

Engineering Evaluation of Ft. George Inlet and Adjacent Beaches



Study Objectives

- Update previous model with 2002 bathymetry in Ft. George Inlet
- Model existing conditions for tidal currents and waves
- Evaluate effects of combined flood shoal and Ward's Bank alternative from previous study

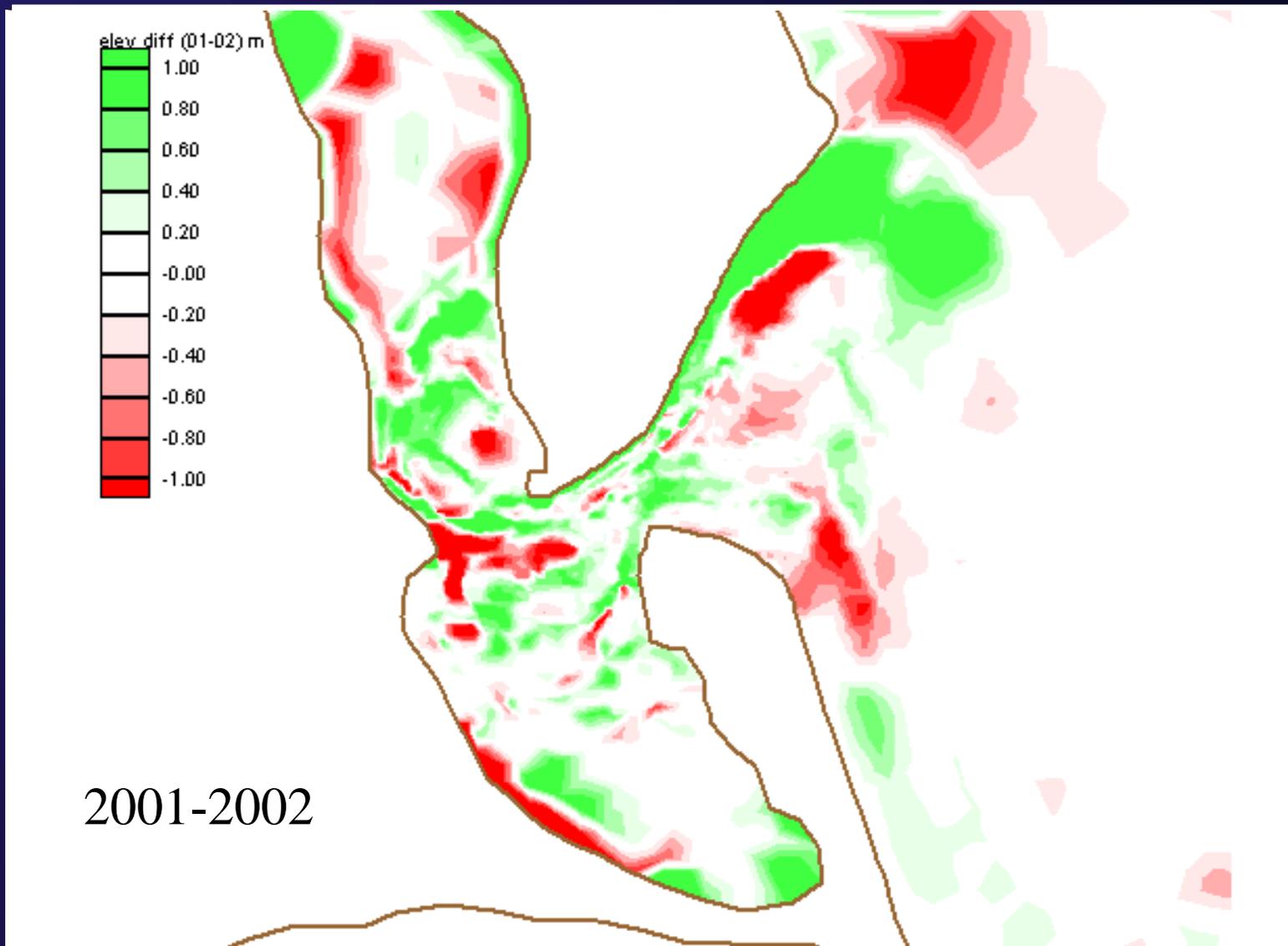




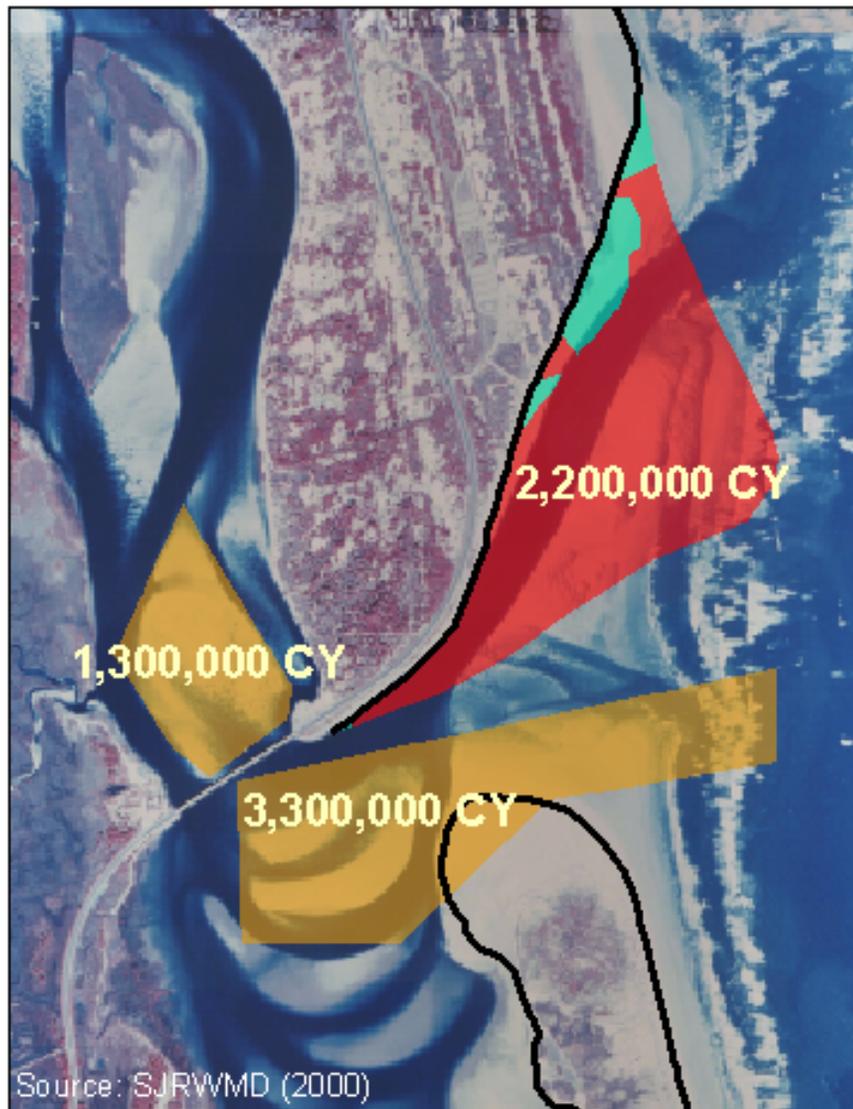
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Bathymetric Comparison



Proposed Borrow Sites And Fill



0 0.25 0.5 Miles

LEGEND

- BERM BREAK 2001 SURVEY
- DREDGE AREAS (-20)
- AS BUILT < 6 ft
- AS BUILT > 6 ft

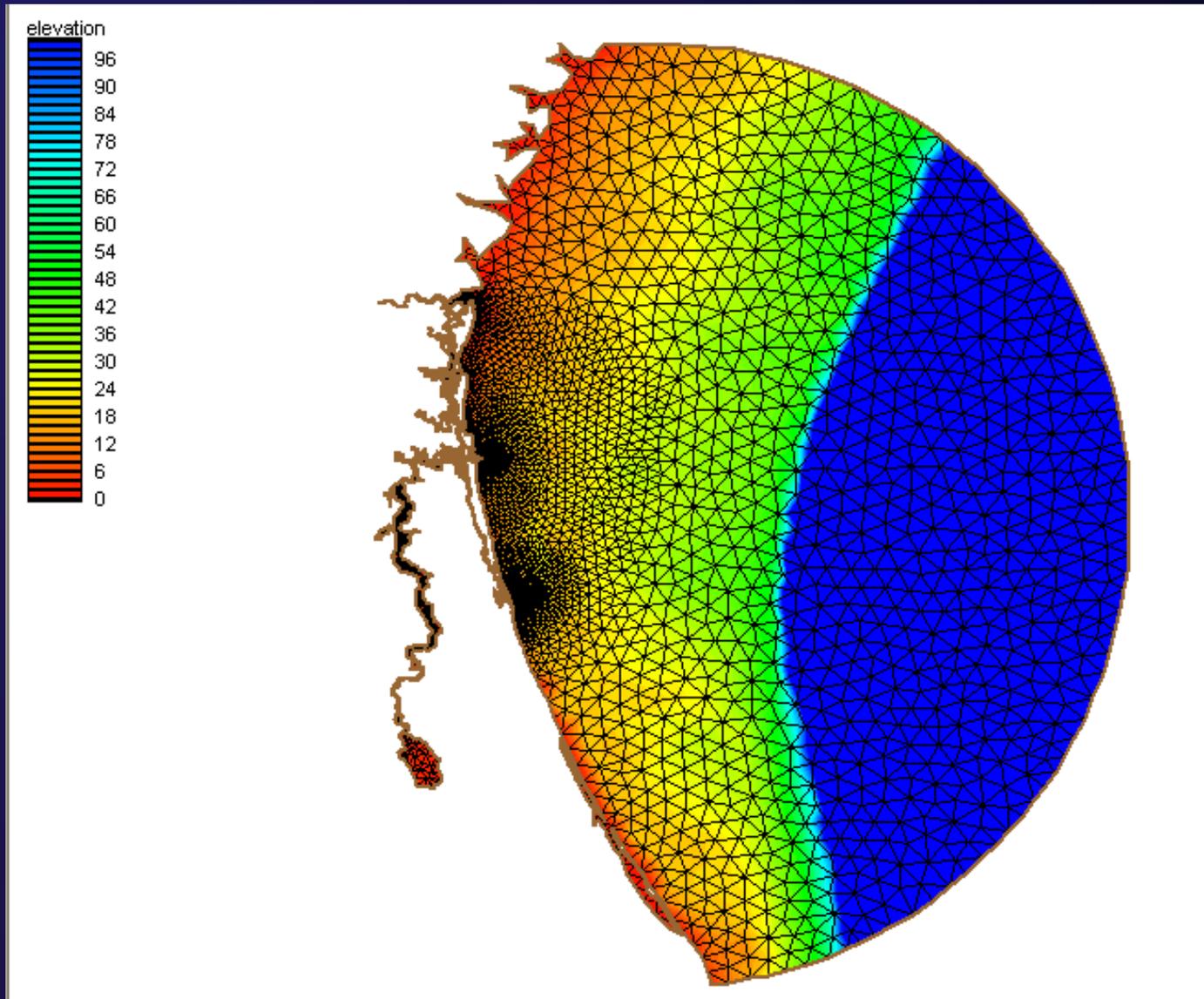


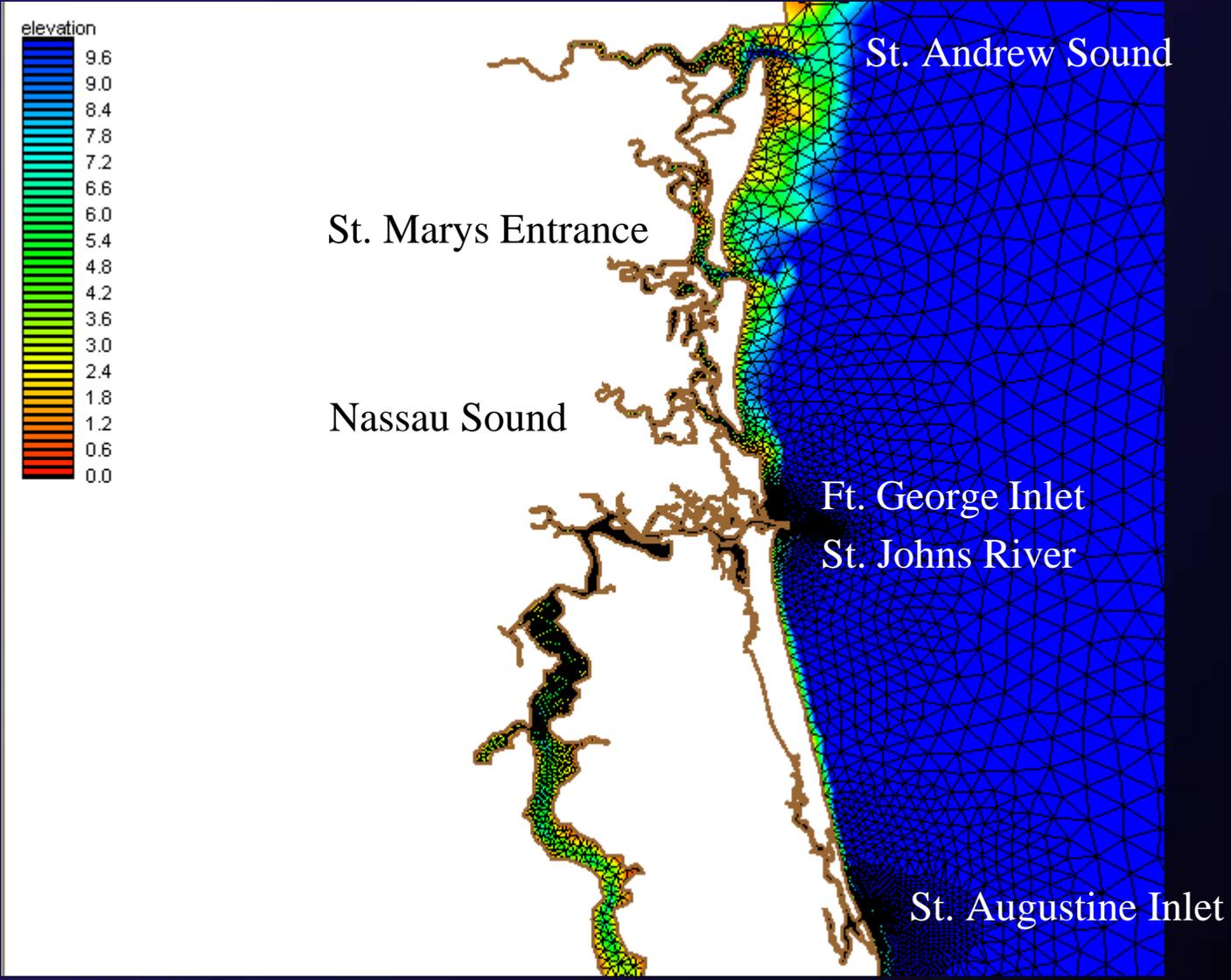
Tidal Circulation Modeling

- Purpose:
 - ◆ Evaluate Modifications to Tidal Circulation
 - ◆ Evaluate Changes in Sediment Transport
- ADCIRC
- Sediment Transport – van Rijn Formula

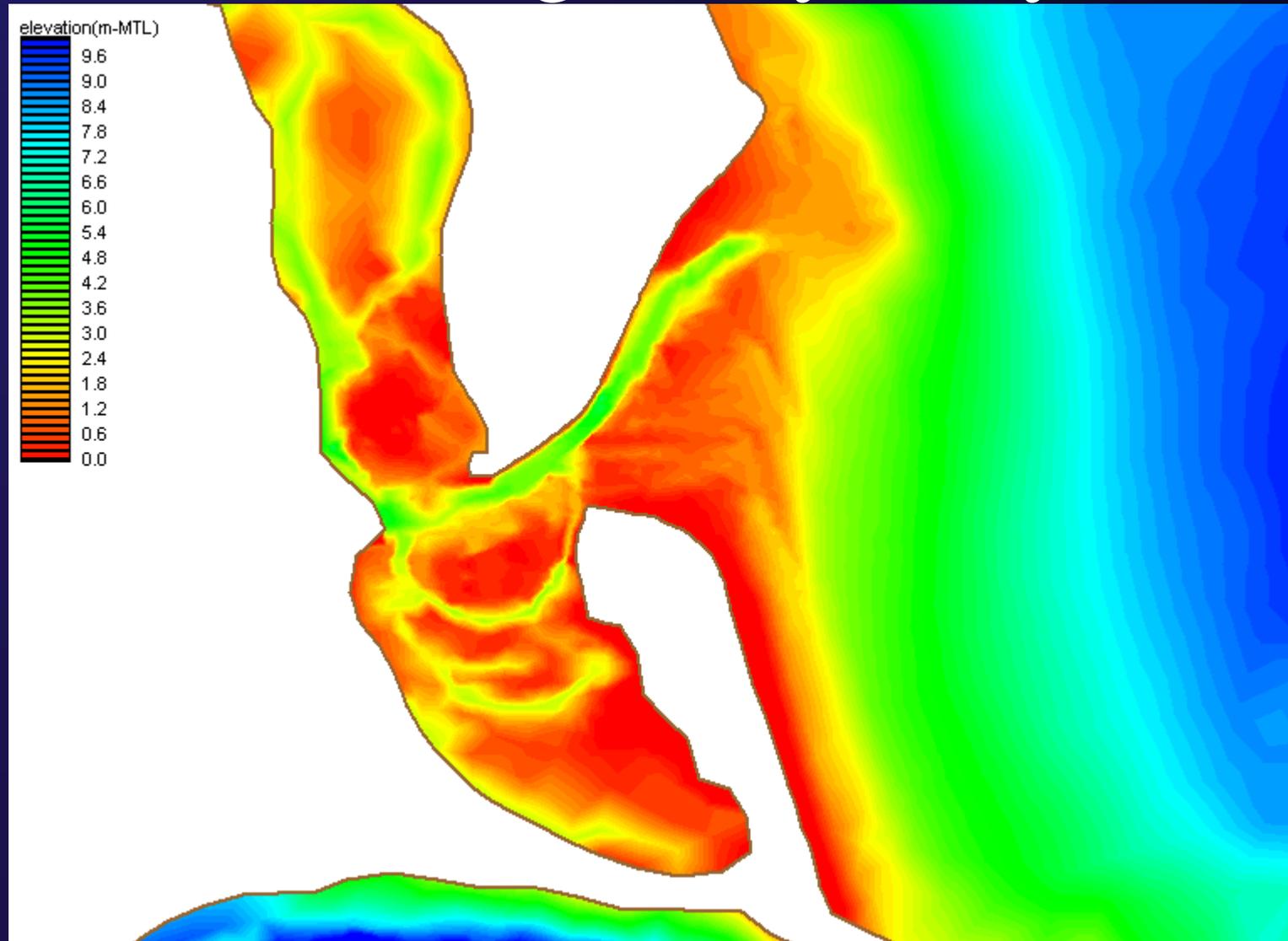


Model Domain

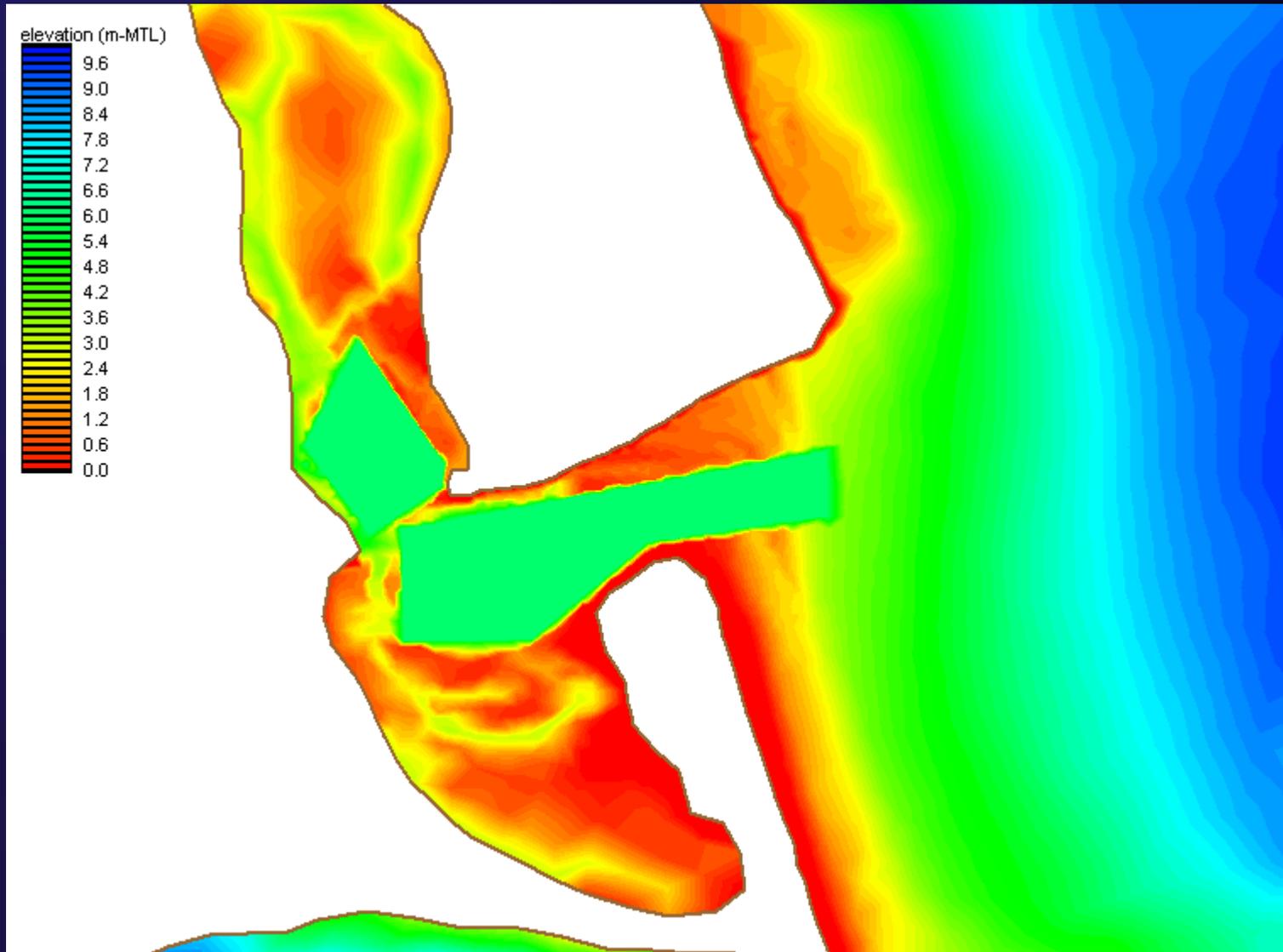




Existing Bathymetry



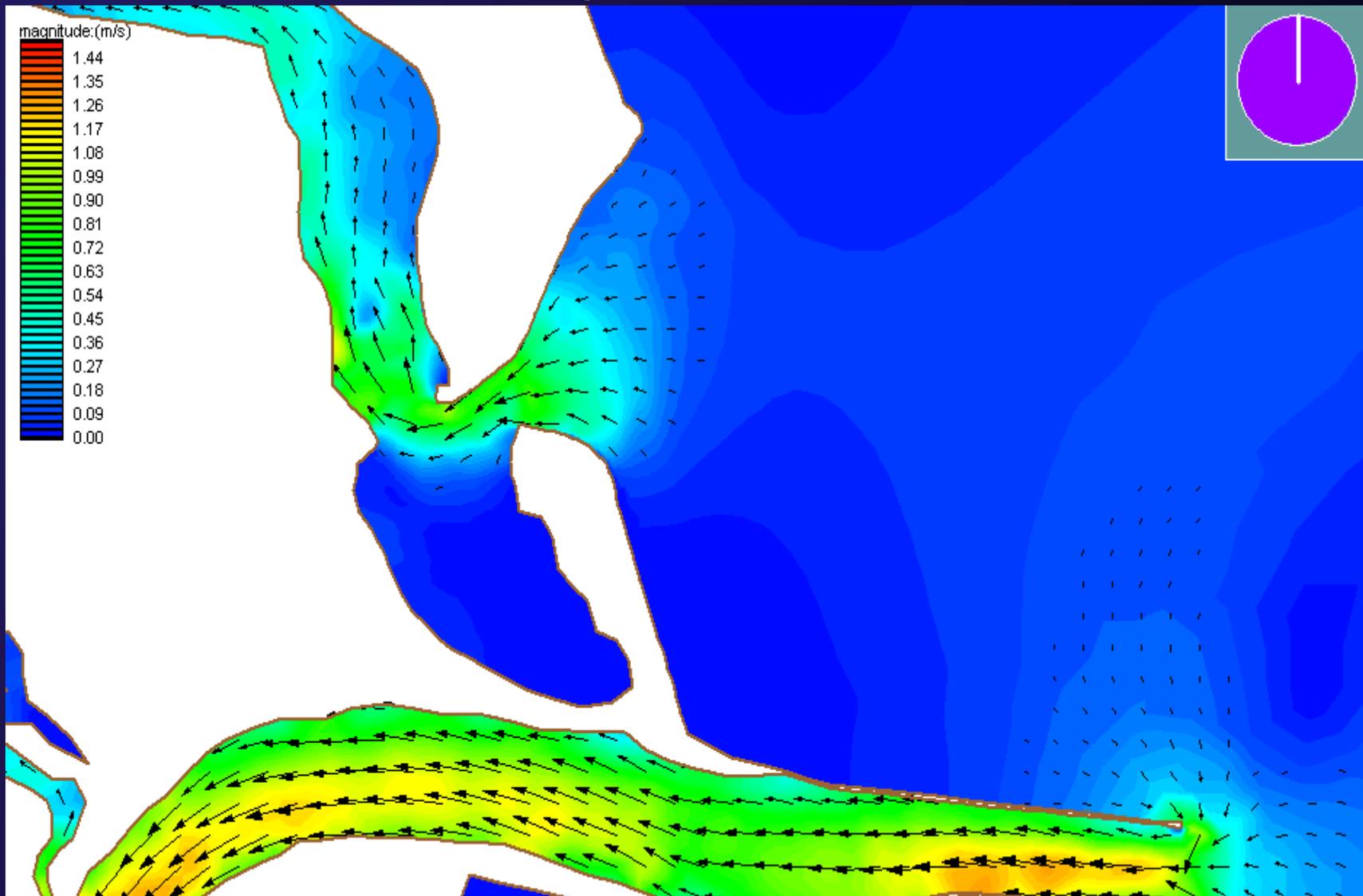
Combined Alternative



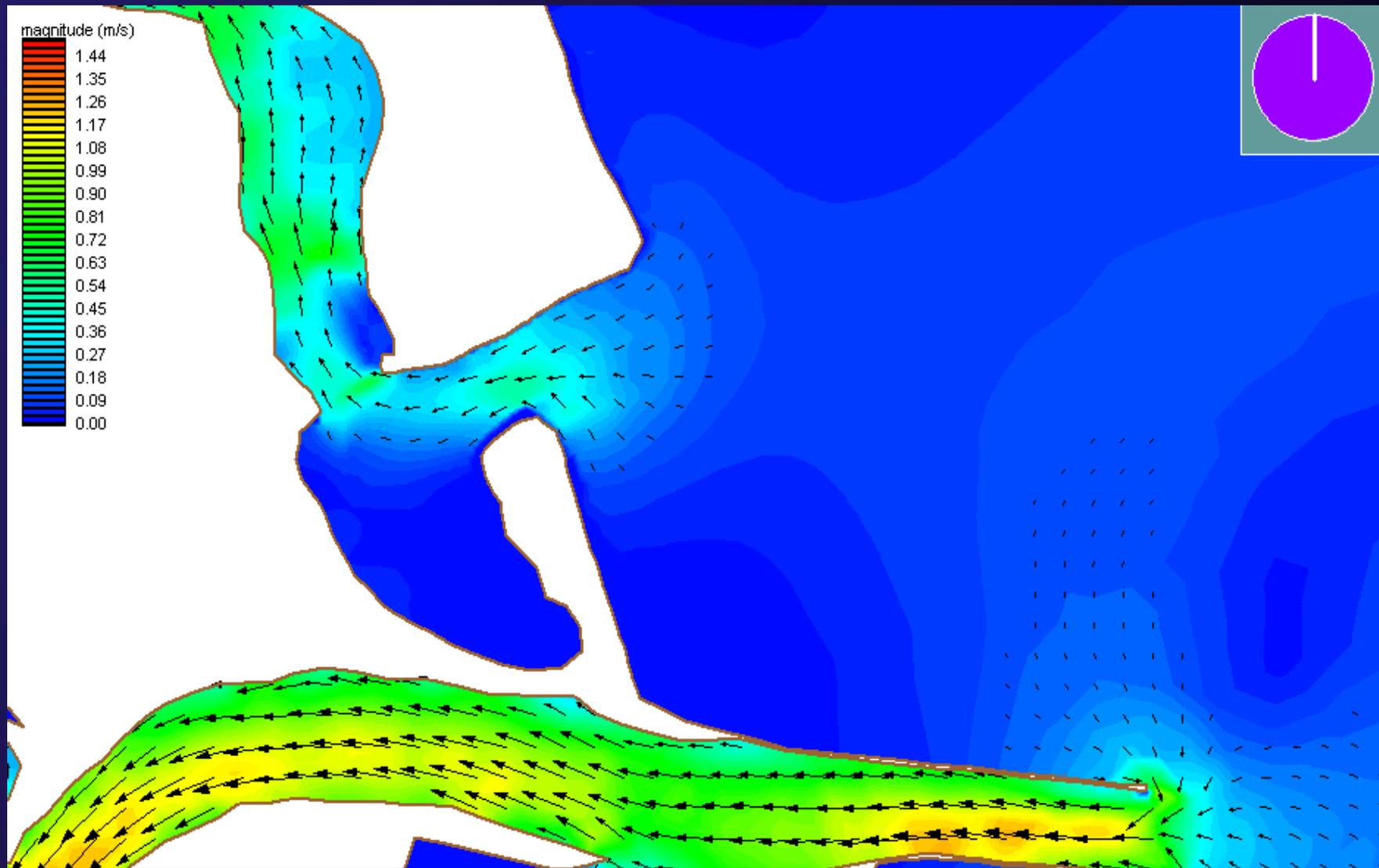
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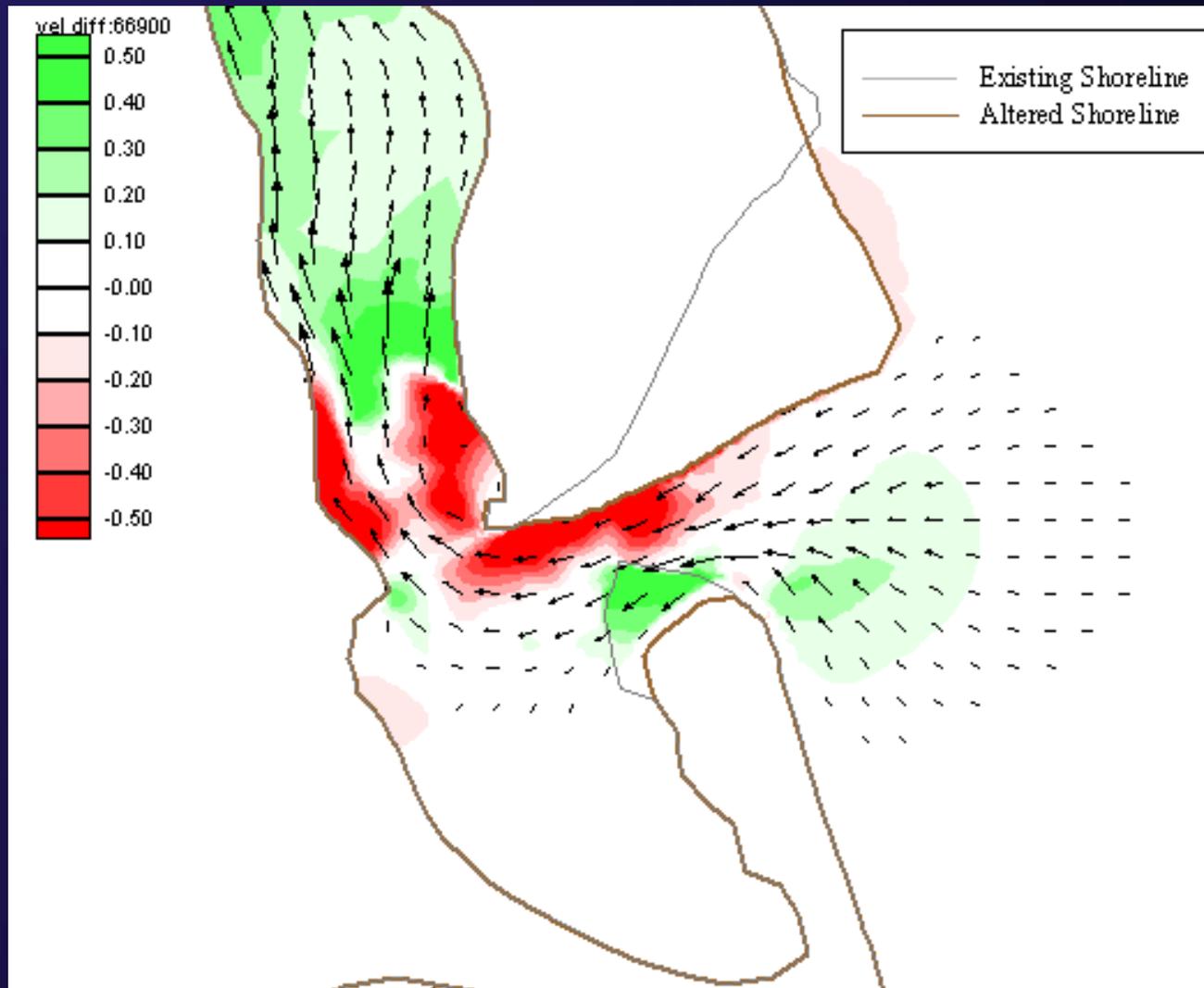
Existing Conditions



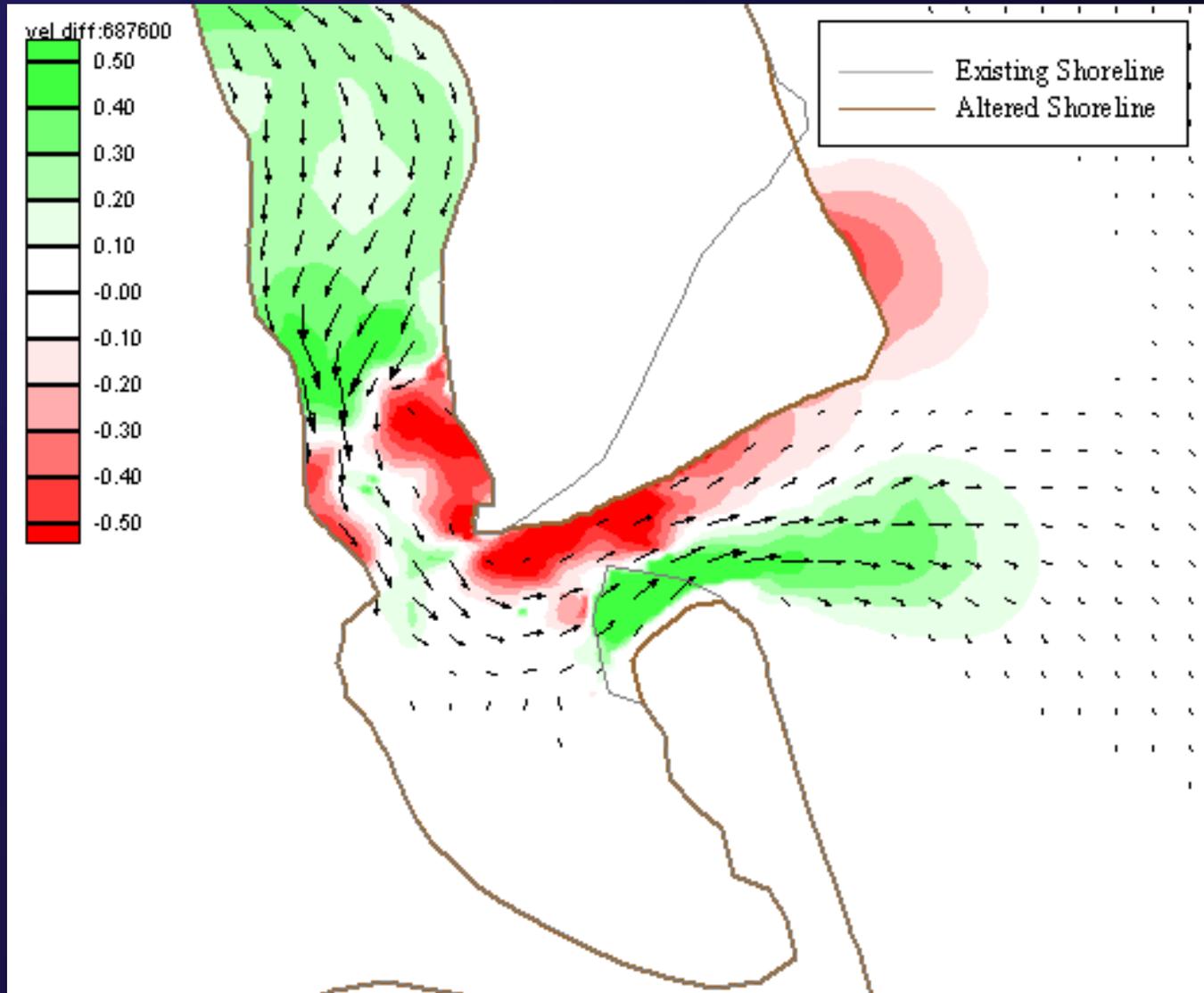
Combined Alternative



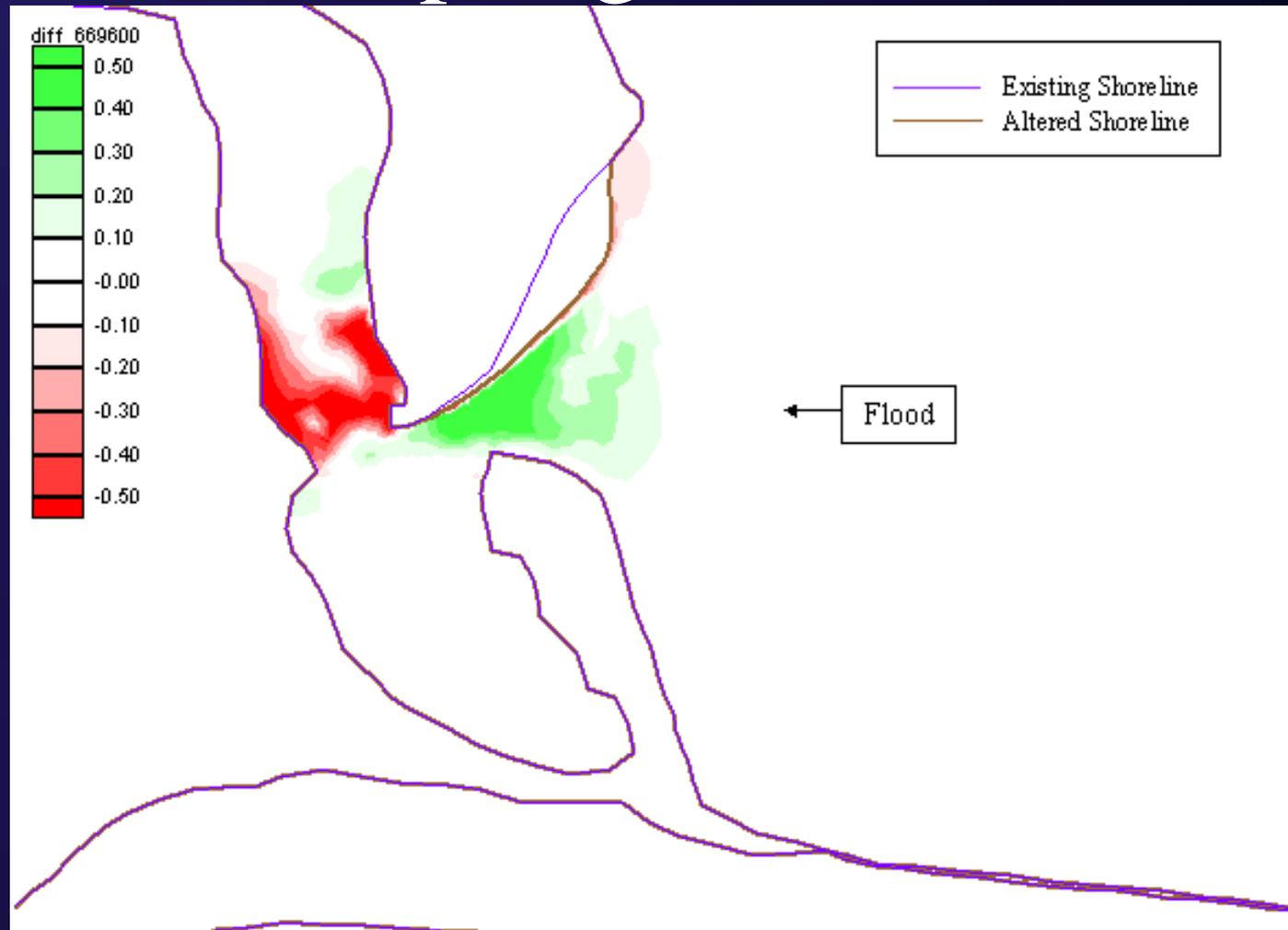
Difference – Combined (Spring Flood)



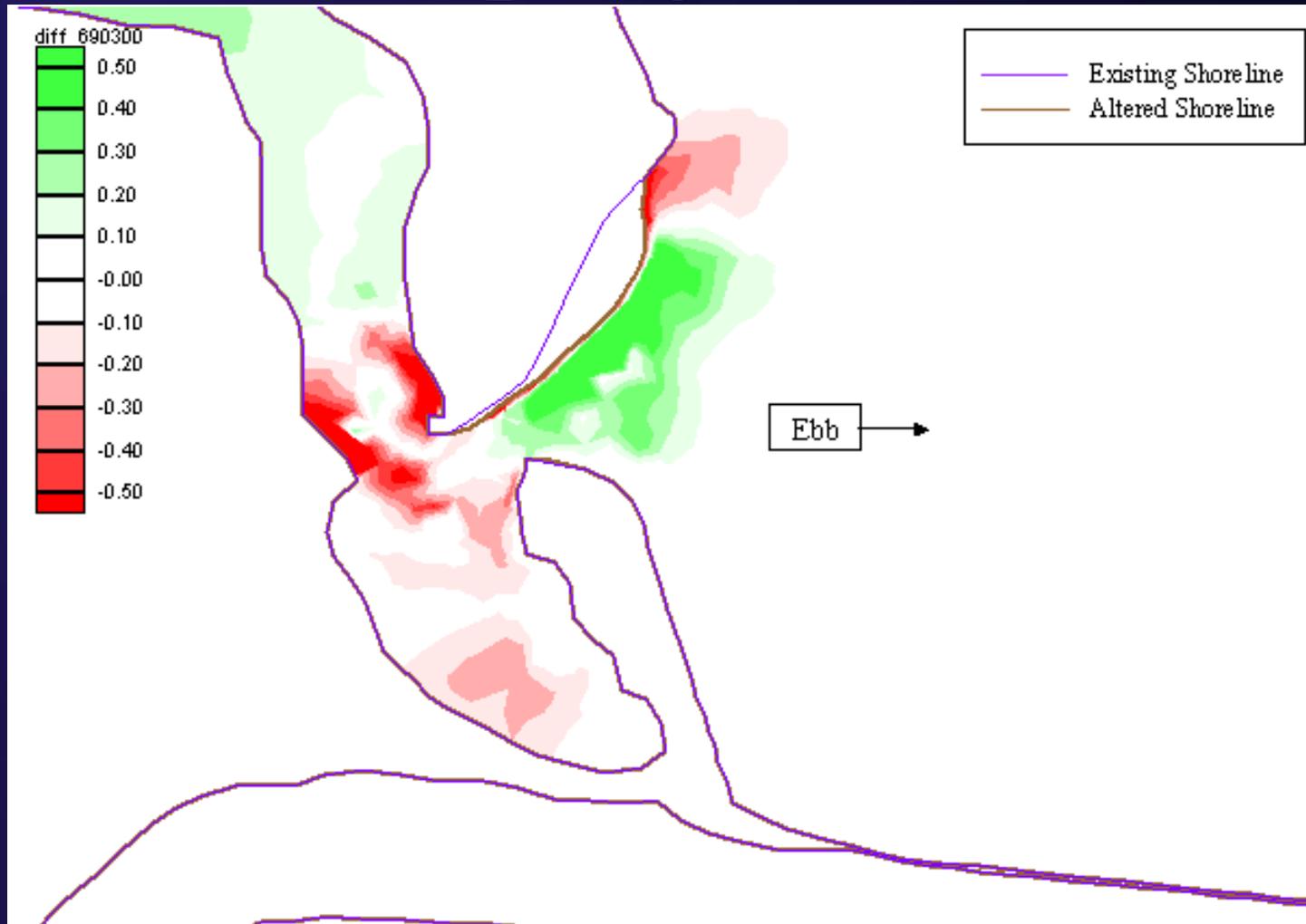
Difference – Combined (Spring Ebb)



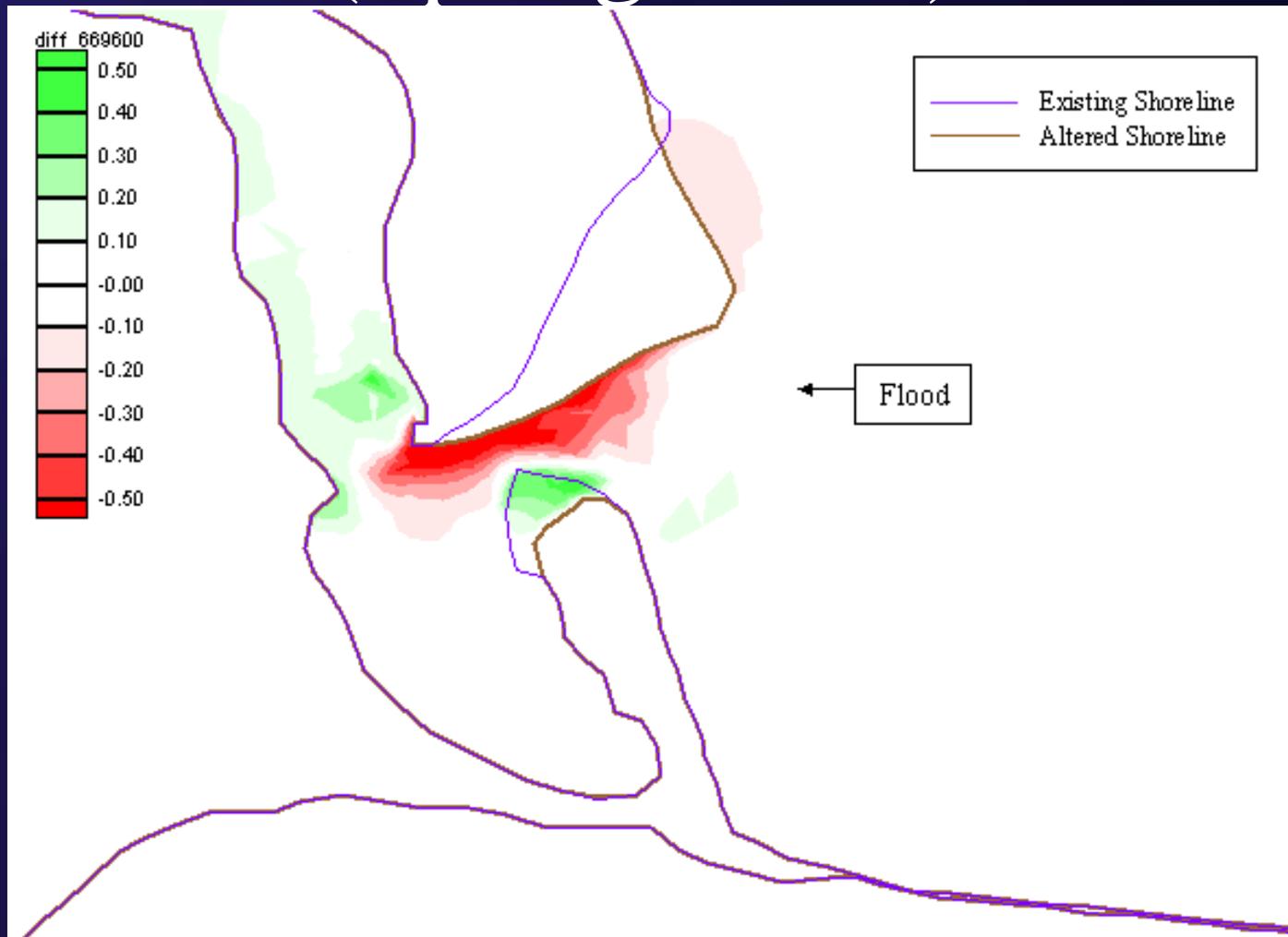
Difference – Flood Shoal (Spring Flood)



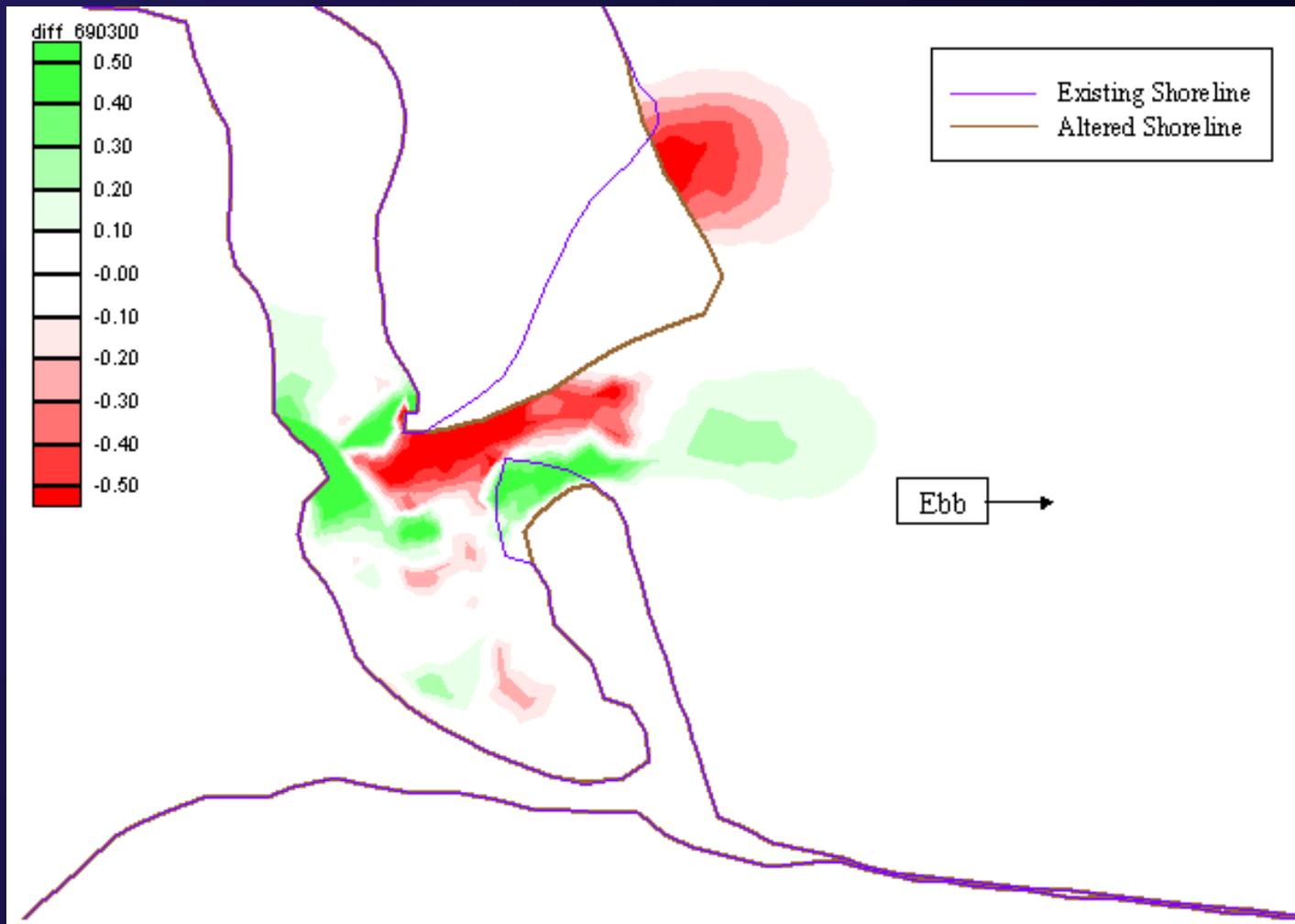
Difference – Flood Shoal (Spring Ebb)



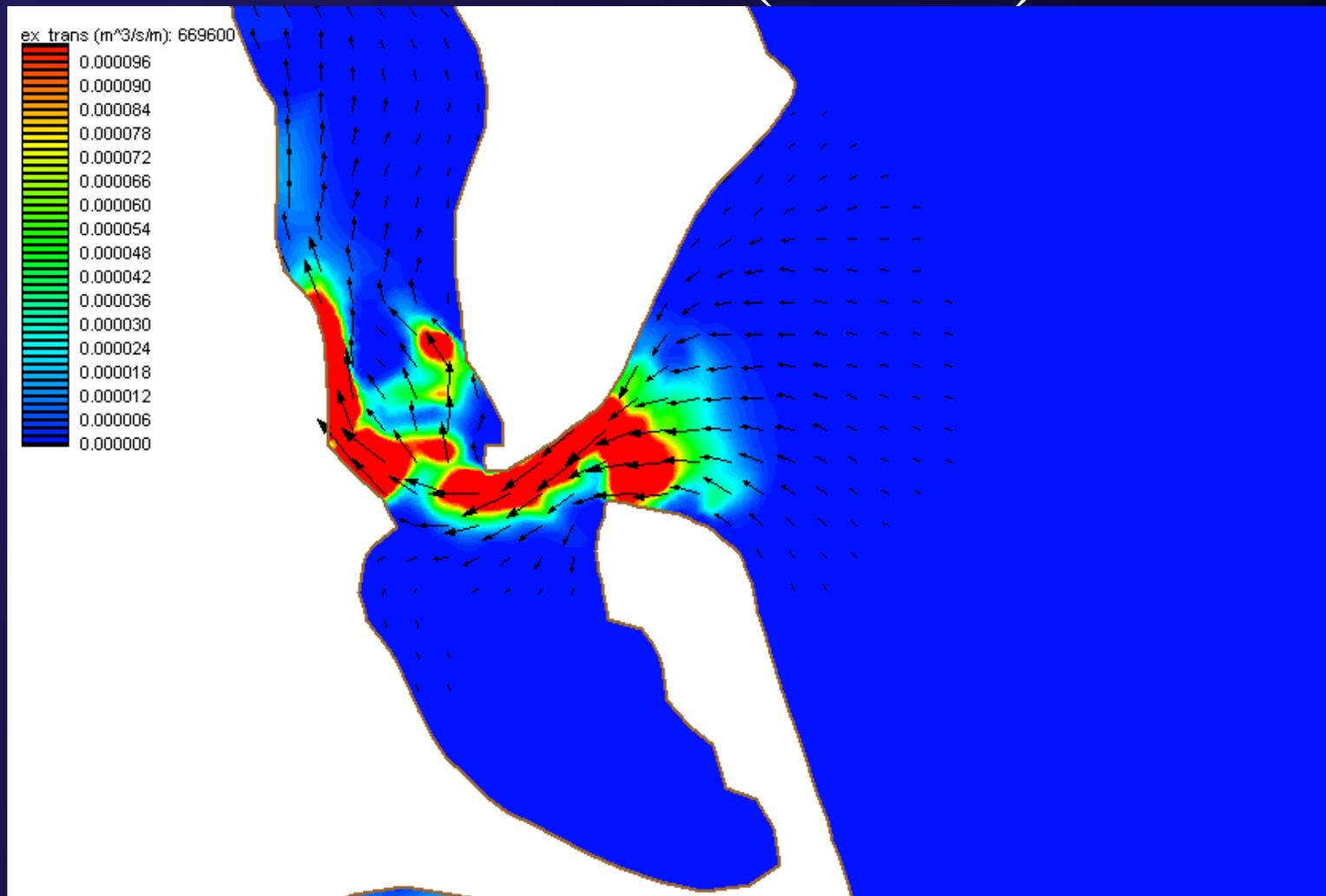
Difference – Ward's Bank (Spring Flood)



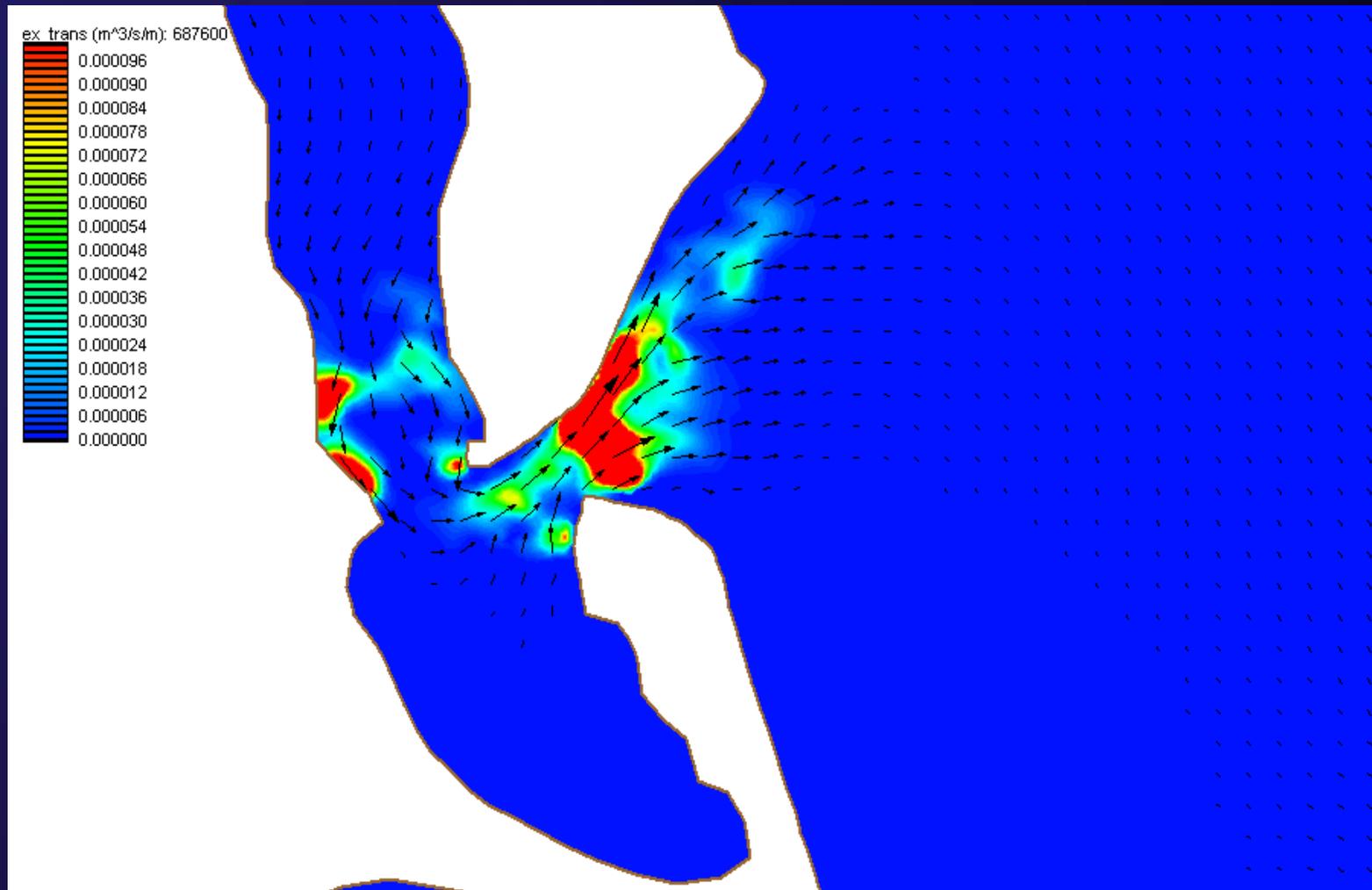
Difference – Ward's Bank (Spring Ebb)



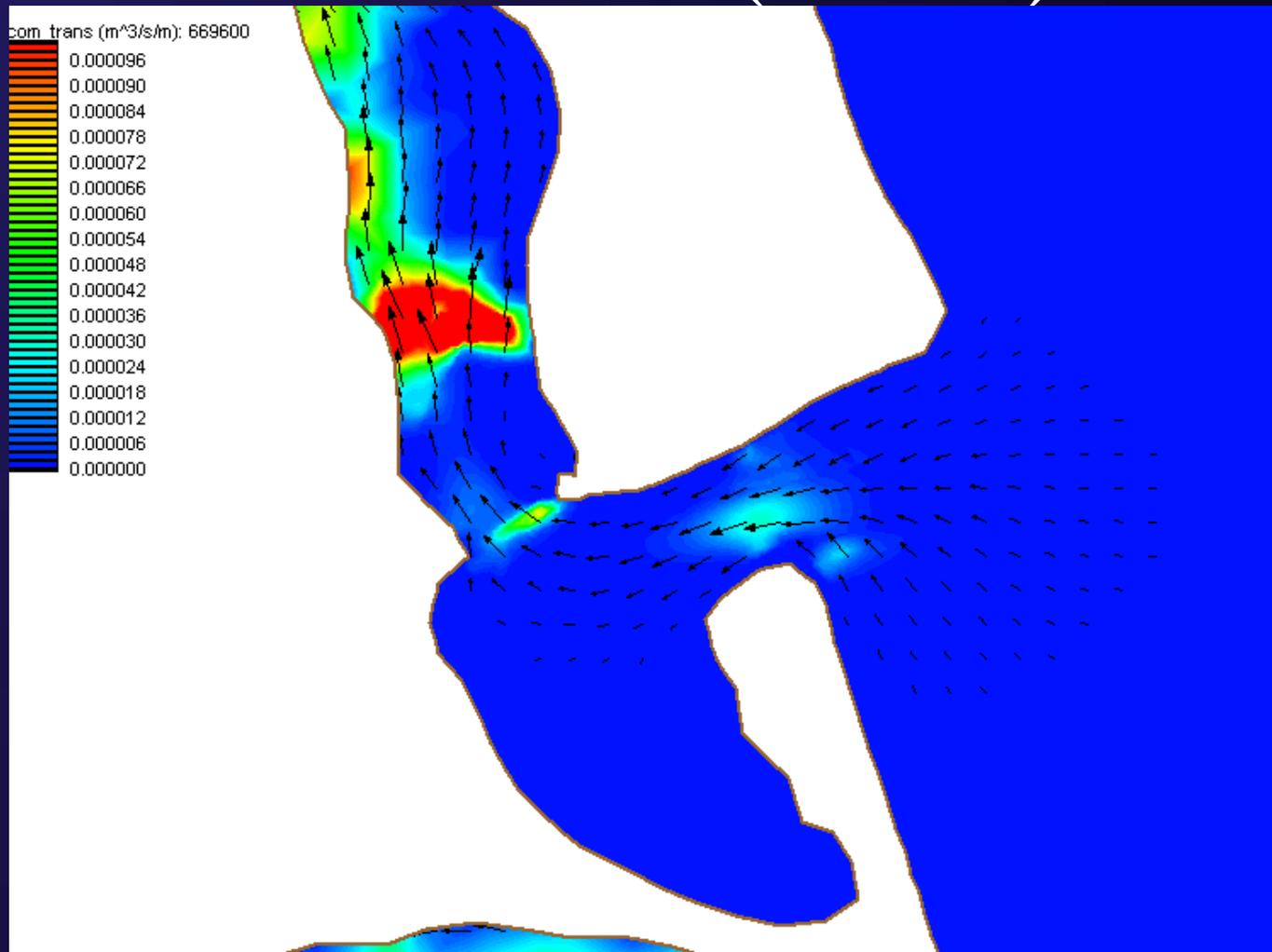
Sediment Transport – Existing Conditions (Flood)



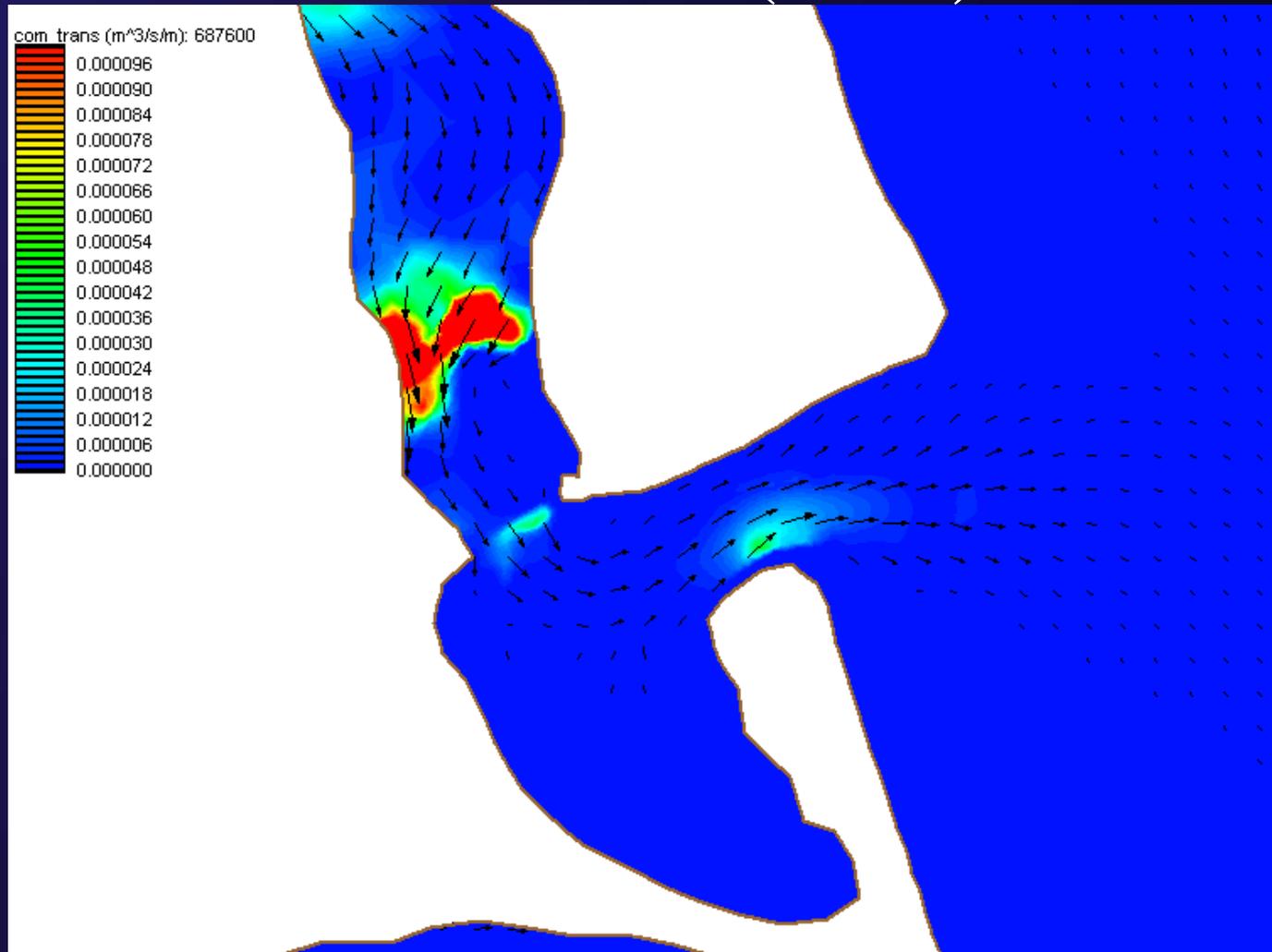
Sediment Transport – Existing Conditions (Ebb)



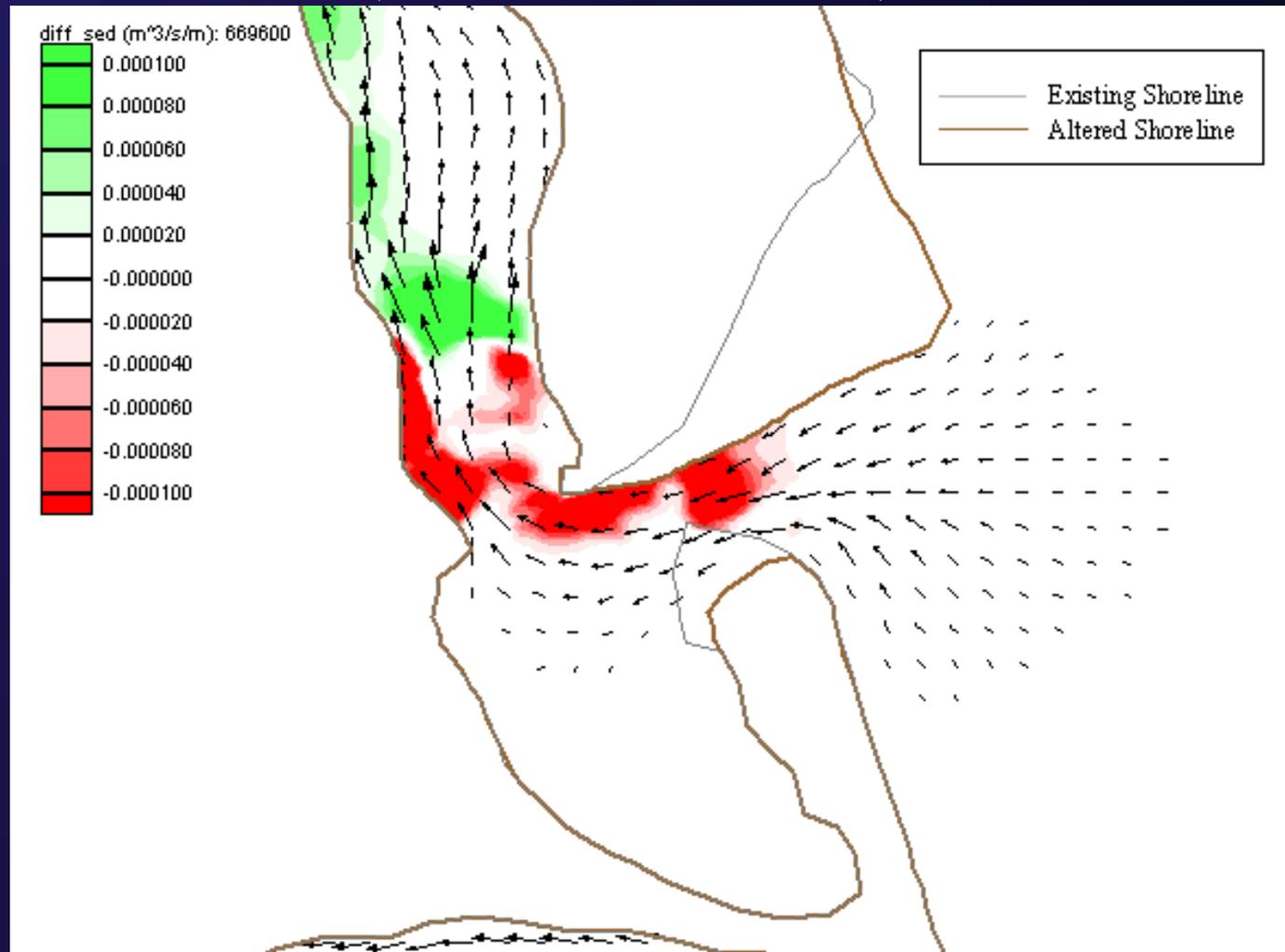
Sediment Transport – Combined Alternative (Flood)



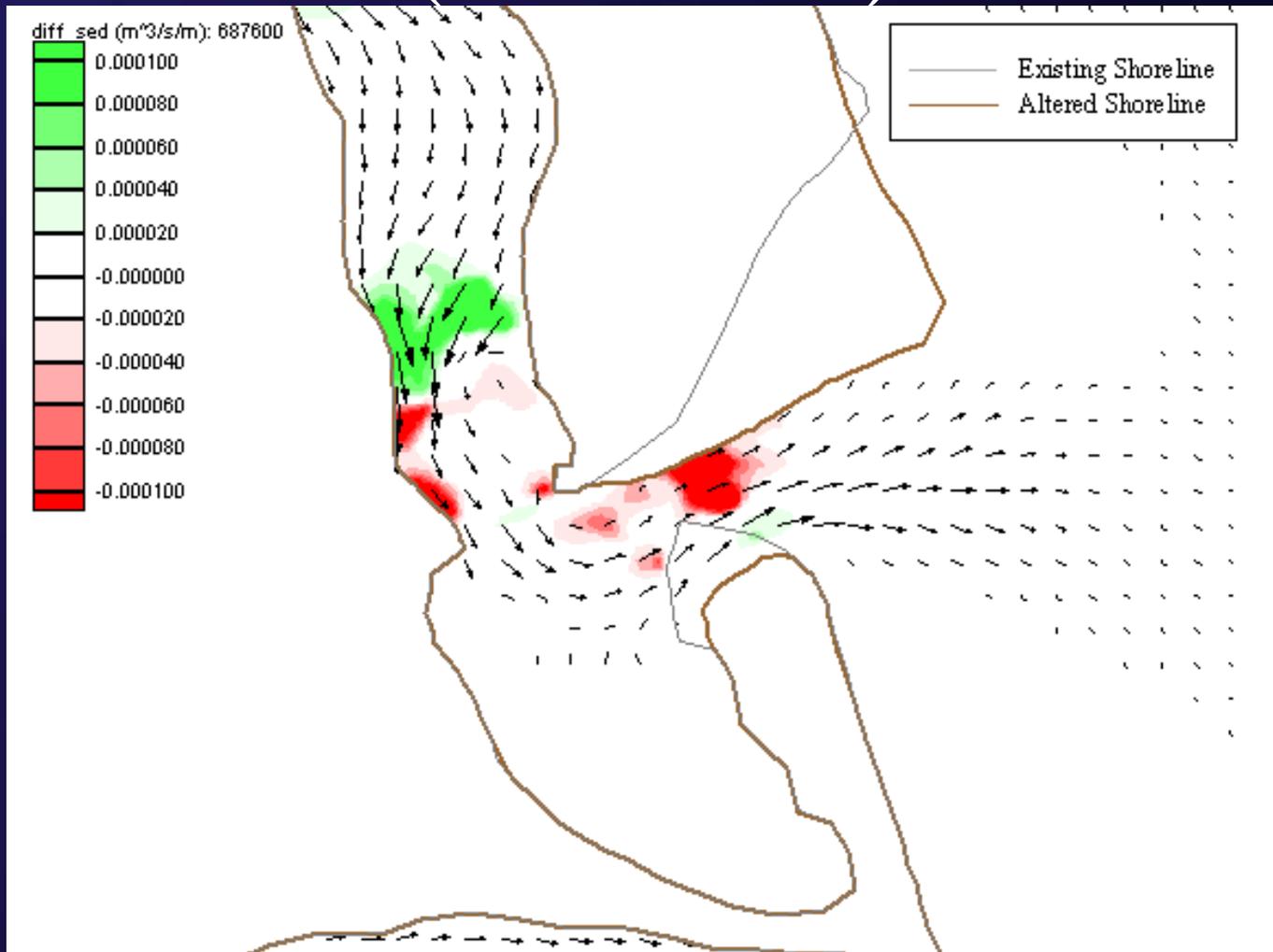
Sediment Transport – Combined Alternative (Ebb)



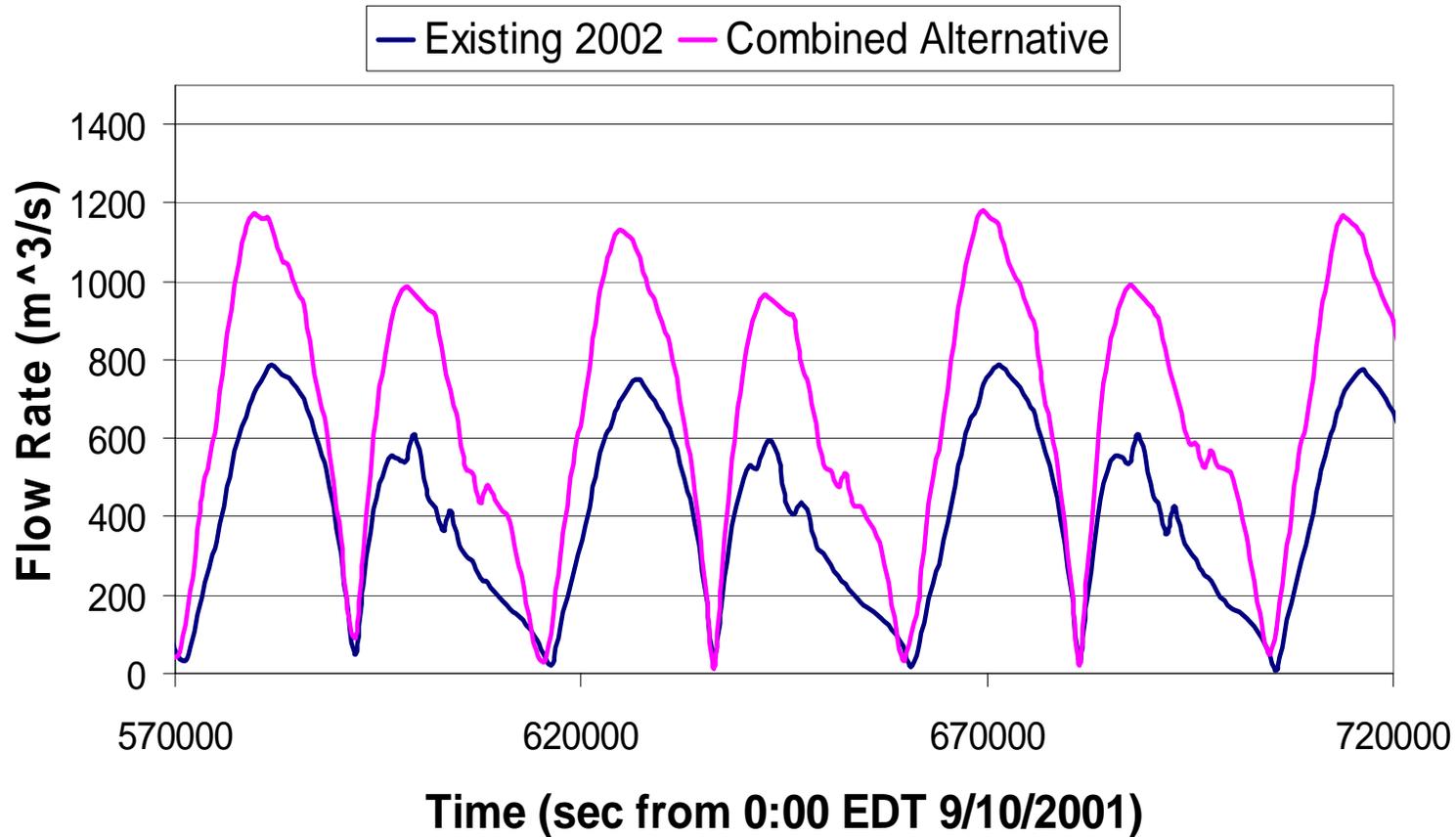
Sediment Transport Difference (Peak Flood)



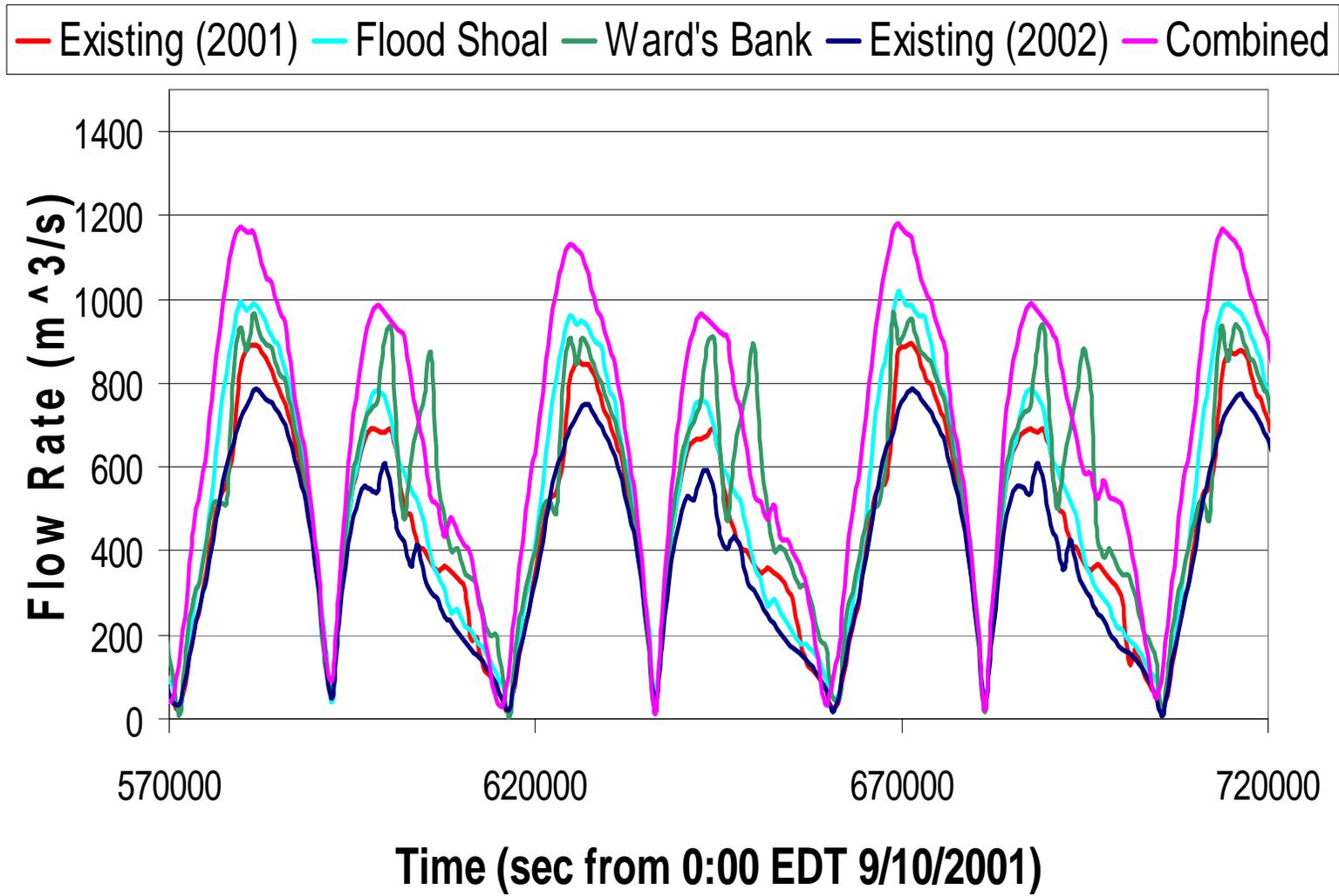
Sediment Transport Difference (Peak Ebb)



Combined Alternative Tidal Prism



Tidal Prism Comparison



Tidal Prism Comparison of Combined Alternative with 2002 Bathymetry

Simulation	Flood Tidal Prism (m ³ in millions)	Ebb Tidal Prism (m ³ in millions)	Flood/Ebb Ratio	% increase from existing - flood	% increase from existing - ebb
Existing (2002)	10.4	7.7	1.35	----	----
Combined	15.7	14.4	1.09	50.96	87.01

Tidal Prism Comparison of Alternatives and 2002 Bathymetry with 2001 Bathymetry

Simulation	Flood Tidal Prism (m ³ in millions)	Ebb Tidal Prism (m ³ in millions)	Flood/Ebb Ratio	% increase from existing - flood	% increase from existing - ebb
Existing (2001)	11.0	9.4	1.17	----	----
Flood Shoal	13..0	9.9	1.32	18.25	4.27
Ward's Bank	11.9	12.5	0.95	7.78	32.27
Existing (2002)	10.4	7.7	1.35	-6.11	-18.60
Combined	15.7	14.4	1.09	42.46	52.03



Cost Analysis

- Mobilization/Demobilization
 - ◆ \$2 – \$2.5 Million
- Little Talbot Island Shoreline Construction
 - ◆ \$2.50 – \$3.50/cy
 - ◆ For 2.2 mcy, Total = \$5.5 – \$7.7 Million
- Beach Renourishment South of Jetties
 - ◆ \$3.50 – \$4.50/cy
 - ◆ For 2.4 mcy, Total = \$8.4 – \$10.8 Million
- Total Project Price Range
 - ◆ \$15.9 – \$21.0 Million



Summary

- Flood Shoal mining produces 1.3 mcy
- Ward's Bank mining produces 3.3 mcy
- Little Talbot Shoreline reconstruction to approximately its 1970s location
- 2.4 mcy available for sediment by-pass



Conclusions

■ Tidal Circulation Results

◆ Advantages

- ◆ Reduces flow velocities through the inlet and along Little Talbot Island shoreline
- ◆ Flow path is centralized in the channel

◆ Disadvantages

- ◆ Increases flow velocities at bridge on ebb (Potential scour)
- ◆ Increases flow velocities north of flood shoal cut - east side of channel on flood and west side of channel on ebb



Conclusions

- ◆ Increases tidal prism
- ◆ Tidal prism flood/ebb ratio is approximately 1

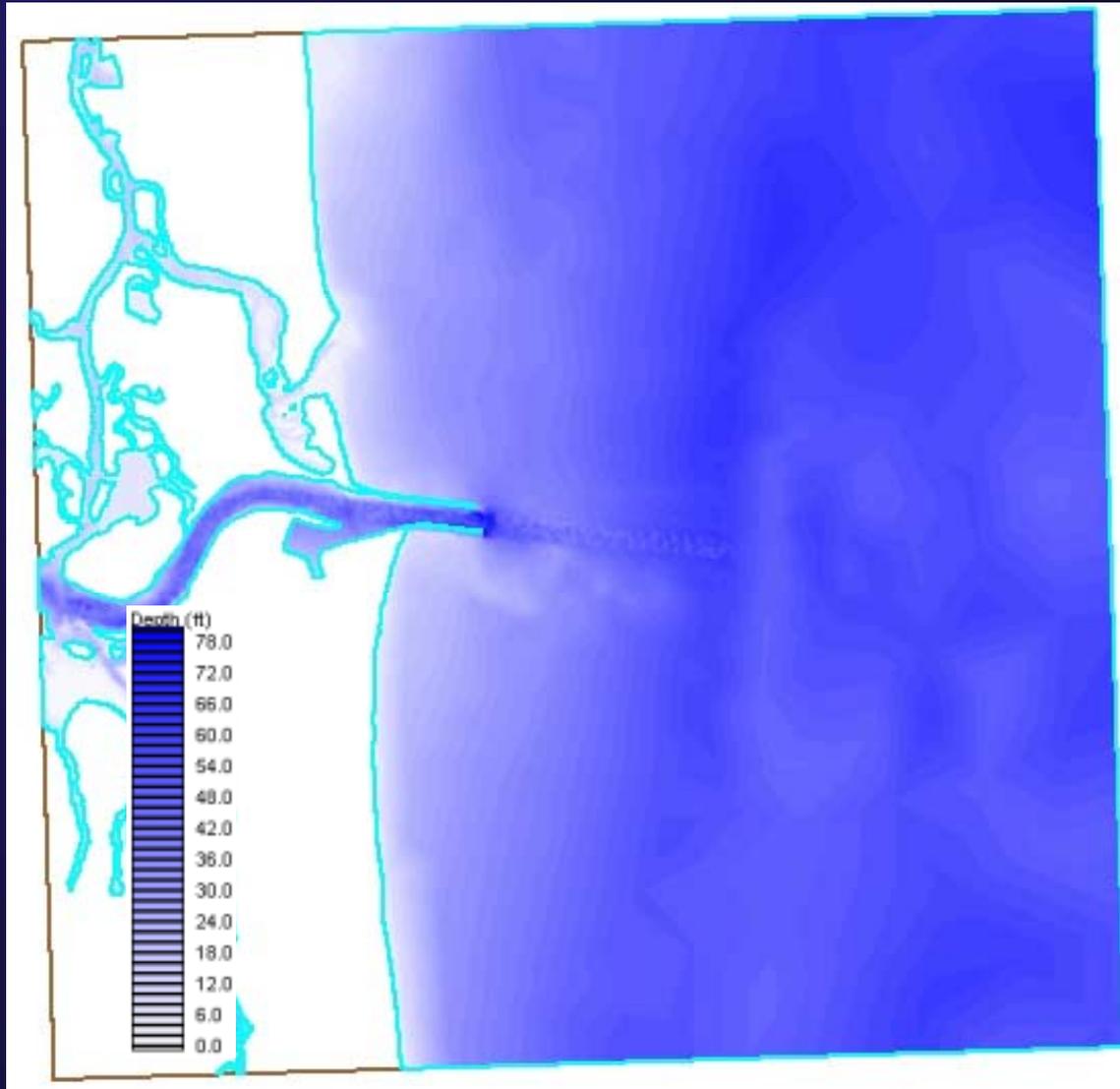


Wave Modeling

- Purpose:
 - ◆ Evaluate Modification to Wave Climate
 - ◆ Evaluate Changes in Littoral Drift
- STWave
 - ◆ Existing Conditions, Flood Shoal, Wards Bank, & Combined Alternative
- Conditions Defined by WIS Data
 - ◆ 15 Cases
 - ◆ 87.4% of All Waves
- Calculate Littoral Drift

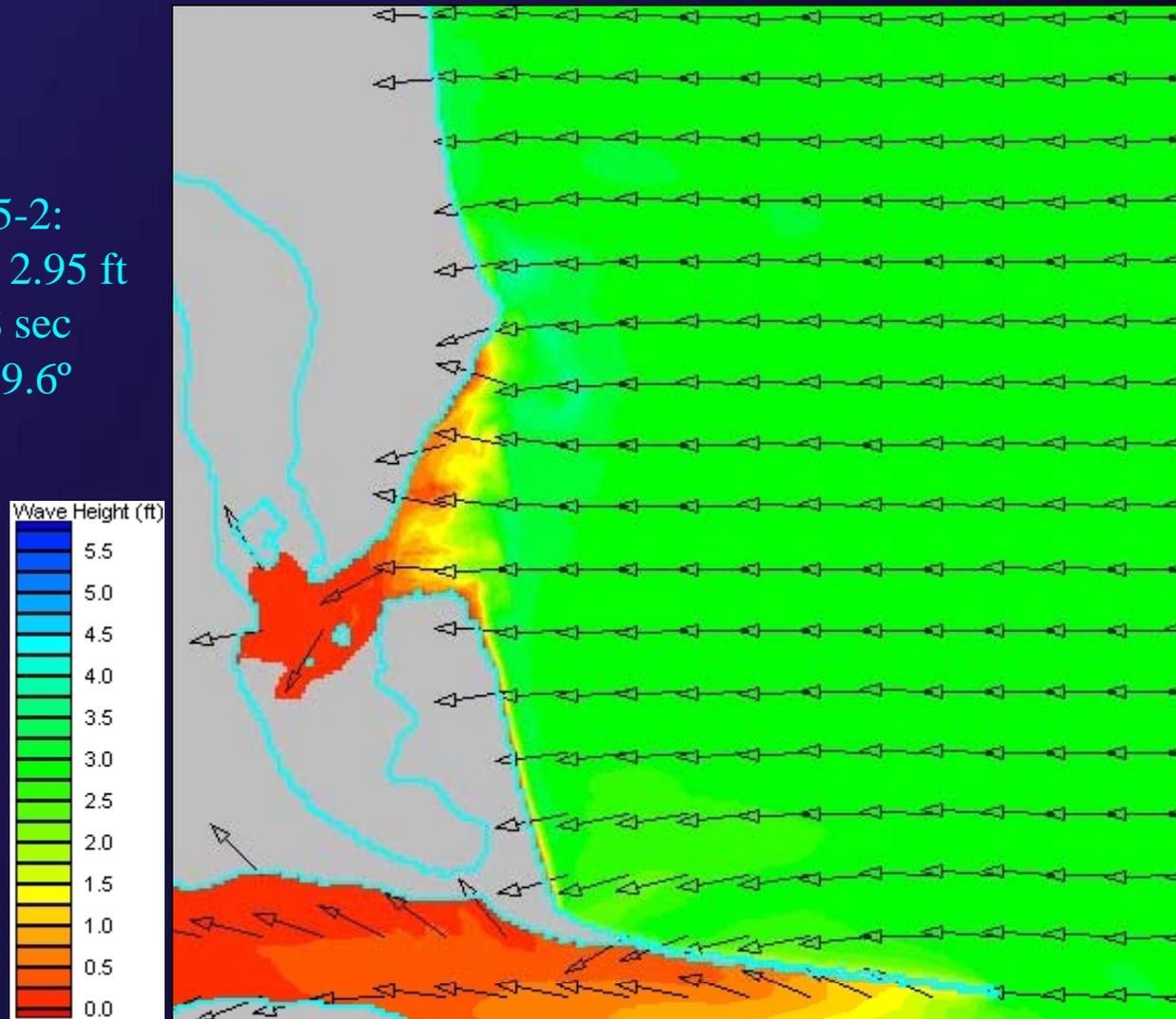


Model Grid



Existing Conditions

Case 5-2:
 $H_{mo} = 2.95$ ft
 $T_p = 8$ sec
 $\theta_0 = 89.6^\circ$



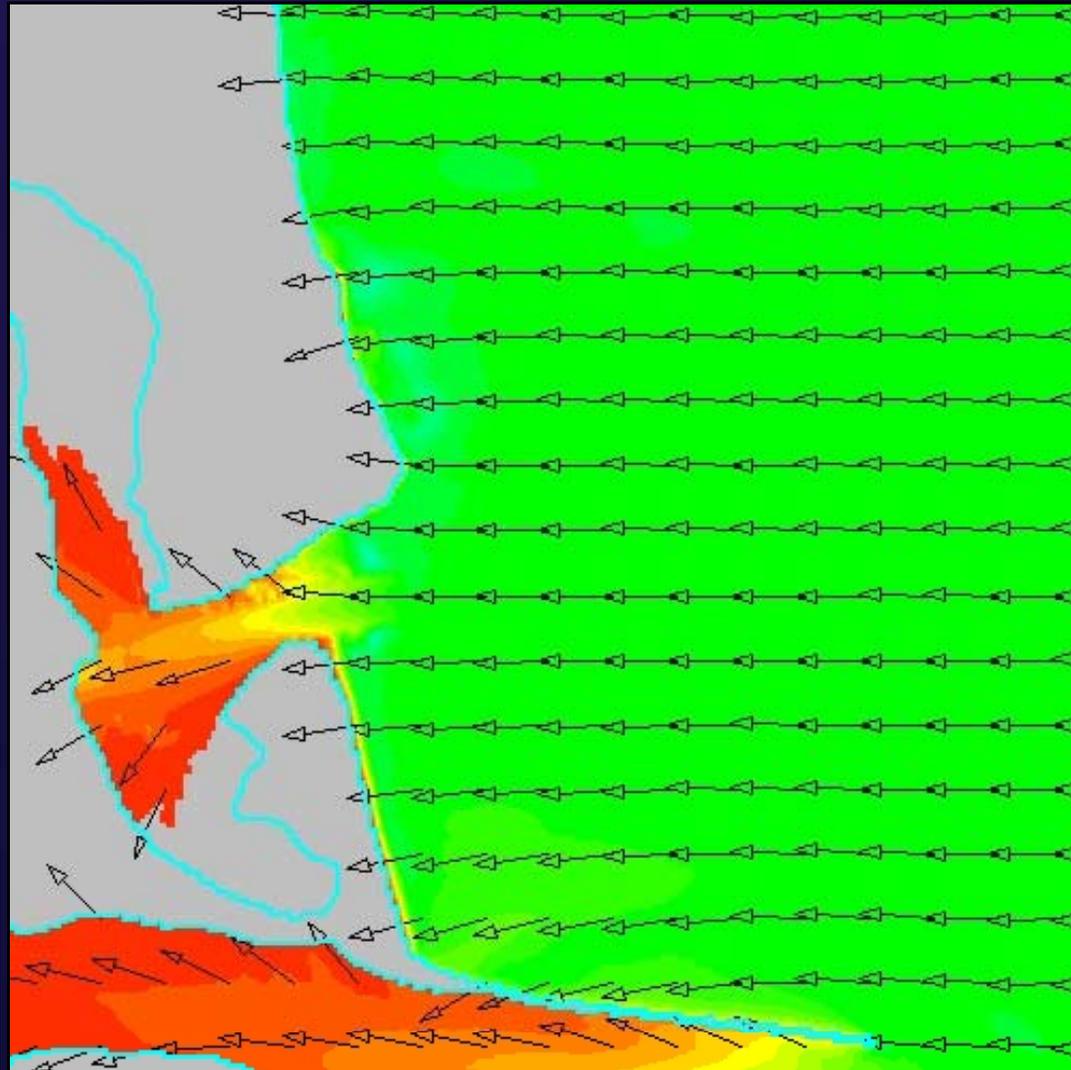
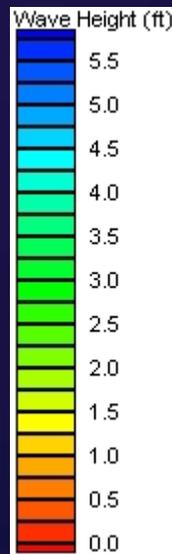
Combined Alternative

Case 5-2:

$$H_{mo} = 2.95 \text{ ft}$$

$$T_p = 8 \text{ sec}$$

$$\theta_0 = 89.6^\circ$$



Wave Height Difference

Case 5-2:

$$H_{mo} = 2.95 \text{ ft}$$

$$T_p = 8 \text{ sec}$$

$$\theta_0 = 89.6^\circ$$

