Hydric Soil Indicators - Remainder
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OBJECTIVES

- Define and describe seasonal high water table indicators for hydric soils
- Provide correct methodology for hydric soil indicator identification

NOTE

Additional information on certain slides will be found in the “NOTES” section and will only be visible in the “normal” view in PowerPoint

Remainder of the Field Indicators (Not on test)

NOTE

- While these are the “Hydric Soil Indicators” (HSI), the language that “makes” the soil hydric has been bracketed. Ignore this information to use the indicator for SHWT idicator only. Example: [starting within the upper 15 cm (6 inches) of the soil surface.]
- This is to facilitate the idea that FDOH uses all HSI as SHWT indicators only.
- Additional language used for clarification will be underlined

NOTE

- The laminated HSI sheets have not been bracketed as in this presentation in order to provide consistency with all other HSI information from other sources

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]
- Gleyed matrix has already been defined in the previous presentation

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.

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

A1. Histosol

- *For use in all LRRs*
- Soil classifies as a Histosol (except Folist)
- Normally ≥ 16” (40 cm) of top 32” (80 cm) is organic material such as muck, mucky peat and peat

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.

- Indicator A1 (Histosols). Muck is >1 meter thick
- 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

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
- 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

- 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

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
- Does not require proof of aquic conditions

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.

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

A4. Hydrogen Sulfide

- *For use in all LRRs*
- A hydrogen sulfide odor [within 30 cm (12 inches) of the soil surface]
- Must be a “rotten egg” odor
- Other “unpleasant” odors exist such as mercaptans which contain sulfur compounds (e.g. smell placed in natural gas) but is not hydrogen sulfide

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. Methyl mercaptan is produced as a decay product of animal and vegetable matter, but this is not Hydrogen Sulfide (H_2S).

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

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

A11 Depleted Below Dark Surface

- 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 meet 70% masked criterion

- 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.

A12 Thick Dark Surface

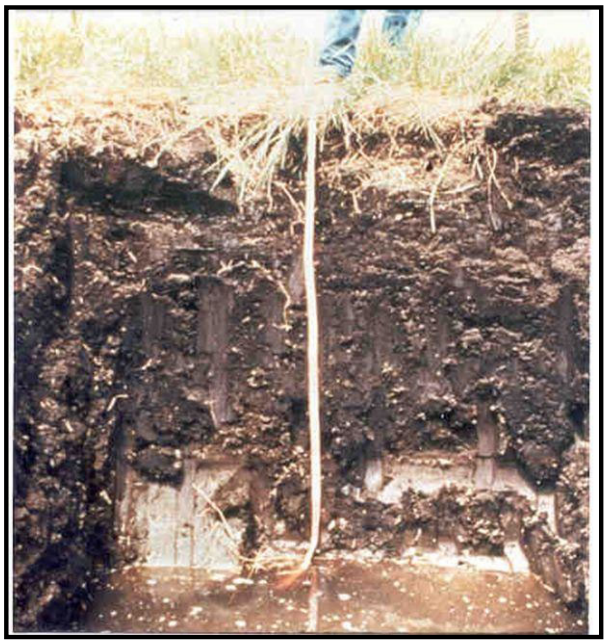
- *For use in all LRRs*
- A layer at least 15cm (6”) thick with a depleted or gleyed matrix that has 60% or more chroma ≤2 [starting below 30cm (12”) of the surface]
- The layer(s) above the depleted or gleyed matrix must have value ≤2.5 and chroma ≤1 to a depth of at least 30cm (12”) and value ≤3 and chroma ≤1 in any remaining layers above the depleted or gleyed matrix

A12 Thick Dark Surface

- Any sandy material above the depleted or gleyed matrix must meet the 70 % masked criterion

A12 Thick Dark Surface

Indicator A12 (Thick Dark Surface)
Deep observation is often necessary



Indicator A12 (Thick Dark Surface)
A depleted matrix is below the mollic epipedon

F3. Depleted Matrix

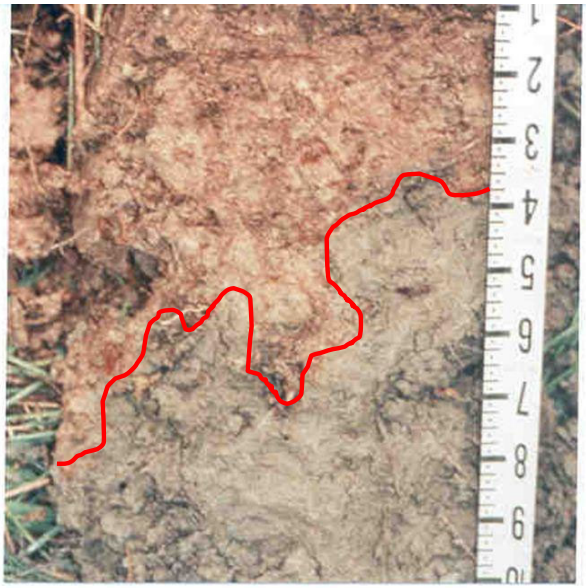
- Term has been previously defined
- *For use in all of Florida*
- A layer with a depleted matrix that has 60% or more chroma 2 or less that has a minimum thickness of either:
  a. 5 cm (2 inches) if 5 cm (2 inches) is entirely within the upper 15 cm (6 inches) of the soil, or
  b. 15 cm (6 inches) [and starts within 25 cm (10 inches) of the soil surface] beginning at any depth

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.

Indicator F3 (Depleted Matrix) The chroma is 1 Redox concentrations are present but not required

Indicator F3 (Depleted Matrix) The chroma is 2 Redox concentrations are present as required



Indicator F3 (Depleted Matrix)

The chroma is 1 within a depth of about 10 to 15 cm

Redox concentrations are absent

Scale is inches

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.

Indicator F3 (Depleted Matrix)
The chroma is 2 below a depth of about 15 cm
Redox concentrations are present as required
Scale is inches

Indicator F3 (Depleted Matrix). The chroma is 2 below a depth of about 15 cm. Redox concentrations are present as required. Scale is inches.

F6. Redox Dark Surface

- *For use in all of Florida*
- A layer at least 10 cm (4”) thick [entirely within the upper 30 cm (12”) of the mineral soil] that has:

  a. matrix value ≤3 and chroma ≤1 with ≥2% distinct or prominent redox concentrations as soft masses or pore linings, or

  b. matrix value ≤ 3 and chroma 2 with ≥ 5% distinct or prominent redox concentrations as soft masses or pore linings

Redox Dark Surface User Notes:

- 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 as it can mask some/all of the concentrations*
- *Careful examination is required to see what are often brownish redox concentrations in the darkened materials*

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. 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.

Redox in Dark Colored Soils

- *Where the matrix has Value ≤3 and Chroma ≤1, redox concentrations may have sharp (not diffuse) boundaries*
- *Caused by organic material masking the redox concentration*

Indicator F6 (Redox Dark Surface)
Prominent redox concentrations as soft masses and pore linings are present
Below the dark epipedon is indicator A11 (Depleted Below Dark Surface)
Scale is cm

Indicator F6 (Redox Dark Surface)
Prominent redox concentrations as soft masses and pore linings are present
Often, as in this soil the redox concentrations are small (fine)

F7. Depleted Dark Surface

- *For use in all of Florida*
- Redox depletions, with value ≥5 and chroma ≤2, in a layer at least 10 cm (4”) thick [entirely within the upper 30 cm (12”) of the mineral soil] that has:
  a. matrix value 3 or less and chroma 1 or less and ≥10% redox depletions, or
  b. matrix value ≤3 and chroma 2 and ≥ 20% 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.

Indicator F7 (Depleted Dark Surface). Depletions as they occur within a dark surface layer.

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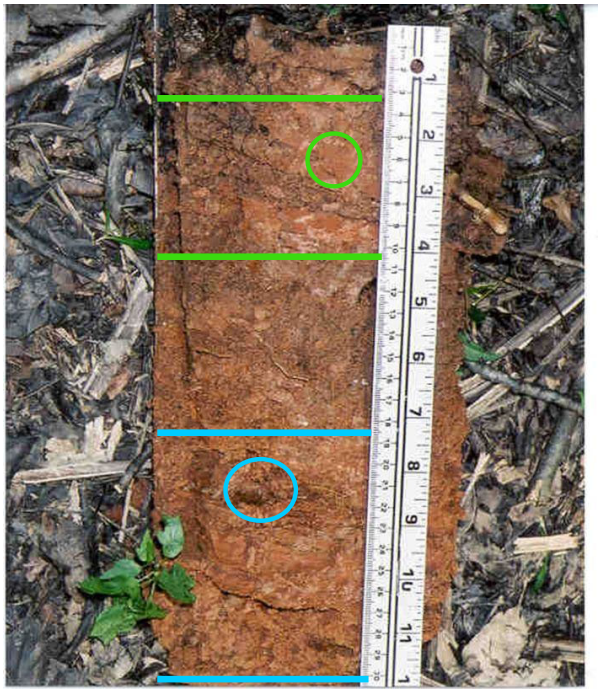
Scale is inches. Depletions are difficult to see by many. Sometimes they are more readily seen if the soil is allowed to dry.

F8. Redox Depressions

- *For use in all of Florida*
- In closed depressions subject to ponding, ≥ 5% 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”) 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.

F8, slightly more than 2” thick layer



F8. REDOX DEPRESSIONS
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

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).

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.

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

F12. Iron/Manganese Masses

- *For use in LRRs P and T*
- On flood plains, a layer ≥10 cm (4”) thick with ≥40% chroma ≤2, and ≥2% distinct or prominent redox concentrations as soft iron/manganese masses with diffuse boundaries

F12. Iron/Manganese Masses

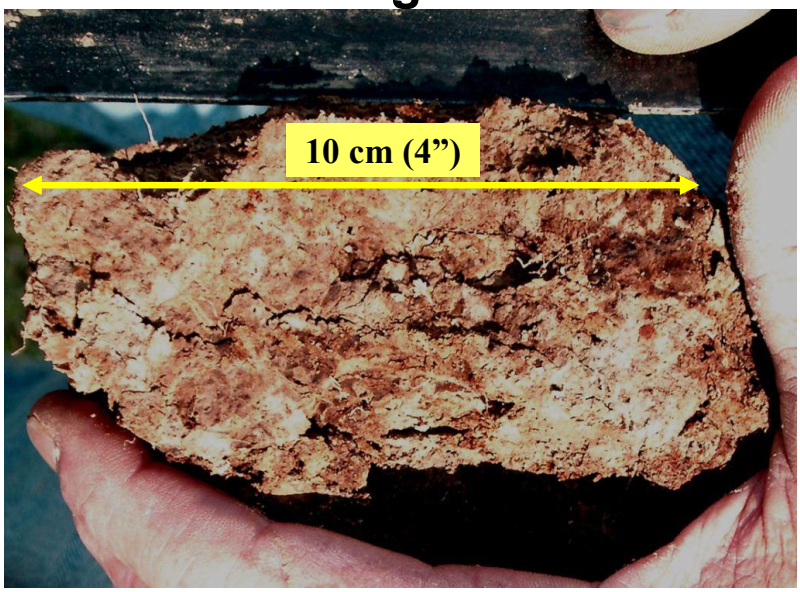
- [The layer occurs entirely within 30 cm (12 inches) of the soil surface]
- Most commonly Iron/manganese masses have value and chroma of 3; sometimes they are black
- The thickness requirement is waived if the layer is the mineral surface layer
- Note landform restriction (floodplains)

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.

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

F12. Iron/Manganese Masses



F13. Umbric Surface

- *For use in all Florida*
- In depressions and other concave landforms
- A layer ≥25 cm (10”) thick [starting within 15 cm (6”) of the soil surface]
- Upper 15 cm (6”) must have value ≤3 and chroma ≤ 1, and the lower 10 cm (4”) of the layer must have the same colors as above or any other color that has a chroma ≤2

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.

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

F22. Very Shallow Dark Surface

For use in MLRA 138 of LRR P, MLRA 154 of LRR U, and West Florida portion of MLRA 152A in LRR T

SEE NEXT 4 SLIDES

Note: MLRA means Major Land Resource Area

In depressions and flood plains subject to frequent ponding and/or flooding, one of the following

a) if bedrock occurs between 15 cm (6 inches) and 25 cm (10 inches), a layer at least 15 cm (6 inches) thick [starting within 10 cm (4 inches) of the soil surface] with value 2.5 or less and chroma 1 or less,

Continued next slide

and the remaining soil to bedrock must have the same colors as above or any other color that has a chroma 2 or less, or

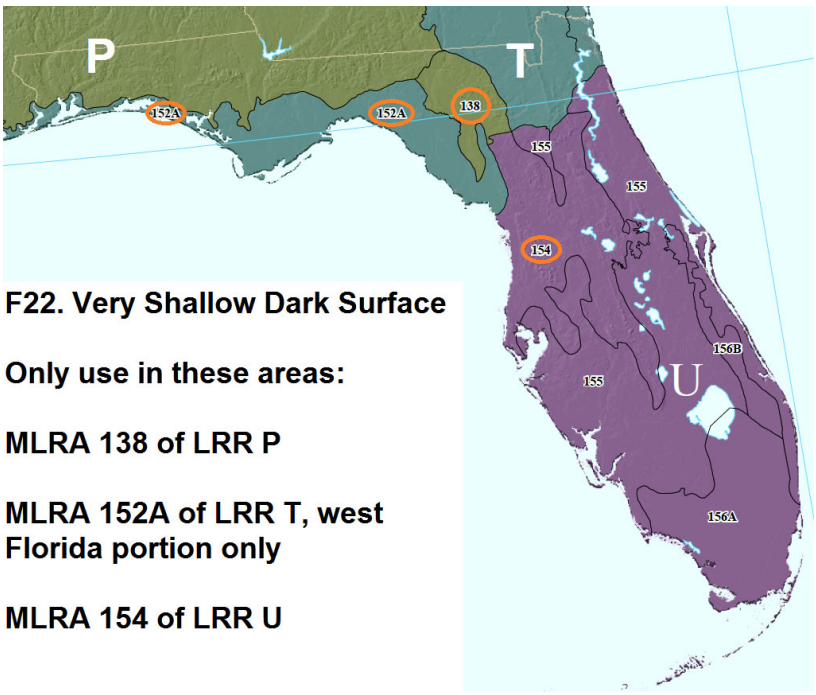
b) if bedrock occurs within 15 cm (6 inches), more than half of the soil thickness must have value 2.5 or less and chroma 1 or less, and the remaining soil to bedrock must have the same colors as above or any other color that has a chroma 2 or less.

LRR MAP with MLRAs for use with F22 Very Shallow Dark Surface

LRR P- See MLRA 138

LRR T- See MLRA 152A

LRR U- See MLRA 154



F22. Very Shallow Dark Surface

Only use in these areas:

MLRA 138 of LRR P

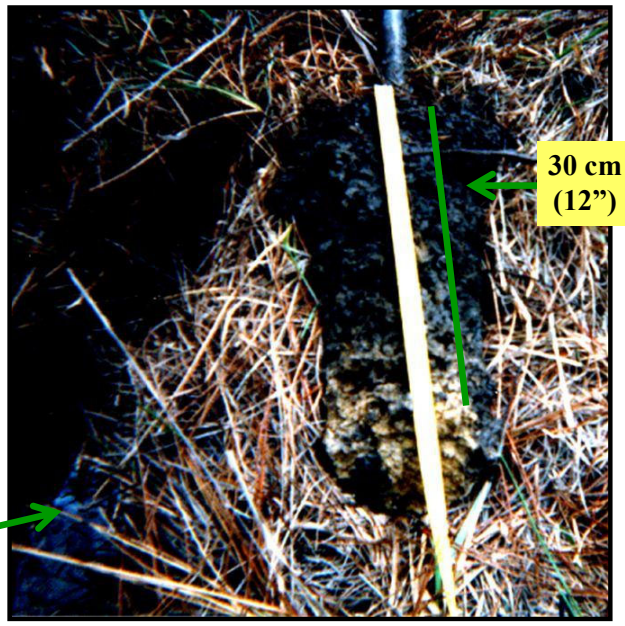
MLRA 152A of LRR T, west Florida portion only

MLRA 154 of LRR U

Problem Hydric Soil?##

Has Umbric Surface and Redox Dark Surface

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



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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.

Combining HSI

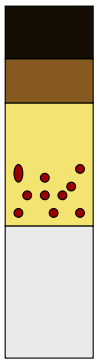
- It is permissible to combine certain hydric soil indicators
- All requirements of the indicators are met except for thickness
- The most restrictive requirements for thickness of layers in any indicators used must be met

Combining HSI

- 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

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

NATURAL SOIL SERIES



0-4” 10YR 2/1 FS

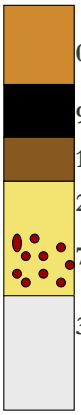
4-13” 10YR 4/6 FS

13-25 ” 2.5Y 4/6 FS

7.5YR 6/8 many/prm RF @ 19”

25-72” 2.5Y 8/1 FSL

9” FILL ADDED OVER SOIL



0-9” 10YR 6/8 FS FILL

9-13” 10YR 2/1 FS

13-22” 10YR 4/6 FS

22-34” 2.5Y 4/6 FS

7.5YR 6/8 many/prm RF @ 28”

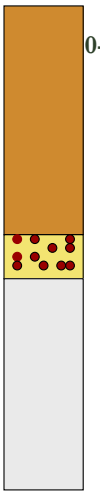
34-72” 2.5Y 8/1 FSL

16” NATURAL SOIL REMOVED

0-9 ” 2.5Y 4/6 FS

7.5YR 6/8 many/prm RF @ 3”

9-72” 2.5Y 8/1 FSL



0-35” 10YR 6/8 FS FILL

35-38” 2.5Y 4/6 FS with 7.5YR 6/8 many/prm RF @ 35”

38-72” 2.5Y 8/1 FSL

NATURAL SOIL REMOVED AND FILL MATERIAL PUT IN PLACE

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

Soil Pits

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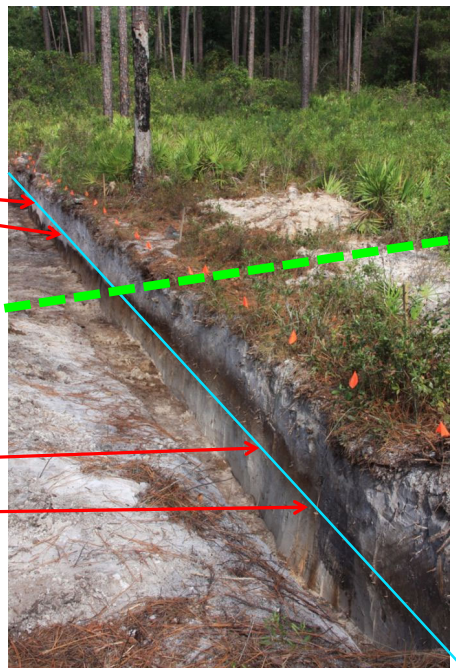
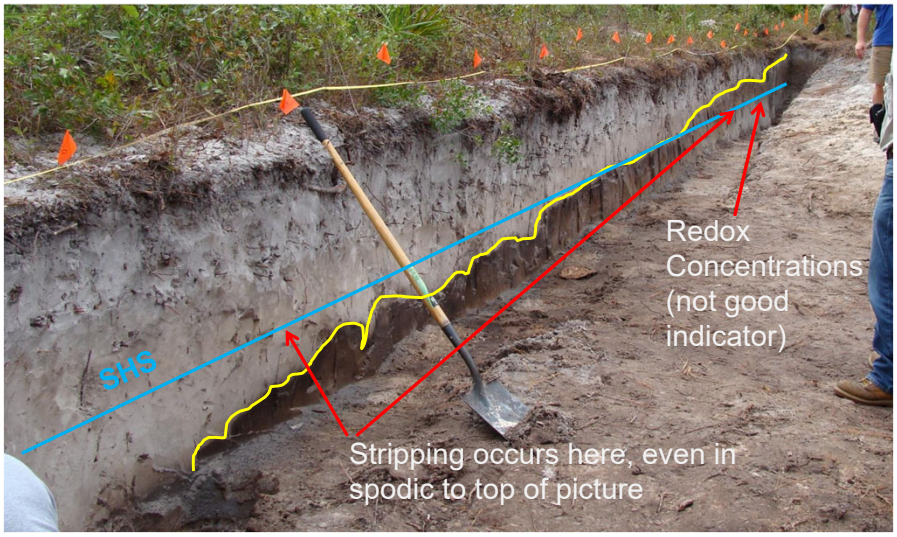
Stripping

Flatwoods

Sandhill

Stripped matrix and "redox concentrations" (RC not good indicator in spodic)




Redox
Concentrations
(not good
indicator)
SHG
Stripping occurs here, even in
spodic to top of picture

THE END

QUESTIONS?