

ESTIMATING SOIL EROSION FROM WATER WITH THE REVISED UNIVERSAL SOIL LOSS EQUATION (RUSLE)

The Revised Universal Soil Loss Equation (RUSLE) is an improved version of the USLE model that has been used to predict soil loss by water erosion. The equation is:

$$A = R \times K \times (LS) \times C \times P \text{ where:}$$

A = the predicted average annual soil loss in tons per acre per year calculated from a given slope.

R = the rainfall factor. It is a measure of rainfall energy and intensity rather than just rainfall amount. The R-factor values are specific by county and are shown in Section I-(iv)-A-13.

K = the soil erodibility factor. It is a measure of the relative resistance of a soil to detachment and transport by water; K-factor values vary throughout the year based on seasonal changes of temperature and rainfall. K-factor values for any particular soil in Missouri will be found in the Field Office Technical Guide (FOTG), Section II, Engineering Interpretations, Physical Properties of Soils Reports. RUSLE uses an adjusted K-factor value for any K-factor is Section II; the adjusted factors for the separate climatic zones are found in Section I-(iv)-A-14.

LS = the slope length and steepness factor. It is the ratio of soil loss from a given field slope to that from a slope 72.6 feet in length with a uniform slope steepness of 9 percent. Slope length (L) is the horizontal distance measured from the point of origin of overland flow to the point where deposition occurs or runoff is concentrated in a defined channel. Slope steepness (S) is measured in the field with a clinometer, Abney level, or similar device. Tables for the LS-factor are found in Section I-(iv)-A-15.

C = the crop and management factor. It is the ratio of soil loss from land cropped under specified conditions to the corresponding soil loss from clean-tilled, continuous fallow. This factor measures the combined effect of all interrelated cover and management variables. Tables for the C-factor values based on each of four climatic zones are found in Section I-(iv)-A-16. The map to identify the specific climatic zones of each county in Missouri are found in Section I-(iv)-11.

P = the support practice factor. It is the ratio of soil loss with a specific support practice to the corresponding soil loss with up-and-down hill tillage. Support practices include contouring, stripcropping, and terracing. An overall P-factor is computed as a product of P subfactors for individual support practices which may be installed on the land in combination. P-factor values are determined by the process in Section I-(iv)-A-17.

NOTE: Soil erosion rates estimated with the RUSLE will not be added to rates estimated with the Wind Erosion Equation (WEQ) or Wind Erosion Prediction System (WEPS) for conservation planning purposes unless the unsheltered distance (L) of the WEQ/WEPS calculation and the slope length (L) of the USLE calculation are from identical locations with identical L-values within the field. This condition would seldom, if ever, occur. RUSLE factors will not be used in other water erosion models such as the Universal Soil Loss Equation (USLE) or the Revised Universal Soil Loss Equation, Version 2 (RUSLE2).