Today’s topics
- Sediment yield

Announcements
- Assignment: HW#13
- Assignment: Read chapter 9 in the text
- HW#12 due 10/22
Downstream Sediment Yields

- Natural resource managers need to know
- Use the USLE and a sediment delivery ratio
- USLE estimates gross sheet and rill erosion
  - Does not account for sediment deposited enroute
  - Does not account for gully or channel erosion
- Sediment delivery ratio ➔ the ratio of sediment delivered at a location in the stream system to the gross erosion from the drainage area above that point.
Sediment Delivery Ratio

- Varies widely with:
  - The size of the area
  - Steepness
  - Density of drainage network
  - Etc.

- Affect of watershed size on ratio
  - 6.4 ac ➔ 65% of eroded soil delivered to stream
  - 320 ac ➔ 33% of eroded soil delivered to stream
  - 3,200 ac ➔ 22% of eroded soil delivered
  - 64,000 ac ➔ 10% of eroded soil delivered
Single Event Sediment Yields

- **USLE**
  - Gross erosion for seasonal, annual, long term

- **MUSLE**
  - Modified Universal Soil Loss Equation
  - Sediment yields for individual storm events
  - \[ Y = 95 \times (Q \times q)^{0.56} \times K \times LS \times C \times P \]
    - \( Y \) = single storm sediment yield in tons
    - \( Q \) = storm runoff volume in acre-feet
    - \( q \) = peak discharge in cfs
    - \( K, LS, C \) and \( P \) are the standard USLE terms
Example 9.12 Text

- **Given:**
  - 320-acre watershed
  - 2 in. rainfall event that produces:
    - 12 acre-feet of runoff \( Q \)
    - Peak discharge of 200 cfs \( q \)
  - Soil erodibility factor \( (K) = 0.27 \)
  - Topographic factor \( (LS) = 0.6 \)
  - Cover – management factor \( (C) = 0.05 \)
  - Erosion control practice \( (P) = 0.25 \)

- **Solution:**
  \[
  Y = 95[(12)200]^{0.56}(0.27)(0.6)(0.05)(0.25) = 15 \text{ tons}
  \]
\[ V_1 = \frac{(600 \text{ ft}^3/\text{s} \times 3600 \text{ s/hr} \times 4 \text{ hr})}{2} = 4,320,000 \text{ ft}^3 \]
\[ V_2 = \frac{(600 \text{ ft}^3/\text{s} \times 3600 \text{ s/hr} \times 4 \text{ hr})}{2} = 4,320,000 \text{ ft}^3 \]
\[ V_T = \frac{(8,640,000 \text{ ft}^3)}{(43,560 \text{ ft}^2/\text{ac})} = 198.3 \text{ ac-ft} \]
Class Wrap-up

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