Characterizing the Source of Fine-Grained Sediments in New Jersey Rivers Using Radionuclides

Joshua C. Galster[1], Kirk Barrett[2], Huan Feng[1], Nicole Bujalski[1], Jared Lopes[1]

[1]Earth & Environmental Studies, Montclair State University, Montclair, NJ

[2]Passaic River Institute, Montclair State University, Montclair, NJ

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MONTCLAIR STATE UNIVERSITY

Two promises for this talk

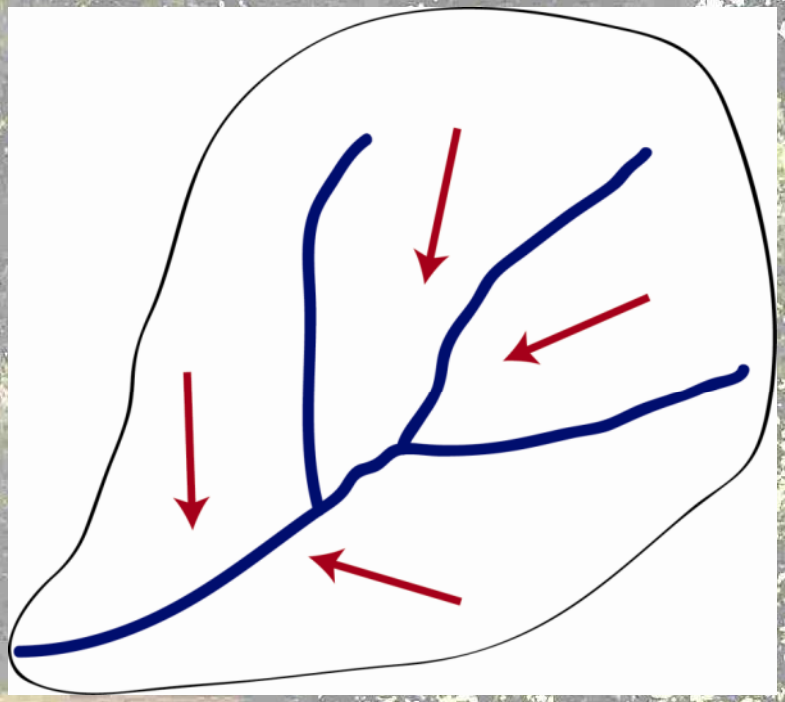
- I will not go over my time…
- I (sadly) don't have much data to present

Excess sediment in streams

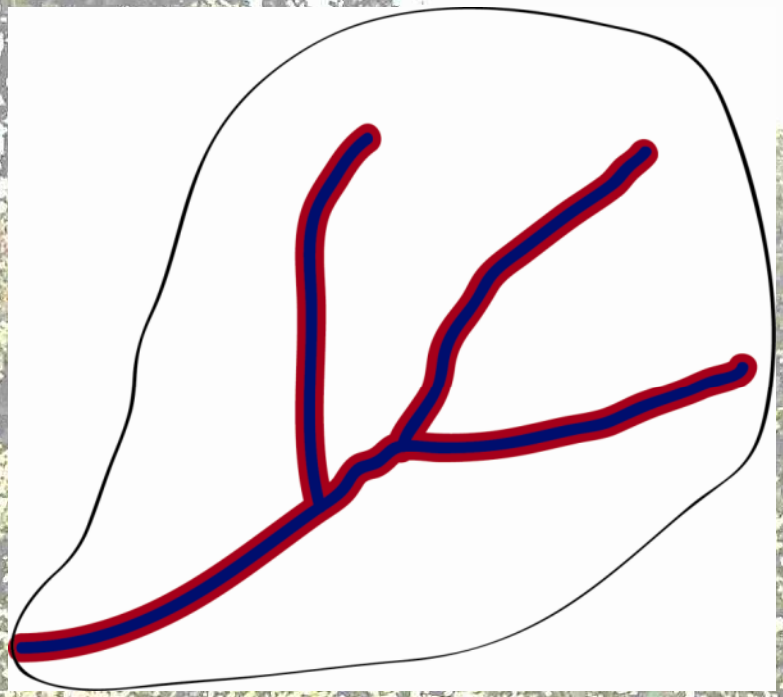
- In 2006 NJ DEP declared 370 miles^2 and 700 miles of stream channel "impaired" by excess sedimentation
- 2007 EPA declared sedimentation the number one cause of stream impairment

http://www.glc.org/basin/images/projects/mi_BigSabRC_imag1.JPG

Sources of *sediment*

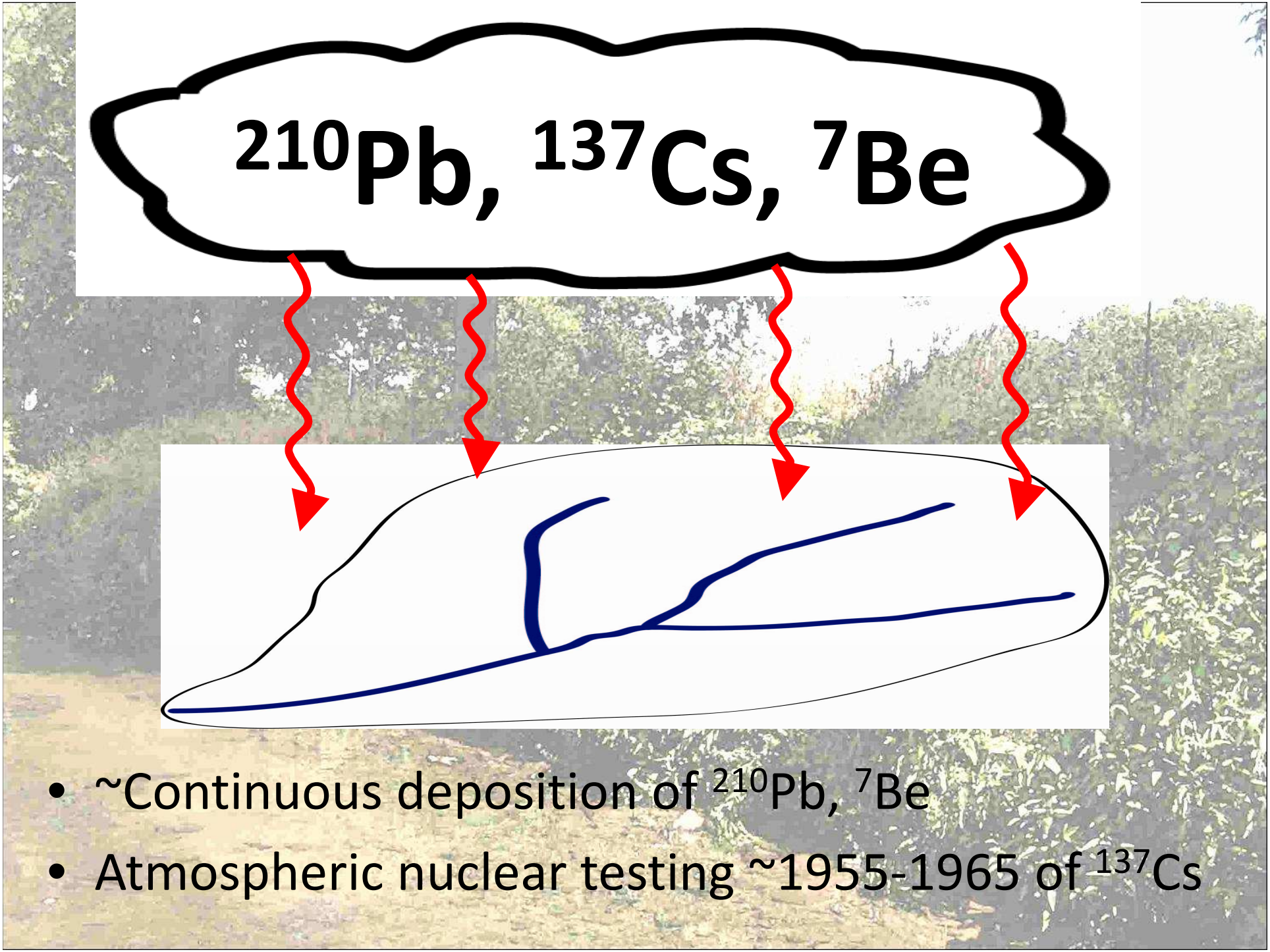


vs.



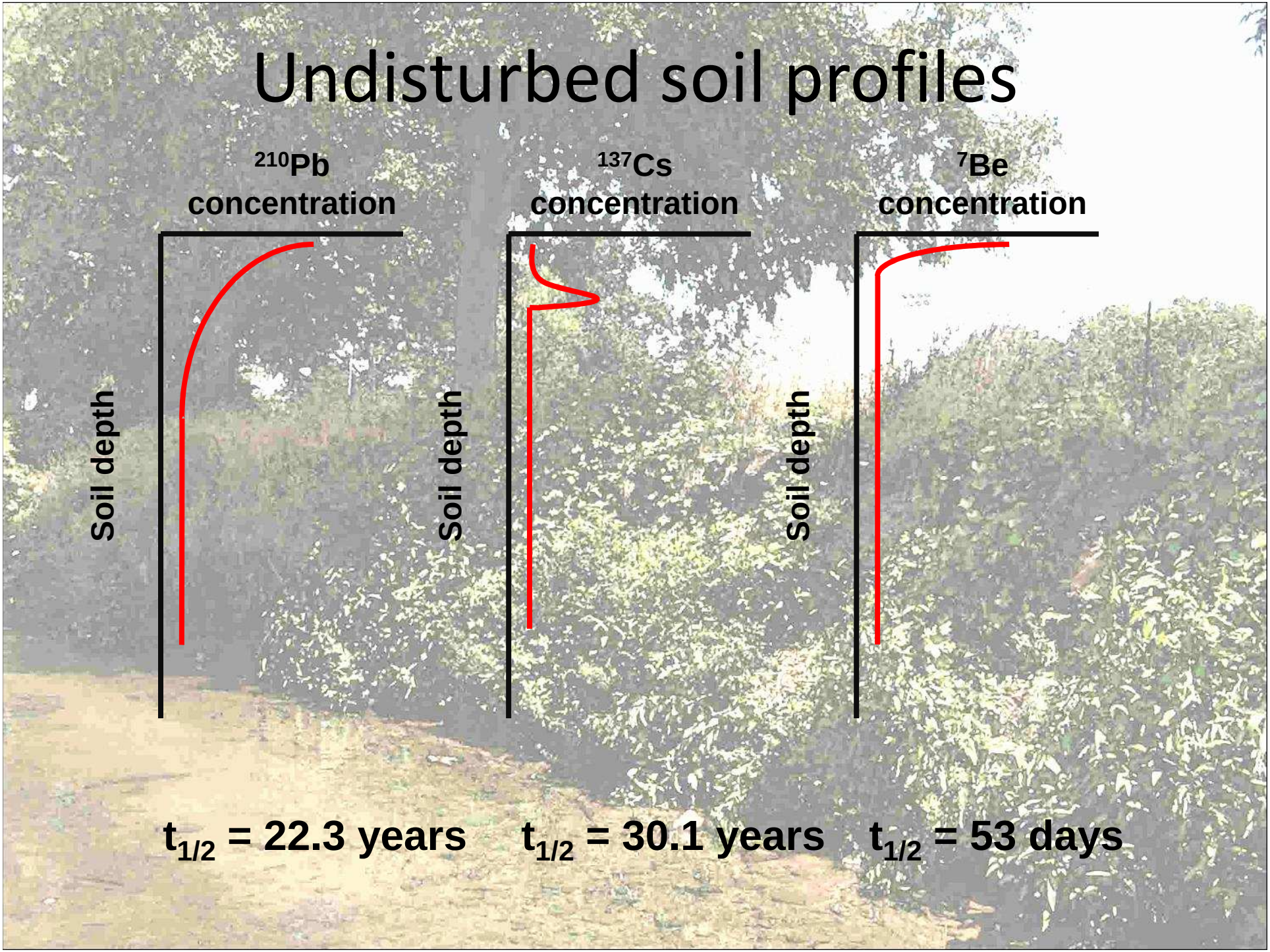
Generalized surficial erosion **Channel erosion**

Best management practices differ for each source…



- ~Continuous deposition of ^{210}Pb, ^{7}Be
- Atmospheric nuclear testing ~1955-1965 of ^{137}Cs

Undisturbed soil profiles



Similar work

- Tilled vs. non-till sediment sources (Matisoff et al., 2002)
- Erosion rates from developed land (Walling and He, 1999; Singh et al., 2007)
- Land-use change and sediment yield (Walling, 1999)
- Stream bank contribution to suspended sediment (Whiting and Matisoff, 2008: Monday, 3:30)

Local calibration is important

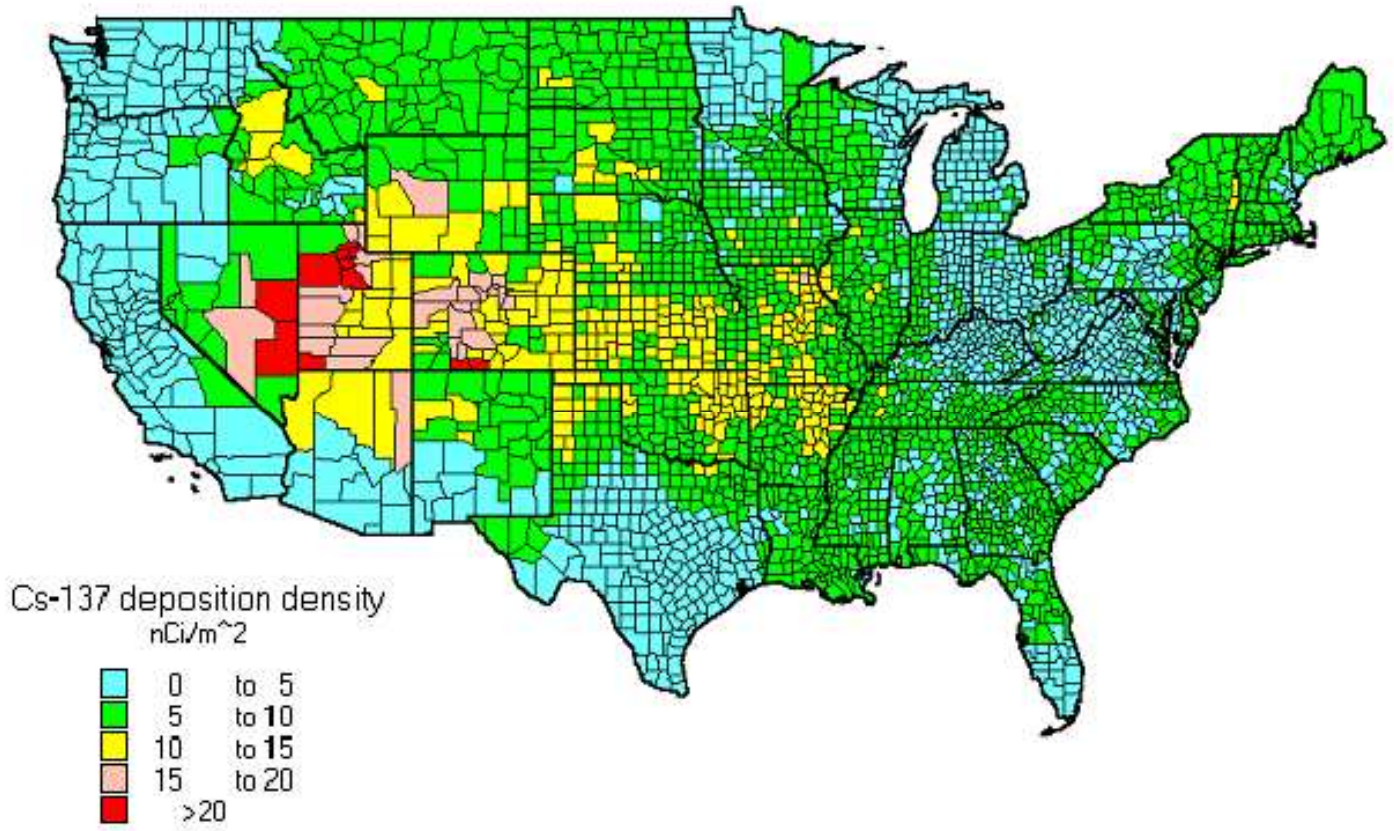
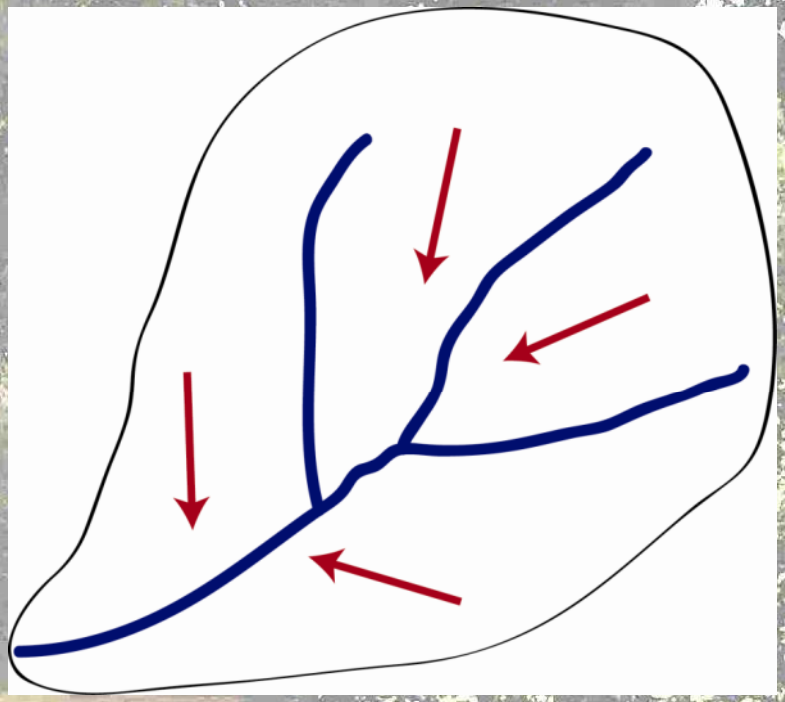


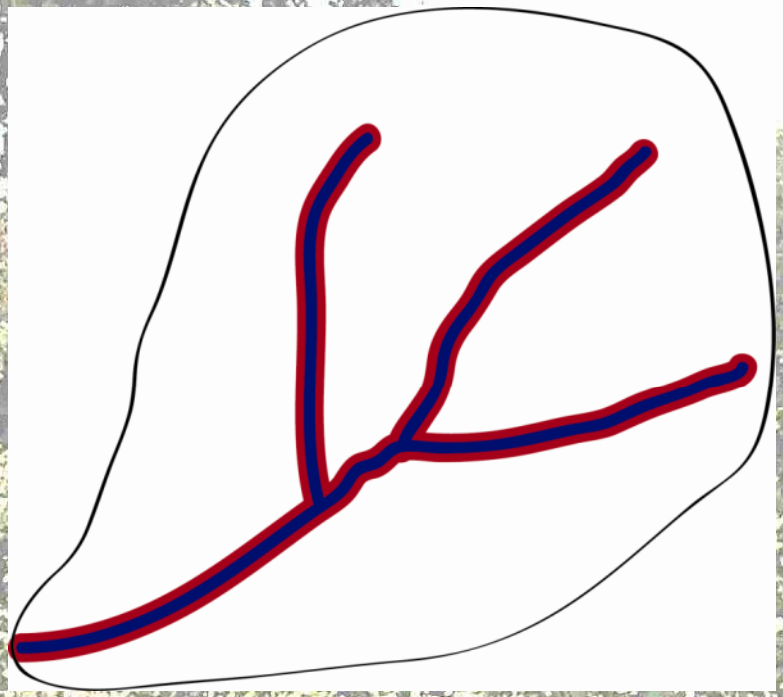
Figure 1. Cs-137 deposition density due to all NTS tests.

http://www.idealist.ws/cesium137.bmp

Sources of *sediment*



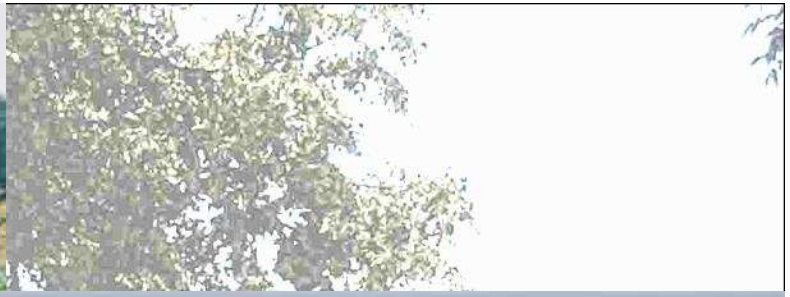
vs.



Generalized surficial erosion

Channel erosion

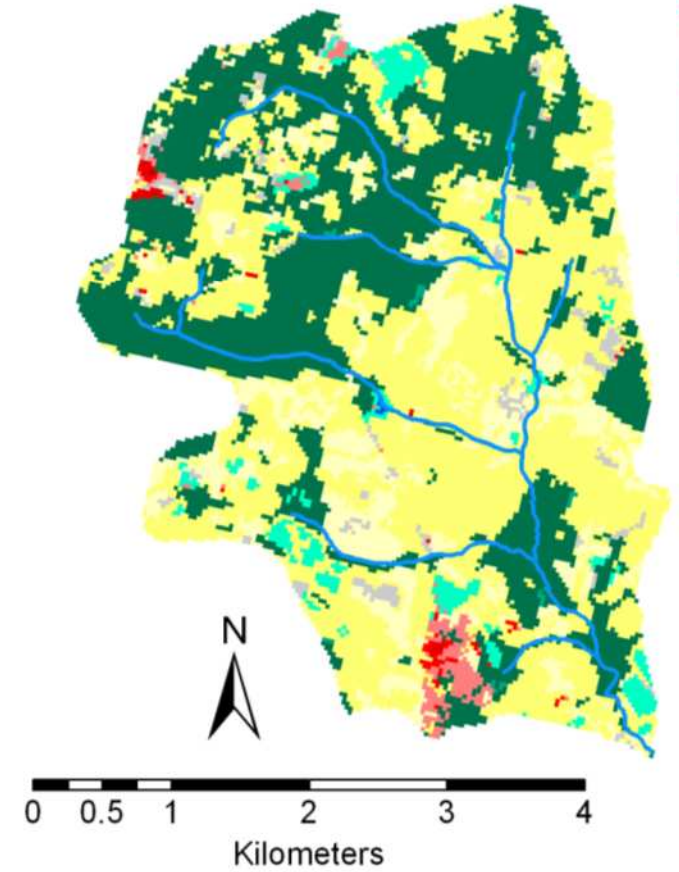
Finding the right watershed…



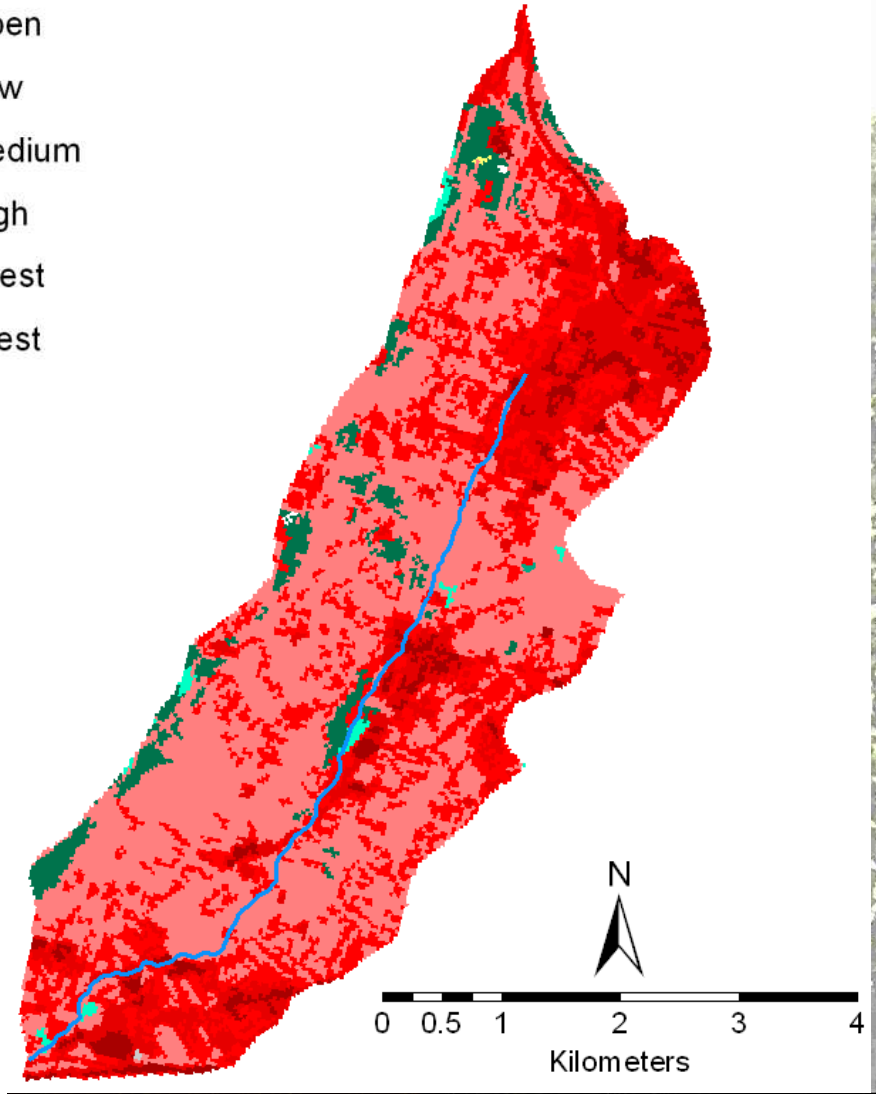
What's the best land use?

Cold Brook

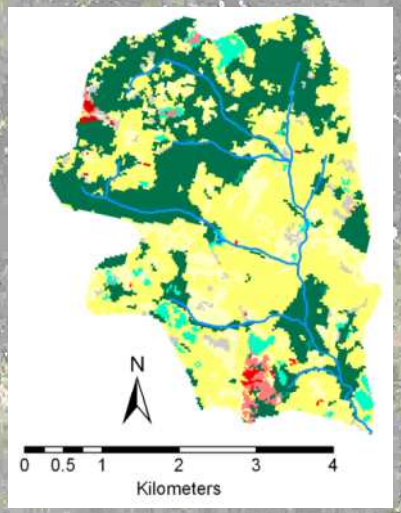
East Branch of the Rahway

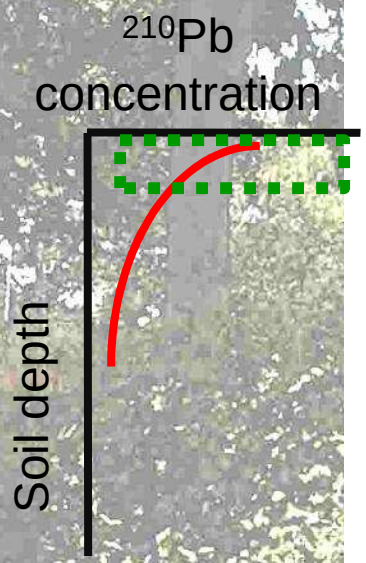


Water
Developed, Open
Developed, Low
Developed, Medium
Developed, High
Deciduous Forest
Evergreen Forest
Pasture
Row Crops
Wetlands

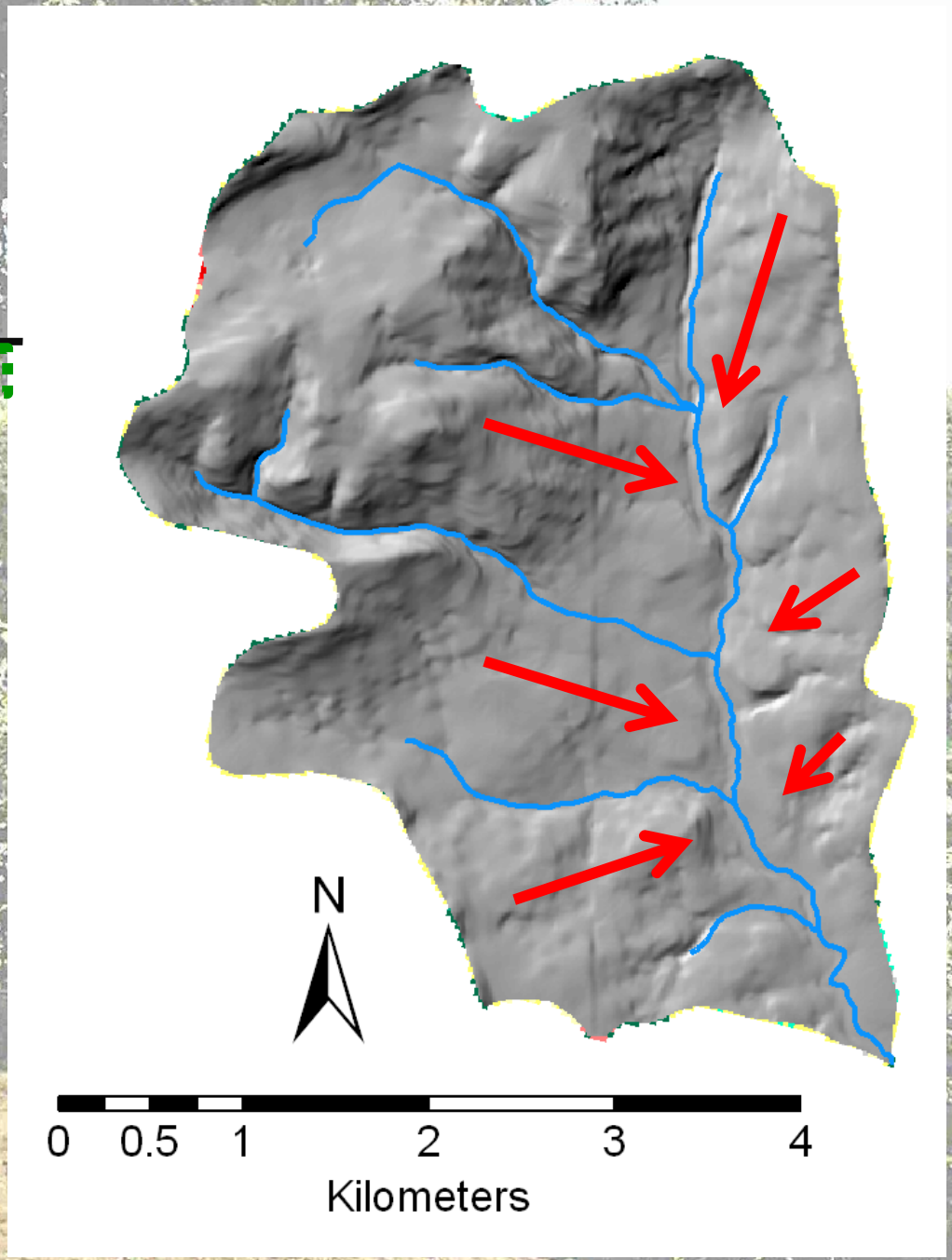


Expected result 1

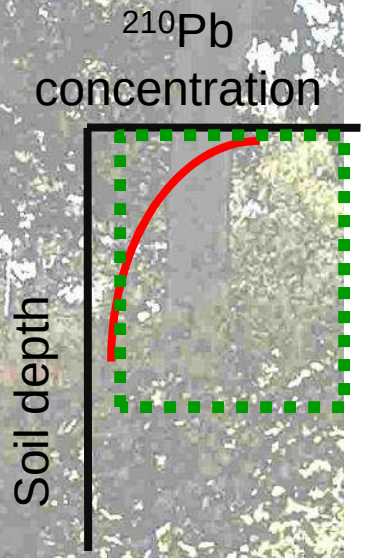


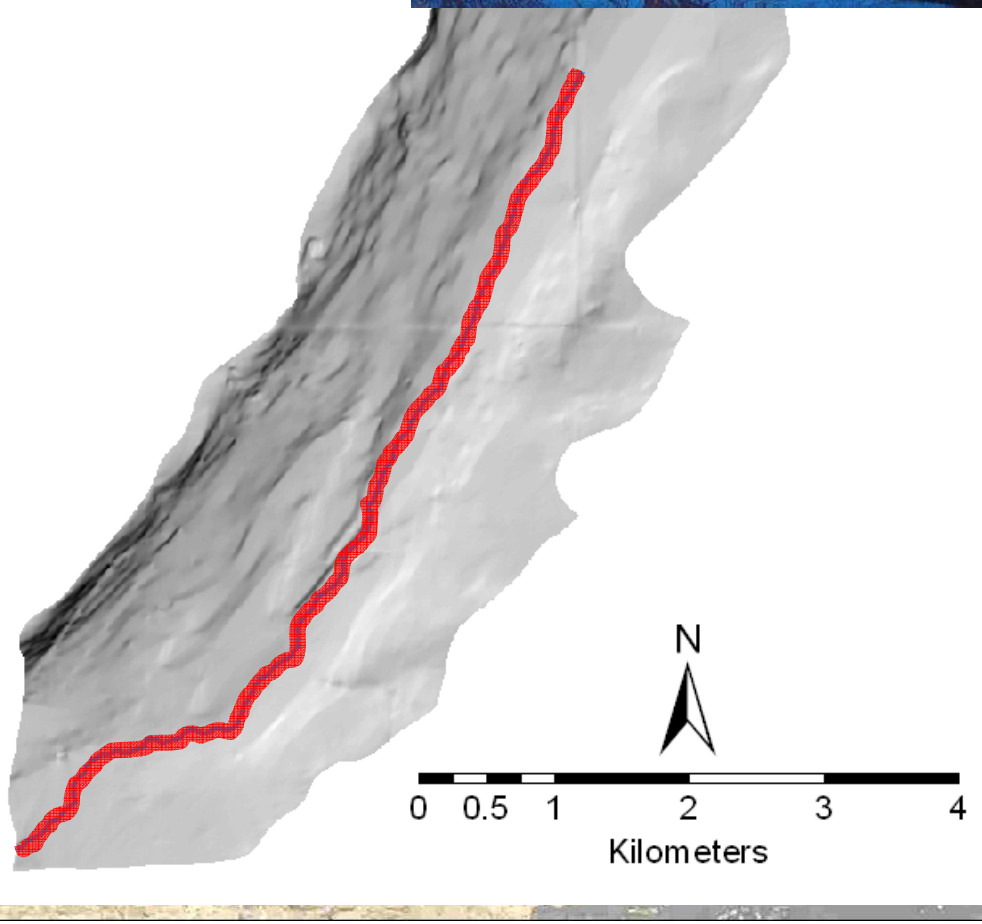


- Surficial (rill) erosion
- Higher concentrations of radionuclides



Expected result 2





- More stream bank erosion
- Lower concentrations


Stay tuned…