**Proposal to redefine the “dominant critical soil” to use in the CART sheet and rill erosion assessment to align with standard conservation planning procedures.**

February 20, 2020

**See USDA-NRCS. CART Version 1.0 Resource Concern Assessment. January 27, 2020. Document Version 1.1.**

**Current description of the dominant critical soil. p. 18-19.**

“Where K is the soil erodibility factor of the surface horizon of the dominant critical soil component. The dominant critical soil component is determined as the soil with the highest surface K factor and is a major map unit component (majorcompflag=True) that is greater than 10% of the PLU. In case of a K factor tie, choose the soil component among the set having the highest percent of the PLU. K is obtained from the SSURGO data base data element for soil erodibility factor (chorizon.kffact).”

Conservation Assessment Ranking ToolResource Concern Assessment 19 | Pagesurface K factor and is a major map unit component (majorcompflag=True) that is greater than 10% of the PLU. In case of a K factor tie, choose the soil component among the set having the highest percent of the PLU. K is obtained from the SSURGO data base data element for soil erodibility factor (chorizon.kffact).

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**I propose deleting the description above and adding:**

A “dominant critical” soil component is used as a proxy to assess sheet and rill erosion for the whole field. The “critical” soil components are the most at risk to be degraded by sheet and rill erosion using K\*(LS)/T (EIwt) to estimate. The chosen soil should also represent a significant enough area or portion of the field (dominant), at least 10%, on which to base planning. Thus, the “dominant critical” soil is determined by:

1. Calculating the K\*(LS)/T for each soil component.
2. Sorting the soil components from the most critical to the least critical.
3. Determining the area in acres of each soil component.
4. Sequentially adding the soil component areas starting with the most critical to produce the cumulative area of that component and all more at-risk components, and
5. Selecting the first component in which the cumulative area represents 10% of the field.

**Optional additional language:**

Typically, during the on-site field inventory, other factors may be considered such as proximity to water when sheet and rill erosion are used to assess the risk to water quality. Or the on-site inventory may make it clear that that the steep areas of the field require different treatment than flatter areas and should be assessed separately. The on-site inventory may provide reasons to override the CART assessment.

**Further explanation:**

Determining the dominant critical soil could mean producing a table like this:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Component | K\*(LS)/T for  the component  (sorted most at risk to least) | Acres of component | Cumulative acres | Cumulative  percent |
| 1 | 10 (not sure the scale of these numbers) | 3 | 3 | 3% |
| 2 | 9 | 2 | 5 | 5% |
| **3** | **8** | **8** | **13** | **13%** |
| 4 | 7 | 32 | 45 | 45% |
| -- | -- | -- | -- |  |
| -- | -- | -- | -- |  |
| -- | -- | -- | 100 | 100% |

Soil component 3 plus the more at-risk soils represent at least 10% of the field. Thus, soil component 3 is the dominant critical soil and used to assess sheet and rill erosion.

**Why this change is needed.** (more analysis can be provided if needed)

The slope (LS) is a more critical influence on sheet and rill erosion risk than the K factor. Sheet and rill conservation training teaches to look for the steepest and longest slopes to choose the proxy soil to evaluate sheet and rill erosion for a field. K informs the choice of a proxy soil on the slope, distinguishing among soils with similar slopes. And T can be critical if there are some shallow soils in the PLU with very low tolerance to erosion. If only K is used, a soil which is very prone to erosion and degradation, but on flat ground could be used as a proxy over a lesser prone soil on a steep slope. This would produce an incorrect assessment of the sheet and rill resource concern in a field and the subsequent loss in productivity.

**Other Notes**

Missing from this discussion is an explanation of why K might be appropriate to determine the dominant critical soil. When I looked at the issue a few years back, I did not find an explanation as to why the K factor alone might be appropriate to determine the proxy. No state in the region used it. It was used in the Resource Stewardship Evaluation Tool (RSET) and the Integrated Erosion Tool (IET).

See [Dominant Critical Area: Basic Planning Concepts for RUSLE2](https://snapplus.wisc.edu/wp-content/uploads/sites/80/2013/12/ChoosingCriticalSoilType.pdf) for Wisconsin guidance.

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