Appendix C Soil Identification Resources

Examples of Common Field Indicators of Hydric Soils, Version 7.0
Informal Key for Hydric Soil Indicators in Indiana
Indiana Hydric Soil Indicators Flowchart
Determining Soil Texture by the Feel Method
Determining Hydric Soil Indicators
Hydric Soil Indicator Tests

References


Examples of Common Field Indicators of Hydric Soils, Version 7.0*

<table>
<thead>
<tr>
<th>Indicator Type</th>
<th>Description</th>
<th>Colors</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1, Histosol</td>
<td>≥ 16 inches of the upper 32 inches is organic material</td>
<td></td>
<td>Classifies as a Histosol</td>
</tr>
<tr>
<td>A2, Histic Epipedon</td>
<td>A histic epipedon, ≥ 8 inches of organic material underlain by mineral soil with low chroma</td>
<td>Chroma 2 or less</td>
<td></td>
</tr>
<tr>
<td>A10, 2cm Muck</td>
<td>≥ 0.75 inches much layer starting within the upper 6 inches</td>
<td>Value 3 or less Chroma 1 or less</td>
<td></td>
</tr>
<tr>
<td>A11, Depleted Below Dark Surface</td>
<td>A layer with a depleted matrix (DM) or gleyed matrix starting within 12 inches of the soil surface that has a minimum thickness of 6 inches.</td>
<td>DM is ≥ 60%, chroma 2 or less; gleyed matrix, layers above must be color 3/21 or less, 3/1 or less for sands</td>
<td>Previously F4. For Fragmental and sandy soil material refer to Version 6.0</td>
</tr>
<tr>
<td>A12, Thick Dark Surface</td>
<td>A layer with a DM or gleyed matrix, ≥ 6 inches thick starting below 12 inches of the soil surface. Dark surface: upper 12 inches is 2.5/1 or less and remainder is 3/1 or less</td>
<td>DM is ≥ 60%, chroma 2 or less; gleyed matrix</td>
<td>Previously F5. For sandy soils refer to Version 6.0</td>
</tr>
<tr>
<td>S1, Sandy Mucky Mineral</td>
<td>≥ 2 inches of mucky modified sandy mineral layer starting within the upper 6 inches</td>
<td></td>
<td>“mucky” is a USDA texture modifier for mineral soils</td>
</tr>
<tr>
<td>F1, Loamy Mucky Mineral</td>
<td>≥ 4 inches of mucky modified mineral layer starting within the upper 6 inches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3, Depleted Matrix</td>
<td>A DM is either: ≥ 2 inch thick within the upper 6 inches or ≥ 6 inch thick starting within the upper 10 inches</td>
<td>≥ 60% chroma 2 or less</td>
<td>E horizons without RC are excluded; refer to Version 6.0</td>
</tr>
<tr>
<td>F6, Redox Dark Surface</td>
<td>≥ 4 inch thick layer entirely within the upper 12 inches of mineral soil. All redox concentrations (RC) must be distinct or prominent.</td>
<td>3/1 or less and ≥ 2% RC or 3/2 or less and ≥ 5% RC</td>
<td>RC are the reddish, brownish and yellowish colors (previously called mottles)</td>
</tr>
</tbody>
</table>

NOTE – For all depleted matrixes, RC are required for: 4/1, 4/2, and 5/2 matrix colors.

* Refer to the latest version of the NRCS Field Indicators of Hydric Soils for official use.
Informal Key for Hydric Soil Decisions in Indiana, Sept. 2012

See Field Indicators of Hydric Soils in the United States (v. 8.0) for details.

This key is written to help navigate Field Indicators of Hydric Soils in the United States (v. 8.0).

1. Does the top layer have a dominant chroma >2 and is more than 6 inches thick?
   YES = you will not make any indicator
   NO = go to 2

2. Is the soil muck? Muck is sapric organic soil material in which virtually all of the organic material is so decomposed that identification of plant forms is not possible:
   YES = go to 3
   NO = go to 7

   All soils, mainly thick organic matter accumulation.

3. Is the soil a Histosol (16 inches of organic material in the top 32 inches)?
   YES = hydric (A1)
   NO = go to 4

4. Is there a layer of muck ≥ 2 centimeters starting within 6 inches of the soil surface?
   YES = go to 5
   NO = go to 6

5. Is there a layer of muck ≥ 8 inches thick starting within 6 inches of the soil surface?
   YES = hydric (A2)
   NO = hydric (A10) in LRR M and N

6. Are there several stratified layers within 6 inches of the soil surface and 1 or more layers (≤ 3/1) and/or is muck or mucky modifier?
   YES = hydric (A5)
   NO = go to 7

7. Is the top 10 inches of the soil loamy sand or coarser? This includes lfs, ls, lcos, vfs, fs, s and cos.
   YES = got to 8
   NO = go to 13

   Sandy soils (loamy fine sand and coarser). These include lfs, ls, lcos, vfs, fs, s and cos.

8. Is there ≥ 2 inches of mucky sand within the upper 6 inches of the soil?
   YES = hydric (S1)
   NO = go to 9

9. Is there ≥ 2 inches of mucky peat or peat within the top 6 inches of soil with (value/chroma of 3/2 or darker)?
   YES = hydric (S3) in LRR M
   NO = go to 10
10. Is there a layer with $\geq 60\%$ gley page colors within the upper 6 inches of the soil?
   YES = hydric (S4)
   NO = go to 11

11. Is there a $\geq 4$ inch thick layer within 6 inches of the soil surface with $\geq 2\%$ bright mottles? The matrix chroma is $\leq 2$ (any value) and the mottles are distinct or prominent.
   YES = hydric (S5)
   NO = go to 12

12. Within the upper 6 inches of the soil surface is there a layer or gray splotchy colors, with Value 5 or more? [no thickness requirement]
   YES = hydric (S5)
   NO = go to 13

Loamy and fine soils (loamy very fine sand and finer). Includes: loamy very fine sand, sandy loams, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay and clay)

13. Does the soil have a Depleted Matrix* immediately below the topsoil with any of the combinations of topsoil depths and colors described in Table 1 & Figure 1 below?
   YES = hydric
   NO = go to 14

Table 1. For Soils with a Depleted Matrix immediately below the topsoil

<table>
<thead>
<tr>
<th>Depth to the Top of Layer with Depleted Matrix</th>
<th>Required Thickness of DM</th>
<th>Value/ Chroma of topsoil above DM</th>
<th>NRCS Field Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 4 inches</td>
<td>2 inches</td>
<td>Any</td>
<td>F3</td>
</tr>
<tr>
<td>4 to 6 inches</td>
<td>6 inches</td>
<td>Any</td>
<td>F3</td>
</tr>
<tr>
<td>&gt; 6 to 10 inches</td>
<td>6 inches</td>
<td>3/2 or darker, but up to 6 inches of the topsoil can be any color</td>
<td>F3</td>
</tr>
<tr>
<td>&gt; 10 to 12 inches</td>
<td>6 inches</td>
<td>3/2 or darker</td>
<td>A11</td>
</tr>
<tr>
<td>&gt; 12 inches</td>
<td>6 inches</td>
<td>Top foot is 2.5/1 or darker and below is 3/1 or darker</td>
<td>A12</td>
</tr>
</tbody>
</table>

*A Depleted Matrix is a layer with dominantly gray colors, usually with bright mottles, in combinations per Figure 1. Matrix colors are in the upper left side of the color chart (4/2 and upward to the left). Applies to other color charts, also (e.g., 2.5Y, 5Y, 7.5YR, etc.). Mottles, if required, are red or brown (redox concentrations); at least 2% abundance; and are distinct or prominent. Mottles are required for color chips 4/1, 4/2, and 5/2. Mottles are optional for color chips 5-8/1 and 6-8/2. The Depleted Matrix is for use with Loamy and Clayey textured soils.
14. Is there ≥4 inches thick with “mucky” organic matter content (for example, mucky loam, mucky silt loam, mucky silty clay loam, etc.) starting within 6 inches of the soil surface?
   YES = hydric (F1) except LRR N
   NO = go to 15

15. Does the topsoil (3/2 or darker) have a mottled layer ≥4 inches thick all within the top 12 inches of the soil, with an of the combinations of topsoil colors and mottle abundances described in Table 2 below?

   Table 2. For Soils with Mottles in the top foot of a dark topsoil

<table>
<thead>
<tr>
<th>Topsoil Matrix Value/Chroma</th>
<th>Percent red mottles (Fe concentrations) (distinct or prominent)</th>
<th>Percent gray mottles (Fe Depletions) Value ≥5/Chroma ≤2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/1 or darker</td>
<td>2 percent (F6)</td>
<td>10 percent (F7)</td>
</tr>
<tr>
<td>3/2 or darker</td>
<td>5 percent (F6)</td>
<td>20 percent (F7)</td>
</tr>
</tbody>
</table>

   YES = hydric
   NO = go to 16

16. Is there a layer with ≥60% gley page colors within the upper 12 inches of the soil surface?
   YES = hydric (F2)
   NO = go to 17

17. Is the soil in a closed depression subject to ponding AND there are ≥5% bright distinct or prominent mottles (redox concentrations) in a layer 2 inches thick entirely in the top 6 inches of the soil?
   YES = hydric (F8)
Notes: Redox Features Types and Location
Concentrations (C) are those redox features that have a chroma of 3 or higher.
Depletions (D) are those redox features that have a chroma of 2 or less.
Generally the redox features will be found in the matrix (M).

NOTES: Texture

<table>
<thead>
<tr>
<th>Coarse sand – cos</th>
<th>Loamy very fine sand – lvfs</th>
<th>Silt – si</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand – s</td>
<td>Coarse loamy sand – cosl</td>
<td>Sandy clay loam – scl</td>
</tr>
<tr>
<td>Fine sand – fs</td>
<td>Sandy loam – sl</td>
<td>Clay loam – cl</td>
</tr>
<tr>
<td>Very fine sand – vfs</td>
<td>Fine sandy loam – fsl</td>
<td>Silty clay loam – sicl</td>
</tr>
<tr>
<td>Loamy coarse sand – lcos</td>
<td>Very fine sandy loam – vfsl</td>
<td>Sandy clay – sc</td>
</tr>
<tr>
<td>Loamy sand - ls</td>
<td>Loam – l</td>
<td>Silty clay – sic</td>
</tr>
<tr>
<td>Loamy find sand - lfs</td>
<td>Silt loam - sil</td>
<td>Clay – c</td>
</tr>
</tbody>
</table>

Source: Field Book for Describing and Sampling Soils, p. 2-38.
Determining Soil Texture by the “Feel Method”

**Texture Classification**
- C = Coarse
- MC = Moderately Coarse
- M = Medium
- F = Fine

1. **Start**
   - Place approximately one tablespoon of soil in palm. Add water a drop at a time and knead the soil to break down all aggregates. Soil is at the proper consistency when plastic and mobile, like mold putty.
   - **YES**
   - **NO**
   - **Start**

2. **Is the soil too wet?**
   - **NO**
   - **SAND C**
   - **YES**
   - **NO**
   - **SAND C**

3. **Is the soil to dry?**
   - **YES**
   - **LOAMY SAND C**
   - **NO**
   - **SAND C**

4. **Does the soil form a ribbon?**
   - **YES**
   - **NO**
   - **SAND C**

5. **Does the soil make a weak ribbon less than 1" long before breaking?**
   - **YES**
   - **NO**
   - **SANDY LOAM MC**

6. **Excessively wet a small pinch of soil in palm of hand and rub with forefinger.**
   - **YES**
   - **NO**
   - **SANDY CLAY LOAM MC**

7. **Does the soil feel very gritty?**
   - **YES**
   - **NO**
   - **SANDY CLAY MC**

8. **Does the soil feel very smooth?**
   - **YES**
   - **NO**
   - **Silty CLAY LOAM F**

9. **Does the soil feel very smooth?**
   - **YES**
   - **NO**
   - **Silty CLAY F**

10. **Does the soil feel very smooth?**
    - **YES**
    - **NO**
    - **Neither grittiness nor smoothness predominates.**

* Sand Particle size should be estimated (very fine, fine, medium, coarse) for these textures. Individual grains of very fine sand are not visible without magnification and there is a gritty feeling to a very small sample ground between the teeth. Some fine sand particles may be just visible. Medium sand particles are easily visible. Examples of sand size descriptions where one size is predominant are; very fine sand, fine sandy loam, loamy coarse sand.

**Cay percentage range.**

*Modified from: Thien, Steven J., Kansas state University, 1979 Jour. Agronomy education.*
Determining Hydric Soil Indicators

Examples of collected layer data and the appropriate hydric soil indicators.

a. Layer # 1 – 0 to 24”
   Layer # 2 – 24 to 54”
   Black (10YR 2/1) muck, no redox concentrations
   Grayish brown (10YR 5/2) loamy/clayey soil
   6% strong brown redox concentrations (7.5YR 5/6)

   A1, A2, A10 (intended for accumulation of organic matter), A12 (would be hard to support if only indicator), can see this on slopes with ground water seeps

b. Layer # 1 – 0 to 11”
   Layer # 2 – 11 to 30”
   Black (10YR 2/1) muck, no redox
   Grayish brown (10YR 5/2) loamy/clayey soil
   6% strong brown redox concentrations (7.5YR 5/6)

   A1, doesn’t meet A2 or A10, not surface horizons

c. Layer # 1 – 0 to 14”
   Layer # 2 – 14 to 18”
   Very dark gray (10YR 3/1) loamy/clayey soil
   5% strong brown redox concentrations (7.5YR 4/6)

   Layer # 3 – 18 to 25”
   Grayish brown (10YR 5/2) loamy/clayey soil
   6% strong brown redox concentrations (7.5YR 5/6)

   A12, not F6 (no redox in surface)

d. Layer # 1 – 0 to 8”
   Layer # 2 – 8 to 20”
   Very dark gray (10YR 3/1) loamy/clayey soil
   6% strong brown redox concentrations (7.5YR 5/6)

   F3, A11 (starting within 12” of soil surface)

e. Layer # 1 – 0 to 11”
   Layer # 2 – 11 to 25”
   Very dark gray (10YR 3/1) loamy/clayey soil
   6% strong brown redox concentrations (7.5YR 5/6)

   A11

f. Layer # 1A – 3”
   Layer # 1B – 0 to 6”
   Black (10YR 2/1) loamy/clayey soil
   5% strong brown redox concentrations (7.5YR 5/6)

   Layer # 2 – 6 to 14”
   Grayish brown (10YR 5/2) loamy/clayey soil
   6% strong brown redox concentrations (7.5YR 5/6)

   A11, F3 and F6
g. Layer # 1 – 0 to 3”  Very dark gray (10YR 3/1) sandy soil, no redox  
Layer # 2 – 3 to 25”  Grayish brown (10YR 5/2) sandy soil  
  4% strong brown redox concentrations (7.5YR 5/6)  

A11, S5 fails because of depth

h. Layer # 1A –  3” Fibric material (duff) on surface  
Layer # 1B – 0 to 4”  Black (10YR 2/1) loamy/clayey soil, no redox  
Layer # 2 – 4 to 14”  Grayish brown (10YR 5/2) loamy/clayey soil  

No redox documented, described.

i. Layer # 1A –  3” Fibric material (duff) on surface  
Layer # 1B – 0 to 4”  Dark grayish brown (10YR 3/2) loamy/clayey soil  
  5% strong brown redox concentrations (7.5YR 4/6)  
Layer # 2 – 4 to 14”  Grayish brown (10YR 5/2) loamy/clayey soil  
  6% strong brown redox concentrations (7.5YR 5/6)  

A11, F3 and F6

j. Layer # 1 – 0 to 1”  Black (10YR 2/1) muck, no redox  
Layer # 2 – 1 to 6”  Dark grayish brown (10YR 3/2) sandy  
  5% strong brown redox concentrations (7.5YR 5/6)  
Layer # 3 – 6 to 14”  Grayish brown (10YR 6/2) loamy/clayey soil  
  18% strong brown redox concentrations (7.5YR 5/6)  

A10, F3, and S5, not A11 because of 3/2

k. Layer # 1 – 0 to 24”  Black (10YR 2/1) loamy/clayey, no redox  

Move hole, keep digging
## Hydric Indicator Tests

Rick Neilson  
Asst. State Soil Scientist, Indianapolis, IN

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth</th>
<th>Matrix Color</th>
<th>%</th>
<th>Texture</th>
<th>Mottle Color</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0-11</td>
<td>10YR 3/2</td>
<td>100</td>
<td>SiCL</td>
<td>10YR 5/6</td>
<td>30</td>
</tr>
<tr>
<td>Btg</td>
<td>11-20</td>
<td>10YR 4/2</td>
<td>70</td>
<td>SiCL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator(s): A11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| A       | 0-15  | 10YR 2/1     | 100| SiCL    |              |   |
| Btg     | 15-25 | 10YR 4/1     | 70 | SiCL    |              |   |
| Indicator(s): A12 |

| A       | 0-5   | 10YR 4/4     | 100| SiCL    |              |   |
| Btg     | 5-25  | 10YR 4/2     | 70 | SiCL    |              |   |
| Indicator(s): F3 |

| A       | 0-8   | 10YR 2/1     | 70 | SiCL    | 10YR 5/6     | 30|
| Btg     | 8-20  | 10YR 4/2     | 100| SiCL    |              |   |
| Indicator(s): F3, (F8 - assuming that you are in a closed depression subject to ponding.) |

| A       | 0-11  | 10YR 3/3     | 100| SiCL    | 10YR 5/6     | 30|
| Btg     | 11-20 | 10YR 4/2     | 70 | SiCL    |              |   |
| Indicator(s): None, F3 - too deep, A11 or any other indicator - too brown in surface |

| A       | 0-5   | 10YR 3/2     | 100| SiCL    |              |   |
| Btg     | 5-10  | 10YR 4/2     | 70 | SiCL    | 10YR 5/6     | 30|
| Indicator(s): None, DM is not thick enough |

| A1      | 0-10  | 10YR 2/1     | 100| SiCL    |              |   |
| A2      | 10-15 | 10YR 3/1     | 100| SiCL    |              |   |
| Btg     | 15-25 | 10YR 4/1     | 70 | SiCL    | 10YR 5/6     | 30|
| Indicator(s): None, A12 - A2 horizon is too light |

| A1      | 0-3   | 10YR 3/1     | 100| S       | 10YR 5/6     | 30|
| Btg     | 3-15  | 10YR 4/2     | 70 | S       |              |   |
| Indicator(s): S5 |

| A       | 0-6   | 10YR 2/1     | 100| SL      | 10YR 5/6     | 30|
| B       | 6-20  | 10YR 3/1     | 70 | SiCL    |              |   |
| Indicator(s): None, no DM |

| Oa      | 0-9   | 10YR 2/1     | 100| Muck    |              |   |
| B       | 9-20  | 10YR 4/4     | 70 | SiCL    | 10YR 5/6     | 30|
| Indicator(s): A2, also meets A10 |

| A       | 0-12  | 10YR 2/1     | 100| S       |              |   |
| B       | 12+   | 10YR 5/1     | 100| S       |              |   |
| Indicator(s): None, no DM |

| A       | 0-10  | 10YR 3/2     | 75 | SiL     | 10YR 5/2     | 25|
| B       | 10-15 | 10YR 4/3     | 70 | CL      | 10YR 5/6     | 30|
| Indicator(s): F7 |