

Geomorphic Characteristics and the Impact on Bank Retreat Measuring Techniques:

- A Case Study -



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CAROLINA**
STORMWATER & GIS DIVISION

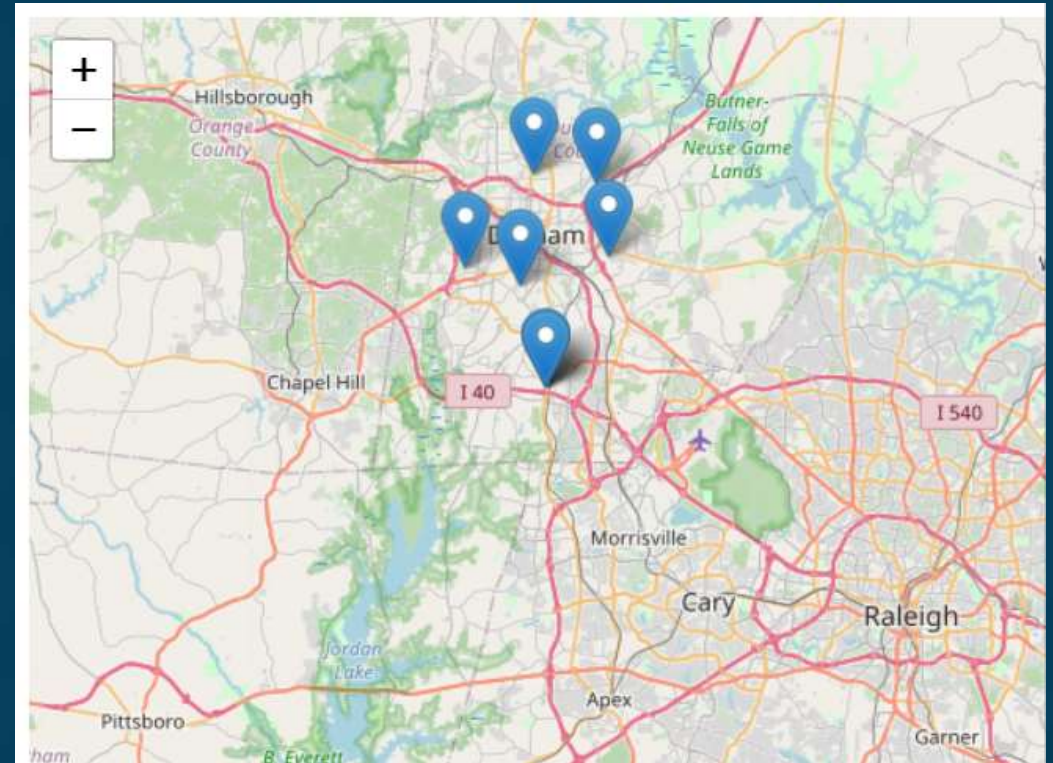
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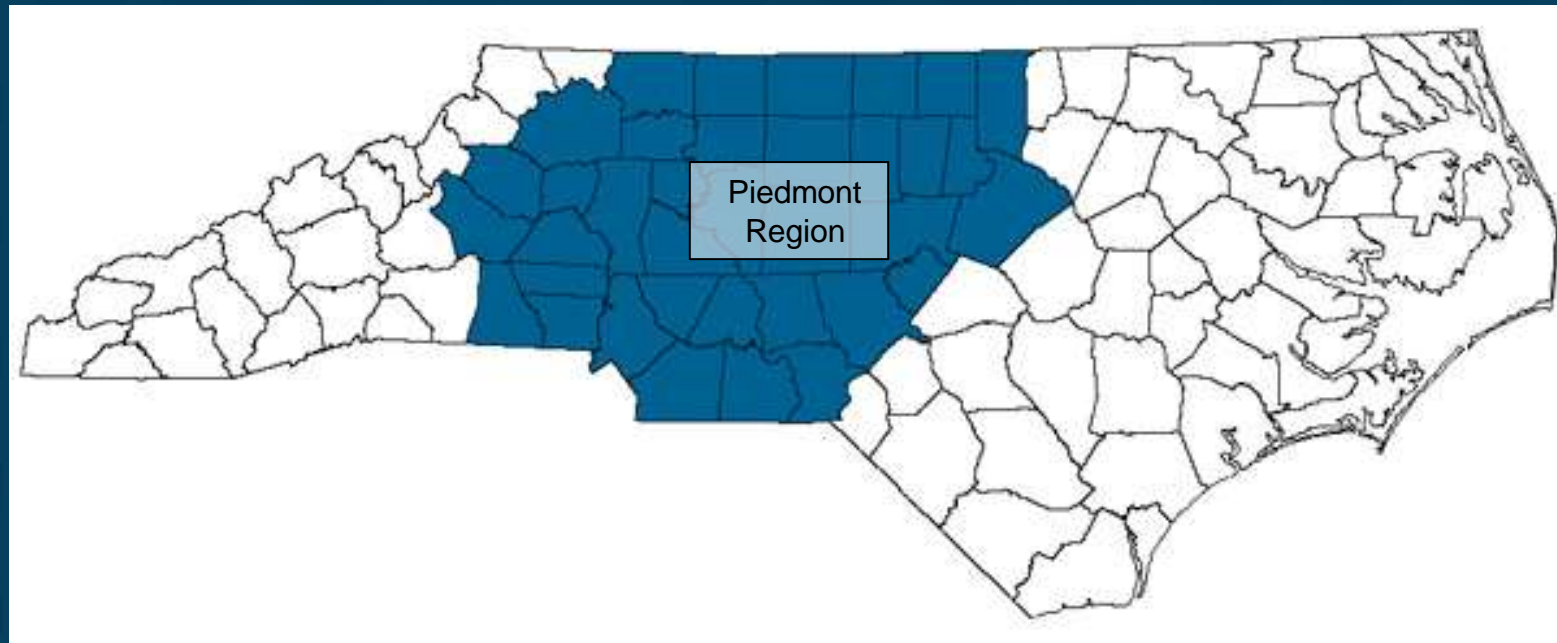
PROJECT OVERVIEW

- DETERMINE STREAMBANK EROSION RATES USING THREE TECHNIQUES AT 10 LOCATIONS
 - EROSION BANK PINS
 - JET EROSION TEST (JET)
 - ROOT DENDROGEOMORPHOLOGY
- COMPARE EROSION RATES
- IMPROVE THE CHARACTERIZATION OF PHYSICAL PARAMETERS
- UNDERSTAND VARIABILITY ACROSS STREAMS IN THE NC PIEDMONT REGION



GOALS AND OBJECTIVES

TO DEVELOP, VALIDATE, AND IMPLEMENT A PROCESS-BASED FRAMEWORK FOR EVALUATING AND PREDICTING STREAMBANK EROSION AND SEDIMENT TRANSPORT ASSOCIATED WITH STREAM RESTORATION PRACTICES.



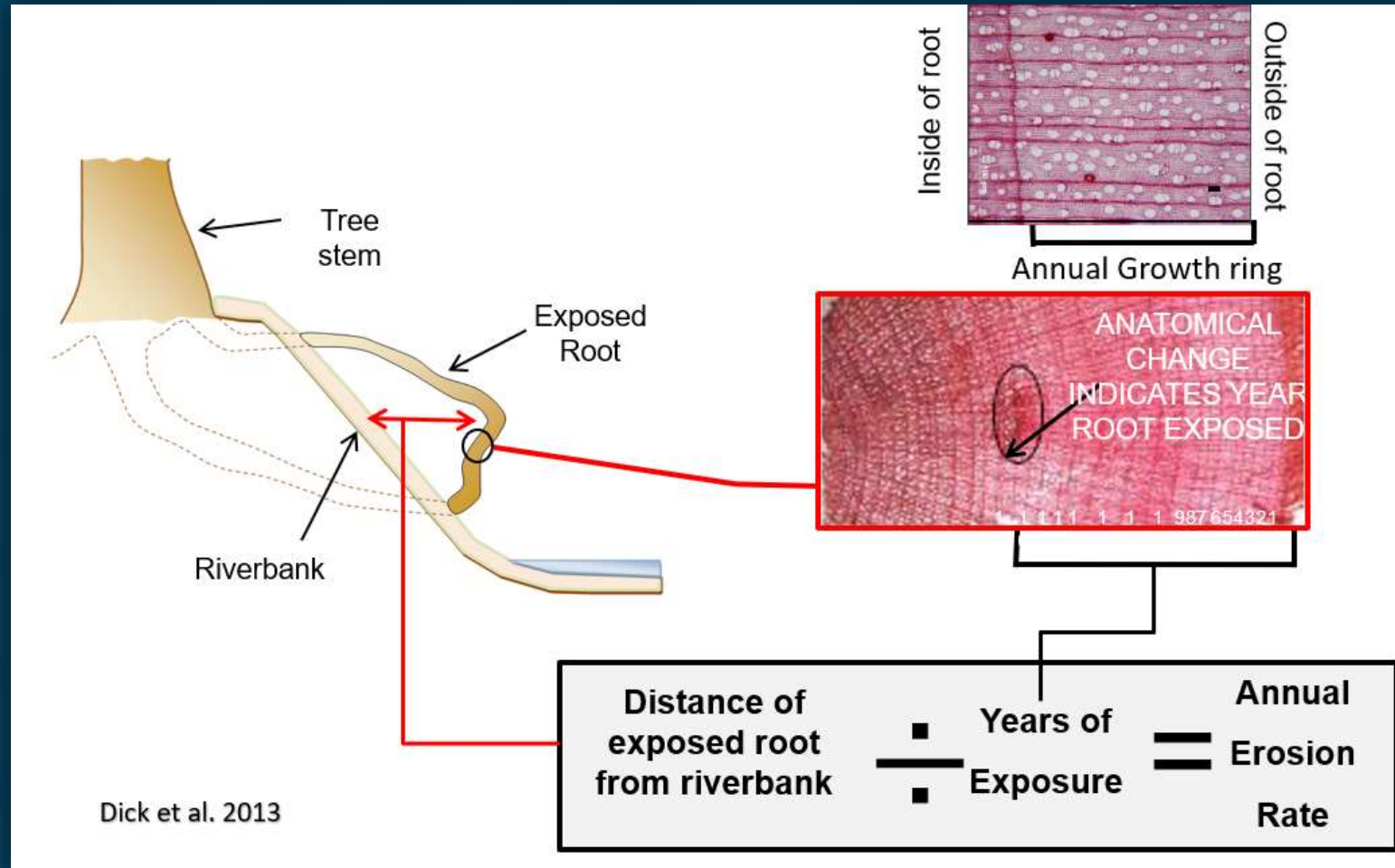
INTRODUCTION TO DENDROGEOMORPHOLOGY



- DENDROGEOMORPHOLOGY: USE OF TREE GROWTH RINGS TO IDENTIFY DATES OF CHANGES IN EARTH SURFACE PROCESSES
- TREE RINGS CHANGE IN RESPONSE TO ENVIRONMENTAL FACTORS (E.G. LANDSLIDE, STREAMBANK, AND HILLSLOPE EROSION)

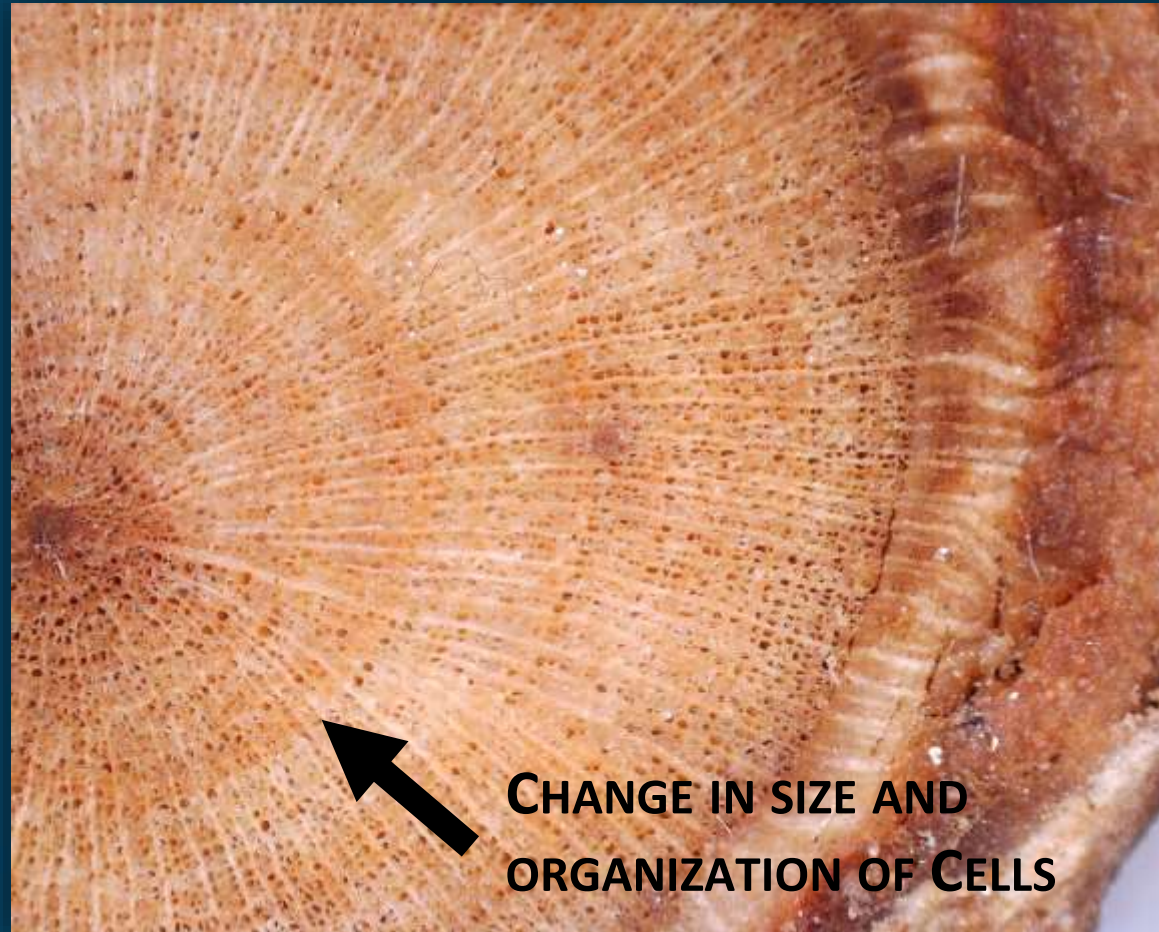
INTRODUCTION TO DENDROGEOMORPHOLOGY

ANALYSIS OF EXPOSED TREE ROOTS TO DETERMINE EROSION RATES



INTRODUCTION TO DENDROGEOMORPHOLOGY

ANALYSIS OF EXPOSED TREE ROOTS TO DETERMINE EROSION RATES



**CHANGE IN SIZE AND
ORGANIZATION OF CELLS**

FIELD CHARACTERIZATION

- IDENTIFY ROOT SAMPLES TO COLLECT IN THE VICINITY OF THE BANK PINS
- IF THERE ARE NO ROOTS AVAILABLE, COLLECT THE SAMPLE FROM A SIMILAR LOCATION (I.E. SIMILAR NEAR BANK STRESS, SAME BEHI, SAME EROSIONAL FORCES)
- TRY TO COLLECT ROOTS ACROSS THE BANK (TOP, MIDDLE, AND BOTTOM)



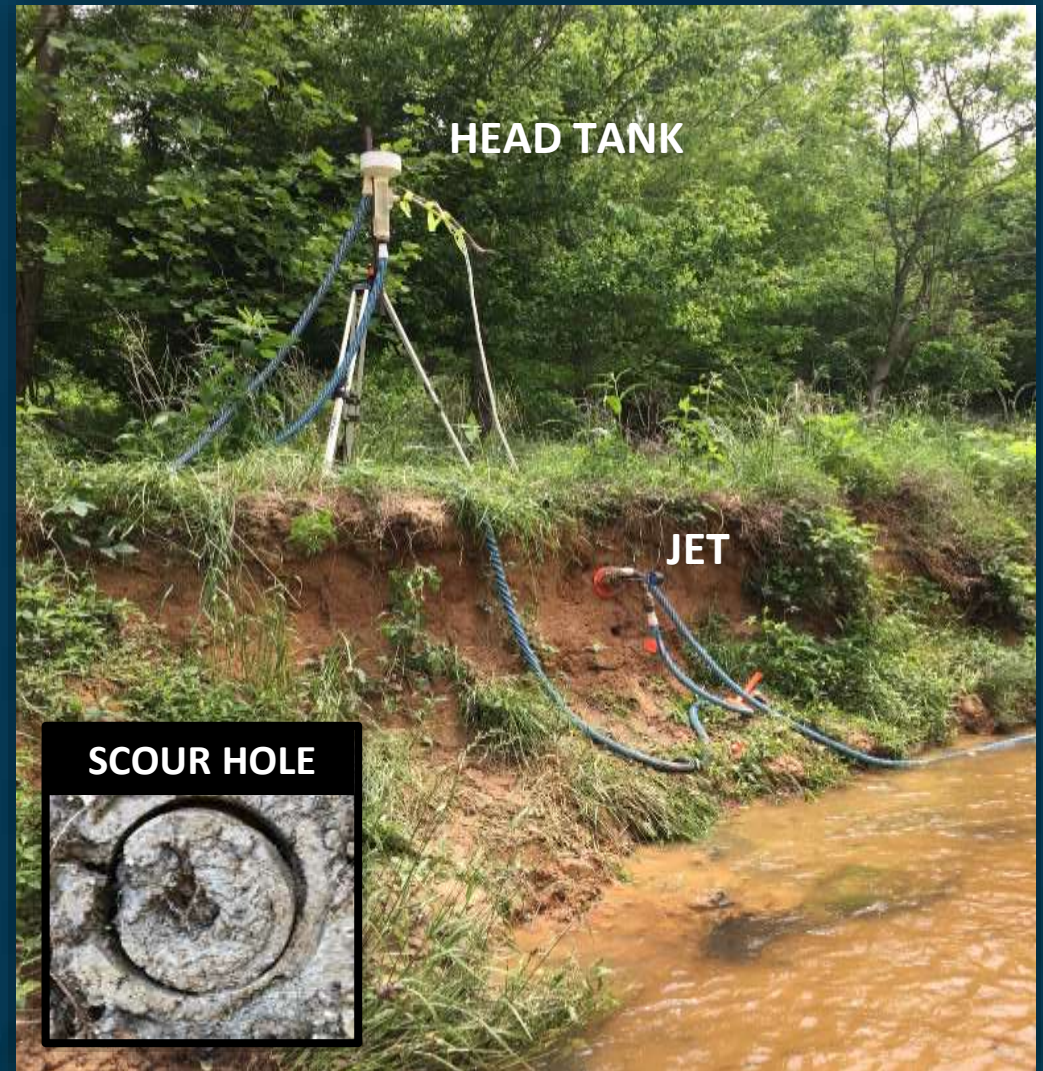
FIELD CHARACTERIZATION



- DOCUMENT BANK CONDITIONS (BEHI MEASUREMENTS, PHOTOS, GPS)
- MEASURE THE HORIZONTAL DISTANCE FROM THE MID-POINT OF THE ROOT BACK TO THE BANK AND RECORD
- MEASURE THE VERTICAL DISTANCE FROM THE MID-POINT OF THE ROOT DOWN TO THE TOE OF SLOPE AND RECORD

FIELD CHARACTERIZATION

- CONDUCT JET ANALYSIS IN THE SAME VICINITY AS THE ROOTS AND BANK PINS
 - UNDERSTAND SOIL PARAMETERS
 - ERODIBILITY COEFFICIENT
 - SHEAR STRESS OF SOIL
- DOCUMENT BANK CONDITIONS (BEHI MEASUREMENTS, PHOTOS, GPS)



DATA COLLECTION AND ANALYSIS

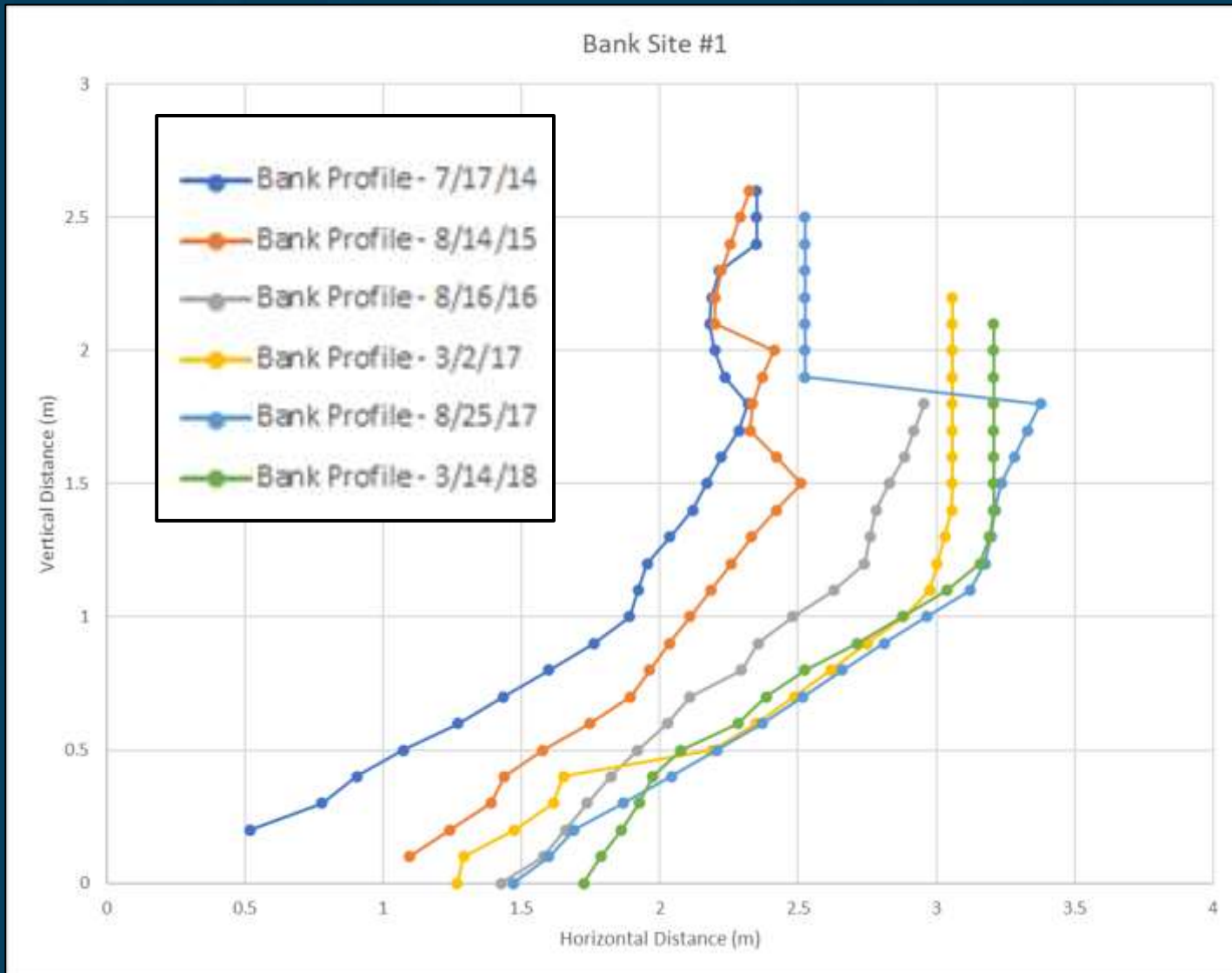
APPROACH TO ASSESS THE ACCURACY OF ROOT-BASED PREDICTIONS:

CROSS COMPARISON OF EROSION PIN MEASUREMENTS TO ROOT DERIVED ANNUAL EROSION RATES:

- CUMULATIVE CHANGE IN DISTANCE OVER TIME.
- DIFFERENCE IN PREDICTED (ROOT) VS. OBSERVED (EROSION PIN) BY:
 - BANK POSITION.
 - SUMMARY STATISTICS (MINIMUM AND MAXIMUM RATES).

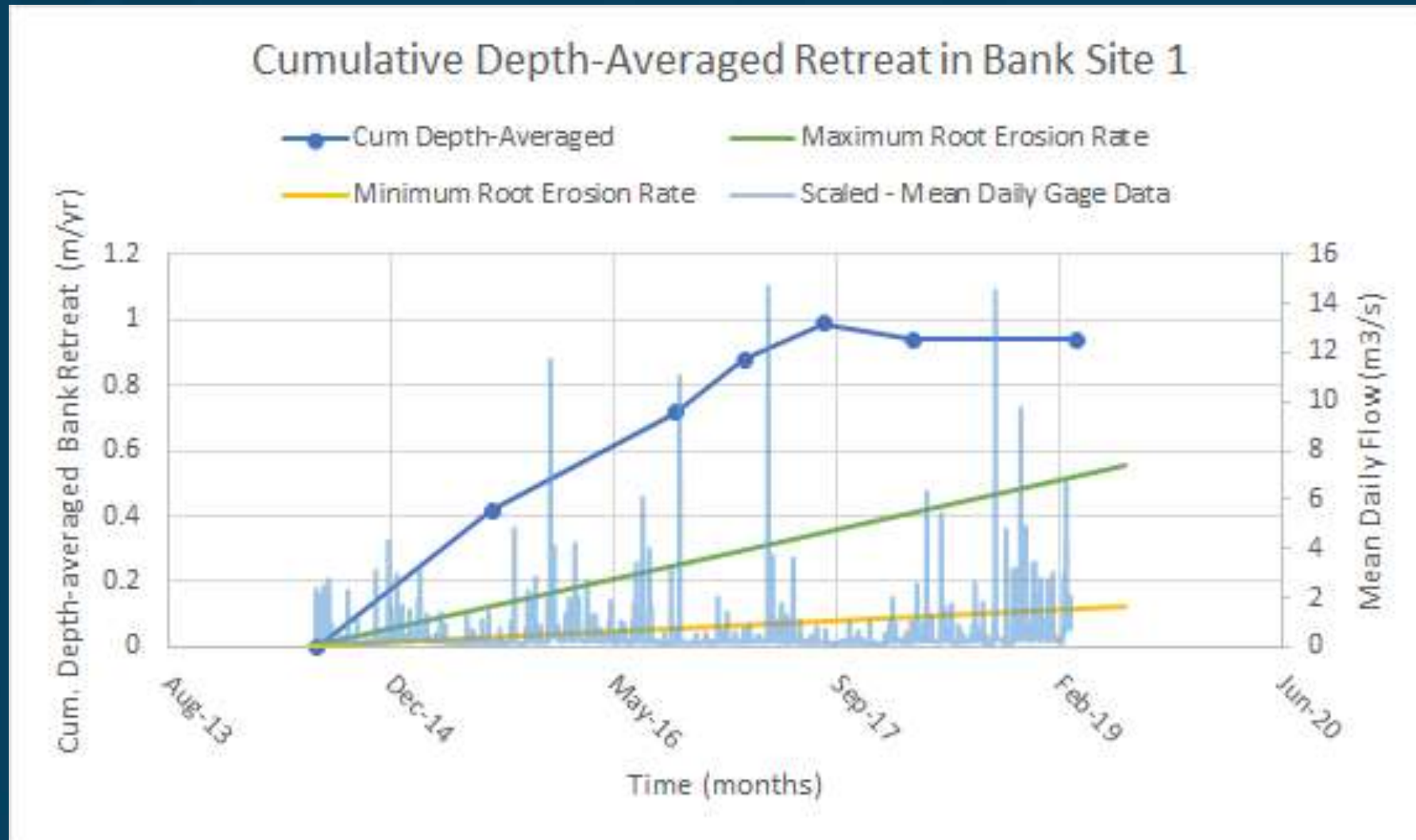
DATA COLLECTION AND ANALYSIS

UT to Ellerbe Creek Bank Site #1



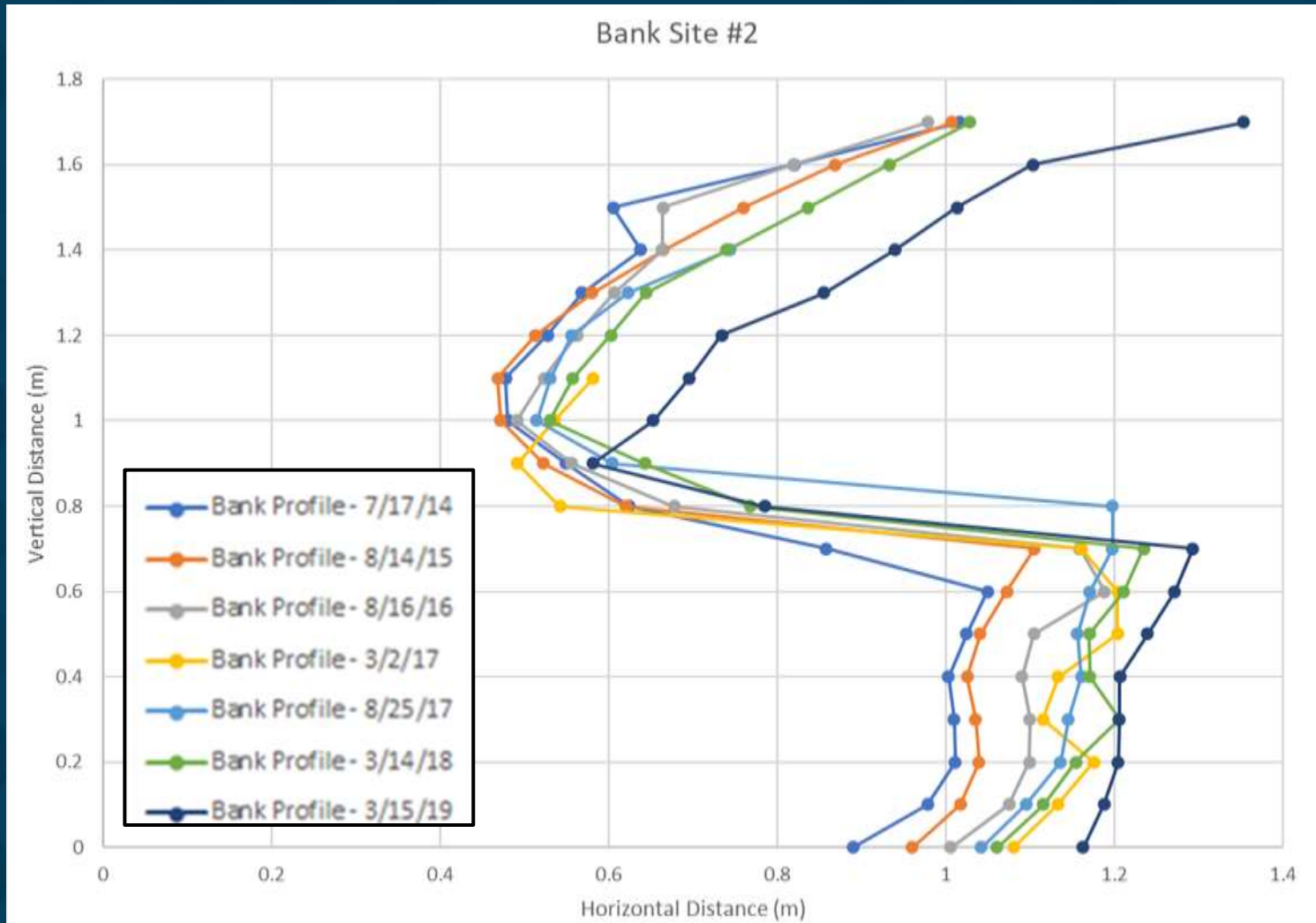
BP #1 — UT to Ellerbe Creek
BEHI: Extreme | NBS: Extreme
Location: Camden Ave.

DATA COLLECTION AND ANALYSIS



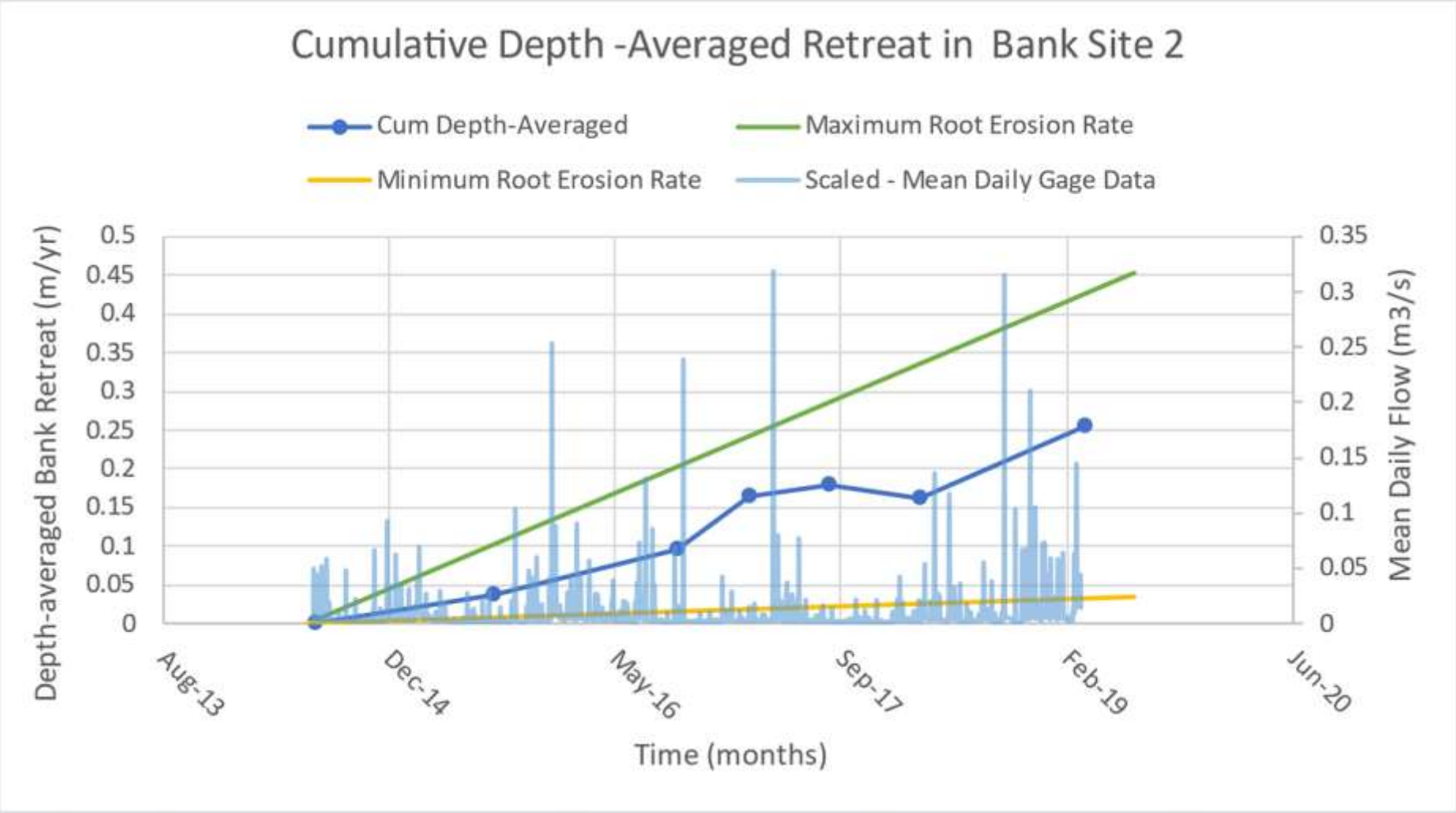
DATA COLLECTION AND ANALYSIS

UT to Ellerbe Creek Bank Site #2



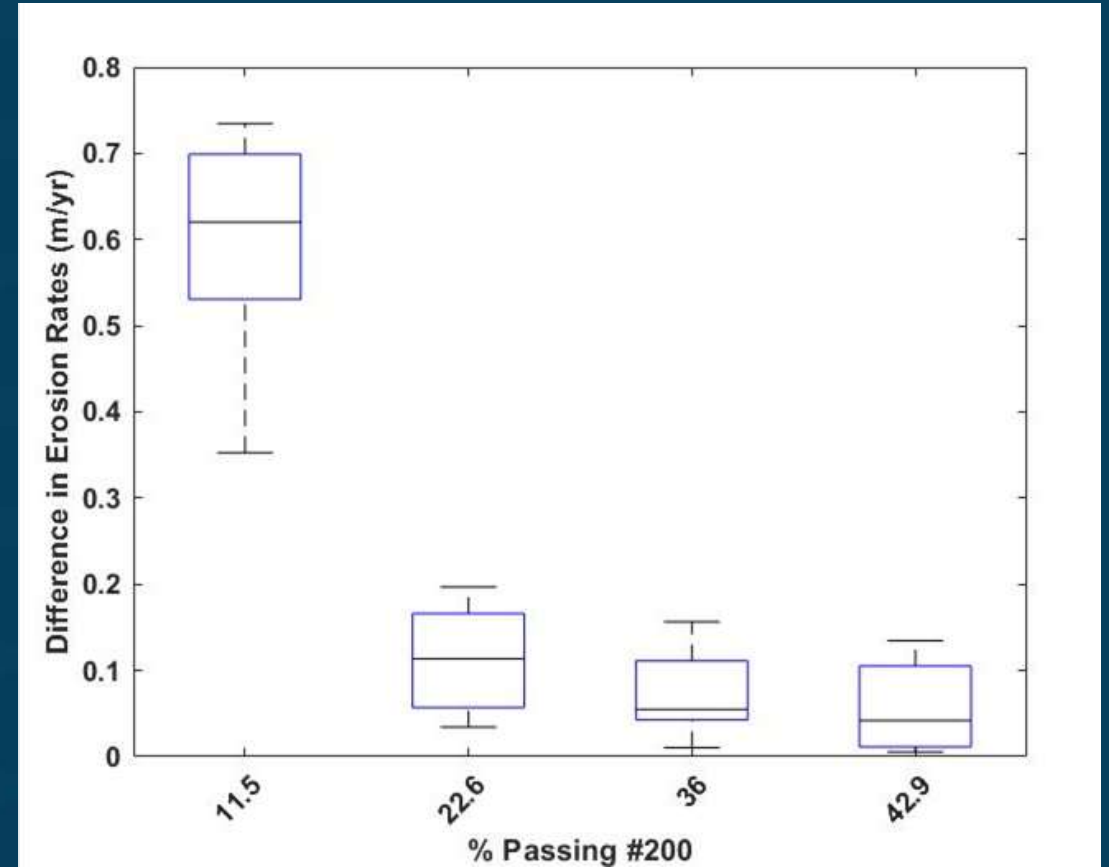
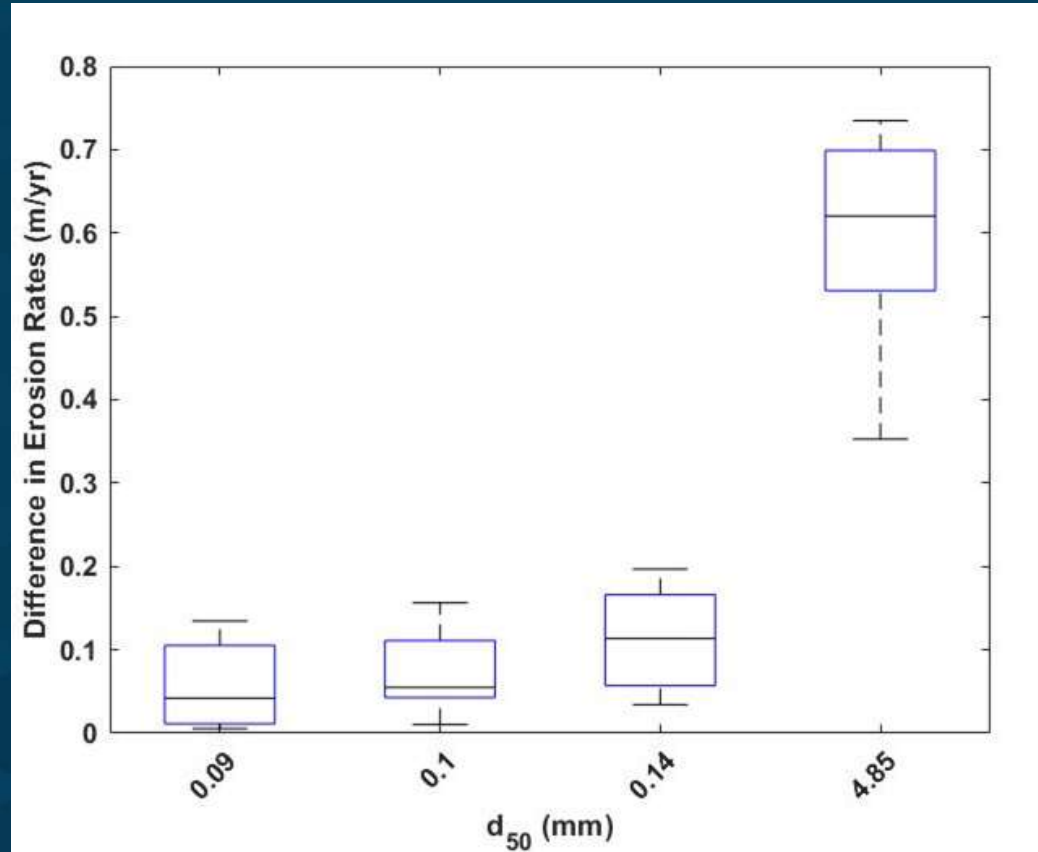
BP #2 — UT to Ellerbe Creek
BEHI: High | NBS: Very High
Location: Museum of Life and Science

DATA COLLECTION AND ANALYSIS



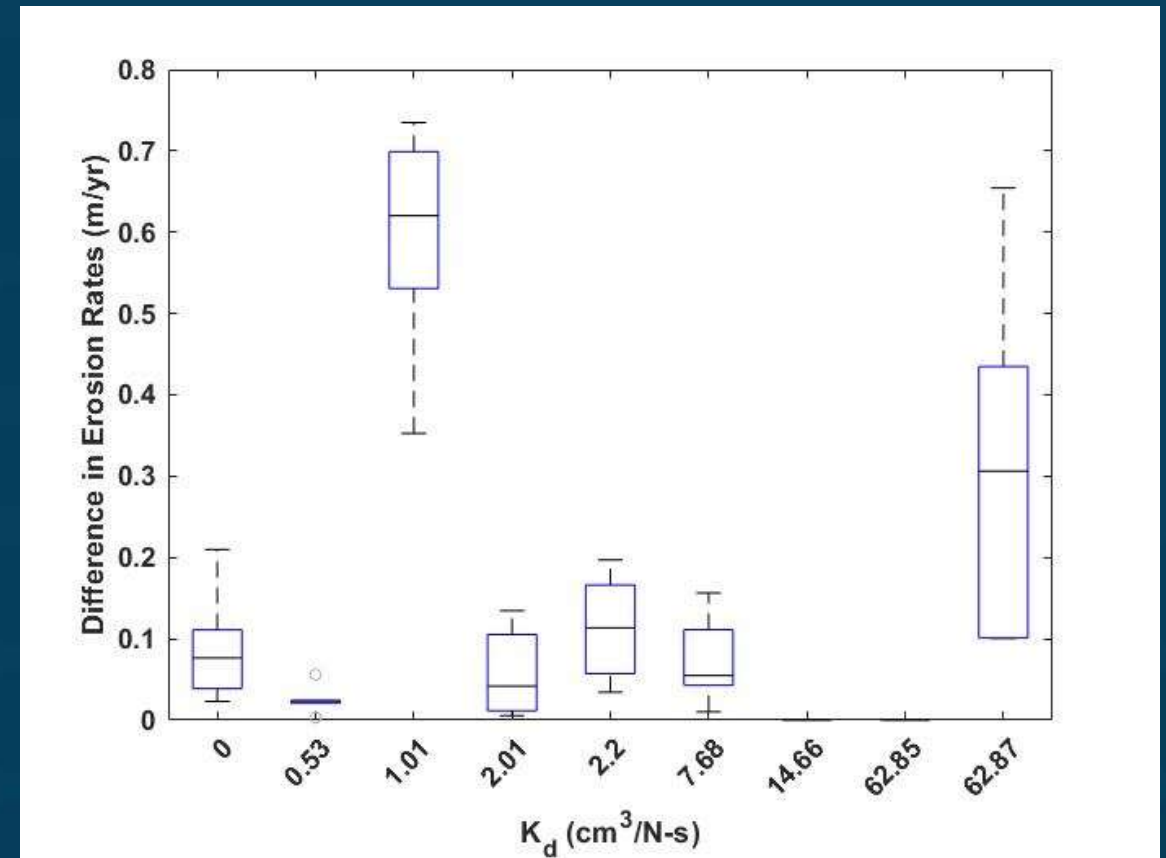
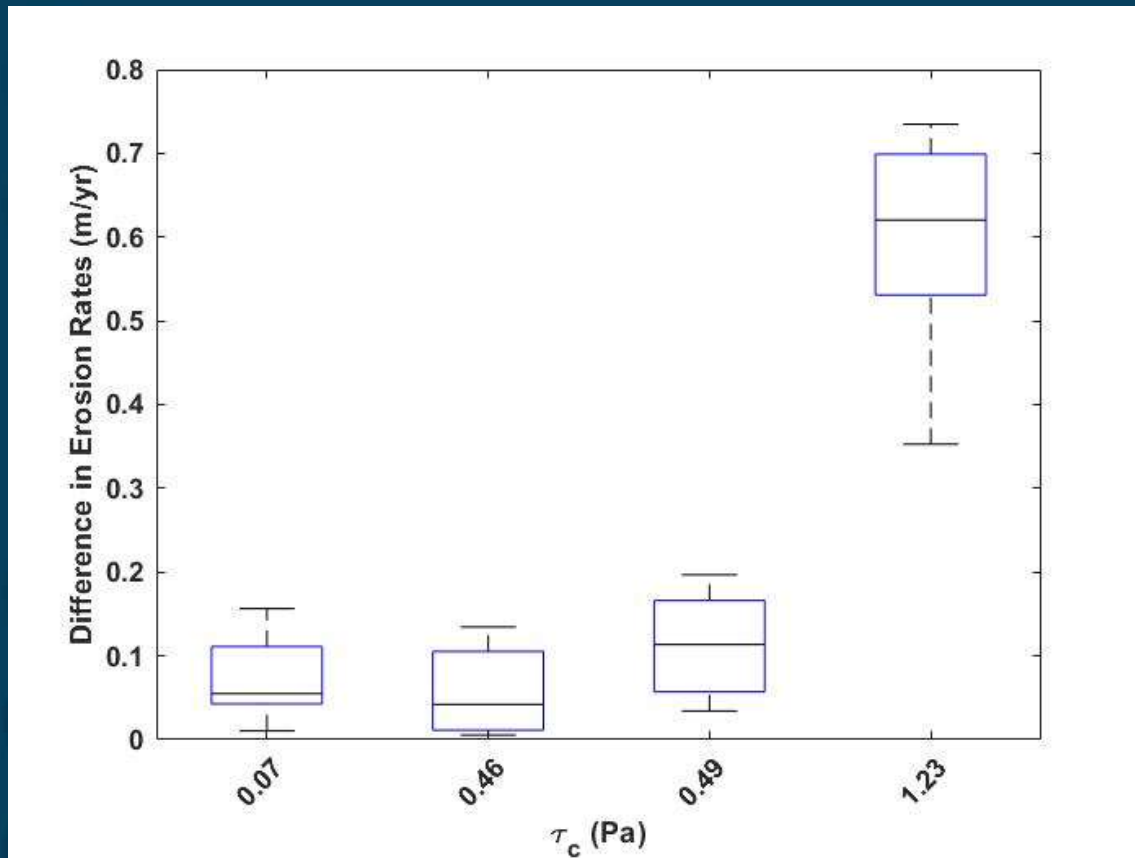
DATA COLLECTION AND ANALYSIS

GEOMORPHIC CHARACTERIZATION



DATA COLLECTION AND ANALYSIS

GEOMORPHIC CHARACTERIZATION



ECONOMIC IMPLICATIONS

- BEST VALUE WHEN PICKING A MEASURING TOOL
 - BANK PINS TAKE TIME & EFFORT
 - UNDERSTAND YOUR ASSUMPTIONS
- USE MEASUREMENT TECHNIQUES TO QUANTIFY WATER QUALITY IMPROVEMENTS
 - NITROGEN
 - PHOSPHOROUS
- JUSTIFICATION TO AGENCIES FOR STREAMBANK STABILIZATION AND STREAM RESTORATION PROJECTS
- OPPORTUNITIES FOR GRANT FUNDING



ACKNOWLEDGMENTS



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