2010 Trust Fund Recommended Protocols: Geomorphic Monitoring

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Introduction

- Why develop recommended, standard protocols?
- Who was involved in development?
- Discuss protocols for
  - Pebble Counts
    - Reach-wide: AKA “weighted,” “proportional”
    - Active-bed: AKA “riffle”
  - Cross-Sections
  - Longitudinal Profile
  - NO BANCS – (BEHI and NBS)* *Differs from last year
- Questions?

Goals of 2010 Trust Fund

- Created in 2007 to reduce nutrient and sediment inputs to Chesapeake and Atlantic Coastal Bays
- Focusing on nonpoint pollution control projects in high-priority watersheds
- To standardize assessments, DNR promoting use of consistent protocols
  - Water Quality
  - Biology
  - Flow
  - Geomorphology

Goals of 2010 Trust Fund

- Restoration projects may have additional goals outside of Trust Fund
- These protocols focus on monitoring to assess Trust Fund goals
  - Reduced Nutrients
  - Reduced Sediment
- Additional assessment methods and analyses may be necessary to assess other goals
- Standard protocols will ensure comparability and consistency between projects

Geomorphic Protocol Development

- Protocols for geomorphology assessment selected and developed by a team of scientists
  - Maryland Department of Natural Resources
  - United States Fish and Wildlife Service
  - Versar, Inc.
- Once developed, protocols reviewed by scientists
  - Coastal Resources, Inc.
  - KCI Technologies
  - McCormick Taylor

Pebble Counts

Enable assessment of substrate composition, for classification, and for velocity/discharge calculations

Two types of pebble counts

Reach-wide pebble counts

- based on the proportion of riffles, runs, pools, and glides within reach

Active Bed (Riffle) pebble counts

- only within the active bed of the riffle cross section

Pebble Counts

Recommended Equipment

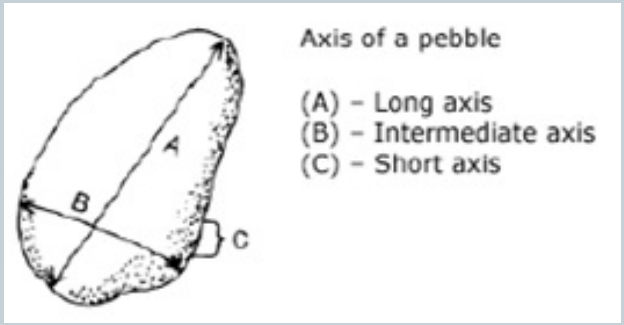
- Representative pebble count datasheet printed on Rite-in-the-Rain paper
- Active bed riffle pebble count datasheet printed on Rite-in-the-Rain paper
- Sand gauge reference cards (1 per surveyor)
- Metric ruler (with mm markings) (1 per surveyor)
- Metal hand tally counter (clicker) (1 per surveyor)
- Clipboard
- Pencil

Reach-wide Pebble Counts

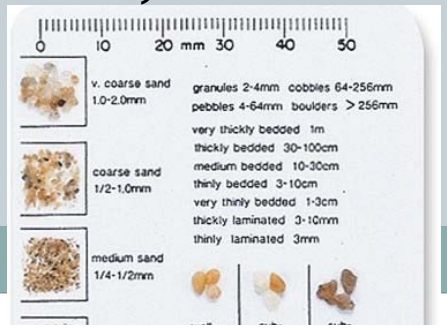
- 100 pebbles are selected and measured within 10 transects
- Determine proportion of riffles, runs, pools, and glides within assessment reach
- Allocate transects based on these proportions
  - Eg: Reach is 40% riffle, 20% run, 30% pool, 10% glide
  - Sample 4 riffle transects, 2 run transects, 3 pool transects, 1 glide transect
- Measure 10 pebbles equally spaced across each transect

Reach-wide Pebble Counts

- Reach down into the stream (*don't peek*!) and pick up the first particle you touch
- Using metric ruler, measure the intermediate axis



- If too small to measure, use sand card to determine grain size



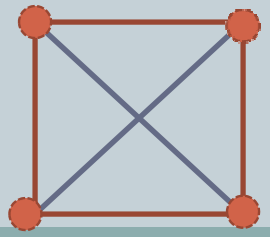
Reach-wide Pebble Counts

- Continue moving across the transect, perpendicular to banks, until 10 equally spaced, random particles are selected and measured

- Repeat procedure until 10 random particles at 10 different transects have been measured in proportion to the bed features (100 particles total).

Reach-wide Pebble Counts TIPS

- No more than 5% (one sample every other transect) of materials should be selected from particles between the bankfull and wetted elevations
- A metal hand tally counter/clicker can be used to help keep track of counts
- Use dot boxes to record particle sizes in corresponding cells on data sheet



Active Bed Pebble Counts

- Method is very similar to Reach-wide Pebble Counts
  - Only selecting particles within the active-bed (Wetted-Width) of the Riffle Cross Section
- 100 particles are selected and measured
- Reach down into the stream (*don't peek*!) and pick up the first particle you touch
- Using metric ruler, measure the intermediate axis
- If too small to measure, use sand card to determine grain size

Active-Bed Pebble Counts

- Continue moving across the transect, perpendicular to banks, until 10 equally spaced, random particles are selected and measured

- Repeat procedure until 10 random particles at 10 different transects have been measured within the active bed of the riffle cross section (100 particles total)

Cross Section Survey

Enable assessment of floodplain connectivity, changes in bed stability, channel enlargement, lateral accretion

Cross Section Survey

Recommended Equipment

- Cross-section datasheet printed on Rite-in-the-Rain paper
- Clipboard
- Pencil
- Self-leveling laser level and audible receiver
- Tripod
- Top-setting, telescoping survey rod
- 300-foot measuring tape
- Bank pins
- Survey caps
- Small sledgehammer
- Wooden stakes
- Flagging
- Hammer and aluminum nails
- Bright-colored spray paint
- GPS unit
- Digital camera
- Hand shears

Cross Section Survey

- Choose 1 stable riffle and 1 meander bend for cross-section surveys
  - Cross Sections should be established perpendicular to flow
- Establish permanent monuments on either bank
  - Geo-reference using GPS, and flag
- Stretch tape from left bank to right bank
  - Remember: Left and Right are facing **DOWNSTREAM**
  - Tape should be taut
  - Station 0 of the tape should be directly over the left bank monument

Cross Section Survey

- Place survey rod on top of left bank monument
- Hold it as steady and vertical/plumb as possible while moving the receiver up/down until the audible tone indicates a proper reading
  - Fast Beeps: Too high
  - Slow Beeps: Too low
  - Solid Beep: Just right
- Record reading in hundredth's of feet

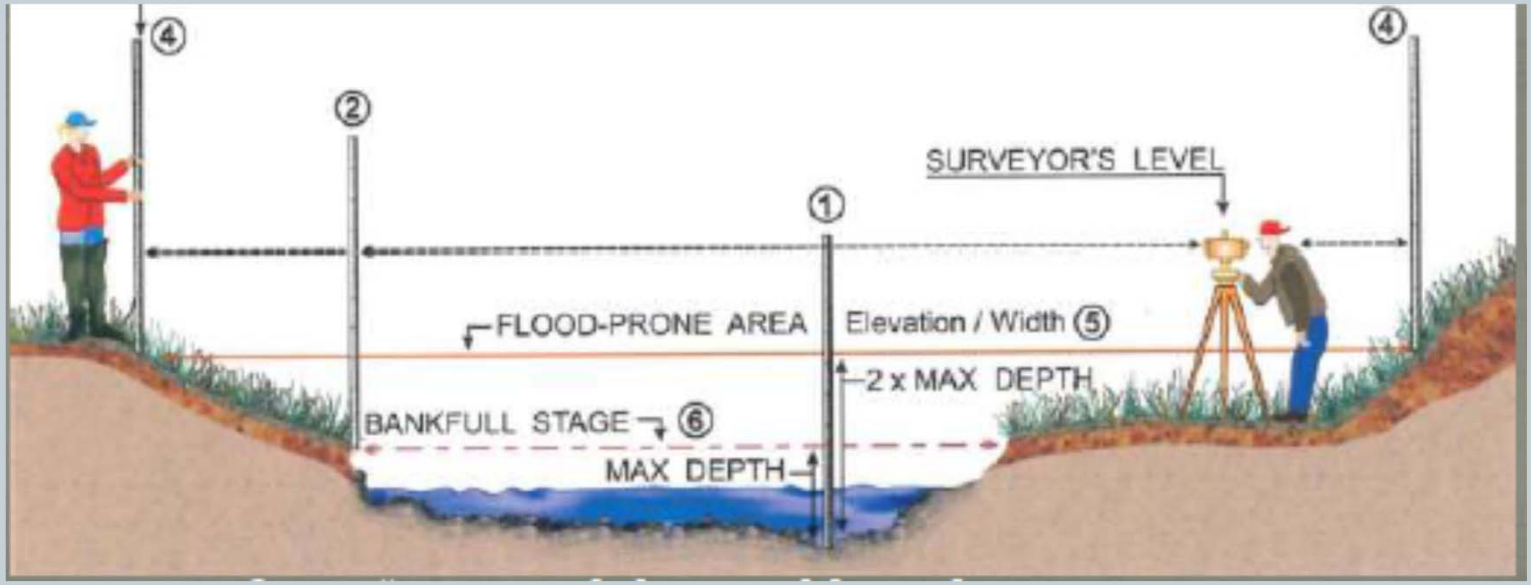
Cross Section Survey

- Move the rod beside the monument
- Repeat steps to determine the elevation
- Continue from left to right, surveying breaks in elevation
- At a minimum, survey should include
  - Top of Monuments (left and right)
  - Top of Bank (left and right)
  - Field Bankfull (left and right)
  - Edge of Water (left and right)
  - Thalweg
  - Limits of depositional features

Cross Section Survey

- Using thalweg and bankfull measurements, determine the floodprone elevation
  - Bankfull Depth = Thalweg elevation – bankfull elevation
  - Floodprone elevation= Thalweg elevation – (2*Bankfull Depth)
- If you've bracketed this elevation on both sides of the cross-section, you're good
- Else, move upslope in line with the monuments until this elevation is reached on both sides of the XS
- Measure and record the distance between these floodprone elevation points as Floodprone Width

Cross Section Survey



Cross Section Survey

- Before taking down the tape, QC the data sheets
- If surveying in conjunction with a longitudinal profile, record the location along the longitudinal profile where the cross section tape crosses the longitudinal profile tape
- Before taking down the tape, take 4 photographs:
  - Upstream
  - Downstream
  - Right Bank
  - Left Bank

Cross Section Survey

Wheel Creek Monitoring – November 2012
Geomorphic Assessment Photos – Cross Sections

Appendix A

WC01 – XS-1 facing upstream

WC01 – XS-1 facing downstream

WC01 – XS-1 facing right bank

WC01 – XS-1 facing left bank

Longitudinal Profile Survey

Enable evaluation of changes in slopes, bed features, and channel aggradation/degradation

Longitudinal Profile Survey

Recommended Equipment

- Longitudinal Profile datasheet printed on Rite-in-the-Rain paper
- Clipboard
- Pencil
- Self-leveling laser level and audible receiver
- Tripod
- Top-setting, telescoping survey rod
- Two (2) 300-foot measuring tapes
- Bank pins
- Survey caps
- Small sledgehammer
- Wooden stakes
- Flagging
- Hammer and aluminum nails
- Bright-colored spray paint
- GPS unit
- Digital camera
- Hand shears

Longitudinal Profile Survey

- Establish permanent monuments at upstream and downstream ends of reach (2 at upstream/start, 1 at downstream/end)
  - Georeference with GPS and flag
- Run tape from upstream to downstream in the center of the channel
- Survey should begin at the top of a feature and end at the top of a feature
  - Beginning and ending at tops of like features is preferred (e.g. begin and end at top of riffle)

Longitudinal Profile Survey

- Begin by surveying the tops of both of the upstream monuments
- Next survey the top of the feature at the upstream end of the reach
  - Record station as 0+00, and thalweg and water surface elevations (or water depth)
  - Record stationing along profile tape in tenths of feet and elevation in hundredths of feet
- Continue moving downstream, surveying breaks in elevation, including tops of features
  - Top of riffle
  - Top of run
  - Top of pool
  - Maximum depth of pool
  - Top of glide

Longitudinal Profile Survey

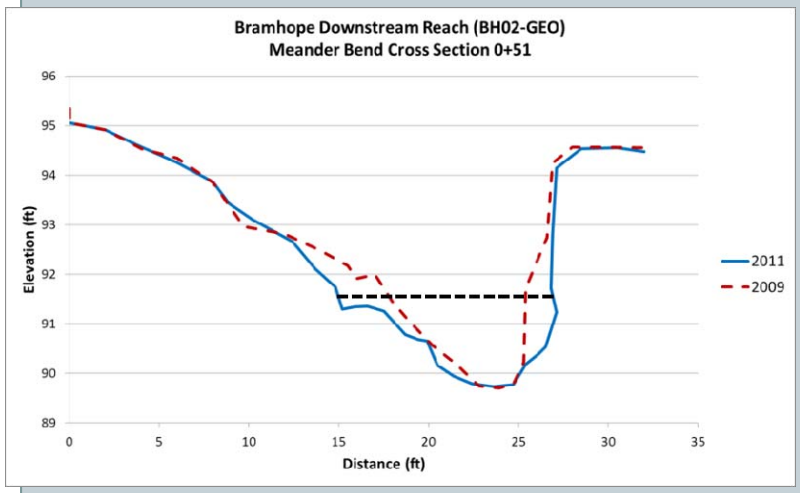
- At the top of each riffle, and where indicators are strong, survey bankfull elevation. In these locations, also survey the top of the lowest bank
- At cross-section intersections, take measurements on top of at least one cross-section end pin and note location of cross-section along longitudinal profile
- If the entire profile is not able to be surveyed from the initial location of the level, use a turning point
  - Choose a stable location
  - Record first elevation prior to moving and re-setting laser
  - After moving and re-setting laser, survey the same point again

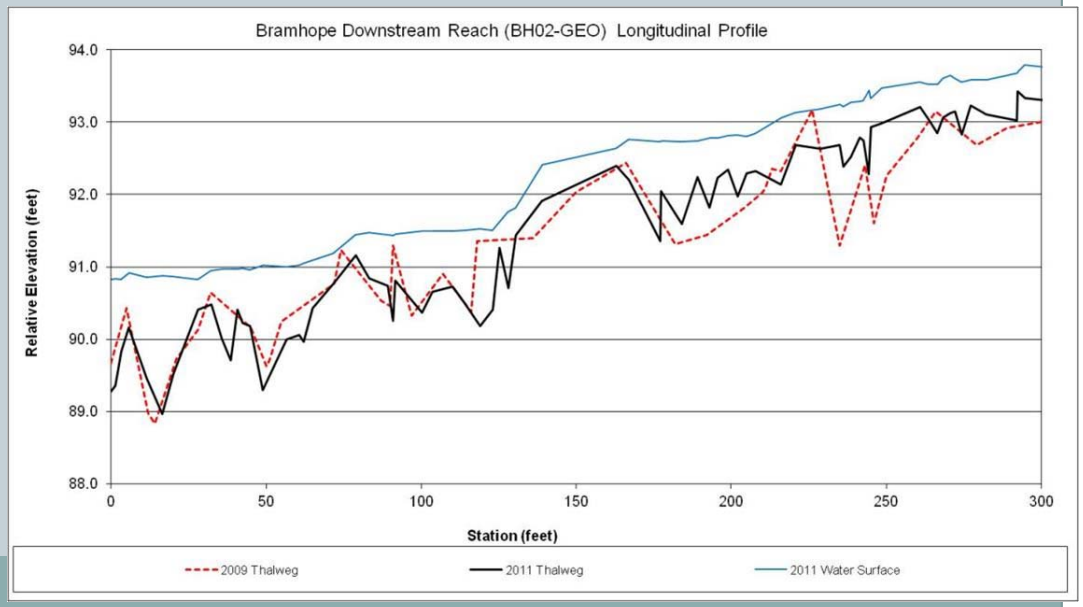
Longitudinal Profile Survey

- At the end of the survey reach, survey the top of the last feature and record the water surface elevation or depth
- Be sure to then survey the downstream monument to close out the survey
- Before removing the tape, QC the data sheets
- Before removing the tape, take photographs moving along the profile, noting stations

Data Entry and Analyses

- Enter data for Pebble Counts, Cross Sections, and Longitudinal Profiles using the Ohio Department of Natural Resources Reference Reach Spreadsheet (or other transferable program)
- Plot Cross Sections and Longitudinal Profiles





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Any Questions?