	Flats	Yes
	Rutlege	3	Depressions	Yes
	Santee	2	Flood plains	Yes
	Plummer	9	Flatwoods	No

226

Inherent Problems with Hydric Soil Lists

- There is a problem with hydric soil lists which may confuse users (Hurt and Carlisle. 1997).
  - The presence of a soil on a hydric soil list does not mean that the soil is in fact hydric. This is only an interpretive rating. Just as is the case with all interpretations based on information in a published soil survey or other sources of estimated soil properties, hydric soil interpretations are confirmed by on-site investigations.
- Hydric soil indicators (Hurt and Vasilas. 2006) provides us a method of on-site confirmation of the presence or absence of a hydric soil.

227

THE END

QUESTIONS???

228