



Pocket Guide to Field Indicators of Hydric Soils and Wetland Hydrology in Minnesota

Applicable to the following Land Resource Regions (LRR) in Minnesota and associated Regional Supplements to the Corps of Engineers Wetland Delineation Manual: LLR F (Great Plains), LLR K (North Central/North East), LLR M (Midwest)

Adapted from:

NRCS Field Indicators of Hydric Soils in the U.S. (Version 8.2, 2018) and Regional Supplements to the Corps of Engineers Wetland Delineation Manual (2.0 Versions)

July 2020
(1st Printing)

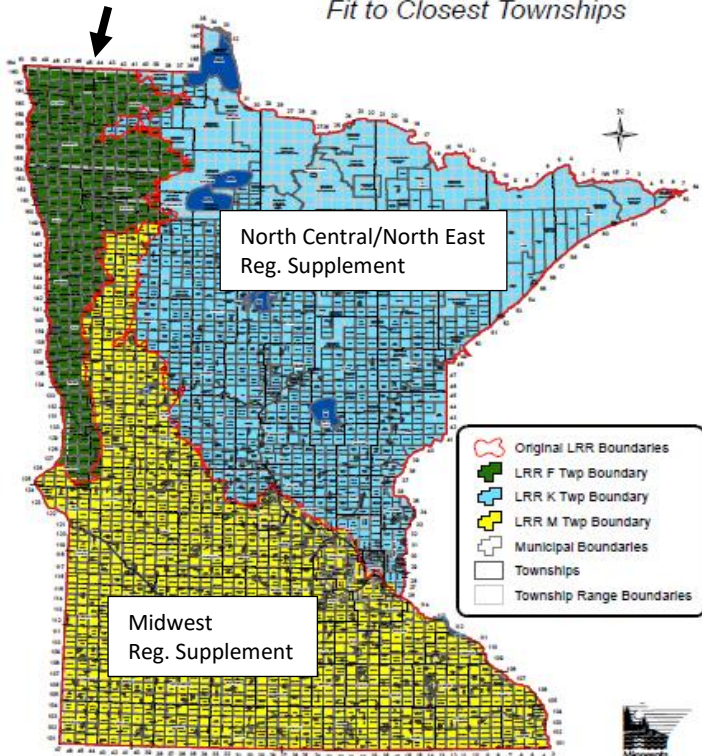
Hydric Soil Indicator User Notes

- a) Indicators are organized by the soil textures they occur in. “A” indicators occur in all soil textures, “F” indicators in loamy/clayey textures, and “S” indicators in sandy textures.
- b) For F and S Indicators, only that part of the soil profile required by the indicator must meet the texture requirement.
- c) An indicator is applicable statewide unless otherwise indicated below the indicator description.
- d) Indicators that are designated as a “test indicator” for one or more LRRs, except F21, are not listed in this guide because they are not approved for use.
- e) The indicator descriptions in this guide are abbreviated versions of the complete descriptions found in *NRCS Field Indicators of Hydric Soils in the US (Version 8.2)*.
- f) All soil colors (hue, value and chroma) refer to moist Munsell colors.

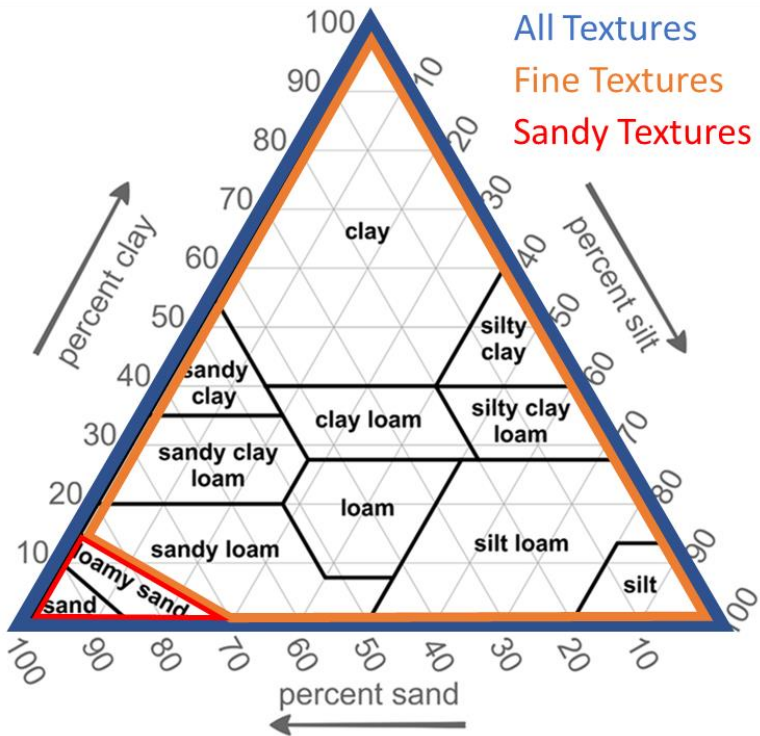
- g) Redox features in organic-rich layers are often more visible as the sample dries.
- h) Nodules and concretions are not considered redox concentrations for the application of the indicators.
- i) Chroma should not to be rounded to the next chip to qualify as meeting an indicator. However, Value may be rounded to the next color chip when using the indicators.
- j) Some indicators require users to estimate proportions. A visual chart for estimating proportion can be found in most soil color books.
- k) Refer to the glossary of *NRCS Field Indicators of Hydric Soils in the US (Version 8.2)* for definitions of faint, distinct, prominent and other important terms used for the indicators.

Great Plains
Reg. Supplement

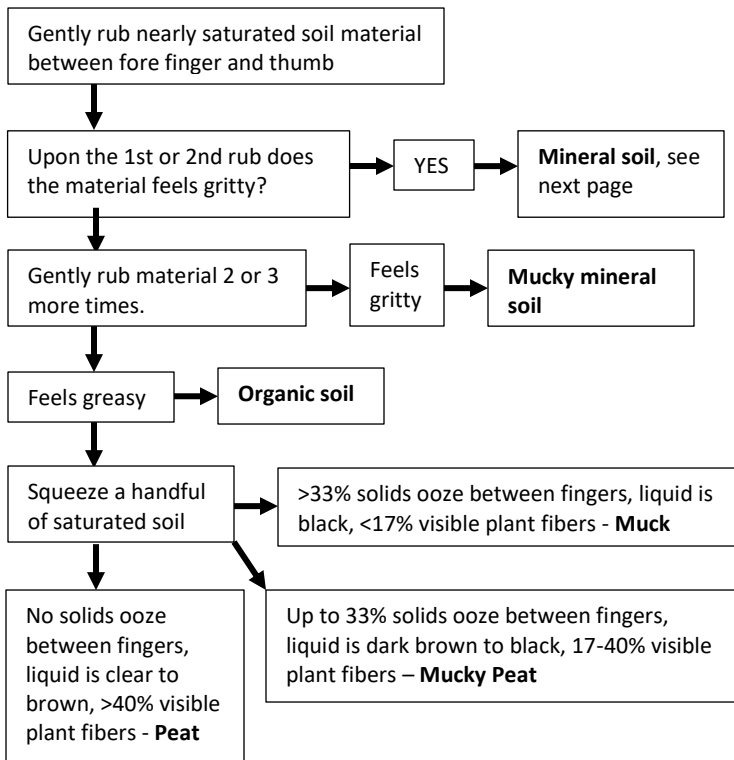
*Land Resource Region Boundaries
Fit to Closest Townships*



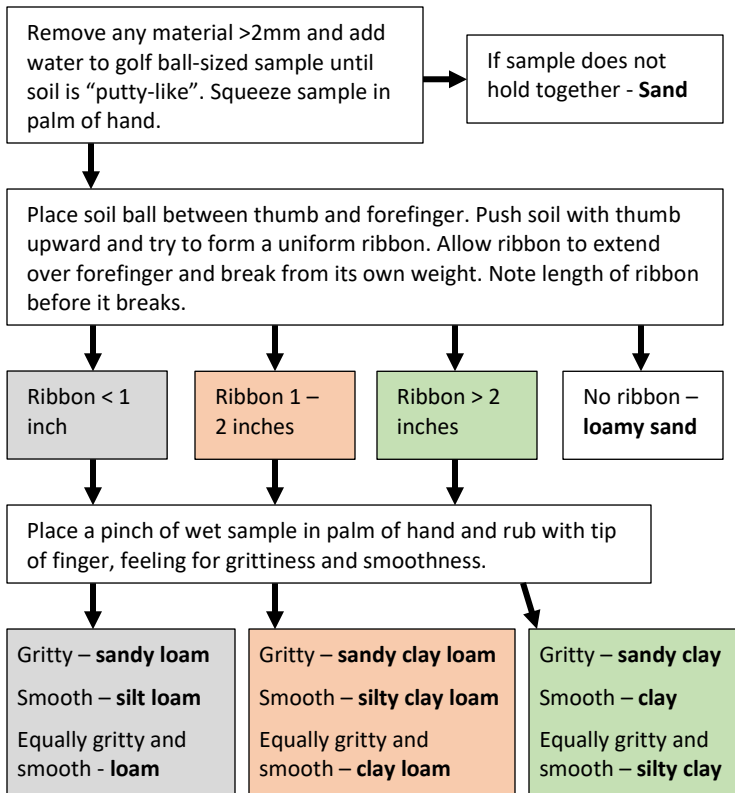
May 2008



Field Methods for Determining Soil Texture



Field Methods for Determining Soil Texture (cont.)



Important Definitions

Criteria for Depleted Matrix

| Value | Chroma | Redox Conc. |
|----------|----------|---|
| ≥ 5 | ≤ 1 | Not req. |
| ≥ 6 | ≤ 2 | Not req. |
| 4 or 5 | 2 | $\geq 2\%$ distinct or prominent required |
| 4 | 1 | $\geq 2\%$ distinct or prominent required |

Gleyed Matrix - Soils with a gleyed matrix have the following combinations of hue, value, and:

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

Hydric Soil Indicators for Any Texture (“A”)

All mineral layers above any of the A Indicators have a dominant chroma ≤ 2 , or the layer(s) with a dominant chroma of > 2 is < 6 inches thick.

A1. Histosol: Classifies as a Histosol. A Histosol has a layer of organic matter accumulation of ≥ 16 inches in the upper 32 inches of soil material.

A2. Histic Epipedon: Histic epipedon underlain by mineral soil material with chroma ≤ 2 . Histic epipedons are layers of organic matter accumulation 8 - 16 inches thick in the upper 32 inches of soil material.

A3. Black Histic: A layer of peat, mucky peat, or muck ≥ 8 inches thick that starts < 6 inches from the soil surface, has a hue of 10YR or yellower, value ≤ 3 , chroma of 1 or less, and is underlain by mineral soil material with chroma ≤ 2 .

A4. Hydrogen Sulfide: A hydrogen sulfide odor (rotten egg smell) within 12 inches of the soil surface.

A5. Stratified Layers: Several stratified layers starting < 6 inches from the soil surface. At least one of the layers has:

- a) Value ≤ 3 and chroma 1 or less; or
- b) A muck, mucky peat, peat, or mucky modified mineral texture.

The remaining layers have chroma ≤ 2 . For any sandy material that constitutes the layer with value of ≤ 3 and chroma of 1 or less, at least 70% of the visible soil particles must be masked with organic material as seen with 10 or 15x hand lens (appear 100% masked without a hand lens).

A9. 1 cm Muck. A layer of muck ≥ 0.5 inches thick with value ≤ 3 and chroma of 1 or less; and starting ≤ 6 inches from the soil surface.

Great Plains Supplement (LRR F) only



A10. 2 cm Muck: A layer of muck \geq 0.75 inches thick with value \leq 3 and chroma of 1 or less; and starting \leq 6 inches from the soil surface.



Midwest Supplement (LRR M) only

A11. Depleted Below Dark Surface: A layer with a depleted or gleyed matrix that has \geq 60% chroma \leq 2 starting at \leq 12 inches from the soil surface, and having a minimum thickness of either 6 inches or 2 inches if the 6 inches consists of fragments.

Organic, loamy or clayey layer(s) above the depleted or gleyed matrix have value \leq 3 and chroma \leq 2 starting $<$ 6 inches from the soil surface and extend to the depleted or gleyed matrix. Any sandy material above the depleted or gleyed matrix must have value \leq 3 and chroma 1 or less, starting \leq 6 inches from the soil surface, and extend to the depleted or gleyed matrix. At least 70% of the visible soil particles must be masked with organic material as seen with 10 or 15x hand lens (appear 100% masked without a hand lens).

A12.Thick Dark Surface: A layer ≥ 6 inches thick with a depleted or gleyed matrix that has $\geq 60\%$ chroma ≤ 2 starting > 12 inches from the soil surface. The layer(s) above the depleted or gleyed matrix and starting < 6 inches from the soil surface must have value of ≤ 2.5 , chroma of 1 or less to a depth of ≥ 12 inches, and value ≤ 3 and chroma of 1 or less in any remaining layers above the depleted or gleyed matrix. In sandy material above the depleted or gleyed matrix, at least 70% of the visible soil particles must be masked with organic material as seen with 10 or 15x hand lens (appear 100% masked without a hand lens).

Hydric Soil Indicators for loamy and clayey soils with textures of loamy very fine sand and finer (“F”)

All mineral layers above any of the F Indicators, except for Indicators F8 and F21, have a dominant chroma ≤ 2 , or the layer(s) with a dominant chroma > 2 is < 6 inches thick.

F1. Loamy Mucky Mineral: A layer of mucky modified loamy or clayey soil material ≥ 4 inches thick starting ≤ 6 inches from the soil surface.

F2. Loamy Gleyed Matrix: A gleyed matrix that occupies $\geq 60\%$ of a layer starting ≤ 12 inches from the soil surface.

F3. Depleted Matrix: A layer that has a depleted matrix with $\geq 60\%$ chroma ≤ 2 with a minimum thickness of:

- a) 2 inches if starting ≤ 4 inches from the soil surface; or
- b) 6 inches if starting ≤ 10 inches from the soil surface.

F6. Redox Dark Surface: A layer ≥ 4 inches thick starting ≤ 8 inches from the mineral soil, and has:

- a) Value ≤ 3 , chroma of 1 or less, and $\geq 2\%$ distinct or prominent redox concentrations as soft masses or pore linings; or
- b) Value ≤ 3 , chroma ≤ 2 , and $\geq 5\%$ distinct or prominent redox concentrations as soft masses or pore linings.

F7. Depleted Dark Surface: Redox depletions with value ≥ 5 and chroma ≤ 2 in a layer that is ≥ 4 inches thick, starting at a depth ≤ 8 inches from the mineral soil surface, and has:

- a. Value ≤ 3 and chroma of 1 or less and $\geq 10\%$ redox depletions; or
- b. Value ≤ 3 and chroma ≤ 2 or and $\geq 20\%$ redox depletions.

F8. Redox Depressions: Only in closed depressions subject to ponding, $\geq 5\%$ distinct or prominent redox concentrations occurring as soft masses or pore linings in a layer that is ≥ 2 inches thick and starts ≤ 4 inches from the soil surface.

F10. Marl: A layer of marl (usually at soil surface) with value ≥ 5 and chroma ≤ 2 starting at ≤ 4 inches from the soil surface. Marl is a limnic material deposited in water by precipitation of calcium carbonate that reacts with dilute hydrochloric acid to evolve carbon dioxide. Marl is *not* the carbonatic substrate material associated with limestone bedrock.

F18. Reduced Vertic: A positive reaction to alpha-alpha-dipyridyl within $\geq 60\%$ of a layer that is:

- a. ≥ 4 inches thick starting ≤ 12 inches; or ≥ 2 inches thick starting at 6 inches from the mineral or muck soil surface; and
- b. Occurs during a normal or drier season and month (16 - 84% of probable precipitation) for ≥ 7 continuous days and 28 cumulative days.

Found in Vertisols and Vertic intergrades. Vertisols are mineral soils with $\geq 30\%$ clay in all layers. They expand/shrink depending on moisture content and have slickened sides or wedge-shaped peds. These soils generally have thick dark surface horizons, but indicators A11, A12, and F6 commonly are not evident, possibly because of masking of redoximorphic features by organic carbon.

Great Plains Supplement (LRR F) only



F21. Red Parent Material: A layer derived from red parent materials that is ≥ 4 inches thick, starting at ≤ 10 inches from the soil surface with a hue of 7.5YR or redder. The matrix has a value and chroma > 2 and ≤ 4 . The layer must contain $\geq 10\%$ depletions and/or distinct or prominent redox concentrations occurring as soft masses or pore linings. Redox depletions should differ in color by having:

- a) A minimum difference of one value higher and one chroma lower than the matrix, or
- b) Value ≥ 4 and chroma ≤ 2 .

Red parent materials are likely to be encountered in red glacial material near Lake Superior in North Central/North East Land Resource Region (LRR K). They are unlikely to be encountered in Midwest (LRR M) or Great Plains (LRR F) Land Resource Regions.

Statewide Test Indicator

Hydric Soil Indicators for sandy soils with textures of loamy fine sand and coarser (“S”)

All mineral layers above any of the S Indicators, except Indicator S6, have a dominant chroma ≤ 2 , or the layer(s) with a dominant chroma of > 2 is < 6 inches thick.

S1. Sandy Mucky Mineral: A layer of mucky modified sandy soil material ≥ 2 inches thick starting at ≤ 6 inches from the soil surface.

S3. 2 in Mucky Peat or Peat: A layer of mucky peat or peat ≥ 2 inches thick, with value ≤ 3 , chroma ≤ 2 , starting at ≤ 6 inches from the soil surface, and underlain by sandy soil material.

S4. Sandy Gleyed Matrix: A gleyed matrix that occupies $\geq 60\%$ of a layer starting at ≤ 6 inches from the soil surface.

S5. Sandy Redox: A layer starting ≤ 6 inches from the soil surface that is ≥ 4 inches thick, has a matrix with $\geq 60\%$ of chroma ≤ 2 , and $\geq 2\%$ distinct or prominent redox concentrations as soft masses and/or pore linings.

S6. Stripped Matrix: A layer starting at ≤ 6 inches from 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. The stripped areas and translocated oxides and/or organic matter form a faintly contrasting pattern of two or more colors with diffuse boundaries. The stripped zones are $\geq 10\%$ of the volume and are rounded. Common or many areas of stripped soil materials are required. The stripped areas are typically 0.5 - 1 inches in size forming a splotchy pattern, which may be a difficult to recognize, and is more evident when a horizontal slice is observed.

S7. Dark Surface: A layer 4 inches thick, starting at ≤ 6 inches from the soil surface, with value ≤ 3 , and chroma 1 or less. At least 70% of the visible soil particles must be masked with organic material as seen with 10 or 15x hand lens (appear 100% masked without a hand lens). The matrix color of the layer immediately below the dark layer must have the same colors as those described above or any color that has chroma ≤ 2 .

**North Central/North East Supplement
(LRR K) & Midwest Supplement (LRR M)
only**



S8. Polyvalue Below Surface: A layer with value ≤ 3 and chroma 1 or less starting ≤ 6 inches from the soil surface. At least 70% of the visible soil particles must be masked with organic material as seen with 10 or 15x hand lens (appear 100% masked without a hand lens). Directly below this layer, $\geq 5\%$ of the soil volume has value ≤ 3 , chroma of 1 or less, and the remainder of the soil volume has value ≥ 4 and chroma of 1 or less to depth of 12 inches or to the spodic horizon, whichever is less. A spodic horizon is a layer of accumulation below a relatively high value, low chroma layer where organics and oxides have leached and accumulated in the B horizon.



**North Central/North East Supplement
(LRR K) only**

S9. Thin Dark Surface: A layer ≥ 2 inches thick, starting at ≤ 6 inches from the soil surface, with value ≤ 3 , and chroma of 1 or less. At least 70% of the visible soil particles must be masked with organic material as seen with 10 or 15x hand lens (appear 100% masked without a hand lens). This layer is underlain by a layer or layers with value ≤ 4 and chroma of 1 or less to a depth of 12 inches or to the spodic horizon, whichever is less. A spodic horizon is a layer of accumulation below a relatively high value, low chroma layer where organics and oxides have leached and accumulated in the B horizon.

**North Central/North East Supplement
(LRR K) only**



S11. High Chroma Sands: In coastal zones and dune-and-swale complexes, a layer ≥ 2 inches thick starting at ≤ 4 inches from the surface with chroma ≤ 4 and $\geq 2\%$ distinct or prominent redox concentrations.

**North Central/North East Supplement
(LRR K) only**



Wetland Hydrology Indicator User Notes

- a) Indicators are divided into four groups:
 - A – direct observation of surface/ground water;
 - B – evidence of ponding/flooding;
 - C – evidence of current/recent saturated soil; and
 - D – landscape and vegetation characteristics indicating contemporary wet conditions.
- b) Indicators are either primary or secondary based on their estimated reliability in a region.
- c) Primary hydrology indicators provide stand-alone evidence of wetland hydrology, while secondary indicators must be supported by one or more additional hydrology indicators to conclude the presence of wetland hydrology.
- d) The indicator descriptions in this guide are abbreviated versions of the full descriptions found the Regional Supplements to the Corps of Engineers Wetland Delineation Manual (Great Plains, North Central/North East, Midwest). Users

are encouraged to reference the full descriptions and user notes found in those documents.

- e) An indicator is applicable statewide unless otherwise indicated below the indicator description.
- f) Although most wetlands exhibit one or more indicators, some wetlands may lack any of these indicators due to disturbance, temporary dry conditions, or other factors. The lack of an indicator is not evidence for the absence of wetland hydrology. Chapter 5 of the applicable regional supplement should be consulted for help in identifying wetlands that may lack wetland hydrology indicators at certain times.
- g) Users should evaluate and consider antecedent precipitation and climatic conditions prior to field observations when interpreting hydrology indicators. Care should be taken to thoroughly document observations on data forms, and interpretations of indicators should be clearly distinguished from objective observations.

“A” Indicators- direct observation of surface or groundwater

Consider antecedent precipitation conditions, recent rainfall events, and the effect of any artificial drainage (e.g., ditches and subsurface drain tiles) when interpreting these indicators for wetland determination/delineation purposes.

A1. Surface Water: Direct, visual observation of surface water. Primary Indicator.

A2. High Water Table: Visual observation of water table \leq 12 inches below the soil surface in a pit, hole, or shallow monitoring well. Includes water tables that are perched, through flow, and groundwater discharge. Primary Indicator. Must allow time for water to seep into newly dug hole and stabilize at the water table level. The upper level at which water is seeping into the hole can be used for identifying the water table level.

A3. Saturation: Visual observation of saturated soils ≤ 12 inches below the soil surface as indicated by water glistening on the surfaces and broken interior faces of soil samples removed from the pit or auger hole. Must be associated with a water table immediately below the saturated zone except when zone of saturation is above a relatively impermeable layer of soil or bedrock ≤ 12 inches of the soil surface. Primary Indicator. Water observed in soil cracks or on ped faces does not meet this indicator unless ped interiors are also saturated. Do not squeeze soil samples when checking for this indicator.

“B” Indicators- evidence of ponding or flooding – past or present

B1. Water Marks: Discolorations or stains on the bark of woody vegetation, rocks, bridge supports, buildings, fences, or other fixed objects as a result of inundation. Primary Indicator. May not apply to water marks caused by extreme, infrequent, or very brief flooding events or flooding outside the growing season. Additional information may be needed to interpret this indicator in areas of altered hydrology if water marks could be relict, reflecting the historic rather than current hydrologic regime.

B2. Sediment Deposits: Thin layers or coatings of fine-grained mineral material (e.g., silt, clay) or organic matter (e.g., pollen), sometimes mixed with other detritus, remaining on tree bark, plant stems or leaves, rocks, and other objects after surface water recedes. Primary Indicator. May not apply to deposits caused by extreme, infrequent, or very brief flooding events, flooding outside the growing season, or in areas where drainage systems remove excess water quickly.

B3. Drift Deposits: Rafted debris (vegetation remnants, man-made litter) deposited on the ground or entangled in vegetation or other fixed objects. May be deposited at/near high water line in ponded or flooded areas, piled against upstream sides of trees, rocks, and other fixed objects, or widely distributed within the dewatered area. Primary Indicator. May not apply to deposits caused by extreme, infrequent, or very brief flooding events, flooding outside the growing season, or in areas where drainage systems remove excess water quickly. In general, the larger the drift deposit, the more extreme the event.

B4. Algal Mat or Crust: Mat or dried crust of algae (sometimes mixed with other detritus) left on or near the soil surface after dewatering. Primary Indicator. May be attached to low vegetation or other fixed objects or may cover the soil surface.

B5. Iron Deposits: A thin orange or yellow crust or gel of oxidized iron on the soil surface or on objects near the surface. Primary Indicator.

B6. Surface Soil Cracks: Shallow cracks that form when fine-grained mineral or organic sediments dry and shrink, often creating a network of cracks or small polygons. Secondary Indicator. May occur in non-wetland temporary ponds and puddles and in areas that have been effectively drained. This indicator does not apply to deep cracks due to shrink-swell action in clay soils.

B7. Inundation Visible on Aerial Photography:

One or more recent aerial photographs or satellite images showing inundation. Primary Indicator. Antecedent moisture conditions must be assessed and considered when evaluating photographs and images for this indicator. Refer to Chapter 5 of the applicable regional supplement for suggested procedures as well as Minnesota guidance on offsite hydrology and wetland determinations.

B8. Sparsely Vegetated Concave Surface:

Concave land surfaces (e.g., depressions, swales) where the ground surface is either unvegetated or sparsely vegetated (< 5% cover) due to long-duration ponding during the growing season. Primary Indicator in North Central/North East Supplement (LRR K) and Midwest Supplement (LRR M). Secondary Indicator in Great Plains Supplement (LRR F). Concave land surfaces must contrast with vegetated slopes and convex surfaces in the same area.

B9. Water-Stained Leaves: Fallen or recumbent dead leaves that have turned grayish or blackish in color due to inundation for long periods. Primary Indicator. Water-stained leaf colors should contrast strongly with fallen leaves in nearby non-wetland landscapes.

B10. Drainage Patterns: Flow patterns visible on the soil surface or eroded into the soil, low vegetation bent over in the direction of flow, absence of leaf litter or small woody debris due to flowing water, and similar evidence that water flowed across the ground surface. Secondary Indicator. Use caution when interpreting this indicator in areas subject to high winds, affected by recent unusual flooding events, and in grassed waterways of upland agricultural areas.

B13. Aquatic Fauna: Presence of live individuals, diapausing insect eggs or crustacean cysts, or dead remains of aquatic fauna (e.g., clams, aquatic snails, aquatic insects, ostracods, shrimp, other crustaceans, tadpoles, and fish) either on the soil surface or clinging to plants or other emergent objects. Primary Indicator. Fauna or their remains should be reasonably abundant; the presence of one or two individuals is not sufficient for this indicator. Not applicable for remains present due to transport by high winds, water, or animals.

B14. True Aquatic Plants: Presence of live individuals or dead remains of plant species that are normally submerged, have floating leaves or stems, require water for support, or desiccate in the absence of standing water. Primary indicator. Examples include watershield (*Brasenia schreberi*), watermilfoil (*Myriophyllum* spp.), cow lily (*Nuphar luteum*), water lily (*Nymphaea* spp.), American lotus (*Nelumbo lutea*), pondweeds (*Potamogeton* spp.), bladderworts (*Utricularia* spp.), and duckweeds (*Lemna* spp.).



Midwest Supplement (LRR M) only

B15. Marl Deposits: Presence of marl (calcium carbonate precipitated from standing or flowing water through the action of algae or diatoms) as a tan or whitish deposit on the soil surface.

Primary Indicator.

**North Central/North East Supplement
(LRR K) only**



B16. Moss Trim Lines: The presence (on trees or other upright objects) of an abrupt trim line below which water-intolerant mosses have been killed by prolonged inundation in a seasonally inundated area.

Secondary Indicator. Does not include lichen trim lines or trim lines caused by ice scour or abrasion, indicated by bark or tissue damage.

**North Central/North East Supplement
(LRR K) only**



“C” Indicators- evidence of soil saturation – past or present

C1. Hydrogen Sulfide Odor: Hydrogen sulfide (rotten egg) odor \leq 12 inches of soil surface. Primary Indicator. Dig soil pit \leq 12 inches when checking for this indicator to avoid release of hydrogen sulfide from deeper in the profile.

C2. Dry-Season Water Table: Visual observation of water table 12 - 24 inches below the surface during the normal dry season or during a drier-than-normal year. Primary Indicator in Great Plains (LRR F), Secondary Indicator in North Central/North East (LRR K) and Midwest (LRR M) supplements. Must wait for water to seep into newly dug hole and stabilize. The upper level at which water is seeping into the hole can be used to indicate the water table level. The observation hole should not penetrate any restrictive soil layer capable of perching water near the surface. Consider antecedent precipitation conditions. N/A in agricultural areas that have controlled drainage structures for subsurface irrigation.

C3. Oxidized Rhizospheres Along Living Roots:

A soil layer with $\geq 2\%$ (by volume) iron-oxide coatings or plaques on the surfaces of living roots and/or iron-oxide coatings or lining on soil pores immediately surrounding living roots ≤ 12 inches of the soil surface.

Primary Indicator. Secondary Indicator in Great Plains Supplement (LRR F) where soils are mechanically plowed or tilled. A hand lens is useful in distinguishing mineral-based iron-oxide coatings from organic material of similar color.

C4. Presence of Reduced Iron: Reduced (ferrous) iron ≤ 12 inches of the soil surface as indicated by a ferrous iron test or soil that changes color upon exposure to the air. Primary Indicator.

C6. Recent Iron Reduction in Tilled Soils: $\geq 2\%$ continuous and unbroken redox concentrations as pore linings or soft masses in the tilled surface layer of soils cultivated within the last 2 years. Redox concentrations must be within the tilled zone or ≤ 12 inches from the soil surface, whichever is shallower. Primary Indicator. Indicator is most reliable in regularly cultivated areas where soil aggregates and older redox features are more likely to be broken up.

North Central/ North East Supplement (LRR K) & Midwest Supplement (LRR M) only



C7. Thin Muck Surface: layer of muck ≤ 1 inch thick on the soil surface. Primary Indicator. Layer must be at the surface and consist of a highly decomposed organic layer (muck).

C8. Crayfish Burrows: Openings in soft ground ≤ 2 inches in diameter and surrounded by chimney-like mounds of excavated mud due to crayfish activity. Secondary Indicator.

C9. Saturation Visible on Aerial Imagery: One or more recent aerial photographs or satellite images indicating soil saturation. Saturated soil signatures must correspond to field-verified hydric soils, depressions or drainage patterns, differential crop management, or other evidence of a seasonal high-water table. Secondary Indicator. Antecedent moisture conditions must be assessed and considered when evaluating photographs and images for this indicator. Refer to Chapter 5 of the applicable regional supplement for suggested procedures as well as Minnesota guidance on offsite hydrology and wetland determinations.

“D” Indicators- landscape and vegetation characteristics that indicate contemporary wet conditions

D1. Stunted or Stressed Plants: In agricultural or planted vegetation only, > 50% of individuals of the same species in a depression, swale, or other low area that are clearly of smaller stature, less vigorous, or stressed compared with individuals growing in nearby drier landscape situations. Secondary Indicator. Not applicable for plant stress due to low soil fertility, excessive soil drainage, salinity, cold temperatures, uneven application of agricultural chemicals, or other factors not related to wetness.

North Central/North East Supplement (LRR K) & Midwest Supplement (LRR M) only



D2. Geomorphic Position: Immediate area is in a depression, drainageway, concave position within a floodplain, at the toe of a slope, on the low-elevation fringe of a pond or other water body, or in an area where groundwater discharges. Secondary Indicator. Not applicable in areas with *functioning* drainage systems in North Central/North East (LRR K) and Midwest (LRR M) supplements. Does not include concave positions on rapidly permeable soils that do not have wetland hydrology unless the water table is near the surface.

D3. Shallow Aquitard: A layer of relatively impermeable soil or bedrock ≤ 24 inches of the soil surface that is potentially capable of perching water within ≤ 12 inches of the soil surface. Secondary Indicator. Seasonally frozen soil layers are not aquitards unless they are observed to perch water for long periods during the growing season.

**North Central/North East Supplement
(LRR K) only**



D4. Microtopographic Relief: Microtopographic features in areas of seasonal inundation or high-water tables (e.g., hummocks, tussocks) with micro highs < 36 inches above the base soil level. Secondary Indicator. Does not include uneven topography due to vegetation-covered rocks, logs, or other debris, or trampling by livestock.

North Central/North East Supplement (LRR K) only



D5. FAC-Neutral Test: > 50% of dominant plant species across all strata are FACW and/or OBL after dropping all facultative dominant species. This test can be used in communities that contain no facultative dominants. If an equal number of dominants are OBL and FACW versus FACU and UPL, non-dominant species should be considered. Secondary Indicator.

D7. Frost-Heave Hummocks. The presence of hummocky microtopography produced by frost action in saturated wetland soils. Secondary Indicator. Does not include pimple mounds, gilgai micro relief in clay soils, or other factors that can produce hummocky topography (e.g., trampling by livestock).

Great Plains Supplement (LRR F) only



D9. Gauge or Well Data: Stream or lake gauge or groundwater well data that indicate that the area is inundated or has a water table ≤ 12 inches below the surface for ≥ 14 consecutive days during the growing season in most years (at least 5 years in 10), or meets an alternative wetland hydrology standard established for a particular geographic area or wetland type.

Primary Indicator. Antecedent moisture conditions must be assessed and considered when evaluating data for this indicator. Refer to Chapter 5 of the applicable regional supplement for suggested procedures.

Midwest Supplement (LRR M) only

