

South River Science Team - ROPs Residence Time of Fine-grained Sediments in the River

December 11, 2018
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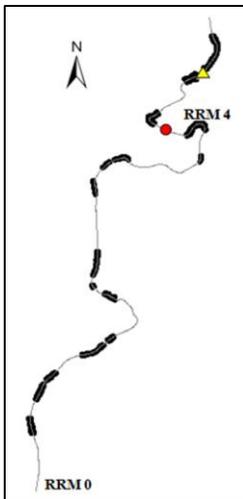
Residence Time and Channel Bed Turnover

- Important concept for the physical recovery of the river following bank stabilization
- Affects Long Term Monitoring Program and timing
- Impacts approach for future phases of remediation within the Adaptive Management program

University of Delaware Study (2012)

Pomeraning and Pizzuto

- Objective: Determine the residence time of silt/clay-sized particles within the sand and gravel matrix in the river bed using:
 - Isotope dating of 4 sediment cores in 5 cm intervals down to 25 cm
 - Two sets of 5 Scour chains to document changes in bed elevation



University of Delaware Study (2012)

Pomeraning and Pizzuto

Conclusion:

- The residence time of the fine sediment fraction of the channel bed is approximately 36 years to a depth of 25 cm
- This is based primarily on isotope data (Pb, Cs, Be)
- Flow events with magnitudes between 0.61 and 12.76 year recurrence intervals had statistically significant scour and fill up to 3-4 cm.

Possible Future Study: Proposal from University of Delaware

1. Revisit existing data set

- a. estimate the timing and extent of scour through time, including error estimates to bound the recovery times.
- b. Couple scour chain data with conceptual model of particle storage and reworking of the bed

Possible Future Study: Proposal from University of Delaware

2. Limited Field Program in RRM 0-2

- a. Develop improved conceptual models for hyporheic zone particle storage and exchange in different subareas (riffle, pool run) and calibrate with a mechanistic model at a given subarea within the channel.
- b. Develop a bedload transport model (coupled to HEC-RAS) to relate scour and fill to variability in discharge (if appropriate)

Possible Future Study: Proposal from University of Delaware

3. More extensive field work in RRM 0-2

- a. Install a network of scour chains in the reach and monitor for approximately 1 year (through spring of 2020).
- b. Consider implementing other field techniques to document scour (reworking/winnowing?)
- c. Use data to help calibrate / refine the mechanistic and conceptual models in #2

Questions / Discussion

- Pursue studies?
- Recommended changes to the scope?
- Other questions to be answered?

Other Slides

How Scour Chains work

Illustration of how scour chains provide a reference for measuring scour and fill in bed elevation. (a) A scour chain is installed at low discharge. (b) A large discharge event causes bed to lower and scour chain to be exposed. (c) Fill occurs on top of the exposed chain. (Figure from Nawa and Frissell, 1993)

