NRCS, WI
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"DOMINANT CRITICAL AREA" BASIC PLANNING CONCEPTS FOR RUSLE2

NRCS requires the use of the Revised Universal Soil Loss Equation, Version 2 (RUSLE2) for conservation planning done to address sheet and rill erosion concerns. RUSLE2 is used to predict erosion rates on a field or conservation treatment unit. It is a tool to help the producer to make sound treatment decisions based on comparing erosion rates against Tolerable soil loss levels (T).

Planning is done on a whole field basis because most producers farm the field using the same cropping (rotation) and tillage sequence (residue). Additional supporting practices such as contour, contour strip crop, contour buffer strips, or grassed waterways may be planned for specific parts of the field to supplement the crop rotation and tillage system used on the field.

Fields are rarely comprised of a single soil map unit or uniform topography. In order to plan a treatment system that is adequate for the whole field the dominant critical area needs to be identified. The dominant critical area is the area of the field that is used to represent the entire field or Conservation Management Unit (CMU). The sheet and rill erosion estimate (T), Soil Conditioning Index (SCI) and Soil Tillage Intensity Rating (STIR) values as well as planning decisions are made based on this "dominant critical area". The soil unit and associated Length and Steepness factors selected are critical to quality planning in RUSLE2.

Selecting the Soil Unit

Planners typically review soil maps while observing the field. An understanding of soil T values and erosivity factors (K Values) is important information when assessing a field. Fields typically may contain flat upland areas, sloping areas and depositional areas or bottomland areas. Obviously, erosion rates are different in each of these areas with the sloping areas having potentially higher erosion rates. Because of this variance, planning decisions need to address the quality criteria for dominant critical areas. Under the" dominant critical area" concept, the area that is significant and large enough to effect soil loss levels becomes the planning unit. Averaging the site characteristics of the field or using the worst case scenario are not dominant critical area concepts and are not used for RUSLE2 planning. Instead, dominant critical area is the process used for selecting soil units for RUSLE2 planning.

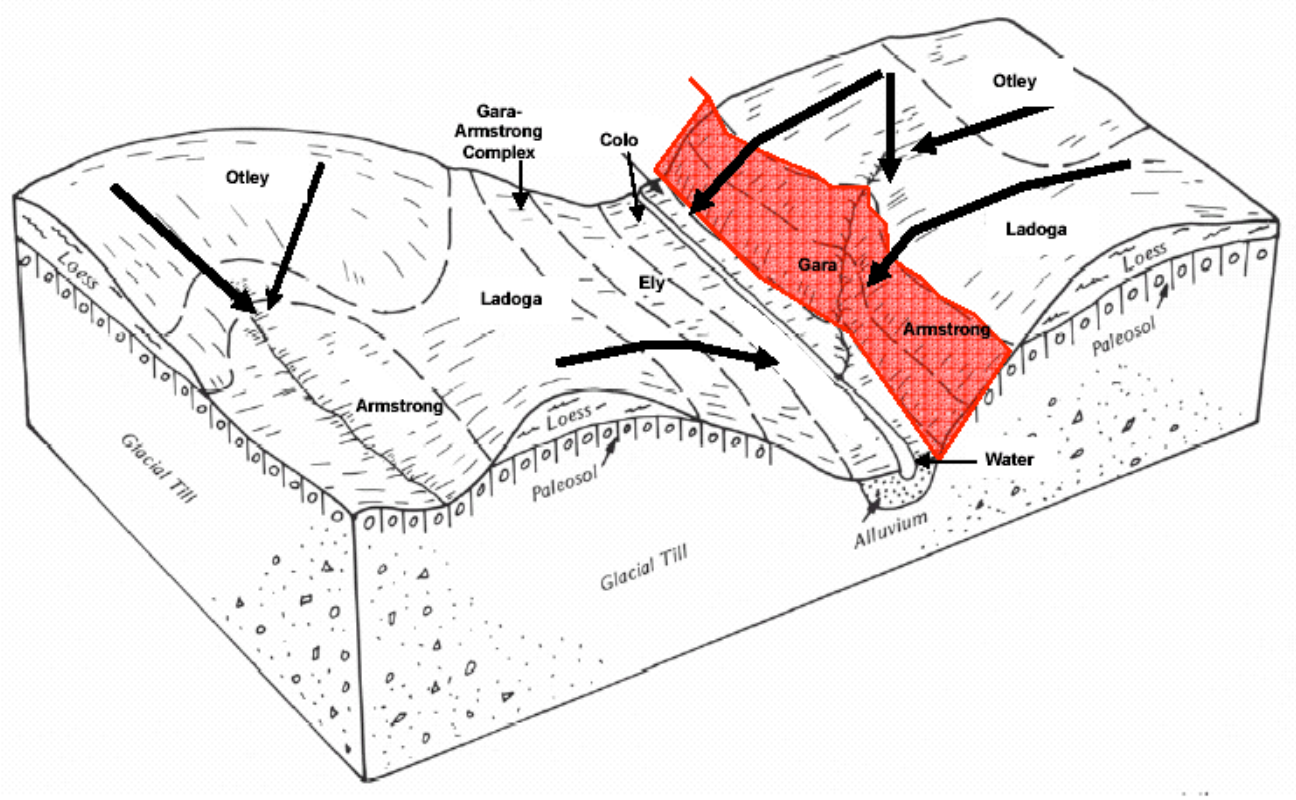
It is improper to plan the treatment for the largest common landscape in cases where it is the flattest and least erosive. In this case, the other sloping areas will be under treated. Additionally, planning to average slope or weighted average slope in the field is improper since it results in areas that are under treated. Some fields may also have a small, insignificant area of 10% or less of the field that is much steeper and more erosive. Such areas are critical but not dominant and it would be improper to plan the treatment system

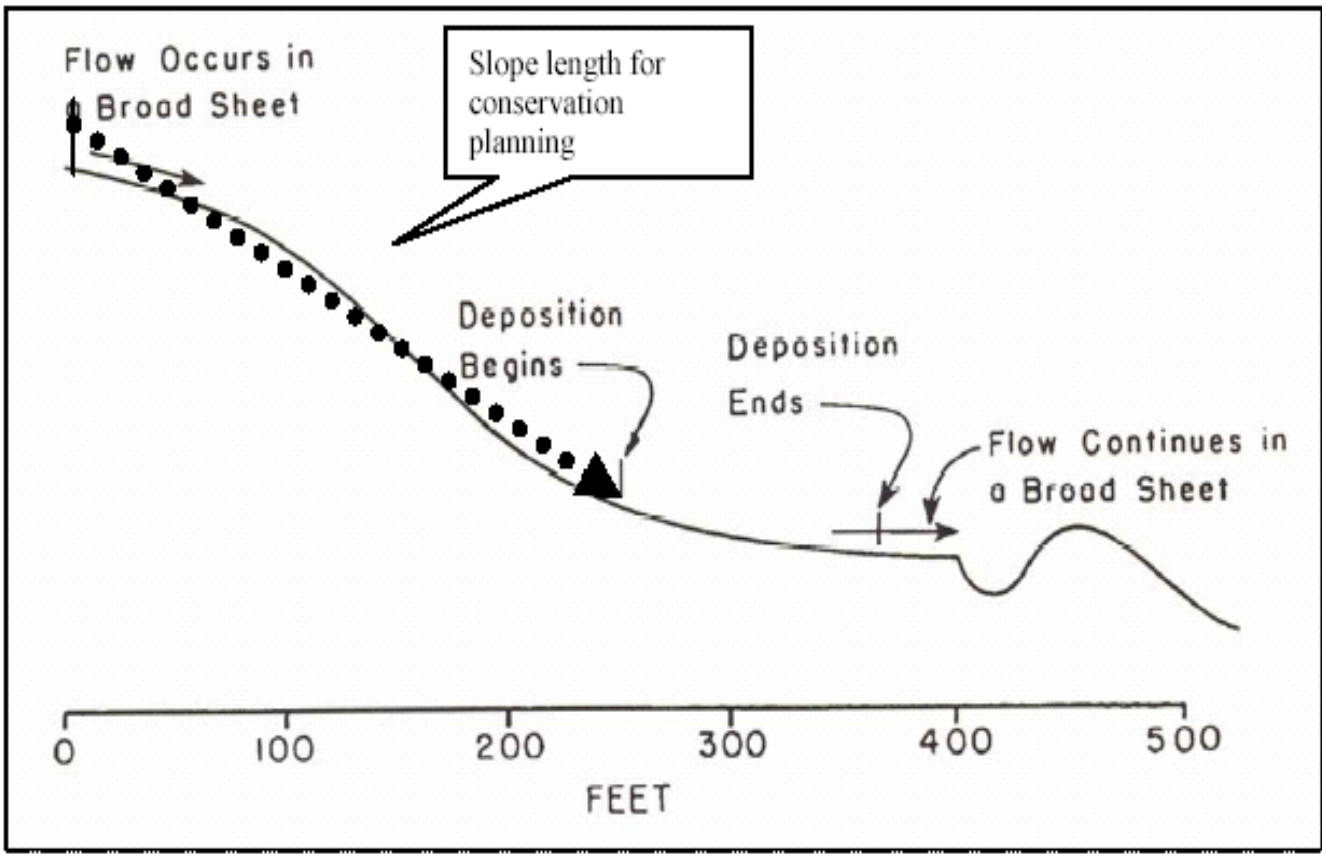
for this area and apply it to the whole field because it would significantly over treat the field and be impractical to the producer. Opportunities may exist to split out this area and develop it as a wildlife area or recreation area with permanent cover or to apply additional supporting practices to the cropping and tillage practices planned for the dominant critical area. In summary, selecting the soil unit used for planning the entire field requires that it be significant in size (not less than 10% of the field), it is an actual value (not averaged), and it addresses erosion issues on the remaining portion of that field (significant soil unit based on evaluation of T, K, L&S).

Determining slope lengths and grades.

Using RUSLE2 to determine the erosion rates for the field involves determining slope lengths and grades. While default values exist for various soil units, actual slope lengths and grades require an onsite evaluation. When completing field slope lengths and grades in the field, the planner chooses an existing common length and grade to represent the field being evaluated.

Because topographical maps are generally not accurate enough to be used in the office to calculate slope length and steepness, an onsite field evaluation is important. Default slope lengths and grades are helpful tools but are not site specific and should be used as a general guide. Quality planning for RUSLE2 purposes requires a field assessment of the soil slope length and steepness.





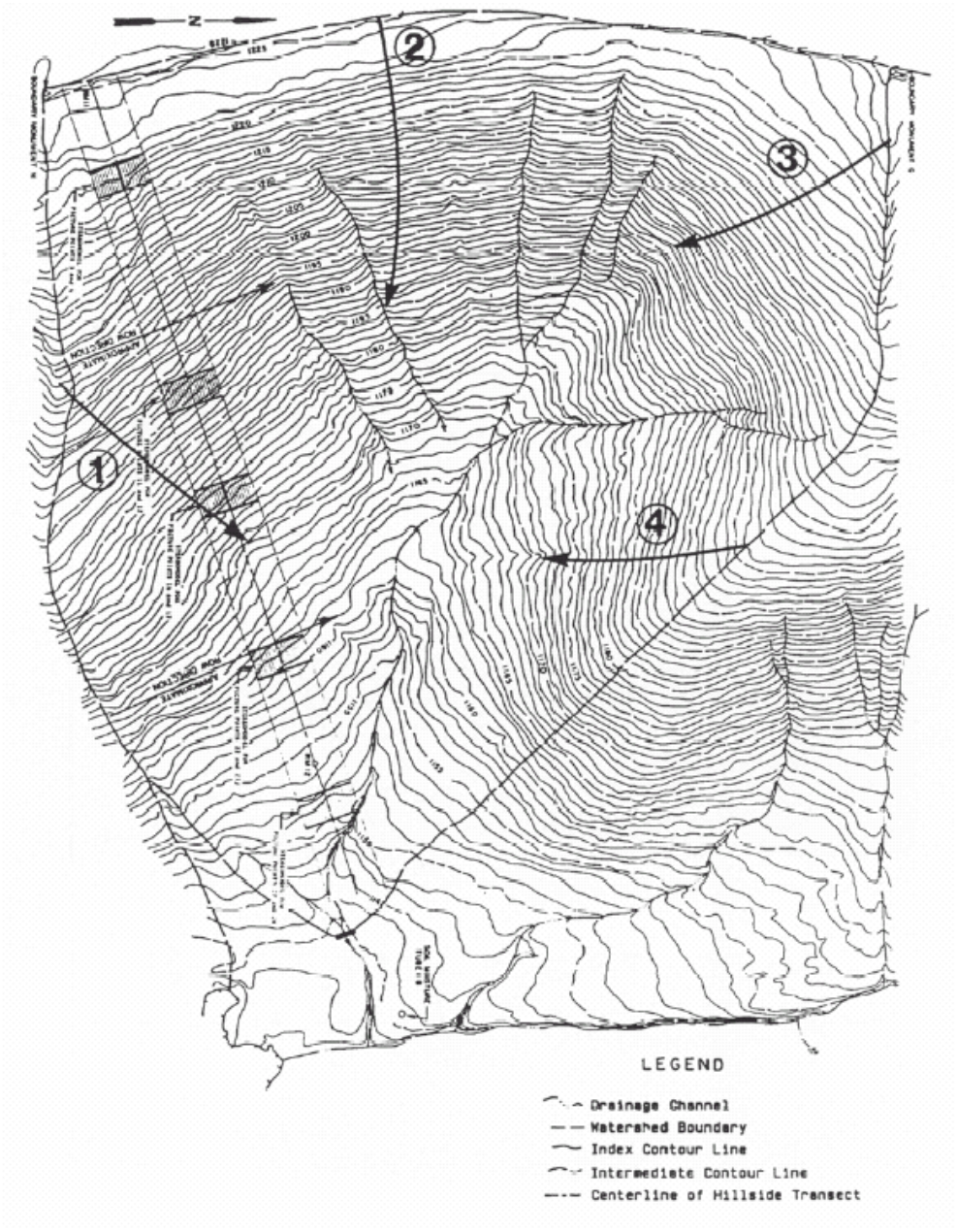
Determining slope grade

Slope is always measured perpendicular to the contour or directly up and down the slope in the direction that gravity forces water to run.

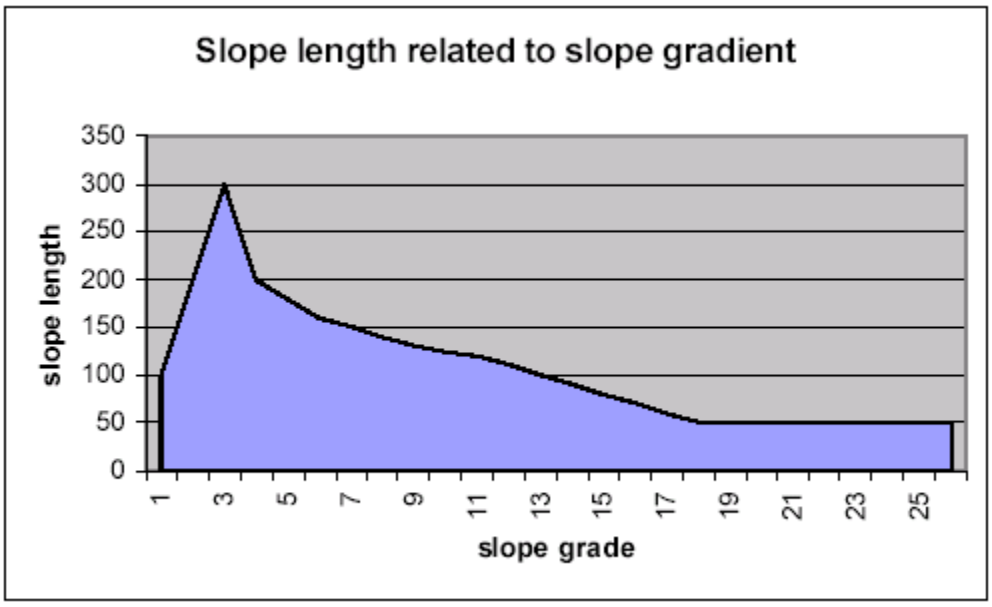
Slope grades can be measured using a hand level, clinometer or Abney level or other survey equipment. Correctly calibrating for "eye height" along with accurate pacing is critical in quality Length & Steepness (L&S) planning. Knowing where deposition or concentrated flow channels begin is also important in determining accurate L&S values.

Determining slope lengths

Slopes for RUSLE2 are measured perpendicular to the contour line starting near the op of the slope and ending either where significant deposition occurs (slope flattens significantly) or at the point where flow concentrates in a larger channels (ephemeral gully).



Slopes 2, 3 and 4 end at concentrated flow, while slope 1 ends at the point of deposition.



Slopes are generally shorter on the flatter soils, become longer at moderate steepness, and then shorten at the steeper landscapes. This is because water spreads out and diffuses at flat grades and tends to become more concentrated at the steeper grades. Concentrated flow channels form quickly on steep slopes thus creating short slope lengths. RUSLE2 does not estimate gully or ephemeral gully erosion. Only sheet and rill erosion is addressed in the RUSLE2 program which is why only slope lengths model sheet and rill erosion factors. While RUSLE2 model does not calculate erosion from concentrated flow channels, it is important that planners recognize ephemeral and gully erosion must also be managed properly on cropland fields.

A common error in selecting slope length is to measure from the top of the watershed slope and then all the way down to the depositional area at the base of the slope. Correct slope length follows a 30 to 45 degree angle to the concentrated flow channel. Measuring several slope lengths along a field will provide a slope length that represents a majority of the landscape for that field.