

AWM106 Agricultural Sediment Fundamentals

Name	Date	Grade
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Lab Exercise #5 – “Tolerable” Soil Losses

Lab Objective (3-5 bullets):

- Gain experience with the estimation of soil loss from agricultural fields using the Revised Universal Soil Loss Equation (RUSLE2).
- Complete a sensitivity analysis using variable values of RUSLE2 factors to show how these factors affect the RUSLE2 results.
- Learn the relationship between RUSLE2 and T;

Lab Introduction Narrative (3-5 sentences):

The RUSLE2 Equation is one of the more important analytical tools used in USDA-NRCS offices, so it is important for anyone involved in watershed management and working with erosion and sedimentation to be familiar with this tool. The version of RUSLE2 used in this exercise is the only equation for use approved by USDA-NRCS field offices to estimate soil loss by erosion. This exercise demonstrates the importance of the various factors in the RUSLE2 Equation in determining erosion losses from agricultural fields.

Text References:

- 1) **USDA ARS Agriculture Handbook 703**, “*Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*”
- 2) http://www.ars.usda.gov/SP2UserFiles/Place/64080530/RUSLE/AH_703.pdf
- 3) RUSLE2
 - a) <http://www.ars.usda.gov/Research/docs.htm?docid=6010>
- 4) Online RUSLE calculation tool (Michigan State University)
 - a) <http://www.iwr.msu.edu/rusle/>
- 5) This site provides explanation of the components of RUSLE2. Use the links on the site for each factor to get an explanation of what they each mean. Potential values for each are listed. These can be used to select a range of values for running the sensitivity analysis in this exercise for each factor.
 - a) **$A = R * K * LS * C * P$**
 - b) There is also an explanation of “T”, which is not included in RUSLE2, but used in conjunction with it.
- 6) Illinois T by 2000 Program
 - a) <https://www.agr.state.il.us/t-by-2000-soil-conservation-for-the-21st-century>
 - b) <http://www.jswconline.org/content/44/5/392.extract>
- 7) Review of Indiana T by 2000 program
 - a. <http://www.jswconline.org/content/44/5/392.extract>

(Very similar to the program in Illinois.)

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Tools and Materials:

- 1) Computer with Internet access
- 2) RUSLE2 online **---(Confirmed by Brett Roberts==NRCS Illinois State Agronomist---- 3-21-2016)**
 - a) http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm
 - b) Associated official databases.---also accessed from that website.

This site contains the official NRCS version of RUSLE2. It is the only version of RUSLE2 to be used for official purposes by NRCS field offices. The NRCS developed and maintains the database components on this site. These components comprise the Official NRCS RUSLE2 Database. The official NRCS RUSLE2 database is the only database to be used for official purposes by NRCS field office employees.

Safety Precautions:

N/A

Procedures:

- 1) Select a field in your watershed and collect the information needed to use the RUSLE2 to estimate soil loss. (Use the Online tool developed by Michigan State University)
- 2) Determine the "T" factor for that field.
- 3) Choose 3 of the RUSLE2 factors and run the program for a range of 3 different values for each. Put these values in a table....or a graph to illustrate their effect on **A**. That should give you an idea of the effect of each factor.

Maintenance of Workstation and Tools:

Summary Statement:

It is nearly impossible to completely eliminate soil loss. But reducing soil loss to match the rate of new soil generation may be a sustainable goal. The NRCS and cooperating university soil scientists have developed soil models to help estimate the amount of soil loss and the amount of soil regeneration on an annual basis. The RUSLE2 model (Revised Universal Soil Loss Equation, version 2) is used to generate the amount of soil loss from a field. The "T" factor associated with RUSLE2 is an estimate of the "tolerable" amount of soil loss, is basically equivalent to the rate of new soil generation, so that, if a rate of loss below "T" is achieved, there is no net loss of soil.

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Lab-covered Questions (15-points):

Element	Excellent	Proficient	Partially Proficient	Below Proficient	Unsatisfactory	Points
Student Lab Participation	5 points The student is engaging thoroughly, with well thought out questions and answers.	4 points For the student to answer (or ask a question) to engage in the discussion, he/she is engaging, but sometimes is not fully explained or developed.	3 points The student's question/answer was somewhat proficient but could have been expanded upon	2 points- 1 pt. The student's answers was minimal and did not address much of the issues or topics in order to be engaging.	0 points Engagement was neither attempted nor completed	__/5
Student Lab Performance	5 points The student's actions, feedback and comments were thought-provoking and had substance	4 points The student's actions, feedback, and comments were good but could be expanded upon	3 points The student's actions, feedback, and comments made were minimal and did not provide much depth	2 points- 1 pt. The student's actions, feedback, and comments were one sentence that did not expand upon the lab topic	0 points No responses or feedback were given by student	__/5
Total points						__/ 10

Lab Participation (10-points):