

Field Indicators of Hydric Soils

Natural Resources Conservation Service
in cooperation with the
National Technical Committee for Hydric Soils

A Training Slide Set to Accompany the Publication
“Field Indicators of Hydric Soils in the U.S.”



Agenda

- What, how, why, who
- Review development of field indicators
- Introduce new concepts and terminology in 1998 Field Indicators
- Review pertinent indicators for use on this sessions field trips

Introduction

- Field indicators are soil morphological features used to identify hydric soils
- The features result from soil genesis in the presence of “Anaerobic Conditions”
- They are used for on-site verification



Why Indicators?

- ❑ NTCHS 1982, “... mottling, chroma 2 or less... no mottling, chroma 1 or less”
- ❑ NTCHS 1992, “criteria not meant for onsite identification or verification”
- ❑ There are soils on the hydric list that may or may not be hydric
- ❑ NAS 1995, “field indicators should be used for on-site verification”



1996 / 98 Field Indicators

- Refinements of 1987 Indicators
 - Low Chroma Colors, Mottles
 - Gleyed Colors
 - “High” Organic Matter Content
 - Organic Streaking
 - Histosol, Histic epipedon
 - Sulfidic Material
- Address problem soils

Development

- Continuous Process
 - ◊ Ongoing since mid 80's
- Inter-agency
 - ◊ including universities, private sector, federal, state, and local agencies
- Multi-disciplinary
 - ◊ soil scientists, hydrologists, botanists



Hydromorphic Processes

- Reduction, translocation, and precipitation of Iron and Manganese
- Accumulation and differential translocation of Organic Matter
- Reduction of Sulfur



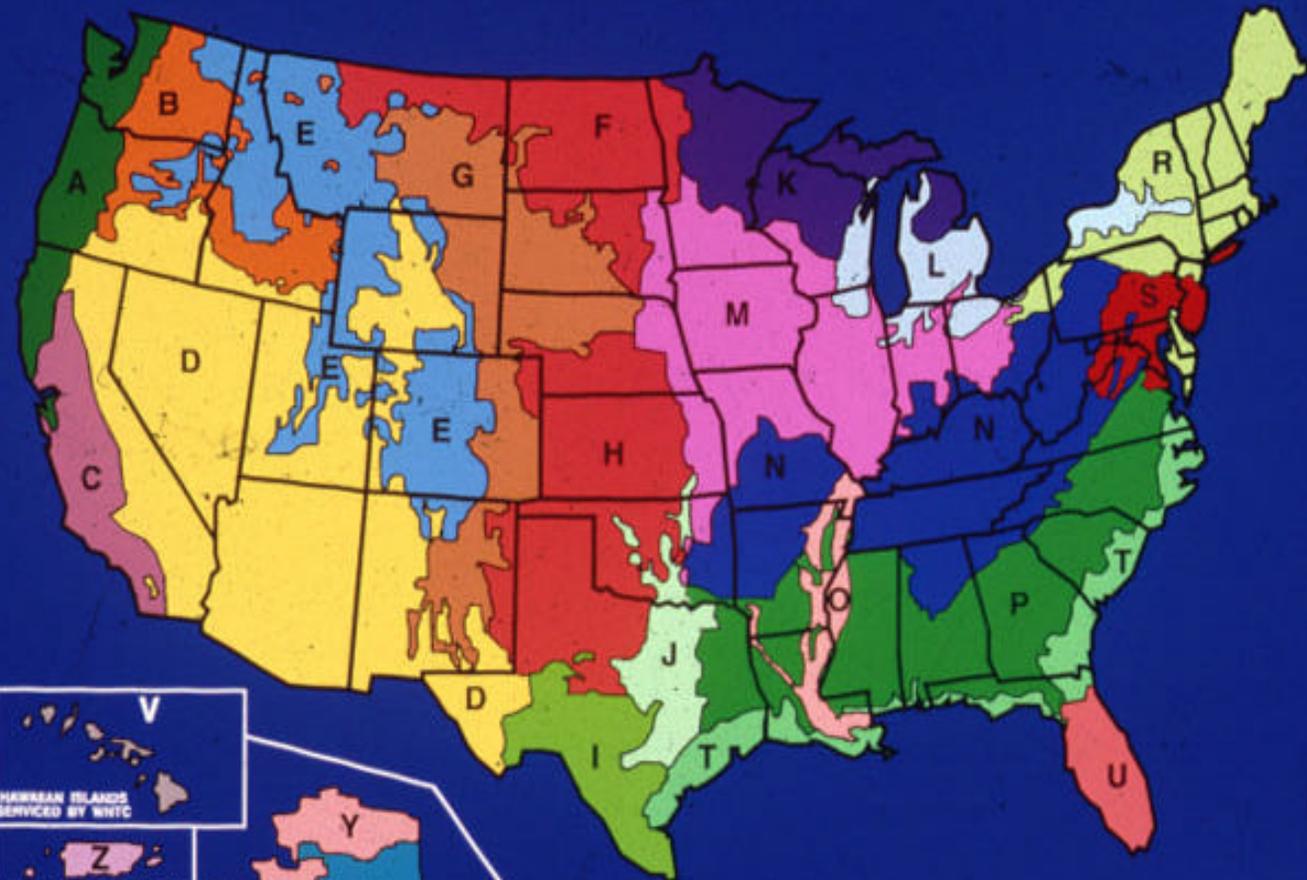
New Concepts and Terminology

- Regionalized
- Control Sections
- Depleted Matrix
- Gleyed Matrix
- Test Indicators

Regional

- Lists by Land Resource Region
- Addresses “Problem” Soils
 - Mollisols and Vertisols
 - Sandy Soils
 - Flooded and Ponded Soils
 - Red Parent Materials





Land Resource Regions United States

SOURCE: DIGITIZED FROM SCS BASE 1000393-05 DATED SEPTEMBER 1988.
ALBERS EQUAL AREA PROJECTION, NATIONAL CARTOGRAPHY AND GEOGRAPHIC
INFORMATION SYSTEM, FORT WORTH, TEXAS 1994.

Control Sections or Zones

- Layers with :
 - high value, low chroma or;
 - redoximorphic features or;
 - organic matter accumulations
- at a depth
- of certain thickness



Redox Morphology

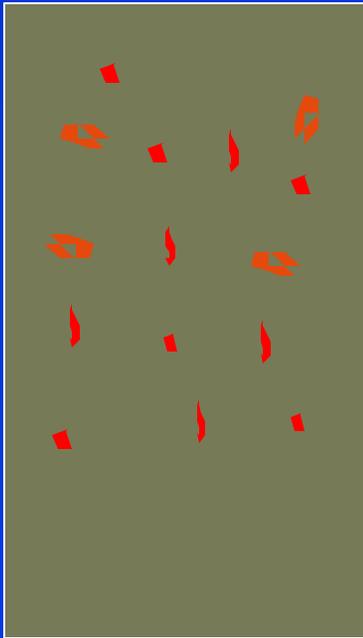
□ Depleted Matrix

- Value ≥ 5 , Chroma ≤ 1
- Value ≥ 6 , Chroma ≤ 2
- Value 4, Chroma 1 or 2 with cd “mottles”
- Value 5, Chroma 2 with cd “mottles”

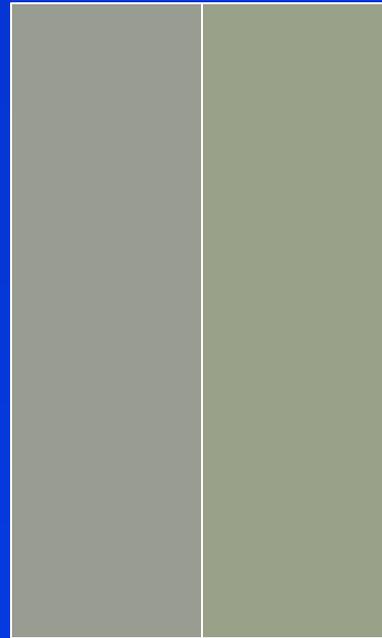
□ Gleyed Matrix

- All Gleyed Pages Value ≥ 4

Depleted / Gleyed Matrix



4/2, 5/2, 4/1
with 2% redox.
concentrations

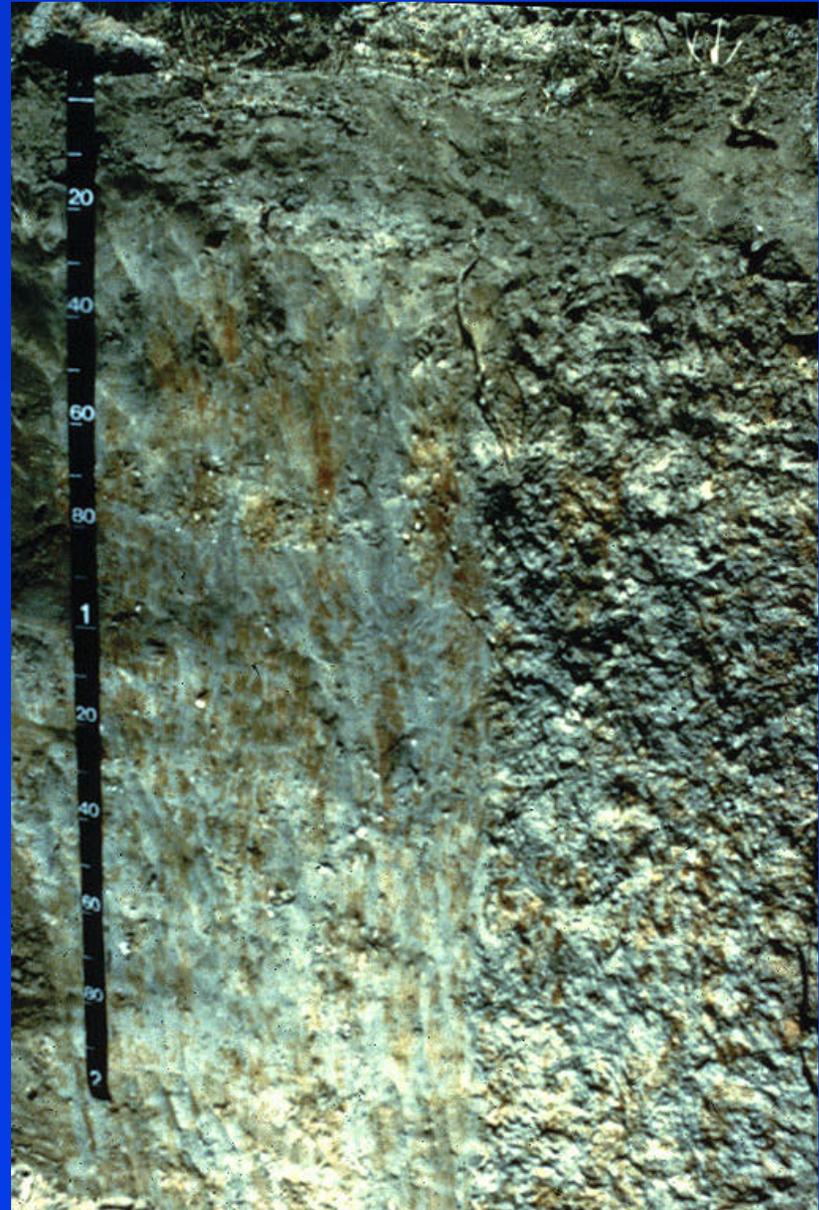


5/1 6/2
with or without



Value ≥ 4
Gley pages

Depleted Matrices



Gleyed Matrix



Three Major Divisions

- All Soils
 - Use regardless of soil texture
 - Mostly surface layers of organic material
- Sandy Soils
- Loamy Soils
 - Use sandy indicators in sandy layers,
loamy indicators in loamy layers

Indicator Format

1. Alpha Numeric Listing
2. Short Name
3. Applicable Land Resource Region (LRR)
4. Description of the Indicator
5. User Notes

For example,

A1 indicates the first indicator for All Soils; **Histosol** is the short name; the indicator is for use in all LRR's. **Classifies as a Histosol, except Folists** is the indicator description; and **user notes** are added.



TORRY SERIES
TYPIC MEDISAPRIST

“All Soils”

- A2, Histic Epipedon
- A3, Black Histic
 - A layer of peat, mucky peat, or muck 20 cm or more thick starting within the upper 15 cm of the soil surface having hue 10YR or yellower, value 3 or less, and chroma 1 or less
- A4, Hydrogen Sulfide

**Histic
Epipedon**



Sulfihemist



All, cont.

- A5, Stratified Layers
 - Several stratified layers starting within the upper 15 cm of the soil surface. One or more of the layers has value 3 or less with chroma 1 or less and/or it is muck, mucky peat, peat, or mucky modified mineral texture.



A5 in Loamy Materials (left) & Sandy Materials (right)



All, cont.

- A6, Organic Bodies
 - Presence of 2% or more organic bodies of muck or a mucky texture, approx. 1 to 3 cm in diameter, starting within 15 cm of the soil surface.



All, cont.

- A8, A9, A10
 - A layer of muck x cm or more thick with value 3 or less and chroma 1 or less starting within 15 cm of the soil surface.
(thickness depends on climatic location)



Sandy Soils

- A Layer less than 25 cm depth is loamy fine sand or coarser
- “Control Section” < 15 cm depth
- Indicators include:
 - organic surface layers
 - differential translocation
 - streaking of OM
 - Fe stripped matrix

Sandy Soils *with High OM surface layers*

- S1, Sandy Mucky Mineral
- S2, 2.5 cm Mucky Peat or Peat
- S3, 5 cm Mucky Peat or Peat



Sandy Soils *with Redox Colors*

- S4, Sandy Gleyed Matrix
- S5, Sandy Redox



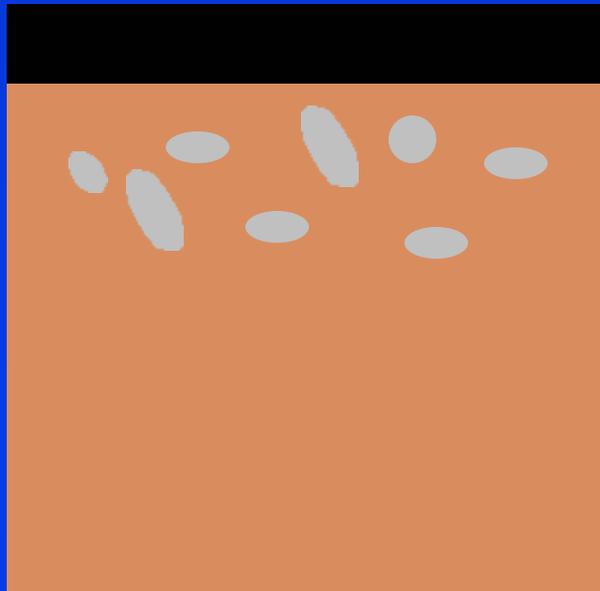


A 10

S 5

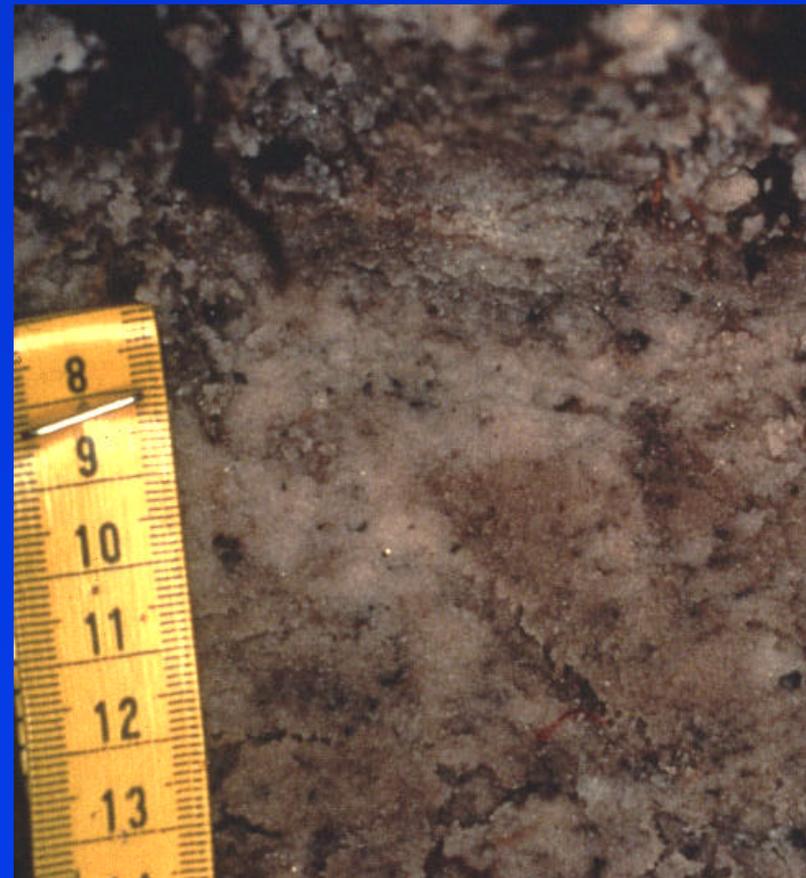
S6, Stripped Matrix

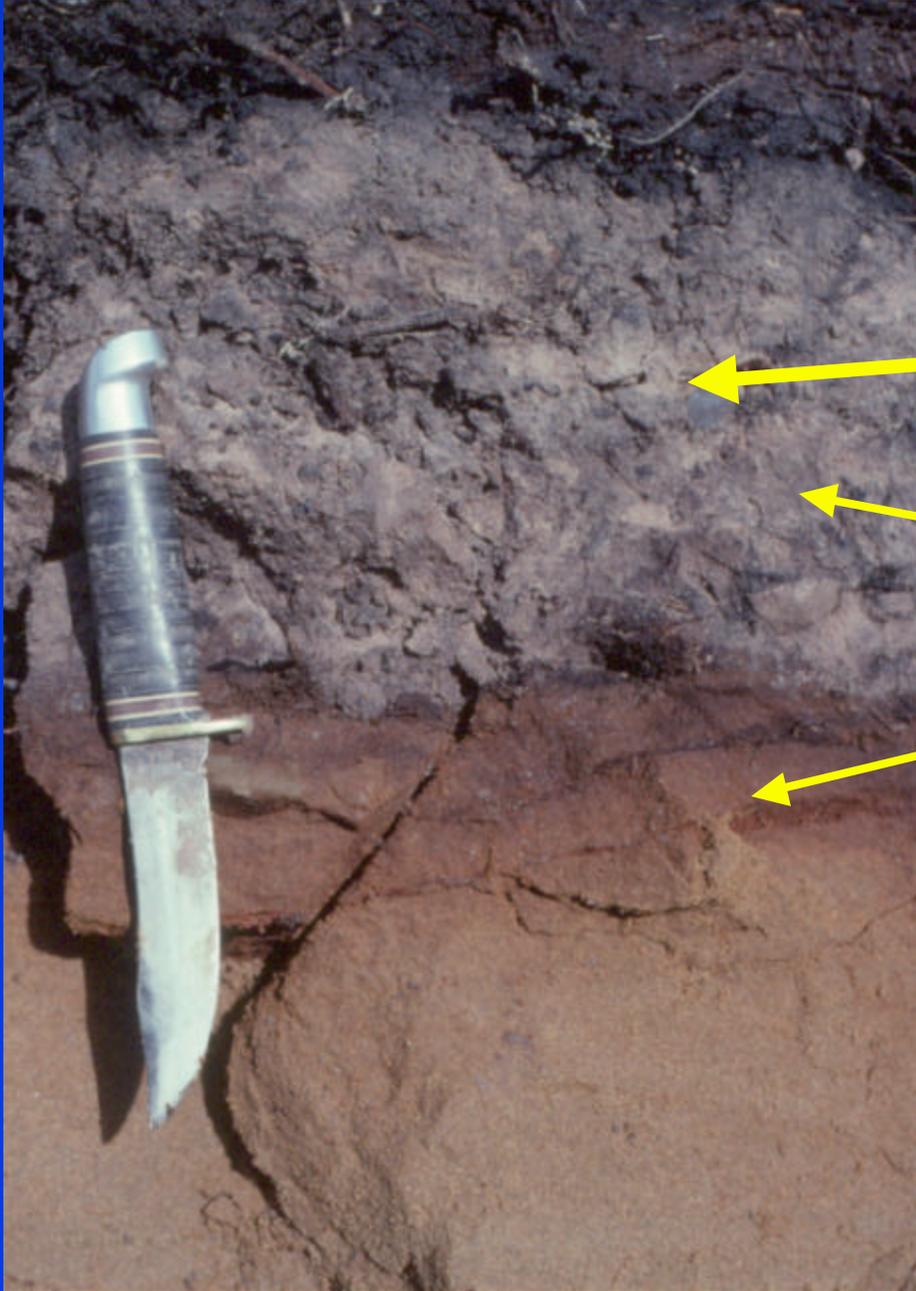
A layer starting within 15 cm of the soil surface in which Fe/Mn oxides and / or organic matter have been stripped from the matrix (in places) exposing the primary base colors of the minerals. The striped areas and translocated oxides and / or organic matter form a diffuse splotchy pattern of 2 or more colors.



Stripped Matrix

Left is OM, Right is Fe and OM





**S6, Stripped
Matrix**

**E horizon
over Ortstein**

S7, Dark Surface

- A layer 10 cm or more thick starting within the upper 15 cm of the soil surface with a matrix value 3 or less and chroma 1 or less. At least 70% of grains are dark colored. The matrix color of the layer immediately below the dark layer must have chroma 2 or less.

(Eastern LRR's)





70% black

50% black

90% black

S8, Polyvalue Below Surface

- A layer with value 3 or less and chroma 1 or less starting (at least 70% dark particles) within 15 cm of the soil surface underlain by a layer(s) where translocated organic matter forms a diffuse splotchy pattern. The splotchy layer has a mix of value 3 and 4, and chroma 1 or less.



S9, Thin Dark Surface

- A layer 5 cm or more thick within the upper 15 cm of the surface, with value 3 or less and chroma 1 or less. At least 70% dark particles. Layer is underlain by a layer with value 4 or less and chroma 1 or less to a depth of 30 cm or to the spodic, whichever is less.



Loamy Soils

- If **Any** Layer in upper 25 cm is loamy very fine sand or finer
- Control Section usually starts within 25 - 30 cm
- Most indicators are based upon the reduction / oxidation of Fe

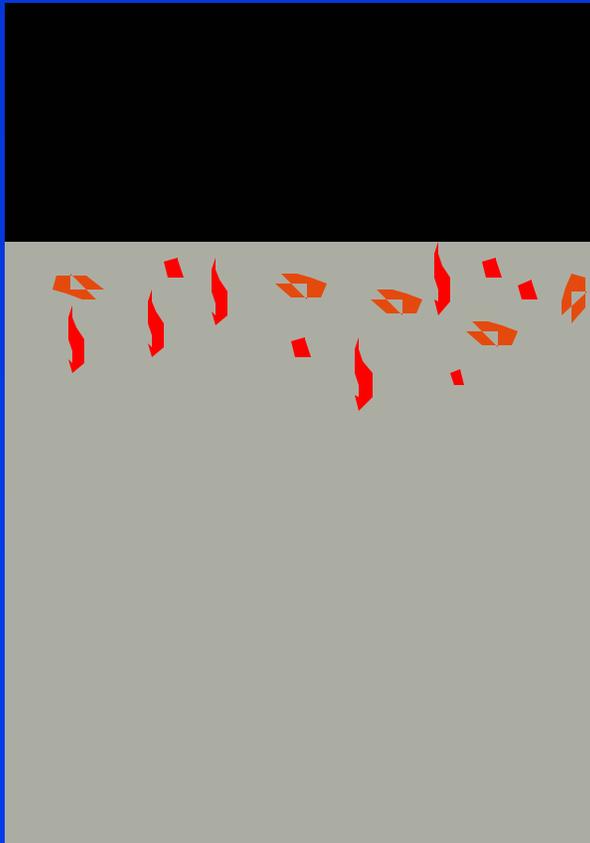


- Loamy Gleyed (F2) indicator in a dominantly Sandy soil.

Gleyed layer at approx. 9 inches, sandy material above.

F3, Depleted Matrix

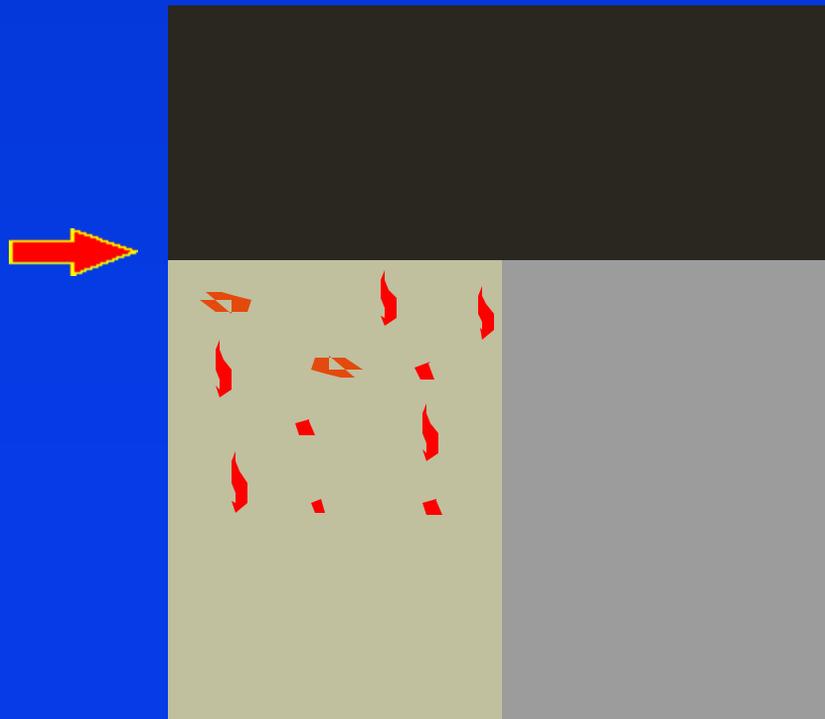
A layer at least 15 cm. thick with a depleted matrix that has 60% or more chroma 2 or less starting within 25 cm. of the surface.





F4, Depleted Below Dark Surface

A layer at least 15cm thick with a depleted matrix that has 60% or more chroma 2 or less starting within 30cm of the surface. The layer(s) above the depleted matrix have value 3 or less, chroma 2 or less.

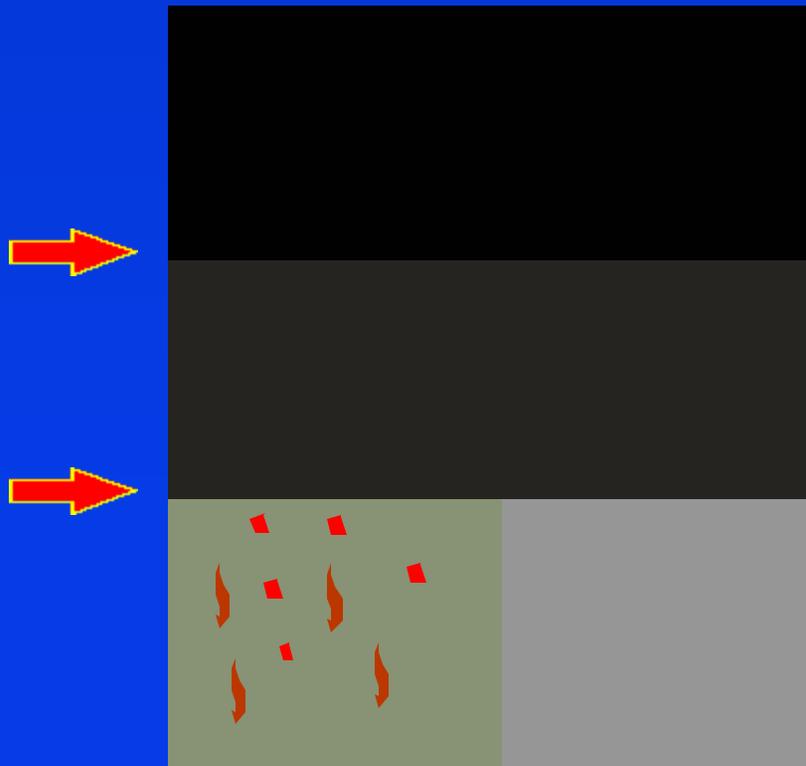


F4, Depleted Below Dark Surface



F5, Thick Dark Surface

A layer at least 15 cm. thick with a depleted or gleyed matrix that has 60% or more chroma 2 or less starting below 30 cm. of the surface. The layer(s) above the depleted / gleyed matrix have hue N and value 3 or less in upper 30 cm. and value 3 or less and chroma 1 or less in the remainder of the epipedon



F5, User Note



- The soil has a black or very dark gray surface layer > 30 cm. thick. The dark colored subsoil is mollic with chroma 1 or Neutral. Immediately below the Mollic epipedon is a depleted/gleyed matrix. This indicator is for cumulic soils in concave landscape positions.

F6, Redox Dark Surface

A layer at least 10 cm. thick entirely within the upper 30 cm. that has:

- matrix value 3 or less and chroma 1 or less and 2% or more distinct or prominent redox concentrations, or
- matrix value 3 or less and chroma 2 or less and 5% or more redox concentrations.

□ Chroma 1
with 2%



□ Chroma 2
with 5%



F 6



Moist color



Dry color

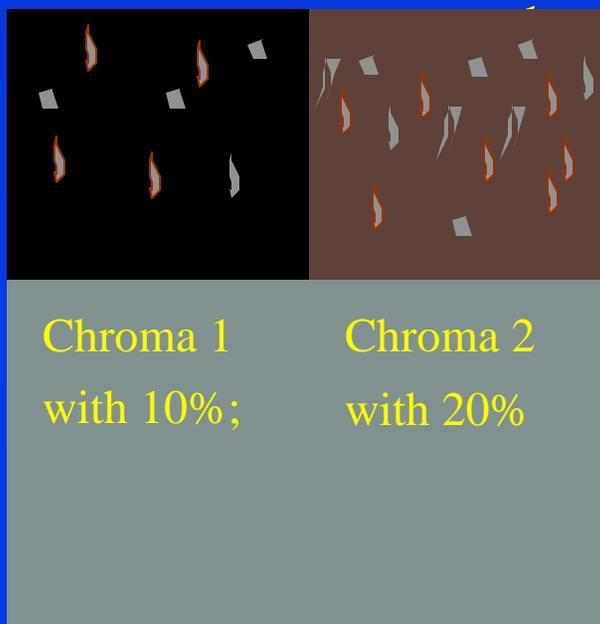
F 6



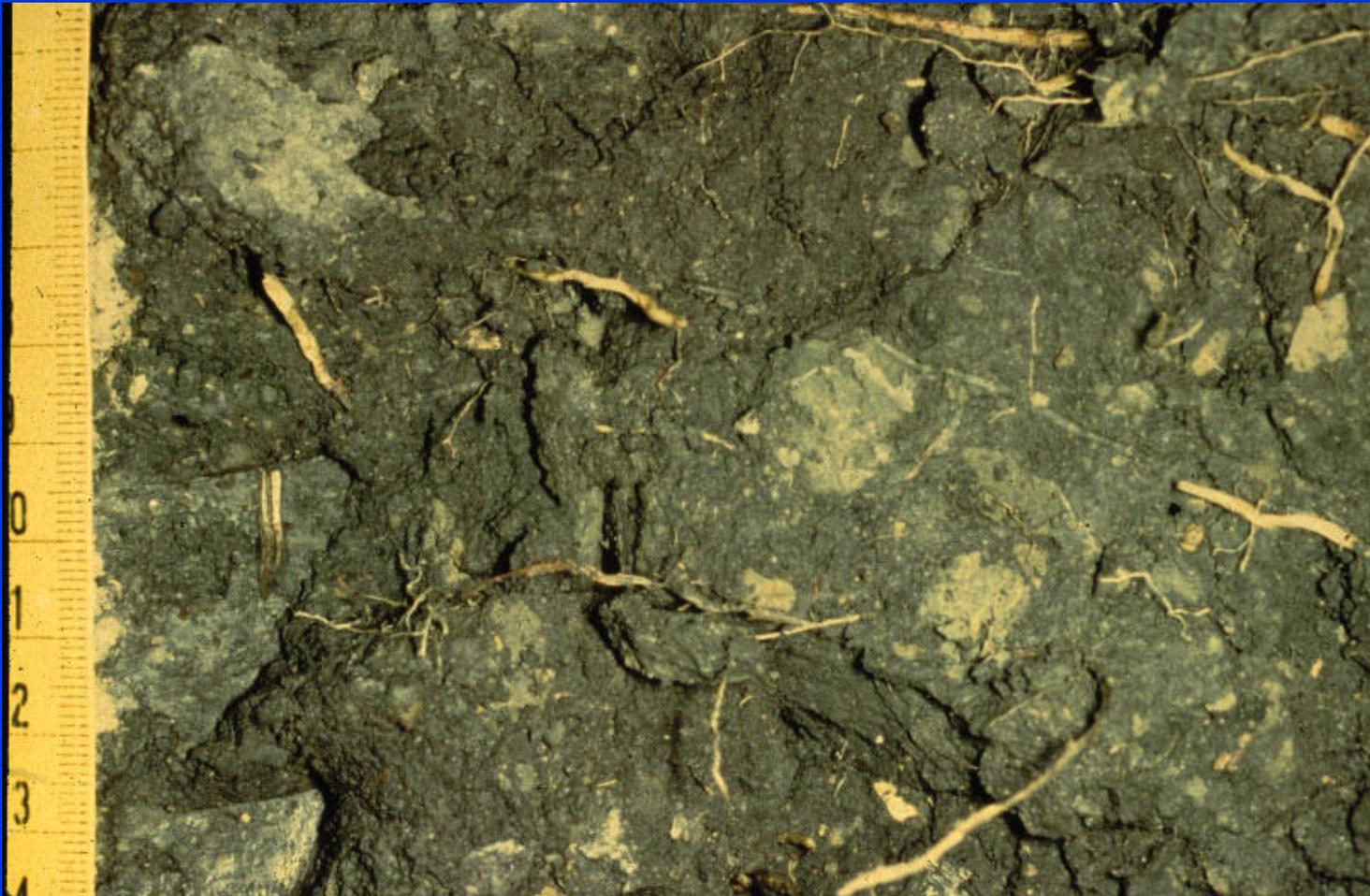
F7, Depleted Dark Surface

Redox depletions, with value 5 or more and chroma 2 or less, in a layer at least 10 cm. thick entirely within the upper 30 cm. of the mineral soil that has:

- a. value 3 or less and chroma 1 or less and 10% or more redox depletions, or
- b. value 3 or less and chroma 2 and 20% or more redox depletions.



F7, Depleted Dark Surface





Depressional Landform
Vernal Pool, CA

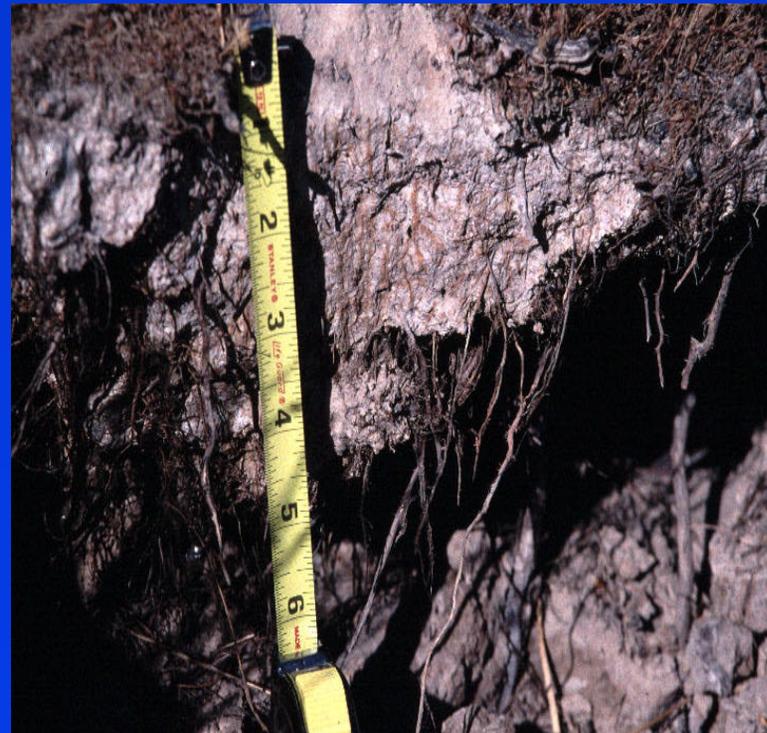
Loamy Depressions

■ **F8, Redox Depressions**

- In CD's subj. to ponding, 5% or more redox conc. in a layer 2 cm or more thick entirely within upper 15 cm.

■ **F9, Vernal Pools**

- In CD's, presence of a depleted matrix 5 cm or more thick entirely within the upper 15 cm.

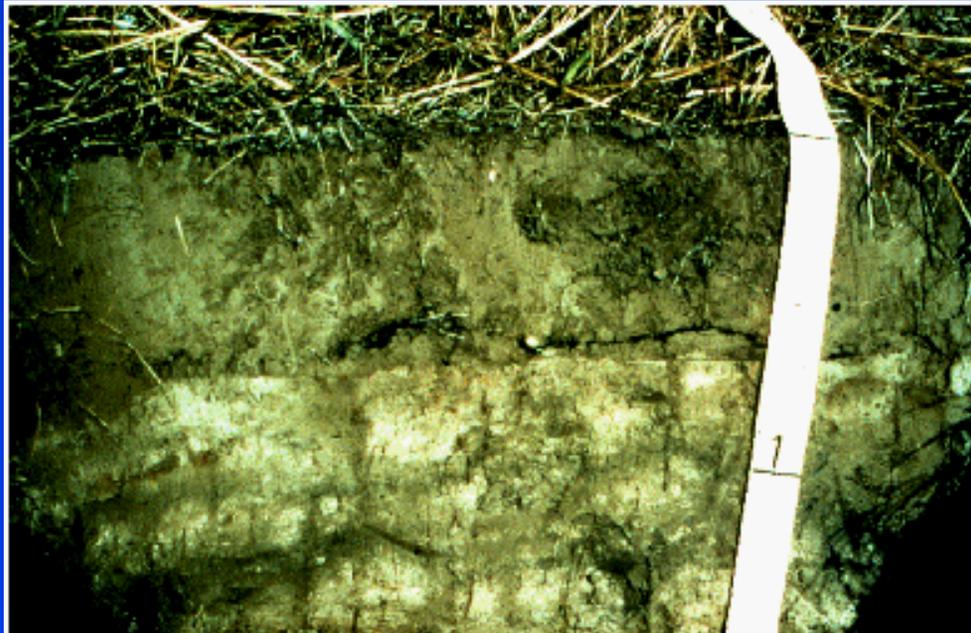


F 10, Marl

- So. Florida, LRR U.

A layer of Marl with value 5 or more starting within 10 cm of the soil surface.

Marl is limnic (type of organic) material deposited in water as precip. of CaCO_3 by algae. Has been reported to occur in hydric soils in parts of the Midwest.



F 12, Iron / Manganese Masses

- On floodplains, a layer 10 cm or more thick with 40% or more chroma 2 or less, and 2% or more redox conc. as soft Fe/Mn masses with diffuse boundaries. The layer occurs entirely within 30 cm of the soil surface.



F13, Umbric Surface

- LRR's P & T.

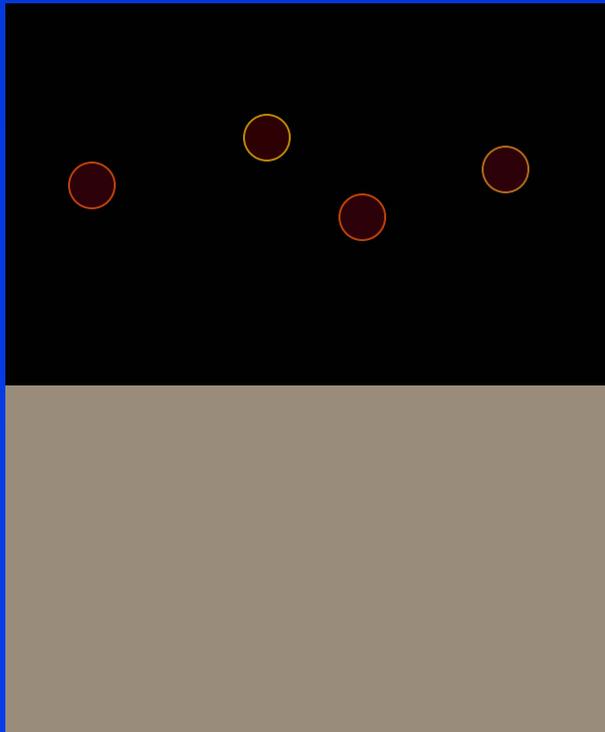
In depressions and other concave landforms, a layer 15 cm or more thick starting within the upper 15 cm of the surface with value 3 or less, chroma 1 or less underlain by a layer 10 cm or more thick with chroma 2 or less



F16, High Plains Depressions

In closed depressions subject to ponding, a layer at least 10 cm. thick within the upper 35 cm. of the soil that has chroma 1 or less and:

- a. 1% or more redox concentrations as nodules or concretions, or
- b. redox concentrations as nodules or concretions with distinct or prominent halos.



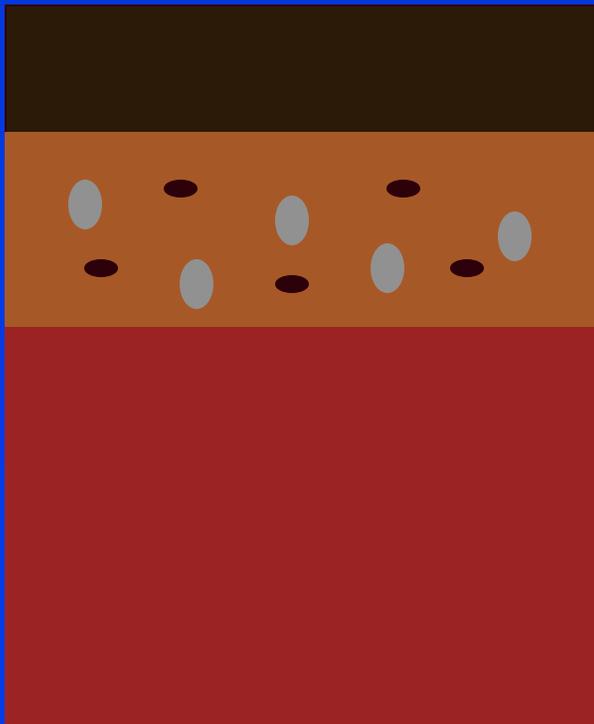


“Test” Indicators

- Proposed indicators for further study
- Formatted the same as others
- Have “suggested” LRR’s for use
- Any indicator on list may be evaluated for use in other regions

TF2, Red Parent Material

In parent material with a hue of 7.5YR or redder, a layer at least 10 cm thick with a matrix chroma of 4 or less and 2% or more redox depletions and/or redox concentrations as soft masses and/or pore linings. The layer is entirely within 30 cm of the soil surface.



Glossary

- These terms are either defined for the first time or they have definitions that are slightly different from the definitions in the referenced materials.
- Gleyed Matrix
- Depleted Matrix
- Mucky
- Distinct “mottles”

Correlation of 1987 Indicators and 1998 Indicators



The Future

- 1998 Field Indicators is a “classification” system
 - Meets an indicator – it is hydric
 - Doesn't meet an indicator – may or may not be hydric, professional judgment required
- The “Second Approximation”
- Dynamic, it is anticipated that more indicators will be added

To Propose Additional Indicators

- NRCS Wetland Institute
- NRCS - NSSC
- COE / WES
- Universities
- USFWS
- EPA
- Russ Pringle
- Wade Hurt
- Russ Theriot
- Michael Vepraskas
- Buck Reed
- Bill Sipple

Where to get more Information

- Inter-agency training sessions
- Field Indicators on INTERNET
 - <http://www.statlab.iastate.edu:80/soils-info/hydric>
- Available in hard copy from NRCS Wetland Science Institute
 - Russ Pringle: rpringle@agctr.lsu.edu

Summary

“Field Indicators of the U.S.”

- are based upon soil genetic processes
- use hydromorphic features
- are “test positive”
- represent “state of the science”
- are regionalized
- will require further development, testing, and validation
- can be used in CWA delineations per

17 Sept, 1998 John Studt Memo