

Key to Field Indicators of Hydric Soils in Florida

A Facilitator for the Determination of the Presence of
Hydric Soil Field Indicators

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INTRODUCTION

The purpose of this document is to aid in the identification of hydric soil field indicators for certain morphological characteristics found in soil profiles throughout Florida. This key's purpose is for hydric soil identification and delineation and not for taxonomic purposes, therefore it applies to the upper 20 inches of the soil and is only used lower to complete the identification of a hydric soil indicator that started within the upper 20 inches of the soil.

FORMAT

This document is formatted to be used after a complete and thorough soil profile description has been written. It looks at the different morphological characteristics noted within the soil profile description. If the soil profile description is incomplete or not thorough then some indicators may be missed. Once a soil profile description is done, each individual morphological characteristic will have to go through the key to determine all associated hydric soil field indicators. Examples of morphological characteristics are:

- Layer of organic soil material
- Layer of mucky modified mineral soil material
- Layer of high organic accumulation in mineral soil material
- Gleyed matrix
- Depleted matrix
- Depletions
- Redox concentrations

Key 1
Guide to Hydric Soil Field Indicator Keys

1. Morphological characteristic is a hydrogen sulfide odor starting within 12 inches of the soil surface
A4 – Hydrogen Sulfide
1. Morphological characteristic is not as above
 2. Morphological characteristic and/or surrounding soil matrix is organic material accumulation such that in sandy texture soils at least 70 percent of the visible soil particles are masked; in fine textured soils the value is 3 or less and chroma of 2 or less; an 8 inch layer of organic soil material (Fibric/Peat, Hemic/Mucky Peat, Sapric/Muck); or a layer with the texture of muck or mucky mineral.
 3. Morphological characteristic is several stratified layers starting within the upper 6 inches of the soil surface. At least one of the layers has value of 3 or less and chroma of 1 or less, or it is muck, mucky peat, peat, or a mucky modified mineral texture. The remaining layers have chroma of 2 or less. For any sandy material that constitutes the layer with value of 3 or less and chroma of 1 or less, at least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. These layers are normally less than 1 inch thick, but are not required to be less than 1 inch thick.
A5 – Stratified Layers
 3. Morphological characteristic is not as above
 4. Morphological characteristic is the presence of 2 percent or more organic bodies of muck or a mucky modified mineral texture starting within 6 inches of the soil surface
A6 – Organic Bodies
 4. Morphological characteristic is not as above
 5. Morphological characteristic and/or surrounding soil matrix is comprised of organic soil material (Fibric/Peat, Hemic/Mucky Peat, Sapric/Muck)
 6. Morphological characteristic and/or surrounding soil matrix is comprised of Fibric (Peat) or Hemic (Mucky Peat) soil material
Key 2
 6. Morphological characteristic and/or surrounding soil matrix is comprised of Sapric (Muck) soil material
Key 3
 5. Morphological characteristic and/or surrounding soil matrix is not comprised of organic soil material (Fibric/Peat, Hemic/Mucky Peat, Sapric/Muck)
 7. Morphological characteristic and/or surrounding soil matrix is comprised of Mucky Modified Mineral soil material
Key 4
 7. Morphological characteristic and/or surrounding soil matrix is not comprised of Mucky Modified Mineral soil material
 8. Morphological characteristic and/or surrounding soil matrix ribbons and has a value of 3 or less and chroma of 2 or less
Key 5
 8. Morphological characteristic and/or surrounding soil matrix does not ribbon and at least 70 percent of the visible soil particles masked with organic material
Key 6
 2. Morphological characteristic and/or surrounding soil matrix is not organic material accumulation.
 9. Morphological characteristic and/or surrounding soil matrix ribbons and has a value of greater than 3
Key 7
 9. Morphological characteristic and/or surrounding soil matrix does not ribbon and has less than 70 percent of the visible soil particles masked with organic material
Key 8

Key 2
Comprised of Fibric (Peat) or Hemic (Mucky Peat) soil material

1. Morphological characteristic and/or surrounding soil matrix is 16 inches or more thick
 2. Morphological characteristic starts within the upper 6 inches of the soil surface; has a hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less
Note: Additionally to hydric soil field indicator A3 – Black Histic being satisfied:
 - A1 – Histosol is satisfied with proof of aquic conditions or artificial drainage
 - A2 – Histic Epipedon is satisfied with proof of aquic conditions or artificial drainage

A3 – Black Histic
 2. Morphological characteristic is not as above
 3. Morphological characteristic is underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage
Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:
 - A1 – Histosol is satisfied

A2 – Histic Epipedon
 3. Morphological characteristic is not as above
 4. Morphological characteristic starts within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

A1 - Histosol
 4. Morphological characteristic is not as above

No hydric soil field indicator
1. Morphological characteristic and/or surrounding soil matrix is less than 16 inches thick
 5. Morphological characteristic and/or surrounding soil matrix is 8 inches or more thick
 6. Morphological characteristic starts within the upper 6 inches of the soil surface; has a hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less
Note: Additionally to hydric soil field indicator A3 – Black Histic being satisfied:
 - A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and with proof of aquic conditions or artificial drainage
 - A2 – Histic Epipedon is satisfied with proof of aquic conditions or artificial drainage

A3 – Black Histic
 6. Morphological characteristic is not as above
 7. Morphological characteristic is underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage
Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:
 - A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s)

A2 – Histic Epipedon
 7. Morphological characteristic is not as above
 8. Morphological characteristic is a continuous combined 16 inch thick layer of organic soil material starting within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

A1 - Histosol
 8. Morphological characteristic is not as above

No hydric soil field indicator
 5. Morphological characteristic and/or surrounding soil matrix is less than 8 inches thick
 9. Morphological characteristic is a continuous combined 8 inch thick layer of organic soil material starting within the upper 6 inches of the soil surface; has a hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less
Note: Additionally to hydric soil field indicator A3 – Black Histic being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial drainage
- A2 – Histic Epipedon is satisfied with a continuous combined 8 inch thick organic soil material layer(s) and proof of aquic conditions or artificial drainage

A3 – Black Histic

9. Morphological characteristic is not as above

10. Morphological characteristic is a continuous combined 8 inch thick layer of organic soil material underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial drainage

A2 – Histic Epipedon

10. Morphological characteristic is not as above

11. Morphological characteristic is a continuous combined 16 inch thick layer of organic soil material starting within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

A1 - Histosol

11. Morphological characteristic is not as above

No hydric soil field indicator

Key 3

Comprised of Sapric (Muck) soil material

1. Morphological characteristic and/or surrounding soil matrix is 16 inches or more thick

2. Morphological characteristic has a chroma of 1 or less

3. Morphological characteristic starts at the soil surface and has a value of 2.5 or less and directly below is a layer at least 6 inches thick with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less

Note: Additionally to hydric soil field indicator A12 – Thick Dark Surface being satisfied:

- A1 – Histosol is satisfied with proof of aquic conditions or artificial drainage
- A2 – Histic Epipedon is satisfied with proof of aquic conditions or artificial drainage
- A3 – Black Histic is satisfied if the hue is 10YR or yellower
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and is located in Land Resource Region P or T

A12 – Thick Dark Surface

3. Morphological characteristic is not as above

4. Morphological characteristic starts within the upper 6 inches of the soil surface; has a hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less

Note: Additionally to hydric soil field indicator A3 – Black Histic being satisfied:

- A1 – Histosol is satisfied with proof of aquic conditions or artificial drainage
- A2 – Histic Epipedon is satisfied with proof of aquic conditions or artificial drainage
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A3 – Black Histic

4. Morphological characteristic is not as above

5. Morphological characteristic is underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:

- A1 – Histosol is satisfied

- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A2 – Histic Epipedon

5. Morphological characteristic is not as above

6. Morphological characteristic starts within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A1 – Histosol being satisfied:

- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A1 – Histosol

6. Morphological characteristic is not as above

7. Located in Land Resource Region P or T

8. Morphological characteristic is a layer of muck 0.5 inch or more thick with value of 3 or less and chroma of 1 or less and starting within 6 inches of the soil surface

A9 – 1cm Muck

8. Morphological characteristic is not as above

No hydric soil field indicator

7. Located in Land Resource Region U

9. Morphological characteristic is a layer of muck with value of 3 or less and chroma of 1 or less, starting within 6 inches of the soil surface

A8 – Muck Presence

9. Morphological characteristic is not as above

No hydric soil field indicator

2. Morphological characteristic has a chroma of more than 1

10. Morphological characteristic is underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:

- A1 – Histosol is satisfied

A2 – Histic Epipedon

10. Morphological characteristic is not as above

11. Morphological characteristic starts within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

A1 – Histosol

11. Morphological characteristic is not as above

No hydric soil field

1. Morphological characteristic and/or surrounding soil matrix is less than 16 inches thick

12. Morphological characteristic and/or surrounding soil matrix is 12 inches or more thick

13. Morphological characteristic has a chroma of 1 or less

14. Morphological characteristic starts at the soil surface and has a value of 2.5 or less and directly below is a layer at least 6 inches thick with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less

Note: Additionally to hydric soil field indicator A12 – Thick Dark Surface being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial drainage
- A2 – Histic Epipedon is satisfied with proof of aquic conditions or artificial drainage
- A3 – Black Histic is satisfied if the hue is 10YR or yellower
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and is located in Land Resource Region P or T

A12 – Thick Dark Surface

14. Morphological characteristic is not as above

15. Morphological characteristic starts within the upper 6 inches of the soil surface; has a hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less

Note: Additionally to hydric soil field indicator A3 – Black Histic being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial
- A2 – Histic Epipedon is satisfied with proof of aquic conditions or artificial drainage
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A3 – Black Histic

15. Morphological characteristic is not as above

16. Morphological characteristic is underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A2 – Histic Epipedon

16. Morphological characteristic is not as above

17. Morphological characteristic is a continuous combined 16 inch thick layer of organic soil material starting within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A1 – Histosol being satisfied:

- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A1 – Histosol

17. Morphological characteristic is not as above

18. Located in Land Resource Region P or T

19. Morphological characteristic is a layer of muck 0.5 inch or more thick with value of 3 or less and chroma of 1 or less and starting within 6 inches of the soil surface

A9 – 1cm Muck

19. Morphological characteristic is not as above

No hydric soil field indicator

18. Located in Land Resource Region U

20. Morphological characteristic is a layer of muck with value of 3 or less and chroma of 1 or less, starting within 6 inches of the soil surface

A8 – Muck Presence

20. Morphological characteristic is not as above

No hydric soil field indicator

13. Morphological characteristic has a chroma of more than 1

21. Morphological characteristic is underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial

A2 – Histic Epipedon

21. Morphological characteristic is not as above

22. Morphological characteristic is a continuous combined 16 inch thick layer of organic soil material starting within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

A1 – Histosol

22. Morphological characteristic is not as above

No hydric soil field indicator

12. Morphological characteristic and/or surrounding soil matrix is less than 12 inches thick

23. Morphological characteristic is 8 inches or more thick

24. Morphological characteristic is a layer(s) that starts at the soil surface and has value of 3 or less and chroma of 1 or less. Directly below is a layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, and having a minimum thickness of either:

- a. 6 inches, or
- b. 2 inches if the 2 inches consists of fragmental soil material

Note: Additionally to hydric soil field indicator A11 – Depleted Below Dark Surface being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial
- A2 – Histic Epipedon is satisfied with proof of aquic conditions or artificial drainage
- A3 – Black Histic is satisfied if the hue is 10YR or yellower
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A11 – Depleted Below Dark Surface

24. Morphological characteristic is not as above

25. Morphological characteristic starts within the upper 6 inches of the soil surface; has a hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less

Note: Additionally to hydric soil field indicator A3 – Black Histic being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial
- A2 – Histic Epipedon is satisfied with proof of aquic conditions or artificial drainage
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A3 – Black Histic

25. Morphological characteristic is not as above

26. Morphological characteristic is underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A2 – Histic Epipedon

26. Morphological characteristic is not as above

27. Morphological characteristic is a continuous combined 16 inch thick layer of organic soil material starting within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A1 – Histosol being satisfied:

- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A1 – Histosol

27. Morphological characteristic is not as above

28. Located in Land Resource Region P or T

29. Morphological characteristic is a layer of muck 0.5 inch or more thick with value of 3 or less and chroma of 1 or less and starting within 6 inches of the soil surface

A9 – 1cm Muck

29. Morphological characteristic is not as above

No hydric soil field indicator

28. Located in Land Resource Region U

30. Morphological characteristic is a layer of muck with value of 3 or less and chroma of 1 or less, starting within 6 inches of the soil surface

A8 – Muck Presence

30. Morphological characteristic is not as above

No hydric soil field indicator

23. Morphological characteristic is less than 8 inches thick

31. Morphological characteristic is a continuous combined 8 inch thick layer of organic soil material starting within the upper 6 inches of the soil surface; has a hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less

Note: Additionally to hydric soil field indicator A3 – Black Histic being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial drainage
- A2 – Histic Epipedon is satisfied with a continuous combined 8 inch thick organic soil material layer(s) and proof of aquic conditions or artificial drainage
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A3 – Black Histic

31. Morphological characteristic is not as above

32. Morphological characteristic is a continuous combined 8 inch thick layer of organic soil material underlain by mineral soil material with chroma of 2 or less and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A2 – Histic Epipedon being satisfied:

- A1 – Histosol is satisfied with a continuous combined 16 inch thick organic soil material layer(s) and proof of aquic conditions or artificial drainage
- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A2 – Histic Epipedon

32. Morphological characteristic is not as above

33. Morphological characteristic is a continuous combined 16 inch thick layer of organic soil material starting within 16 inches of the soil surface and there is proof of aquic conditions or artificial drainage

Note: Additionally to hydric soil field indicator A1 – Histosol being satisfied:

- A8 – Muck Presence is satisfied if value is 3 or less and located in Land Resource Region U
- A9 – 1cm Muck is satisfied if value is 3 or less and located in Land Resource Region P or T

A1 - Histosol

33. Morphological characteristic is not as above

34. Located in Land Resource Region P or T

35. Morphological characteristic is a layer of muck 0.5 inch or more thick with value of 3 or less and chroma of 1 or less and starting within 6 inches of the soil surface

A9 – 1cm Muck

35. Morphological characteristic is not as above
No hydric soil field indicator
34. Located in Land Resource Region U
36. Morphological characteristic is a layer of muck with value of 3 or less and chroma of 1 or less, starting within 6 inches of the soil surface
A8 – Muck Presence
36. Morphological characteristic is not as above
No hydric soil field indicator

Key 4
Comprised of Mucky Modified Mineral soil material

1. Morphological characteristic is 12 inches or more thick
2. Morphological characteristic is a layer that starts at the soil surface and has a value of 2.5 or less and chroma of 1 or less. Directly below is a layer at least 6 inches thick with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less
Note: Additionally to hydric soil field indicator A12 – Thick Dark Surface being satisfied:
- A7 – 5cm Mucky Mineral is satisfied
A12 – Thick Dark Surface
2. Morphological characteristic is not as above
3. Morphological characteristic is a layer of mucky modified mineral soil material 2 inches or more thick, starting within 6 inches of the soil surface
A7 – 5cm Mucky Mineral
3. Morphological characteristic is not as above
No hydric soil field indicator present
1. Morphological characteristic is less than 12 inches thick
4. Morphological characteristic is a layer(s) that starts at the soil surface and has value of 3 or less and chroma of 1 or less. Directly below is a layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, and having a minimum thickness of either:
- a. 6 inches, or
 - b. 2 inches if the 2 inches consists of fragmental soil material
- Note:** Additionally to hydric soil field indicator A11 – Depleted Below Dark Surface being satisfied:
- A7 – 5cm Mucky Mineral is satisfied with a 2 inch thick layer of mucky modified mineral soil material
A11 – Depleted Below Dark Surface
4. Morphological characteristic is not as above
5. Morphological characteristic is a layer of mucky modified mineral soil material 2 inches or more thick, starting within 6 inches of the soil surface
A7 – 5cm Mucky Mineral
5. Morphological characteristic is not as above
No hydric soil field indicator present

Key 5

Mineral soil material that ribbons & has value of 3 or less and chroma of 2 or less

1. Morphological characteristic is a layer that starts at the soil surface and has a value of 2.5 or less and chroma of 1 or less to a depth of at least 12 inches and value of 3 or less and chroma of 1 or less in any remaining layers above a depleted or gleyed matrix. The depleted or gleyed matrix directly below this layer is at least 6 inches thick and is 60 percent or more chroma of 2 or less

Note: Additionally to hydric soil field indicator A12 – Thick Dark Surface being satisfied:

- F13 – Umbric Surface is satisfied

A12 – Thick Dark Surface

1. Morphological characteristic is not as above

2. Morphological characteristic is a layer that starts at the soil surface and has a value of 3 or less and chroma of 1 or less. Directly below is a layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, and having a minimum thickness of either:

- a. 6 inches, or
- b. 2 inches if the 2 inches consists of fragmental soil material

A11 – Depleted Below Dark Surface

2. Morphological characteristic is not as above

3. Morphological characteristic is redox depletions with value of 5 or more and chroma of 2 or less in a layer that is at least 4 inches thick, starts with 8 inches of the soil surface, and has:

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

F7 – Depleted Dark Surface

3. Morphological characteristic is not as above

4. Morphological characteristic starts within 4 inches of the soil surface

5. Morphological characteristic is redox concentrations within a layer that is at least 4 inches thick, and has:

- a. 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
- b. 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

Note: Additionally to hydric soil field indicator F6 – Redox Dark Surface being satisfied:

- F8 – Redox Depression is satisfied if it is located within a closed depression subject to ponding with 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings within a 2 inch or more thick layer
- F12 – Iron-Manganese Masses is satisfied if it is located on a flood plain in Land Resource Region P or T with 2 percent or more distinct or prominent iron-manganese masses with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less. The thickness requirement is waived if the layer is the mineral surface layer
- F13 – Umbric Surface is satisfied if it is located within a depression or other concave landforms, and is a layer 10 inches or more thick, in which the upper 6 inches have a value of 3 or less and chroma of 1 or less and in which the lower 4 inches have the same colors as those described above or any other color that has chroma of 2 or less

F6 – Redox Dark Surface

5. Morphological characteristic is not as above

6. Morphological characteristic is 2 percent or more distinct or prominent redox concentrations occurring as soft iron-manganese masses with diffuse boundaries with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less located on a flood plain in Land Resource Region P

or T. The layer starts within 8 inches of the soil surface. The thickness requirement is waived if the layer is the mineral surface layer

Note: Additionally to hydric soil field indicator F12 – Iron-Manganese Masses being satisfied:

- F8 – Redox Depression is satisfied if it is located within a closed depression subject to ponding with 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings within a 2 inch or more thick layer
- F13 – Umbric Surface is satisfied if it is located within a depression or other concave landforms, and is a layer 10 inches or more thick, in which the upper 6 inches have a value of 3 or less and chroma of 1 or less and in which the lower 4 inches have the same colors as those described above or any other color that has chroma of 2 or less

F12 – Iron-Manganese Masses

6. Morphological characteristic is not as above

7. Morphological characteristic is a layer 10 inches or more thick, in which the upper 6 inches has value of 3 or less and chroma of 1 or less and in which the lower 4 inches has the same colors as those described above or any other color that has chroma of 2 or less and is located in a depression or other concave landform

Note: Additionally to hydric soil field indicator F13 – Umbric Surface being satisfied:

- F8 – Redox Depression is satisfied if it is located within a closed depression subject to ponding with 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings within a 2 inch or more thick layer

F13 – Umbric Surface

7. Morphological characteristic is not as above

8. Morphological characteristic is 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings in a layer that is 2 inches or more thick and is located on a flood plain

F8 – Redox Depression

8. Morphological characteristic is not as above

No hydric soil field indicator

4. Morphological characteristic starts below 4 inches from the soil surface

9. Morphological characteristic starts within 6 inches of the soil surface

10. Morphological characteristic is redox concentrations within a layer that is at least 4 inches thick, and has:

- a. 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
- b. 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

Note: Additionally to hydric soil field indicator F6 – Redox Dark Surface being satisfied:

- F12 – Iron-Manganese Masses is satisfied if it is located on a flood plain in Land Resource Region P or T with 2 percent or more distinct or prominent iron-manganese masses with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less. The thickness requirement is waived if the layer is the mineral surface layer
- F13 – Umbric Surface is satisfied if it is located within a depression or other concave landforms, and is a layer 10 inches or more thick, in which the upper 6 inches have a value of 3 or less and chroma of 1 or less and in which the lower 4 inches have the same colors as those described above or any other color that has chroma of 2 or less

F6 – Redox Dark Surface

10. Morphological characteristic is not as above

11. Morphological characteristic is 2 percent or more distinct or prominent redox concentrations occurring as soft iron-manganese masses with diffuse boundaries with value and chroma of 3 or less within a 4 inch or more thick layer and has a

matrix with 40 percent or more chroma 2 or less located on a flood plain in Land Resource Region P or T. The layer starts within 8 inches of the soil surface. The thickness requirement is waived if the layer is the mineral surface layer

Note: Additionally to hydric soil field indicator F12 – Iron-Manganese Masses being satisfied:

- F13 – Umbric Surface is satisfied if it is located within a depression or other concave landforms, and is a layer 10 inches or more thick, in which the upper 6 inches have a value of 3 or less and chroma of 1 or less and in which the lower 4 inches have the same colors as those described above or any other color that has chroma of 2 or less

F12 – Iron-Manganese Masses

11. Morphological characteristic is not as above

12. Morphological characteristic is a layer 10 inches or more thick, in which the upper 6 inches has value of 3 or less and chroma of 1 or less and in which the lower 4 inches has the same colors as those described above or any other color that has chroma of 2 or less and is located in a depression or other concave landform

F13 – Umbric Surface

12. Morphological characteristic is not as above

No hydric soil field indicator

9. Morphological characteristic starts below 6 inches from the soil surface

13. Morphological characteristic is redox concentrations within a layer that is at least 4 inches thick, and has:

- a. 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
- b. 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

Note: Additionally to hydric soil field indicator F6 – Redox Dark Surface being satisfied:

- F12 – Iron-Manganese Masses is satisfied if it is located on a flood plain in Land Resource Region P or T with 2 percent or more distinct or prominent iron-manganese masses with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less. The thickness requirement is waived if the layer is the mineral surface layer

F6 – Redox Dark Surface

13. Morphological characteristic is not as above

14. Morphological characteristic is 2 percent or more distinct or prominent redox concentrations occurring as soft iron-manganese masses with diffuse boundaries with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less located on a flood plain in Land Resource Region P or T. The layer starts within 8 inches of the soil surface. The thickness requirement is waived if the layer is the mineral surface layer

F12 – Iron-Manganese Masses

14. Morphological characteristic is not as above

No hydric soil field indicator

Key 6

Mineral soil material that does not ribbon & \geq 70% of the visible soil particles masked with organic material

1. Morphological characteristic is 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings contained within a layer starting within 6 inches of the soil surface that is at least 4 inches thick and has a matrix with 60 percent or more chroma of 2 or less

S5 – Sandy Redox

1. Morphological characteristic is not as above

2. Morphological characteristic is stripped zones which are 10 percent or more of the volume of the layer that they are contained in and are round. This layer starts within 6 inches of the soil surface in which iron-manganese oxides and/or organic matter have been stripped from the matrix and the primary base color of the soil material has been exposed.

S6 – Stripped Matrix

2. Morphological characteristic is not as above

3. Morphological characteristic is 12 inches or more thick

4. Morphological characteristic is a layer that starts at the soil surface and has a value of 2.5 or less and chroma of 1 or less to a depth of at least 12 inches and value of 3 or less and chroma of 1 or less in any remaining layers above a depleted or gleyed matrix. The depleted or gleyed matrix directly below this layer is at least 6 inches thick and is 60 percent or more chroma of 2 or less. 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

Note: Additionally to hydric soil field indicator A12 – Thick Dark Surface being satisfied:

- S7 – Dark Surface is satisfied
- S8 – Polyvalue Below Surface is satisfied if directly below the 70 percent coated layer, to a depth of 12 inches or the spodic horizon whichever is less, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or less, and the remainder of the soil volume has value 4 or more and chroma of 1 or less. Located in Land Resource Regions T and U

A12 – Thick Dark Surface

4. Morphological characteristic is not as above

5. Morphological characteristic is a layer 4 inches thick with a matrix value of 3 or less and chroma of 1 or less starting within 6 inches of the soil surface. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. The matrix color of the layer directly below the dark layer must have the same colors as those described above or any color that has chroma of 2 or less

Note: Additionally to hydric soil field indicator S7 – Dark Surface being satisfied:

- S8 – Polyvalue Below Surface is satisfied if directly below the 70 percent coated layer, to a depth of 12 inches or the spodic horizon whichever is less, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or less, and the remainder of the soil volume has value 4 or more and chroma of 1 or less. Located in Land Resource Regions T and U

S7 – Dark Surface

5. Morphological characteristic is not as above

6. Morphological characteristic is a layer with value of 3 or less and chroma of 1 or less starting within 6 inches of the soil surface. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Directly below this layer, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or less, and the remainder of the soil volume has value of 4 or more and chroma of 1 or less to a depth of 12 inches or to the spodic horizon, whichever is less. Located in Land Resource Region T or U.

S8 – Polyvalue Below Surface

6. Morphological characteristic is not as above

No hydric soil field indicator

3. Morphological characteristic is less than 12 inches thick

7. Morphological characteristic is a layer that starts at the soil surface and has a value of 3 or less and chroma of 1 or less with at least 70 percent of the visible soil particles must be asked with organic material, viewed through a 10x or 15x hand lens. Directly below is a layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, and having a minimum thickness of either:

- a. 6 inches, or
- b. 2 inches if the 2 inches consists of fragmental soil material

Note: Additionally to hydric soil field indicator A11 – Depleted Below Dark Surface being satisfied:

- S7 – Dark Surface is satisfied if layer is 4 inches or more thick
- S8 – Polyvalue Below Surface is satisfied if directly below the 70 percent coated layer, to a depth of 12 inches or the spodic horizon whichever is less, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or less, and the remainder of the soil volume has value 4 or more and chroma of 1 or less. Located in Land Resource Regions T and U
- S9 – Thin Dark Surface is satisfied if layer is 2 inches or more thick and directly below the 70 percent coated layer, to a depth of 12 inches or the spodic horizon whichever is less, the layer or layers have a value of 4 or more and chroma of 1 or less. Located in Land Resource Regions T and U

A11 – Depleted Below Dark Surface

7. Morphological characteristic is not as above

8. Morphological characteristic starts within 4 inches of the soil surface

9. Morphological characteristic is a layer 4 inches thick with a matrix value of 3 or less and chroma of 1 or less. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. The matrix color of the layer directly below the dark layer must have the same colors as those described above or any color that has chroma of 2 or less

Note: Additionally to hydric soil field indicator S7 – Dark Surface being satisfied:

- S8 – Polyvalue Below Surface is satisfied if directly below the 70 percent coated layer, to a depth of 12 inches or the spodic horizon whichever is less, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or less, and the remainder of the soil volume has value 4 or more and chroma of 1 or less. Located in Land Resource Regions T and U
- S9 – Thin Dark Surface is satisfied if directly below the 70 percent coated layer, to a depth of 12 inches or the spodic horizon whichever is less, the layer or layers have a value of 4 or more and chroma of 1 or less. Located in Land Resource Regions T and U

S7 – Dark Surface

9. Morphological characteristic not as above

10. Morphological characteristic is a 2 inch or more thick layer with value of 3 or less and chroma of 1 or less. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. This layer is underlain by a layer or layers with value of 4 or more and chroma of 1 or less to a depth of 12 inches or to the spodic horizon, whichever is less. Located in Land Resource Region T or U.

S9 – Thin Dark Surface

10. Morphological characteristic is not as above

11. Morphological characteristic is a layer with value of 3 or less and chroma of 1 or less. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Directly below this layer, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or

less, and the remainder of the soil volume has value of 4 or more and chroma of 1 or less to a depth of 12 inches or to the spodic horizon, whichever is less. Located in Land Resource Region T or U.

S8 – Polyvalue Below Surface

11. Morphological characteristic is not as above

No hydric soil field indicator

8. Morphological characteristic starts below 4 inches from the soil surface

12. Morphological characteristic is a layer 4 inches thick, starting within 6 inches of the soil surface, with matrix value of 3 or less and chroma of 1 or less. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. The matrix color of the layer directly below the dark layer must have the same colors as those described above or any color that has chroma of 2 or less

Note: Additionally to hydric soil field indicator S7 – Dark Surface being satisfied:

- S8 – Polyvalue Below Surface is satisfied if directly below the 70 percent coated layer, to a depth of 12 inches or the spodic horizon whichever is less, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or less, and the remainder of the soil volume has value 4 or more and chroma of 1 or less. Located in Land Resource Regions T and U

S7 – Dark Surface

12. Morphological characteristic is not as above

13. Morphological characteristic is a layer with value of 3 or less and chroma of 1 or less starting within 6 inches of the soil surface. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Directly below this layer, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or less, and the remainder of the soil volume has value of 4 or more and chroma of 1 or less to a depth of 12 inches or to the spodic horizon, whichever is less. Located in Land Resource Region T or U.

S8 – Polyvalue Below Surface

13. Morphological characteristic is not as above

No hydric soil field indicator

Key 7

Mineral soil material that ribbons & has a value greater than 3

1. Morphological characteristic is a layer of marl with value of 5 or more and starting within 4 inches of the soil surface and located within Land Resource Region U

F10 - Marl

1. Morphological characteristic is not as above

2. Morphological characteristic is a gleyed matrix that occupies 60 percent or more of a layer starting within 12 inches of the soil surface

F2 – Loamy Gleyed Matrix

2. Morphological characteristic is not as above

3. Morphological characteristic starts within 4 inches of the soil surface

4. Morphological characteristic is a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

- a. 2 inches if the 2 inches is entirely within the upper 6 inches of the soil, or
- b. 6 inches, starting within 10 inches of the soil surface

Note: Additionally to hydric soil field indicator F3 – Depleted Matrix being satisfied:

- F8 – Redox Depression is satisfied if it is located within a closed depression subject to ponding with 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings

- F12 – Iron-Manganese Masses is satisfied if it is located on a flood plain in Land Resource Region P or T with 2 percent or more distinct or prominent iron-manganese masses with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less. The thickness requirement is waived if the layer is the mineral surface layer

F3 – Depleted Matrix

4. Morphological characteristic is not as above

5. Morphological characteristic is 2 percent or more distinct or prominent redox concentrations occurring as soft iron-manganese masses with diffuse boundaries with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less located on a flood plain in Land Resource Region P or T. The layer starts within 8 inches of the soil surface. The thickness requirement is waived if the layer is the mineral surface layer

Note: Additionally to hydric soil field indicator F12 – Iron-Manganese Masses being satisfied:

- F8 – Redox Depression is satisfied if it is located within a closed depression subject to ponding with 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings within a 2 inch or more thick layer

F12 – Iron-Manganese Masses

5. Morphological characteristic is not as above

6. Morphological characteristic is 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings in a layer that is 2 inches or more thick and starts within 4 inches of the soil surface located on a flood plain

F8 – Redox Depression

6. Morphological characteristic is not as above

No hydric soil field indicator

3. Morphological characteristic starts below 4 inches from the soil surface

7. Morphological characteristic is a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

- 2 inches if the 2 inches is entirely within the upper 6 inches of the soil, or
- 6 inches, starting within 10 inches of the soil surface

Note: Additionally to hydric soil field indicator F3 – Depleted Matrix being satisfied:

- F12 – Iron-Manganese Masses is satisfied if it is located on a flood plain in Land Resource Region P or T with 2 percent or more distinct or prominent iron-manganese masses with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less starting within 8 inches of the soil surface. The thickness requirement is waived if the layer is the mineral surface layer

F3 – Depleted Matrix

7. Morphological characteristic is not as above

8. Morphological characteristic is 2 percent or more distinct or prominent redox concentrations occurring as soft iron-manganese masses with diffuse boundaries with value and chroma of 3 or less within a 4 inch or more thick layer and has a matrix with 40 percent or more chroma 2 or less located on a flood plain in Land Resource Region P or T. The layer starts within 8 inches of the soil surface. The thickness requirement is waived if the layer is the mineral surface layer

F12 – Iron-Manganese Masses

8. Morphological characteristic is not as above

No hydric soil field indicator

Key 8

Mineral soil material that does not ribbon & < 70% of the visible soil particles masked with organic material

1. Morphological characteristic is a gleyed matrix that occupies 60 percent or more of a layer starting within 6 inches of the soil surface

S4 – Sandy Gleyed Matrix

1. Morphological characteristic is not as above

2. Morphological characteristic is 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings contained within a layer starting within 6 inches of the soil surface that is at least 4 inches thick and has a matrix with 60 percent or more chroma of 2 or less

S5 – Sandy Redox

2. Morphological characteristic is not as above

3. Morphological characteristic is stripped zones which are 10 percent or more of the volume of the layer that they are contained in and are round. This layer starts within 6 inches of the soil surface in which iron-manganese oxides and/or organic matter have been stripped from the matrix and the primary base color of the soil material has been exposed.

S6 – Stripped Matrix

3. Morphological characteristic is not as above

No hydric soil field indicator

GLOSSARY

Adapted from NRCS Field Indicators of Hydric Soils in the United States Version 7.0, 2010

As defined in this Glossary, terms marked with an asterisk (*) have definitions that are slightly different from the definitions in the referenced materials. The definitions in the Glossary are intended to assist users of this document and are not intended to add to or replace definitions in the referenced materials.

A horizon. A mineral soil horizon that formed at the surface or below an O horizon where organic material is accumulating. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Accreting areas. Landscape positions in which soil material accumulates through deposition from higher elevations or upstream positions more rapidly than the rate at which soil material is being lost through erosion.

Anaerobic. A condition in which molecular oxygen is virtually absent from the soil.

Anaerobiosis. Microbiological activity under anaerobic conditions.

Aquic conditions. Conditions in the soil represented by depth of saturation, occurrence of reduction, and redoximorphic features. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

***Artificial drainage.** The use of human efforts and devices to remove free water from the soil surface or from the soil profile. The hydrology may also be modified by levees and dams, which keep water from entering a site.

CaCO₃ equivalent. The acid neutralizing capacity of a soil expressed as a weight percentage of CaCO₃ (molecular weight of CaCO₃ equals 100).

Calcic horizon. An illuvial horizon in which carbonates have accumulated to a significant extent. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Calcium carbonate. Calcium carbonate has the chemical formula CaCO₃. It effervesces when treated with cold hydrochloric acid.

Closed depressions. Low-lying areas that are surrounded by higher ground and have no natural outlet for surface drainage.

COE. U.S. Army Corps of Engineers.

Common. When referring to redox concentrations and/or depletions, “common” represents 2 to 20 percent of the observed surface.

Concave landscapes. Landscapes in which the surface curves downward.

***Depleted matrix.** For loamy and clayey material (and sandy material in areas of indicators A11 and A12), a depleted matrix refers to the volume of a soil horizon or subhorizon in which the processes of reduction and translocation have removed or transformed iron, creating colors of low chroma and high value. A, E, and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless the soil has common or many distinct or prominent redox concentrations occurring as soft masses or pore linings. In some areas the depleted matrix may change color upon exposure to air (see Reduced matrix); this phenomenon is included in the concept of depleted matrix. The following combinations of value and chroma identify a depleted matrix:

1. Matrix value of 5 or more and chroma of 1 or less with or without redox concentrations occurring as soft masses and/or pore linings; or
2. Matrix value of 6 or more and chroma of 2 or less with or without redox concentrations occurring as soft masses and/or pore linings; or
3. Matrix value of 4 or 5 and chroma of 2 and 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings; or
4. Matrix value of 4 and chroma of 1 and 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings.

Diffuse boundary. Used to describe redoximorphic features that grade gradually from one color to another. The color grade is commonly more than 2 mm wide. “Clear” is used to describe boundary color gradations intermediate between sharp and diffuse.

Distinct.² (Figure 1) Readily seen but contrasting only moderately with the color to which compared. The contrast is distinct if:

1. Delta hue³ = 0, then a) Delta value ≤2 and delta chroma >1 to <4, or
b) Delta value >2 to <4 and delta chroma <4.
2. Delta hue = 1, then a) Delta value ≤1 and delta chroma >1 to <3, or
b) Delta value >1 to <3 and delta chroma <3.
3. Delta hue = 2, then a) Delta value = 0 and delta chroma >0 to <2, or
b) Delta value >0 to <2 and delta chroma <2.

² Regardless of the magnitude of hue difference, where both colors have value ≤3 and chroma ≤2, the contrast is faint.

³ Field Booklet **Note:** A delta hue of 1 is equal to 2.5 units (Figure 2), as defined in the *Soil Survey Manual* (Soil Survey Staff, 1993)

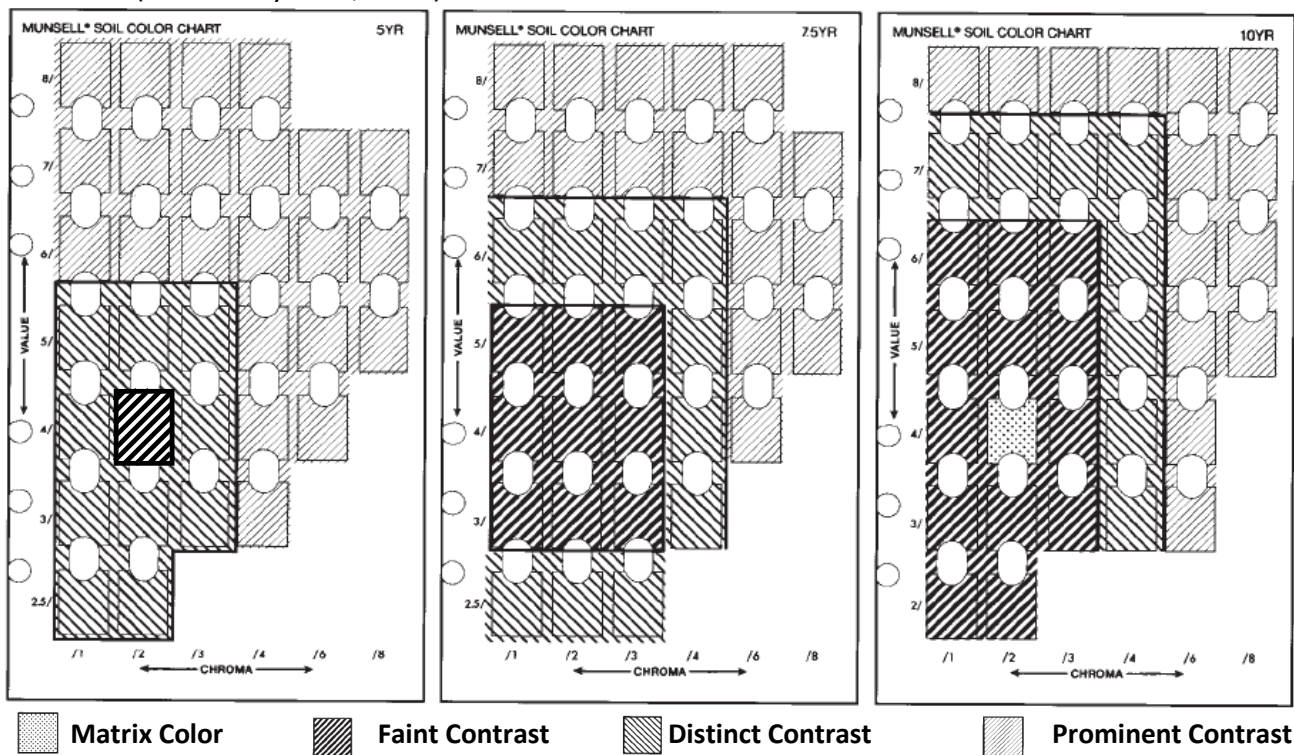


Figure 1: Faint, distinct, and prominent contrast as defined for the NRCS Indicators. All contrasting colors are with respect to the 10YR 4/2 color chip.

Adapted from: U.S. Army Corps of Engineers Wetlands Research Program (WRP) Technical Note SG-DE-4.1 (January 1999)

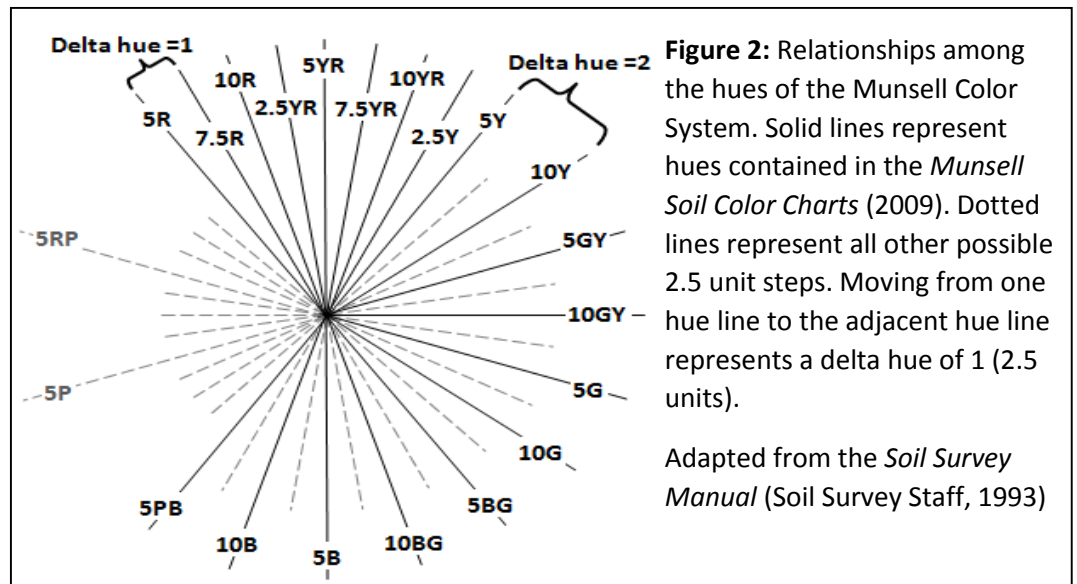


Figure 2: Relationships among the hues of the Munsell Color System. Solid lines represent hues contained in the *Munsell Soil Color Charts* (2009). Dotted lines represent all other possible 2.5 unit steps. Moving from one hue line to the adjacent hue line represents a delta hue of 1 (2.5 units).

Adapted from the *Soil Survey Manual* (Soil Survey Staff, 1993)

E horizon. A mineral horizon in which the dominant process is loss of silicate clay, iron, and/or aluminum, leaving a concentration of sand and silt particles. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

EPA. U.S. Environmental Protection Agency.

Epipedon. A horizon that has developed at the soil surface. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Faint. (Figure 1) Evident only on close examination. The contrast is faint if:

1. Delta hue = 0, then delta value ≤ 2 and delta chroma ≤ 1 , or
 2. Delta hue = 1, then delta value ≤ 1 and delta chroma ≤ 1 , or
 3. Delta hue = 2, then delta value = 0 and delta chroma = 0, or
- Any delta hue if both colors have value ≤ 3 and chroma ≤ 2 .

Fe-Mn concretions. Firm to extremely firm, irregularly shaped bodies with sharp to diffuse boundaries. When broken in half, concretions have concentric layers. See Vepraskas (1994) for a complete discussion.

Fe-Mn nodules. Firm to extremely firm, irregularly shaped bodies with sharp to diffuse boundaries. When broken in half, nodules do not have visibly organized internal structure. See Vepraskas (1994) for a complete discussion.

Few. When referring to redox concentrations and/or depletions, “few” represents less than 2 percent of the observed surface.

Fibric. See Peat.

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.

Frequently flooded or ponded. A frequency class in which flooding or ponding is likely to occur often under usual weather conditions (a chance of more than 50 percent in any year, or more than 50 times in 100 years).

FWS. U.S. Department of the Interior, Fish and Wildlife Service.

***g.** A horizon suffix indicating that the horizon is gray because of wetness but not necessarily that it is gleyed. All gleyed matrices (defined below) should have the suffix “g”; however, not all horizons with the “g” suffix are gleyed. For example, a horizon with the color 10YR 6/2 that is at least seasonally wet, with or without other redoximorphic features, should have the “g” suffix.

Glaucconitic. Refers to a mineral aggregate that contains a micaceous mineral resulting in a characteristic green color, e.g., glauconitic shale or clay.

***Gleyed matrix.** Soils with a gleyed matrix have the following combinations of hue, value, and chroma (the soils are not glauconitic):

1. 10Y, 5GY, 10GY, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value of 4 or more and chroma of 1; or
2. 5G with value of 4 or more and chroma of 1 or 2; or
3. N with value of 4 or more

In some places the gleyed matrix may change color upon exposure to air. (See Reduced matrix). This phenomenon is included in the concept of gleyed matrix.

***Hemic.** See Mucky peat.

Histels. Organic soils that overlie permafrost and show evidence of cryoturbation. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Histic epipedon. A thick (20- to 60-cm, or 8- to 24- inch) organic soil horizon that is saturated with water at some period of the year (unless the soil is artificially drained) and that is at or near the surface of a mineral soil.

Histosols. Organic soils that have organic soil materials in more than half of the upper 80 cm (32 inches) or that have organic materials of any thickness if they overlie rock or fragmental materials

that have interstices filled with organic soil materials. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Horizon. A layer, approximately parallel to the surface of the soil, distinguishable from adjacent layers by a distinctive set of properties produced by soil-forming processes. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Hydric soil definition (1994). 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.

Hydrogen sulfide odor. The odor of H₂S. It is similar to the smell of rotten eggs.

Hydromorphic features. Features in the soil caused or formed by water.

Layer(s). A horizon, subhorizon, or combination of contiguous horizons or subhorizons sharing at least one property referred to in the indicators.

Lithologic discontinuity. Occurs in a soil that has developed in more than one type of parent material. Commonly determined by a significant change in particle-size distribution, mineralogy, etc. that indicates a difference in material from which the horizons formed.

LRR. Land resource region. LRRs are geographic areas characterized by a particular pattern of soils, climate, water resources, and land use. Each LRR is assigned a different letter of the alphabet (A-Z). LRRs are defined in U.S. Department of Agriculture Handbook 296 (USDA, NRCS, 2006b).

Many. When referring to redox concentrations and/or depletions, “many” represents more than 20 percent of the observed surface.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

***Masked.** Through redoximorphic processes, the color of soil particles is hidden by organic material, silicate clay, iron, aluminum, or some combination of these.

Matrix. The dominant soil volume that is continuous in appearance and envelops microsites. When three colors occur, such as when a matrix, depletions, and concentrations are present, the matrix may represent less than 50 percent of the total soil volume.

MLRA. Major land resource areas. MLRAs are geographically associated divisions of land resource regions. MLRAs are defined in U.S. Department of Agriculture Handbook 296 (USDA, NRCS, 2006b).

Mollic epipedon. A mineral surface horizon that is relatively thick, dark colored, and humus rich and has high base saturation. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Mollisols. Mineral soils that have a mollic epipedon. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

***Muck.** Sapric organic soil material in which virtually all of the organic material is so decomposed that identification of plant forms is not possible. Bulk density is normally 0.2 or more. Muck has less than one-sixth fibers after rubbing, and its sodium pyrophosphate solution extract color has lower value and chroma than 5/1, 6/2, and 7/3.

***Mucky modified mineral soil material.** (Figure 3) A USDA soil texture modifier, e.g., mucky sand. Mucky modified mineral soil material that has 0 percent clay has between 5 and 12 percent organic carbon. Mucky modified mineral soil material that has 60 percent clay has between 12 and 18 percent organic carbon. Soils with an intermediate amount of clay have intermediate amounts of organic carbon. Where the organic component is peat (fibric material) or mucky peat (hemic material), mucky mineral soil material does not occur.

***Mucky peat.** Hemic organic material, which is characterized by decomposition that is intermediate between that of fibric material and that of sapric material. Bulk density is normally between 0.1 and 0.2 g/cm³. Mucky peat does not meet the fiber content (after rubbing) or sodium pyrophosphate solution extract color requirements for either fibric or sapric soil material.

Nodules. See Fe-Mn nodules.

NRCS. USDA, Natural Resources Conservation Service (formerly Soil Conservation Service).

NTCHS. National Technical Committee for Hydric Soils.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Organic soil material. (Figure 3)

Soil material that is saturated with water for long periods or artificially drained and, excluding live roots, has 18 percent or more organic carbon with 60 percent or more clay or 12 percent or more organic carbon with 0 percent clay. Soils with an intermediate amount of clay have an intermediate amount of organic carbon. If the soil is never saturated for more than a few days, it contains 20 percent or more organic carbon. Organic soil material includes muck, mucky peat, and peat.

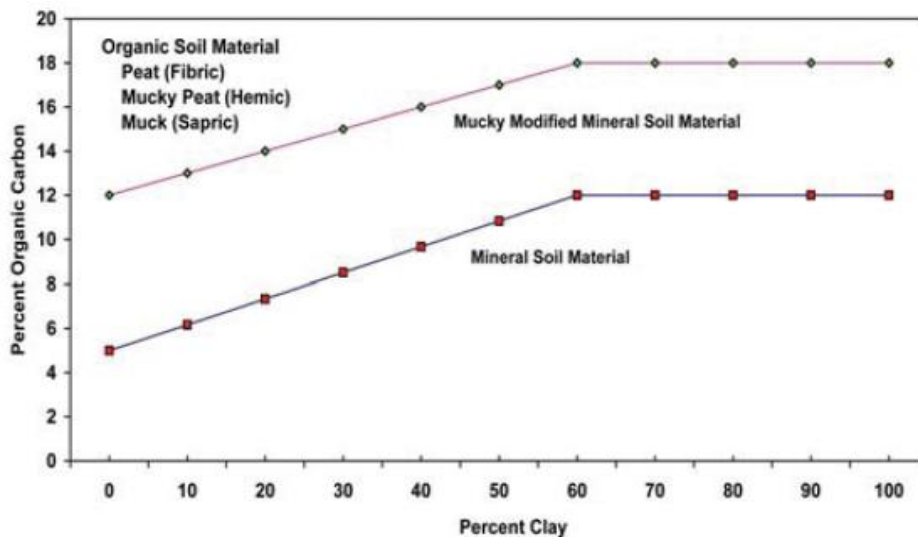


Figure 3: Percent organic carbon required for organic soil material, mucky modified mineral soil material, and mineral soil material as it is related to content of clay

Field Booklet Note: Generally, organic soil material is 2 cm or smaller.

***Peat.** Fibric organic soil material. The plant forms can be identified in virtually all of the organic material. Bulk density is normally <0.1 . Peat has three-fourths or more fibers after rubbing, or it has two-fifths or more fibers after rubbing and has sodium pyrophosphate solution extract color of 7/1, 7/2, 8/2, or 8/3.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete discussion.

Ponding. Standing water in a closed depression that is removed only by percolation, evaporation, or transpiration. The ponding lasts for more than 7 days.

Pore linings. Zones of accumulation that may be either coatings on a ped or pore surface or impregnations of the matrix adjacent to the pore or ped. See Vepraskas (1994) for a complete discussion.

Prominent. (Figure 1) Contrasts strongly in color. Color contrasts more contrasting than faint and distinct are prominent.

Red parent material. The parent material with a natural inherent reddish color attributable to the presence of iron oxides, typically hematite (Elless and Rabenhorst, 1994; Elless et al., 1996), occurring as coatings on and occluded within mineral grains. Soils that formed in red parent material have conditions that greatly retard the development and extent of the redoximorphic features that normally occur under prolonged aquic conditions. They typically have a Color Change Propensity Index (CCPI) of <30 (Rabenhorst and Parikh, 2000). Most commonly, the material consists of dark red, consolidated Mesozoic or Paleozoic sedimentary rocks, such as shale, siltstone, and sandstone, or alluvial materials derived from such rocks. Assistance from a local soil scientist may be needed to determine where red parent material occurs.

Redox concentrations. Bodies of apparent accumulation of Fe-Mn oxides. Redox concentrations include soft masses, pore linings, nodules, and concretions. For the purposes of the indicators, nodules and concretions are excluded from the concept of redox concentrations unless otherwise specified by specific indicators. See Vepraskas (1994) for a complete discussion.

Redox depletions. Bodies of low chroma (2 or less) having value of 4 or more where Fe- Mn oxides have been stripped or where both Fe-Mn oxides and clay have been stripped. Redox depletions contrast distinctly or prominently with the matrix. See Vepraskas (1994) for a complete discussion.

Redoximorphic features. Features formed by the processes of reduction, translocation, and/or oxidation of Fe and Mn oxides; formerly called mottles and low-chroma colors. See Vepraskas (1994) for a complete discussion.

Reduced matrix. A soil matrix that has low chroma and high value, but in which the color changes in hue or chroma when the soil is exposed to air. See Vepraskas (1994) for a complete discussion.

***Reduction.** For the purpose of the indicators, reduction occurs when the redox potential (Eh) is below the ferric-ferrous iron threshold as adjusted for pH. In hydric soils, this is the point when the transformation of ferric iron (Fe³⁺) to ferrous iron (Fe²⁺) occurs.

Relict features. Soil morphological features that reflect past hydrologic conditions of saturation and anaerobiosis. See Vepraskas (1994) for a complete discussion.

***Sapric.** See Muck.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Almost all of the soil pores are filled with water.

Sharp boundary. Used to describe redoximorphic features that grade sharply from one color to another. The color grade is commonly less than 0.1 mm wide.

Soft masses. Noncemented redox concentrations, frequently within the soil matrix, that are of various shapes and cannot be removed as discrete units.

Soil texture. The relative proportions, by weight, of sand, silt, and clay particles in the soil material less than 2 mm in size.

Spodic horizon. A mineral soil horizon that is characterized by the illuvial accumulation of amorphous materials consisting of aluminum and organic carbon with or without iron. The spodic horizon has a minimum thickness, a minimum quantity of oxalate extractable carbon plus aluminum, and/or specific color requirements.

Stream Terrace.⁴ One, or a series of flat-topped landforms in a stream valley that flank and are parallel to the stream channel, originally formed by a previous stream level, and representing remnants of an abandoned flood plain, stream bed, or valley floor produced during a past state of fluvial erosion or deposition (i.e., currently very rarely or never flooded; inactive cut and fill and/or scour and fill processes). Erosional surfaces cut into bedrock and thinly mantled with stream deposits (alluvium) are called "strath terraces." Remnants of constructional valley floors thickly mantled with alluvium are called alluvial terraces.

⁴ From NRCS Errata (March 2013)

Umbric epipedon. A thick, dark mineral surface horizon with base saturation of less than 50 percent. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Vertisol. A mineral soil with 30 percent or more clay in all layers. These soils expand and shrink, depending on moisture content, and have slickensides or wedge-shaped peds. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Wetland. An area that has hydrophytic vegetation, hydric soils, and wetland hydrology, as per the "National Food Security Act Manual" and the 1987 *Corps of Engineers Wetlands Delineation Manual* (United States Army Corps of Engineers, 1987).

Within. When referring to specific indicator depth requirements, "within" means not beyond in depth. "Within a depth of 15 cm," for example, indicates that the depth is less than or equal to 15 cm.

Appendix A: Supplemental Information for Soil Descriptions

HORIZON CRITERIA – MASTER HORIZON DESIGNATIONS

O Organic soil materials (not limnic)

A Mineral; organic matter (humus) accumulation, loss of Fe, Al, clay

E Mineral; loss of Fe, Al, clay, or organic matter

B Subsurface accumulation of clay, Fe, Al, Si, humus, CaCO₃, CaSO₄; or loss of CaCO₃; or accumulation of sesquioxides; or subsurface soil structure

C Little or no pedogenic alteration, unconsolidated earthy material, soft bedrock

L Limnic soil materials

R Bedrock, Strongly Cemented to Indurated

HORIZON CRITERIA – SUFFIX DESIGNATIONS

a Highly decomposed organic matter

b Buried genetic horizon (not used with C horizons)

c Concretions or nodules

e Moderately decomposed organic matter

g Strong gley

h Illuvial organic matter accumulation

i Slightly decomposed organic matter

k Pedogenic carbonate accumulation

m Strong cementation (pedogenic, massive)

ma Marl (Used only with L)

n Pedogenic, exchangeable sodium accumulation

o Residual sesquioxide accumulation (pedogenic)

p Plow layer or other artificial disturbance

r Weathered or soft bedrock

s Illuvial sesquioxide accumulation

t Illuvial accumulation of silicate clay

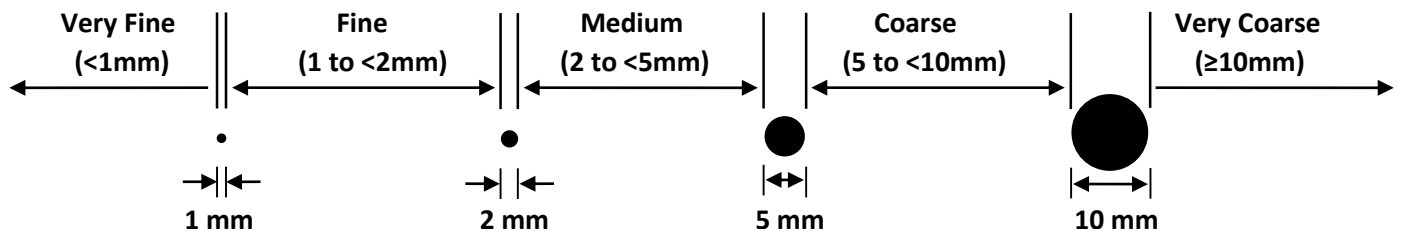
v Plinthite

w Weak color or structure within B (used only with B)

z Pedogenic accumulation of salt more soluble than gypsum

Root Size Estimation Chart

Adapted from *Field Book for Describing Sampling Soils* version 3.0 (NRCS 2012)



NRCS National Technical Committee for Hydric Soils

Hydric Soils Technical Notes contain National Technical Committee for Hydric Soils (NTCHS) updates, insights, and clarifications of the publication "Field Indicators of Hydric Soils in the United States" (USDA, NRCS, 1996 and 1998).

Hydric Soils Technical Note 4: Indicator Insights for Hydric Soil Identification

Question: I have a soil with layers that meet the color and redoximorphic requirements of several indicators; however, they do not meet any of the thickness requirements. What guidance is there regarding combining layers to meet a hydric soil indicator?

Answer: If layers/indicators are combined, the combination needs to meet the most stringent depth/thickness requirements of the combined indicators.

Hydric Soils Technical Note 13: Altered Hydric Soils

The following tables were created by FDEP staff to summarize Technical Note 13 and do not contain the exact text from this Note:

Altered Hydric Soil Type	What was modified?	Modified by what?	Modified how?	Soil status*	Example
Artificial	Hydrology or Soil	Human activities	Wetter or lower surface elevation	Hydric	Excavation/irrigation /water impoundment
Drained/protected	Hydrology	Human activities	Drier or barriers against flooding	Hydric	Ditches/roads/dams/pumps/levees
Historic/buried	Soil	Human activities	Soil placed on ground surface	Not hydric	Fill/erosional depositions
Relict	Hydrology	Geologic activities	Hydrology gone by natural means	Not hydric	Stream downcutting/seismic activity

*See Appendix B for NRCS Hydric Soil Criteria

Soils that are no longer hydric may still exhibit redoximorphic features (called relict features), but these can be differentiated from those in contemporary (currently) hydric soils by the following characteristics:

Feature	Boundary	Nodule and Concretion Surfaces	Macropore Associated Depletions	Pore Linings	Value and Chroma
Contemporary	Diffuse	Irregular, or Smooth with red to yellow corona	Not overlain by iron rich coating	Continuous around live roots	Value ≥ 4 Chroma ≥ 4
Relict	Sharp	Smooth	Overlain by iron rich coating	Broken and unrelated to live roots	Value < 4 Chroma < 4

Appendix B: Hydric Soils Criteria and Technical Standard

Soils are considered hydric by the NRCS if:

1. Have a hydric soil indicator, or
2. Meet hydric soils list criteria 3 or 4, or
3. By data meet the HSTS.

Hydric Soils List Criteria

(Updated by NTCHS February 2012)

1. All Histels except Folistels and Histosols except Folists; or
2. Map unit components in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, or Andic, Cumulic, Pachic, or Vitrandic subgroups that:
 - a. 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
 - b. 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:
 - a. 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
 - b. 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:
 - a. 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
 - b. Show evidence that the soils meet the definition of a hydric soil.

Glossary of Terms Used in Hydric Soils List Criteria

Flooded means a condition in which the soil surface is temporarily covered with flowing water from any source, such as streams overflowing their banks, runoff from adjacent or surrounding slopes, inflow from the high tides, or any combination of sources.

Frequently flooded, ponded, saturated: a frequency class in which flooding, ponding, or saturation is likely to occur often under usual weather conditions (more than 50 percent chance in any year, or more than 50 times in 100 years).

Ponded means a condition in which water stands in a closed depression. The water is removed only by percolation, evaporation, or transpiration.

Long duration means a duration class in which inundation for a single event ranges from 7 days to 1 month.

Map unit components means the collection of soils and miscellaneous areas found within a map unit.

Very long duration means a duration class in which inundation for a single event is greater than 1 month.

Hydric Soil Technical Standard (HSTS)

(From deliberations of NTCHS 2007)

For a soil to be considered hydric by the Natural Resources Conservation Service (NRCS), Anaerobic Conditions and Saturated Conditions must exist for at least 14 consecutive days.

1. Anaerobic Conditions

For a soil to meet the Anaerobic Conditions part of the standard it must meet either

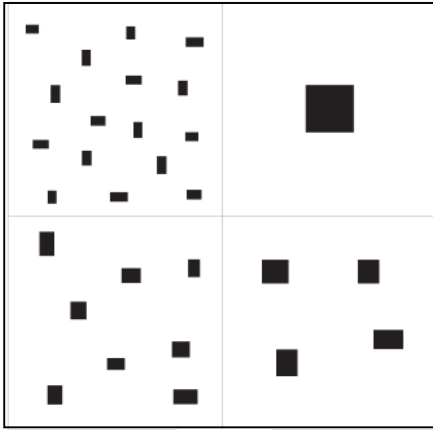
1. The required Redox Potential (Eh) or
2. The required reaction to alpha-alpha-Dipyridyl

- Confirmed by Redox Potential (Eh) data, or
- Confirmed by reduced Iron (FE++) data, or
- IRIS tube data.
- In-situ pH data are needed and on-site precipitation data are needed.

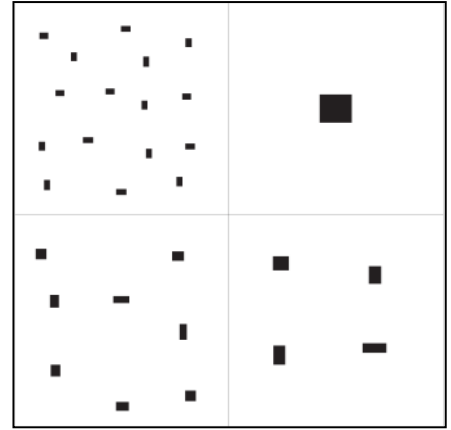
2. Saturated Conditions

- Confirmed by piezometer data.
- NTCHS recommends that the piezometer data be verified by open well data.
- On-site precipitation data are needed.

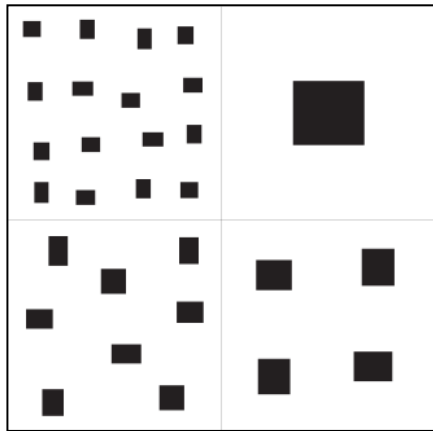
Estimating Percent Coverage



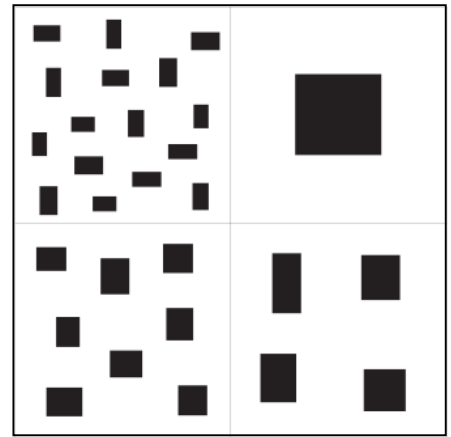
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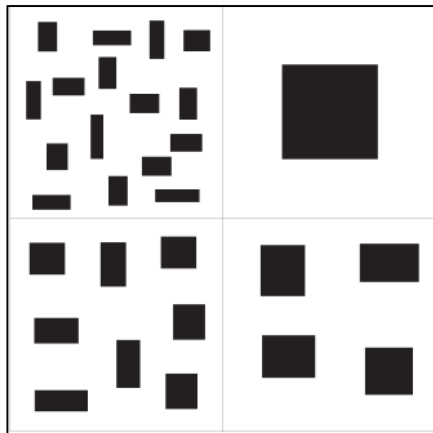
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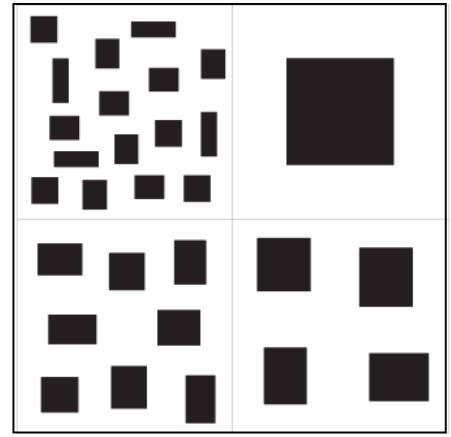
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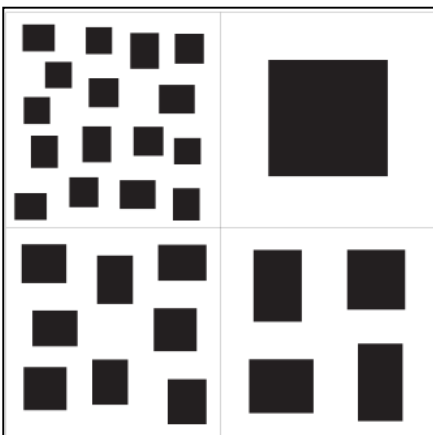
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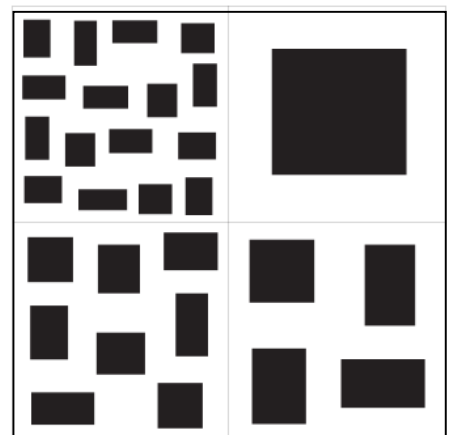
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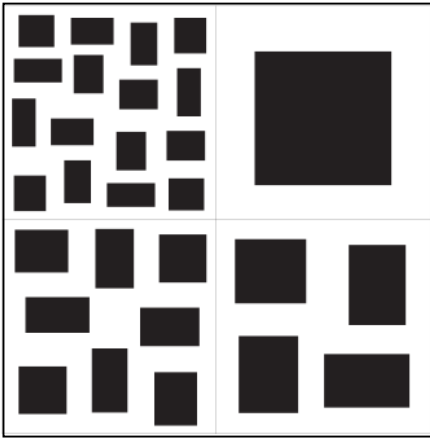
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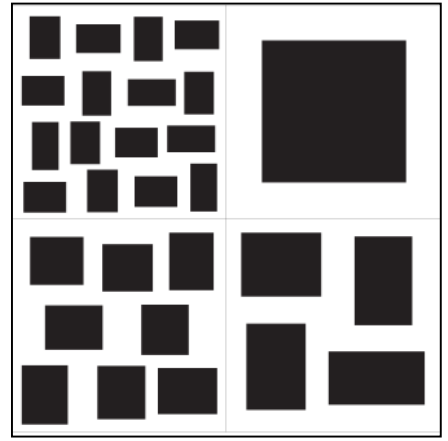
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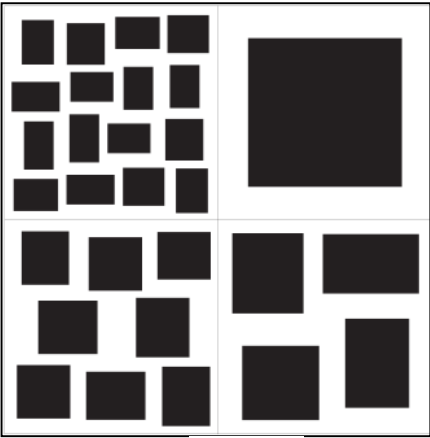
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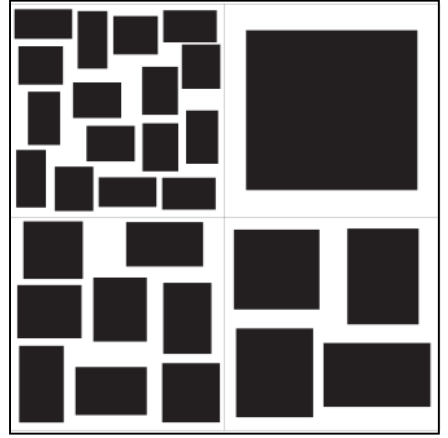
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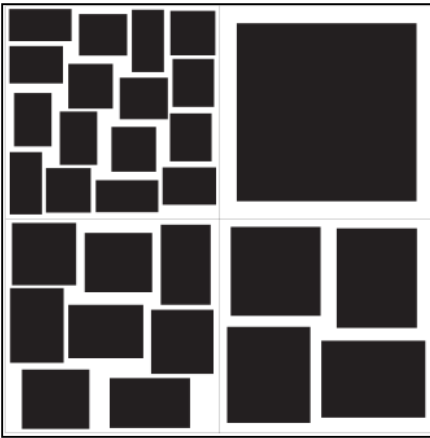
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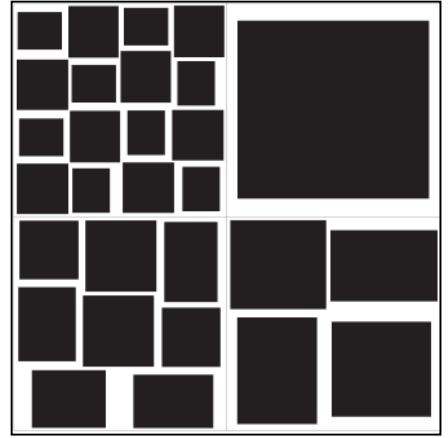
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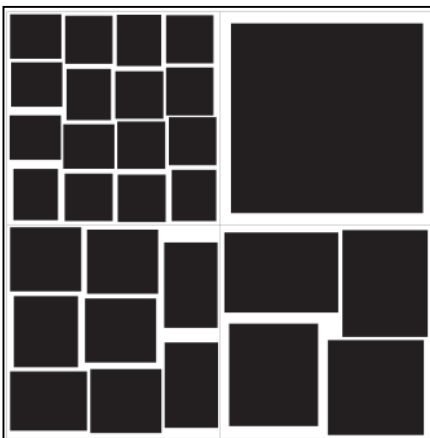
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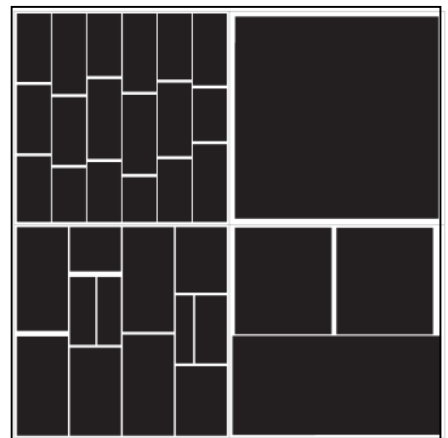
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