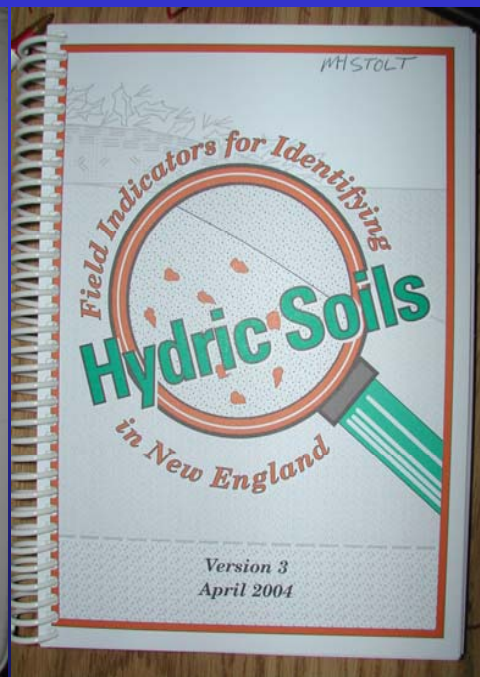
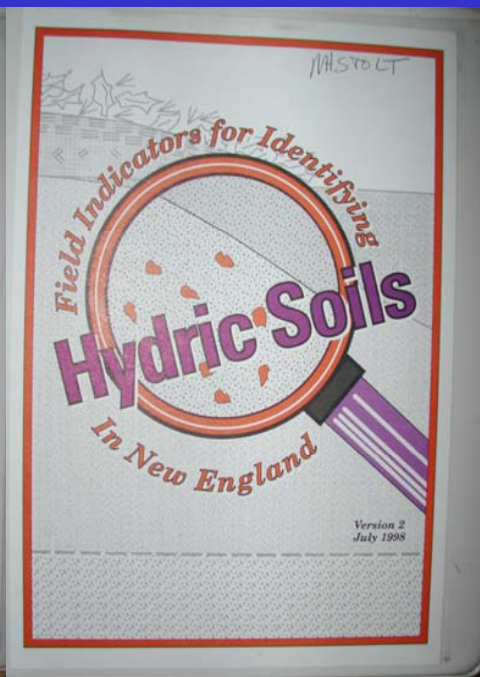
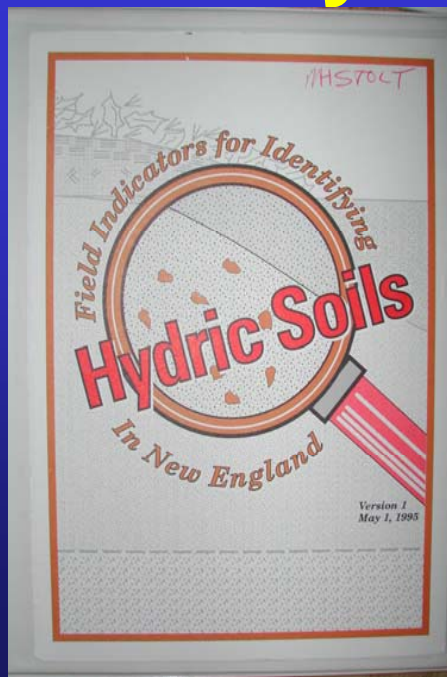


The Revolving (Evolving) Door of Hydric Soil Indicators



A brief history lesson in Hydric Soil Identification (I)

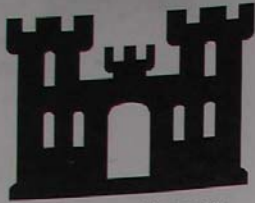
- Cowardin et al. (1979; Classification of Wetlands and Deepwater Habitats of the US) coined the term “hydric soil”
- SCS (NRCS) was asked to develop a definition (Blake Parker and Keith Young)
- Early focus was on using aquic suborders of ST to identify hydric soils
- By 1983, they (NTCHS) discovered that there was considerable inconsistency among states for the same soil series regarding whether it was hydric or not
- In 1985 a definition of hydric soil was published, with most focus on drainage class
- At the same time (1980’s) the NE office of the ACOE with assistance of the NRCS (Pete Fletcher) began to attempt to establish drainage class criteria for all of New England

A brief history lesson in Hydric Soil Identification (II)

- ACOE Wetlands Delineation Manual (1987) publishes the hydric soil criteria, but also includes “wetland indicators for sandy and non-sandy soils”
 - This was in response to the difficulty of applying the hydric soil definition criteria to identifying hydric soils in the field
- What exactly happened after that is not clear, but not long after the NTCHS and the New England Hydric Soils Technical Committee (NEHSTC) began developing “hydric soil indicators”
- In the mid 1990’s both the NTCHS and the NEHSTC published manuals detailing various hydric soil indicators

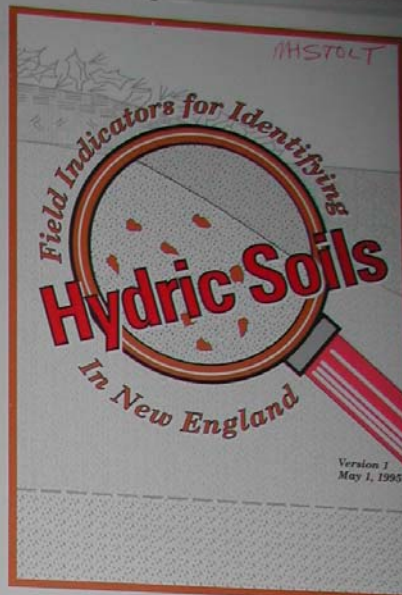
DRAFT GUIDELINES

FOR REGULATORY STAFF
U.S. CORPS OF ENGINEERS
NEW ENGLAND DIVISION



Soil Drainage Classes

Representative morphologies
used for §404 Wetland Delineations

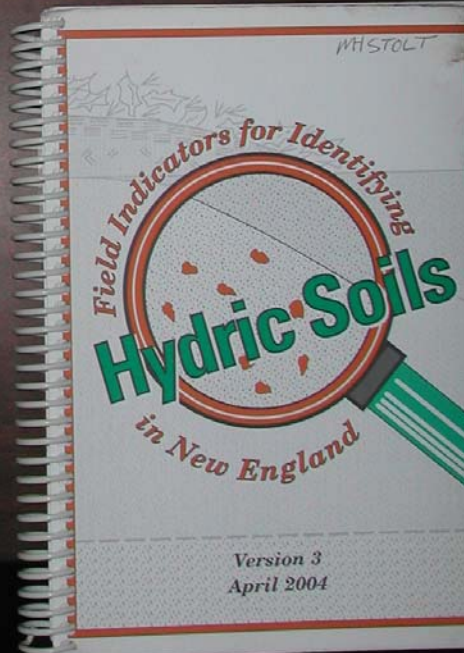
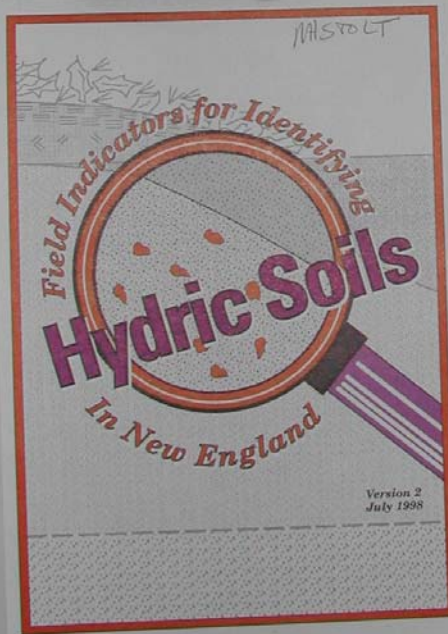


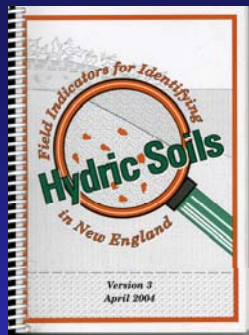
**Draft Guidelines
(1992)**

**Field Indicators for
Identifying Hydric
Soils in New
England (1995)**

Version 2 (1998)

Version 3 (2004)

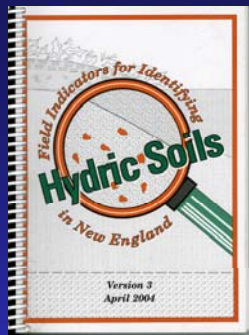




What's the Difference?



- NE – A key, wet to dry
- Grassroots NE development
- Uses multiple morphologies
- Includes what some might refer to as 'facultative' indicators
- NTCHS – A key, hydric or ?
- National in scope
- Most based on single morphology
- Uses tried and true 2 chroma or less



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So what's the problem?

The Issues

- 1) In the past, the NE-ACOE office issued a written memorandum stating that the New England indicators could be used as well as the National for federal wetland determinations in New England
 - Once the WDM regional supplement is issued and approved, **only the supplement will be allowed**
- 2) Right now, I teach use of the National Indicators, New England Indicators, and Southern New England Drainage Class criteria for wetness class 0 soils to identify hydric soils
 - The first **question** the students ask every year is “Why do we need to learn all three?”
 - **My Answer:** Neither the National List of hydric soils indicators nor the New England List of hydric soil indicators is all inclusive
- **The Solution:** an all inclusive list that would support the pending ACOE regional supplements



New England Hydric Soil Technical Committee

ACOE Wetland Specialists

NRCS Soil Scientists

State Soil Scientists and Regulators

University Faculty

Consulting Soil Scientists

A Comparison of National Hydric Soil Indicators, v.6.0, and NE Regional Hydric Soil Indicators, v.3.

Last edited January 14, 2008

Part 1. Matching the NE Indicators to the National Indicators

National Indicator (edited list following ACOE Regional mtg)	NE Regional Indicator that could fit or overlap with all or parts of National Indicator	Notes/Comments
A1 Histosol or Histel	III. HISTOSOLS.	
A2 Histic Epipedon	IV. HISTIC EPIPEDONS.	
A3 Black Histic		Not allowed in MLRA 143 now.
A4 Hydrogen Sulfide	II. TIDAL SOILS.	
A11 Depleted Below Dark Surface	VII. DEPLETED BELOW DARK SURFACE.	
A12 Thick Dark Surface	Overlaps with both: VII. DEPLETED BELOW DARK SURFACE; and XI. ANY TEXTURE, Subsection B.	

Proposal to the NTCHS

Section I. Proposed field indicators (6) that are currently used in New England to identify hydric soils that are not covered in the national indicators.

Section II. Proposed field indicators (2) for use in New England to identify hydric soils (currently not published)

Section III. Proposed Test Field Indicator (1)

NTCHS Response to Proposal

- **This is all well and good but:**
 - 1) we need saturation and reducing conditions data to support the proposal.
 - 2) What about the use the proposed indicators in other states outside of New England that fall within regional boundaries (New York, parts of PA, OH, and NJ)
- **So even though we have been using some of these indicators for almost 20 years, our word that they work in our region was not good enough.**
 - **Their response: since we developed the HS Technical Standards, no indicators will be accepted for use unless it can be shown that the soils meet the technical standard**



What did we find?

- In most cases when applied the National indicators and the New England indicators result in the same answer regarding hydric or non-hydric, they just use other approaches
- In the case of Spodosols on outwash landscapes in SNE, neither the NE or Nat indicators are effective
- Sandy wetland soils in low lying landscapes tend to be problematic
- Some wetland soils we have no confidence in hydric soil indicators at this time (i.e. fine marine deposits)

S___. Sandy Chroma 3 with Redox

A layer at least 3 cm (1 inch) thick with a matrix value 4 or more and chroma 3 or less, with 2 percent or more redox depletions and/or concentrations, starting within 25 cm (10 inches) of the top of the mineral soil material and directly underlying a mineral surface layer with value 3 or less and chroma 2 or less.

User Notes: With or without an O horizon. This is found in many landscapes such as those on glacial outwash and floodplains which are dominated by highly permeable soils.



S__. Sandy Chroma 3 with Redox.

A___. Mesic Spodic

A layer 5 cm (2 inches) or more thick starting within 15 cm (6 inches) of the mineral soil surface that has value 3 or less and chroma 2 or less that is underlain by either: a) a layer(s) 8 cm (3 inches) or more thick occurring within 30 cm (12 inches) of the surface that has value and chroma 3 or less that shows evidence of the accumulation of translocated organic matter; or b) a layer(s) 5 cm (2 inches) or more thick occurring within 30 cm (12 inches) of the mineral soil surface that has value 4 or more and chroma 2 or less that is directly underlain by a layer(s) 8 cm (3 inches) or more thick with value and chroma 3 or less that shows evidence of the accumulation of translocated organic matter.

User Notes

This indicator is used to identify wet soils with spodic materials or that meet the definition of a Spodosols. The layer that has value 4 or more and chroma 2 or less is typically described as an E or Eg horizon (these typically have a color pattern referred to as stripped or partially stripped matrices). The layer with evidence of the accumulation of translocated organic matter is typically described as Bh, Bhs, Bhsm, Bsm, or Bs horizon. These layers typically have several color patterns or cementation indicative of translocated organic matter, aluminum, and/or iron.

Mesic Spodic Problem

- 33 pedons were described by 3 or 4 members of the NEHSTC and discussed as a group during a 2004 field tour
- prior to the tour 2 to 4 years of hydrology data were collected at each location from two thesis studies focused on seasonal inundation
- The majority of the sites that were visited were in sandy deposits.

Summary:

- Of the 8 pedons that were not considered hydric based on the hydrology, one of the 8 was a false positive using the National indicator S-3.
- 5 of the 25 hydric pedons met both regional and national indicators.
- 2 hydric pedons met NE regional indicators but did not meet a national indicator.
- 8 hydric pedons met national indicators but failed to make NE regional indicators.
- 10 didn't meet any indicator, national or regional. The majority of these had spodic morphology.

Bottom Line: Essentially half of the hydric soils did not meet any indicator

Why the failures?

All of the New England indicators for Spodosols require redoximorphic features.

For example: “an E horizon with 2 percent of more redoximorphic features....underlain by a Bh, Bhs, or Bs horizon with 2 percent or more redoximorphic features”





Plates from BhsM. Note the mottled appearance that suggests Fe concentrations



Bhsm. Plates and mottled appearance.



E Horizon



Bhsm Horizon



Bs Horizon



Bw horizon and Bhsm horizon

Don't get me wrong, here!!!

I am not saying that all wet Spodosols lack Fe.





BhsM over bedrock.
Note Fe concentrations.

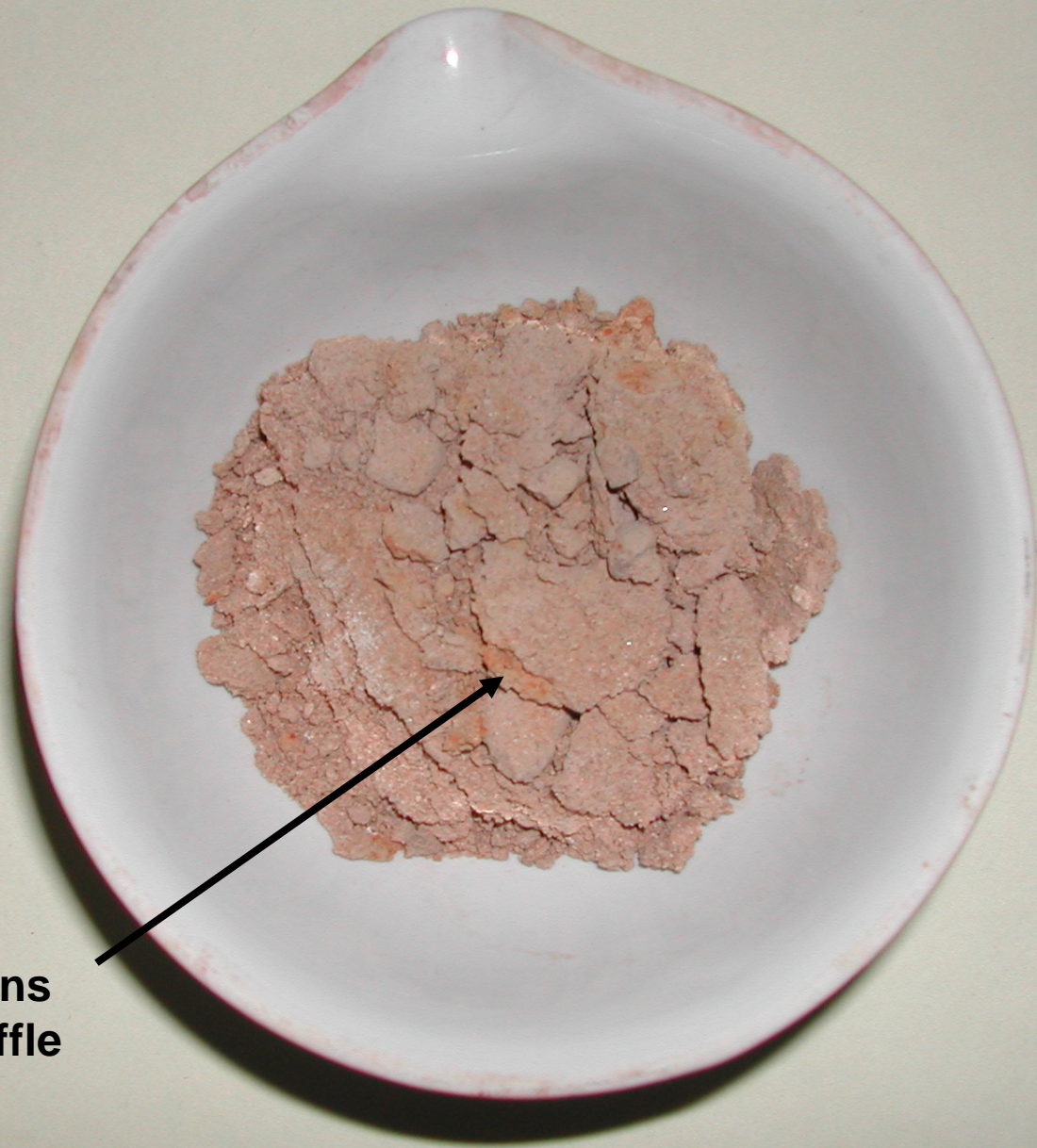


BhsM formed in outwash.
No concentrations observed.



Bw and BhsM for comparison.

Samples photographed after heating to 550 degrees C in muffle furnace to remove organic matter.



**Fe concentrations
visible after muffle
furnace in the
Bism over
bedrock.**

DCB Extractable Fe

Horizon	Depth (cm)	DCB Fe (%)
Oe	8	0.09
Oa	18	0.23
A	30	0.52
E	43	0.02
Bhs	51	0.05
Bs	76	0.09
BC	89	0.09
C	102	0.10

Supplement approved for NE

http://www.usace.army.mil/CECW/Documents/cecwo/reg/int_nc_ne_supp.pdf

- **A1: Histosol**
- **A2: Histic Epipedon**
- **A3: Black Histic**
- **A4: Hydrogen Sulfide**
- **A5: Stratified Layers**
- **A11: Depleted Below Dark Surface**
- **A12: Thick Dark Surface**

Supplement approved for NE

- **S1: Sandy Mucky Mineral**
- **S4: Sandy Gleyed Matrix**
- **S5: Sandy Redox**
- **S6: Stripped Matrix (proposed for elimination)**
- **S7: Dark Surface (for MLRA 149B, Cape Cod and Long Island)**
- **S8: Polyvalue Below Surface (for MLRA 149B, Cape Cod and Long Island and Northeastern Forests Subregion)**
- **S9: Thin Dark Surface (for MLRA 149B, Cape Cod and Long Island and Northeastern Forests)**

Supplement approved for NE

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Supplement approved for NE

- **F2: Loamy Gleyed Matrix**
- **F3: Depleted Matrix**
- **F6: Redox Dark Surface**
- **F7: Depleted Dark Surface**
- **F8: Redox Depressions**

Approved for testing NE

- **TF2: Red Parent Material**

Proposed for testing NE

- **TF2: Red Parent Material**
- **TF__ : Mesic Spodic**
- **TF__ : Sandy Chroma 3 with Redox**