



STREAMBANK EROSION: THE IMPACT OF STREAMBANK GEOMORPHIC CHARACTERISTICS ON ROOT-DERIVED EROSION RATES

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DRIVERS TO ASSESS STREAMBANK EROSION



THREAT TO INFRASTRUCTURE



LOSS OF CHANNEL CAPACITY



LOSS OF LAND

TRADITIONAL METHODS OF QUANTIFYING RIVERBANK EROSION

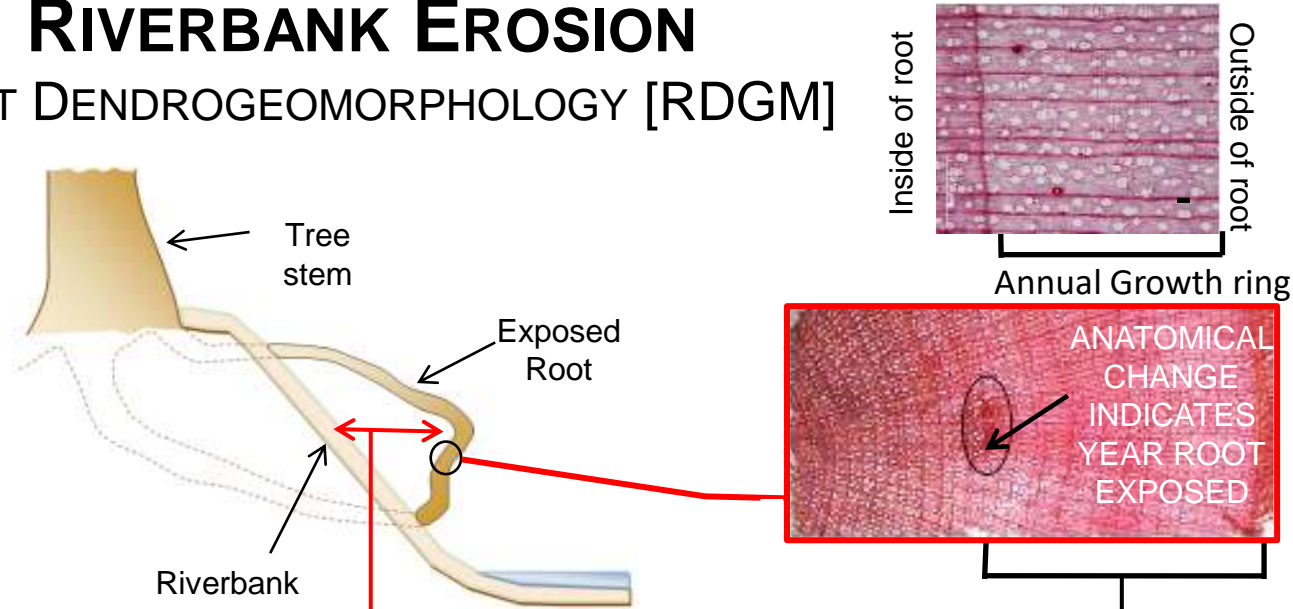


EROSION PINS – “BANK PINS”

Source: Dick et al. 2018

INNOVATIVE METHODS OF QUANTIFYING RIVERBANK EROSION

ROOT DENDROGEOMORPHOLOGY [RDGM]



$$\frac{\text{Distance of exposed root from riverbank}}{\text{Years of Exposure}} = \text{Annual Erosion Rate}$$

Source: Dick et al. 2014
 Alestalo, 1971
 Silhan, 20200

OBJECTIVE

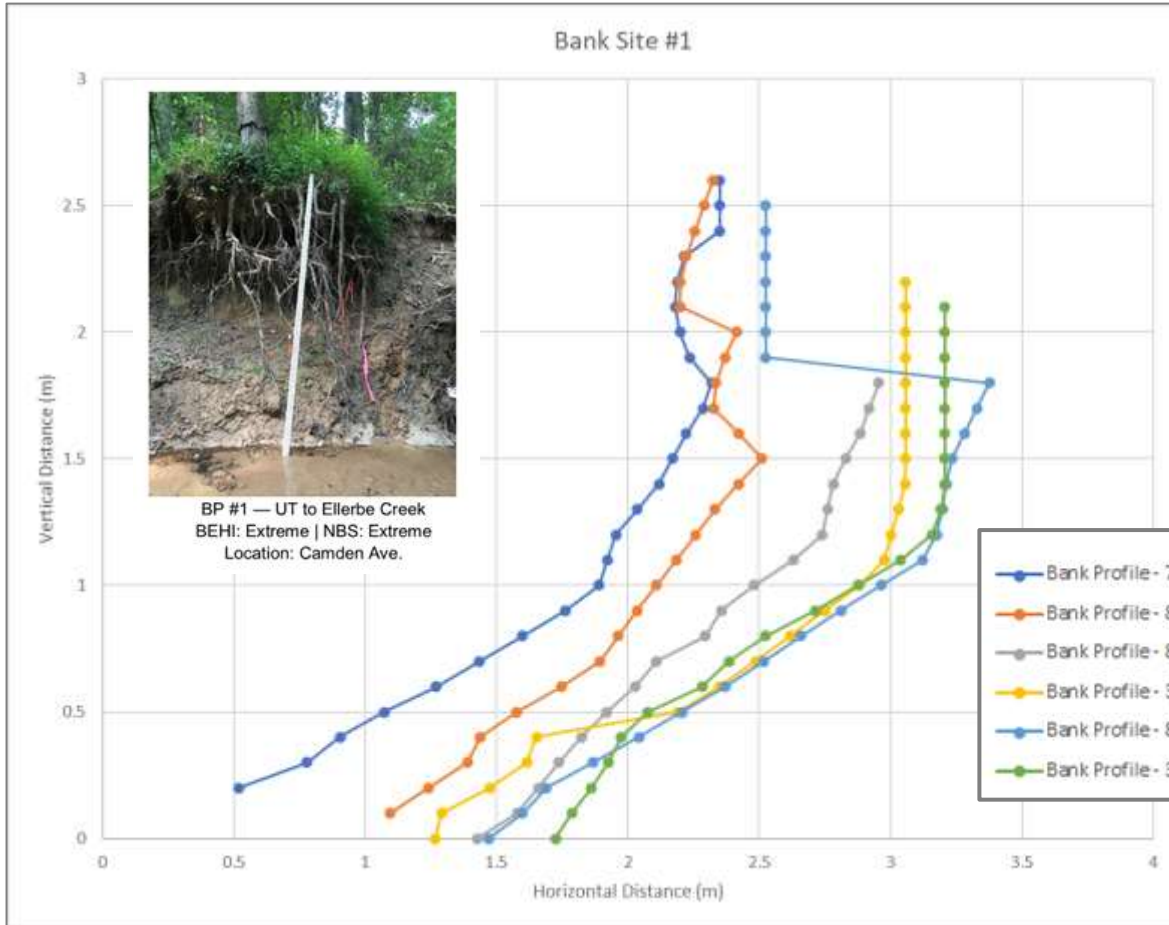
DETERMINE THE GEOMORPHIC CHARACTERISTICS THAT AFFECT THE ACCURACY OF STREAMBANK EROSION RATES USING ROOT DENDROGEOMORPHOLOGY (RDGM).



ROOT-DERIVED VS BANK PIN-DERIVED EROSION RATES

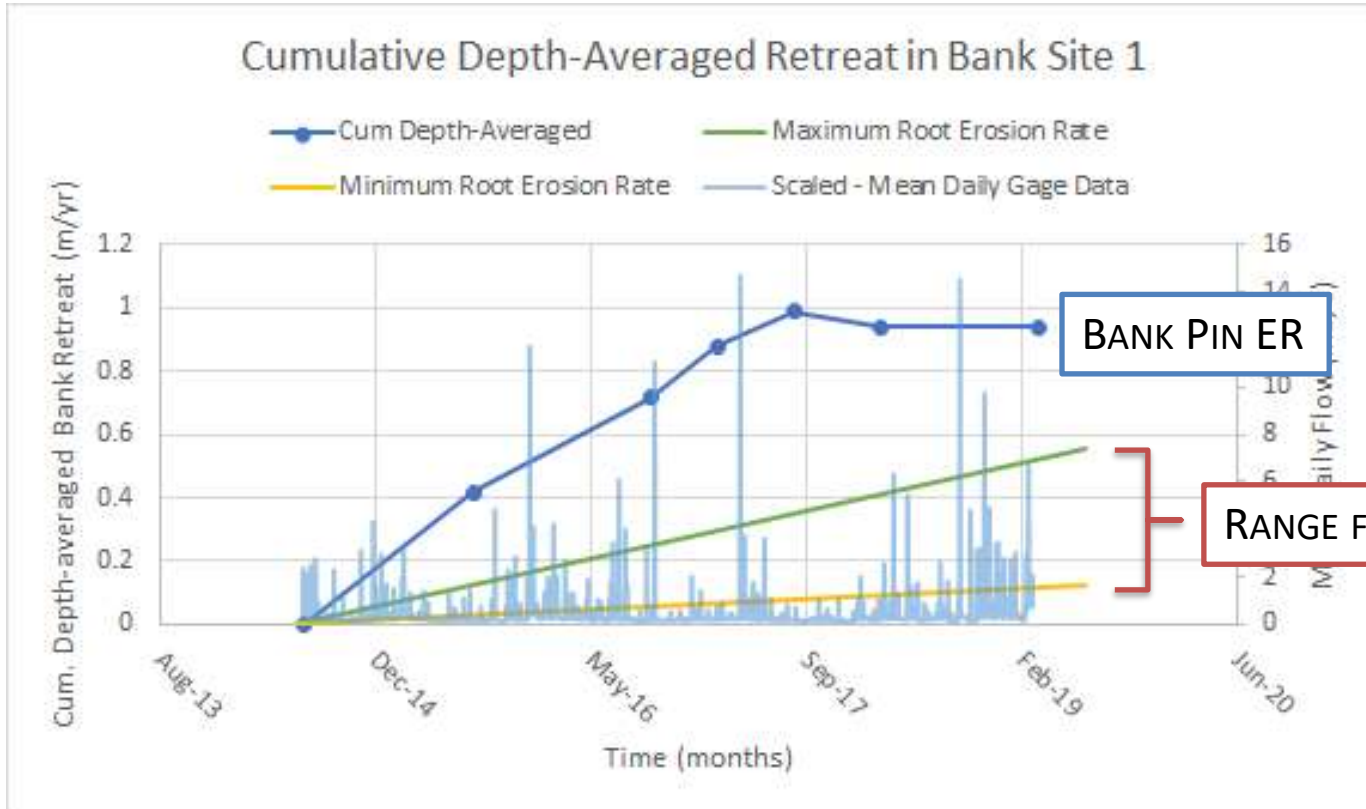


UT TO LITTLE LICK CREEK (BS 12)

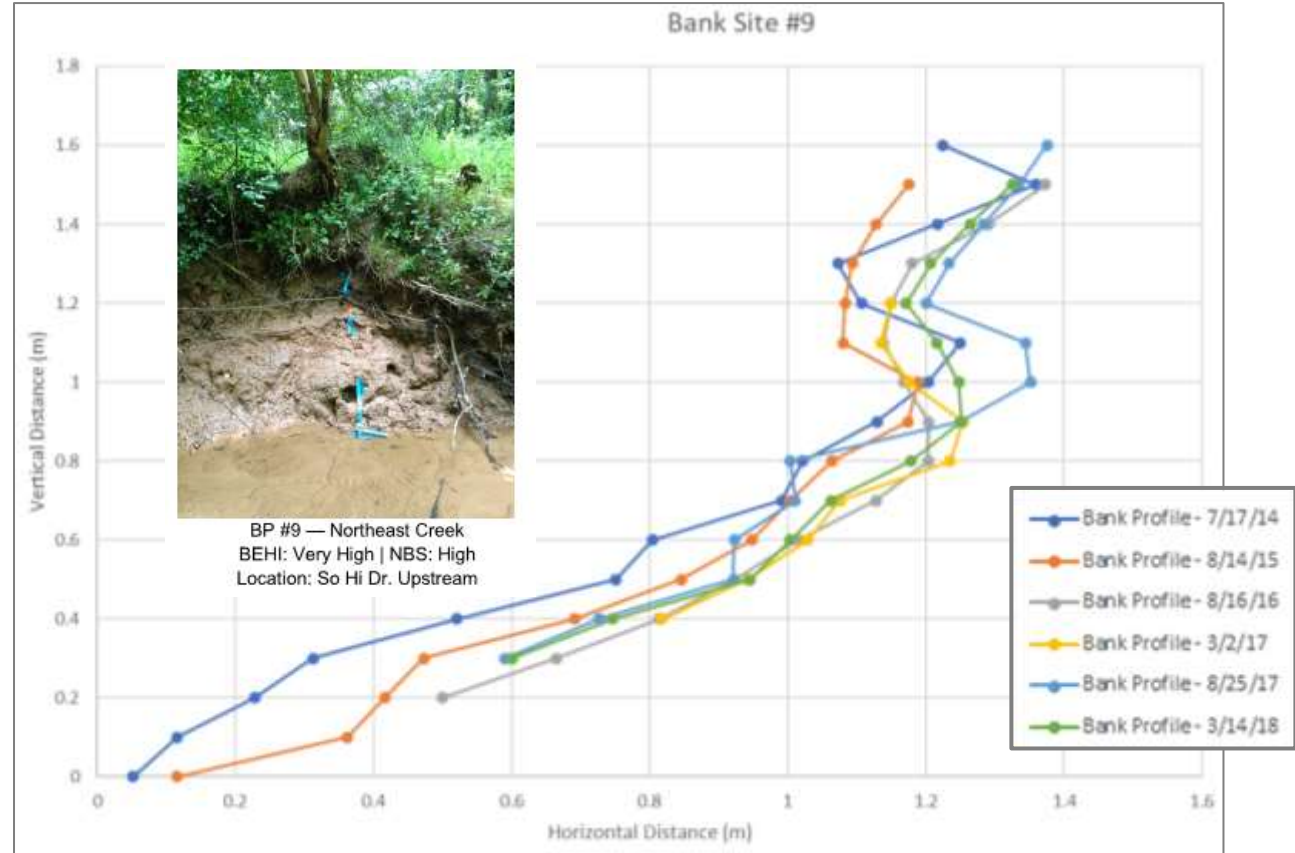


- ❖ **Tc – 9 PA**
- ❖ **KD – 2.57 cm³/N-s**
- ❖ **BULK DENSITY – 1.7 g/cm³**
- ❖ **D50 – 0.12 MM**
- ❖ **POROSITY – 36 %**
- ❖ **Cc – 1.68**
- ❖ **CU – 4.62**
- ❖ **% SAND – 75.6 %**
- ❖ **% SILT – 20.2 %**
- ❖ **% CLAY – 4.2 %**
- ❖ **% PASSING #200 – 24.4 %**
- ❖ **LOAMY SAND**

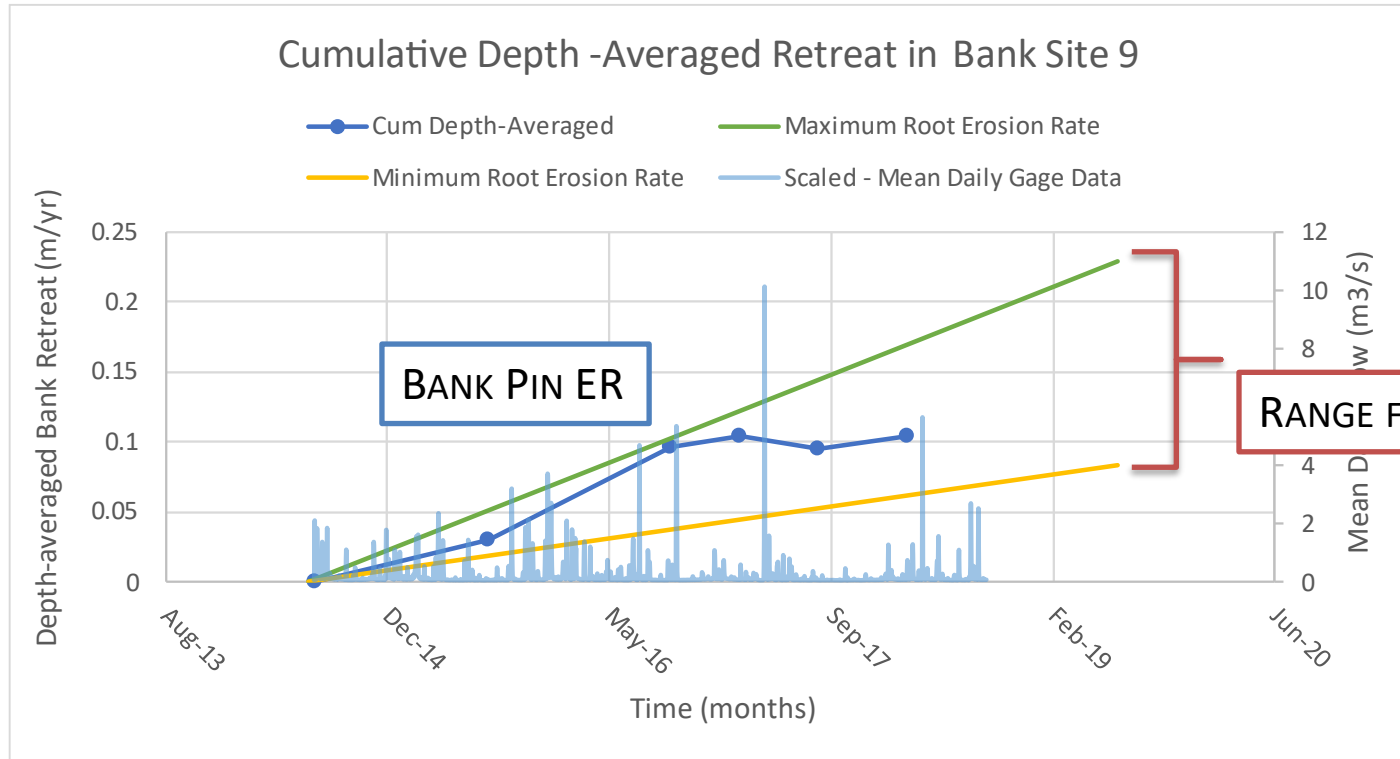
GEOMORPHIC CHARACTERISTICS THAT AFFECT THE ACCURACY OF STREAMBANK EROSION RATES



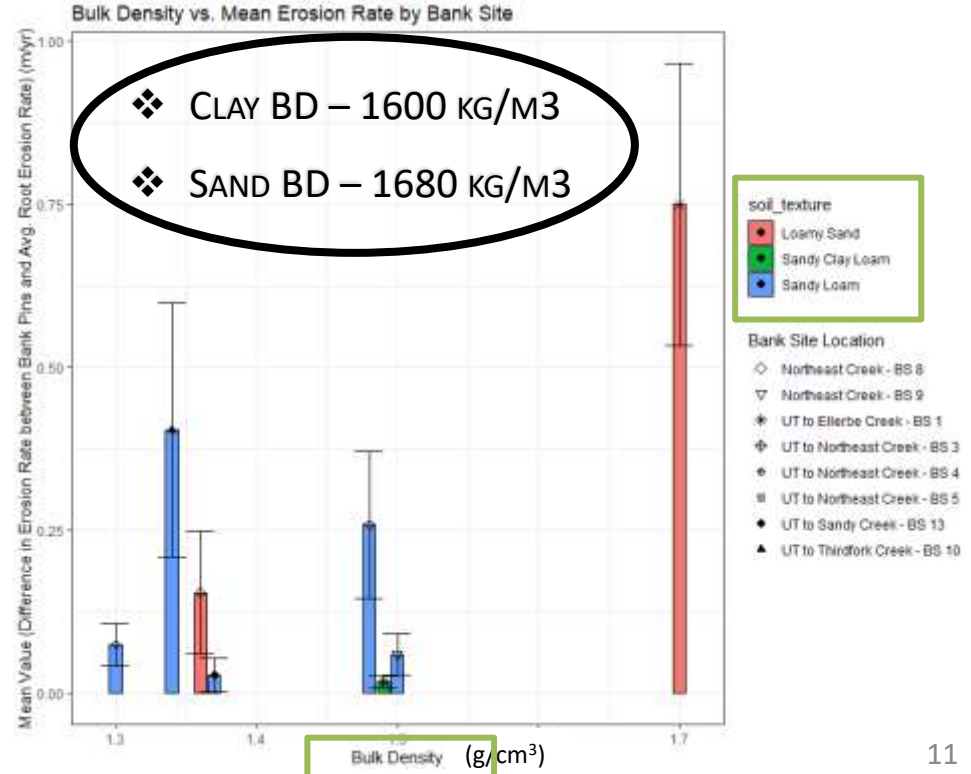
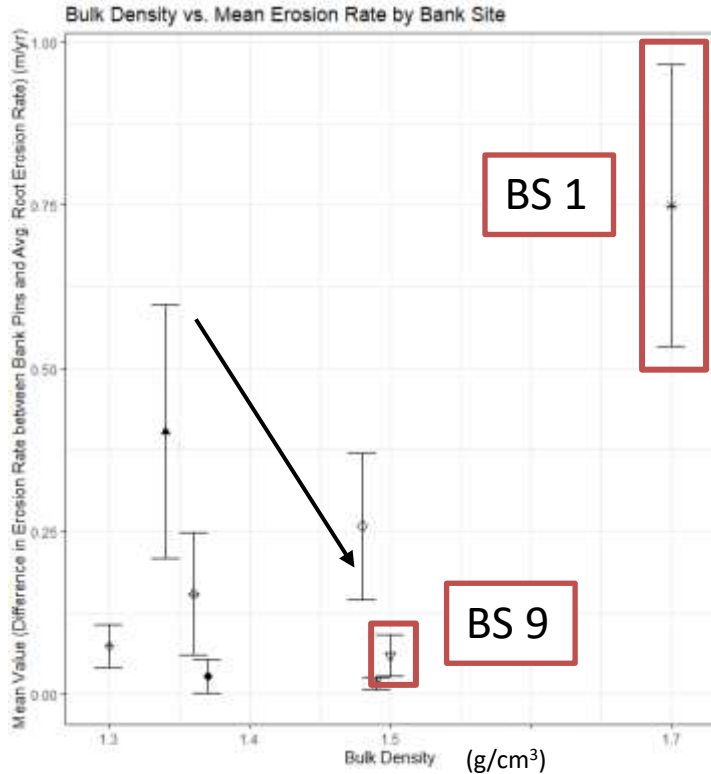
- ❖ Tc – 6.13 PA
- ❖ KD – 0.75 cm³/N-s
- ❖ BULK DENSITY – 1.5 G/cm³
- ❖ D50 – 0.11 MM
- ❖ POROSITY – 43 %
- ❖ Cc – 1.53
- ❖ Cu – 5.87
- ❖ % SAND – 66.7 %
- ❖ % SILT – 25 %
- ❖ % CLAY – 8.3%
- ❖ % PASSING #200 – 33.3 %
- ❖ SANDY LOAM



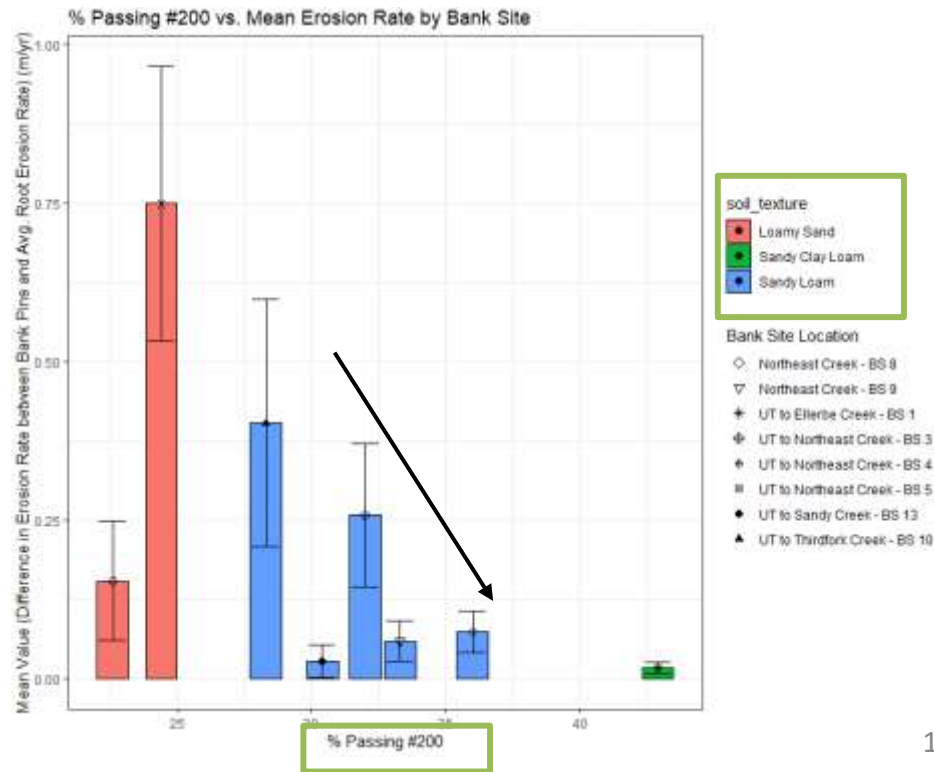
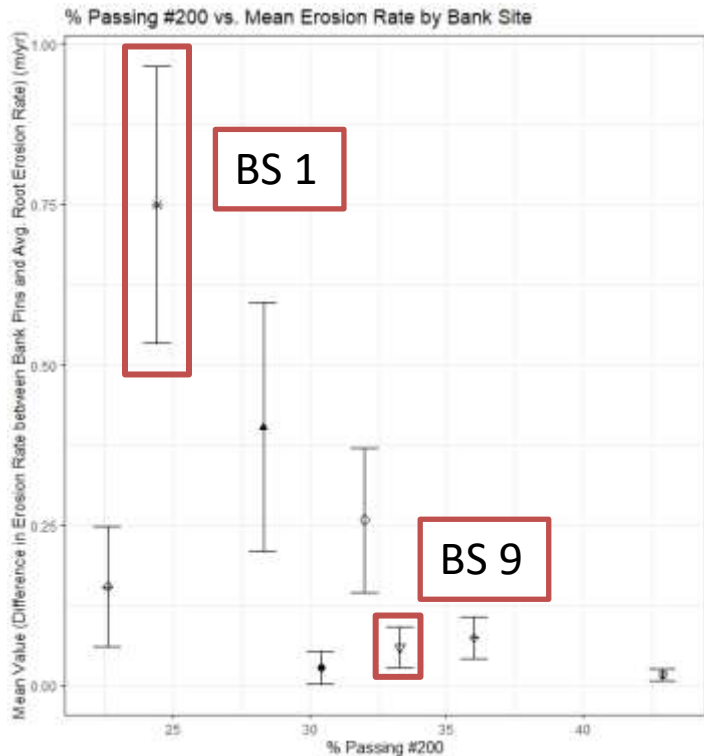
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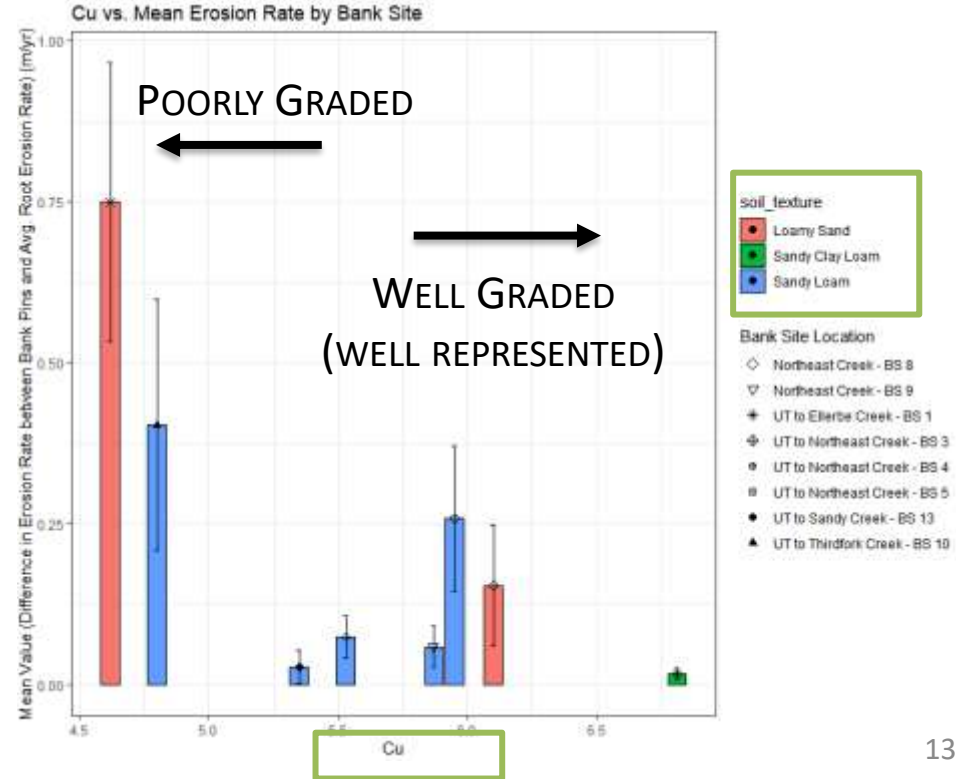
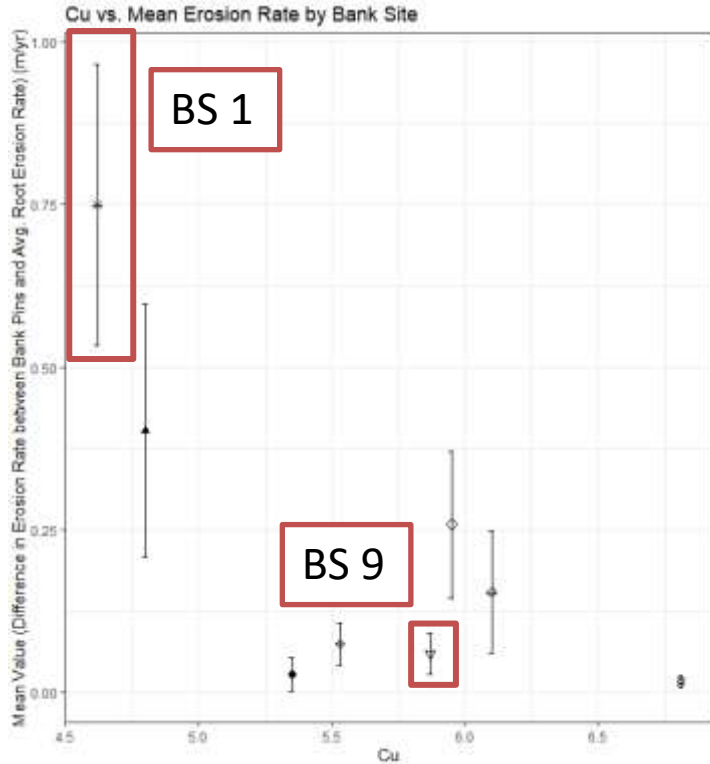
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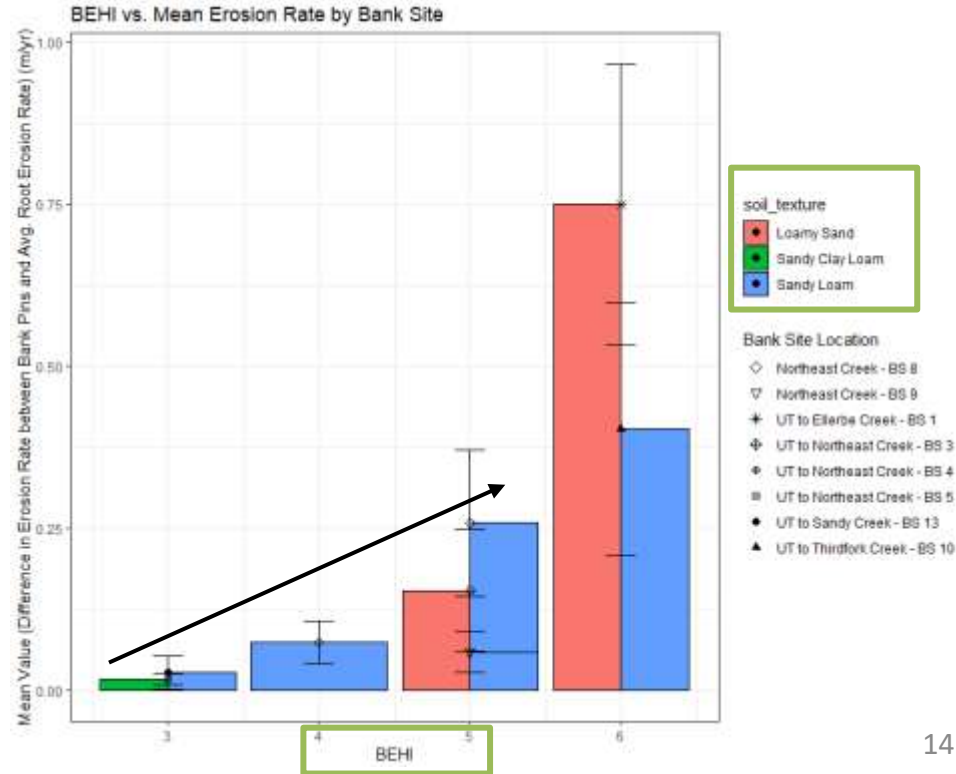
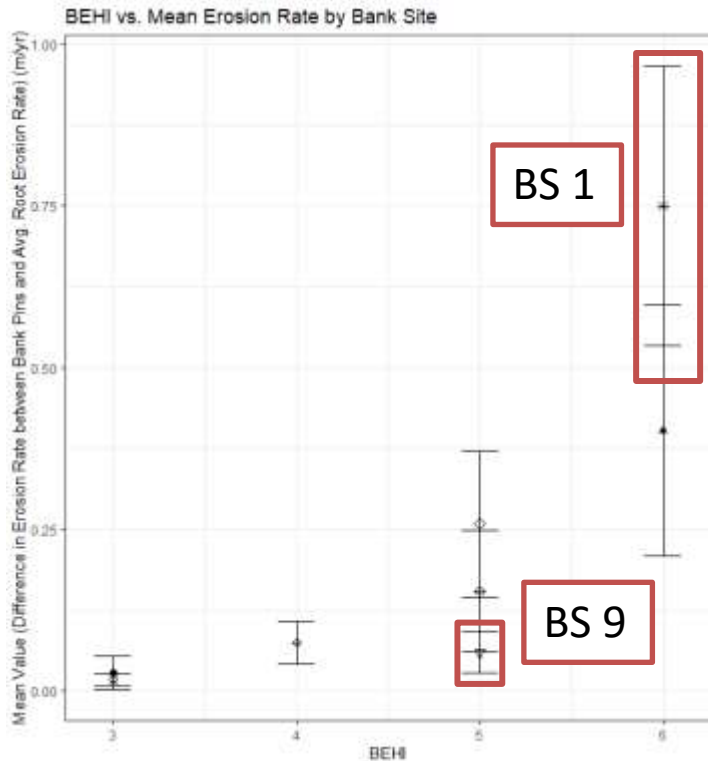
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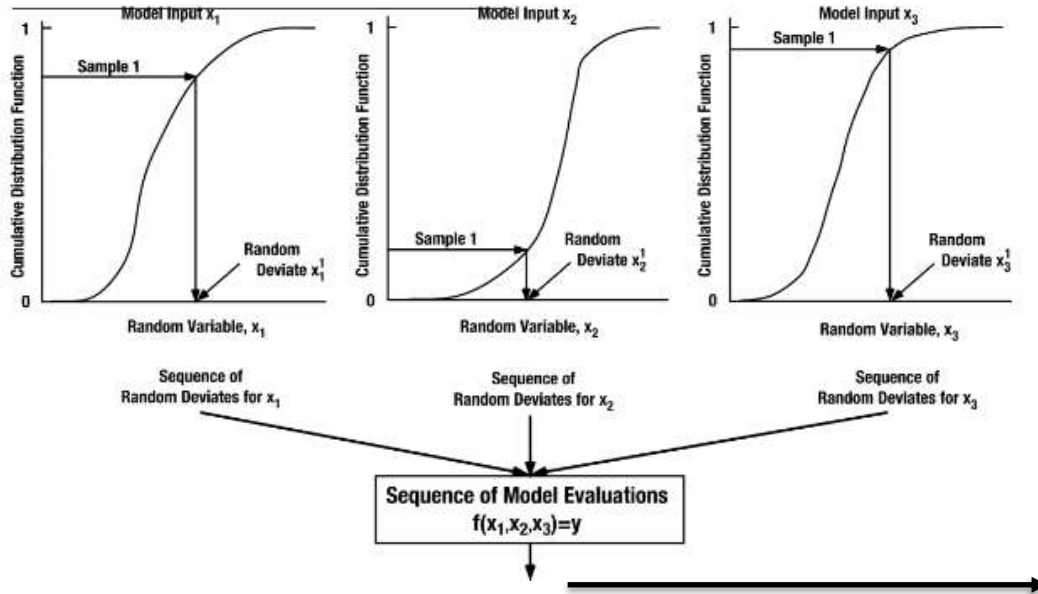


CONCLUSIONS

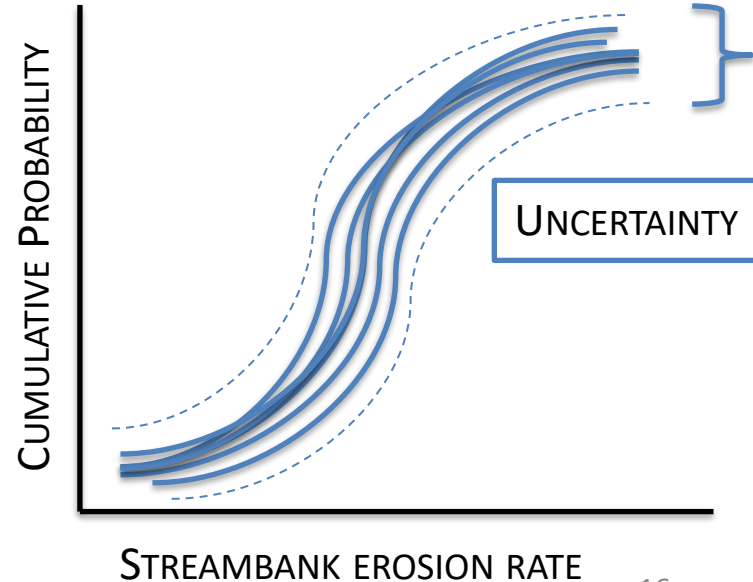
WHEN USING BANK PINS AS THE BASELINE MEASUREMENT:

- ❖ EROSION RATE ESTIMATES FROM RDGM TEND TO HAVE LESS VARIATION FOR SANDY CLAY LOAM AND SANDY LOAM SOILS AS COMPARED TO LOAMY SAND SOILS
- ❖ FOR **SANDY LOAM SOILS** – AS BULK DENSITY INCREASES, DIFFERENCE DECREASES
- ❖ FOR **LOAMY SAND SOILS** – AS BULK DENSITY INCREASES, DIFFERENCE INCREASES
 - ❖ A SIMILAR TREND IS OBSERVED FOR THE % PASSING #200
- ❖ AS BEHI INCREASES, DIFFERENCE INCREASES FOR ALL SOIL TYPES

PROPAGATE THE INPUT UNCERTAINTY THROUGH THE MODEL TO QUANTIFY HOW THESE UNCERTAINTY AFFECTS STREAMBANK EROSION RATE PREDICTIONS



❖ RESULTS PROVIDE A RANGE IN UNCERTAINTY



QUESTIONS?

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