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| NRCS | **Michigan Technical Note**<br><br>**USDA-Natural Resources Conservation Service** |

**AGRONOMY #12**
**Subject: Procedure to Calculate the Soil Conditioning Index for Histosols in Michigan Using RUSLE2**
**Date: March 2006**

## GENERAL INFORMATION

Following for your use and information is the procedure to calculate the Soil Conditioning Index for Histosols in Michigan Using RUSLE2 authored by Norman Widman, Conservation Agronomist, NRCS, East National Technical Support Center, Greensboro, North Carolina. The original text was edited by Jerry Grigar, State Agronomist, and Kim Graham, Conservation Security Program Coordinator, NRCS, East Lansing, Michigan, and reflects organic soils under Michigan landscape conditions.

# Procedure to Calculate the Soil Conditioning Index for Histosols in Michigan Using RUSLE2

The procedure to determine a Soil Conditioning Index (SCI) for Histosols (Organic Soils) will differ from the procedure for mineral soils due to the subsidence that takes place as a result of drainage (lowering of the water table). Organic soils subside when drained by shrinkage from drying, loss of groundwater buoyancy, compaction, wind erosion, burning, and biochemical oxidation.[1]

To properly determine the SCI, one must take into account the tons of soil lost via subsidence, water erosion, and wind erosion.

**Subsidence Rates**

In Michigan (USA), average losses in surface elevation on organic soils measured over 5-year period at 13 sites were 0.30 ft. (9.16 cm)[3] (0.72 inches/year). Near Hennepin County, Minnesota, the total settling varied from 0.5 ft. (15.1 cm) to about 1.1 ft. (33.6 cm) with subsidence approximately proportionate to water-table depths.

Management to reduce subsidence can be implemented by reducing soil disturbance and raising the water table; however, once Histosols are drained and farmed, they are essentially non-sustainable.

**Minimum Subsidence Value for SCI Purposes**

The minimum subsidence value to use is 0.75 inches/year or 21 tons/acre/year. Higher rates may occur on soils with very intense tillage systems and in the warmer climates. The higher rates should be used if they can be documented.

**Subsidence Rate and Tons/Acre***

| Subsidence inches/year | Tons/Acre/Year | | Subsidence inches/year | Tons/Acre/Year |
|---|---|---|---|---|
| 0.25 | 7 | | 2.25 | 63 |
| 0.5 | 14 | | 2.5 | 70 |
| 0.75 | 21 | | 2.75 | 77 |
| 1.0 | 28 | | 3.0 | 84 |
| 1.25 | 35 | | 3.25 | 91 |
| 1.5 | 42 | | 3.5 | 98 |
| 1.75 | 49 | | 3.75 | 105 |
| 2.0 | 56 | | 4.0 | 112 |

* The values in the table were calculated as follows:
1 acre foot of muck soil with a average bulk density of 15.4 lbs/ft$^3$ weighs 670,824 pounds (15.4lbs x 43560 ft$^2$ =670,824 lbs.). 1 acre inch of muck soil therefore weighs 55,902 pounds (670,924/12=55,902) or 28 tons (55,902/2000 = 27.951 tons). Similar thicknesses are displayed in the table.

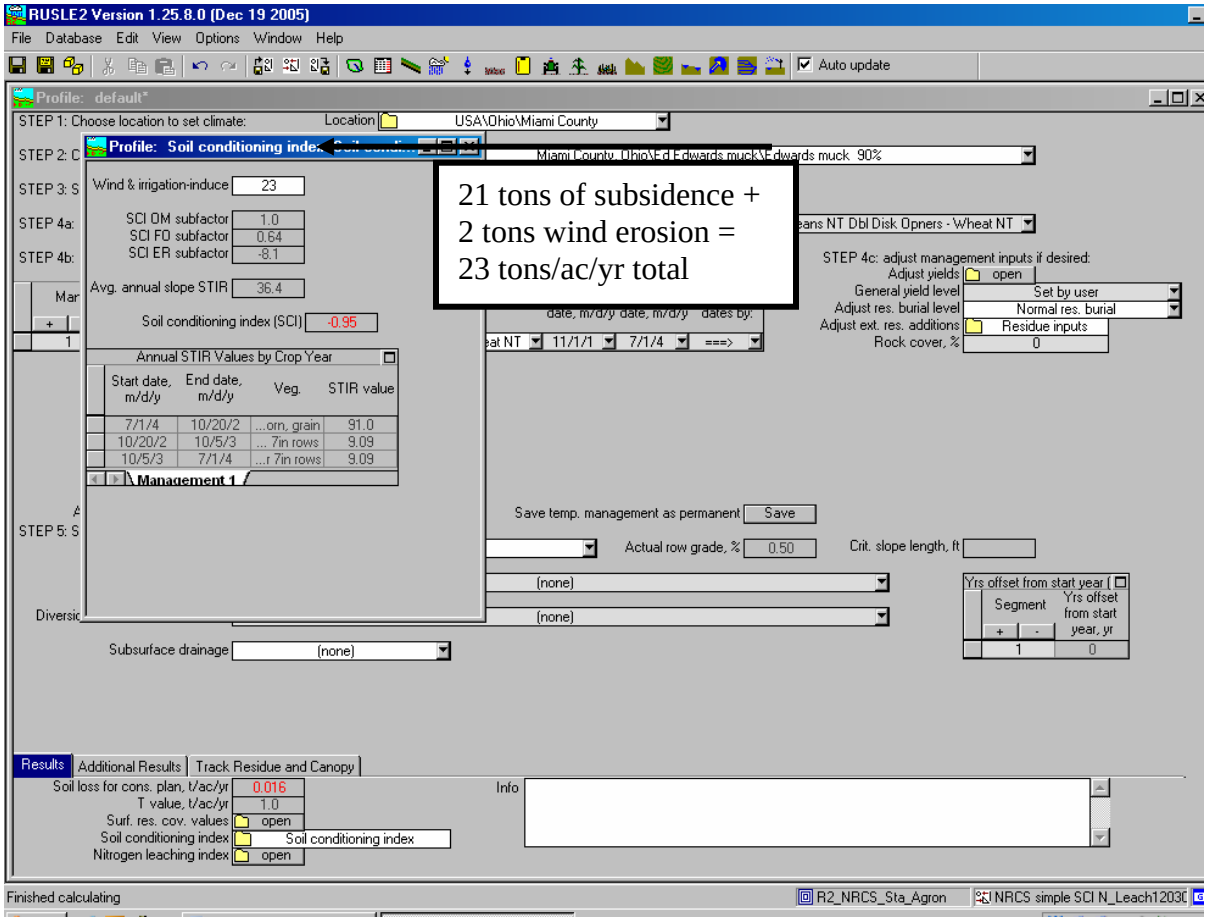
**Updated RUSLE2 Field Office Moses Database:**

Muck soils in Michigan now have a K factor of 0.02 for the updated field office RUSLE2 Moses databases. RUSLE2 can calculate a water erosion prediction for estimating the SCI on muck soils.

**The procedure to calculate SCI for Muck (Histosols) Soils using RUSLE2 is as follows:**

**1st.** Calculate Wind Erosion (if appropriate) and record in tons/acre/year
**2nd.** Enter the Climate Location in RUSLE2
**3rd.** Enter the Organic Soil Component in RUSLE2
**4th.** Enter Slope and Length (Generally 0.1% and 200 feet)
**5th.** Enter the "Management" (Rotation/Tillage/Crops/Yields)
**6th.** Open the Soil Condition Index (SCI) folder and in the Wind & irrigation induced box enter the sum of the (Subsidence Value + Wind Erosion)

This will provide a calculated SCI that takes into consideration the soil loss from sheet and rill, wind (if appropriate), and subsidence loss. See example below:




**References:**


1. *Subsidence of Organic Soils in the USA, John C. Stephens and William H. Speir.*
2. *WEIR, Walter W. (1950): "Subsidence of peat lands of the Sacramento-San Joaquin Delta, California," Hilgardia. vol. 20, no. 3, pp. 37-55, Berkeley, Calif., June.*
3. *DAVIS, J. F. and ENGBERG, C.A. (1955): (A Report of investigations of Subsidence of Organic Soils," Article 37-61, Quarterly Bulletin, Michigan Agricultural Experiment Station, East Lansing, Mich., vol. 37, no. 4, pp. 498-505, May.*

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