Hydric Soils Indicators
APRIL 2015

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OBJECTIVES

- Define and describe:

1. Hydric soils indicator (HSI) usage, terminology and identification methodology *as used by FDOH*
2. Methodology for determining SHWT when using hydric soil indicators
3. Focus on the most common indicators used in Florida

NOTE

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

Please watch for ## which indicates information in the notes section

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

Recognizing Features

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

DOH and Hydric Soil Indicators (HSI)

- *DOH <u>does not</u> 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 the soil has a SHWT closer to the ground surface or is possibly inundated*

DOH and Hydric Soil Indicators

- "Hydric" only means the SHWT of the soil in question meets the criteria for the soil to be termed "hydric" by use of the indicators
- *Must use HSI exactly as written in standards for SHWT determination* (some of the standards are very exacting)
- Exception: Where an HSI indicates a specific feature must start with "X" inches of the surface (i.e. "depth to indicator")

DOH and Hydric Soil Indicators

- Use the current *Field Indicators of Hydric Soils in the U.S.* handbook for full descriptions, not just cheat sheet

Hydric Soils and <u>Other</u> Agencies:

- For soils to be hydric: textures of LFS and coarser must have SHWT within 6”; LVFS and finer must have SHWT within 12”
- *<u>Hydric soil determinations have ramifications for other agencies, not DOH</u>*

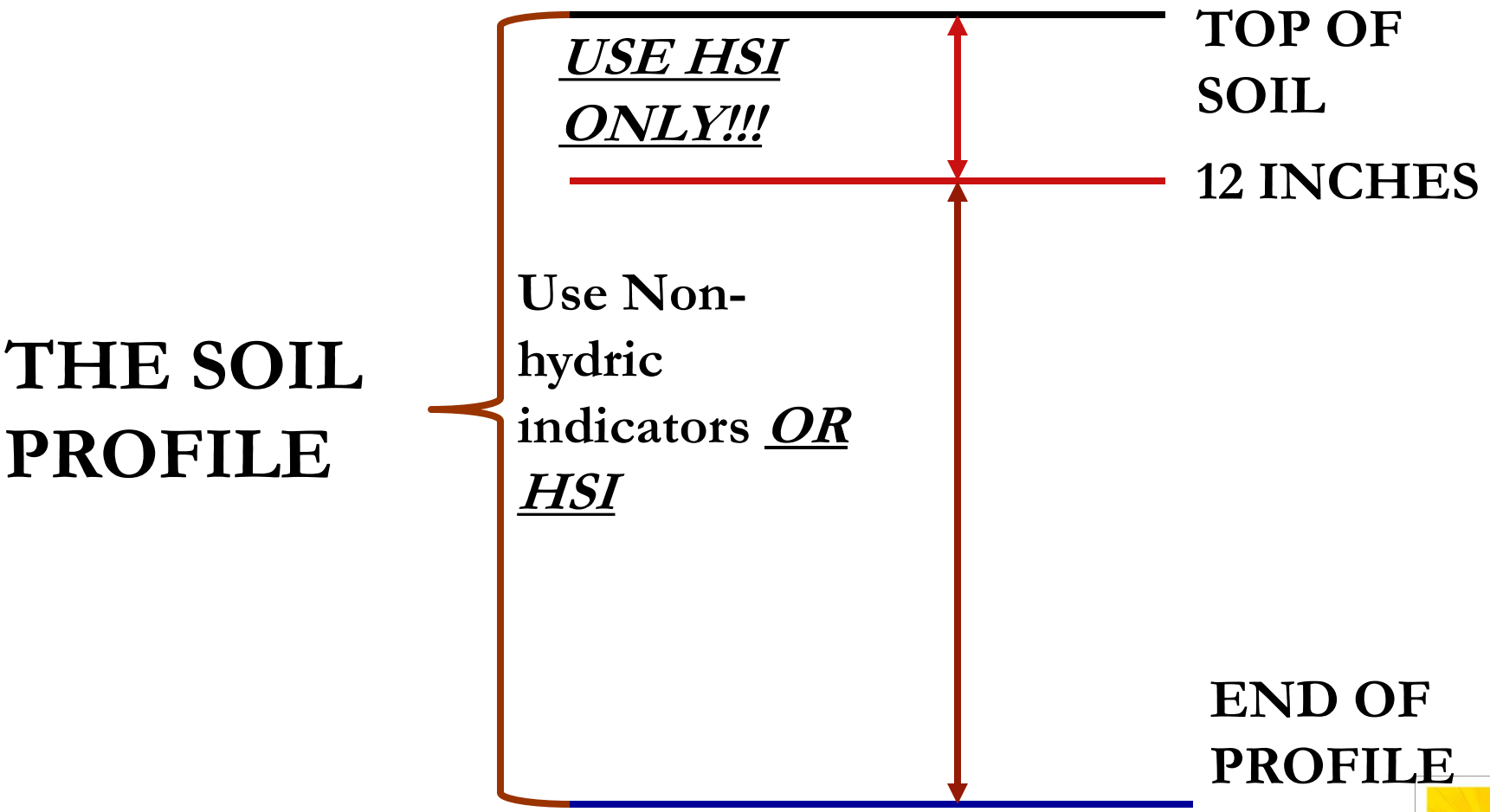
DOH and Hydric Soil Indicators

- 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 (because they are SHWT indicators); the only part of the HSI that will not be met is “depth to indicator” (doesn’t matter) because DOH is not trying to identify a hydric soil, only determine the SHWT

HSI and Fill Material

- When soil has been filled, the indicators must still be used
- Indicators can form in fill
- Underneath fill
- HSI must have formed in place, not been brought in with the fill
- Indicator formation takes time, if ever

Which SHWT Indicators to Use?



Three different textural groupings of HSI

- A indicators: used for All soil textures
- S indicators: used for Sandy soils only (LFS and more coarse)
- F indicators: used for Fine textured soils only (LVFS and finer, the loamy/clayey soils)

DOH and Hydric Soil Indicators

- *Ensure all observations validate the conclusion*
- Thoroughly document all site conditions and soil profiles
- Take samples if necessary
- Take pictures

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 (i.e., 70% masked criterion), do not touch the sample surface
- Several HSI used 70% masked criterion

Sample Observation

- Break open and make observations on <u>natural soil surface</u>
- Touching the sample with objects (like your finger) can change the sample by moving the organic carbon

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*

Hydric Soil Determination: Non-DOH HSI Measurement

- May be used by soil scientists
- 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

Non-DOH HSI Measurement

- 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

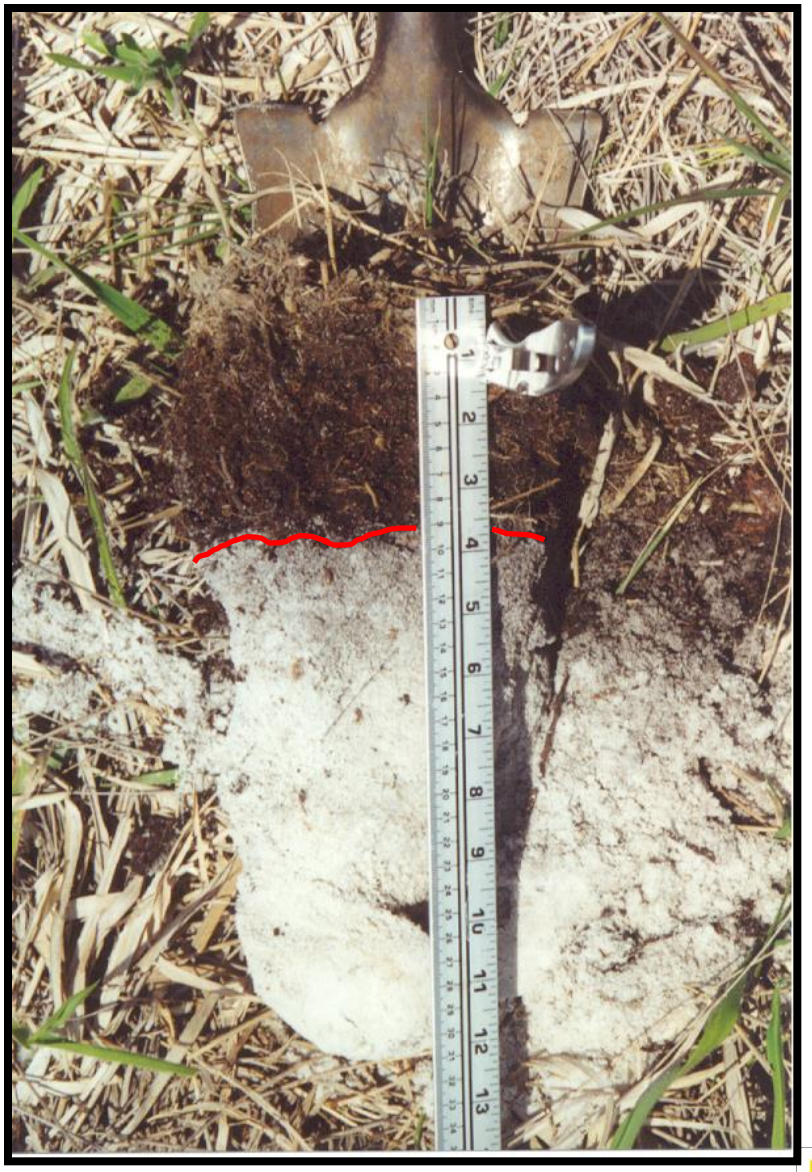
DOH USE

- In Florida, 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

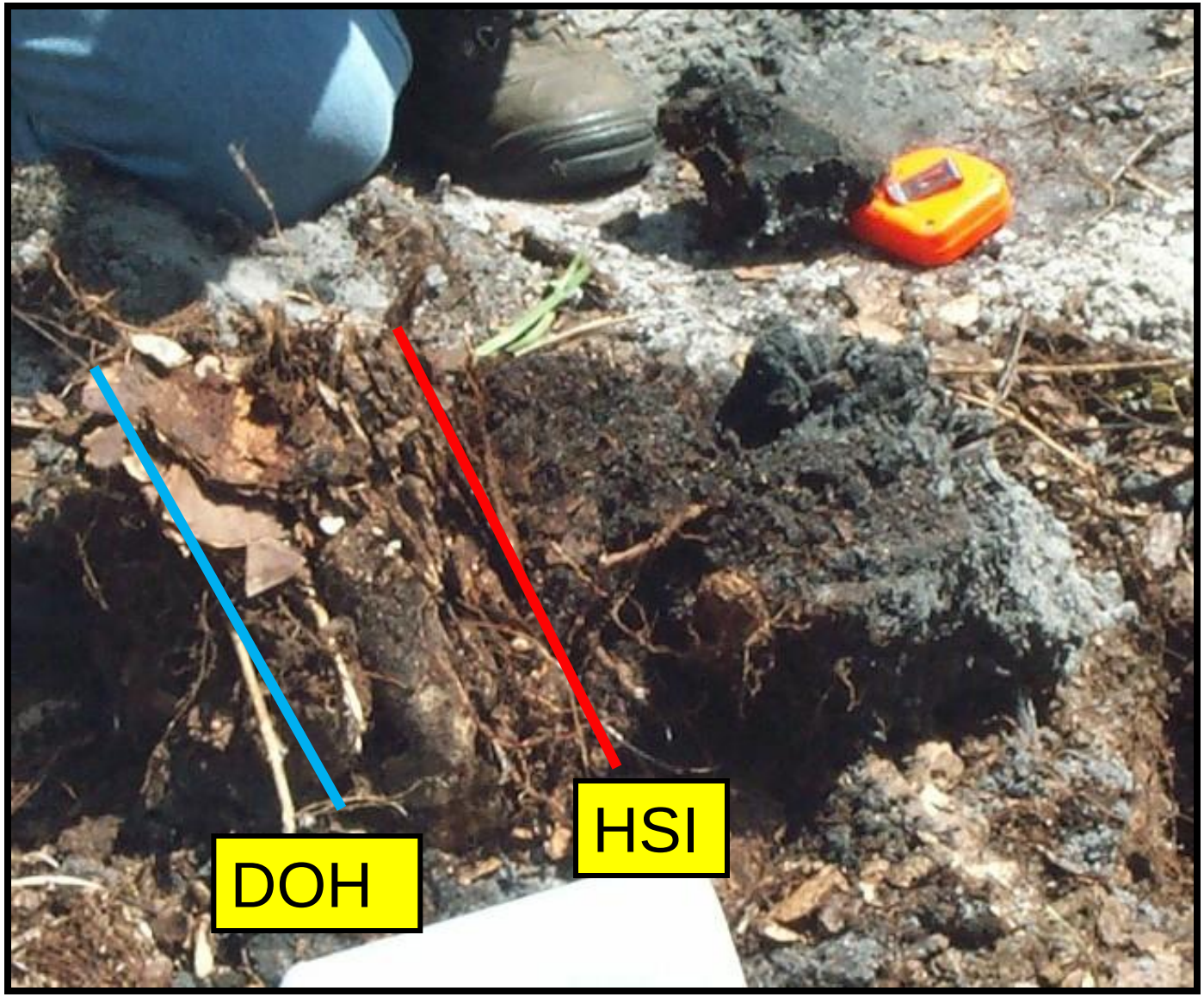
Depth from which to Measure

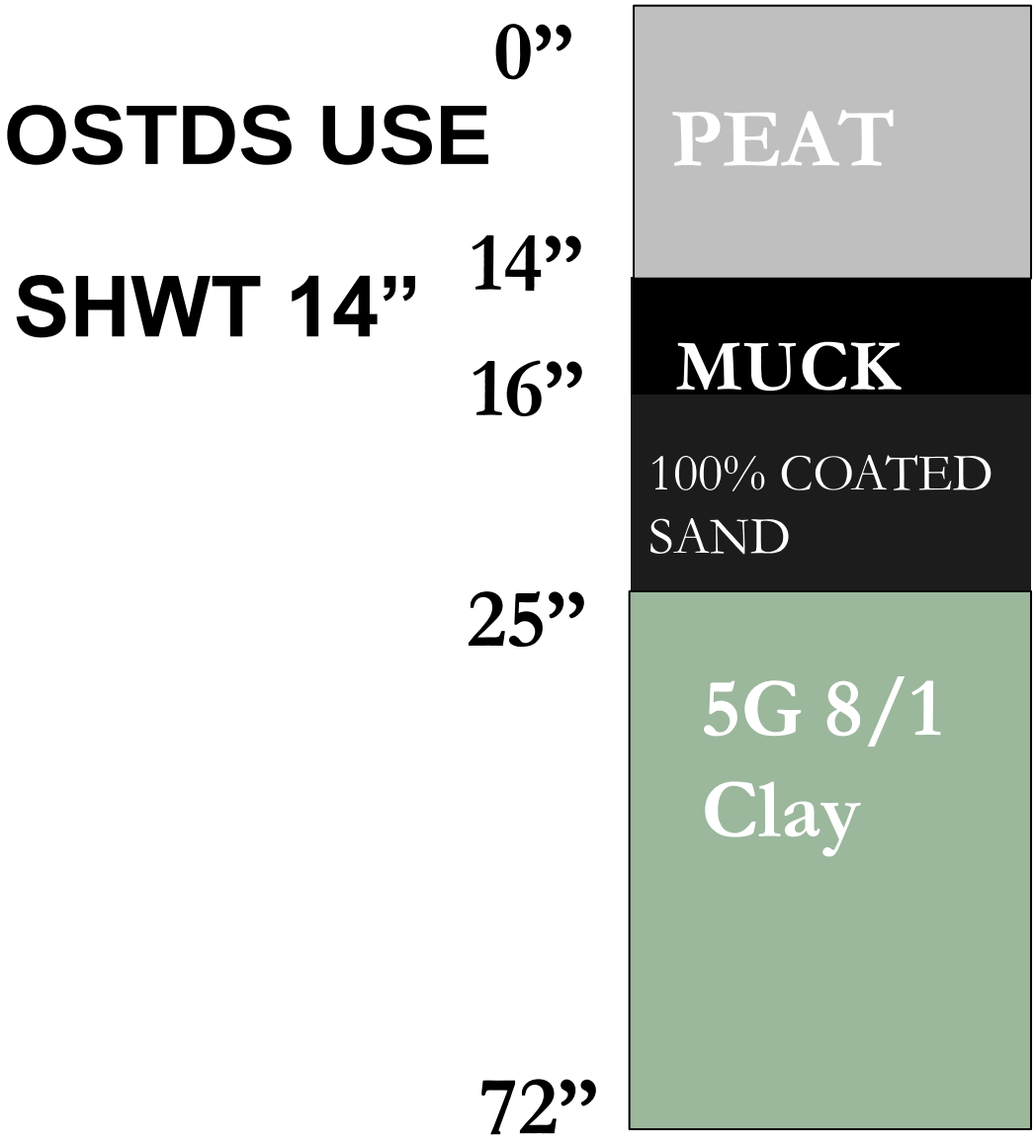
Hemic soil material (mucky peat) is about 9 cm thick directly underlain by sandy mineral soil material

For hydric soil indicator application in Florida, the depth from which to measure (*for HSI determination*) would be from the sandy mineral surface



Where do you start looking for indicators?


DOH
HSI



HSI MEASUREMENT

- STARTS @ 14” from top of grade
- Start depth to indicator from here
- SHWT is 14 inches below top of grade
- Soil is hydric

DOH USE

- Still must use USDA NRCS methodology
- Must use Hydric Soil Criteria correctly to determine SHWT
- To not use correct methodology would mean that the SHWT may be misidentified
- Ramifications

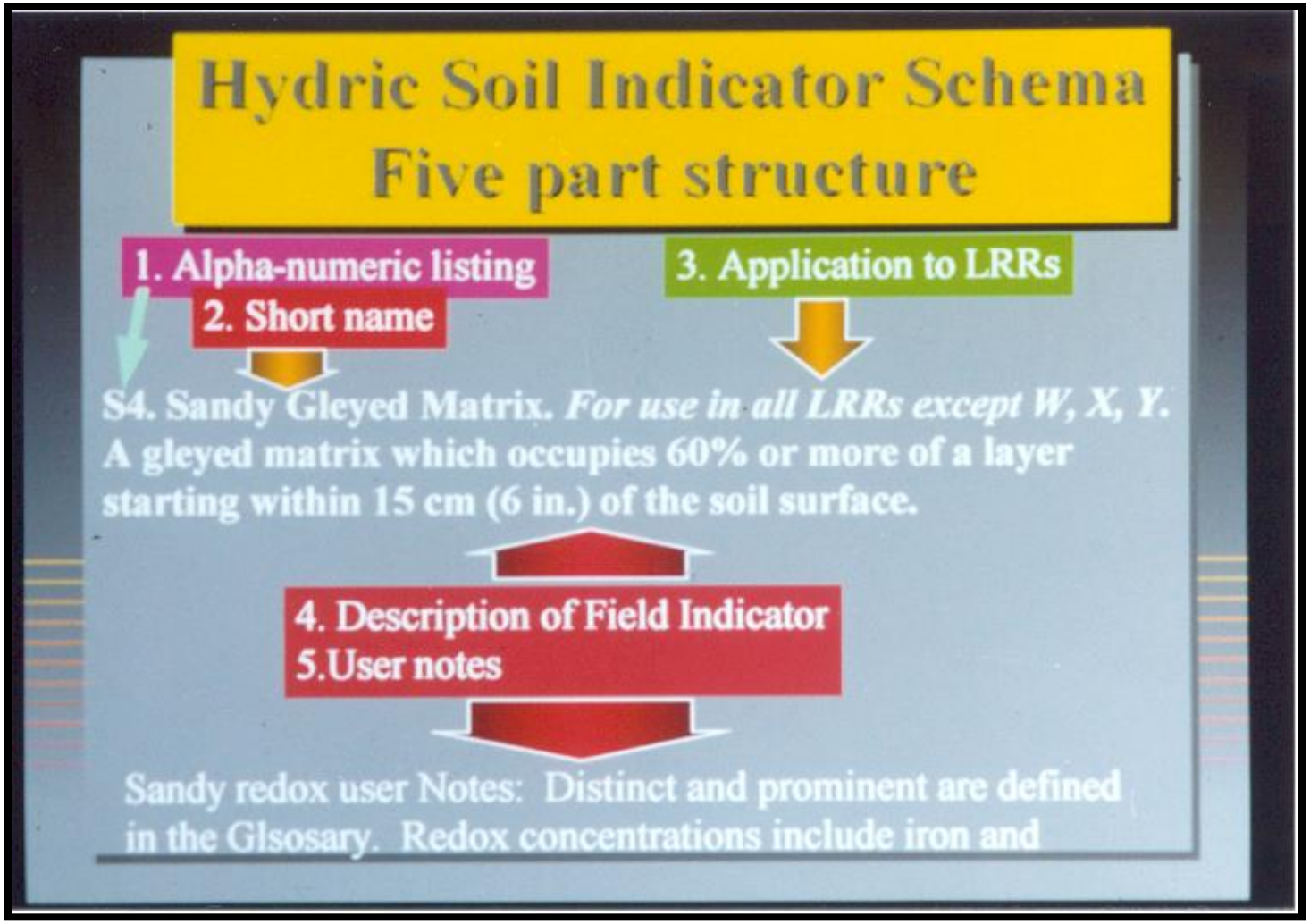
Indicator Presence

- 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*

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

Understanding HSI Information



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 (LRR)*
- Some are based on the smaller Major Land Resource Areas (MLRAs)


A
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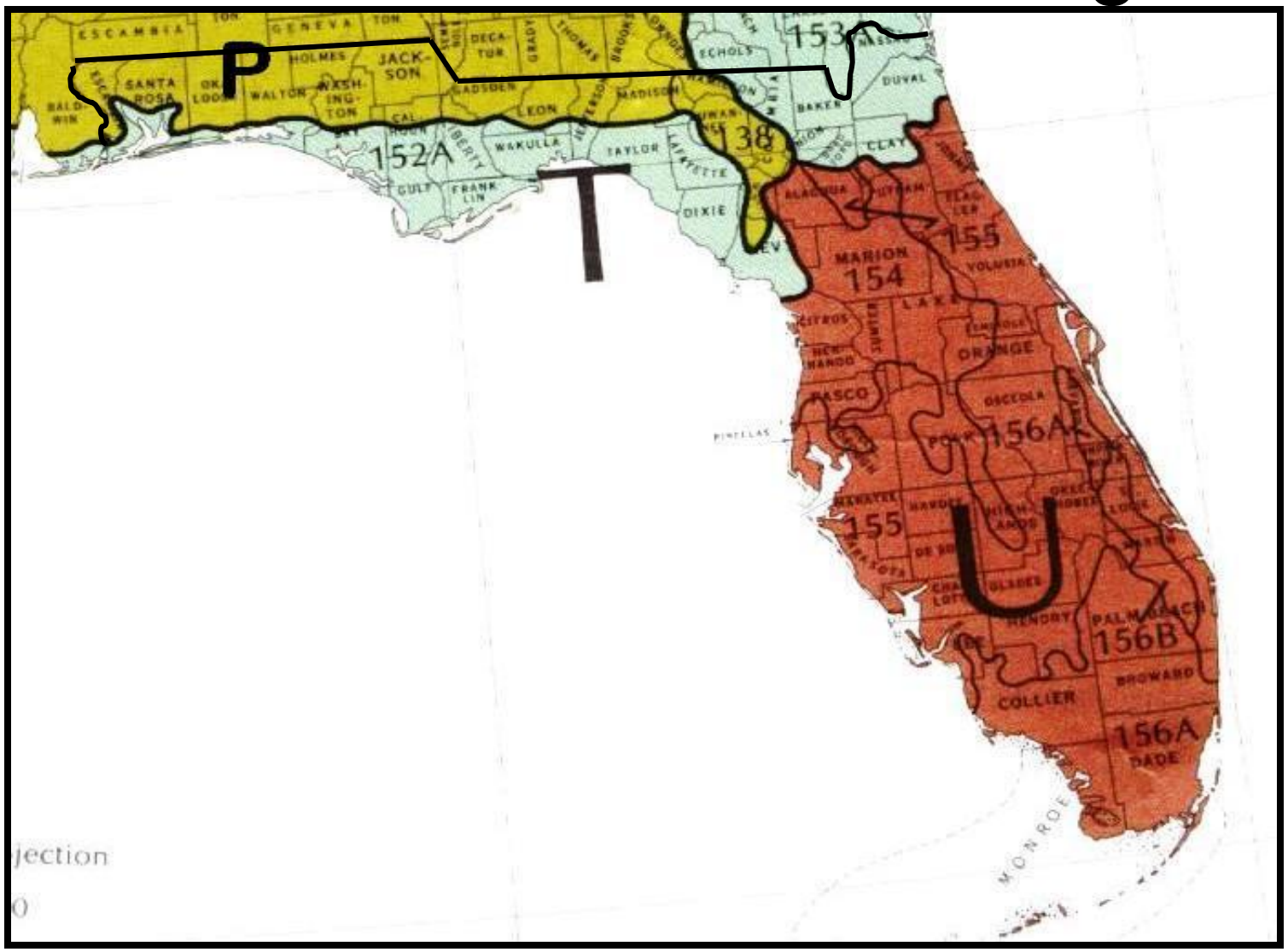
Land Resource Regions
United States

Florida Land Resource Regions



Regionalization of HSI

- Not all HSI can be used in every LRR
- Make sure that the specific indicator is allowed for use in a particular LRR
- Example: Muck as an indicator:
- LRR U (most of peninsular FL): Only the “presence” of muck is required
- LRRs P and T: 1 cm thickness required

Basic Terms of Importance

Several basic terms are used throughout the HSI and will be defined here because they are used in the definitions of many of the indicators

Basic Terms of Importance

- 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

Depleted Matrix

- For loamy and clayey soil material (and sandy soil material for application of Indicators A11 and A12)
- 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

Depleted Matrix

- 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 (more later on this)
- This phenomenon is included in the concept of depleted matrix

Depleted Matrix

The following combinations of value and chroma identify a *Depleted Matrix*

Depleted Matrix

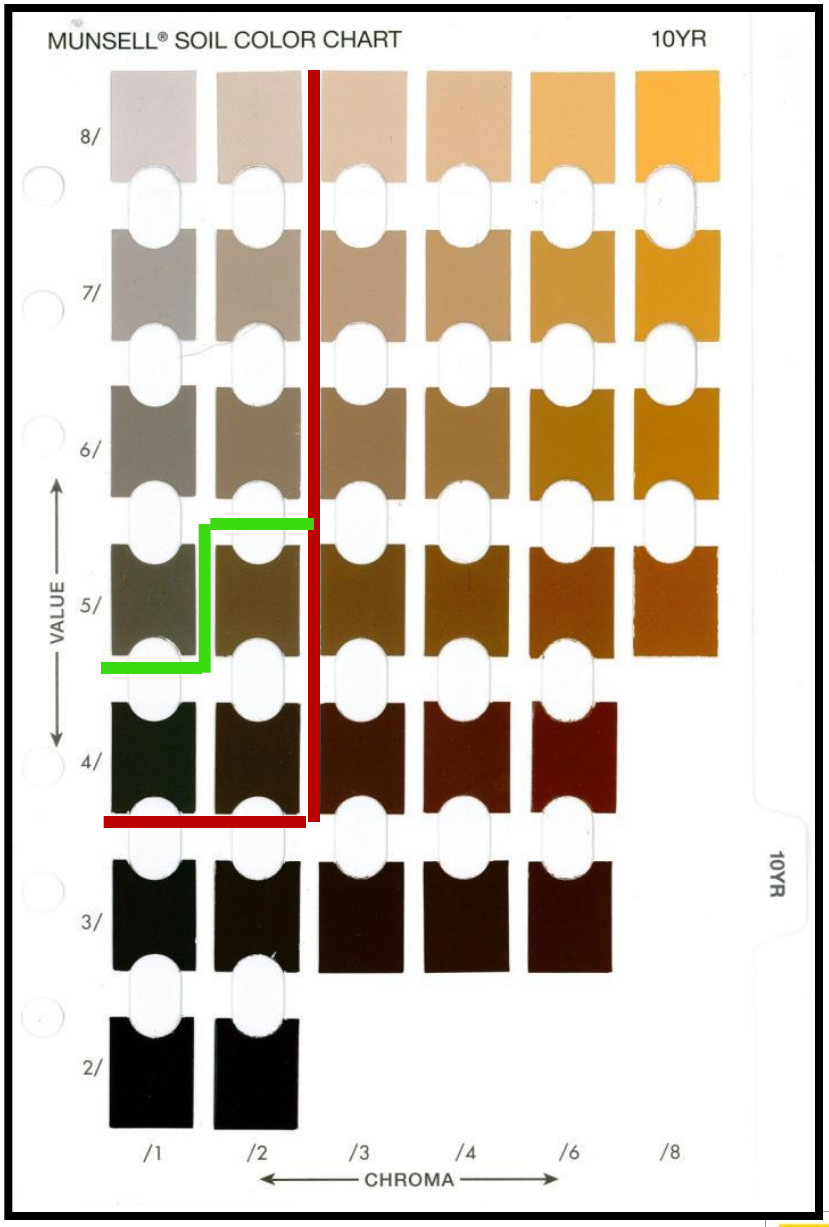
1. Matrix value ≥5 and chroma 1 with or without redox concentrations as soft masses and/or pore linings; or
2. Matrix value ≥6 and chroma 1 or 2 with or without redox concentrations as soft masses and/or pore linings; or

Depleted Matrix

3. Matrix value 4 or 5 and chroma 2 with 2 percent or more distinct or prominent redox concentrations as soft masses and/or pore linings; or
4. Matrix value 4 and chroma 1 with 2 percent or more distinct or prominent redox concentrations as soft masses and/or pore linings

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



Depleted Matrix Note:

Any sandy material deemed a depleted matrix must have redox concentrations regardless of value and chroma

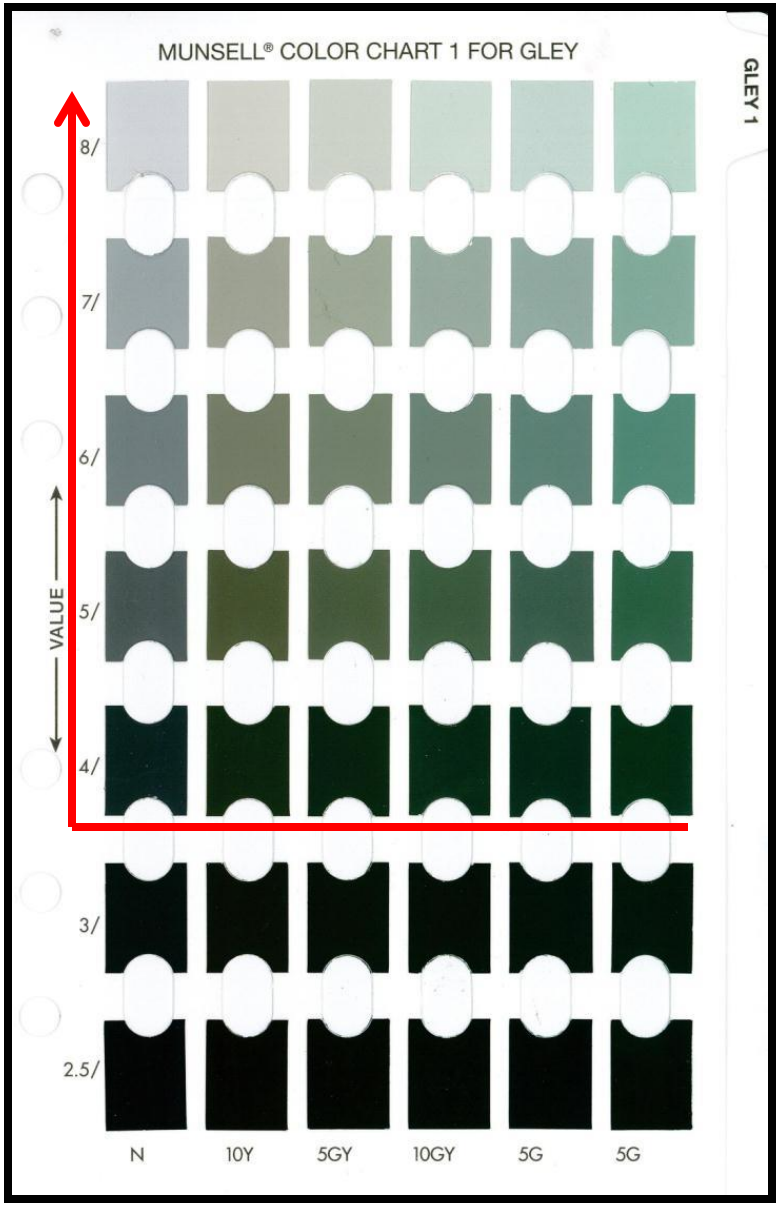
Gleyed Matrix

Soils with a gleyed matrix have the following combinations of hue, value, and chroma and the soils are not glauconitic (*no glauconite in Florida*):

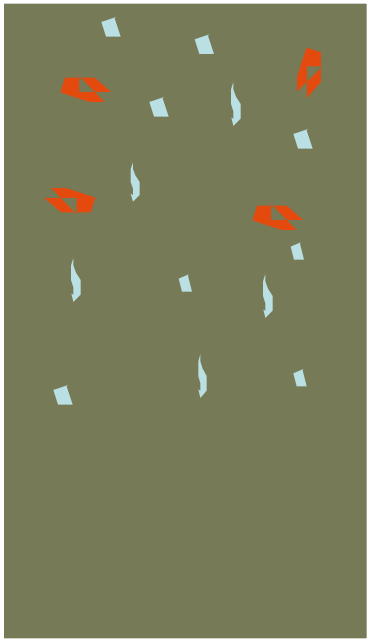
- 1. 10Y, 5GY, 10GY, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value 4 or more and chroma is 1; or
- 2. 5G with value 4 or more and chroma is 1 or 2; or
- 3. N with value 4 or more; or
- In some places the gleyed matrix may change color (rust) upon exposure to air and is termed a *reduced matrix*, which is included in the concept of gleyed matrix

Gleyed Matrix

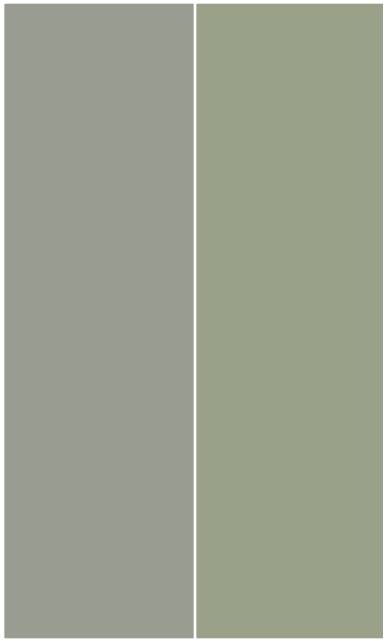
The range of colors for the GLEYED MATRIX is value ≥4 on either of the two gley color charts



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

Reduced Matrix

- 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)

Soil with Gleyed Matrix

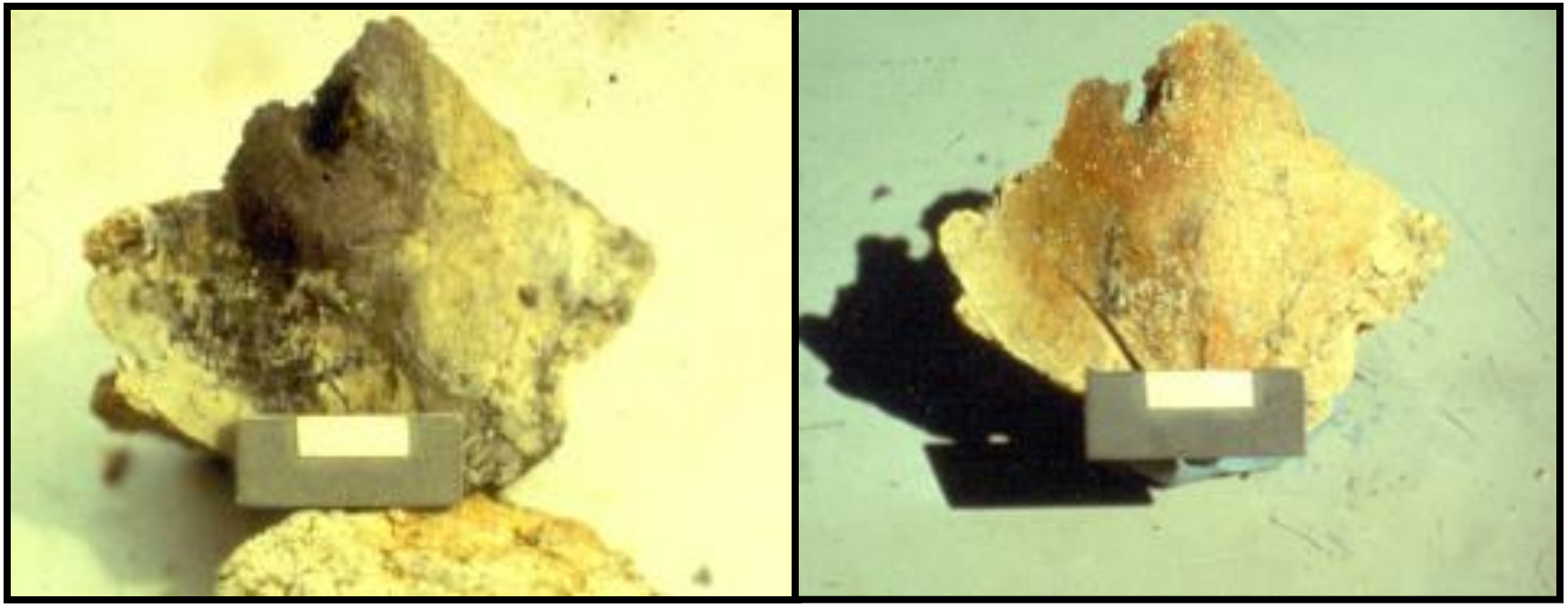
Soil oxidized (rusted) on exposure to air

Reduced Matrix (occurred within 5 minutes)

Reduced Matrix

Initial Exposure

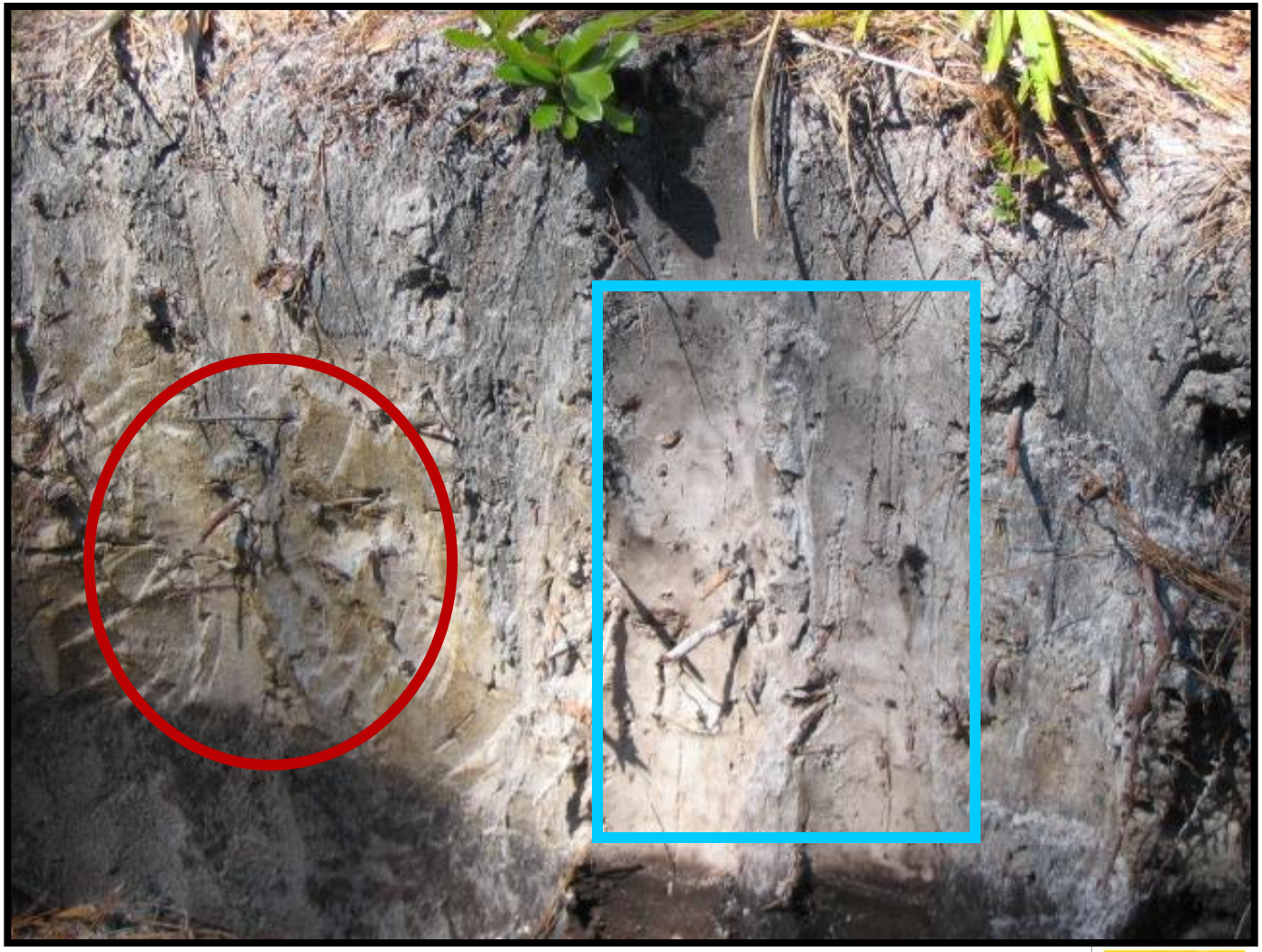
Air-dried 7 days



White bar is 1 cm

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
- Soil is dry

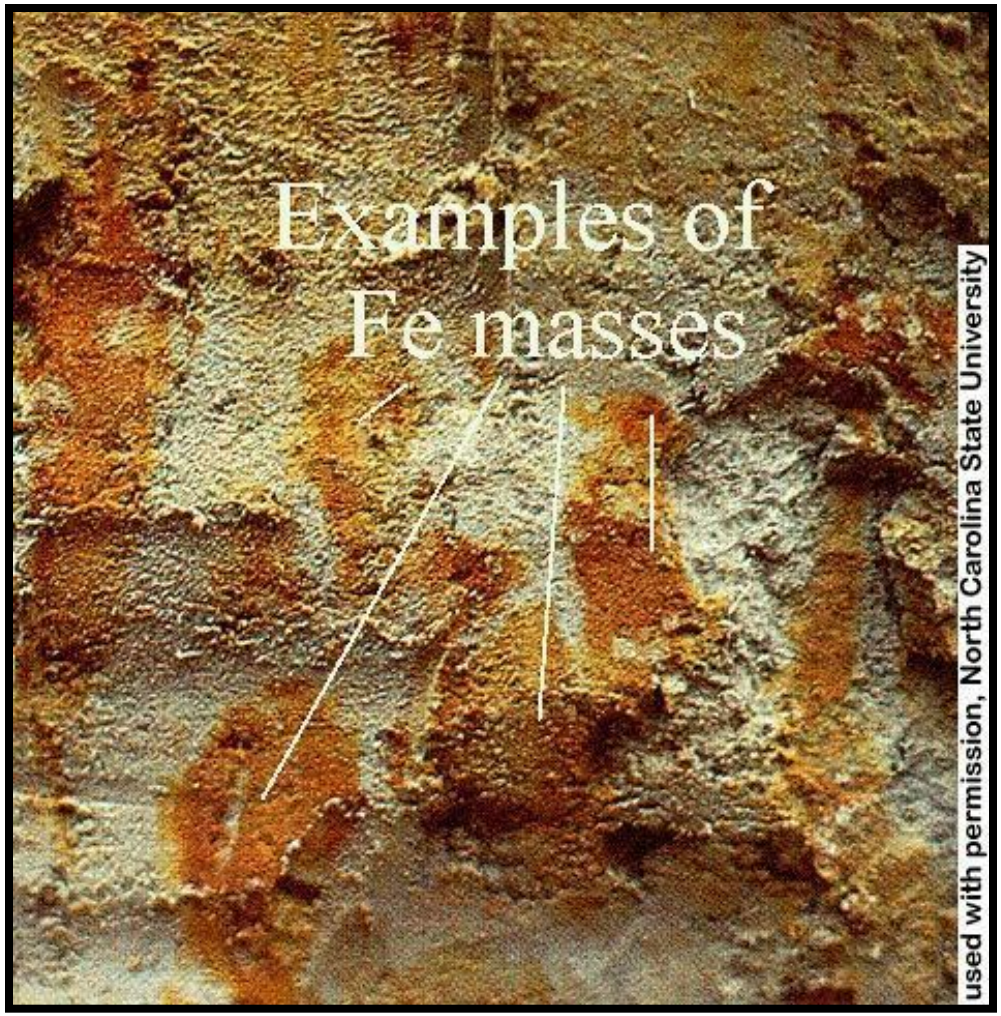


Additional Critical Terms/Issues

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

Soft Masses

- Noncemented redox concentrations, frequently within the soil matrix
- Has various shapes and cannot be removed as discrete units



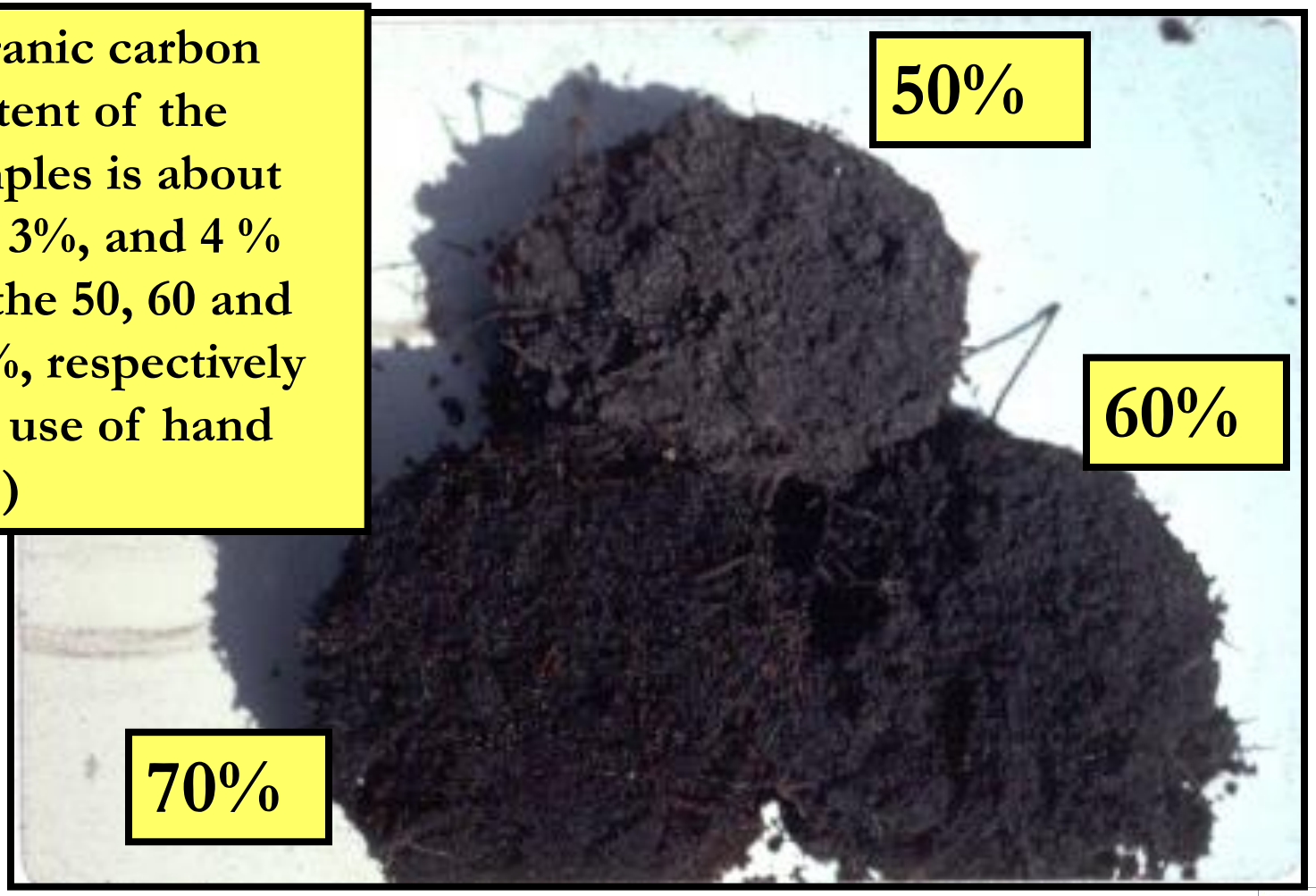
Soft masses (red areas) and Redox Depletion (gray area) along root channel

70% Masked with Organic Material Criterion

- Must observe natural (undisturbed) sample
- 70% masked criterion is for use with 10X or 15X hand lens only
- Viewed with naked eye, the soil must appear to be almost 100% masked (>98%)
- See next slide for example

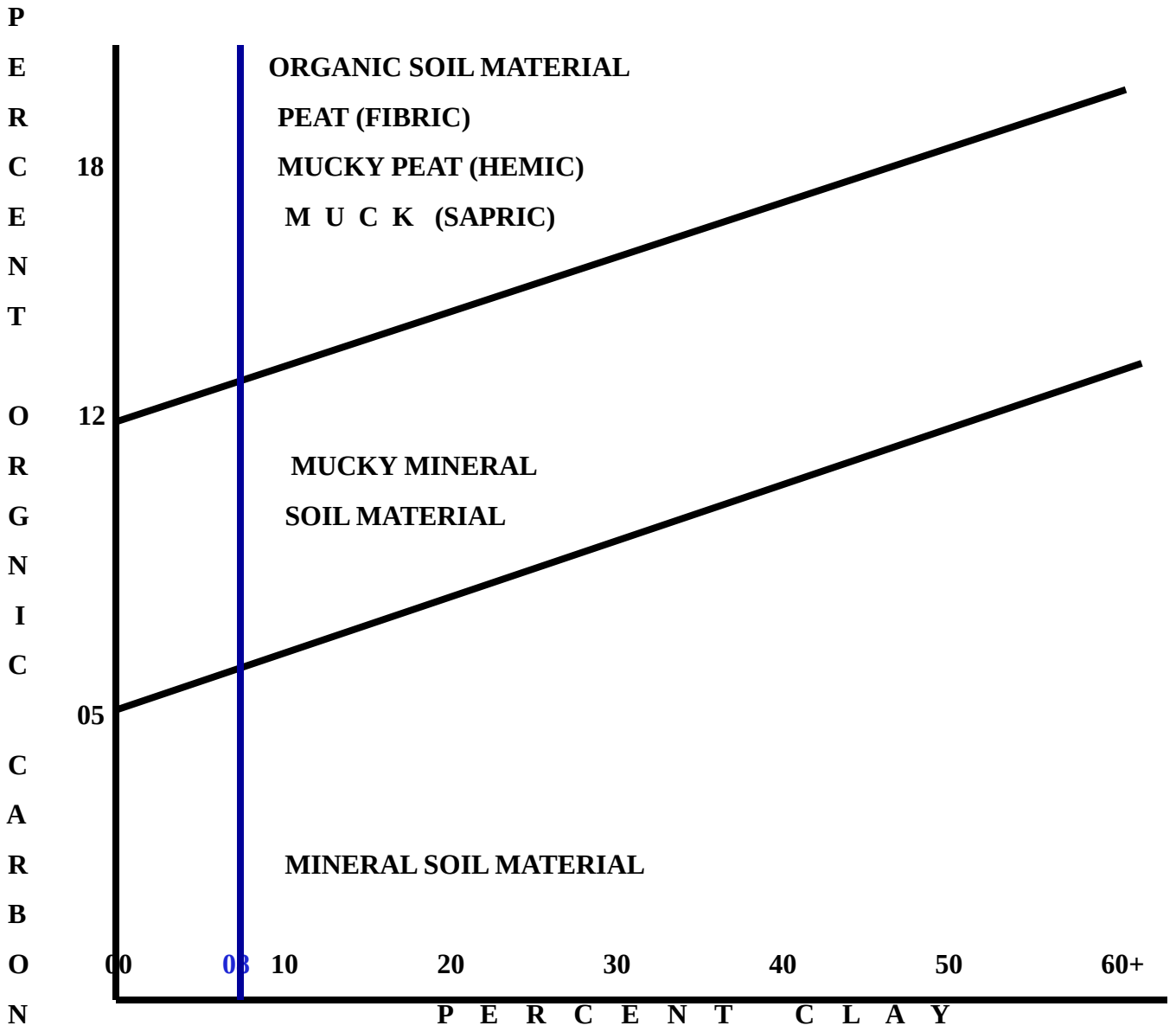
70% Masked with Organic Material

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



Soils and Organic Carbon Content

- HSI often require specific amounts of organic carbon
- Minimum for muck is 12 percent if soil has 0 percent clay
- Mucky mineral ranges from 5-12 percent depending on amount of clay in sample
- <5 percent organic carbon is mineral soil


PERCENT ORGANIC CARBON
18
12
05
00
08
10
20
30
40
50
60+
PERCENT CLAY
ORGANIC SOIL MATERIAL
PEAT (FIBRIC)
MUCKY PEAT (HEMIC)
M U C K (SAPRIC)
MUCKY MINERAL
SOIL MATERIAL
MINERAL SOIL MATERIAL

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

This *<u>is not</u>* the same procedure used in Mineral Texturing

The Near-Saturated Soil Rub Test

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

The Near-Saturated Soil Rub Test

- Looking for material that is non-mineral
- Samples feeling gritty will be dominated by sand
- Samples feeling slick or plastic will be dominated by silt or clay
- Samples not feeling gritty/slick/plastic will be organic (greasy) in nature
- See following slide for breakdown

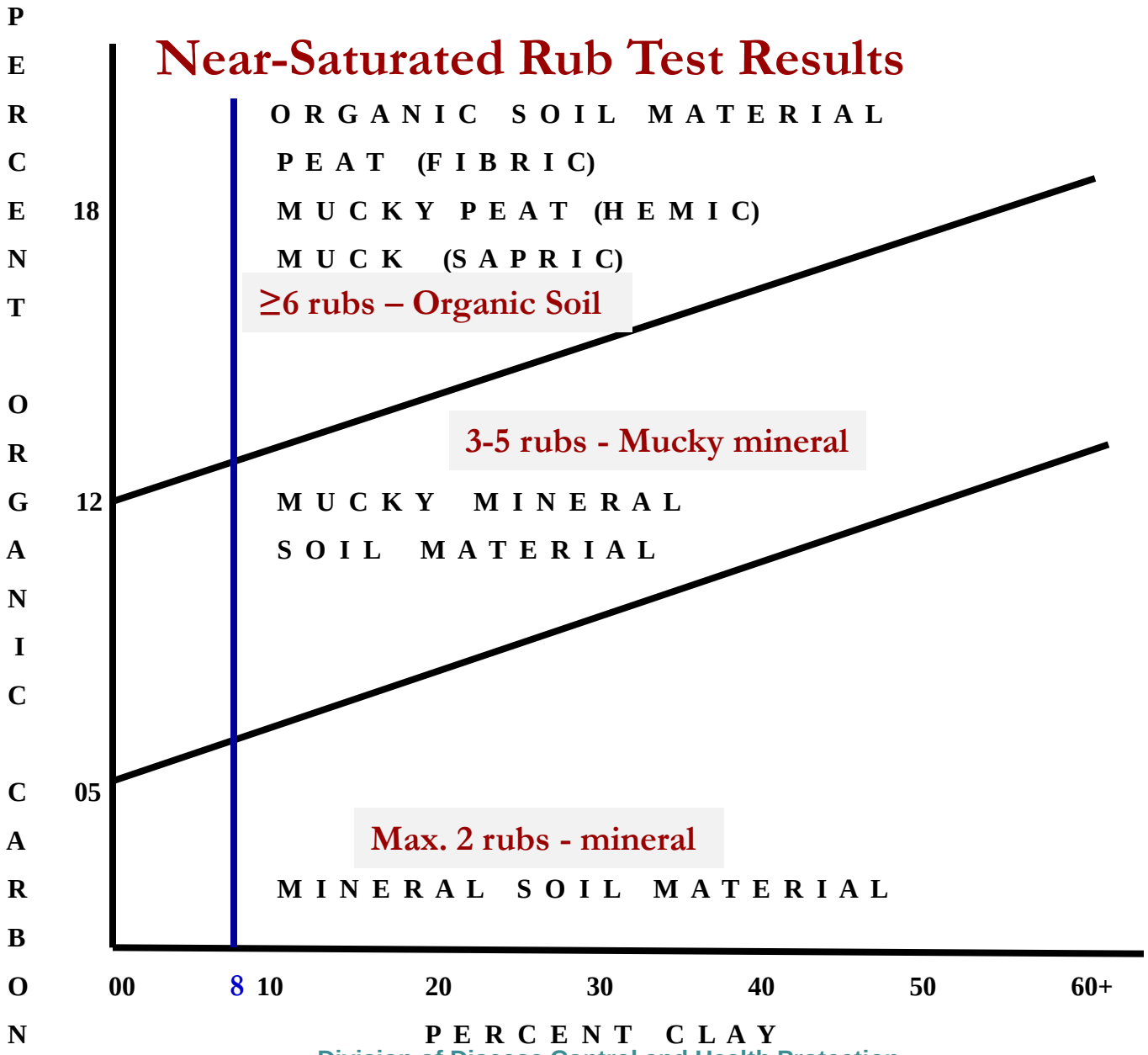
The Near-Saturated Soil Rub Test

- Make sure sample is near-saturated with water, rubs are “slightly firm”
- ≤ 2 light, quick rubs: if gritty/slick/plastic feel, is mineral soil
- 3-5 light, quick rubs: if gritty/slick/plastic feel, is mucky mineral soil
- ≥6 light, quick rubs: soil would be organic, usually muck (if greasy feel)

Water color in Organic Soil

- Water squeezed from different types of organic material have different colors
- Water from peat (fibric material-least decomposed) will be almost colorless
- Water from mucky peat (hemic material-intermediate decomposition) will be reddish in color
- Water from muck (sapric material-highest decomposition) is black

Near-Saturated Rub Test Results

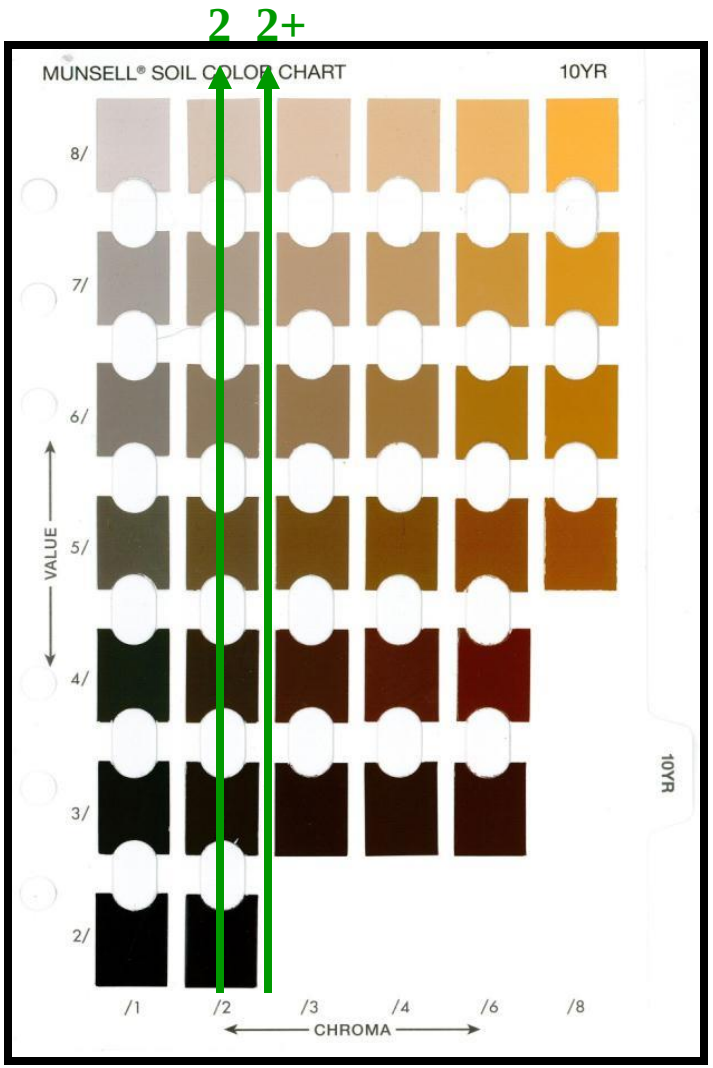


Moist Color

<u>All</u> color requirements (hue, value, and chroma) are for <u>*moist color only*</u>.

Colors *between* chips-yes, between chips

- *<u>Soil colors are not rounded to qualify as meeting an indicator</u>*
- 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



Three different groupings of HSI

- A indicators: used for All soils
- S indicators: used for Sandy soils (LFS and more coarse)
- F indicators: used for Fine textured (loamy/clayey soils) soils (LVFS and finer)

“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
- Nodules and concretions are not redox concentrations

Summary of the Florida "A" indicators

- Many "A" indicators require specific amounts of organic carbon (OC), such as muck or 70% masked criterion
- Most evaluators over-estimate the amount of organic carbon
- May need to work with soil scientist in your area to become familiar with standard

“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 <u>are not</u> redox concentrations

Summary of the “S” indicators

- 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

“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

F Indicator Notes

- 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 not easily identified
- It may be best to work with a local wetland scientist familiar with your region

Redox Concentrations in Hydric Soils

Different Requirements from Non-Hydric Soils

Redox Concentrations and HSI

- Redox colors still comes from Iron (Fe) and Manganese (Mn)
- Different criteria than non-hydric soils
- Must use the following redox concentration criteria whenever using HSI

Redox Concentration Requirements

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 and applies to hydric and non-hydric soils
- Note that gley colors are depletions, not concentrations so cannot be used to identify redoximorphic concentrations
- Note for Mn: except on flood plains of the Florida Panhandle, redoximorphic Mn is relatively unimportant

SUMMARY OF REDOXIMORPHIC FEATURE USE IN HSI

REDOXIMORPHIC FEATURES MUST:

- Have distinct or prominent contrast with the matrix
- Have diffuse boundaries EXCEPT where a specific indicator dictates otherwise

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

The 11 Dominant Hydric Soil Field Indicators used in Florida

We will focus on these indicators, but you need to know how to recognize <u>all</u> 25 HSI

Florida's Dominant Indicators

- A5 Stratified Layers
- A6 Organic Bodies
- A7 5 cm Mucky Mineral
- A8 Muck Presence
- A9 1 cm muck

Florida's Dominant Indicators

- S5 Sandy Redox
- S6 Stripped Matrix
- S7 Dark Surface
- S8 Polyvalue Below Surface
- S9 Thin Dark Surface
- F2 Loamy Gleyed Matrix

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 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.

NOTE

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

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

A5. Stratified Layers

- Individual strata are dominantly less than 2.5 cm (1 inch) thick
- Any sandy material that constitutes the value 3 or less and chroma 1 or less layer must meet 70% masked criterion

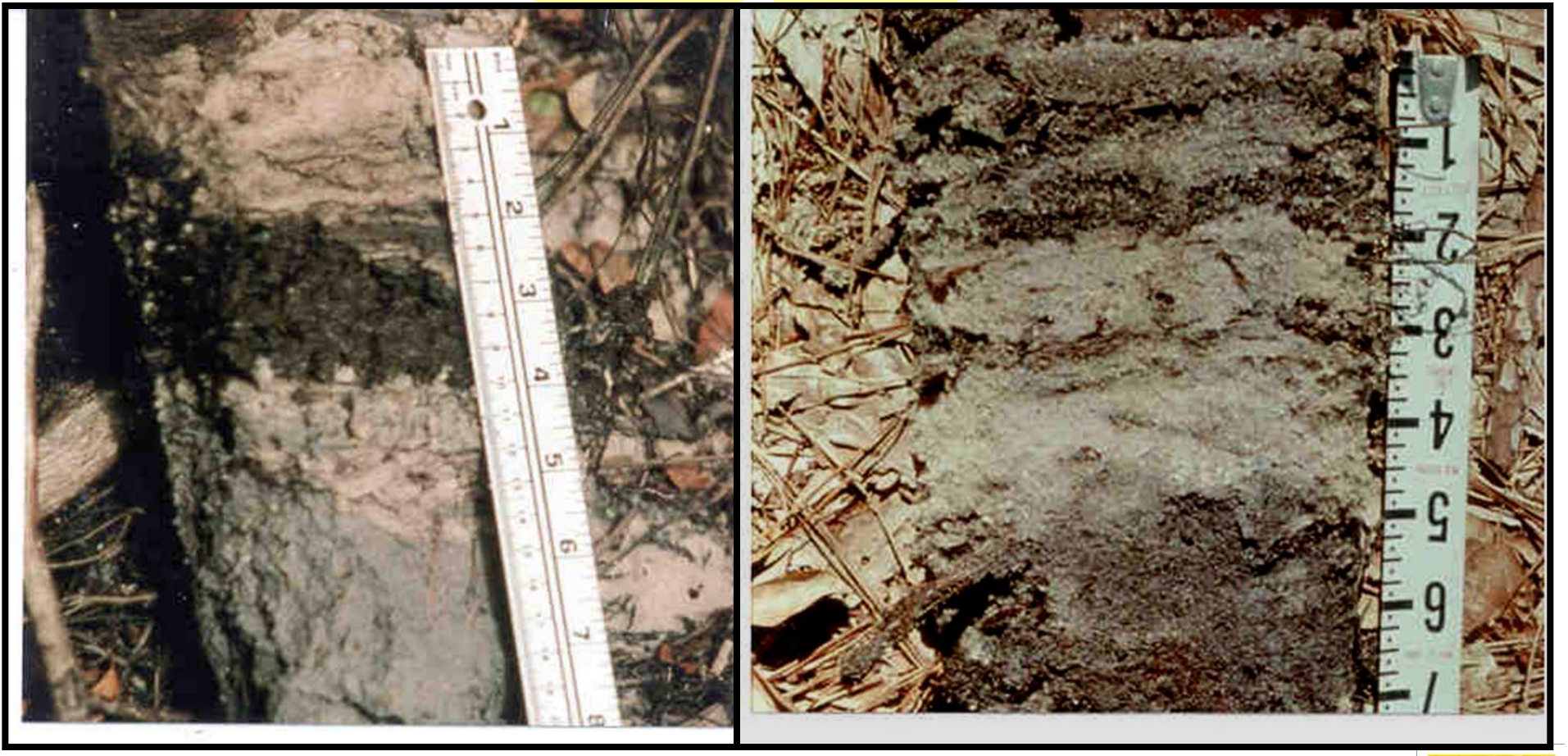
A5. Stratified Layers-User notes

- Hand lens aids in the identification of this indicator
- Many alluvial soils (formed by flowing water deposition) have stratified layers at greater depths and do not meet this indicator
- Many alluvial soils have stratified layers at the required depths but lack chroma 2 or less which will not meet the requirements of this indicator

Indicator A5 (Stratified Layers) in loamy and sandy materials. 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)

A5 Stratified Layers

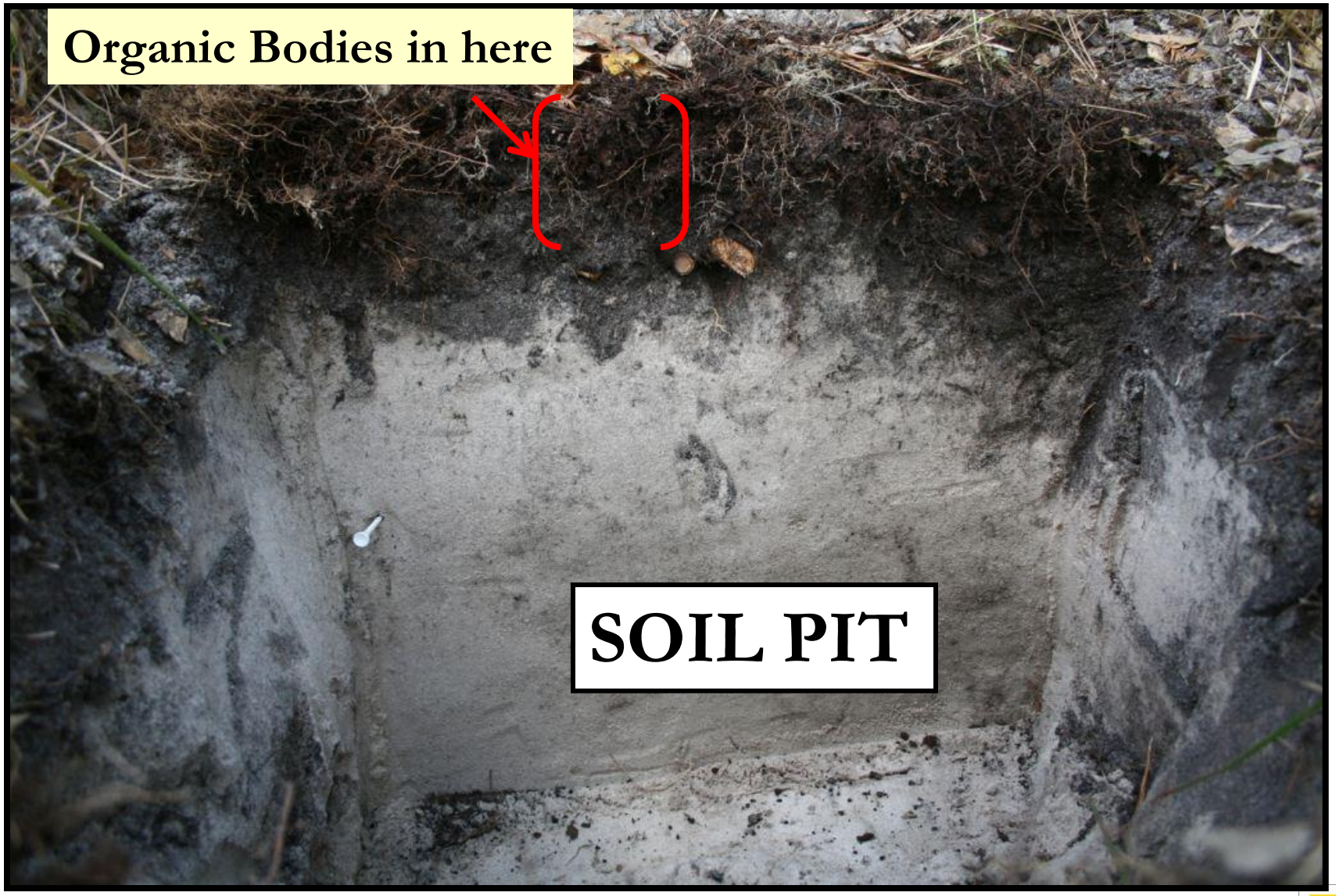
The required masked layer is near the surface

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 (0.4 to 1.2 inches) in diameter
- [Starting within 15 cm (6 inches) of the soil surface]
- See multiple user notes in “notes” section of slide”

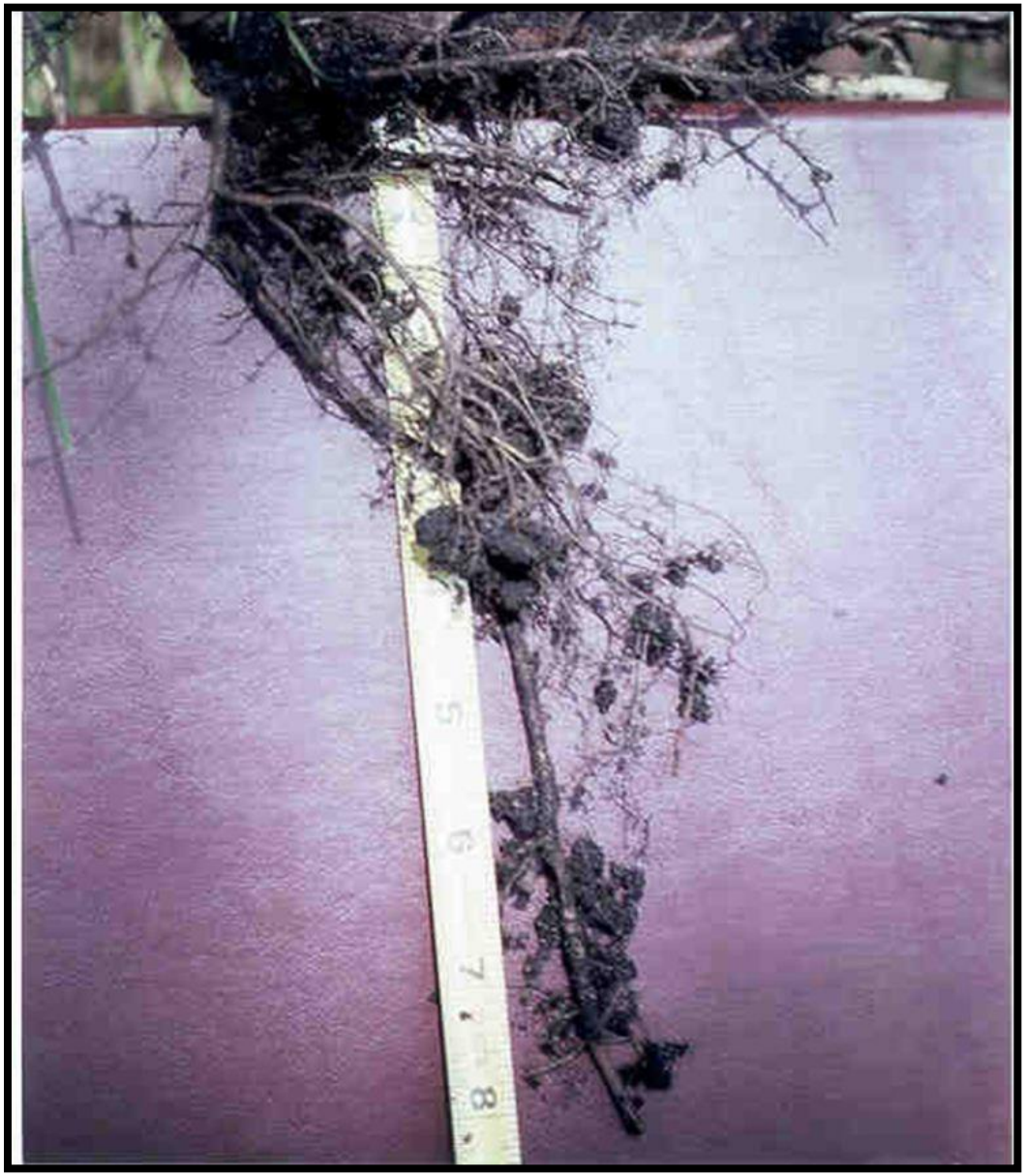
A6. Organic Bodies User Notes

- 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)


Organic Bodies in here
SOIL PIT

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)



- 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

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]
- 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

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

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

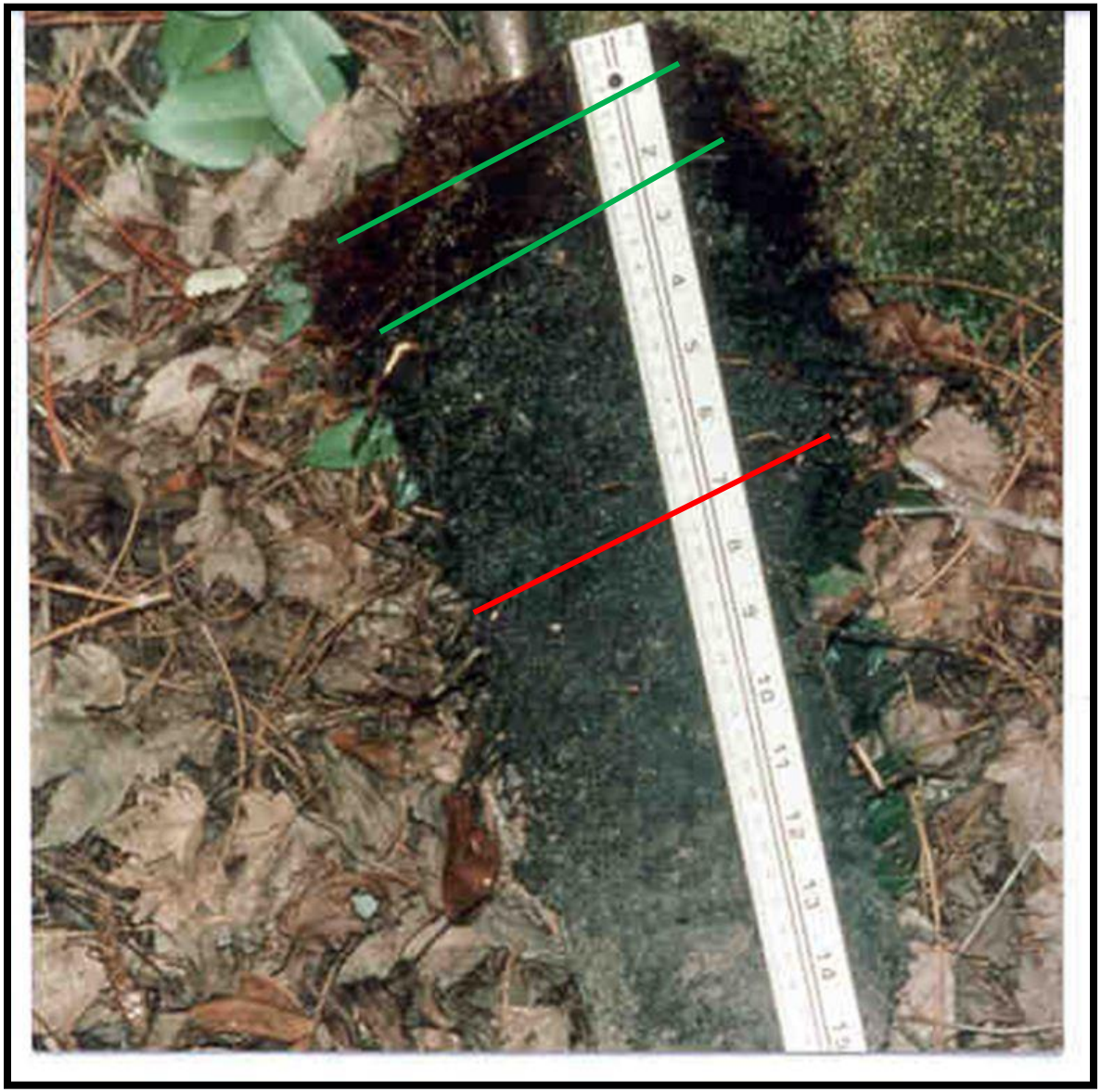
A8. Muck Presence

- *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]
- This is for presence only, *there is no thickness depth*
- Normally occurs at soil surface, but can be deeper
- Look for in natural setting, not tire tracks, etc.

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]
- This indicator has a minimum thickness requirement (hence the indicator name)
- Look for in natural setting

Muck begins at 5 inches in the profile



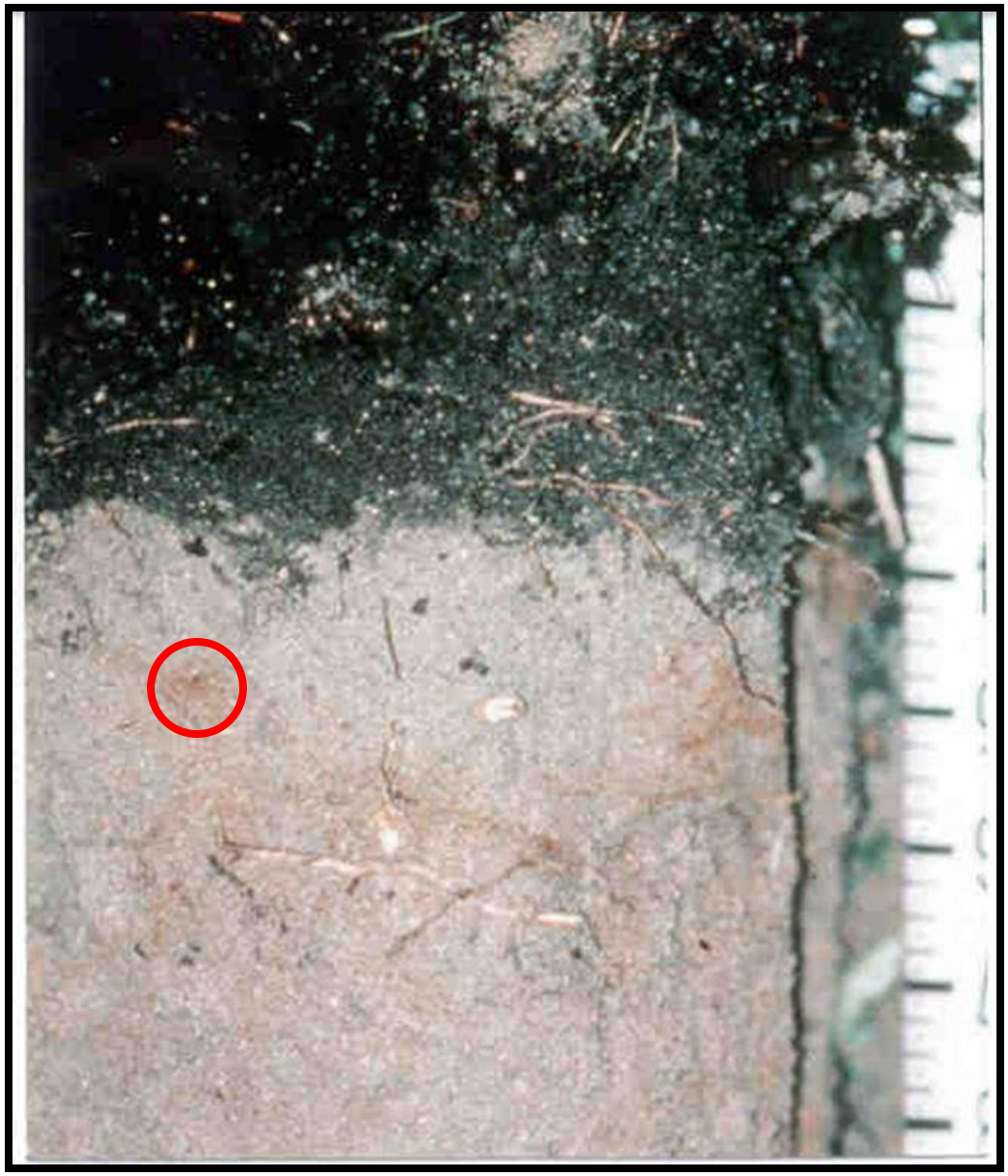
- This could be Indicator A8 or A9; also has Indicator S7 (Dark Surface)
- Muck is about 3 cm thick and the dark surface is 18 cm thick
- Scale is inches (R) and cm (L)

S5. Sandy Redox

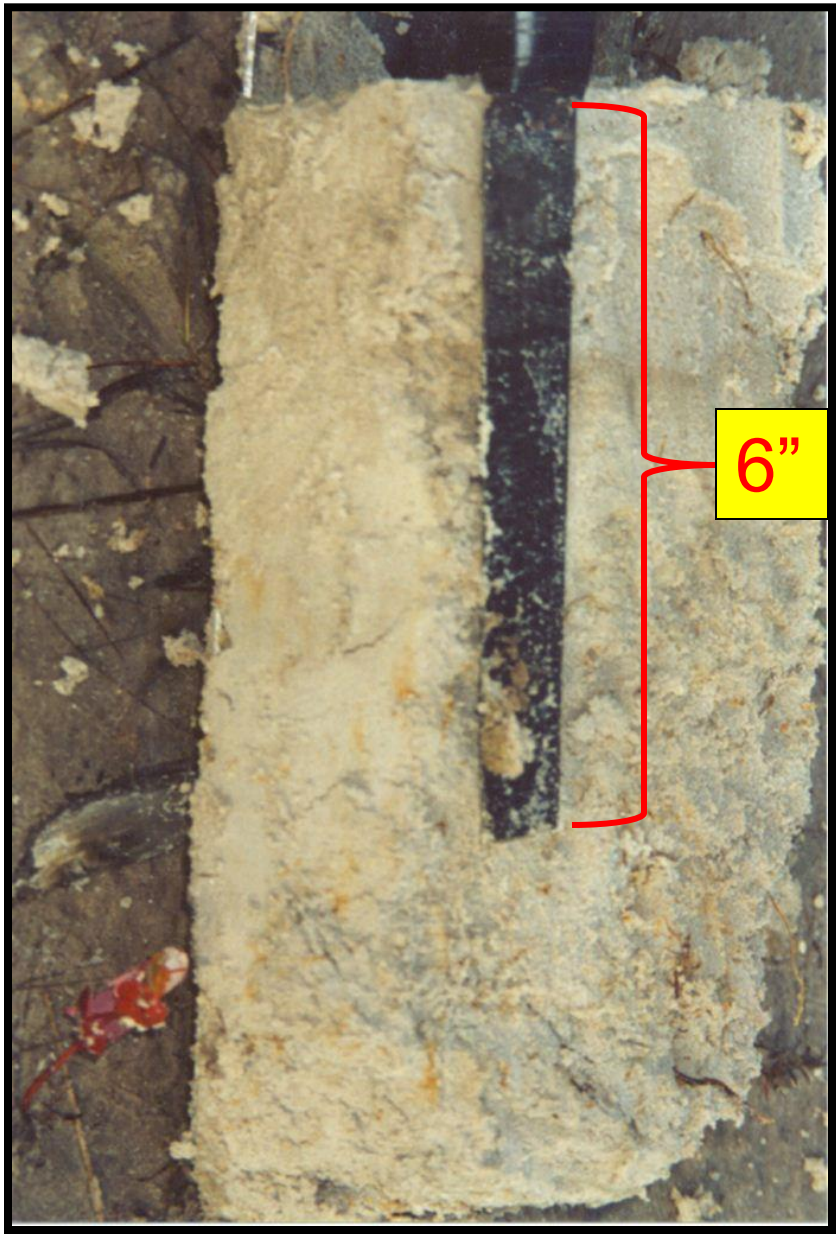
- *For use in all of Florida*
- A layer [starting within 15 cm (6 inches) of the soil surface] that is at least 10 cm (4 inches) thick, and has a matrix with 60% or more chroma 2 or less with 2% or more distinct or prominent redox concentrations as soft masses and/or pore linings
- This is a very common indicator

Sandy Redox

Redox splotches start within 6 inches on both (color altered)



- Indicator S5 (Sandy Redox)
- The redox concentrations are reddest in the center (near a pore) and diffuse into the matrix



S5 (Sandy Redox): redox concentrations may exist in any value matrix from gray (shown here) to black

Redox Concentration Boundaries: Exception

- *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 obscuring the diffused areas

Sandy Redox

(note how difficult the redox concentrations are to see)

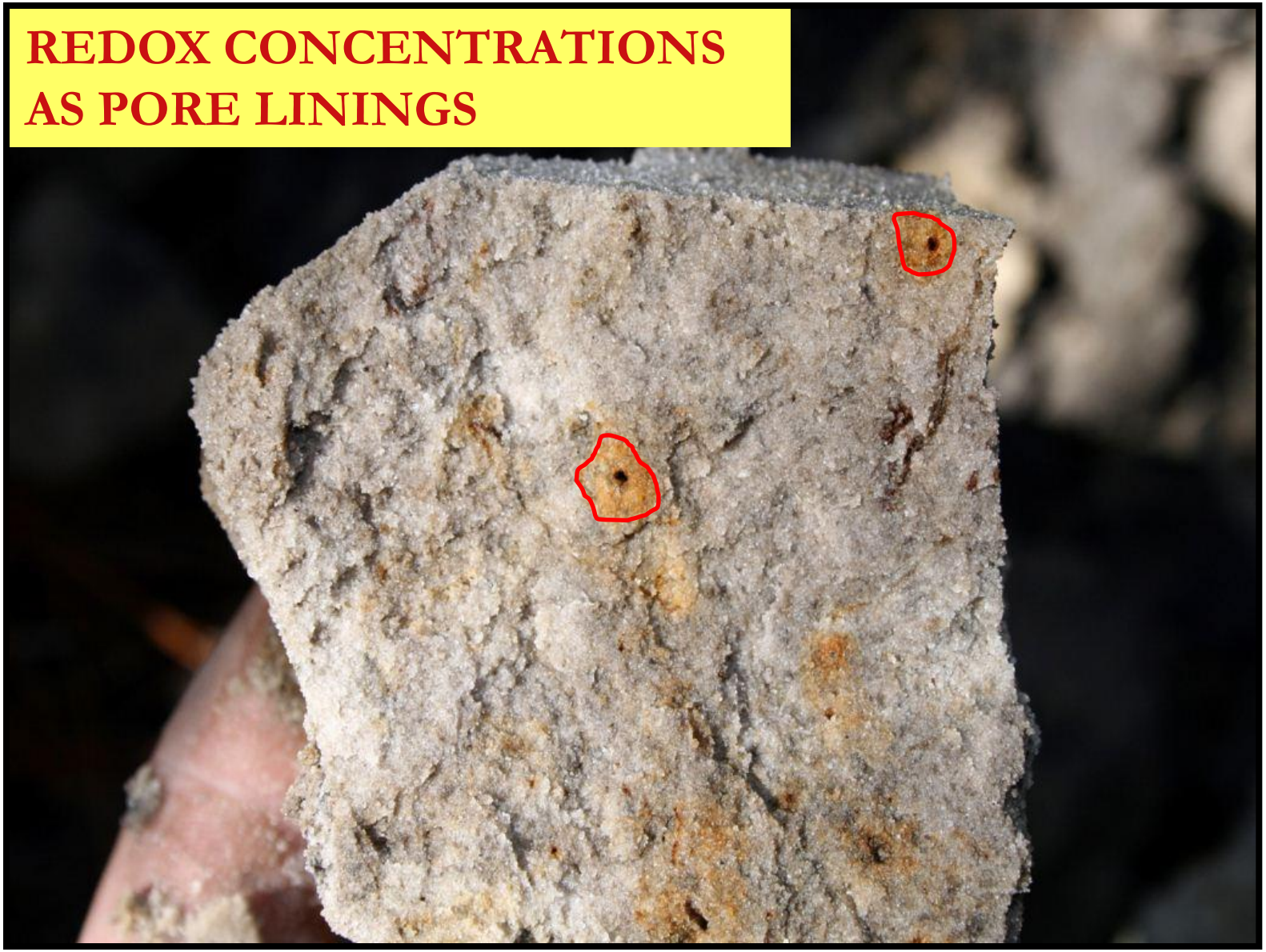
Sandy Redox Dark Soil Enlarged

Sandy redox in dark sands

Sandy redox in dark sands


SANDY REDOX

REDOX CONCENTRATIONS AS PORE LININGS



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 (removed) from the matrix
- The primary base color of the soil material has been exposed

S6. Stripped Matrix

- 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 of the volume and are rounded
- Includes the indicator previously named “polychromatic matrix” or “streaking”

S6. Stripped Matrix notes:

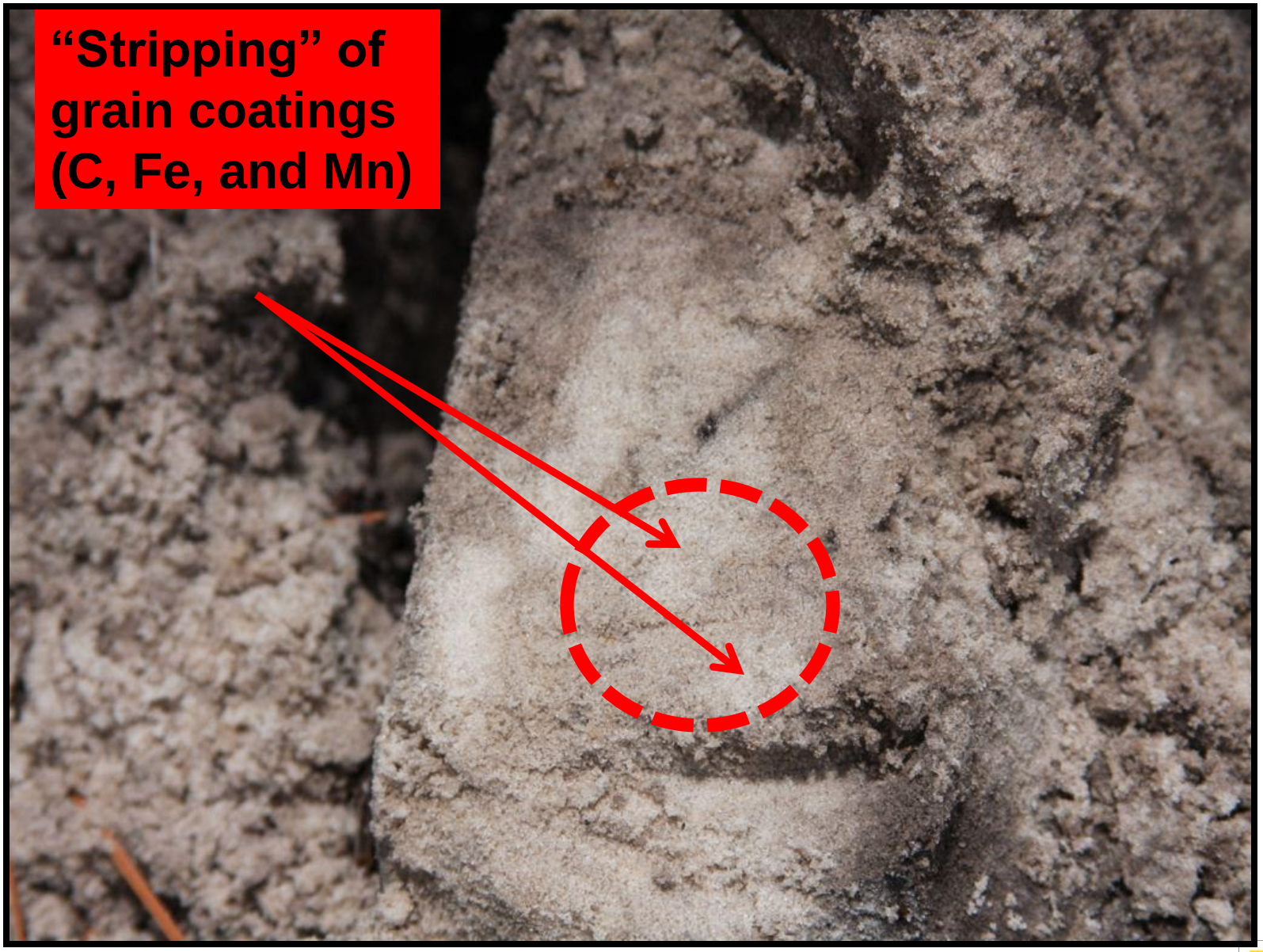
- Stripped areas are typically 1 to 3 cm (0.5 to 1 inch) in size, but may be larger or smaller
- The stripped areas commonly have value of 5 or more and have chroma of 1 and/or 2 and unstripped areas have chroma of 3 and/or 4
- The matrix *may not have* the material with 3 and/or 4 chroma

S6. Stripped Matrix notes:

- The mobilization and translocation of oxides and/or organic matter is the important process and should result in splotchy coated and uncoated soil areas
- Pattern may be difficult to recognize, is more evident when observing a horizontal slice

Indicator S6 (Stripped Matrix). The knife blade is pointing to a perfect example of a stripped splotch##

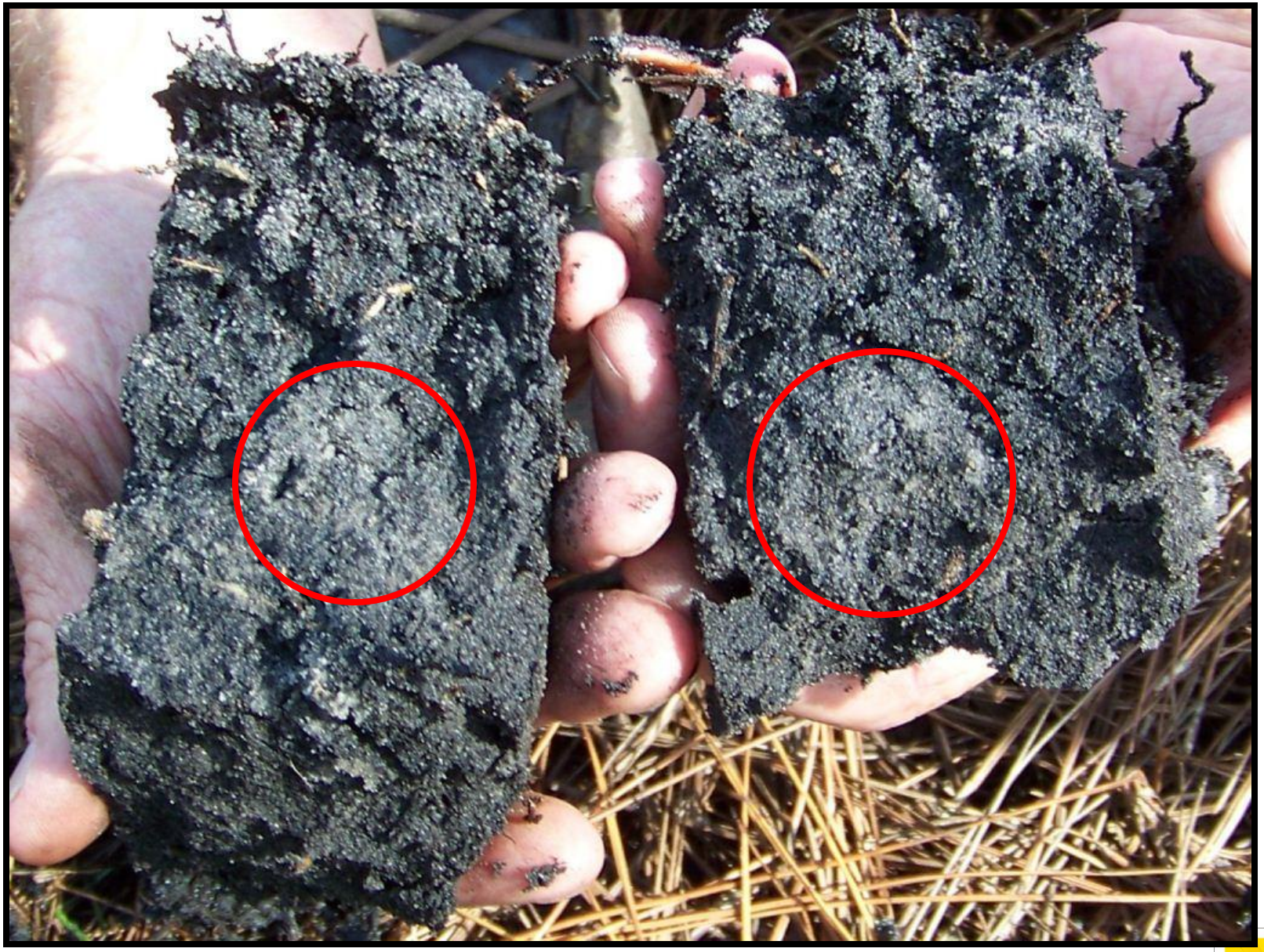
S6 (Stripped Matrix). Knife blade is six inches long.


“Stripping” of grain coatings (C, Fe, and Mn)

Stripped Matrix Horizontal Slice

Stripped Matrix

- The following slide shows Stripped Matrix in a dark horizon
- Note lighter colors in the center of the stripped areas progressively darkening as you move away from the center
- *Do not document only the dark matrix and gray color*
- *Must document all the subtle grays (faint contrast) in the sample as this is the stripped area*



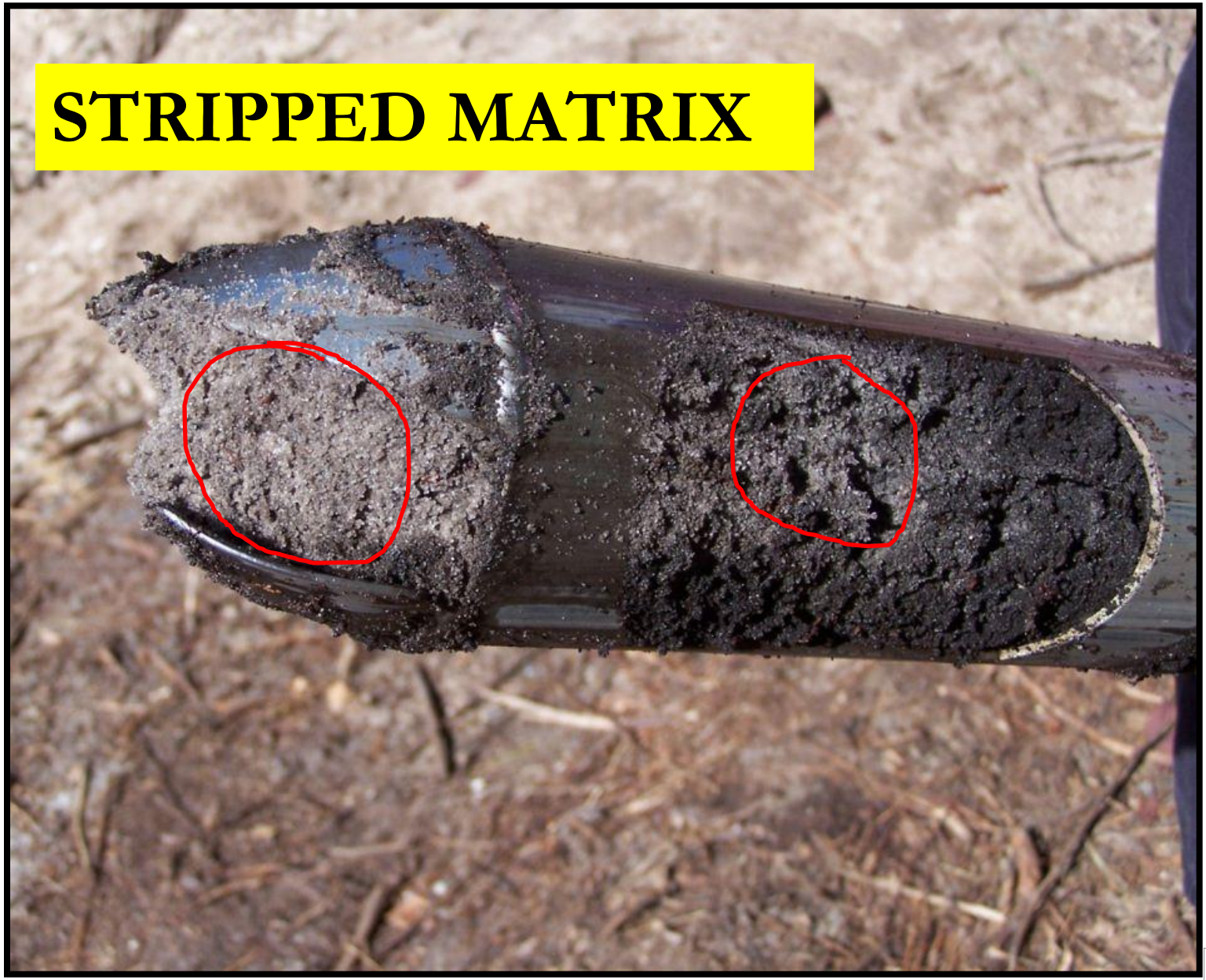
S6. Stripped Matrix

- Be careful when looking for this
- *Stripped Matrix (a.k.a. stripping) is often missed when using a bucket auger, so use of a* Sharpshooter-type shovel is needed
- Soil pit would be better, or dig a trench or pit (maybe with available backhoe)

S6. Stripped Matrix - *Caution*

- *<u>Do not focus on just Stripped Matrix</u>*
- *Other indicators may be present higher in the profile*
- *If other SHWT indicators are higher in the profile, must use them*
- *Area closest to ground surface where <u>any</u> SHWT indicator is met is the SHWT*

STRIPPED MATRIX



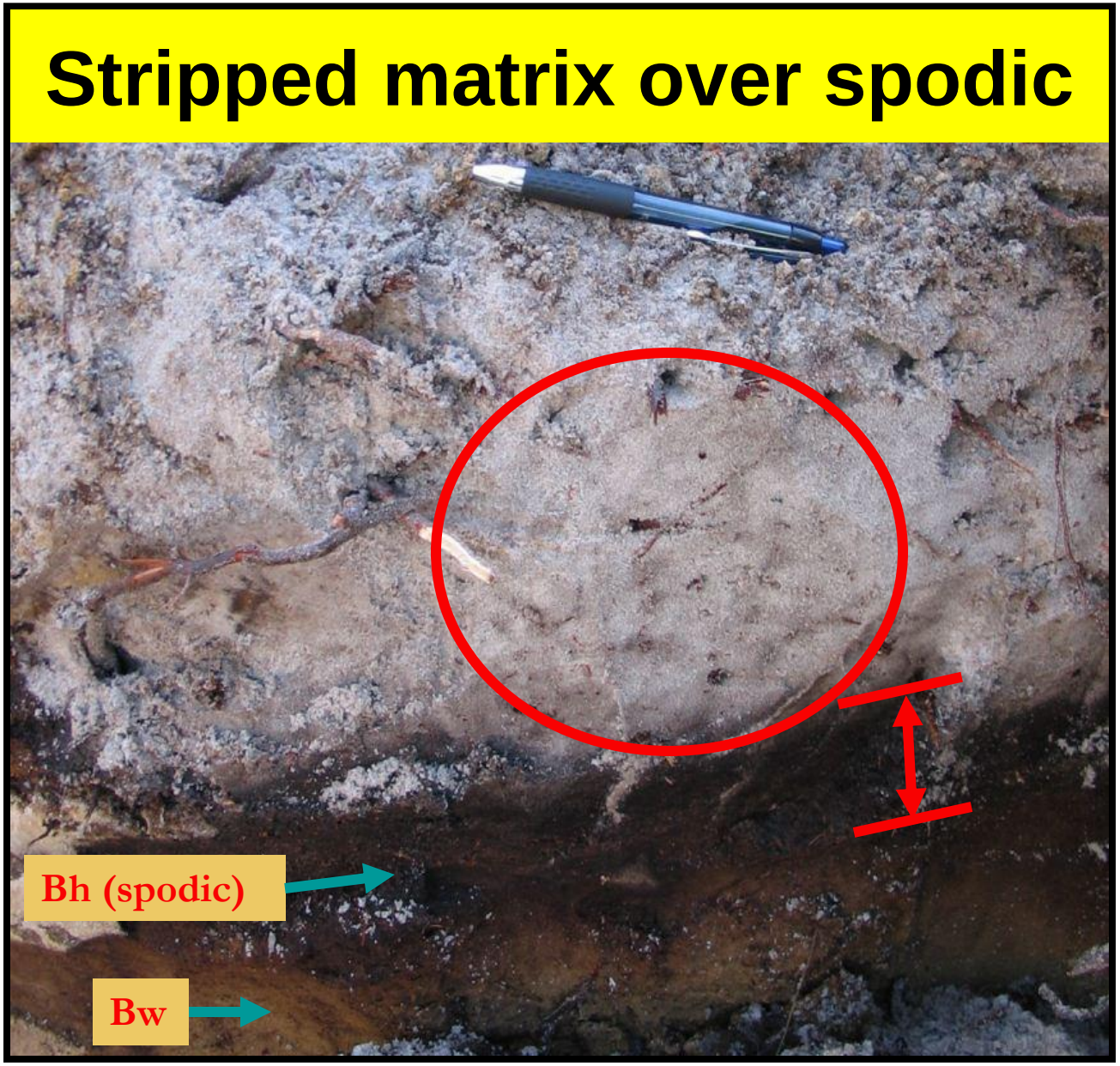
Stripped Matrix Note vertical plane of sample

SPLOTCHES

Stripped Matrix (and a little Fe)

Stripped Matrix and Sandy Redox

Stripped matrix over spodic



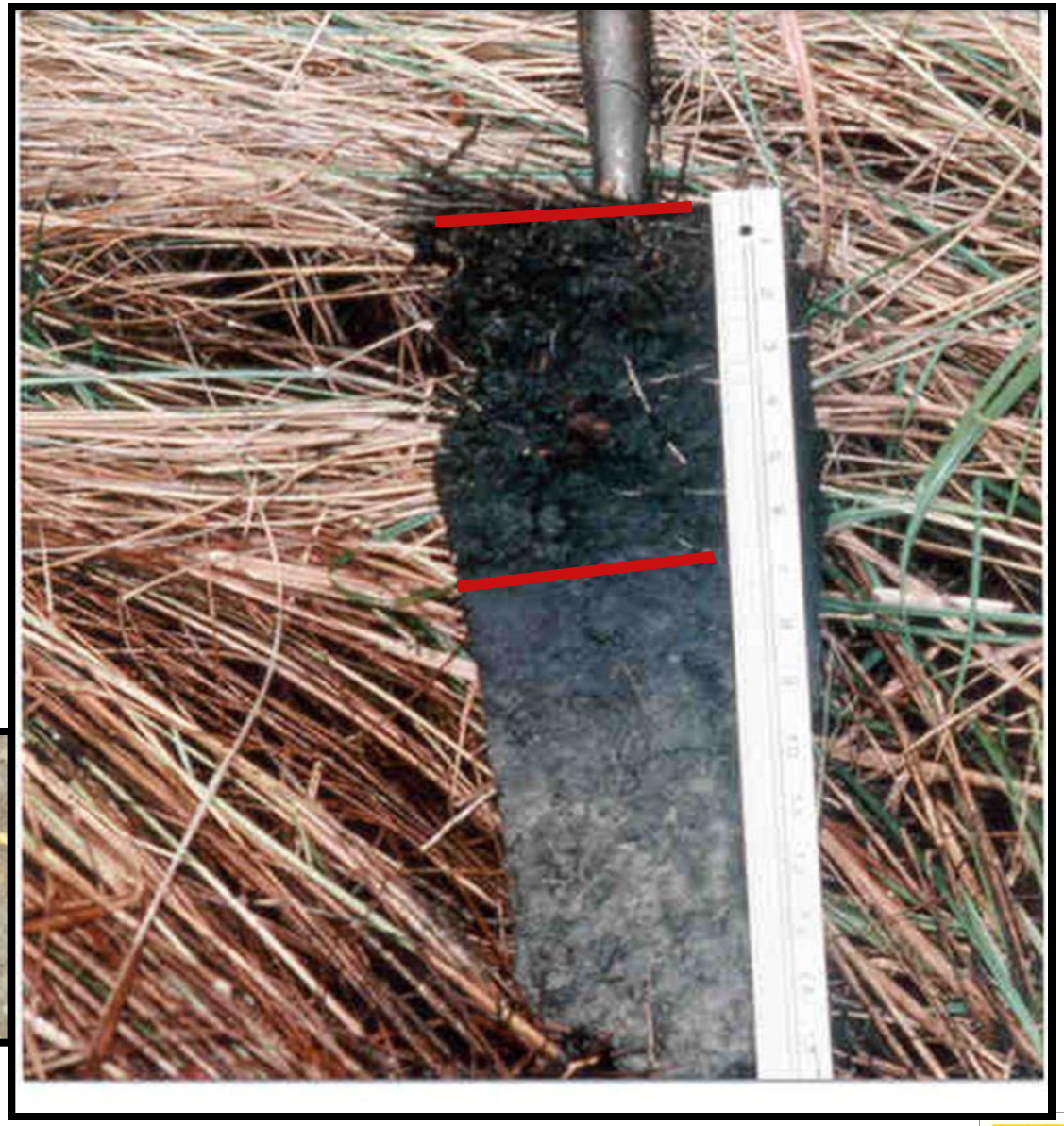
COATED (REDDISH) AND UNCOATED (LIGHTER) SAND GRAINS (*NOT STRIPPED MATRIX, HAS SHARP BOUDARIES*)

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 matrix value 3 or less and chroma of 1 or less with 70% masked criterion required
- The layer immediately below the dark layer must have matrix color as those described above or any color that has chroma of 2 or less

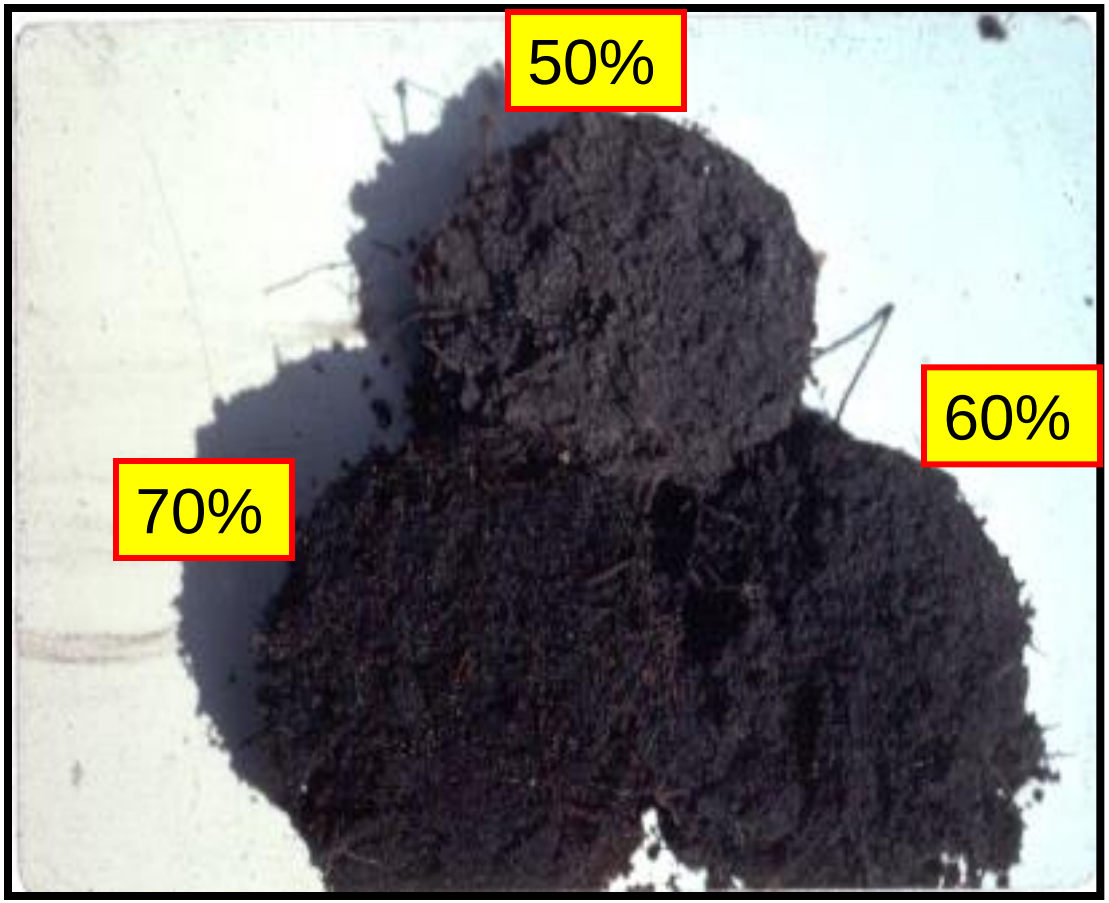
Indicator S7 (Dark Surface). The dark surface is 17 cm thick. Scale is inches (R) and cm (L)

A 10X or 15X hand lens is a tool to help make this decision

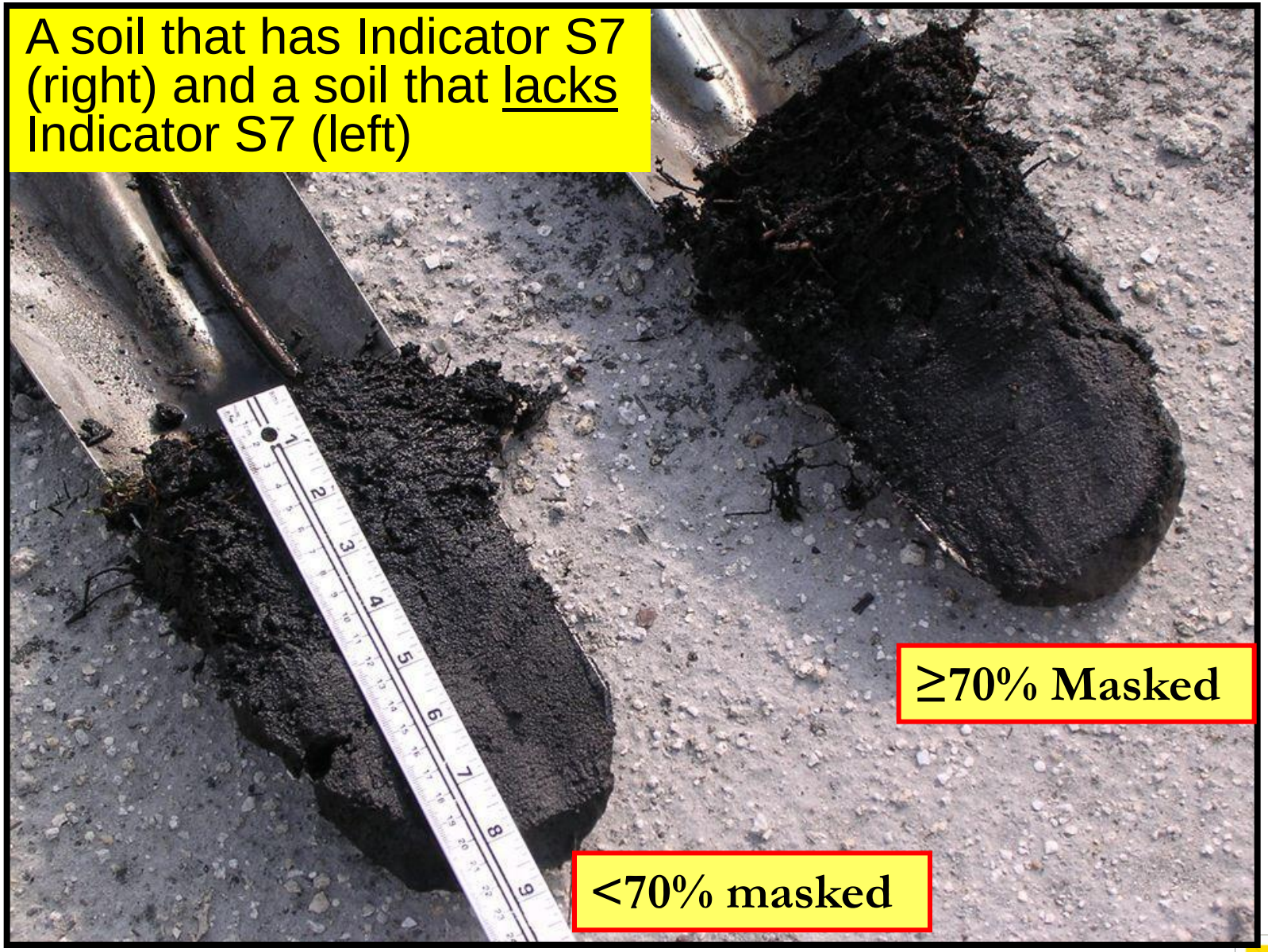


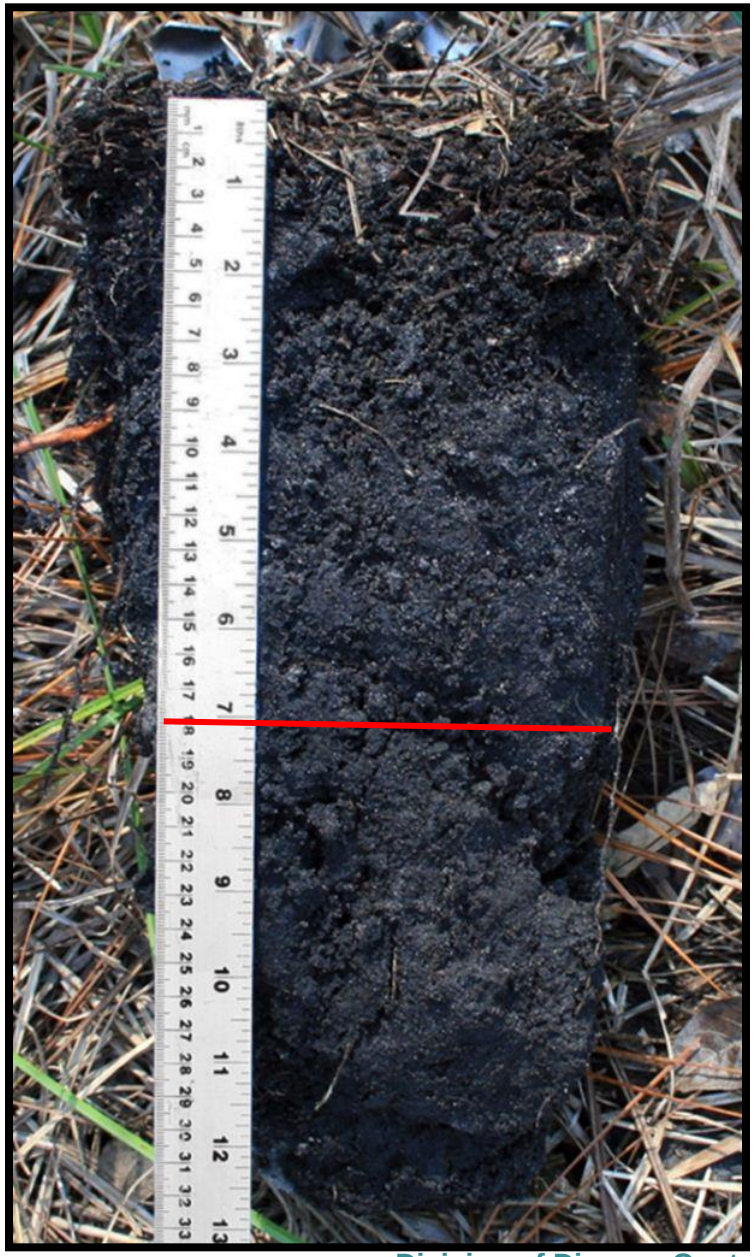
Remember 70% Masked Criterion

- 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



A soil that has Indicator S7 (right) and a soil that lacks Indicator S7 (left)





S7 Dark Surface
The required masked material starts at the mineral surface and extends to a depth of about 7 inches

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] with 70% masked criterion required
- Immediately below the masked layer, 5%-100% of the soil volume has value ≤3 and chroma ≤1
- Continued next slide

S8. Polyvalue Below Surface

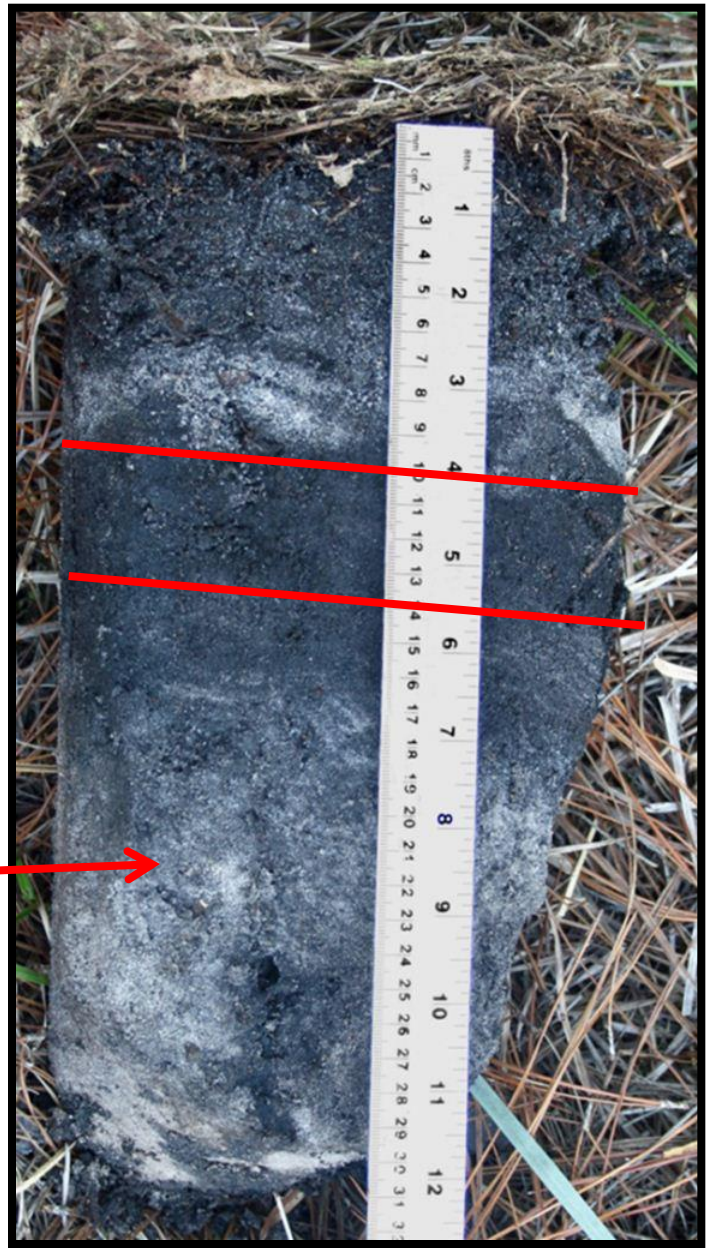
- The remainder of the soil volume (if any) has value ≥4 and chroma ≤1 to a depth of 30 cm (12 inches) or to the spodic horizon, whichever is less

S8 User Notes

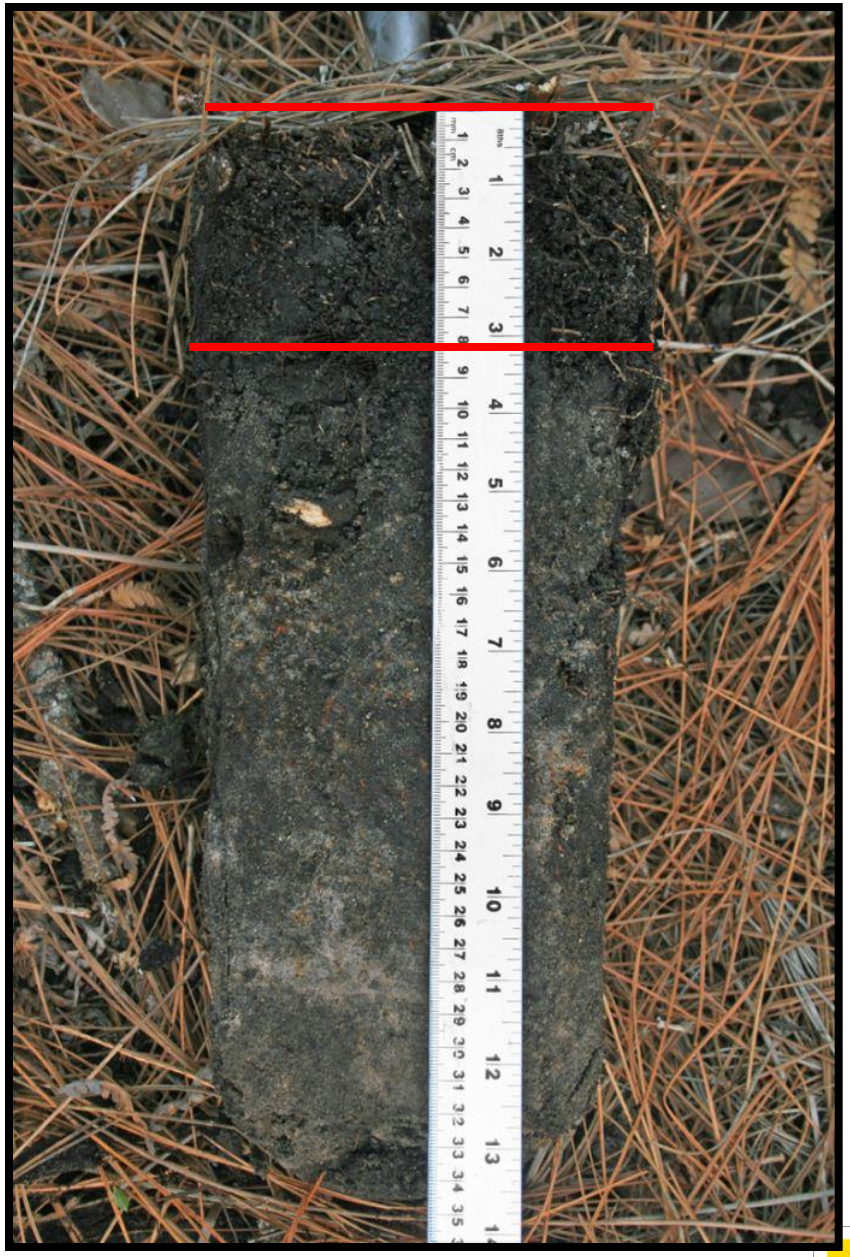
- This indicator describes soils with a very dark gray or black layer <10 cm (4 inches) thick underlain by a layer where organic matter has been differentially distributed within the soil by water movement
- The mobilization and translocation of organic matter results in splotchy coated and uncoated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

Required masked layer starts about 4”

Splotchy coated/uncoated soil



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



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

Pit from which plug was taken

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 with 70% masked criterion met
- This layer is underlain by a layer(s) with value ≤4 and chroma ≤1 (dark gray or blacker) to a depth of 30 cm (12 inches) or to the spodic horizon, whichever is less
- See user notes next two slides

S9. User Notes

- This indicator describes soils with a very dark gray or black soil 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

S9. User Notes

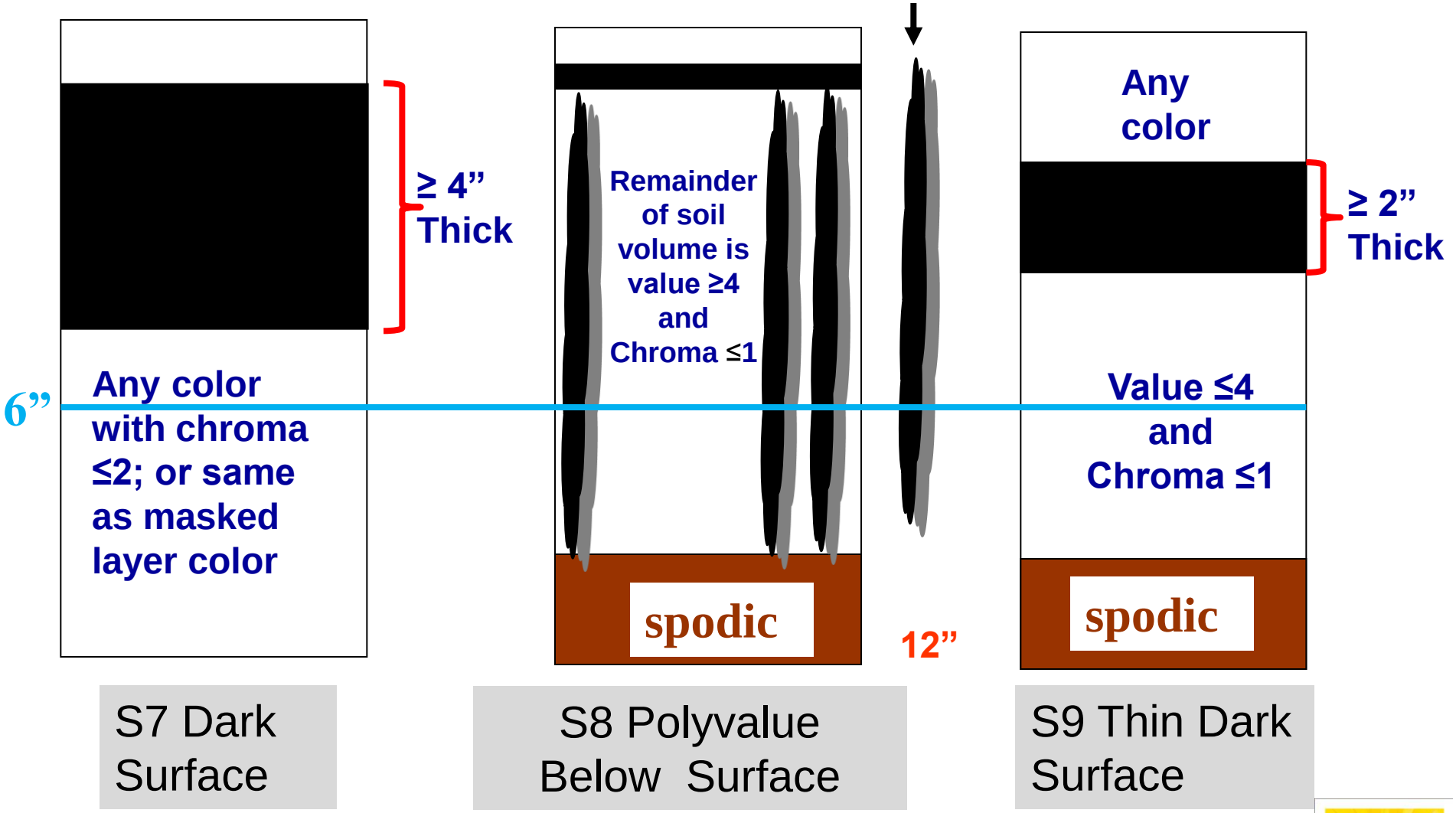
- The chroma 1 or less is critical because it limits application of this indicator to only those soils which are depleted of iron
- This indicator commonly occurs in hydric Spodosols; however, a spodic horizon is not required

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

Differentiation Between Indicators S7, S8 and S9

The black squares on the next slide indicates a value ≤ 3 and chroma ≤ 1 and the 70% masked criterion is met

Value 3 or less and chroma 1 or less (5-100%); 70% masked not required



S7 Dark Surface

S8 Polyvalue Below Surface

S9 Thin Dark Surface

Sample Observation

- Always look at samples that have a natural face
- When determining if a color is dark enough to meet 70% masked criterion do not touch the sample as it can translocate material, altering the natural condition
- Break open and make observations on natural surface by picking the surface

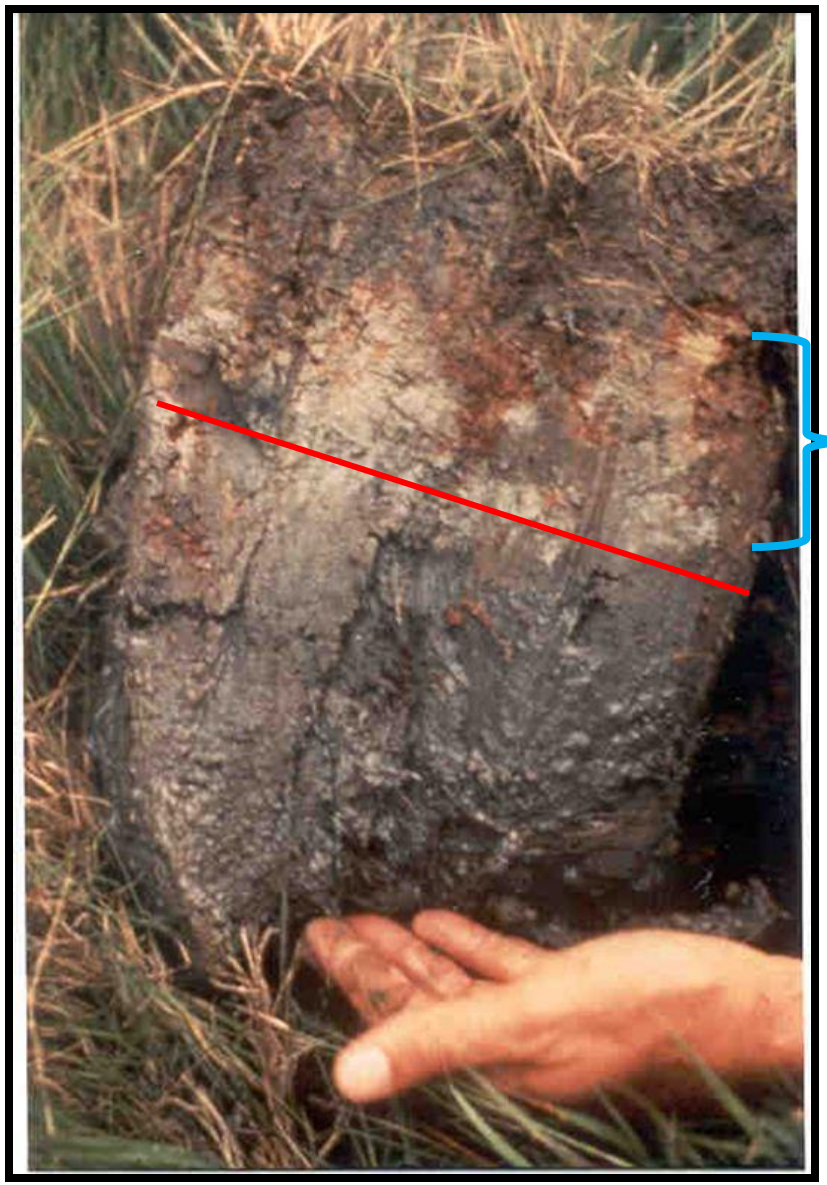
F2. Loamy Gleyed Matrix

- *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]
- Any color on the Gley Charts with value ≥4 meets the indicator
- Included reduced matrix (color change)
- See user notes next two slides

F2. 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)
- Soils with gleyed matrices are saturated for a significant duration, this is why no thickness of the layer is required

Indicator F2 (Loamy Gleyed Matrix) starts at the soil surface. Scale is inches



- Indicator F2 (Loamy Gleyed Matrix). The gleyed matrix begins at a depth of about 18 cm
- Indicator F3 (Depleted Matrix-bracketed area) also occurs between the gleyed matrix and the surface layer

F2 Loamy Gleyed Matrix Requires gleyed matrix must occupy ≥60% of the soil layer. Colors must appear on Gley Charts and have Value ≥4.

THE END

QUESTIONS?