



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE



Describing Hydric Soils and Applying Hydric Soil Indicators

FARM PRODUCTION AND CONSERVATION
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Topics

- What is a hydric soil?
- Describing Soils
 - Layers vs Horizons
 - Color
 - Texture
 - Redoximorphic Features
 - Fragments
- What are the hydric soil indicators?
- Applying Indicators
 - Reading and understanding the indicators
 - Review of common indicators



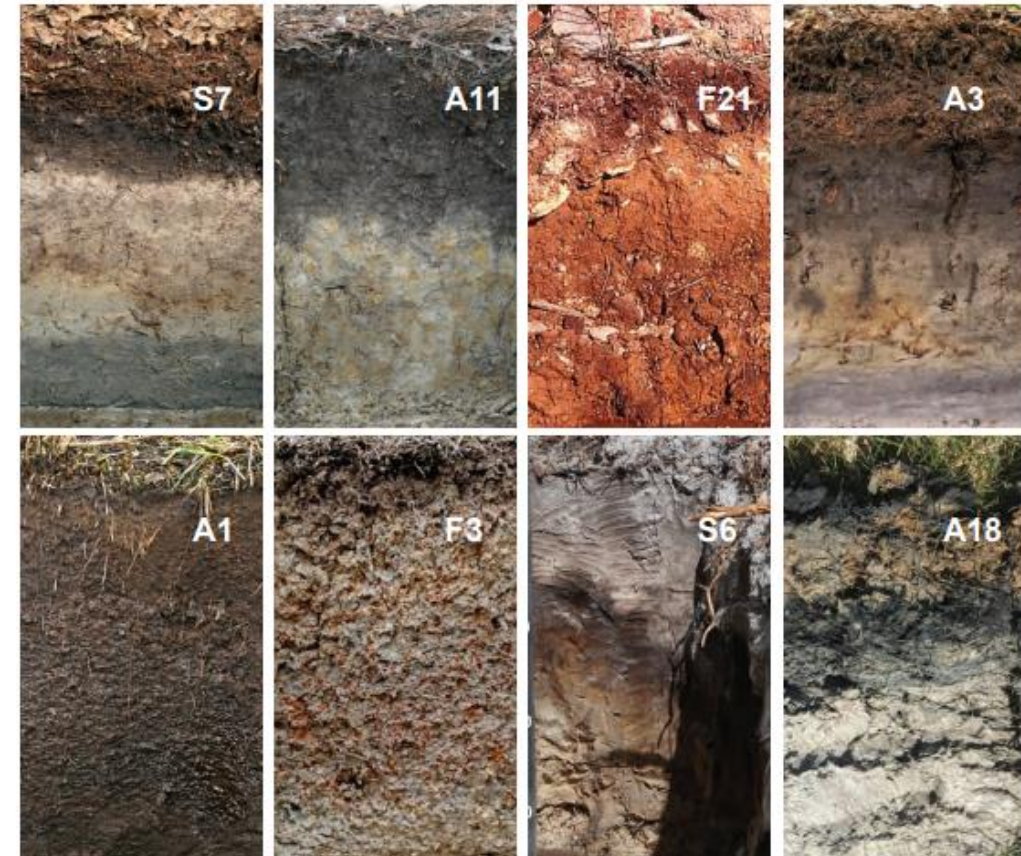


Field Indicators of Hydric Soils in the United States

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

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

“Changes in Hydric Soils of the United States, 60 Fed. Reg. 10349,” 1995



Why are we looking at hydric soils?

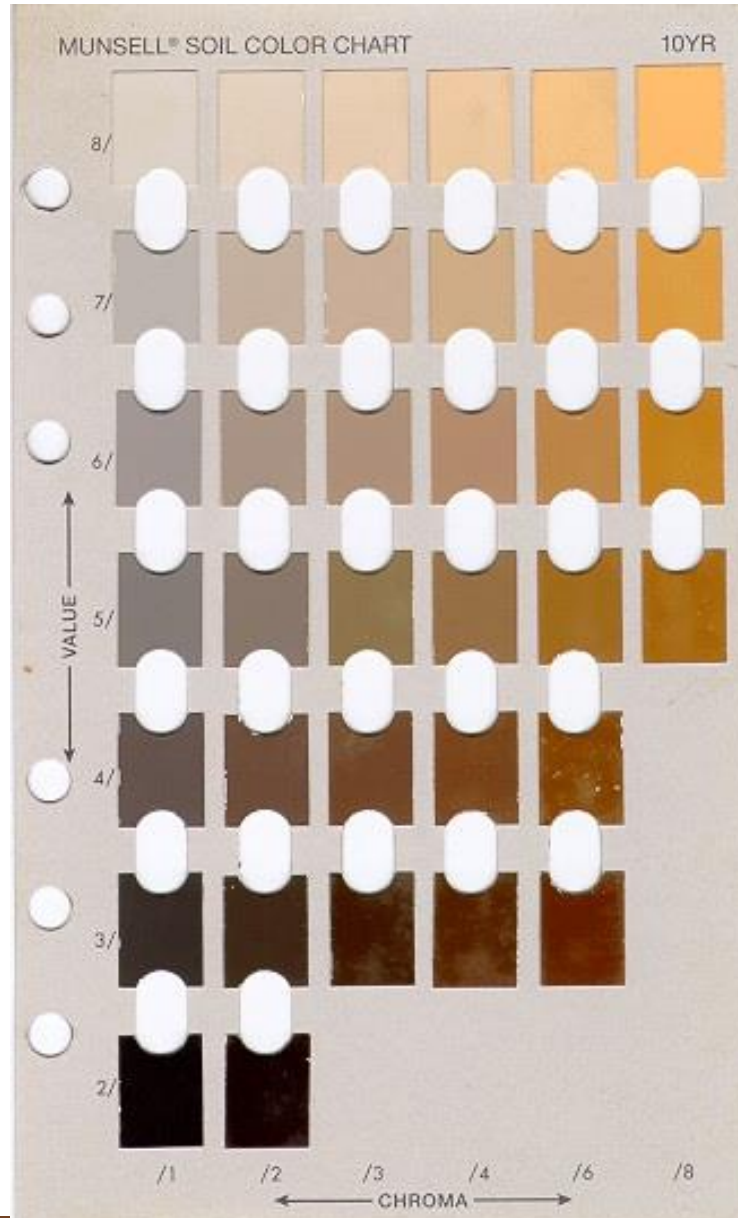
Regulatory Protection of Wetlands

- Clean Water Act-
 - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
 - Wetlands must have
 - A prevalence of hydrophytic vegetation
 - Hydric soil
 - Wetland hydrology

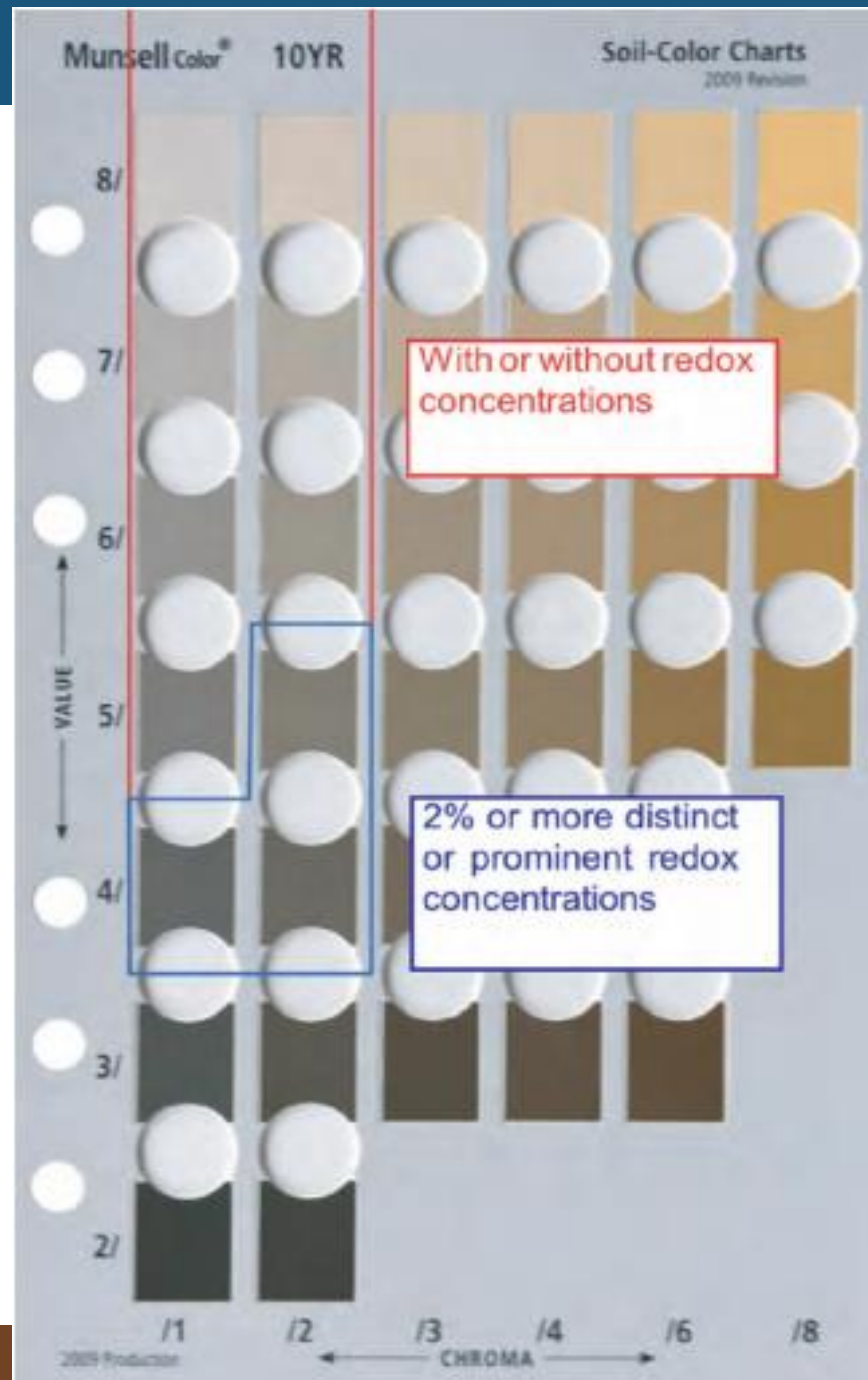
Describing Soils

[illegible]

Color



Color

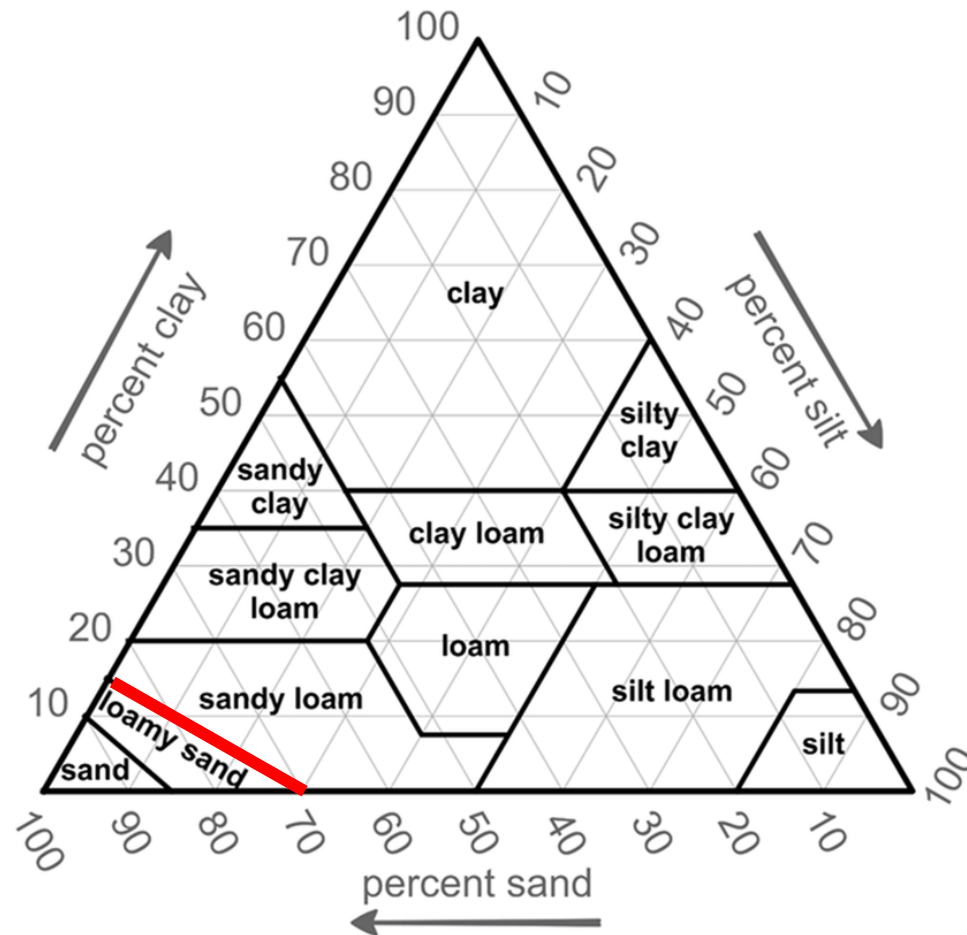


Redoximorphic Features



- Color
- Percent
- Type
 - Concentration
 - Depletion
 - Reduced Matrix
 - Masked Sand Grains
- Location
 - Pore lining
 - Matrix

Texture- Mineral Soils

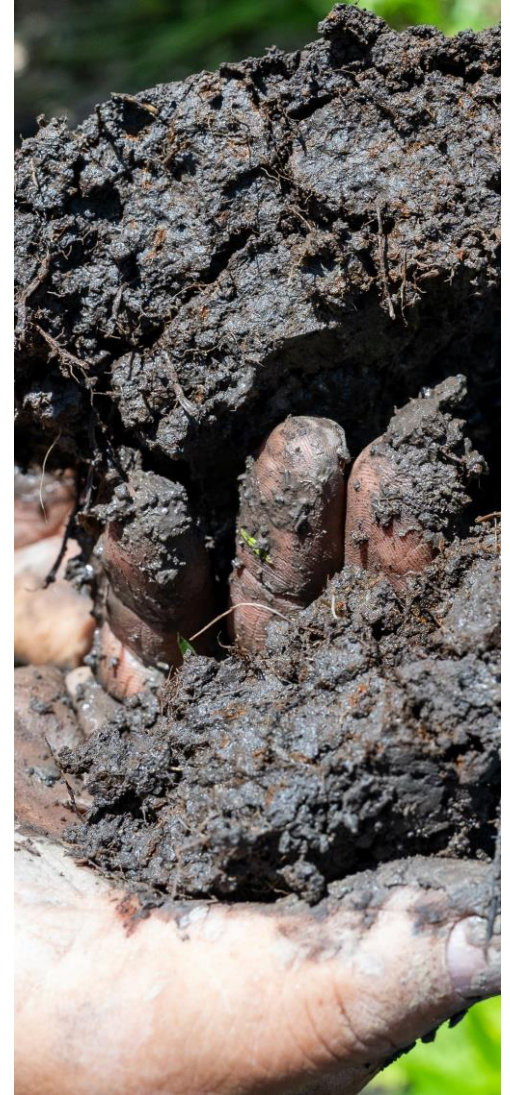


Loamy/Clayey- Loamy very fine sand and finer

Sandy- Loamy fine sand and coarser

Texture- Mineral Soils

- Mucky modified
 - A USDA soil texture modifier, e.g., mucky sand. Mucky modified mineral soil material has between 5 and 12 percent organic carbon. Where the organic component is peat (fibric material) or mucky peat (hemic material), mucky mineral soil material does not occur.
 - Greasy
 - Light in weight
 - Still has enough mineral material that it does meet the cut off for an organic soil



Texture- Organic Soils

Table 5. Proportion of sample consisting of fibers visible with a hand lens.

Unrubbed	Rubbed	Horizon Descriptor	Soil Texture (Saturated Organic Soils)
<33%	<17%	Sapric	Muck
33-67%	17-40%	Hemic	Mucky peat
>67%	>40%	Fibric	Peat

Adapted from USDA Natural Resources Conservation Service (1999).

Table 6. Determination of degree of decomposition of organic materials.

Degree of Humification	Nature of Material Extruded upon Squeezing	Nature of Plant Structure in Residue	Horizon Descriptor	Soil Texture
H1	Clear, colorless water; no organic solids squeezed out	Unaltered, fibrous, undecomposed	Fibric	Peat
H2	Yellowish water; no organic solids squeezed out	Almost unaltered, fibrous		
H3	Brown, turbid water; no organic solids squeezed out	Easily identifiable		
H4	Dark brown, turbid water; no organic solids squeezed out	Visibly altered but identifiable	Hemic	Mucky Peat
H5	Turbid water and some organic solids squeezed out	Recognizable but vague, difficult to identify		
H6	Turbid water; 1/3 of sample squeezed out	Indistinct, pasty		
H7	Very turbid water; 1/2 of sample squeezed out	Faintly recognizable; few remains identifiable, mostly amorphous	Sapric	Muck
H8	Thick and pasty; 2/3 of sample squeezed out	Very indistinct		
H9	No free water; nearly all of sample squeezed out	No identifiable remains		
H10	No free water; all of sample squeezed out	Completely amorphous		

Tables 5 and 6 from the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region

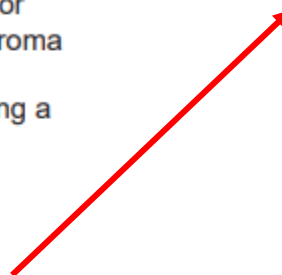
Fragments

A11.—Depleted Below Dark Surface. *For use in all LRRs except for W, X, and Y; for testing in LRRs W, X, and Y.* A layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, starting at a depth of 30 cm (12 inches) or less from the soil surface and having a minimum thickness of either

1. 15 cm (6 inches), or
2. 5 cm (2 inches) if the 5 cm consists of fragmental soil material.

Organic, loamy, or clayey layer(s) above the depleted or gleyed matrix must have value of 3 or less and chroma of 2 or less starting at a depth of less than 15 cm (6 inches) from the soil surface and extend to the depleted or gleyed matrix. Any loamy fine sand and coarser material above the depleted matrix must have value of 3 or less and chroma of 1 or less starting at a depth of 15 cm (6 inches) or less from the soil surface and extend to the depleted or gleyed matrix. When viewed through a 10x or 15x hand lens, at least 70 percent of the visible sand particles must be masked with organic material.

Fragmental soil material. Soil material that consists of 90 percent or more rock fragments. Less than 10 percent of the soil consists of particles 2 mm or smaller.





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Hydric Soil Indicators



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Why do we use hydric soil indicators?

1. The soil exhibits anaerobic conditions that can be measured, and
2. Following a period of normal or drier than normal precipitation when soil microbes are active, the soil is saturated and anaerobic conditions are met, and
3. The soil is saturated in the upper 25 centimeters (cm) of the soil profile for a specific period that is—
 - a. At least 7 consecutive days, occurring for a minimum of 28 days annually, for Vertisols in Louisiana and Texas, or
 - b. At least 14 consecutive days for all other soils.

Hydric Soil Technical Standard



What are the hydric soil indicators?

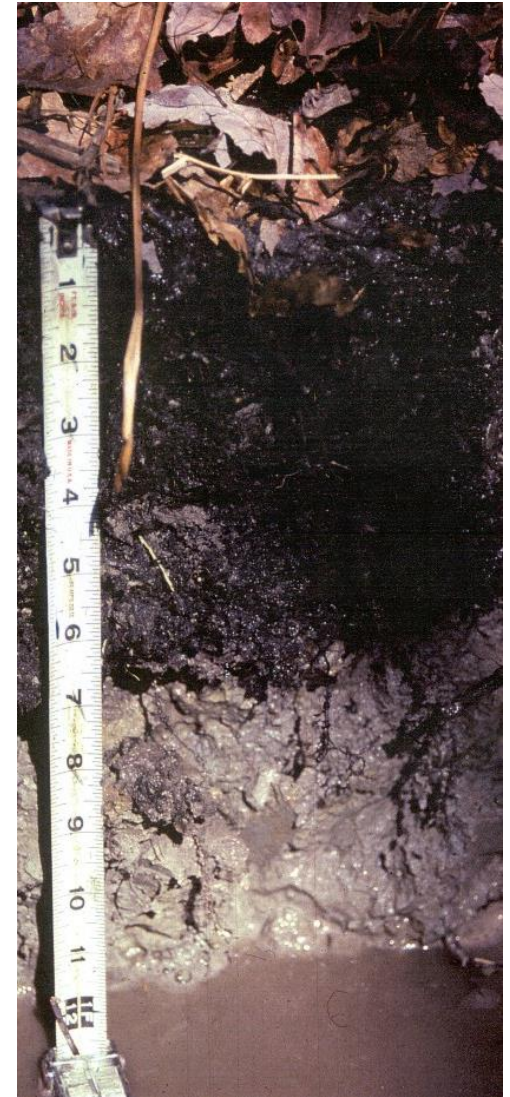
- Observable soil morphologies that have developed over time as a result of the chemical and physical processes of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.
 - Field Indicators for Identifying Hydric Soils in New England, Version 4
- The presence of a hydric soil indicator is proof positive of the presence of a hydric soil
 - BUT this does not guarantee you are in a wetland

A11.-Depleted Below Dark Surface

A11.—Depleted Below Dark Surface. *For use in all LRRs, except for W, X, and Y; for testing in LRRs W, X, and Y.* A layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, starting at a depth ≤ 30 cm (12 inches) from the soil surface, and having a minimum thickness of either:

- a. 15 cm (6 inches), or
- b. 5 cm (2 inches) if the 5 cm consists of fragmental soil material.

Organic, loamy, or clayey layer(s) above the depleted or gleyed matrix must have value of 3 or less and chroma of 2 or less starting at a depth < 15 cm (6 inches) from the soil surface and extend to the depleted or gleyed matrix. Any sandy material above the depleted or gleyed matrix must have value of 3 or less and chroma of 1 or less starting at a depth ≤ 15 cm (6 inches) from the soil surface and extend to the depleted or gleyed matrix. Viewed through a 10x or 15x hand lens, at least 70 percent of the visible sand particles must be masked with organic material. Observed without a hand lens, the sand particles appear to be close to 100 percent masked.



Sampling Point	1
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A12.- Thick Dark Surface

For use in all LRRs. A layer at least 15 cm (6 inches) thick with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less starting below 30 cm (12 inches) of the surface. The layer(s) above the depleted or gleyed matrix and starting at a depth <15 cm (6 inches) from the soil surface must have value of 2.5 or less and chroma of 1 or less to a depth of at least 30 cm (12 inches) and value of 3 or less and chroma of 1 or less in any remaining layers above the depleted or gleyed matrix. In any sandy material above the depleted or gleyed matrix, at least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Observed without a hand lens, the particles appear to be close to 100 percent masked.



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F3.- Depleted Matrix

For use in all LRRs, except W, X, and Y; for testing in LRRs W, X, and Y. A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either

1. 5 cm (2 inches), starting at a depth of 10 cm (4 inches) or less from the soil surface, or
2. 15 cm (6 inches), starting at a depth of 25 cm (10 inches) or less from the soil surface.



Sampling Point	1
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[illegible]²Location: PL=Pore Lining, M=Matrix.

Indicators for Problematic Hydric Soils³:

- | | | |
|---|--|--|
| ☐ Histosol (A1) | ☐ Dark Surface (S7) | ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B) |
| ☐ Histic Epipedon (A2) | ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B) | ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) |
| ☐ Black Histic (A3) | ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B) | ☐ Polyvalue Below Surface (S8) (LRR K, L) |
| ☐ Hydrogen Sulfide (A4) | ☐ High Chroma Sands (S11) (LRR K, L) | ☐ Thin Dark Surface (S9) (LRR K, L) |
| ☒ Stratified Layers (A5) | ☐ Loamy Mucky Mineral (F1) (LRR K, L) | ☐ Iron-Manganese Masses (F12) (LRR K, L, R) |
| ☒ Depleted Below Dark Surface (A11) | ☐ Loamy Gleyed Matrix (F2) | ☐ Piedmont Floodplain Soils (F19) (MLRA 149B) |
| ☐ Thick Dark Surface (A12) | ☒ Depleted Matrix (F3) | ☐ Red Parent Material (F21) (outside MLRA 145) |
| ☐ Mesic Spodic (A17) | ☐ Redox Dark Surface (F6) | ☐ Very Shallow Dark Surface (F22) |
| (MLRA 144A, 145, 149B) | ☐ Depleted Dark Surface (F7) | ☐ Other (Explain in Remarks) |
| ☒ Sandy Mucky Mineral (S1) | ☐ Redox Depressions (F8) | |
| ☒ Sandy Gleyed Matrix (S4) | ☐ Marl (F10) (LRR K, L) | |
| ☒ Sandy Redox (S5) | ☐ Red Parent Material (F21) (MLRA 145) | |
| ☒ Stripped Matrix (S6) | | |
- ³Indicators of hydrophytic vegetation and wetland hydrology must be present.

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

F6.- Redox Dark Surface

For use in all LRRs, except W, X, and Y; for testing in LRRs W, X, and Y. 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.



SOIL

Sampling Point 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

[illegible]

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- | | |
|--|--|
| ☐ Histosol (A1) | ☐ Dark Surface (S7) |
| ☐ Histic Epipedon (A2) | ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B) |
| ☐ Black Histic (A3) | ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B) |
| ☐ Hydrogen Sulfide (A4) | ☐ High Chroma Sands (S11) (LRR K, L) |
| ☐ Stratified Layers (A5) | ☐ Loamy Mucky Mineral (F1) (LRR K, L) |
| ☐ Depleted Below Dark Surface (A11) | ☐ Loamy Gleyed Matrix (F2) |
| ☐ Thick Dark Surface (A12) | ☐ Depleted Matrix (F3) |
| ☐ Mesic Spodic (A17) | ☒ Redox Dark Surface (F6) |
| (MLRA 144A, 145, 149B) | ☐ Depleted Dark Surface (F7) |
| ☐ Sandy Mucky Mineral (S1) | ☒ Redox Depressions (F8) |
| ☐ Sandy Gleyed Matrix (S4) | ☐ Marl (F10) (LRR K, L) |
| ☐ Sandy Redox (S5) | ☐ Red Parent Material (F21) (MLRA 145) |
| ☐ Stripped Matrix (S6) | |

Indicators for Problematic Hydric Soils³:

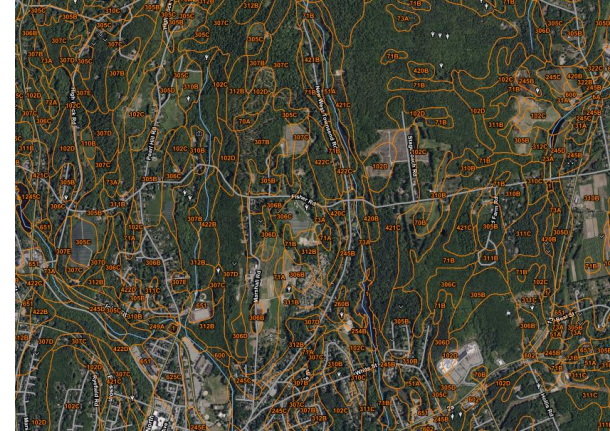
- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
☐ Polyvalue Below Surface (S8) (LRR K, L)
☐ Thin Dark Surface (S9) (LRR K, L)
☐ Iron-Manganese Masses (F12) (LRR K, L, R)
☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
☐ Red Parent Material (F21) (outside MLRA 149B)
☐ Very Shallow Dark Surface (F22)
☐ Other (Explain in Remarks)

^aIndicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

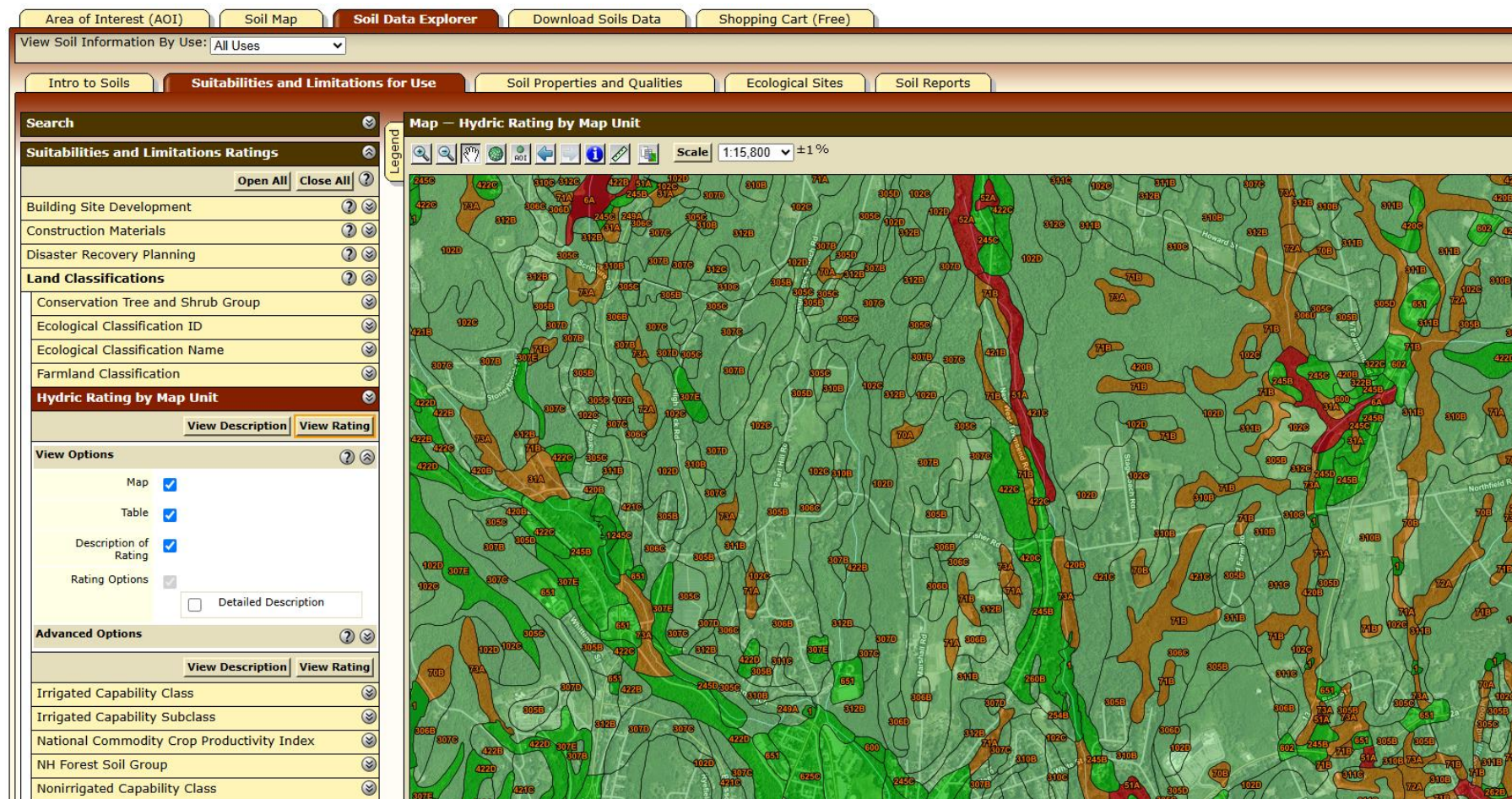




Tools for Office Investigation



Web Soil Survey



SSURGO Portal

Change or Create a Database

SSURGODatabase.gpkg

Browse

Step 2: Select Folder of SSURGO Data

Choose SSURGO Data fold

Browse

*NOTE: It is strongly recommended that you only have
SSURGO Data in your selected SSURGO Data folder.*

Import SSURGO Data

Advanced Import Options +

Help

Contact Us

SSURGO Portal - v0.3.0.8

Your chosen database is: **SSURGODatabase.gpkg**

Import SSURGO Data

SSURGO Data in Database

Soil Data Viewer



SSURGO Portal

Change or Create a Database

SSURGODatabase.gpkg

Browse

Step 2: Select Folder of SSURGO Data

Choose SSURGO Data fold

Browse

NOTE: It is strongly recommended that you only have SSURGO Data in your selected SSURGO Data folder.

Delete SSURGO Data

Help

Contact Us

SSURGO Portal - v0.3.0.8

Your chosen database is: **SSURGODatabase.gpkg**

Import SSURGO Data

SSURGO Data in Database

Soil Data Viewer

☒	Area Symbol ↑	Area Name ↑	SSURGO Version Date ↑	Tabular Only ↑
☒	MA001	Barnstable County, Massachusetts	9/5/2025	
☒	MA003	Berkshire County, Massachusetts	9/5/2025	
☒	MA007	Dukes County, Massachusetts	9/5/2025	
☒	MA011	Franklin County, Massachusetts	9/5/2025	
☒	MA017	Middlesex County, Massachusetts	9/5/2025	
☒	MA019	Nantucket County, Massachusetts	9/5/2025	
☒	MA023	Plymouth County, Massachusetts	9/5/2025	
☒	MA602	Bristol County, Massachusetts, Northern Part	9/5/2025	
☒	MA603	Bristol County, Massachusetts, Southern Part	9/5/2025	
☒	MA605	Essex County, Massachusetts, Northern Part	9/5/2025	

19 out of 19 selected

SSURGO Portal

Change or Create a Database

SSURGODatabase.gpkg

Browse

Search folder and ratings

Group

- Ecological Classification ID
- Ecological Classification Name
- Farmland Classification
- Hydric Rating by Map Unit
- Irrigated Capability Class
- Irrigated Capability Subclass
- National Commodity Crop Productivity Index
- NH Forest Soil Group
- Nonirrigated Capability Class
- Nonirrigated Capability Subclass
- NRCS Ecological Site ID

Generate Rating

Help

Contact Us

SSURGO Portal - v0.3.0.8

Your chosen database is: **SSURGODatabase.gpkg**

Import SSURGO Data

SSURGO Data in Database

Soil Data Viewer

Hydric Rating by Map Unit

Rating Options

Required

There are no required options for this rating

Advanced

Aggregation Method:

Percent Present

Component % Cutoff:

Tie Break Rule:

- ☒ Lower
☐ Higher

Rating Description

View Rating Description

+

Aggregation Method

+

Component Percent Cutoff

+

Tie Break Rule

+



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Questions?

