FY17 RSM IPR

Norfolk District, Sediment Transport Modeling for James River

Tahirih Lackey and Joseph Gailani

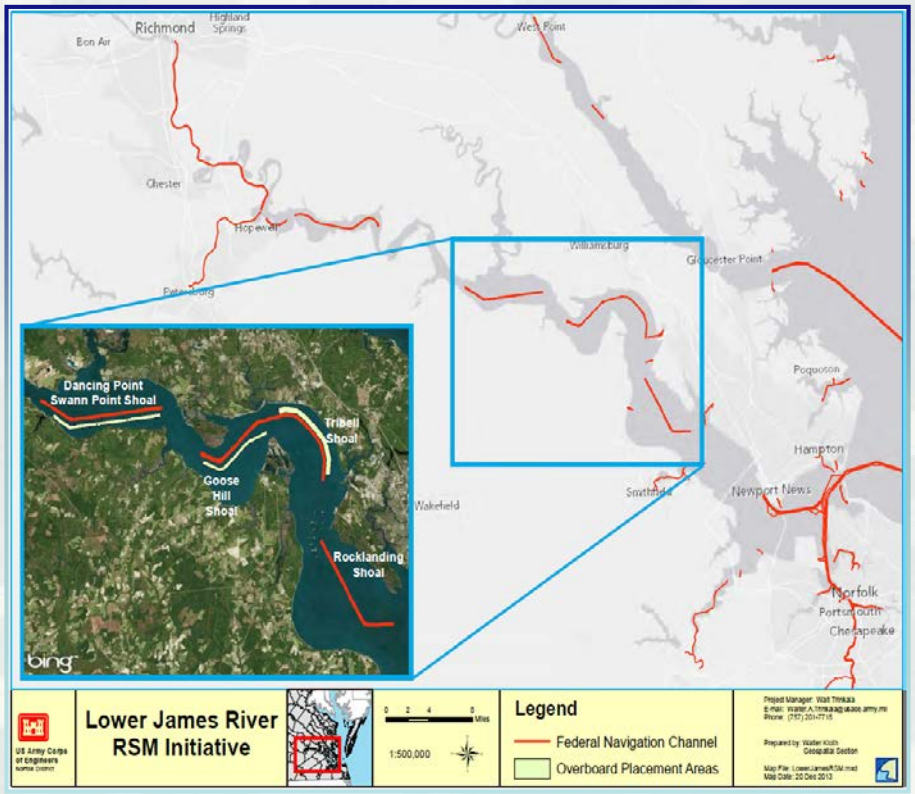
The purpose of this study is to:1) Study the overall regional sediment transport patterns within the Lower James River Initiative region and 2) Focus on exposure from the transport of placed material at the Goosehill Channel region.

Challenge/Objectives

- 1M CY of material is annually dredged from the James River
- Draft/tide restrictions have been placed, which imposes the vessels to be light loaded and impacts the time to travel. Therefore costs increase.
- Previous study demonstrated that a regional perspective must be utilized to understand this system

Approach

- Numerical Modeling
- Field Data Collection: Sediment Characterization (Grainsize, erosion):
  - Extensive Bed Sediment effort
  - Placement area specific



What Is Our Modeling Approach?

Short-term Concerns (2-4 weeks)

Hydrodynamic Modeling (CH3D)
How is the water moving?
Velocity, Salinity, etc

↓

Pipeline Placement Models
When sediment is placed, how much is immediately available for transport?

↓

Farfield Fate (PTM)
Where does the immediately available material go?

Long-term Concerns (2 year)

Hydrodynamic Modeling (CH3D)
How is the water moving?
Velocity, Salinity, etc

↓

Morphology (LTFATE)
Does the mound migrate back into the channel?

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Norfolk District

- **Walt Trinkala**
- **Robert Pruhs**
- **Chris Turner**

ERDC

- **Tahirih Lackey**
- **Sung-Chan Kim**
- **Jarrell Smith**
- **Earl Hayter**
- **Joseph Gailani**
- **Susan Bailey**
- **David Perkey**

Leveraging/Collaborative Opportunities

- **Dredging Operations and Environmental Research (DOER)**
- **VIMS/ERDC – Dave Perkey**

Concerned Parties

James River Partnership Group

"In 2013, more than $66 billion in goods moved in and out of The Port of Virginia and a growing portion of that cargo is moving across The Port of Richmond.
-Virginia Port Authority.

Oyster Bed *(Dave Harp)*

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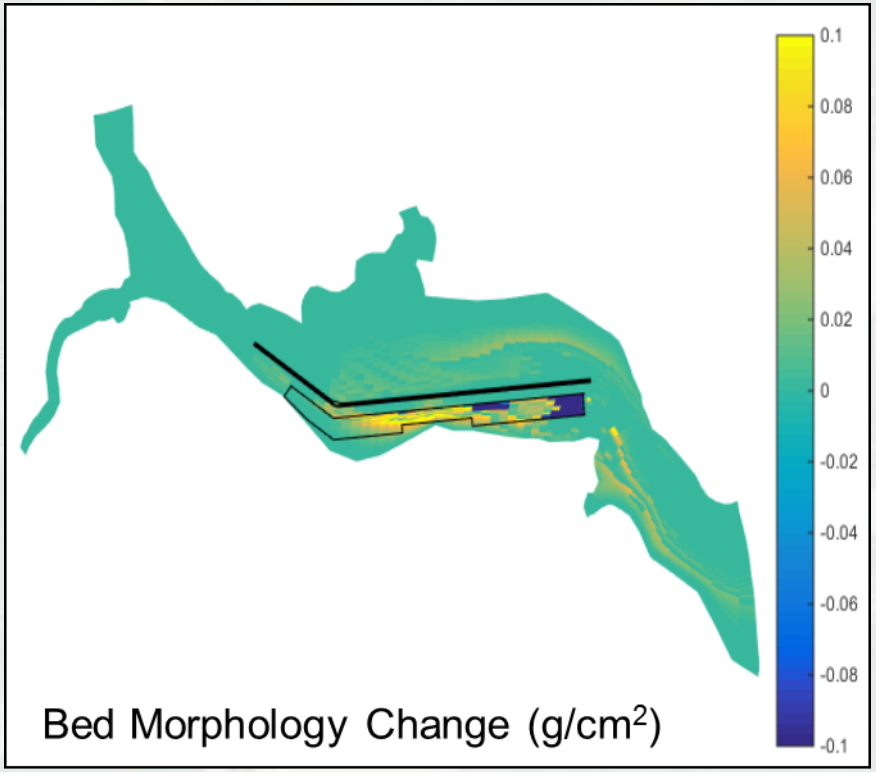
Accomplishments/Deliverables

Lessons Learned/Actions-construction

- **This is the first year of this study, however because it is associated with the previous study, we can go into this with lessons-learned**
- **To answer the real questions:**
  - **“What is the source of sediment”**
  - **“Can placement operational procedures reduce shoaling?”**

  we have to look at the regional sediment transport of the system instead of only the placement location.

- **A draft TR is available from the previous study (FY17)**
- **James River regional transport TR (FY18)**



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What was successful? What wasn't?

- The initial method of numerical modeling and field data collection was successful in understanding transport from Dancing Point – Swan Point Shoal
  - Results show a small fraction of sediment moves back into the channel from the placement site. This suggests that the source of shoaling is most likely not from the placement site.
- For this work, a regional perspective has been adopted, but the original approach (modeling and field data collection) is utilized

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How is this project benefiting the USACE and Nation?

- Maintaining the channels of the James (River) that serve Richmond is critical to its health and expansion of that facility and the regional economy."
  -Virginia Port Authority.

- This information can potentially be used to support management decisions for the James River.

- This project is of interest to a variety of perspectives (James River Partnership Meeting)

- By working with VIMS and DOER, we expand the use of data collected and provide the area with more detailed sediment characterization and transport information. It is planned to combine this effort with the Dredging Technologies web-app and SAGA to make this data available to the District and others.