

RUSLE2 in Five “Easy” Steps

The process to run the RUSLE2 model and predict the soil loss on a farm field requires the conservation planner make a field visit and locate an area within each field that is representative of the farming system used; gather field specific resource data such as slope length and gradient, row direction and grade, surface residue, row widths for each crop grown, and visual estimate of soil disturbance; and interview the producer concerning crop rotation, tillage, planting equipment, harvest methods and other field operations before entering data in the model. Gather as much on farm data as possible to make a realistic erosion prediction!

There is a simple five step process – the NRCS Simple Method – to follow to use the model correctly. The information needed for each field is 1) location, 2) soil, 3) topography, 4) cropping system and management details entered in Steps 4a, 4b, and 4c, and 5) structural practices.

The RUSLE2 data set must be selected before a soil loss prediction may be made. When the RUSLE2 program is started, the conservation planner must always check the Status Bar on the opening screen. The Status Bar is the information at the bottom of the screen and to the right hand side. The first data box will display the Access Group R2_NRCS_Fld_Office; the second data box will display the Active Template (suggest selecting “NRCS simple 07102014”); and the third data box will display the Active Database. The planner will need to load a county-specific database for the FOSA or general area where the erosion estimate is to be made – a Moses database will not contain all the data needed for Missouri conditions.

Once the planner has made all the appropriate changes to the Status Bar, open a Profile by selecting “the green line at a forty-five degree angle” icon from the Toolbar Icons. This will display the Profile data box and will show the five “easy” steps needed for an erosion prediction.

Step 1) Choose location to set climate – The conservation planner must identify the county of interest in the Location data box. To select a county, mouse click on the down arrow (right hand side of the data box). A menu box will appear listing “USA”, “default”, and “sample”. Double-click to select “USA” and then double-click “Missouri” to display a list of all Missouri counties. Scroll through the list and double-click on the county name for the farm location. The county name will appear in the Location data box. The planner may check the climate information by a mouse click on the yellow folder icon to the left of the county name. The Climate data cannot be changed or modified! Close the Climate data box to proceed to Step 2.

Step 2) Choose soil type – The planner will select the primary soil for the erosion profile that was selected and used for data collection in each of the farm fields. To select the soil type, mouse click on the down arrow to the right of the Soil data box. A menu list of counties will be displayed – the FOSA specific databases will contain all counties in the FOSA and any county that is adjacent to the FOSA counties. Double click on the county of interest to display a list of soils in order of their 5-digit statewide number. The planner must scroll

through this list to locate the soil present on the farm field of interest. Double click on the soil map unit and a list of the principle soils in the map unit will be displayed. Double-click on the soil component or on the primary soil component if more than one soil name is displayed. The Soils data box will be populated with the selected soil name. If the planner wants to view the information provides for the selected soil simply mouse click on the yellow folder icon to the left hand side of the Soil data box. The details for the selected soil will be displayed – this data cannot be changed or modified. Close the Soil data detail box to proceed to Step 3.

Step 3) Set slope topography – Enter the ‘slope length (along slope), ft.’ by clicking within the data box and typing in the value that was measured during the field visit. Next enter ‘average slope steepness, %’ by clicking within the box and typing in the gradient measured during the field visit. Slope length may be entered as a whole number but the model will round the entry to the nearest 10 feet – the slope steepness may be entered as any value even with a decimal point. Use the enter key to accept the values typed into the boxes.

Step 4a) Select base management – The management database has been created to the planner options on crops and tillage systems. The planner in Missouri must first decide which Crop Management Zone (CMZ) includes the farm acreage. CMZ16 is a collection of crop files with planting and harvest dates for the northern half of Missouri while CMZ17 has similar files created to represent the southern half of the state. Mouse click on the dropdown arrow to the right hand side of the Base Management data box and select by double-clicking the appropriate CMZ – CMZ16 is all counties north of Bates, Henry, Benton, Morgan, Moniteau, Cole, Osage, Gasconade, Franklin, and St. Louis counties; CMZ17 is all counties including and south of those previously listed. A menu list of files as templates will be displayed with the following choices:

- a) Single Year/Single Crop Templates – a collection of many crops, tillage operations, planting method, and harvest methods to represent possibilities that a planner may find on a farm. A crop rotation may be constructed by combining two or more of these single year templates into one management file.
- b) Multi-year Rotation Templates – a collection of common rotations with common tillage, planting and harvest operations. Merely select the closest template to the farm conditions and make modifications to create a farm and field specific management file.
- c) Other Local Mgt. Records – as RUSLE2 is used and rotations are created, the planner will be instructed to save these files that are created in this file folder. If the RUSLE2 management files are not saved, this file folder will most likely be empty except for the default file.
- d) Construction Site Templates – a special use file folder that may be used when needed.

Select the first crop in the rotation or the multi-year rotation that best fits the field and the Base Management data box will be populated. Mouse click on the yellow file folder icon to the left hand side of the Base Management data box to see all the details in the selected template. The planner may change the date, operation, vegetation, yield, type of cover materials and cover material added/removed to customize the template to the conditions on the current farm field. Any changes to the management file will prevent saving the data

under the name of the template file (all template files are protected). The planner will be required to save the new file under the folder 'c. Other Local Mgt. Records'.

Step 4b) Modify/build management sequence, if desired – Rarely does a management template fit a farm exactly. Step 4b is used to modify or build a new management file by adding additional crops or multi-year rotations to the Base Management template. Simply open 'Rotation builder' by a mouse click on the yellow file folder titled 'open'. The only entries allowed on this screen are in the 'Management List' section. To add to the management file mouse click on the "plus (+)" sign. To remove from the file highlight the line to be deleted and click on the 'minus (-)' sign – the highlighted line will be removed. The planner must select the 'Apply' or the 'Apply/Close' button to finalize any additions or removals from the Rotation builder screen. Return to Step 4a and open the yellow file folder to view any changes that were made and continue with any modifications to the management file.

Step 4c) Adjust management inputs, if desired – There are five actions that can be completed in this step:

- a) Adjust yields – always check yields and adjust to realistic values (especially soybeans)
- b) Adjust external residue additions
- c) Rock cover, %
- d) Fuel type for the entire run
- e) Adjust residue burial levels

Step 5) Set supporting practices – Structural practices installed by the producer to help address resource concerns may be used to change the potential soil loss. The options available to the conservation planner are:

- a) Contouring: choices are i) rows up-and-down hill; ii) multiple selections of absolute row grade; iii) perfect contouring no row grade; or iv) multiple selections of relative row grade. Please learn to use the first three choices as relative row grade will not be available in future updates of RUSLE2.
- b) Strips/barriers: choices are i) Contour Buffer Strips; ii) Filter Strips; iii) Silt Fences; iv) Straw Bale Barriers; v) Strip Cropping; and vi) Vegetative Barriers (grass hedges)
- c) Diversion/terraces, sediment basin: choices are i) Hillside Ditches; ii) multiple selections of Diversions; iii) multiple selections of Parallel Tile Outlet Terraces; iv) multiple selections of Gradient Terraces; and v) Water and Sediment Control Structures.

Warning: there is an error in the RUSLE2 calculations when Parallel Tile Outlet Terraces are selected – use Gradient Terraces as the preferred selection until RUSLE2 can be corrected at the national level.

- d) Subsurface drainage: Choices are none or 100% drained.

All entries should be complete by the time the conservation planner reaches the bottom of the RUSLE2 screen.

Review the Results, Additional Results, and Track Biomass for calculations within the model that have been made based on the input values.

RESULTS:

Soil loss for the conservation plan, tons/acre/year

T value, tons/acre/year

Soil loss for conservation plan OK? – red color for unacceptable erosion, yellow color for erosion exceeding T value, and green color for erosion less than T value

ADDITIONAL RESULTS

Detachment on slope, tons/acre/year

Soil loss eroded portion, tons/acre/year

Sediment delivery, tons/acre/year

Average annual forage harvest, pounds/acre

Net event runoff, inches/year

Crop year results

Soil conditioning index (SCI)

SCI value OK? Red color if unacceptable (negative value); green color if positive value

Surface Residue cover values

TRACK BIOMASS

Residue and Biomass Data