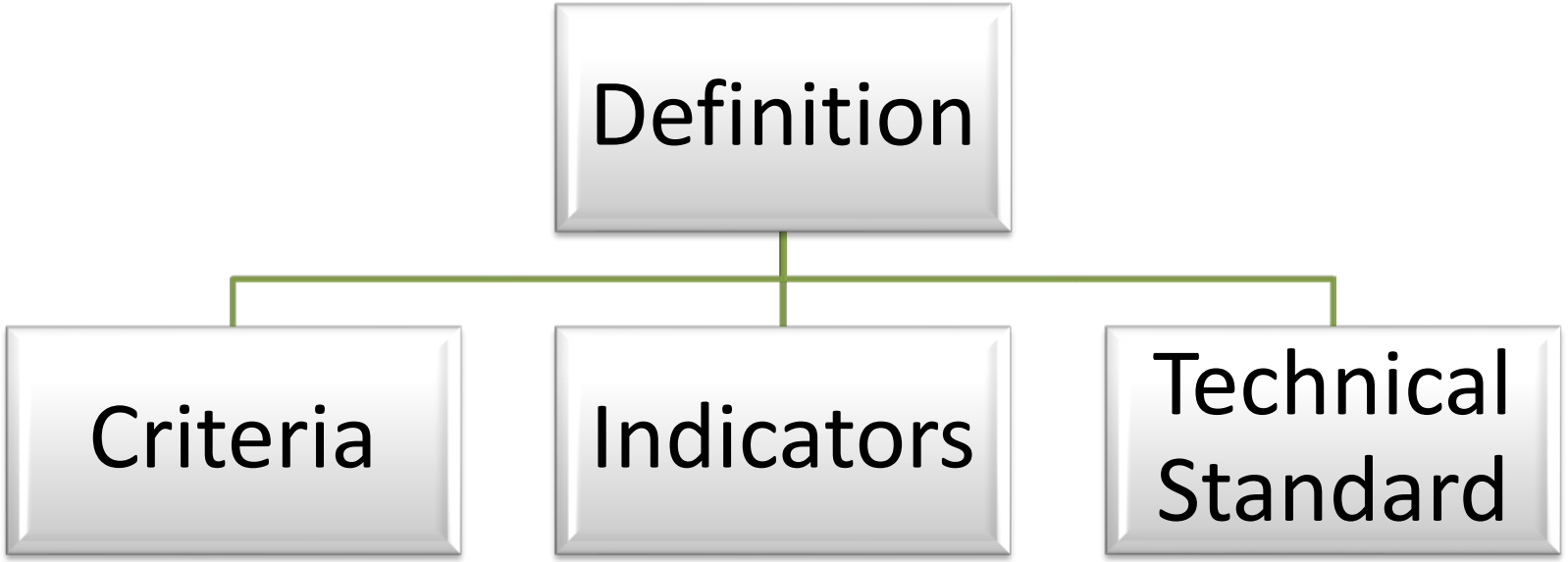
ILLINOIS SOIL CLASSIFIERS ASSOCIATION

INTRODUCTION TO HYDRIC SOILS

Presented By: Alicia Metzger, CPSC, PWS, CWS

WHAT IS A HYDRIC SOIL?



- All hydric soils must meet the definition

DEFINITION OF A HYDRIC SOIL

- "A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part"(Federal Register, 1994)
  - "that formed under" – hydrology alteration does not make a hydric soil no longer hydric
  - "develop anaerobic conditions" – lack oxygen; does not have to be reduced/gleyed
  - "in the upper part" – generally 12.5 cm (5 inches) in a sandy soil and 25 cm (10 inches) in a fine textured soil

CRITERIA FOR HYDRIC SOILS

1. All **Histels** except Folistels and **Histosols** except Folists; or
2. Map unit components in **Aquic** suborders, great groups, or subgroups, **Albolls suborde**r, **Historthels** great group, **Histoturbels** great group, or **Andic, Cumulic, Pachic, or Vitrandic** subgroups that:
    1. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    2. Show evidence that the soil meets the definition of a hydric soil;
3. Map unit components that are frequently **ponded** for long duration or very long duration during the growing season that:
    1. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    2. Show evidence that the soil meets the definition of a hydric soil; or
4. Map unit components that are frequently **flooded** for long duration or very long duration during the growing season that:
    1. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    2. Show evidence that the soils meet the definition of a hydric soil

CRITERIA FOR HYDRIC SOILS

- Hydric soils lists
  - Not all soils on the list are hydric*
    - Range of characteristics may include both hydric and non-hydric soils
- Hydric soil lists are an interpretative rating which must be confirmed by on-site investigations
- Criteria are not intended for on-site application
  - Field Indicators
- Criteria 1 is an indicator
- Data must be collected to prove Criteria 2, 3, or 4

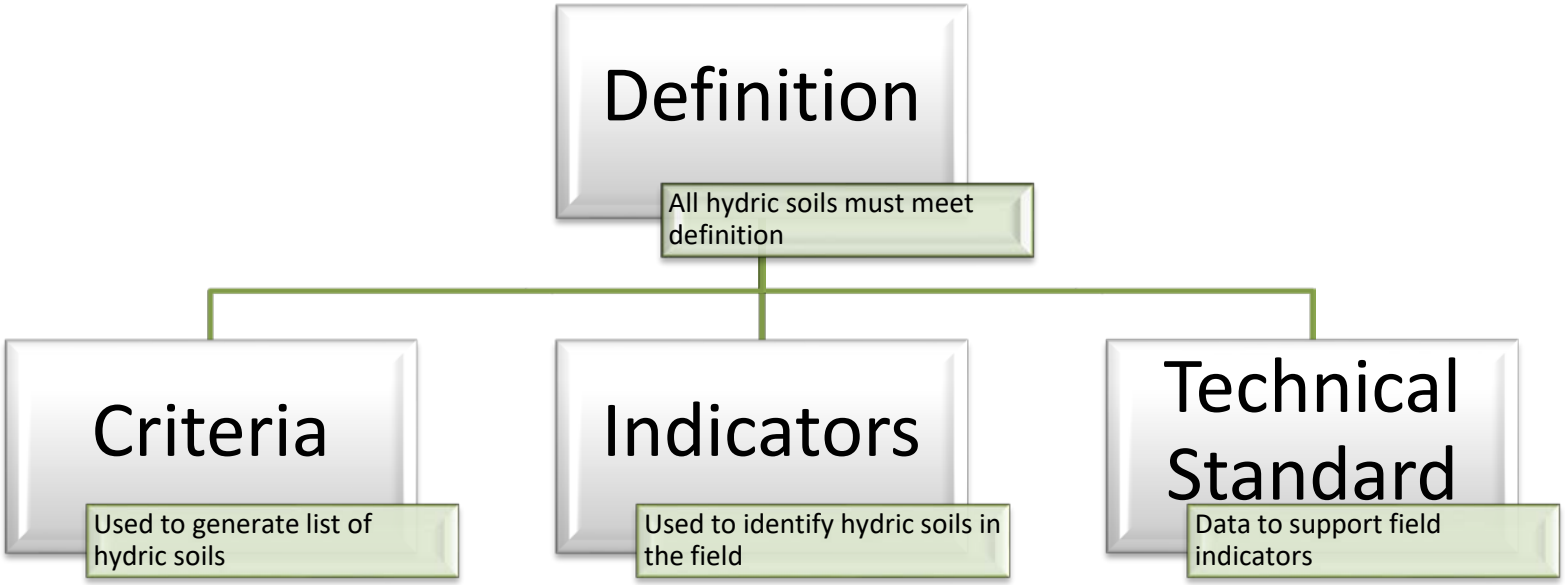
FIELD INDICATORS OF HYDRIC SOILS

- Not intended to replace the requirements in the definition
- Used to identify hydric soil component of wetlands
- **Some hydric soils may not meet any of the currently listed indicators – it may still be hydric by definition**
  - **Proof positive = must prove it is upland soil below thick dark surface (don't stop at 12 inches!! Keep going otherwise assume its hydric)**

TECHNICAL STANDARD FOR HYDRIC SOILS

- Water table measurements
  - Wells
- Reduced potential measurements
- Reduced Iron (Fe II) measurements
  - IRIS Tubes
- On-site pH measurements
- On-site precipitation data
  - Rain gauges

INTRODUCTION TO HYDRIC SOIL INDICATORS SUMMARY



- Not all hydric soils are wetland
- Wetland may still be present if soil doesn't meet hydric soil indicators
  - You must prove it is upland soil
  - Go deeper than 12 inches in the thick black soils of Northern Illinois

QUESTIONS?

ISCA
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ILLINOIS SOIL CLASSIFIERS ASSOCIATION

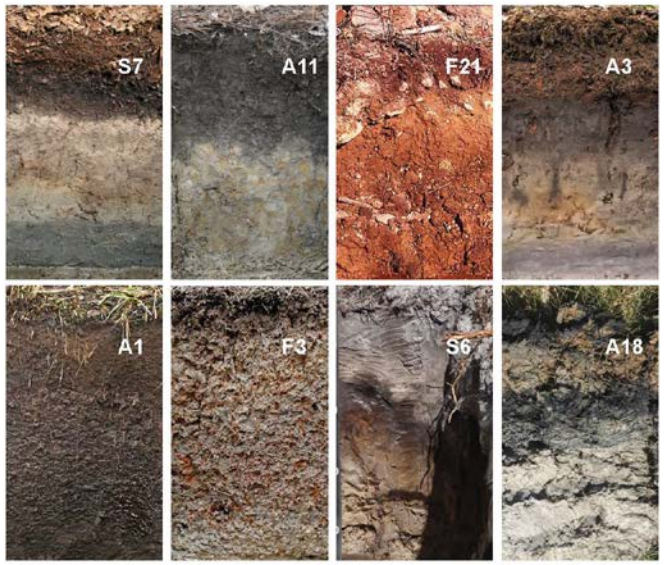
FIELD INDICATORS OF HYDRIC SOILS

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

In cooperation with the National Technical Committee for Hydric Soils

Field Indicators of Hydric Soils in the United States

A Guide for Identifying and Delineating Hydric Soils, Version 9.3, 2026



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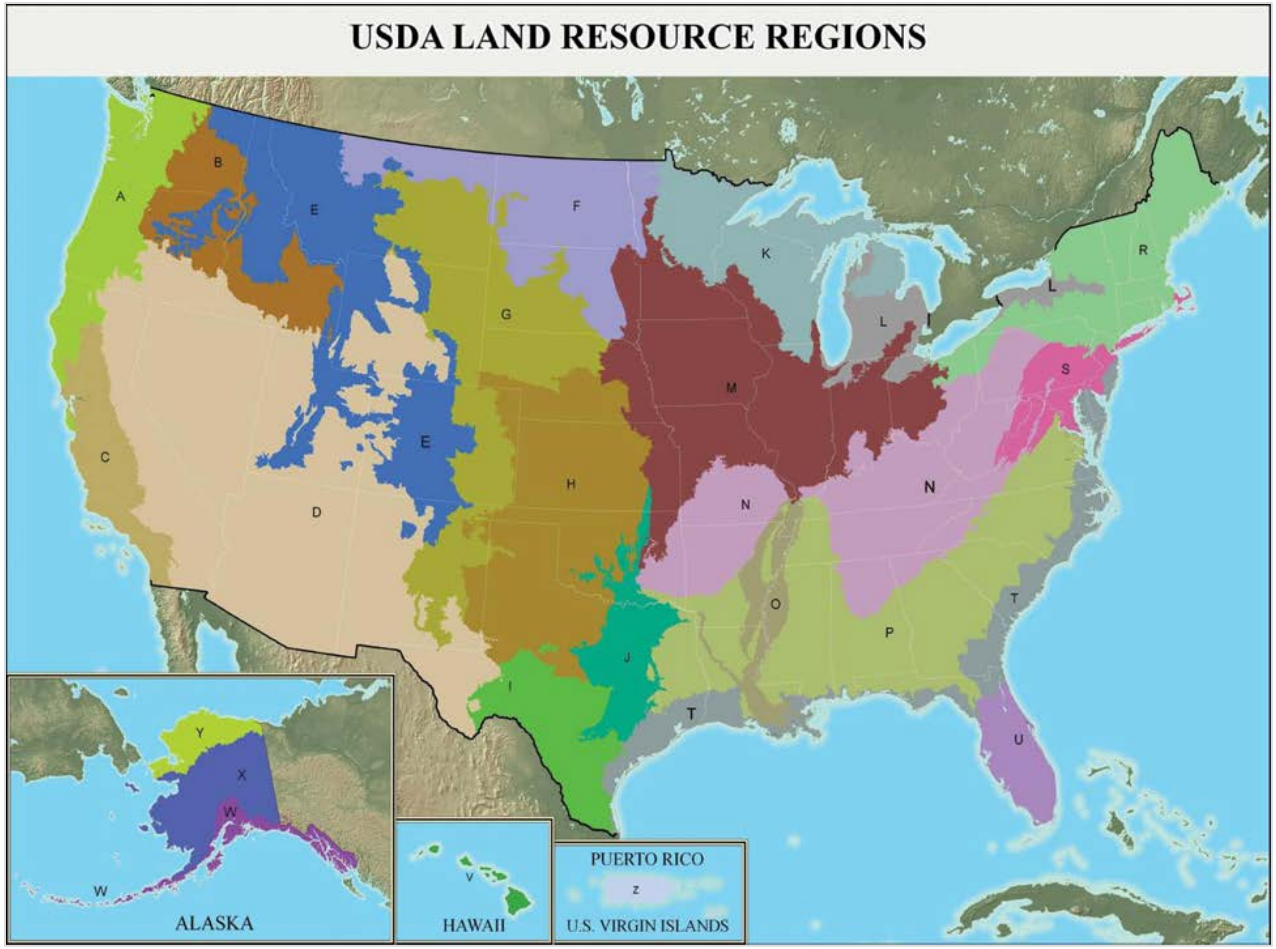
FIELD INDICATORS OF HYDRIC SOILS

- Morphological features are used to identify hydric soils
  - Concentrations
  - Depletions
- Result from saturation and anaerobic conditions (lack of oxygen)
- Formed primarily by:
  - Accumulation or loss of iron (orange/gray colors), manganese (black “BBs”), sulfur, or carbon compounds
- Used for on-site verification of hydric soils
- Soils can meet more than one indicator
  - Or may not meet an indicator
- Regionally specific
  - LRR/MLRA
  - USACE Regional Supplement

LAND RESOURCE REGIONS (LRR) IN IL



- **K – Northern Lake States Forest and Forage Region**
- L – Lake States Fruit, Truck and Dairy Region
- **M – Central Feed Grains and Livestock Region**
- N – East and Central Farming and Forest Region
- O – Mississippi Delta Cotton and Feed Grains
- P – S. Atlantic and Gulf Slope Cash Crops, Forest, and Livestock

USACE REGIONAL SUPPLEMENTS IN IL

- **Midwest**
- **Northcentral and Northeast**
- Eastern Mountains and Piedmont
- Atlantic and Gulf Coastal Plain

MIDWEST VS NCNE INDICATORS

Midwest

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining. M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils [3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ○

Remarks:

NC NE

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

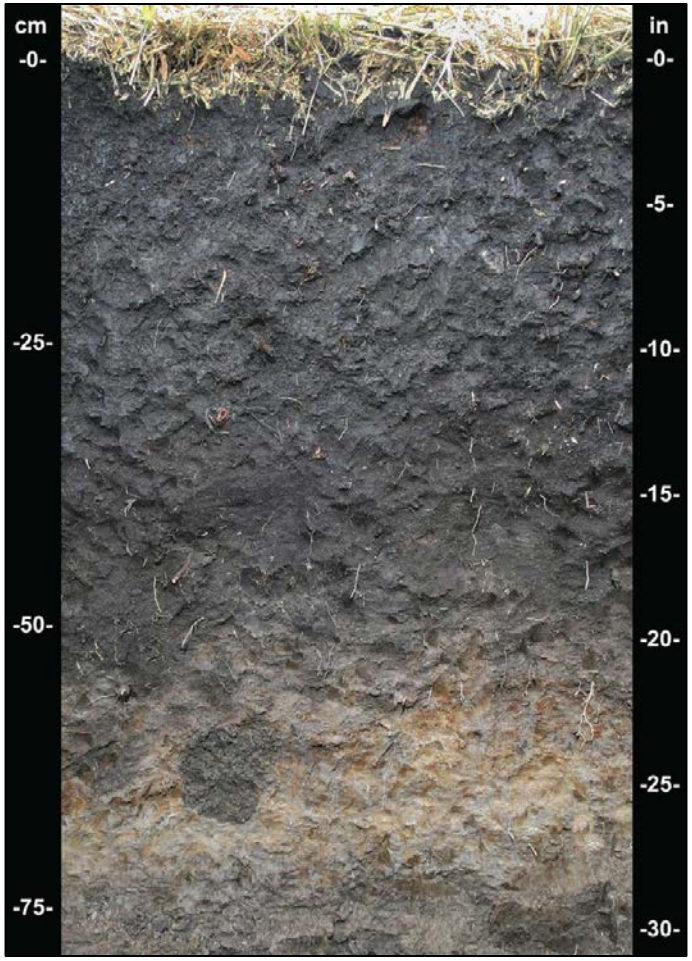
Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

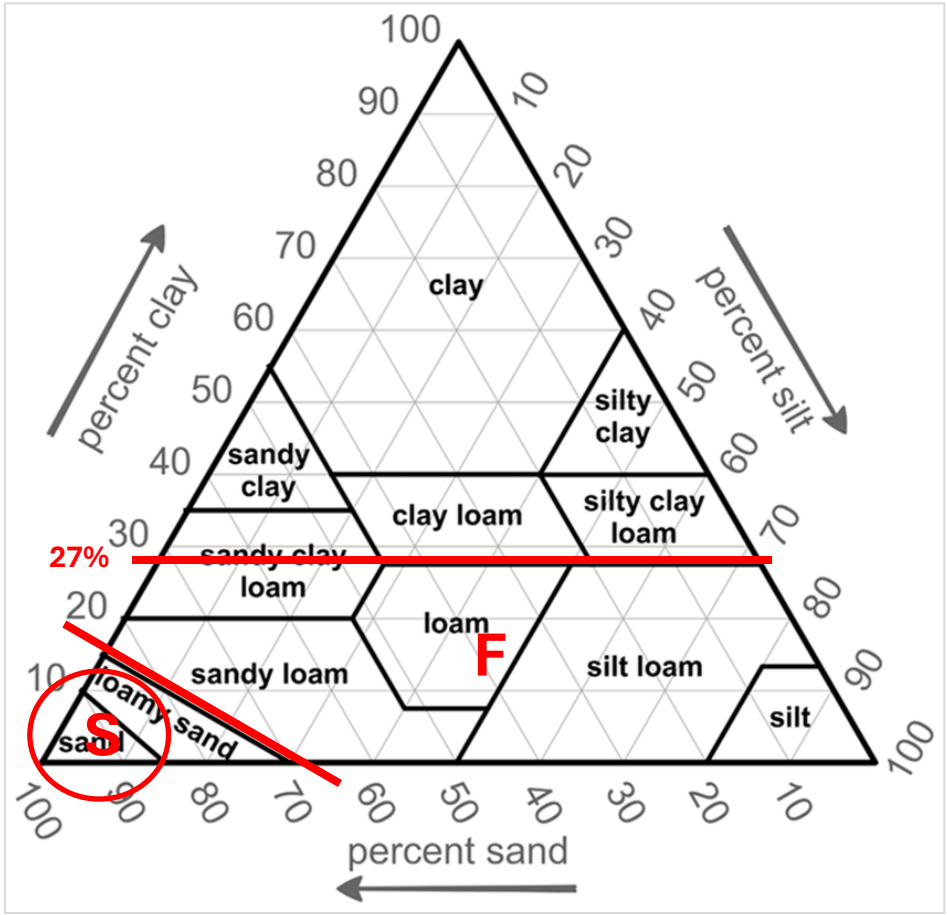
Hydric Soil Present? Yes _____ No _____

FIELD INDICATORS OF HYDRIC SOILS



- If it meets a field indicator, it is a hydric soil
- If it does not meet a field indicator, it still may be, by definition, a hydric soil
  - If it meets the definition of a hydric soil
  - Use best professional judgement
  - Knowledge of soil-landscape relationship
  - Common in thick dark soils of Northern Illinois

THREE MAJOR DIVISIONS



- **A = All Soils**
  - Soils with any texture
- **S = Sandy Soils**
  - Soils with texture of loamy fine sand and coarser (>70% sand)
- **F = Loamy and Clayey Soils**
  - Soils with texture of loamy very fine sand and finer

CONTROL SECTION OR ZONE

"A layer that is 10 cm (4 inches) or more thick, starting at a depth of 20 cm (8 inches) or less from the mineral soil surface, and has:

1. matrix value of 3 or less and chroma of 1 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings, or
2. matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings."

- Layers with:
  - Specific colors
  - Redoximorphic features
  - Organic matter accumulation
- At a specified depth
- Of a certain thickness

INDICATOR FORMAT

Abbreviation and Name → **F6.—Redox Dark Surface.**

Land Regions for Use → *For use in all LRRs, except W, X, and Y; for testing in LRRs W, X, and Y.*

Definition → A layer that is 10 cm (4 inches) or more thick, starting at a depth of 20 cm (8 inches) or less from the mineral soil surface, and has:

1. matrix value of 3 or less and chroma of 1 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings, or
2. matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings.

User Notes or Guidelines for Use →

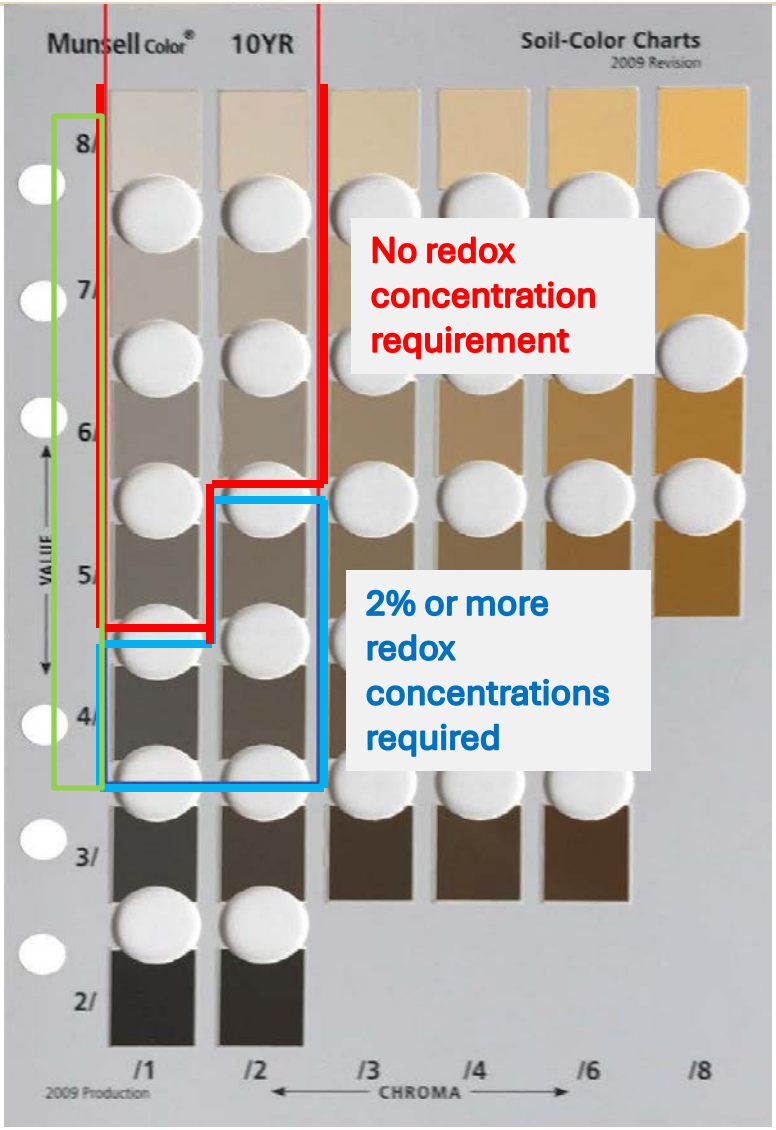
User Notes: This is a very common indicator used to delineate wetland soils that have a dark surface layer. Redox concentrations in mineral soils with a high content of organic matter and a dark surface layer are commonly small and difficult to see (figs. 31, 32, and 33). The organic matter masks some or all of the concentrations that may be present. Careful examination is required to see what commonly brownish redox concentrations in the darkened materials are. 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**. Typically, unless the soil is ponded with saturation only occurring near the surface, the material below the indicator will have a depleted or gleyed matrix. Soils that are subject to 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 surface layer when applying this indicator. This indicator is easily human-induced if a plow pan or other human-made confining layer is present. In these cases, the human-induced feature may have caused the development of a hydric soil. Removal of the feature that is causing the perching of water can eliminate the source of water causing anaerobic conditions to occur; therefore, the soil is no longer actively forming as a hydric soil.**

IMPORTANT TERMS

- Depleted Matrix
- Gleyed Matrix
- Reduced Matrix
- Organic Soil Material
- Mucky Mineral

DEPLETED MATRIX

- Left side of the color chart (grays):
  - Value of 4 or more
  - Chroma of 2 or less
    - e.g., 4/2, 10YR 4/1, 5/1, 5/2, 6/1, 6/2
- At least 2% redox concentrations are required in colors 4/1, 4/2, 5/2
- No redox concentrations are required in colors 5/1, 6/1, 6/2 or higher



GLEYED MATRIX

- Gleyed pages
  - No chroma
  - Y axis is Hue, X axis is Value
- Value greater than 4
  - N 4/, 10Y 4/, 5GY 5/, etc.
- May change color when exposed to air
  - Best to color freshly opened in field

REDUCED MATRIX

- Fe^{+2} (reduced iron) oxidizes to Fe^{+3} (oxidized iron) upon exposure to air
- Blue/gray turns to brown
- Best to color a freshly opened ped in field

ORGANIC MATERIAL

- Muck
  - Sapric organic soil material
  - Almost all organic material is decomposed
  - Oa
- Mucky Peat
  - Hemic organic soil material
  - Decomposition is intermediate
  - Oe
- Peat
  - Fibric organic soil material
  - Plant and fibers can be identified in organic material
  - Oi

- Field Indicators
  - A1
  - A2
  - A3
  - A10

MUCKY MINERAL

- Muck modified mineral soil has:
  - 0% clay and between 5 – 12 & organic carbon
  - 60% clay and between 12 – 18% organic carbon
  - Or intermediate amounts of clay and intermediate amounts of organic carbon
- Only used for where the organic component is muck (no peat or mucky peat)
  - Example: mucky sand
- Field Indicators
  - F1
  - F2
  - S1

TEXTURE OF SOILS HIGH IN ORGANIC CARBON

- By feel
  - Gritty = mineral soil
  - Greasy = organic or mucky mineral
- By continued feel
  - Gritty or plastic = mucky mineral
  - Greasy = organic
- Practice!

ALL (A) SOIL INDICATORS

- A1. Histosol
- A2. Histic Epipedon
- A3. Black Histic
- A4. Hydrogen Sulfide
- A5. Stratified Layers
- A10. 2 cm Muck
- A11. Depleted Below Dark Surface
  - Depleted within 12”
- A12. Thick Dark Surface
  - Depleted below 12”

A1. Histosol


A2. Histic Epipedon

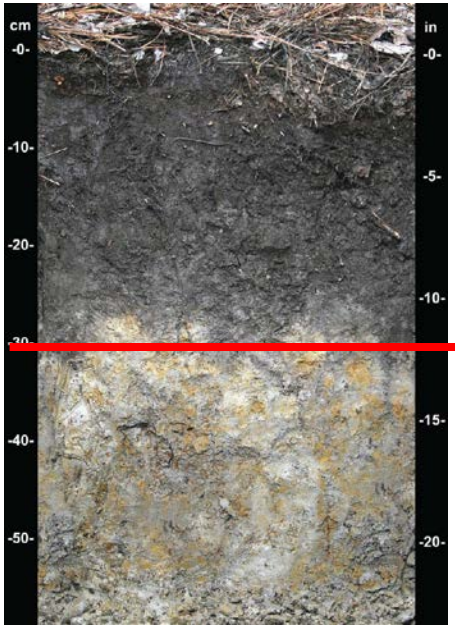

A3. Black Histic


A5. Stratified Layers (loamy soil)

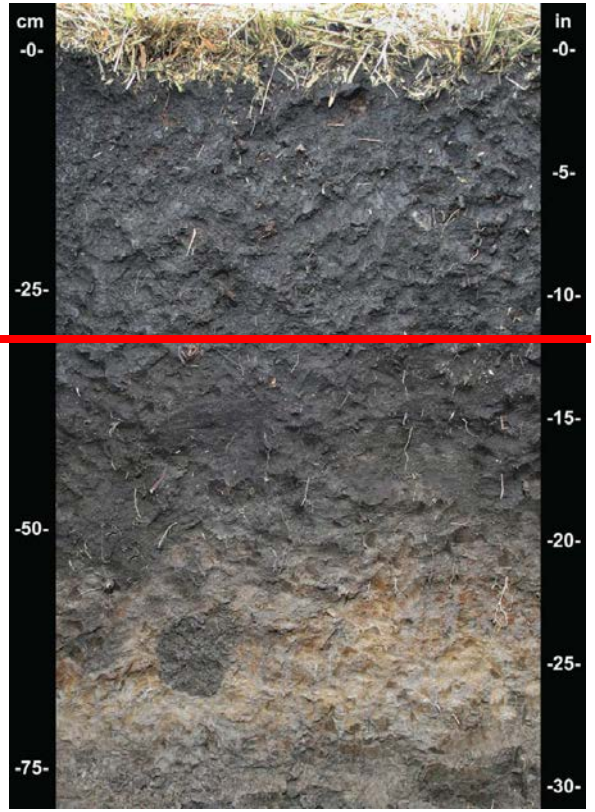

A5. Stratified Layers (sandy soil)

A10, A11 AND A12

A10. 2 cm Muck



A11. Depleted Below Dark Surface (*within 12”)

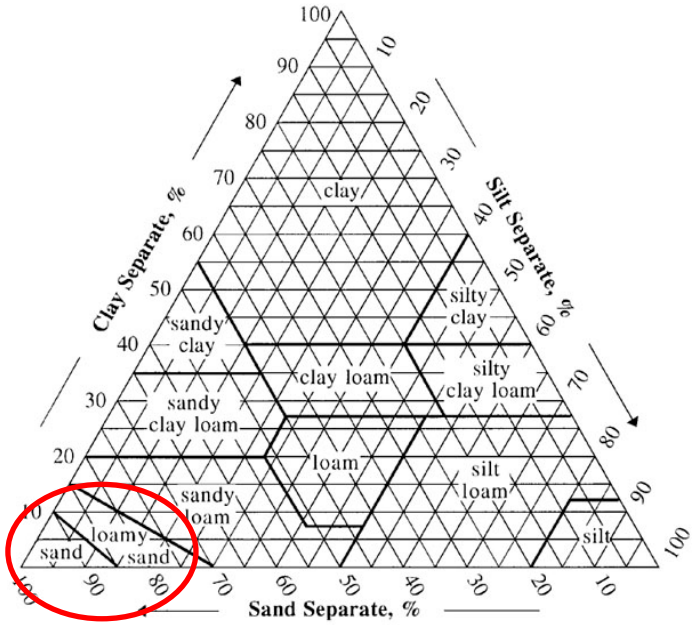


A12. Thick Dark Surface (* > 12”)

SANDY (S) SOILS INDICATORS

- S1. Sandy Mucky Mineral
- S3. 5 cm Mucky Peat or Peat
- S4. Sandy Gleyed Matrix
- S5. Sandy Redox
- S6. Stripped Matrix
  - S7. Dark Surface
    - LRR N
  - S8. Polyvalue Below Surface
    - LRR K and L
  - S9. Thin Dark Surface
    - LRR K and L

- Soil texture must be loamy fine sand and coarser
  - > 70% sand



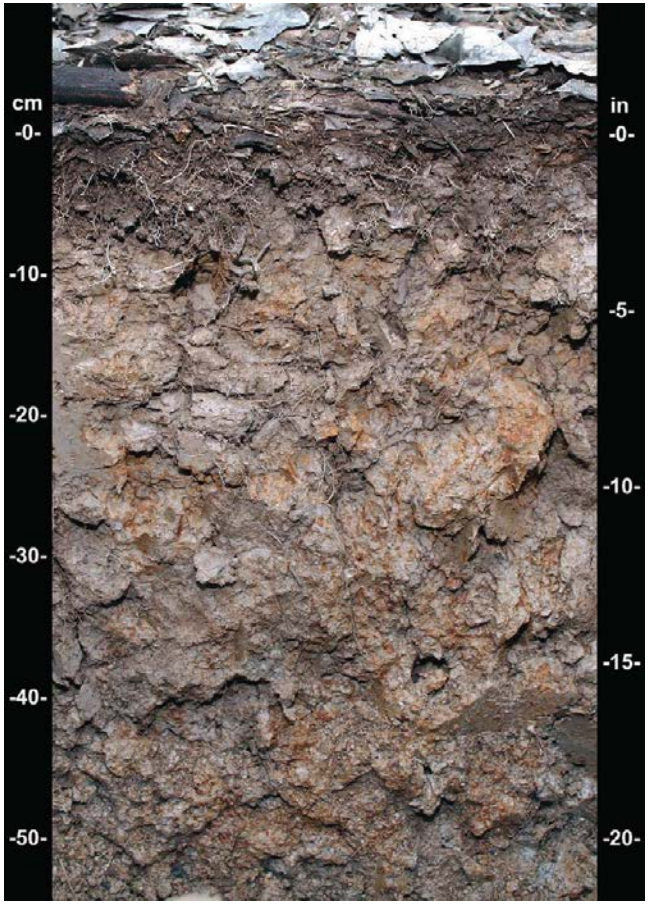
S4 AND S5

S4. Sandy Gleyed Matrix

S5. Sandy Redox

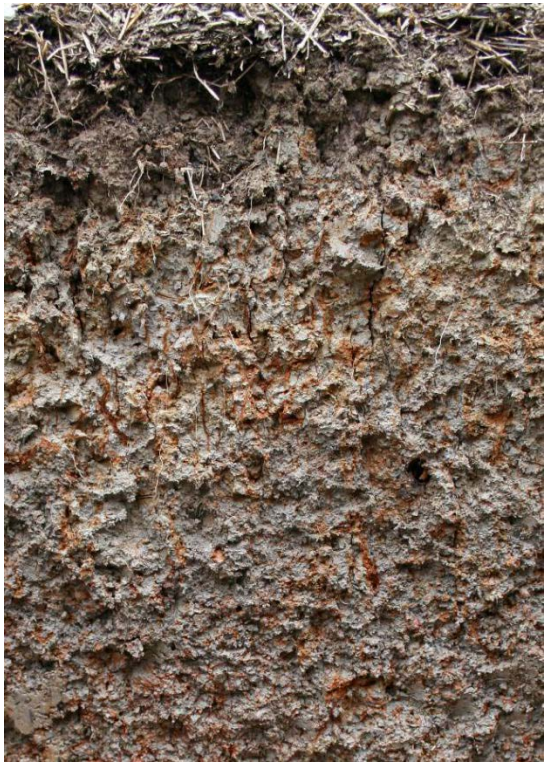
LOAMY/CLAYEY (F) SOIL INDICATORS

- F1. Loamy Mucky Mineral
- F2. Loamy Gleyed Matrix
- F3. Depleted Matrix
- F6. Redox Dark Surface
- F7. Depleted Dark Surface
- F8. Redox Depressions



F3. Depleted Matrix

F3 AND F6



F3. Depleted Matrix with redox concentrations

F6. Redox Dark Surface with redox concentrations

QUESTIONS?

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