Instructions for the "Spreadsheet for Determining Soil Loss Reductions

in Stream-Side Practices" Worksheet

Welcome to the exciting world of determining how much soil has eroded from a streambank (maybe only slightly exaggerated)! We all have seen the ugly scars left behind from a lack of riparian buffers and an overabundance of stormwater runoff. Most of us have likely wondered "just how much soil has been eroded from those banks"? Well now, you and your friends can know exactly (well, get a pretty darn good estimate anyhow) of just how many truckloads of soil has been directly deposited into the stream from bank erosion through the use of this tool. For those of you that have some Labrador Retriever in you left over from another life, you'll find this a fun exercise! Those of you that prefer landlubbing, play fetch with the Labs and let 'em go in and get wet!

Necessary field tools: You will need a measuring tape, pin (or something to hold the measuring tape in the streambed or bank with, a survey flag works quite well!), survey rod, and either a 1) stiff measuring tape or a 2) another survey rod, or 3) (using a trick from the soil scientists) a straight "thing-a-ma-jigger" with markings every 6 inches (half a foot, maybe using one color for feet markers and another for 6 inch markings). It is highly suggested that you use waders and actually walk the stream, being careful of course and not performing the measurement too soon after a rain storm. While you're at it, flip over a few rocks (provided they are not all silted over) and check for macro-invertebrate populations! Have fun! Isn't this why you got into this line of work?!

Determining input values: Good judgment is always the most beneficial tool that can be used in natural resource management issues; the use of this worksheet is no exception. Get your waders on! Walk the edge of the creek (or, preferably the stream itself!) for the entire length of the project area. Get a good feel for the eroded banks, placing different colored flags at the edges of distinctly different reaches (or sections) of the project area. You may want to walk the entire length first, without placing the flags, and then mark the flags on your return trip once you've given it a "once over"! They tend to look a bit different coming and going… Mark distinct changes in bank height and eroded depth areas. Mark areas where both sides of the stream are eroded versus just one side of the stream. You may want to group pools together with the riffle sections or measure them separately dependent upon the severity of erosion of the pool areas. Once you have a good feel for the variances of the eroded banks, from the streambed (or, if you must, from the edge, but be careful), use a survey rod and measuring tape with a pin. Place the pin at "0.0 feet" and walk the thalweg (deepest portion of the streambed) if both sides are eroded or place the pin in the bank itself if only one side of the bank is eroded. Measure the length of the eroded area and document on a blank sheet of the worksheet. Approximately every 50 to 100 feet (dependent upon the total distance), take a bank height measurement of the eroded area. Use your good judgment! Those without good judgment, defer to those that do… Total the height measurements and divide by the number of measurements for your average height. Record the height on a blank worksheet.

Depth measurements are a bit trickier due to sloughing and subsequent deposition of the sloughed area into the stream. For the purposes of this worksheet, don't worry too much about just how acute or just how obtuse those darn bank angles are! Put the survey rod up against the top of bank and down to the toe of the bank at whatever angle the bank may be. Two considerations: 1) at the toe of the bank, if there is significant deposition, place the rod at the point closest to where the "old toe" of the bank was (another one of those judgment calls!) and 2) at the top of bank, if there is a major slough, put the rod (or other "bank angling" device, a felled limb works) at the point where natural vegetation meets… air(!). The purpose of the survey rod is to give you a steady point and angle to measure the depth against. Take at least two depth measurements one third of the way from the bottom and one-third of the way from the top, add them, and divide by two for your average depth. If you take three measurements, divide by three; so on and so forth. Record the depth measurement on the blank worksheet. Use your best judgment! Those of you without good judgment, do it again, you'll have it soon!

Take separate length, height, and depth measurements for each reach that has one bank eroded and another set of measurements for each reach that has both banks eroded. Document these reaches separately on your blank worksheet.

For the column entitled "Number of Years Eroded" enter in the length of time that it took for the bank to become eroded. This may be difficult in many situations, but use information collected from the landowner/operator or look for visual signs of recent erosion. Some ***possible*** visual signs include many fibrous roots, possibly with some soil material still clinging on them (for dear life no doubt!), mineral seepages coming from root zone or former root zone areas, iron oxide bacteria (the red algal looking stuff), depositional patterns with recent activity, and vegetation growing on depositional features. If you see vegetation growing on depositional features (with the notable exception of Japanese stilt grass or some other extremely fast growing annual), generally the deposition has been there for some time. The other mentioned features usually indicate recent activity. If you see woody vegetation growing on depositional features, such as willow tree "whips" or seedlings, gage the age of the tree present. This will give an indication of how long that depositional feature has been stable. Use your best judgment on this. If you lack good judgment, you may want to consider getting some… If you see very recent activity, feel free to use 0.5 years for six months, 0.25 years for 3 months, and so on. If no erosion is present on a reach and you want to record it, use the value "1" so you won't get the error message coming with dividing a product by zero.

Factors used in the use of this tool: Bank erosion is readily determined using volume calculations and the weight of the soil. Effectively all you need to know to use this tool is the length, height, depth, how many sides of the bank are eroding, and how long it has been eroding. All these factors, with the exception of the length of time, are readily discerned in the field with a little practice.

A standard unit weight of soil was used for the weight calculation (90 pounds/cubic foot). This was determined by using the web soil survey, finding soil types adjacent to stream systems, using the soil physical properties/bulk density tables, and converting from metric to English units of measure. An

average was used for the coastal plain, piedmont, and mountain regions, but there was considerable uniformity in the bulk densities of the soils for the vast majority of the soil types found along streams.

The lower portion of the worksheet gives you the option of inputting your own weight/bulk density data however, should you be in a unique area or should you want to get a bit more specific with the data (you erosion nerd, you!). The length, height, and depth measurements are actual measurements (averaged over a given section or "reach" of stream) taken in the field. The total weight (lbs) is obtained by multiplying the length * height * depth * the weight and the total weight (tons) divides the total weight in pounds by 2000 pounds.

Example (see worksheet for data input and final results):

Reach A: 75 ft long by 3.5 ft high by 0.75 ft deep (9 inches), both banks eroding, average bulk density, eroded over a 6 month (0.5) year period

Reach B: 40 ft long by 2.25 ft high by 0.5 ft deep, one side eroding, average bulk density, eroded over a one year period

Reach C: No erosion present (still use one year on the spreadsheet for the "Number of Years Eroded" section)

Reach D: 100 ft long by 1.5 ft high by 1 foot deep, one side eroding, average bulk density, eroded over a two year period