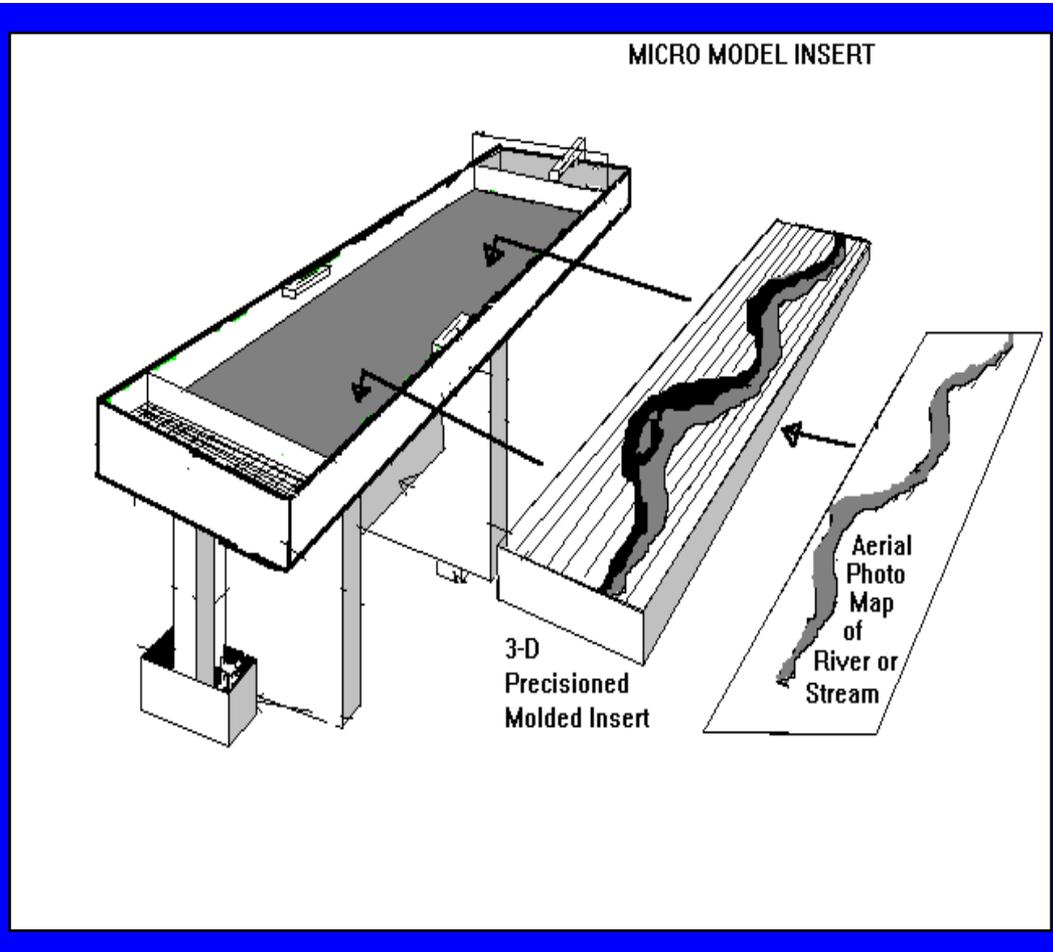


# Hydraulic Sediment Response Modeling

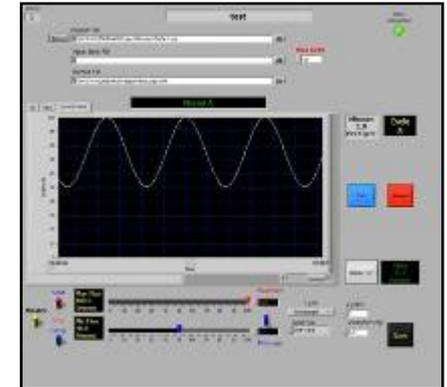


- HSR Models are Small Scale Physical Sediment Transport Modeling of a River or Stream
- Table Top Size
- Three Dimensional Bed Response
- Flow Visualization of Surface Velocity Trends
- Every Part of the Model is Visible, Dynamic, and in Real Time
- Relatively Inexpensive
- Results Usually Obtained within a few months

## Operational Setup



Model Flume with  
Insert Installed



Software Interface  
for the Computer  
Control System



Reservoir and Bag  
System



Flow Meter and  
Electronic Valve



Model Entrance



## HSR Model Data Collection

3D Laser Scanner



Mini-LDV (Laser Doppler Velocimeter)



## Galveston: Hydraulic Sediment Response Model

- Brazos River and Gulf Intracoastal Waterway Crossing
  - Primary Goal – The primary goal of this study was to reduce or eliminate dangerous navigation crossing conditions at the intersection, specifically the eddy formation near the North guide wall of the East Gate.





## Galveston HSR Parameters

### Conditions

1. Gates Closed
2. Gates Opened

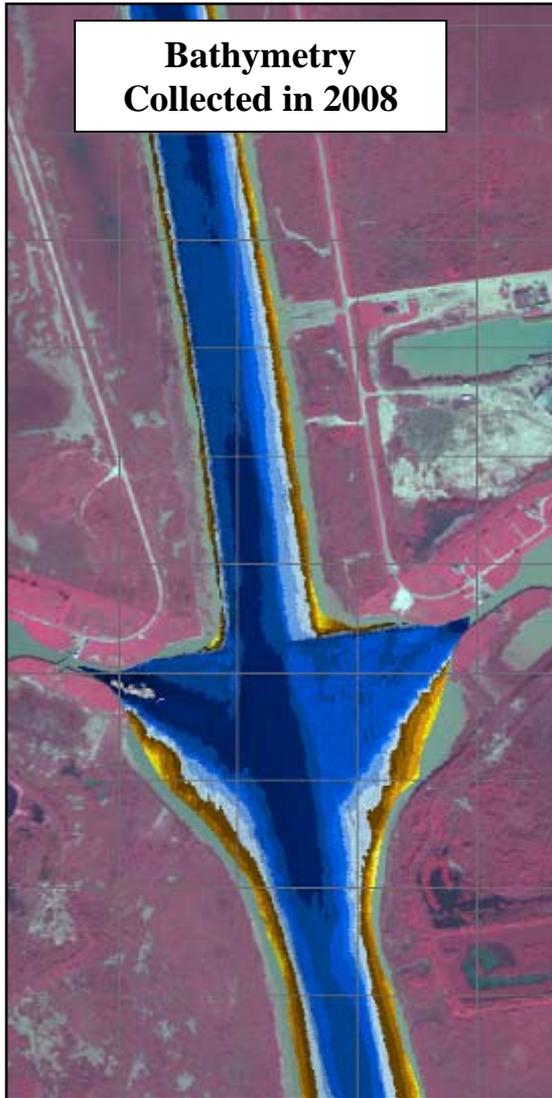
### There are four types of alternatives

1. Upstream of the crossing
2. Downstream
3. Bank manipulation
4. Combinations





## Model Calibration: Bathymetry (NAVD 88)

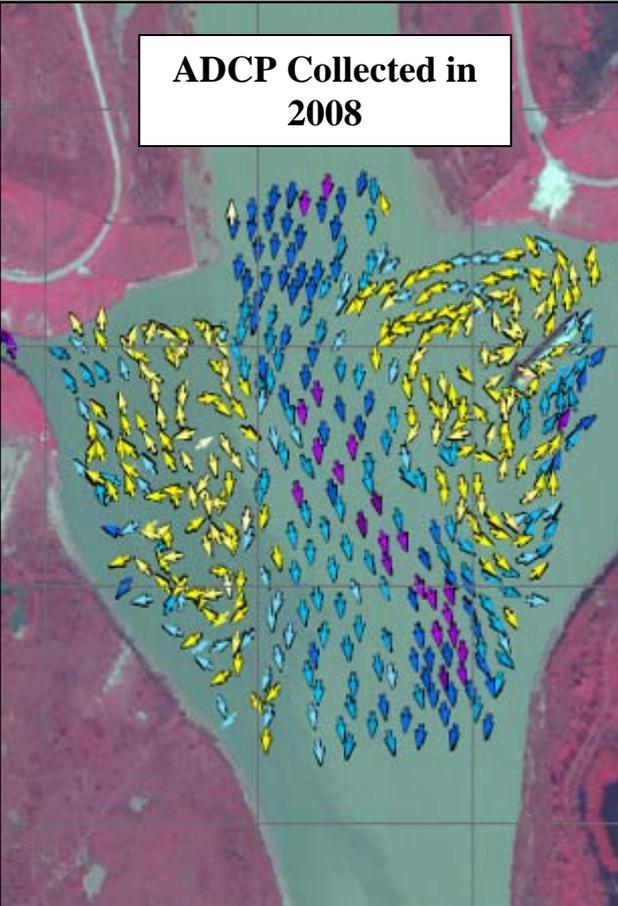


**Yellow - Brown = 0 to -9 (ft)  
Blue = -10 to -29 (ft)  
Grey = -30 to -50 (ft)**



# Model Calibration: Velocity Measurements

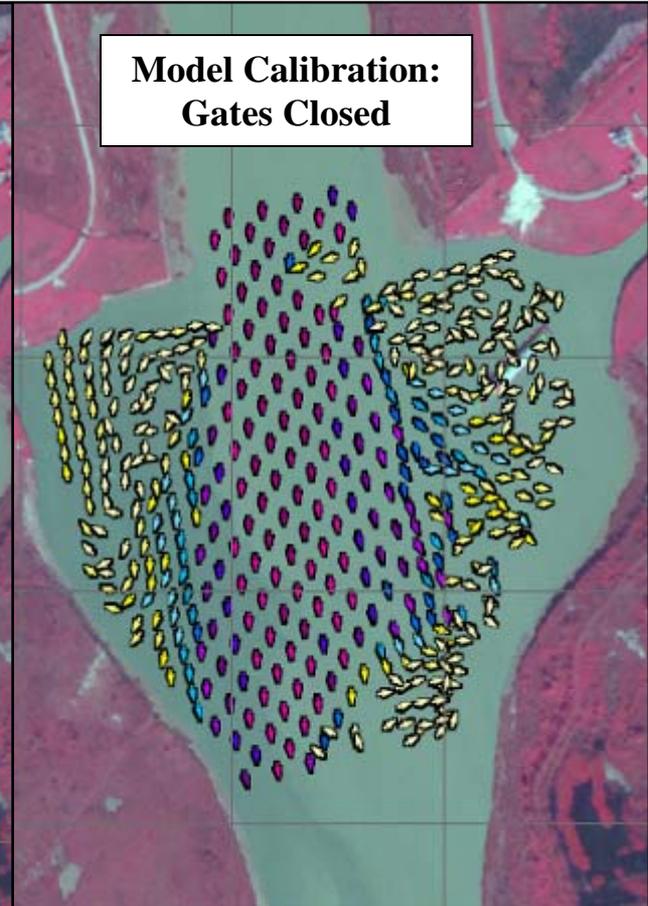
ADCP Collected in 2008



Model Calibration: Gates Opened



Model Calibration: Gates Closed



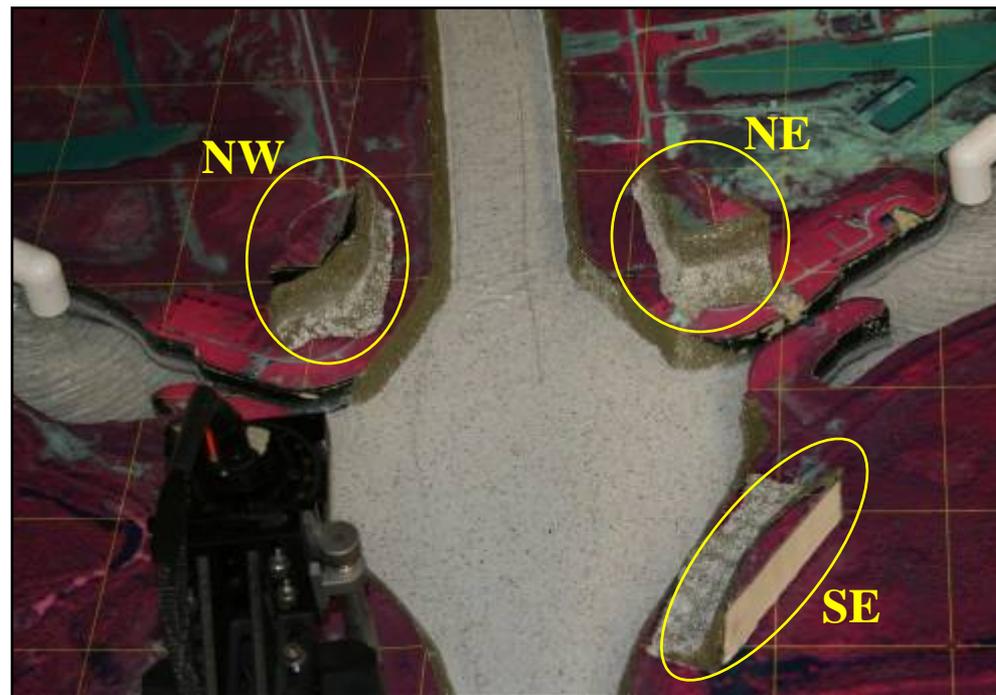
Yellow = low speed  
Blue = medium speed  
Red/Pink = high speed



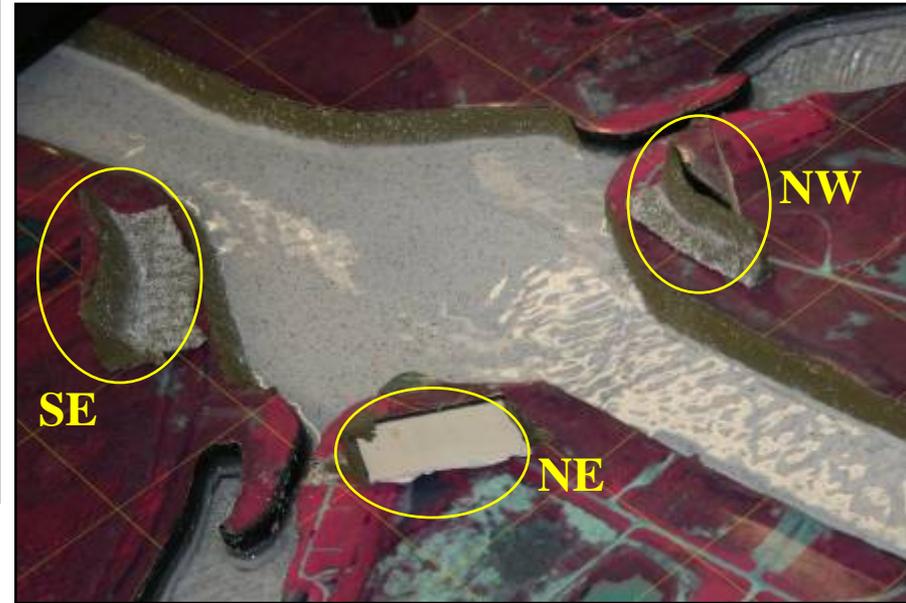
## Galveston Recommended Alternative

- Remove the NW Bank Line
  - Approximate Area = 53,242 sq. ft
  - Remove to depth of -5 ft NAVD 88 or -3.65 ft MLT
- Remove the NE Bank Line
  - Approximate Area = 67,992 sq. ft
  - Remove to depth of -5 ft NAVD 88 or -3.65 ft MLT
- Remove the SE Bank Line
  - Approximate Area = 43,627 sq. ft
  - Remove to depth of -5 ft NAVD 88 or -3.65 ft MLT

# HSR Model with Recommended Alternative



Looking Upstream



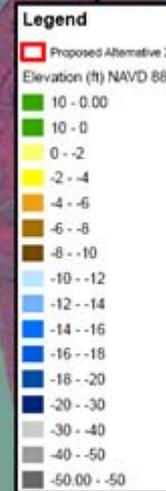
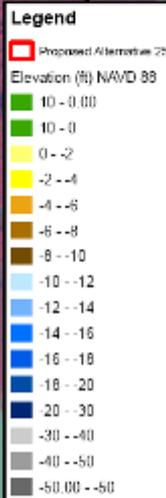
Looking Downstream

**Model Base Test  
Gates Opened**

**Alternative 25  
Gates Opened**

**Model Base Test  
Gates Closed**

**Alternative 25  
Gates Closed**



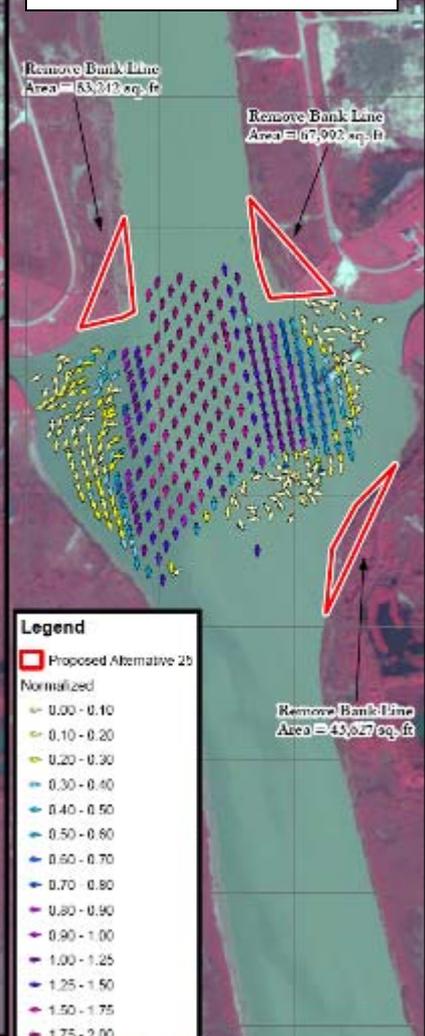
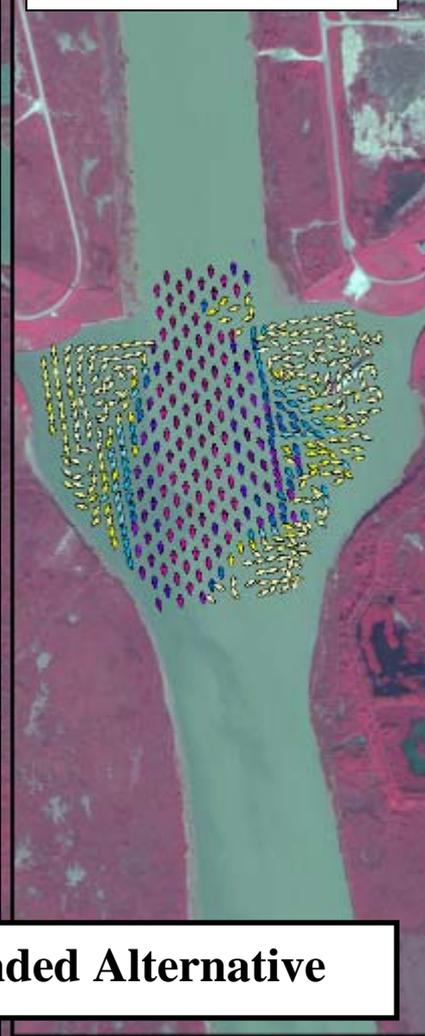
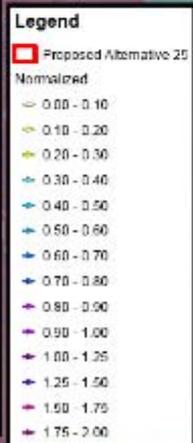
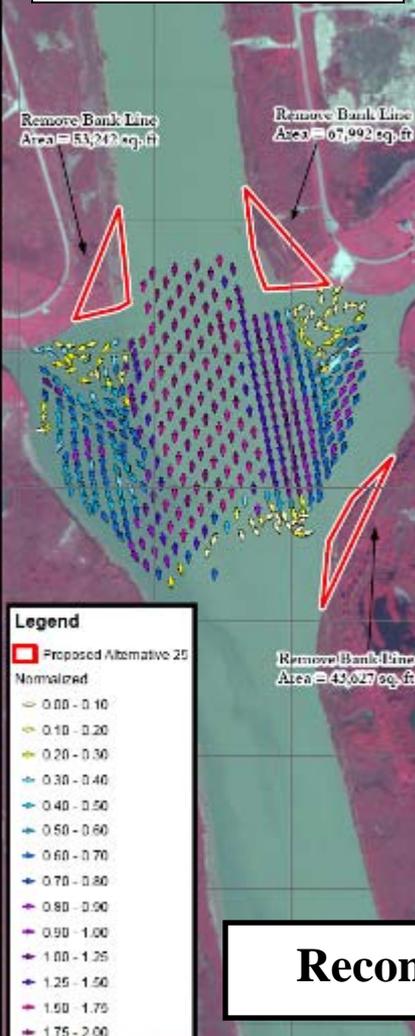
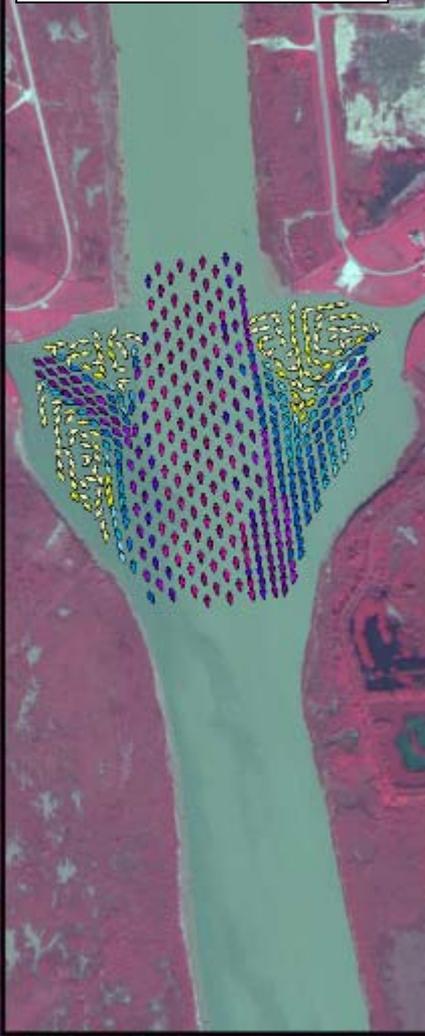
**Recommended Alternative**

**Model Base Test  
Gates Opened**

**Alternative 25  
Gates Opened**

**Model Base Test  
Gates Closed**

**Alternative 25  
Gates Closed**



**Recommended Alternative**



## Questions?

