

Comparison of Video Mapping and Field Measurements of Stream Channel Substrate



Josh Rogers



Outline

- Justification for Research & Introduction
- Objectives & Hypotheses
- Methods & Analysis



Why Measure Substrate?

- Define the Stream
 - Particle size distribution
 - Channel-bed roughness
- Measure the Stream
 - Ecological and Hydrological
 - Bed-load transport rates
- Monitor the Stream
 - Particle size distribution is the first channel characteristic to change in response to land management activities



Introduction



- Measuring Techniques
 - Pebble Counting
 - Wolman (1954)
- Photographic Techniques
 - Early 1970's
 - Technological Advancements
 - Photography
 - Videography
 - GPS & GIS

Introduction

- Video Mapping
 - Growing field in water resources
 - Advantages
 - Quick
 - Less field time = Less cost
 - Not effected by storm events
 - Ease
 - Data Analysis
 - Disadvantages
 - How accurate is it?



Objectives & Hypotheses

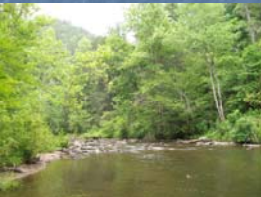
- Primary Objective
 - Compare video mapping and field measurement techniques, using a frame measurement as a control.
 - H_0 : Video mapping and transect measurement techniques do not differ in means by more than 15% in particle size, percent distribution, or diameter class of substrate composition.

Objectives & Hypotheses



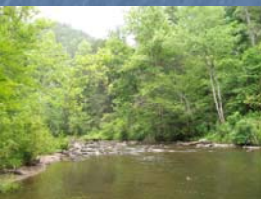
- Secondary Objectives
 - Find the most accurate float pattern
 - H_0 : The video mapping float patterns do not differ in means by more than 15% in particle size, percent distribution, or diameter class of substrate composition.

Objectives & Hypotheses



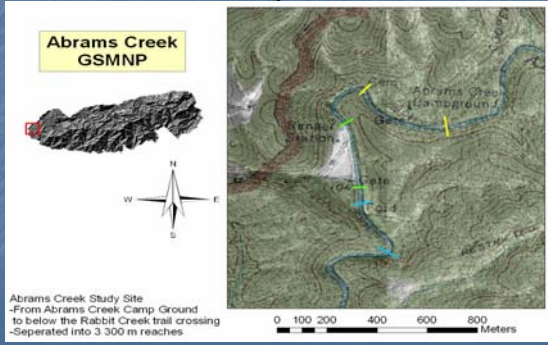
- Secondary Objectives
 - Find the most accurate grid technique
 - H_0 : The transect measurement techniques do not differ in means by more than 15% in particle size, percent distribution, or diameter class of substrate composition.

Objectives & Hypotheses



- Secondary Objectives
 - Measure single observer variability
 - H_0 : Single observer variability will not vary more than 15% between stream reach study sites.

Study Site



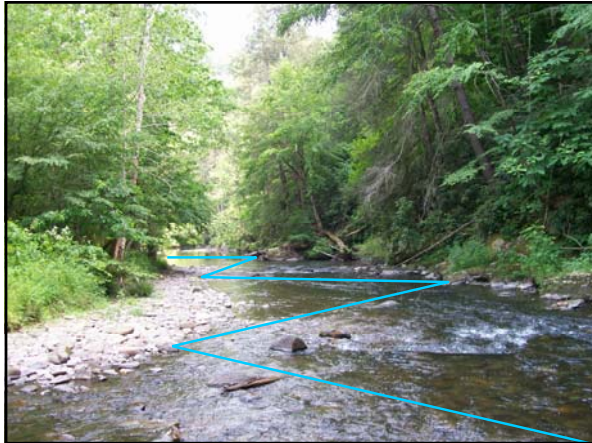
Methods

- Field Measurements (Wolman Pebble Count)
 - Thalweg → 100 points within the thalweg



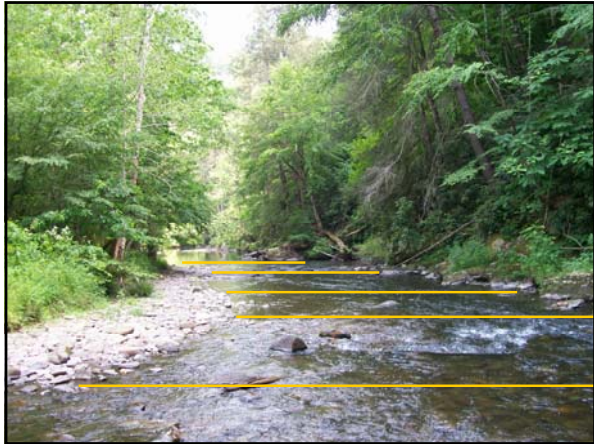
Methods

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 - Proportional → stream segments divided by proportion of each habitat unit and 100 points taken on lines perpendicular to flow



Methods

- Field Measurements (Wolman Pebble Count)
 - Thalweg → 100 points within the thalweg
 - Zig-Zag → 100 points taken on a 45 degree angle from wetted edge to wetted edge
 - Proportional → stream segments divided by proportion of each habitat unit and 100 points taken on lines perpendicular to flow →
 - Frame → standard method (control) that assures 90% confidence in observer accuracy



Methods

- Video Measurements

- Total stream reach floated in kayak with:

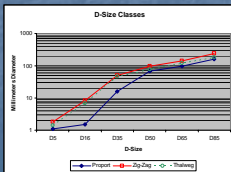
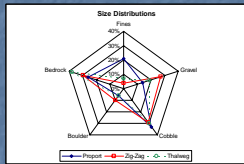
- Vertical & Diagonal Camcorders
- Vertical Laser Pointers
- GPS Unit

- 3 Different Runs

- Thalweg
- Zig-Zag
- Along Bank



Analysis



- Particle Retrieval from Video

- How to read video?

- Time
- Distance
- Random
- Visual Estimation

- ANOVA

- Particle Size, Percent Distribution, and Diameter Size Class



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Questions?
