FY18 RSM IPR Norfolk District, James River Sediment Transport Study, NAO: Michael Anderson ERDC: Tahirih Lackey



BLUF: When dredging cannot occur due to increased cost or risk, the navigation mission suffers. Understanding the James River system and developing a framework to investigate potential impact of operational changes is needed.

Objectives

Investigate channel shoaling in the area
Determine if there are potential placement strategies to reduce dredging and dredging costs without increased risk.

Approach

Numerical modeling

Field Data Collection

On average, 1M CY of material are dredged annually within the James River due to channel shoaling.



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Initial work was focused solely on placed material and its ultimate fate. It was insufficient to completely answer the real question. However a framework was developed. Now we are looking at transport over the entire James River system.

US Army Corps of Engineers



Numerical Model	Purpose	Bed Morphology
CH3D	Hydrodynamic Model	Change (g/cm ²)
CDFATE	Nearfield placement (Source term)	
PTM	Farfield fate (SSC, Deposition, pathways)	
LTFATE	Morphology change	LTFATE Results
US Army Corps of Engineers Engineer Research and Development Center		

Engineer Research and

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PDT Members

Michael Anderson, NAO Chris Turner, NAO Robert Pruhs, NAO Tahirih Lackey, ERDC - CHL Joseph Gailani, ERDC - CHL Sung-Chan Kim, ERDC - CHL Earl Hayter, ERDC - EL Susan Bailey, ERDC - EL Jarrell Smith , ERDC - CHL Dave Perkey, ERDC - CHL

Leveraging/Collaborative Opportunities DOER and VIMS

Stakeholders/Partners James River Partnership



Task 1: CH3D multiblock grid models hydrodynamics throughout James River, to provide hydrodynamic forcing for both PTM and LTFATE sediment modeling

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Deliverables

- TR Draft James River : Dancing Point to Swann Point Channel Sediment transport Study
- James River Partnership meeting Presentation - Nov '17
- WEDA Dredging Summit Norfolk, June '18
- TR James River: Sediment Characterization Field Data Analysis - Sept '18
- TR James River: Goose Hill and Regional Sediment Transport Channel Shoaling Investigation – Oct/Nov '18



Task 2: Fifteen day field data collection effort. Samples collected over approximately 95 river miles. Ponar = surface grab sample Core = erosion testing

PICS: Particle settling velocity **Physical samples**: concentration and grain size analysis

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How is this project benefiting the USACE and Nation?

Increased dredging costs over recent years along with Operations and Maintenance budget cuts have decreased the amount of dredging that can be accomplished to meet navigation needs and the goal of unrestricted navigation on the James River.

- Modeling of the fate of sediments dredged from the channel and overall regional sediment analysis will assist in understanding this complex sediment system.
- This project provides essential data for dredged material management, potentially helping to optimize the placement of the dredged material and evaluate sources of shoaling.
- The field data collection effort is perhaps the most extensive and detailed sediment characterization data collection for this area, providing knowledge for future projects and efforts.

Questions?



PICS Settling Velocity Measurements

