



# The Real Value of the Reference Reach

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UNITED NATIONS DECADE ON  
**ECOSYSTEM  
RESTORATION**  
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# Concerns with the Reference Reach

- Difficult (sometimes impossible) to find
- Not appropriate for the design conditions
- Constraints of new construction limit translation of metrics
- Can create reviewer restraint on design
- Errors in data collection
- Misinterpretation of data
- Bias in data collection
- Time intensive effort
- Can regress into a data collection effort







# Drawbacks of Data Collection

- Operator instrument focus







# Drawbacks of Data Collection

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- Data point focus

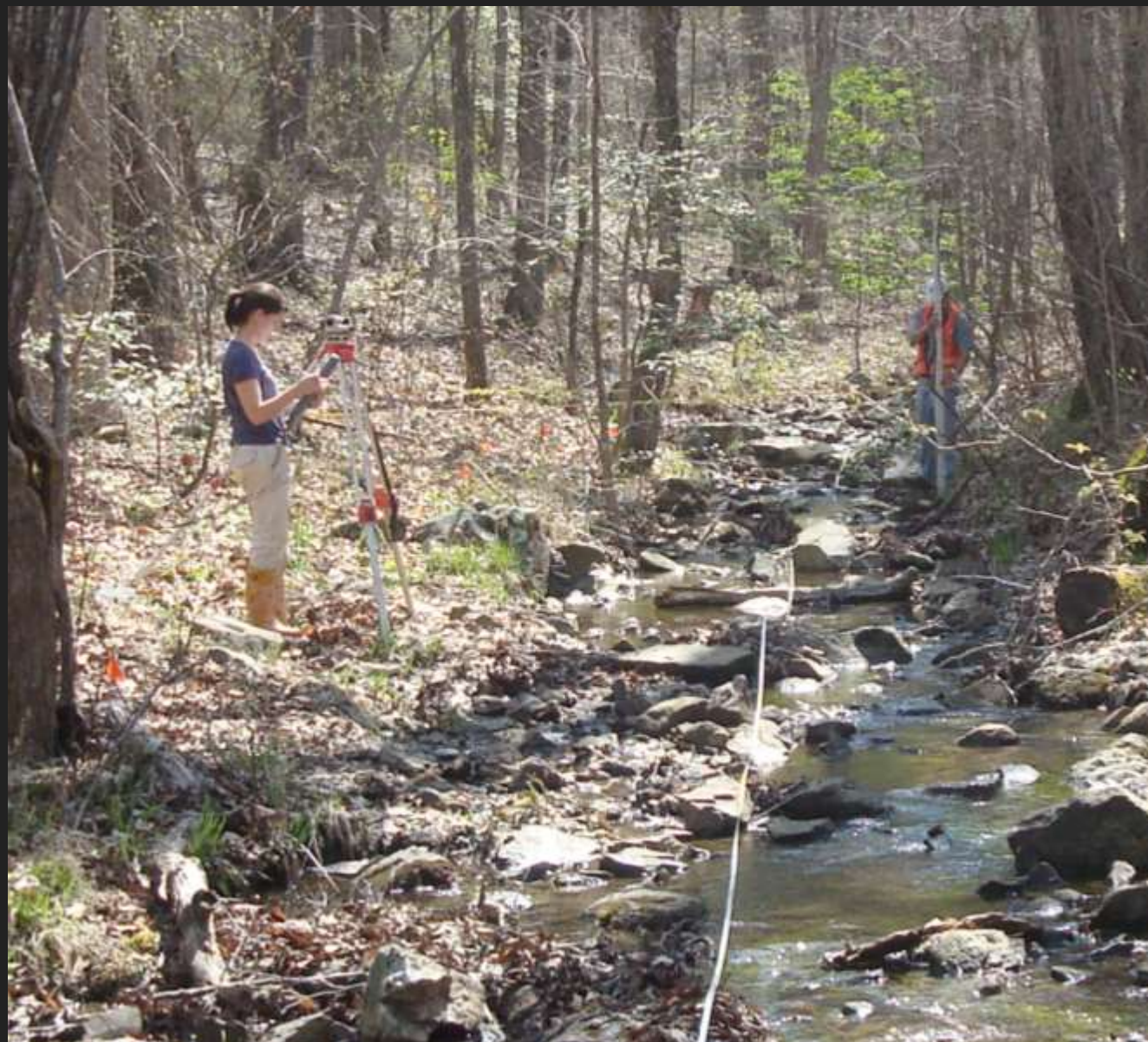






# Drawbacks of Data Collection

- Operator instrument focus
- Data point focus
- Very little time actually spent observing the river

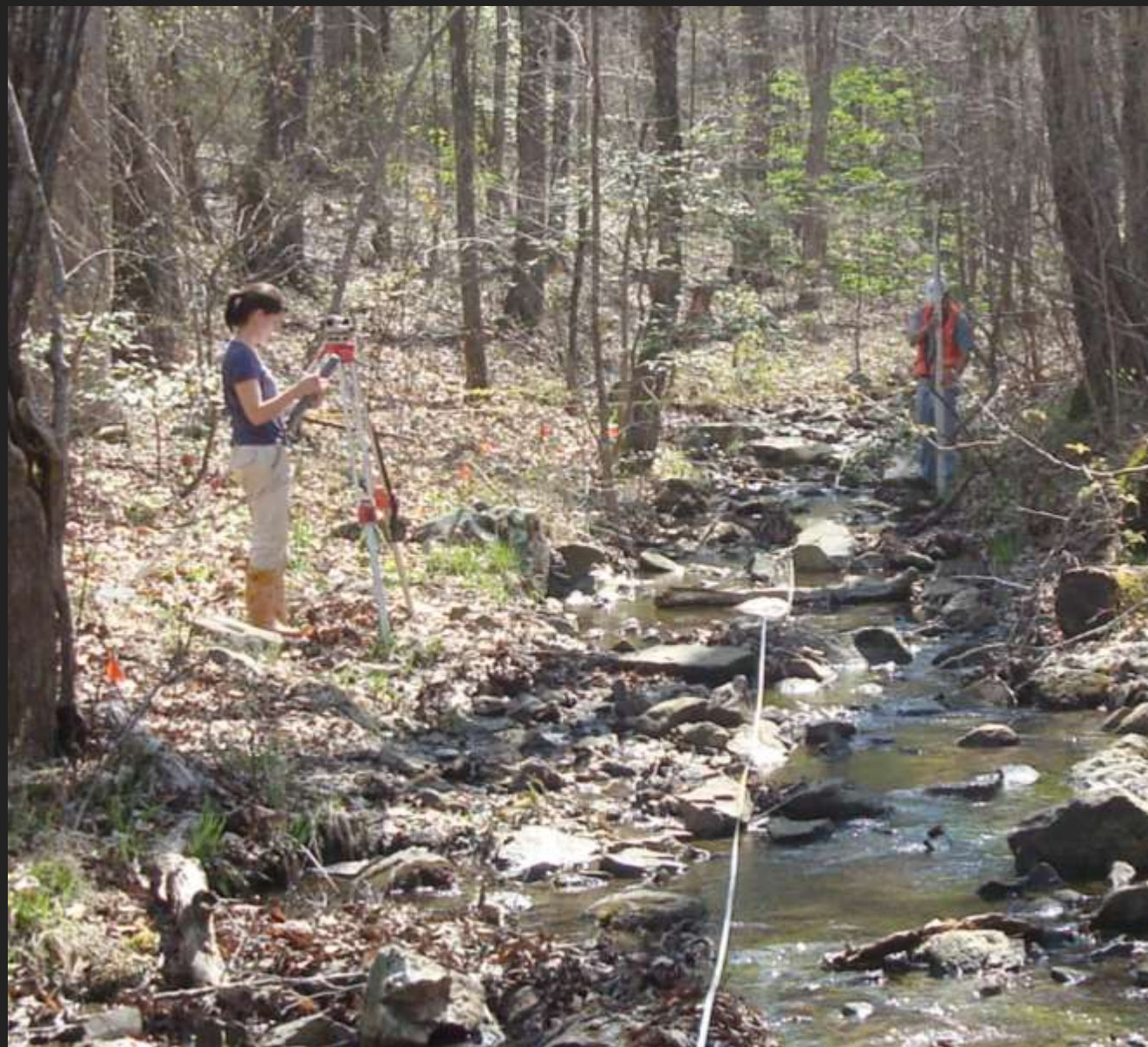






# Drawbacks of Data Collection

- Operator instrument focus
- Data point focus
- Very little time actually spent observing the river
- No immediate feed back on observations
- Modifications of observations during post-processing (aka fudging)
- Time intensive
- Collection of non-relevant data points
- Limited data sample size
- Inability to capture data point context







# Observation Focused

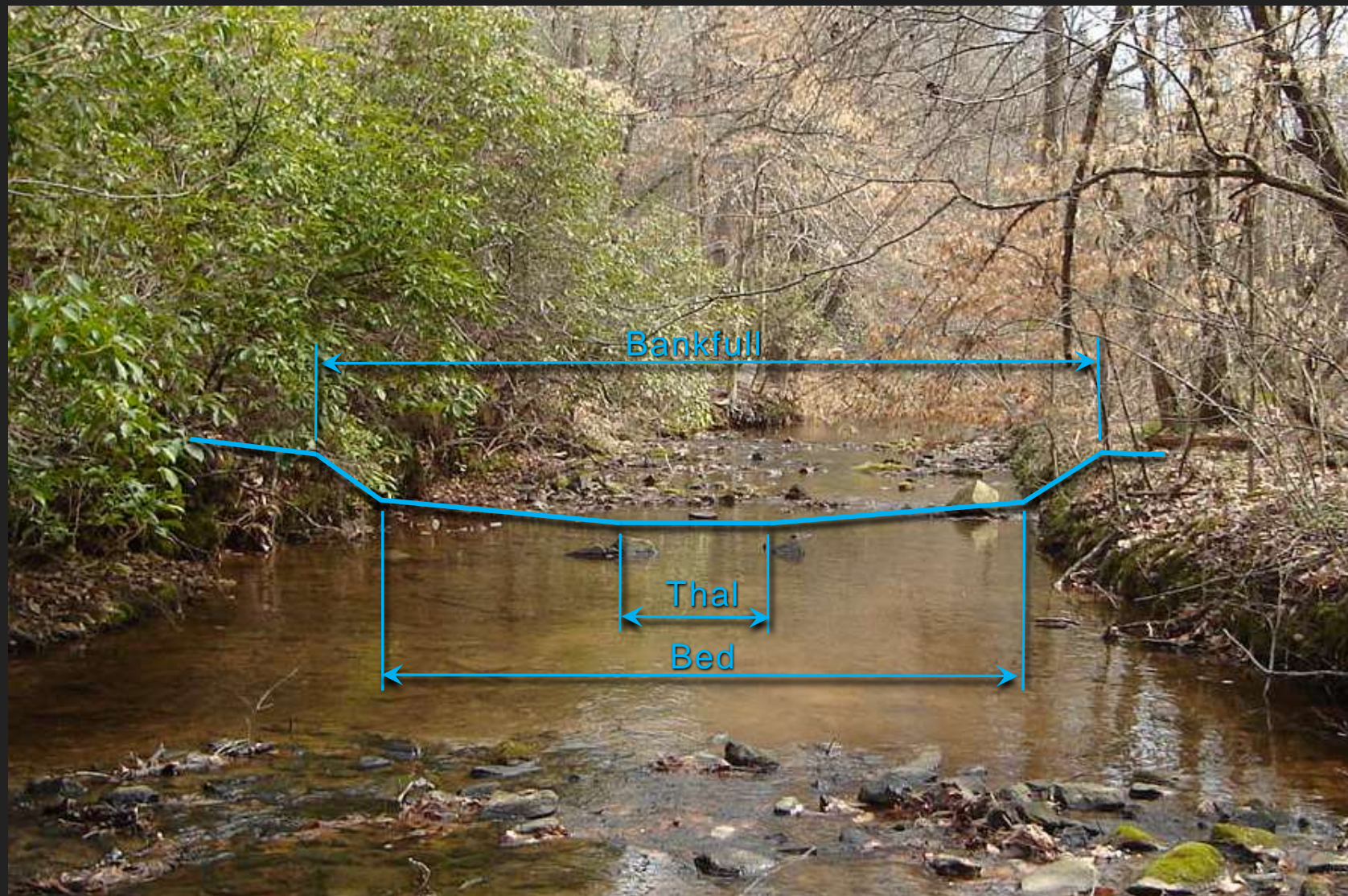
- Main objective: Become better observers
  - The data is secondary
- Simplify data collection
  - Only collect what is needed
  - Simplify section collection
  - Direct measure of profile elements
  - Minimize survey equipment
- Incorporate calibration training
  - $D_{50}$  and  $D_{84}$  estimations
  - Slope estimations
  - W/D ratio estimations





# Quick Sections

- Minimum measurements
  - $W_{BKF}$ ,  $W_{BED}$ ,  $W_{THAL}$
  - $D_{BKF}$ ,  $D_{TOE}$ ,  $D_{THAL}$
  - $D_{FP}$ ,  $W_{FP}$ ,  $D_{LOW\ BNK}$
- Provides section computation of:
  - $XS_{AREA}$  and  $D_{MEAN}$
  - W/D and Ent. ratio
  - Stream type classification
- Accuracy:
  - $XS_{AREA}$  within 5-10% of detailed section
  - Improved  $W_{BKF}$  measurement
  - Improved  $W_{BED}$  measurement





# Observation Focused Section Measurements

- Focus on channel features not surveying
  - Focus shifts from a single section to the whole channel form
- Measurements have context
  - Upstream/downstream relevance
  - Accounting for localized deviations
  - Dimensional relationship to bed form
- Time is less of a constraint
  - Allows for multiple sections
  - More time to discuss observations
- Calibration training opportunities





# Observation Focused Profile Measurements

- Focus on channel features not surveying
  - Focus shifts from a single data point to overall bed form
- Measurements have context
  - Upstream/downstream relevance
  - Accounts for lateral feature expression
  - Requires commitment to feature interpretation
- Time is less of a constraint
  - Allows for larger sampling of pool spacing and riffle slope data
  - More time to discuss observations
- Calibration training opportunities







# Minimal Equipment Requirements

- Chalk line laser
  - Self leveling, 200 ft range
- Camera tripod
  - Lightweight, packable
- 2 pocket rods
- 100' tape
- 2 chaining pins
- Total weight 6 lbs
- Equipment cost less than \$500









# Observation Focused Pool Categories

- Flow Deflection
  - Channel bends
  - Confluences
  - Floodplain contractions
- Flow Obstruction
  - LWD exposed to flow
  - Lateral protrusions
- Bed Structure
  - Step (boulder or LWD)
  - Run (boulder or cobble)
  - Sill (bedrock, boulder or LWD)



Flow Deflection



Flow Obstruction



Bed Structure





# Observation Focused Pebble Counts

1. Estimate  $D_{50}$  and  $D_{84}$
2. Record a 10-count sample
  - 5<sup>th</sup> to 6<sup>th</sup> smallest approximates the  $D_{50}$
  - 1<sup>st</sup> to 2<sup>nd</sup> largest approximates the  $D_{84}$
3. Compare to first estimate and adjust if needed
4. Record another 10-count sample
  - Using all 20 measurements
  - 10<sup>th</sup> to 11<sup>th</sup> smallest is the  $D_{50}$
  - 3<sup>rd</sup> largest is the  $D_{84}$
5. Make any final adjustments to estimates

## Advantages

- You are actually studying the bed material
- Develops skills that aid in design and communication
- Time savings leads to more data that is meaningful
- It's actually fun







**What's the value of the data?  
The real value is in the observations that you make.**



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