

NR 151.075

Silurian Bedrock Performance Standard

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WDNR, Runoff Management

Verification of Land Features in Silurian Bedrock/Karst Areas Standard Team

February 28, 2019



Background

- Why? – decades of groundwater impacts.
- What? – rule that focuses on pathogen contamination in the Silurian Bedrock area.
 - Area in WI where the bedrock consists of Silurian dolomite with a depth to bedrock of 20 feet or less.
- When? – July 1, 2018

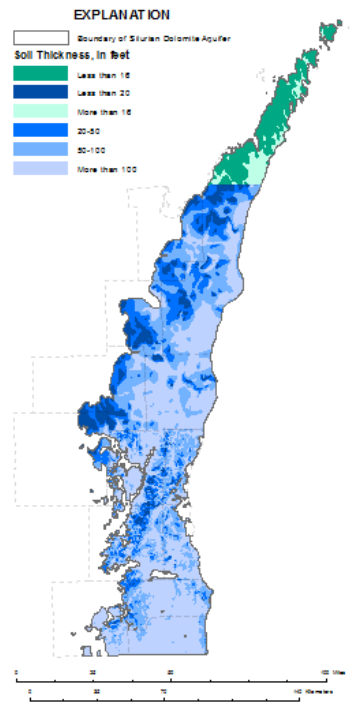


2011, exposed bedrock in field

Background



THICKNESS OF UNCONSOLIDATED MATERIALS



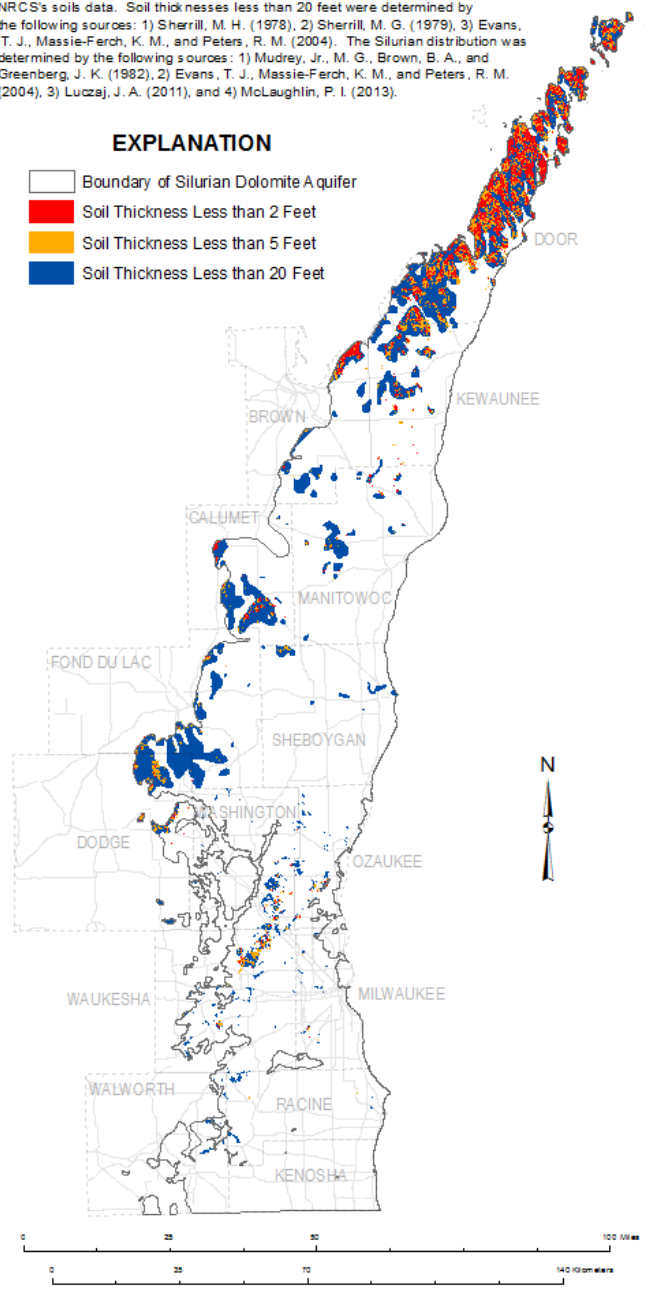
Wisconsin Department of Natural Resources

AREAS OF LESS THAN 20 FEET UNCONSOLIDATED MATERIAL OVER SILURIAN BEDROCK

Soil thicknesses less than 2 feet and less than 5 feet were determined using NRCS's soils data. Soil thicknesses less than 20 feet were determined by the following sources: 1) Sherrill, M. H. (1978), 2) Sherrill, M. G. (1979), 3) Evans, T. J., Massie-Ferch, K. M., and Peters, R. M. (2004). The Silurian distribution was determined by the following sources: 1) Mudrey, Jr., M. G., Brown, B. A., and Greenberg, J. K. (1982), 2) Evans, T. J., Massie-Ferch, K. M., and Peters, R. M. (2004), 3) Luczaj, J. A. (2011), and 4) McLaughlin, P. I. (2013).

EXPLANATION

- Boundary of Silurian Dolomite A quifer
- Soil Thickness Less than 2 Feet
- Soil Thickness Less than 5 Feet
- Soil Thickness Less than 20 Feet



Background

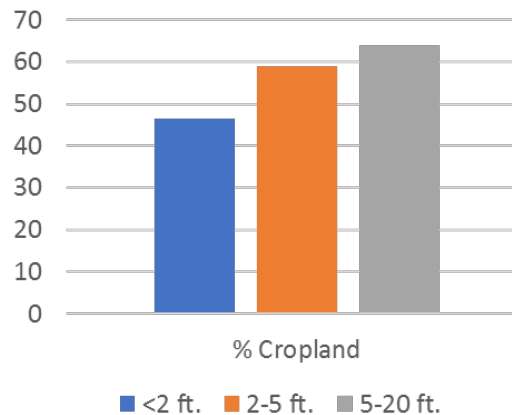
| Silurian Acres with Soils Less Than 2 Feet | | |
|--|---------------|-----------------|
| Land Use | Total Acres | % <2 Foot Soils |
| Cropland | 40,623 | 46.5 |
| Developed | 8,736 | 10.0 |
| Forest | 22,125 | 25.3 |
| Water | 166 | 0.2 |
| Wetlands | 15,667 | 17.9 |
| TOTAL | 87,317 | |

| Silurian Acres with Soils 0-20 Feet | | |
|-------------------------------------|----------------|-------------------|
| Land Use | Total Acres | % 0-20 Foot Soils |
| Cropland | 283,795 | 59.9 |
| Developed | 50,216 | 10.6 |
| Forest | 65,827 | 13.9 |
| Water | 2,406 | 0.5 |
| Wetlands | 71,773 | 15.1 |
| TOTAL | 474,017 | |

| All Silurian Acres | | | |
|--------------------|-----------------|------------------|-------------|
| Land Use | 0-20 Feet Acres | Total Acres | % |
| Cropland | 283,795 | 1,614,869 | 17.6 |
| Developed | 50,216 | 537,342 | 9.3 |
| Forest | 65,827 | 408,800 | 16.1 |
| Water | 2,406 | 31,027 | 7.8 |
| Wetlands | 71,773 | 402,956 | 17.8 |
| TOTAL | 474,017 | 2,994,994 | 15.8 |

| Silurian Acres with Soils 2-5 Feet | | |
|------------------------------------|---------------|------------------|
| Land Use | Total Acres | % 2-5 Foot Soils |
| Cropland | 46,857 | 59.0 |
| Developed | 9,211 | 11.6 |
| Forest | 12,827 | 16.1 |
| Water | 76 | 0.1 |
| Wetlands | 10,488 | 13.2 |
| TOTAL | 79,459 | |

Percent Cropland Affected by Soil Depth



~15.8% of the Silurian acres have bedrock within 20 feet.

~17.6% of the cropland acres over Silurian bedrock could be affected by the proposed NR 151 revision.

~3.1% of the cropland acres in the state could be affected by the proposed NR 151 revision. (~9,300,00 cropland acres)

| Silurian Acres with Soils 5-20 Feet | | |
|-------------------------------------|----------------|-------------------|
| Land Use | Total Acres | % 5-20 Foot Soils |
| Cropland | 196,315 | 63.9 |
| Developed | 32,269 | 10.5 |
| Forest | 30,875 | 10.0 |
| Water | 2,164 | 0.7 |
| Wetlands | 45,618 | 14.8 |
| TOTAL | 307,241 | |

Silurian Performance Standard

1. Applies to all crop producers and livestock producers in the Silurian Bedrock area.
2. Mechanical manure applications may not cause the fecal contamination of a well.
3. Mechanical manure applications are prohibited on 24 inches or less of soil to bedrock and apparent water table.
4. Manure must be applied in accordance to a NMP (NR 151.07 & NRCS 590 2015)

Silurian Performance Standard

Areas where soil is less than 5 feet to Silurian Bedrock:

5. Must be identified – infield verification OR existing maps/data.
6. Must be ranked for risk of pathogen delivery to groundwater.
- 7 & 8. Mechanical apps. are prohibited when soils are frozen or snow covered (7) and rainfall >1” is forecasted within 24 hrs. (8).

Silurian Performance Standard

- 9. <2 feet
- 10. 2-3 feet
- 11. 3-5 feet
- 12. 5-20 feet

LESS RESTRICTIVE



2016, spring injection into cover crop

Silurian Performance Standard

| Depth to bedrock | Solid manure conditions | Liquid manure conditions |
|--|---|---|
| <p style="color: red; text-align: center;"><2'</p> <p style="color: red; text-align: center;">Verification Required²</p> | <p style="color: red;">No mechanical application</p> | <p style="color: red;">No mechanical application</p> |
| <p style="text-align: center;">2'-3'</p> <p style="text-align: center;">Verification Required²</p> | <p>Incorporate³ within 72 hrs to $\leq 4''$ depth and;</p> <p style="color: green;">At least one of the following:</p> <ul style="list-style-type: none"> a) Rate ≤ 15 T/acre, b) Within 10 d planting or established crop, c) Pathogens $\leq 500,000$ CFU | <p>Pre-tillage and;</p> <p>Inject or incorporate⁴ $\leq 4''$ depth within 24hr and;</p> <p style="color: green;">At least one of the following:</p> <ul style="list-style-type: none"> a) Rate is lesser of UW A2809 or Table 1, b) Within 10 d planting or established crop, c) Pathogens $\leq 500,000$ CFU |
| <p style="text-align: center;">3'-5'</p> <p style="text-align: center;">Verification required²</p> | <p>Same as above except $\leq 6''$ depth</p> | <p>Pre-tillage and;</p> <p>Inject or incorporate⁴ $\leq 6''$ depth within 24hr and;</p> <p>Same as above</p> |
| <p style="text-align: center;">5'-20'</p> <p style="text-align: center;">No Verification required</p> | <p>No new conditions proposed</p> | <p>Pre-tillage and;</p> <p>Inject or incorporate⁵ $\leq 6''$ depth within 24hr and;</p> <p>Same as above</p> |

Silurian Performance Standard

13. Establishes horizontal setbacks for mechanical manure applications.
14. Establishes restrictions when applying manure near closed depressions.
15. Restrictions on fields with 6% or greater slopes and concentrated channels that drain to a closed depression.
16. Manure must be land applied with minimal movement.

Nutrient Management New Concepts

- Hydraulic Loading Rate

| Table 1. Silurian Bedrock Maximum Liquid Manure Application Rates | | | |
|---|-------------------------------|-------------------------------|--------------------------------|
| Soil Texture | 2 to 3 Feet Depth (gal/ac/yr) | 3 to 5 Feet Depth (gal/ac/wk) | 5 to 20 Feet Depth (gal/ac/wk) |
| Sand | 6,750 | 6,750 | 13,500 |
| Sandy Loam | 13,500 | 13,500 | 27,000* |
| Loam | 13,500 | 13,500 | 27,000* |
| Silt Loam | 13,500 | 13,500 | 27,000* |
| Clay Loam | 13,500 | 13,500 | 20,000* |
| Clay | 6,750 | 6,750 | 13,500 |

- Pre-tillage (some exemptions)
- Reduced pathogen manure
 - 500,000 cfu / 100 mL



QUESTIONS

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