

USACE Capabilities

Sediment Monitoring & Modeling

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National Center Auditorium
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02 February 2010



US Army Corps of Engineers
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OUTLINE

- Overview of West Bay Diversion analysis
- Sediment Monitoring
- Sediment Modeling



Related Points

- **Monitoring**

- ▶ Know what you want, why you want it, and how you'll use it.
- ▶ Justify every deployment

- **Monitoring Programs:**

- ▶ Long-term - background
- ▶ Short-term - specific



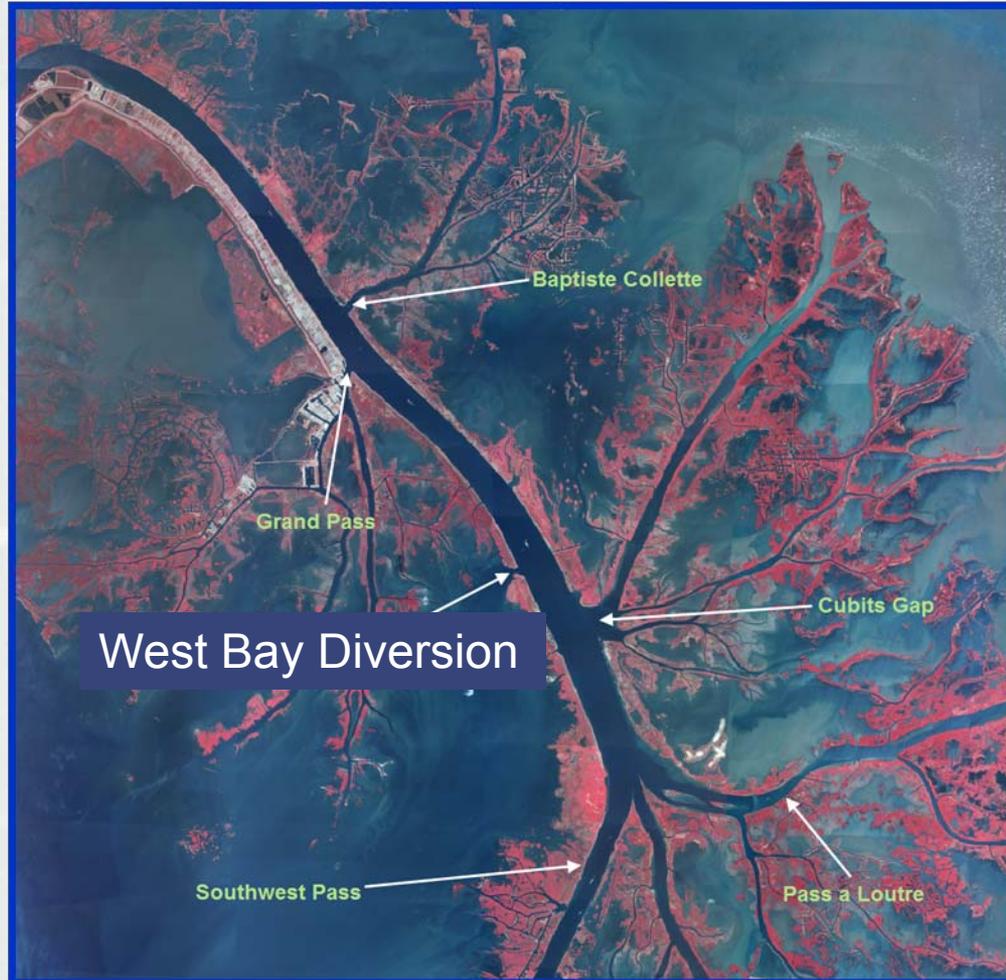
West Bay Diversion



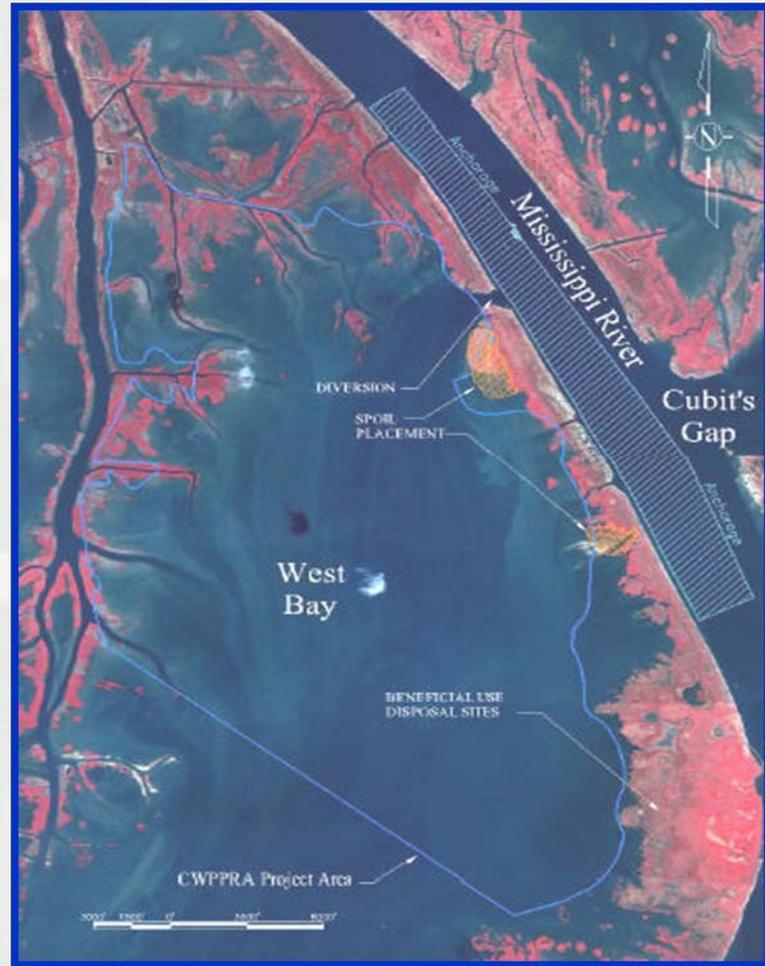
Hydraulic cutterhead dredge
Design 195ft wide, 25ft deep
Current – Width at river 1100ft
Width in throat 480 ft
Depth in throat 71 ft



West Bay Diversion



West Bay Area



Analysis Approach

- Data collection & Analysis
- Geomorphic Analysis
- 1-D Sedimentation Modeling
- 2-D Sedimentation Modeling

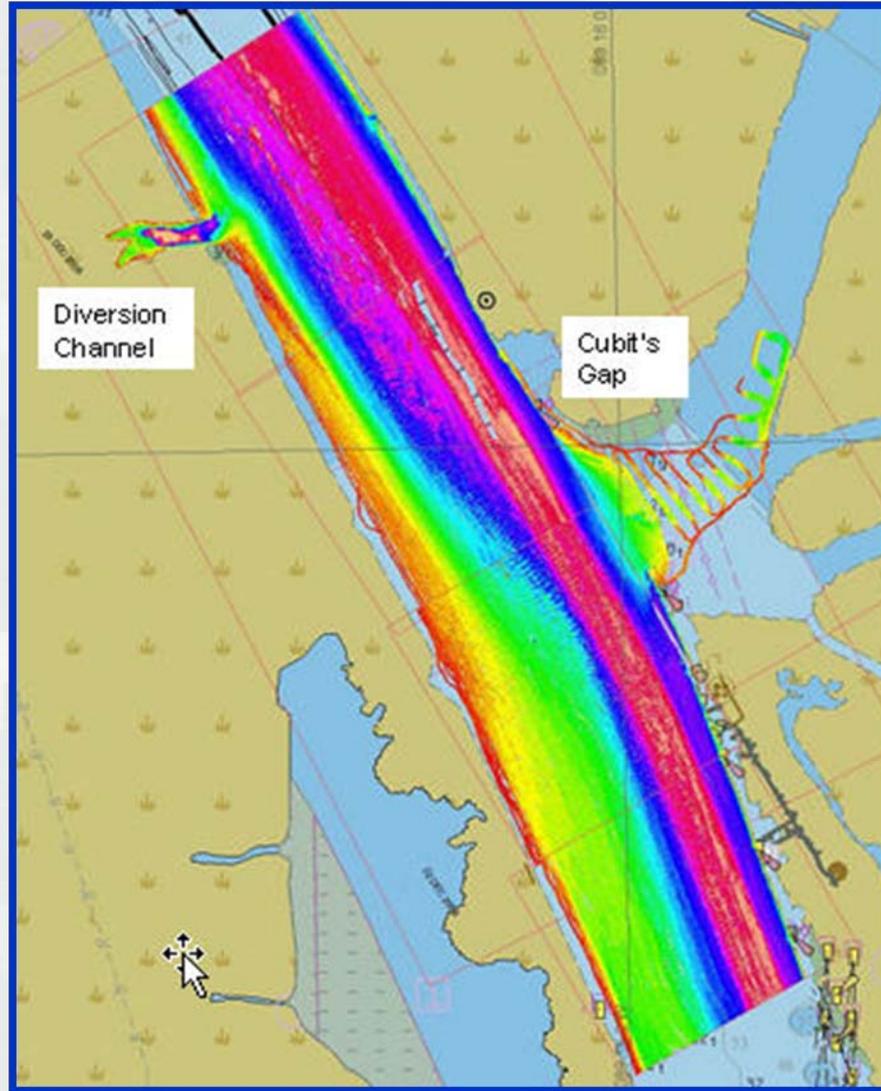


MONITORING

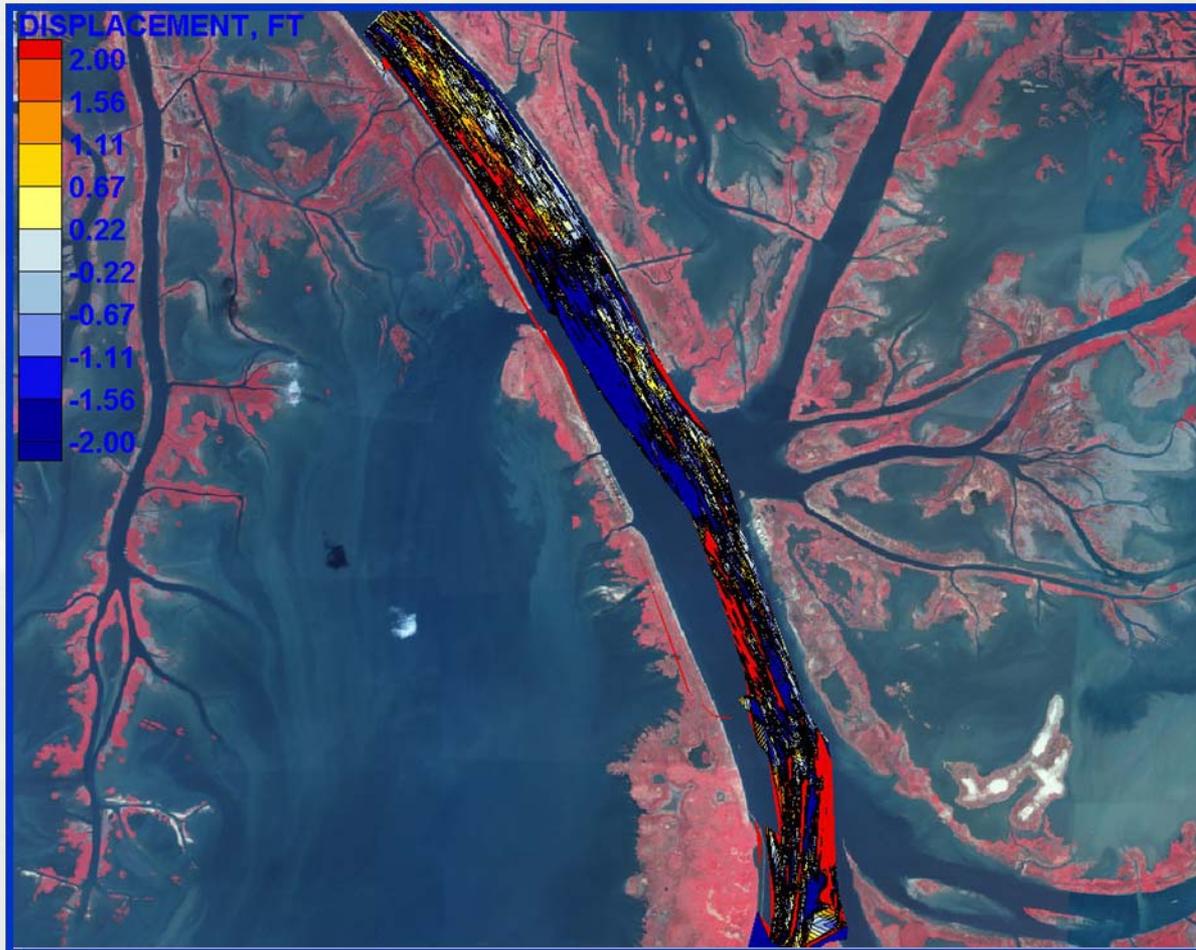


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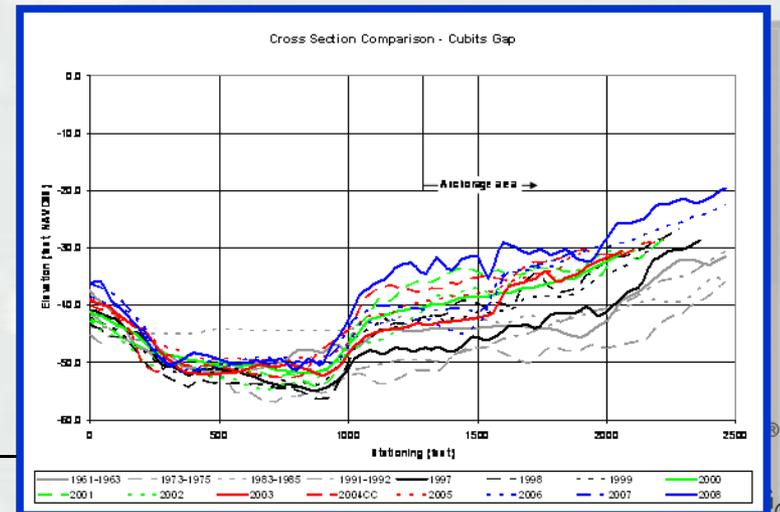
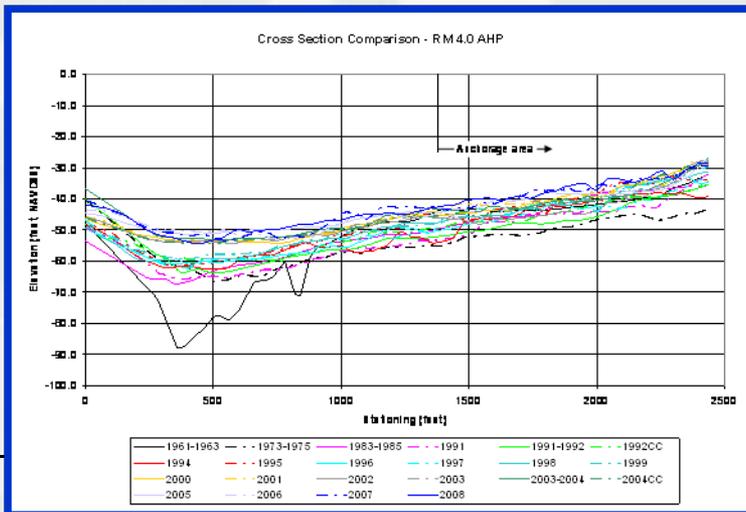
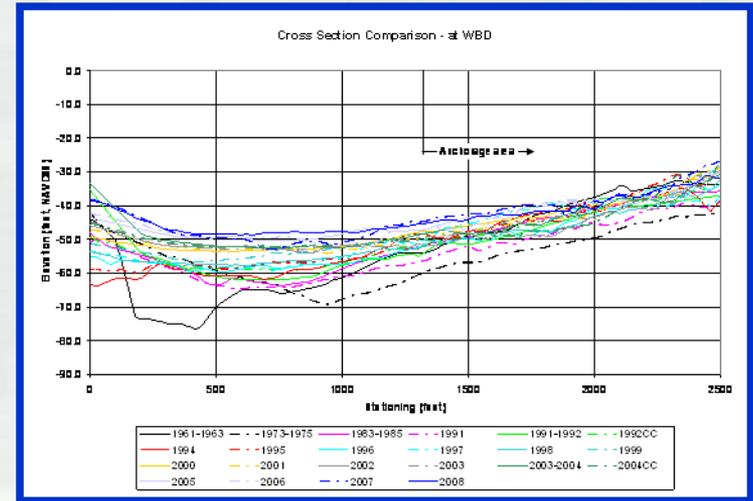
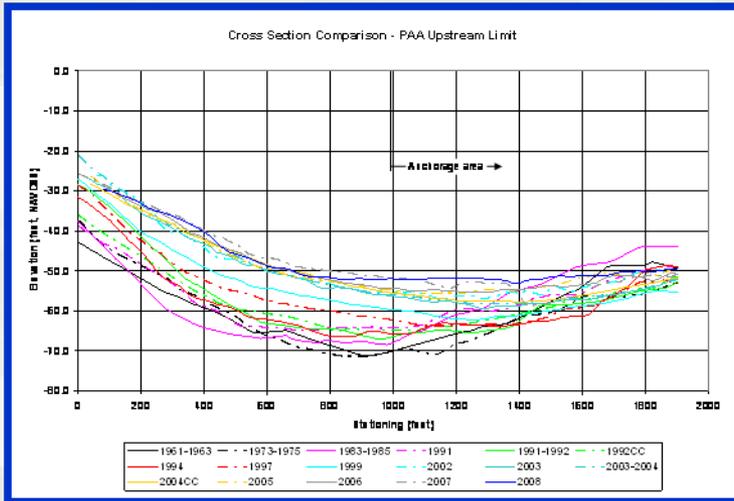
Multi-beam Survey



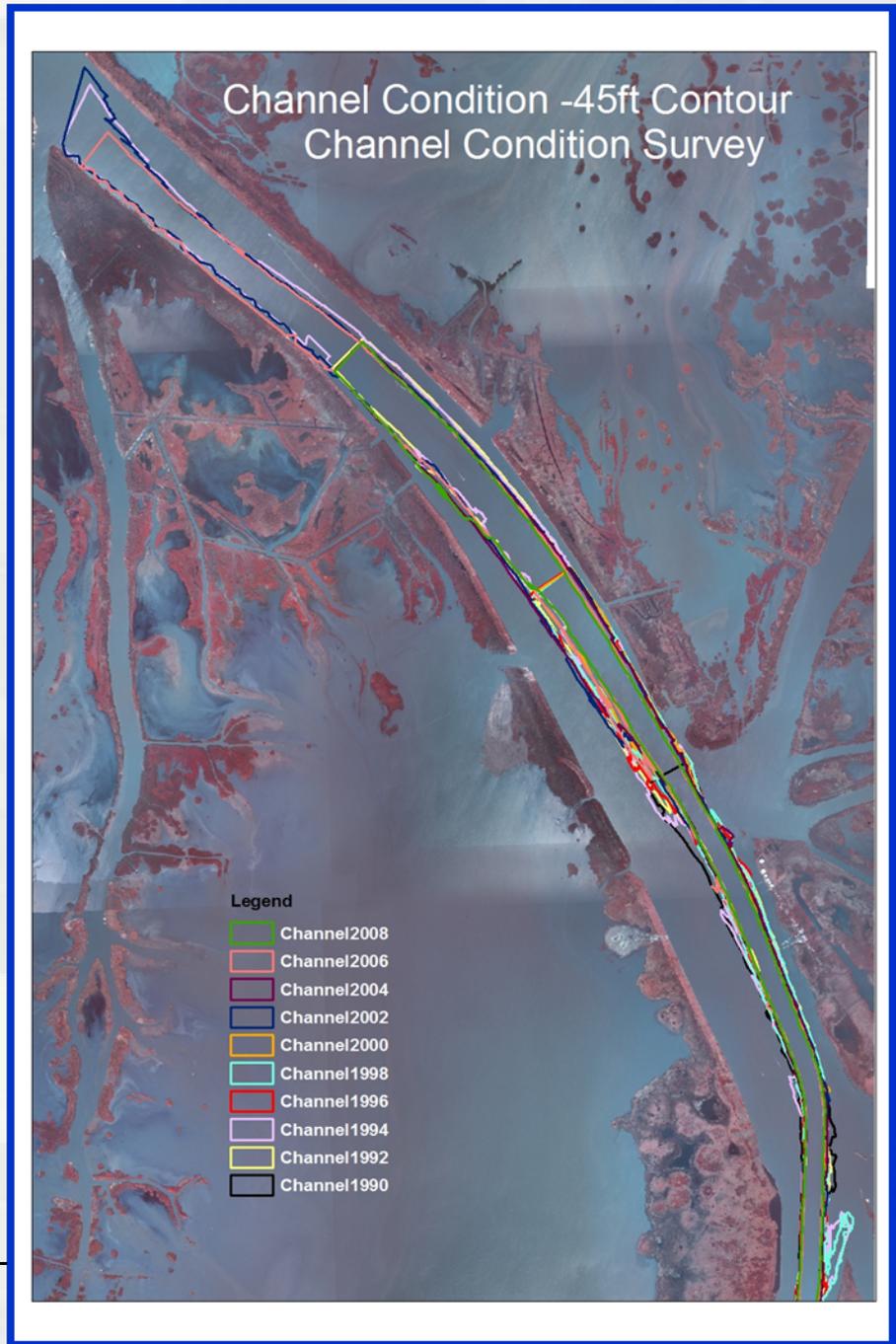
Channel Condition Surveys



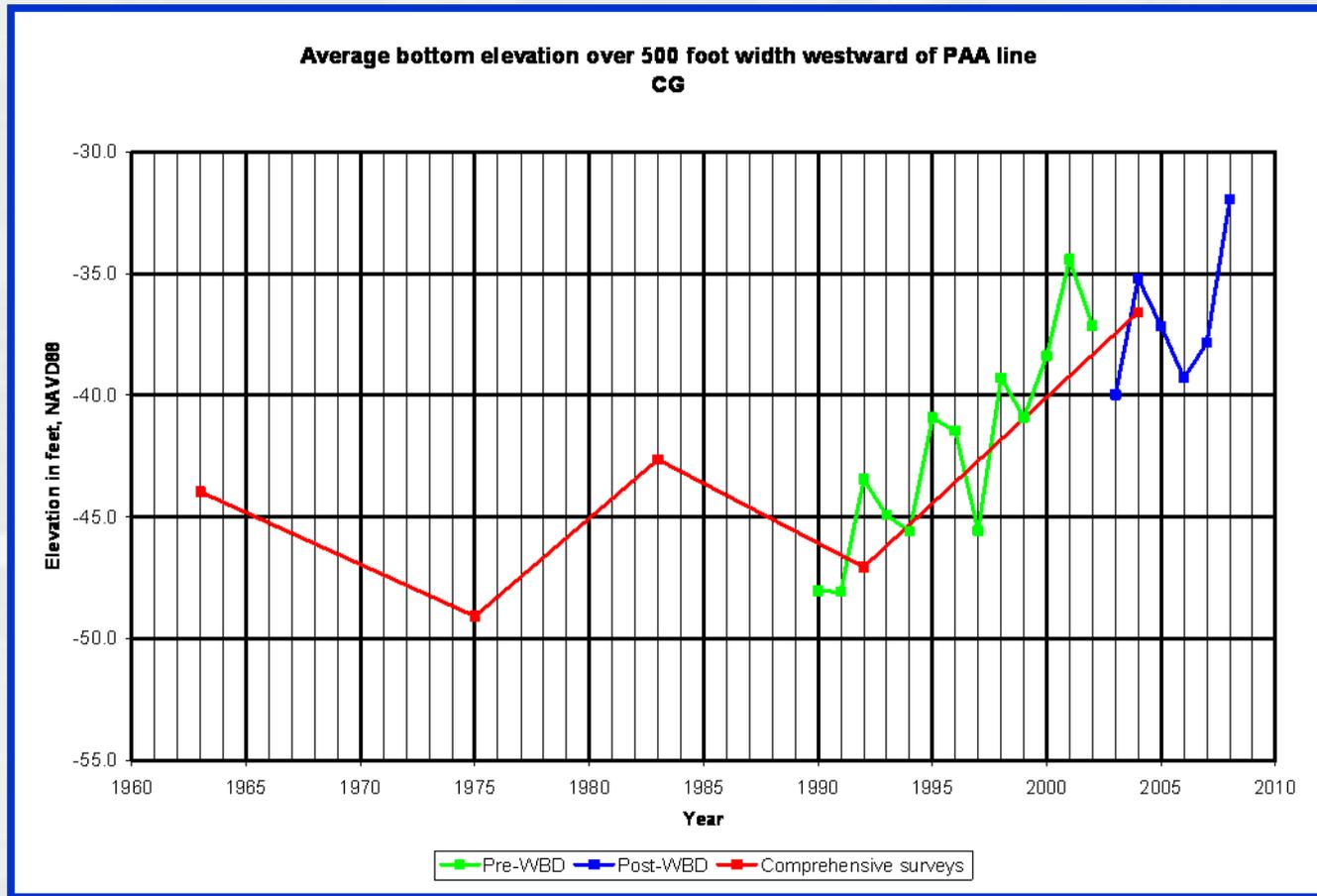
Geometric Data Analysis: Cross Section Comparisons



Channel Pattern Analysis

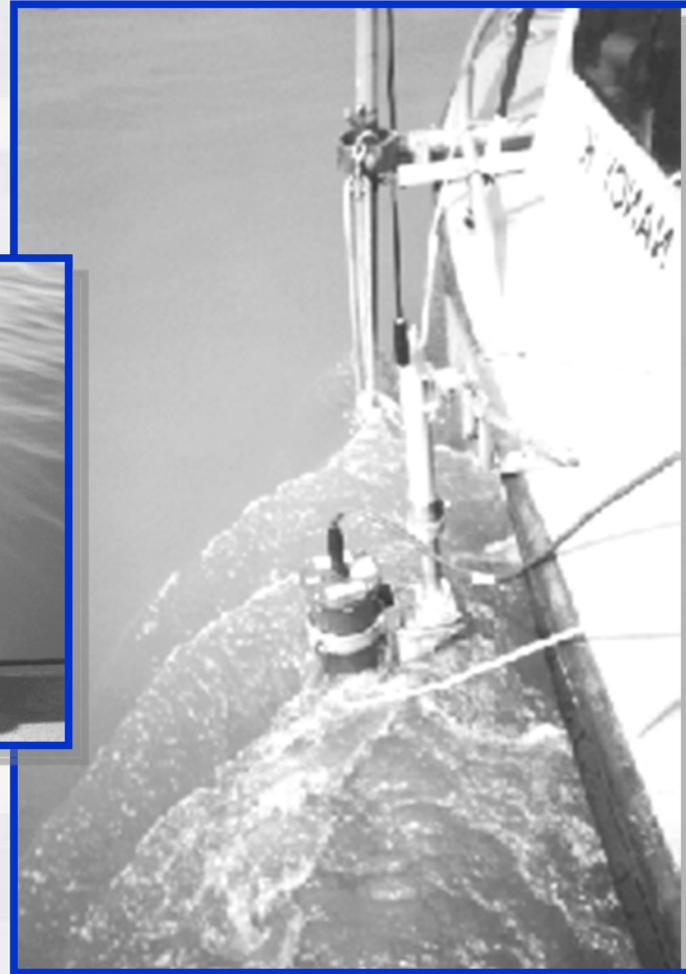


Average Bed Elevation Change

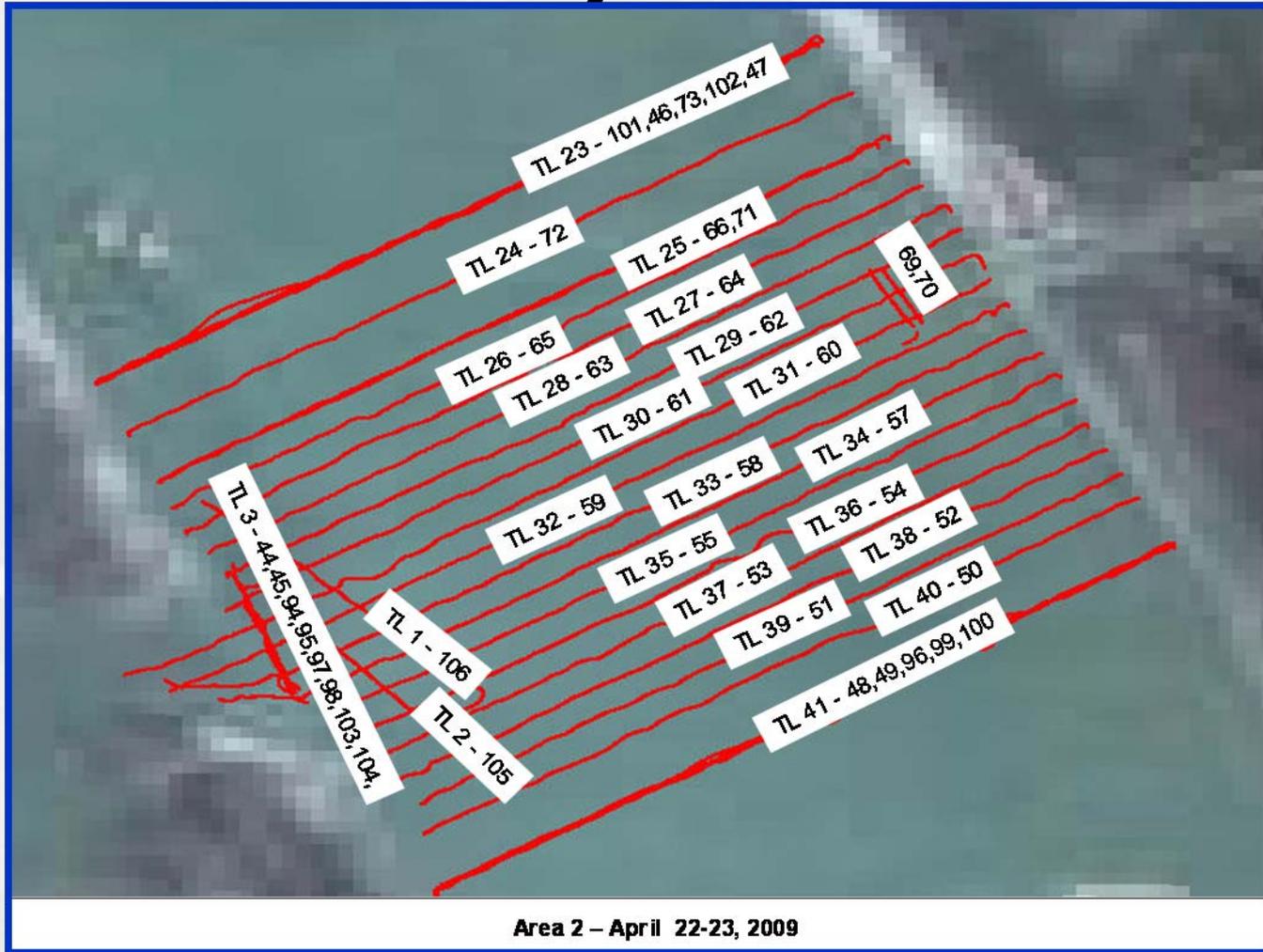




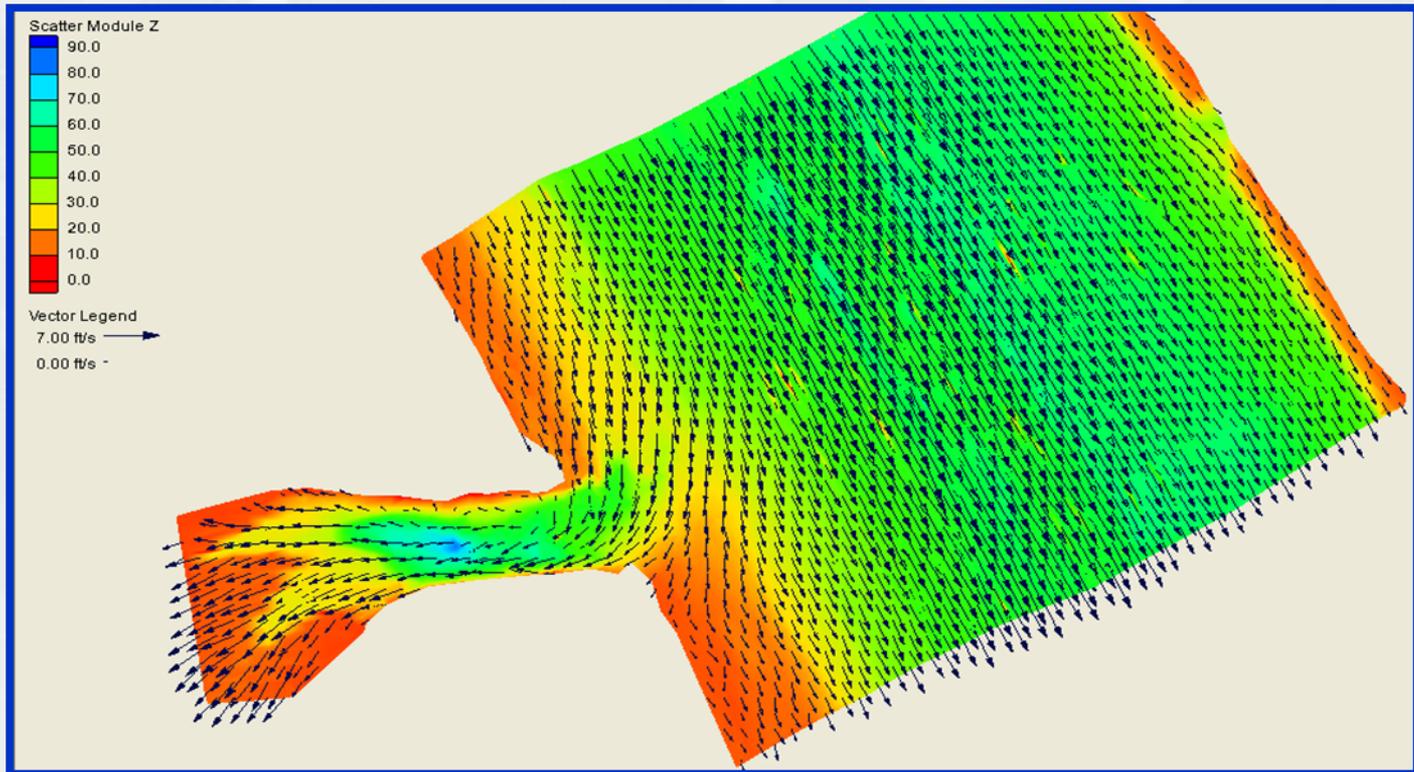
Acoustic Doppler Current Profiler (ADCP)



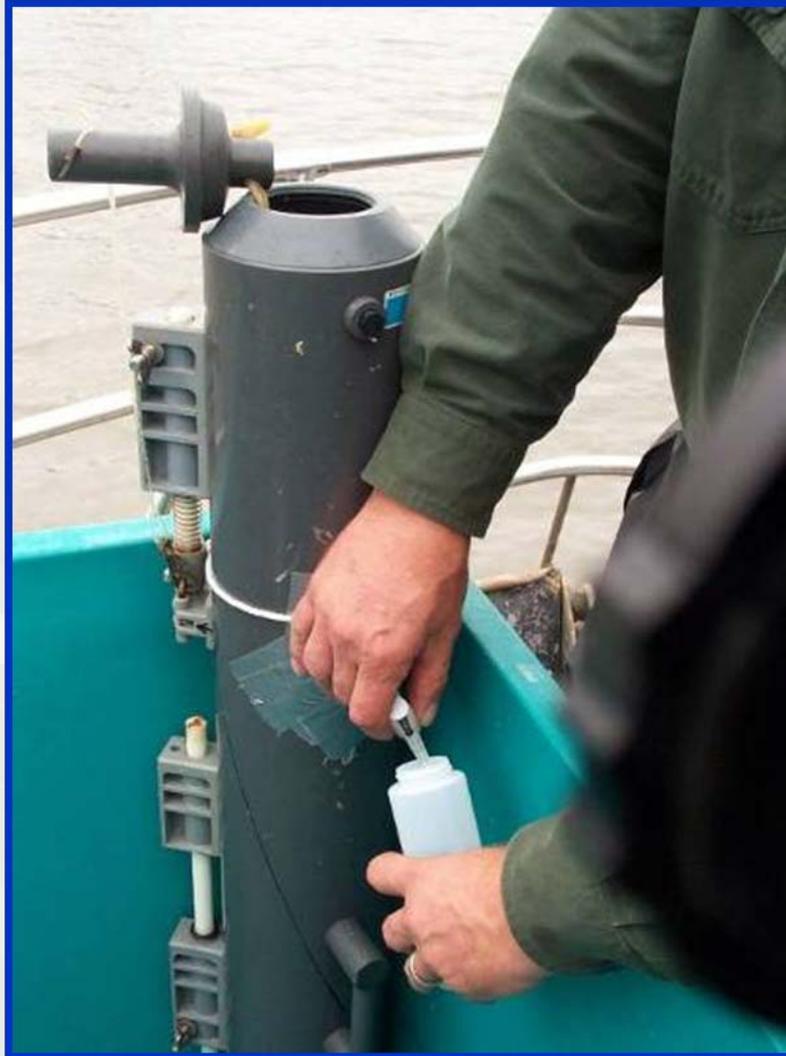
ADCP Transects West Bay Diversion



Water Velocities



Suspended Sediments

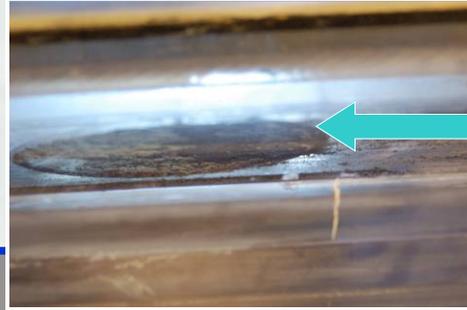


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Suspended Sediment Measurements



Bed Sediments



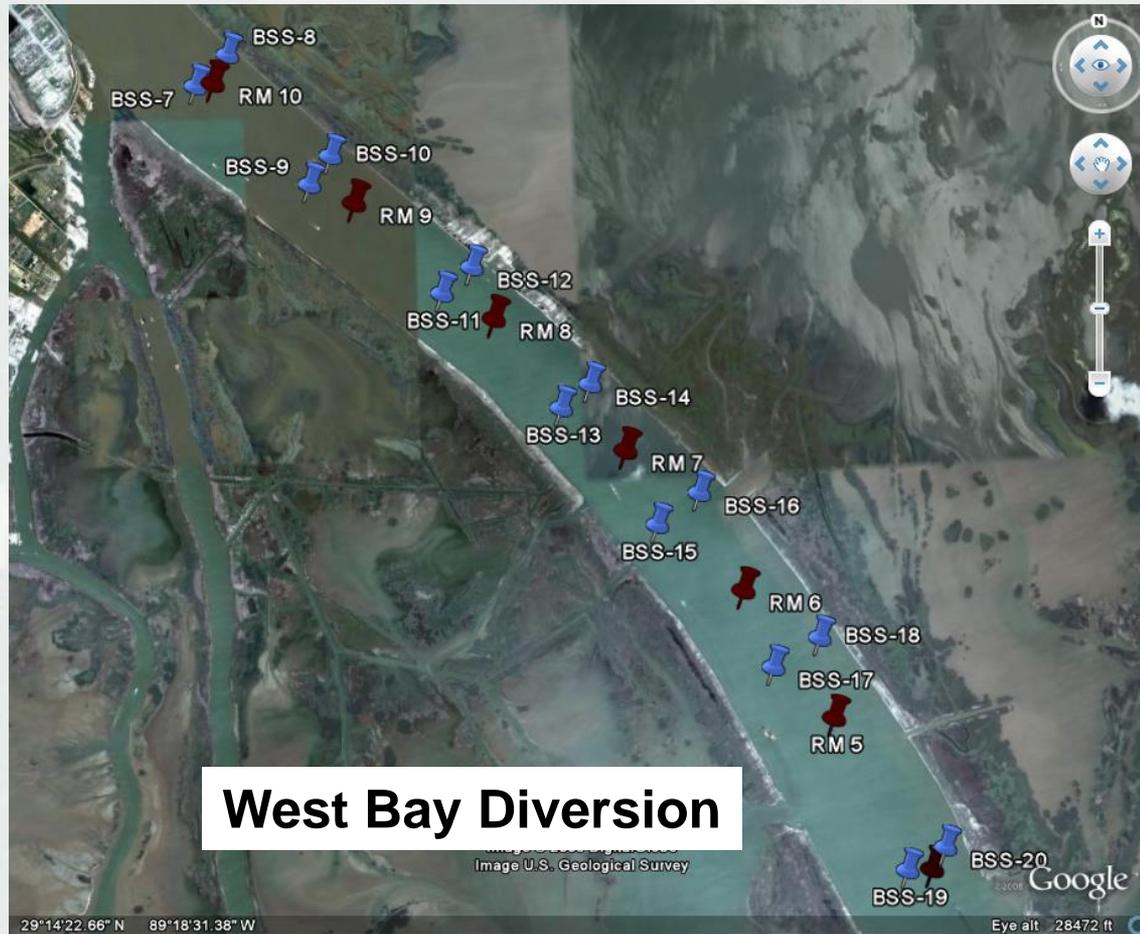
FLOW



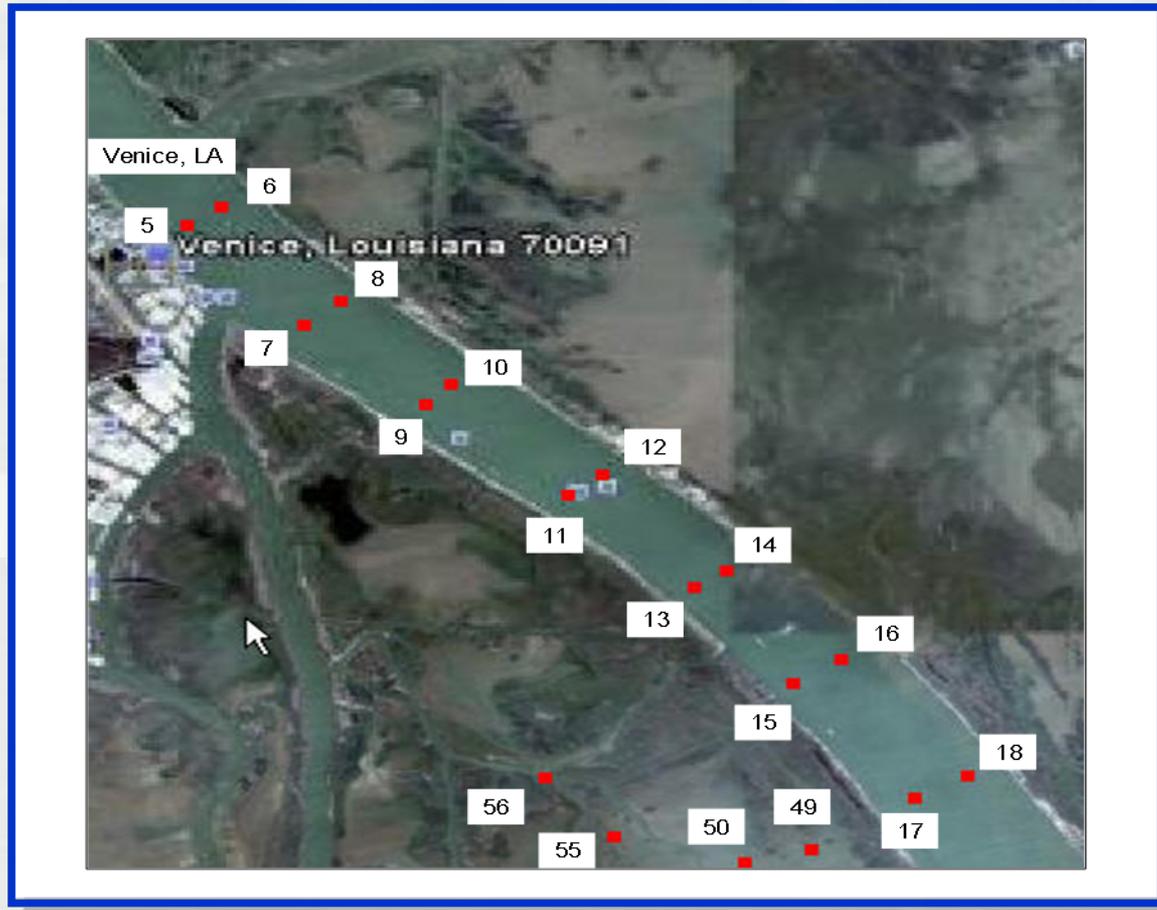
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River Bed Sediment Measurements



Drag and Push-core Samples



Sediment Flux Computations

June 16—17th

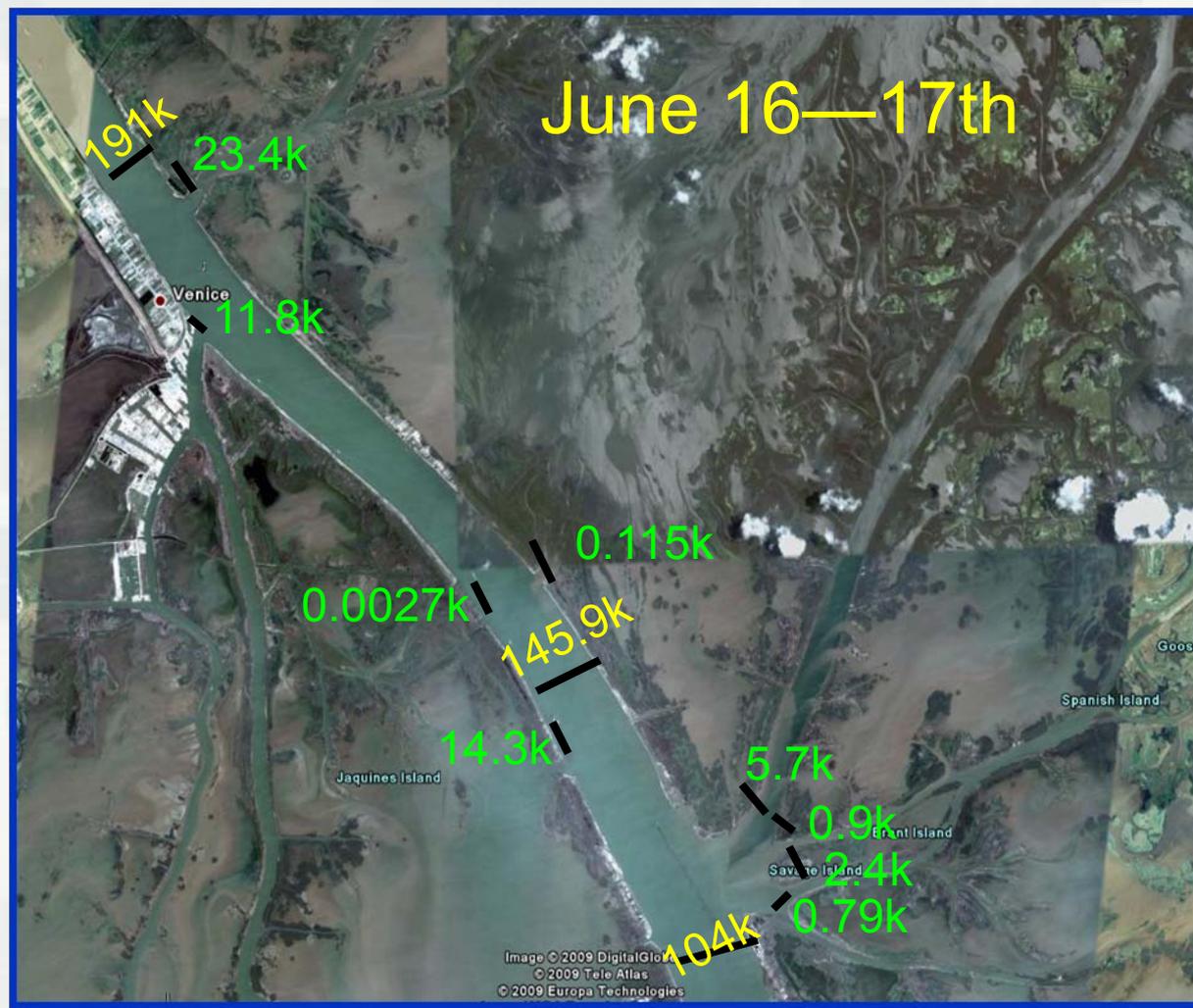


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Line	Total Q (ft ³ /s)	Sed Flux (Tons/Day)	M2
R-2.6	385,500	104 K	101 K
R-5.2	568,000	145.9K	171 K
R-6.5-LB	4,300	0.115 K	.175 K
R-6.4-RB	600	0.003 K	0 K
R-12.1	698,500	191 K	200.0 K
CGRP	7,300	0.79 K	1.1 K
CGBB	21,000	2.4 K	3.4 K
CGOP	9,000	0.9 K	1.1 K
CGMP	50,000	5.7 K	8.6 K
WBD	51,500	14.3 K	16.0 K
GP	74,300	11.9 K	15.7 K
BCB	72,100	23.4 K	18.0 K



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MODELING

SEDIMENT BALANCE



PARTICLE TRACKING

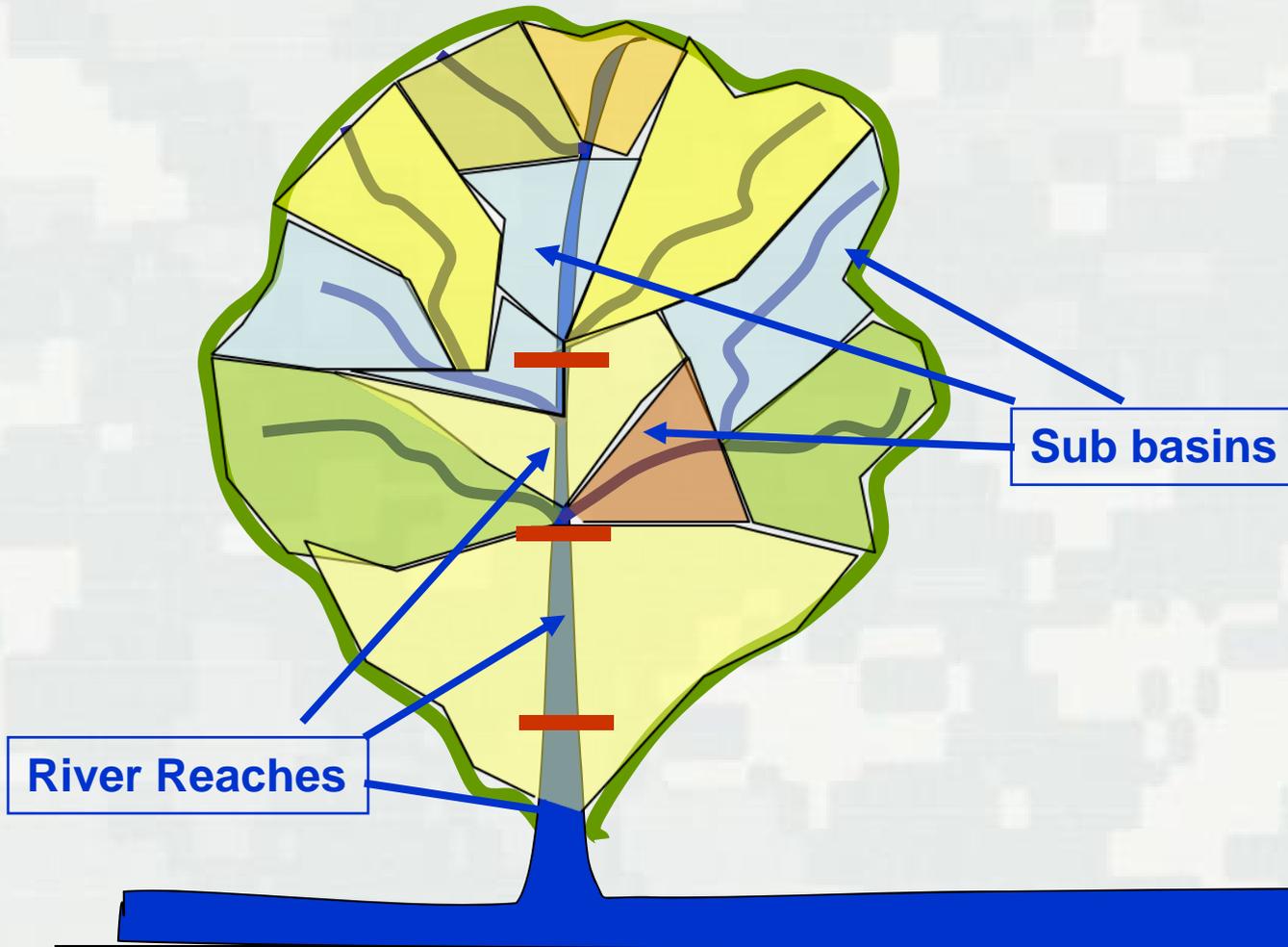


SEDIMENT TRANSPORT



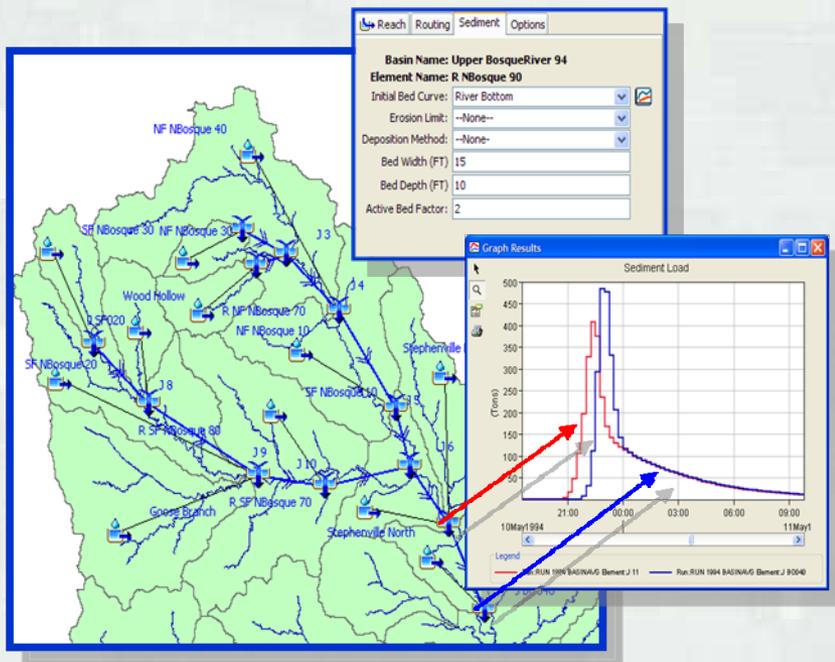
Sediment Balance

Sediment Impact Analysis Model (SIAM)

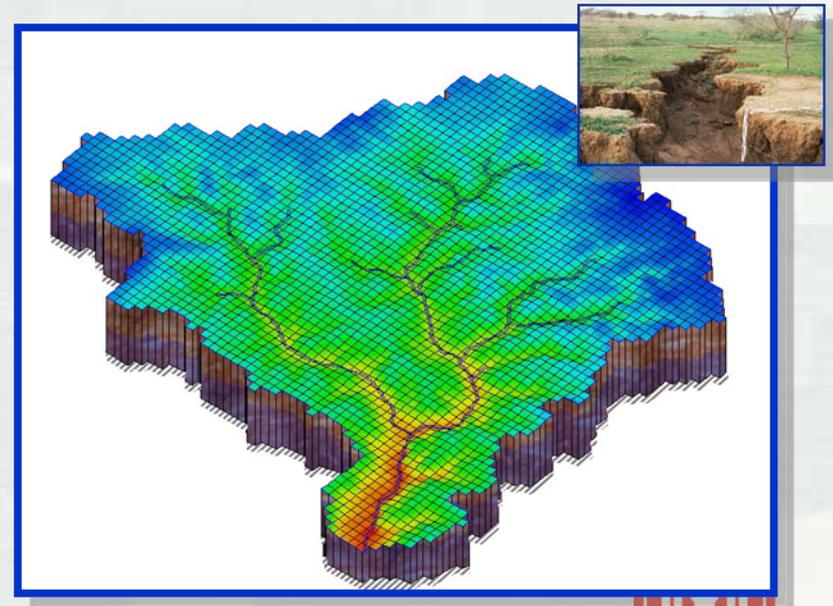


Watershed Models

HEC-HMS



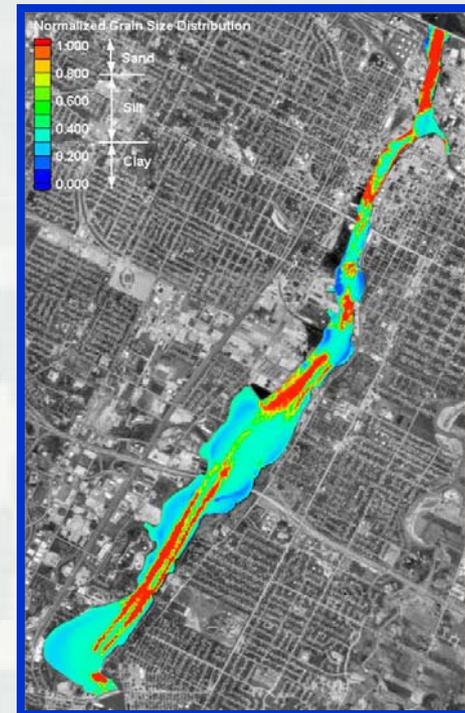
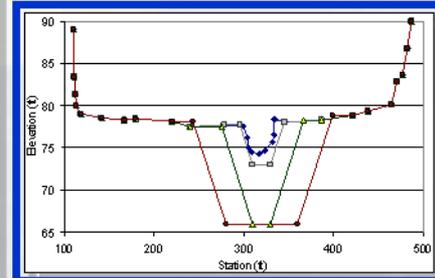
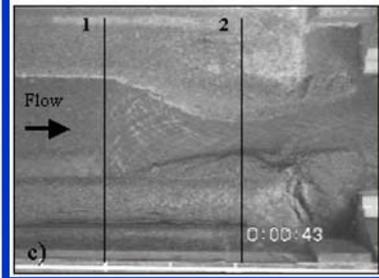
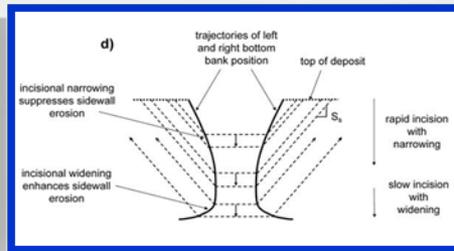
GSSHA



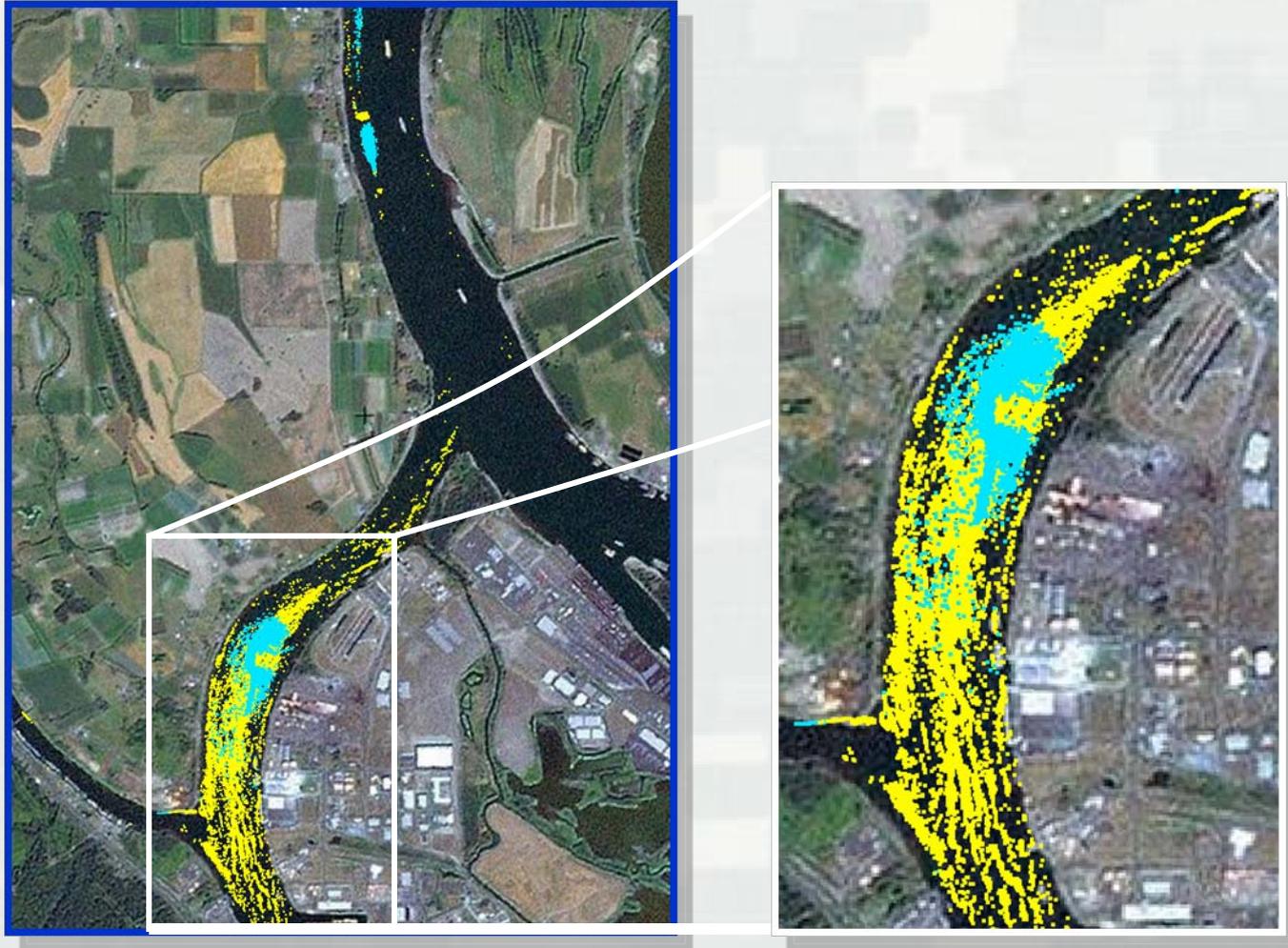
Dimensional Models

HEC-RAS

ADH



Particle Tracking (PTM)



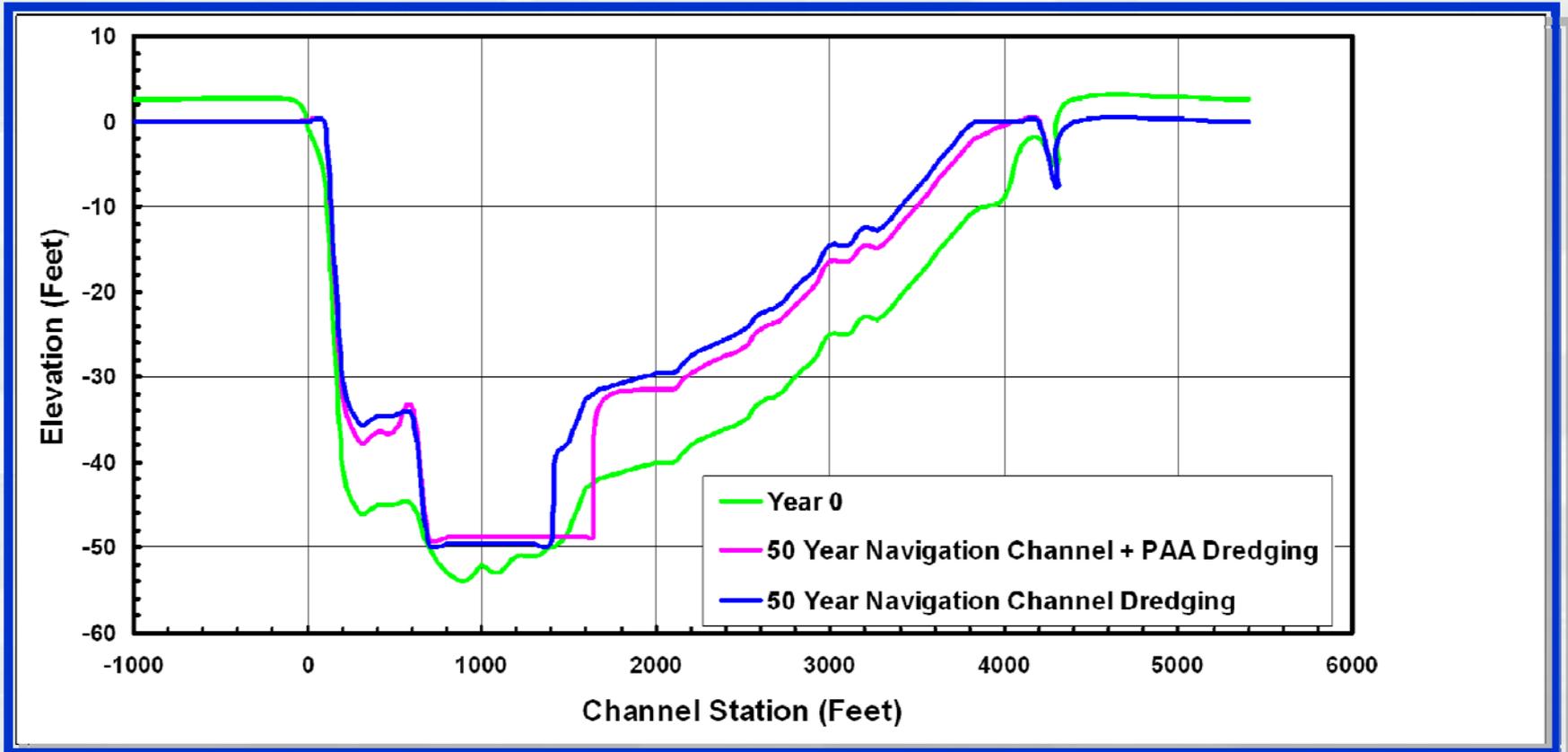
Computational Philosophy

Sediment Library – Open Source

- Bed Layering
- Flocculation
- Settling Velocity
- Erosion/Deposition Relations
- Non-equilibrium corrections
- Bed Slope corrections
- Armoring
- Transport Functions



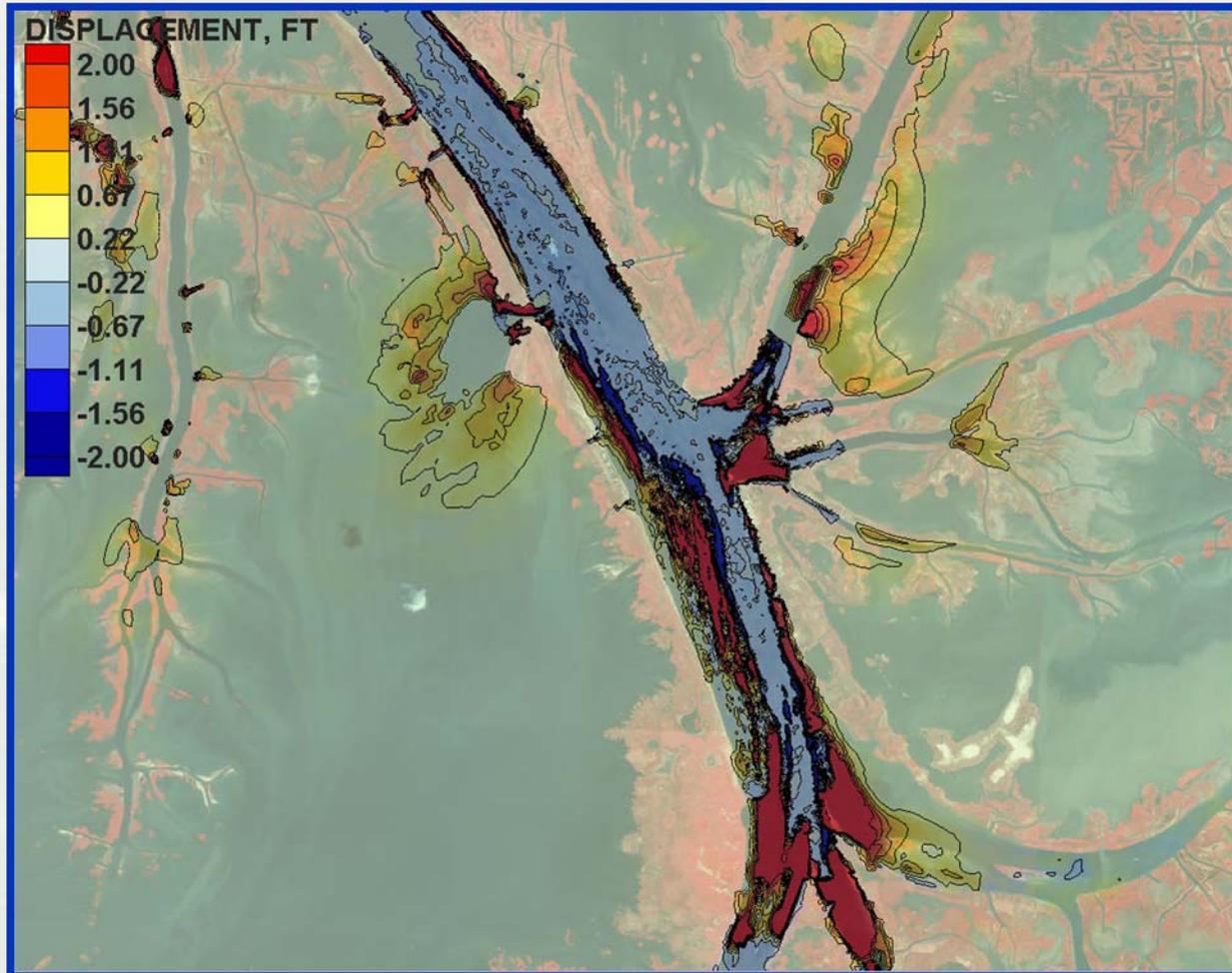
1-D Model



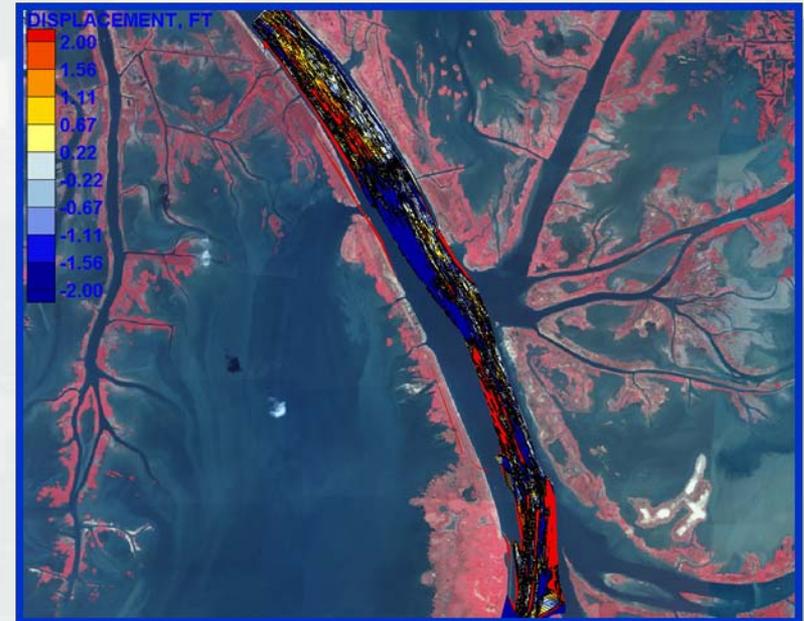
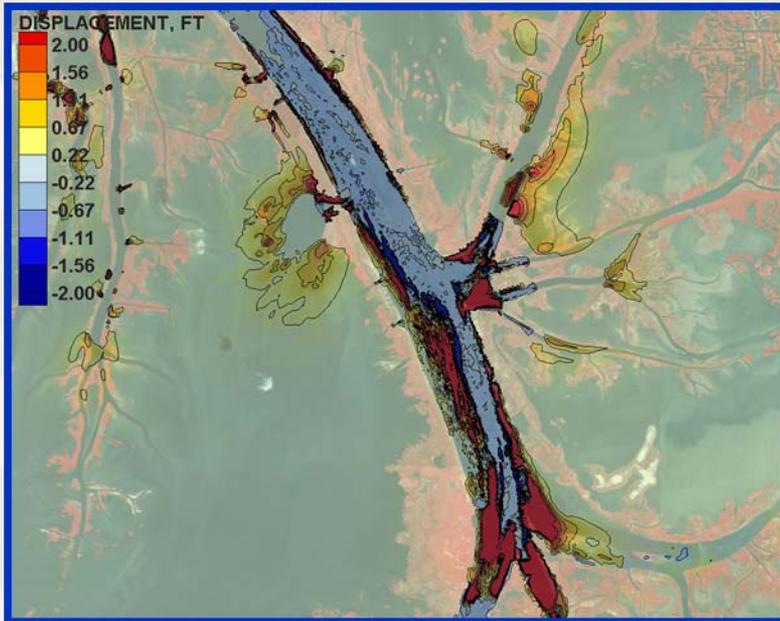
River Mile 2.46 – West Bay Diversion Open



2-D Model Computed Bed Change



2-D Model Results Comparison



Comparison of Modeled and Observed
Bathymetric Difference

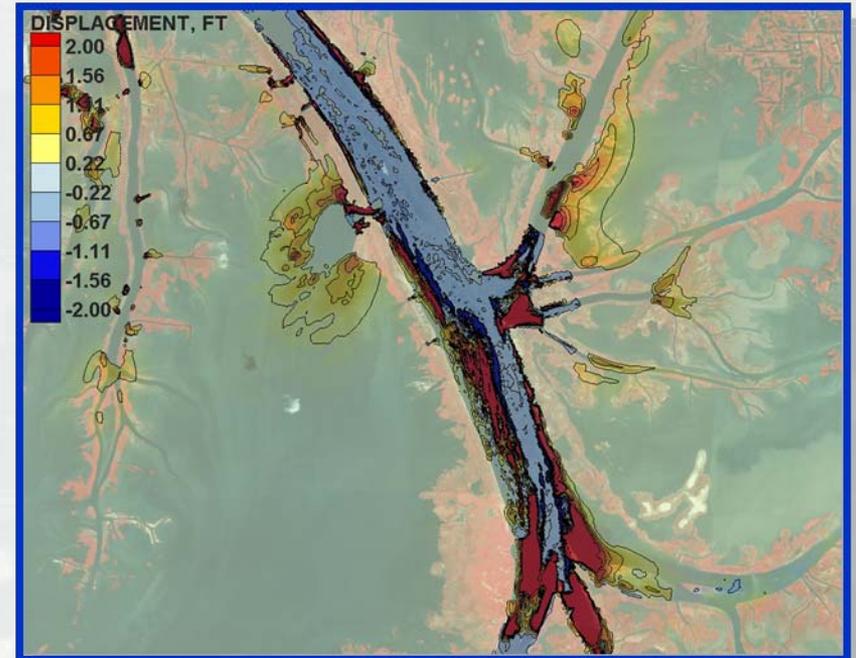
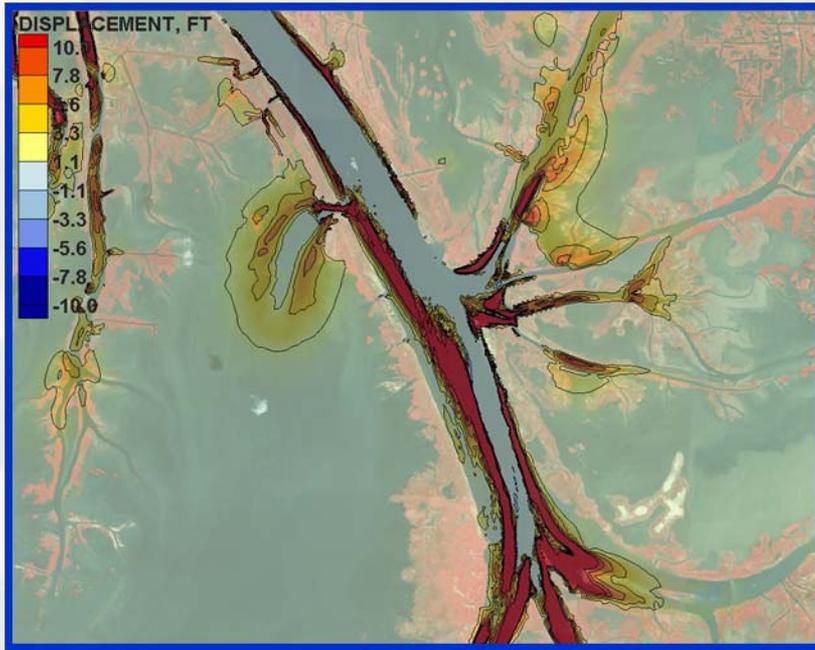


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2-D Model Cumulative Bed Change

Sediment-rich

Sediment-starved



OPPORTUNITIES

- Collaborate to identify monitoring needs
- Collaborate on sediment processes library
- Continue dialogue about monitoring & modeling capabilities
- Brief on other areas of common interest

