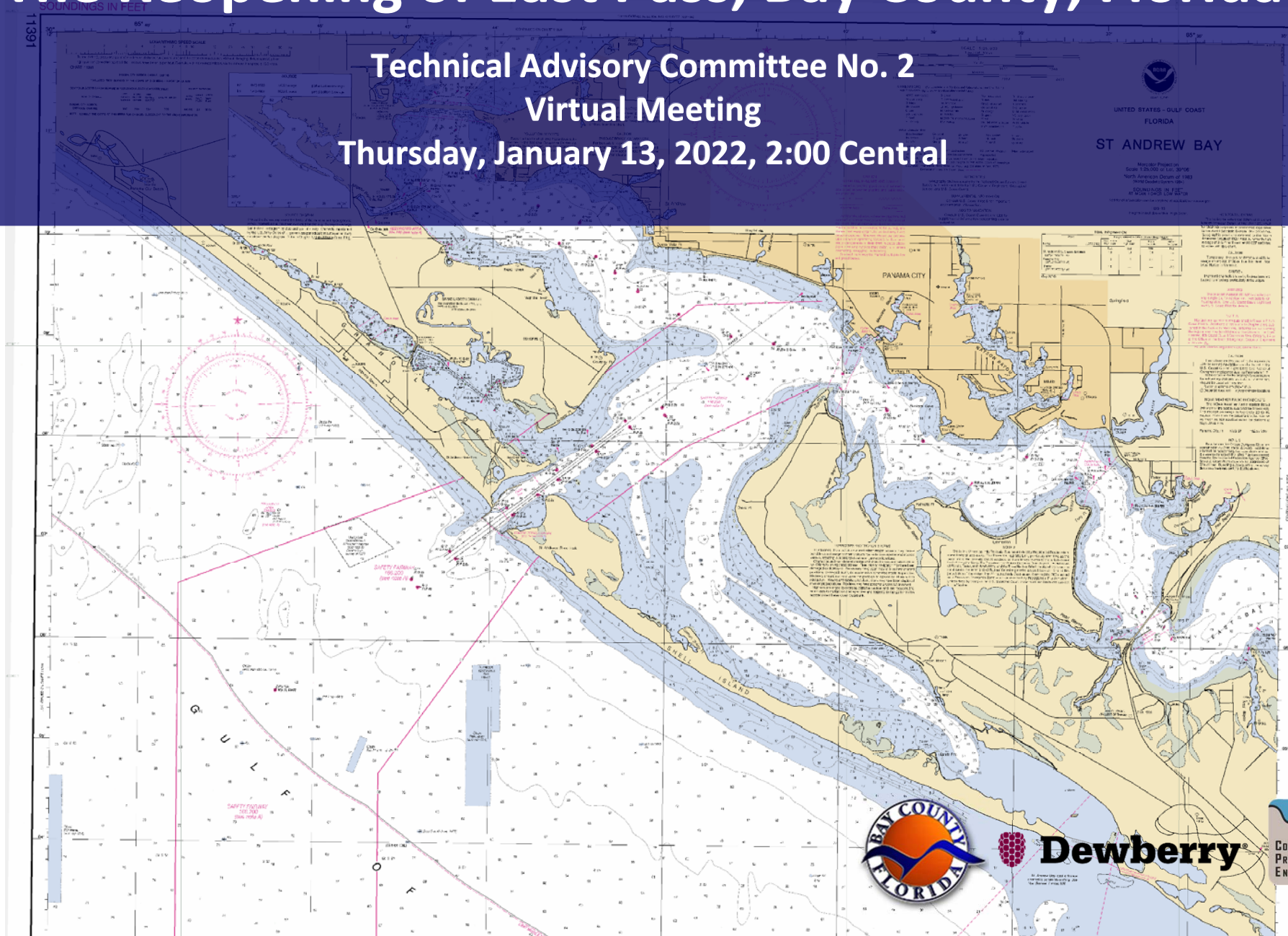


The Reopening of East Pass, Bay County, Florida

Technical Advisory Committee No. 2
Virtual Meeting
Thursday, January 13, 2022, 2:00 Central

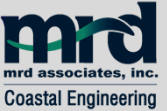


Dewberry



mrd
mrd associates, inc.
Coastal Engineering

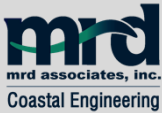
Agenda



- **Introductions**
- **Project Overview**
- **Schedule**
- **Presentation**
 - Feasibility and Design Assessment
 - Model Set-up, Calibration and Validation
- **Future TAC Meetings**
 - Alternative Analysis
- **Discussion**
- **Next TAC #3**



Introductions



TECHNICAL ADVISORY COMMITTEE MEETING #1

October 14, 2021, 2:00 P.M. Central

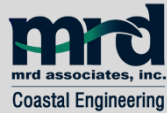
NAME	ORGANIZATION	E-MAIL ADDRESS/PHONE
Commissioner Bill Dozer	Bay County	BDozier@baycountyfl.gov
Luke Powell	Bay County	lpowell@baycountyfl.gov
Ralph Clark	Florida DEP	ralph.clark@dep.state.fl.us
Gregory Garis	Florida DEP	gregory.garis@floridadep.gov
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Patty Kelly	USFWS	patricia_kelly@fws.gov
Katrina Martin	USFWS	catrina_martin@fws.gov
Nick Vitale	FWC	nick.vitale@myfwc.com
Stephanie Somerset	Friends of Shell Island	stephanie@stephaniesomerset.com
Thomas Pierro	CPE	tpierro@coastalprotectioneng.com
Lauren Floyd	CPE	lfloyd@coastalprotectioneng.com
Tara Brenner	CPE	tbrenner@coastalprotectioneng.com
Michael Dombrowski	MRD Associates, Inc.	md@mrd-associates.com (850) 654-1555
Katie Hutschenreuter	MRD Associates, Inc.	kh@mrd-associates.com (850) 654-1555
Joe Morrow	MRD Associates, Inc.	jm@mrd-associates.com (850)-654-1555

Please send to notice of attendance or changes to:

kh@mrd-associates.com

md@mrd-associates.com

Project Overview



It is the goal is to develop a **feasibility study, preliminary design and permitting for re-opening of the historic East Pass in St. Andrew Bay to a natural, non-armored channel.**

The project approach is to divide the scope of work into three phases to achieve the goals in an efficient and cost-effective manner:

Phase I - Feasibility and Design Study – Year 1

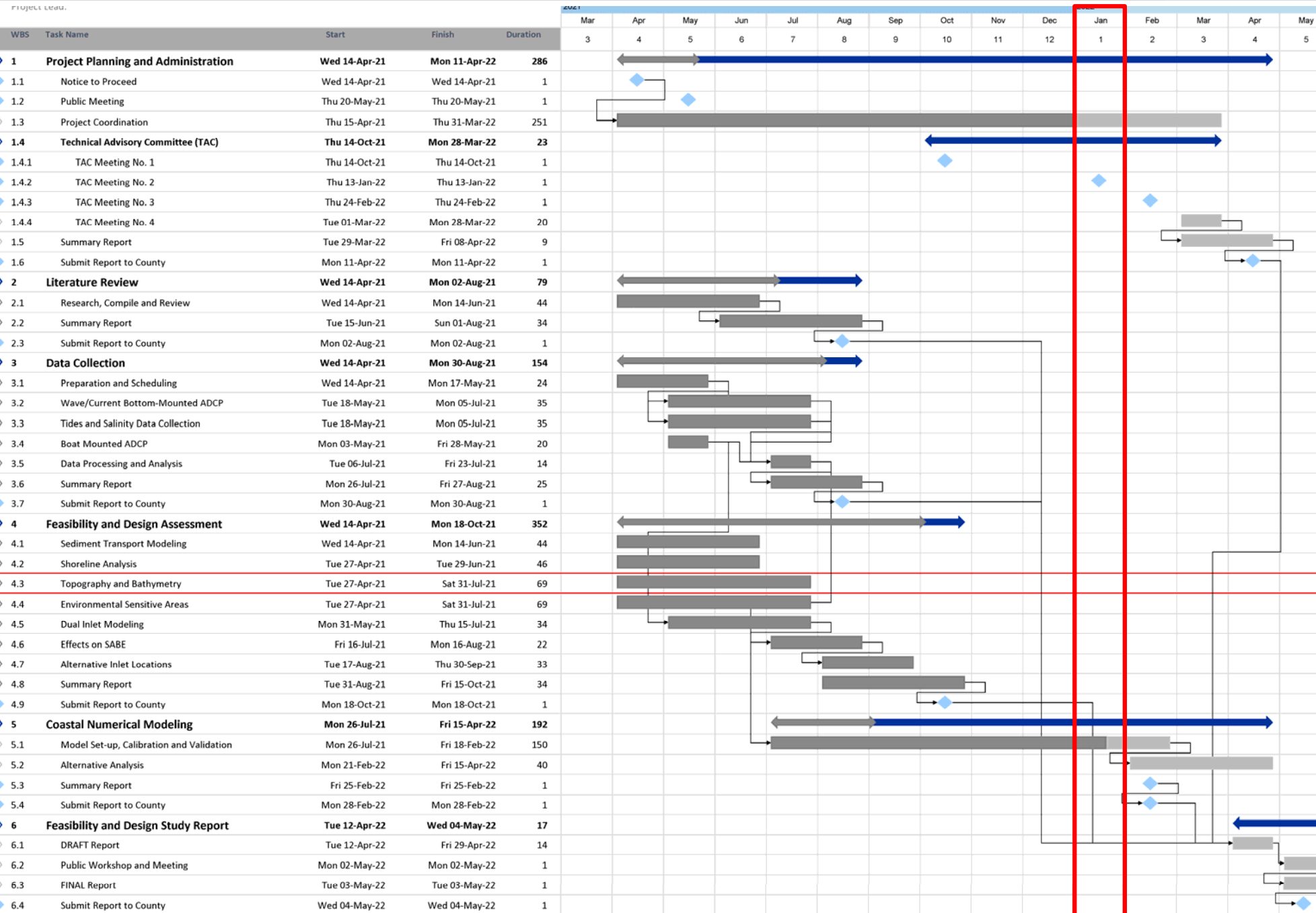
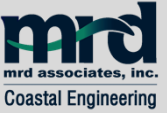
Phase II.A - Permit Support Documentation, Applications and Processing – Year 2,3,4

Phase II.B - Environmental Assessment/ Environmental Impact Statement (EA/EIS) – Year 2,3,4

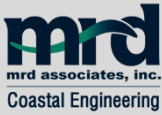
The objectives below are the basis for the issuance of a State of Florida permit under Rule 62B-41.005 (11) and (12), Florida Administrative Code (FAC) and it is understood that the County desires to achieve these objectives:

- a) The inlet will be hydraulically stable under normal conditions; and,***
- b) The inlet will balance the sediment budget such that beach restoration and nourishment of the adjacent beaches, or other forms of shoreline stabilization, including jetties, are not required.***
- c) Restore and enhance water quality within St. Andrew Bay.**
- d) Not result in significant adverse impacts to endangered species.**
- e) Provide a Public Benefit(s).**
- f) Not have an adverse impact on the existing St. Andrew Bay Entrance Channel.**
- g) Qualify for the necessary regulatory permits from the Florida Department of Environmental Protection and the U.S. Army Corps of Engineers.**

Schedule

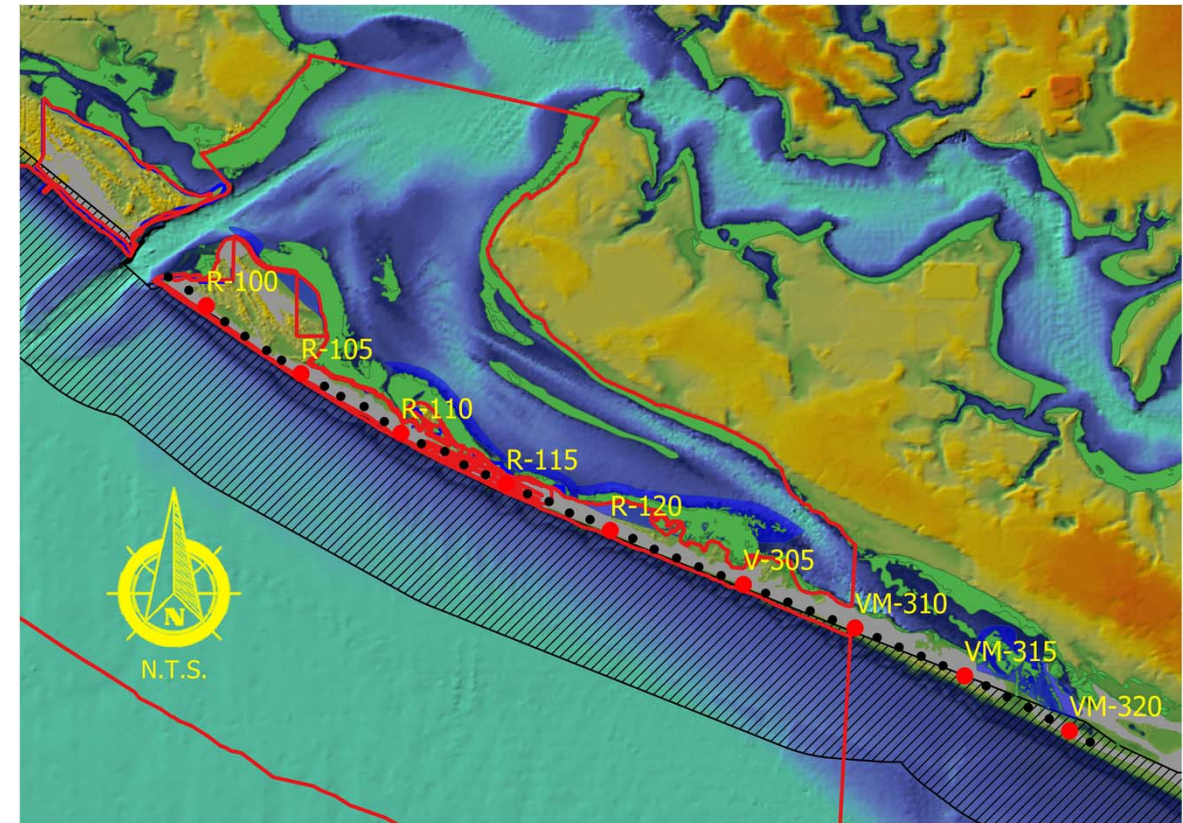


Feasibility and Design

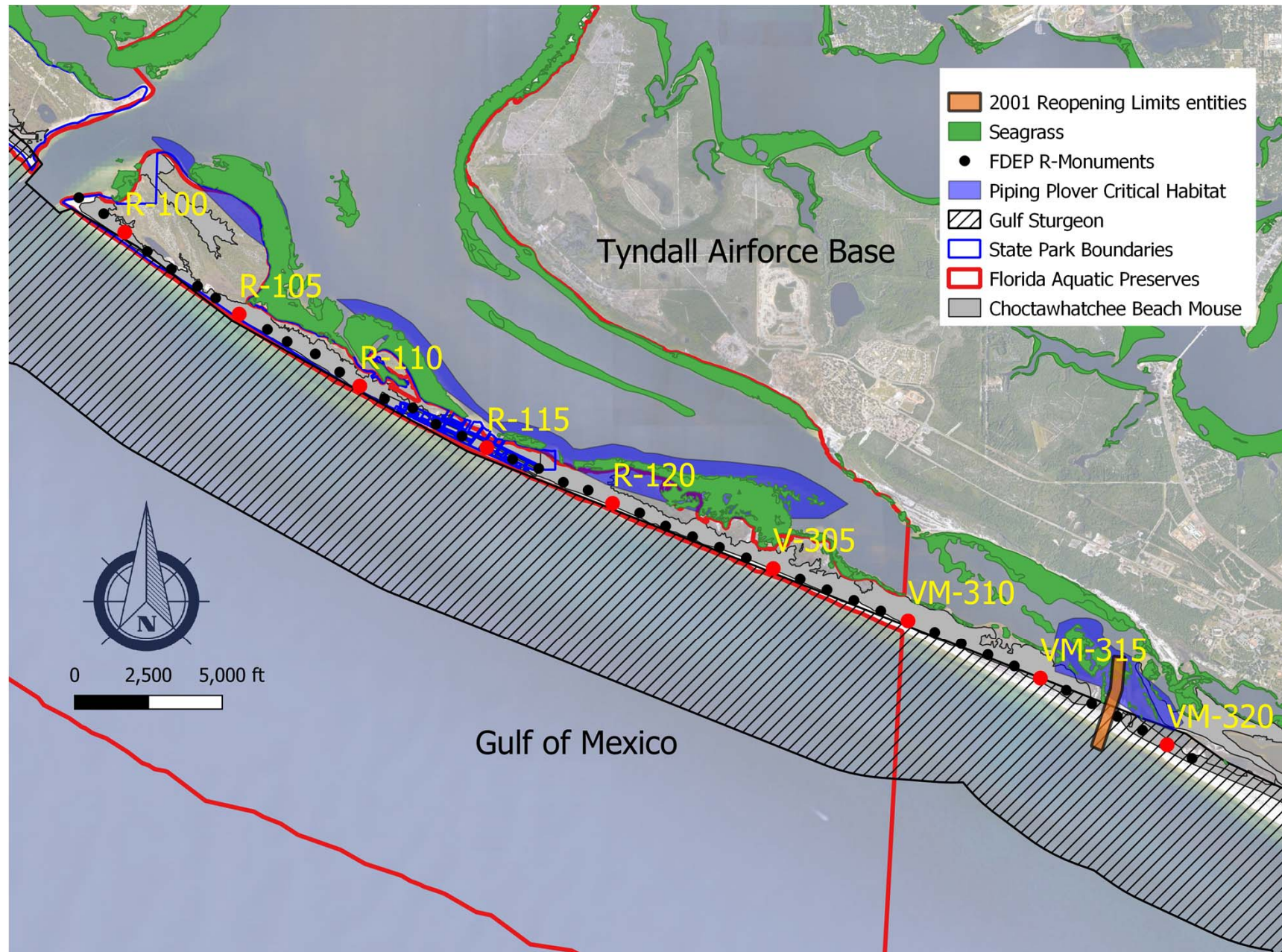
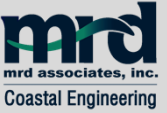


Goals:

- Environmental sensitive areas would be avoided or improved by increasing the exchange of gulf waters within the bay.
- The barrier island topography and bathymetry would result in the least amount of initial dredging volumes and maintenance frequency.
- The gulf front shoreline is eroding.
- There is a divergence in the sediment transport or “nodal-point”.



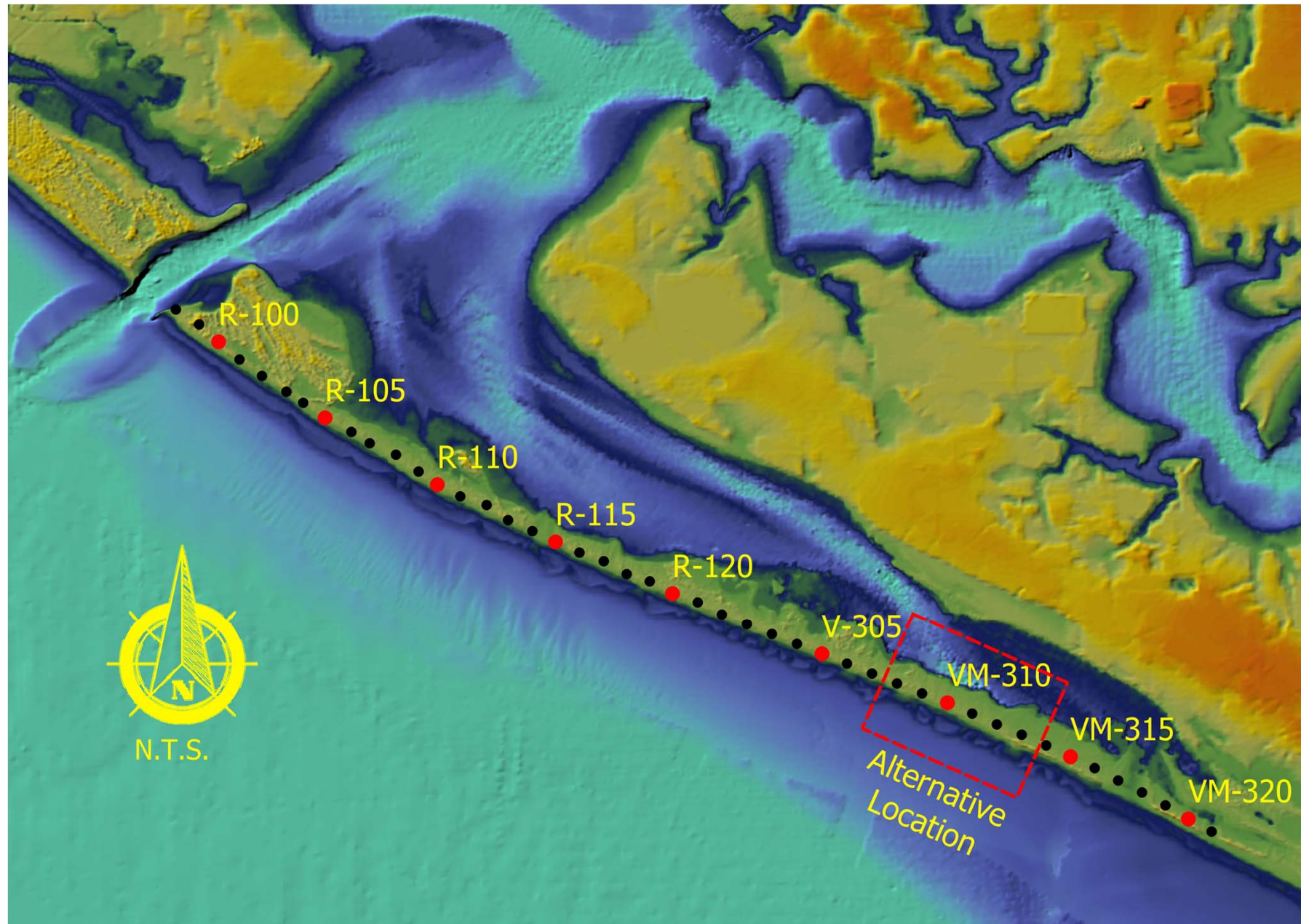
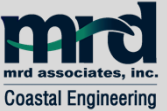
Environmentally Sensitive Areas



Key Takeaways

- **Choctawhatchee Beach Mouse and Gulf Sturgeon Habitat throughout the entire project.**
- **From VM-310 to VM-314.**
 - **Limited Resources**
 - **Not within Aquatic Preserve or State Park.**

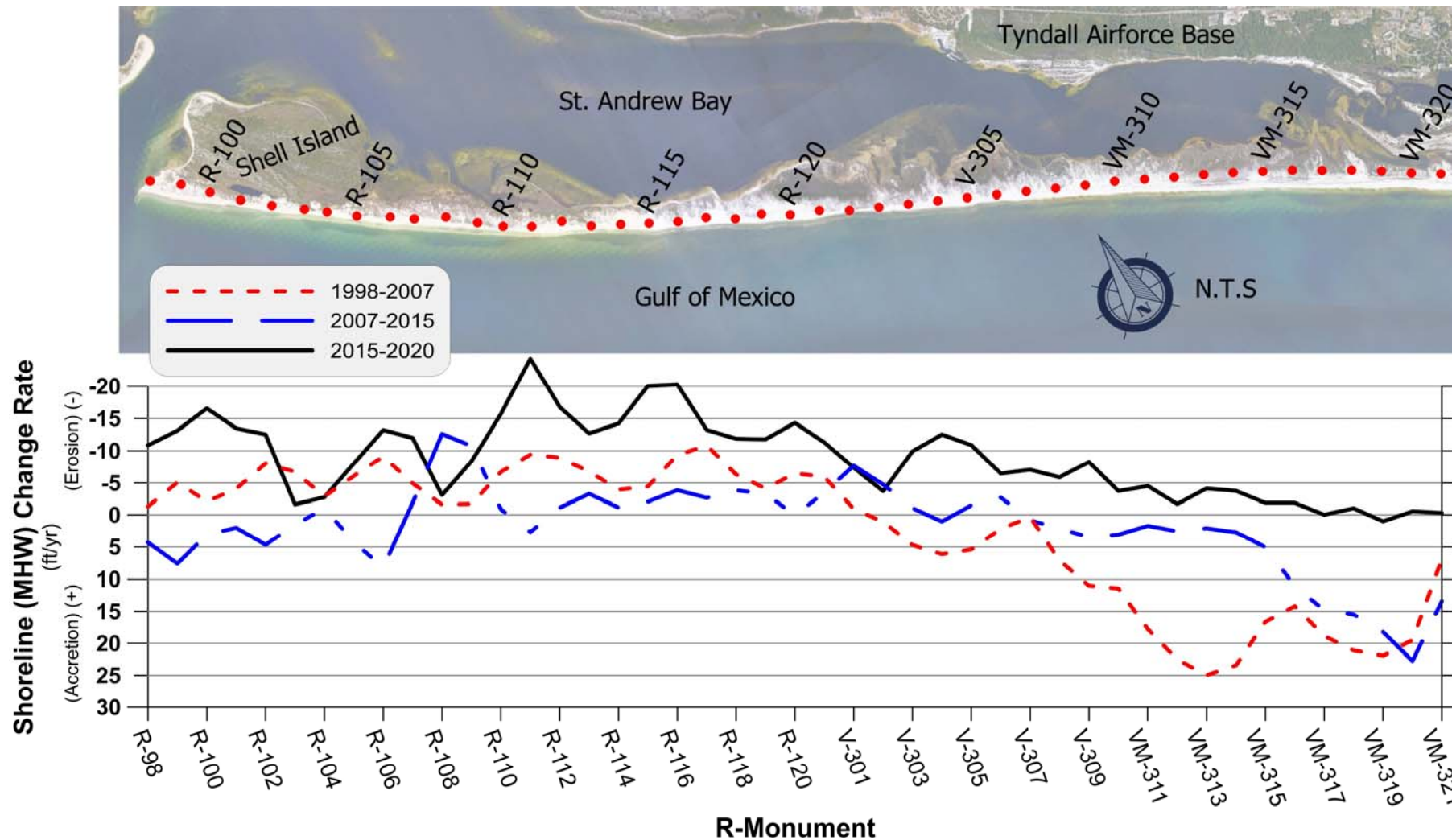
Bathymetry – 2007 Panama City DEM



Key Takeaways

- VM-309 to VM-312
 - Deep Channel in the Bay
 - Narrow Barrier Island Width
 - Low Elevations

Shoreline Change



Shoreline Data

- 2015 and 2020 – US Army Corps of Engineers LIDAR
- 2007 – FDEM (Florida Division of Emergency Management) LIDAR
- 1998 – NASA/NOAA/USGS LIDAR

Key Takeaways

- Historical Accretion (1998-2015) on the eastern end of project range
- Increased Erosion rates recently (2015-2020), dissipating to the east

GenCade



Goals

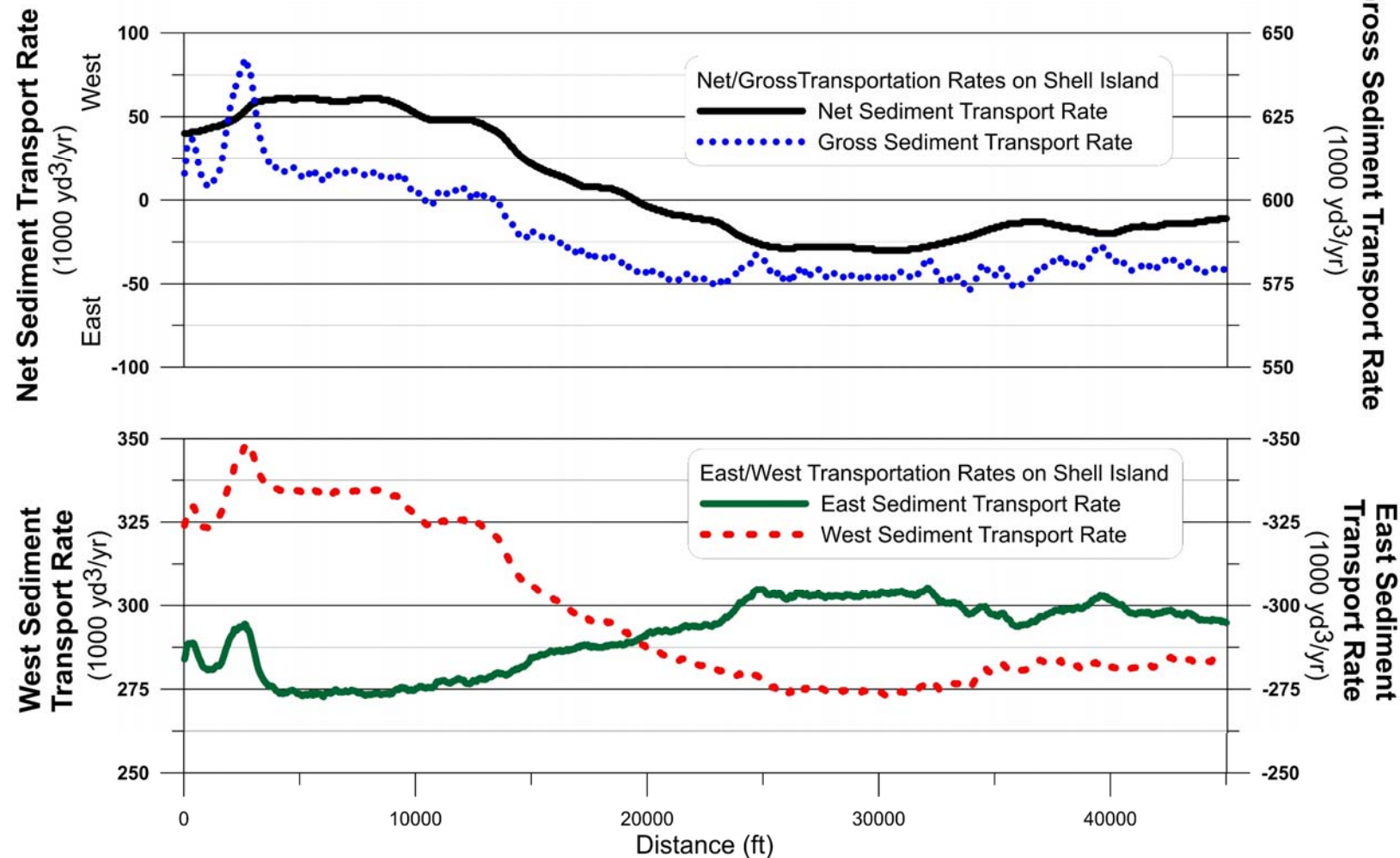
- Estimate sediment transportation rates
- Determine location of nodal point

Inputs

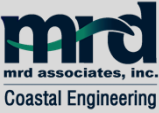
- 2007 Shoreline (FDEM LIDAR)
- USACE WIS Stations 73185, 73186
- Time Range: 2007-2018

Output

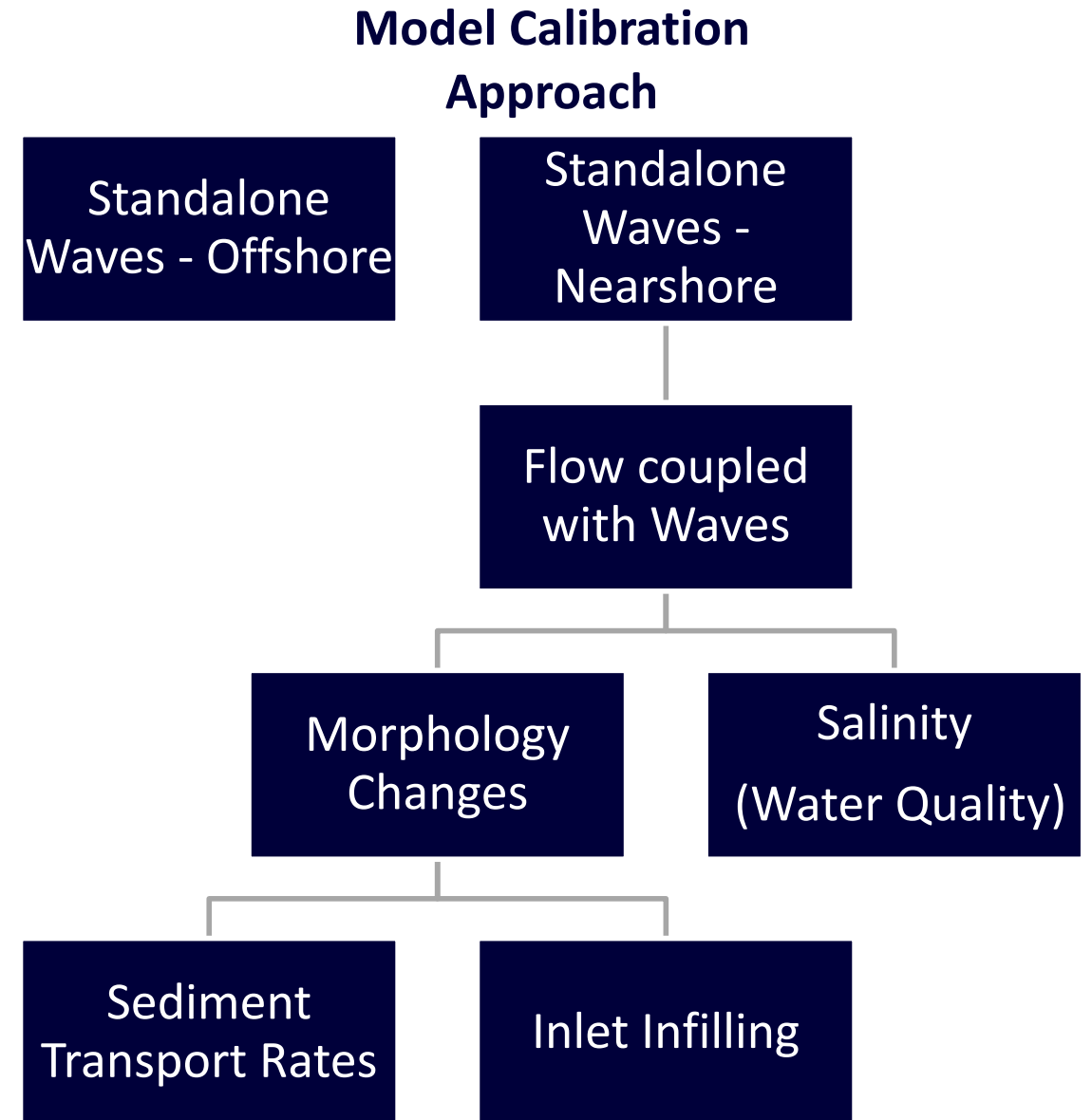
- Nodal Point location: R-115
- Net Sediment Transport Rate near SABE: 60,000 yd³/yr.



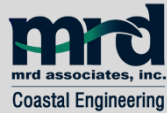
Modeling Approach



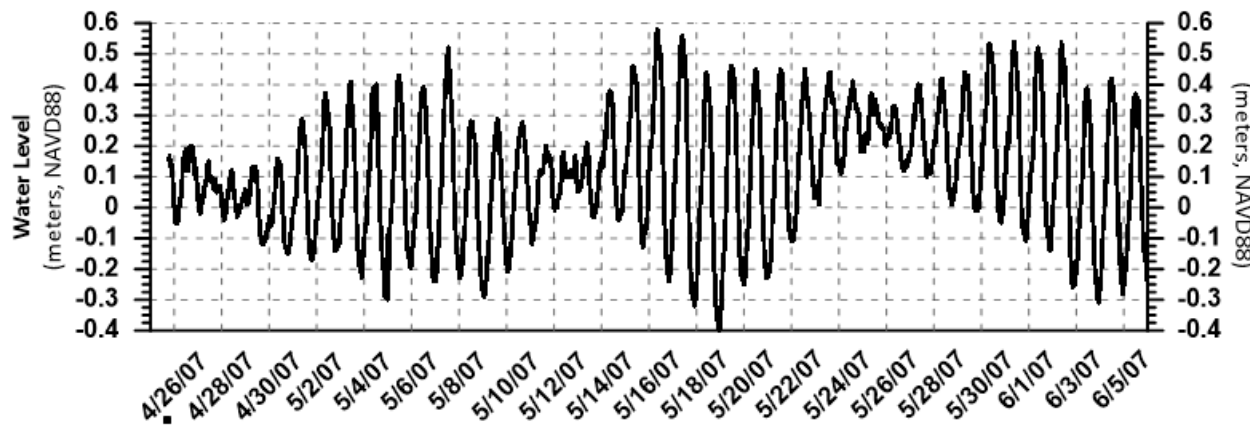
- Delft3D was chosen for the modeling effort (Version 4.03.01)
- Data Sources
 - Forcing Data
 - Calibration Data
- Model Grids
- Model Calibration



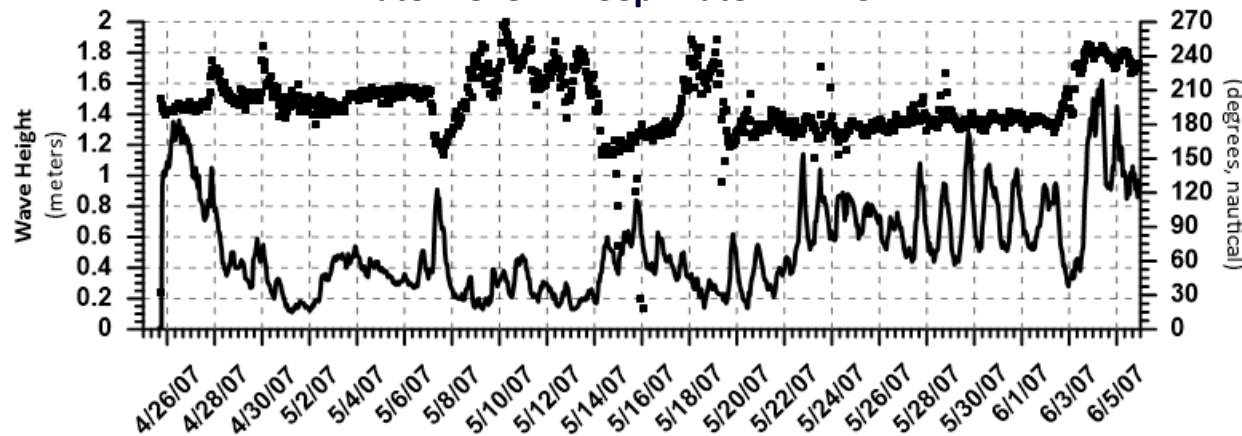
Data Sources



**Data collected by CP&E between
April 25 and June 6, 2007
Waves, Currents, and Water Levels**

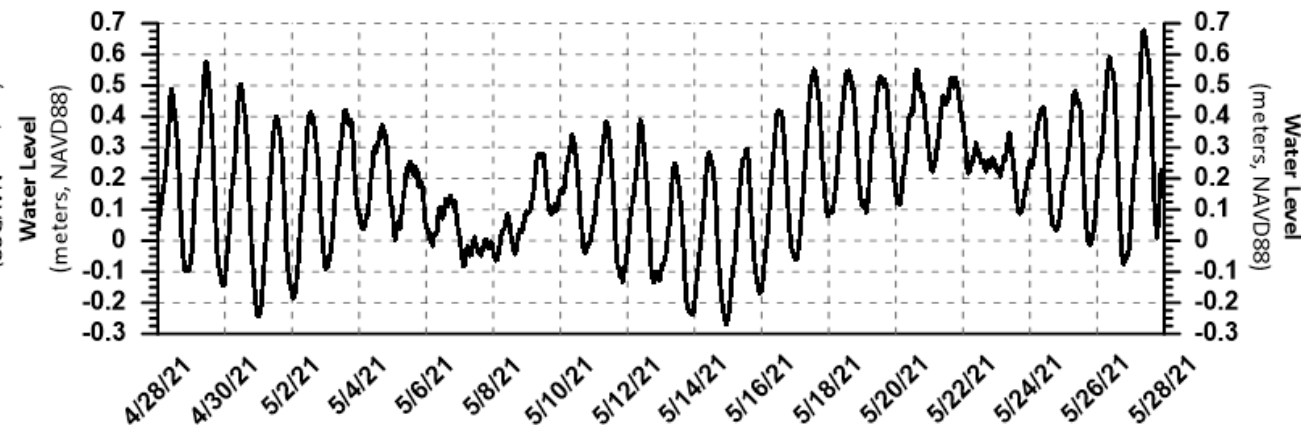


Water Level – Deep Water AWAC

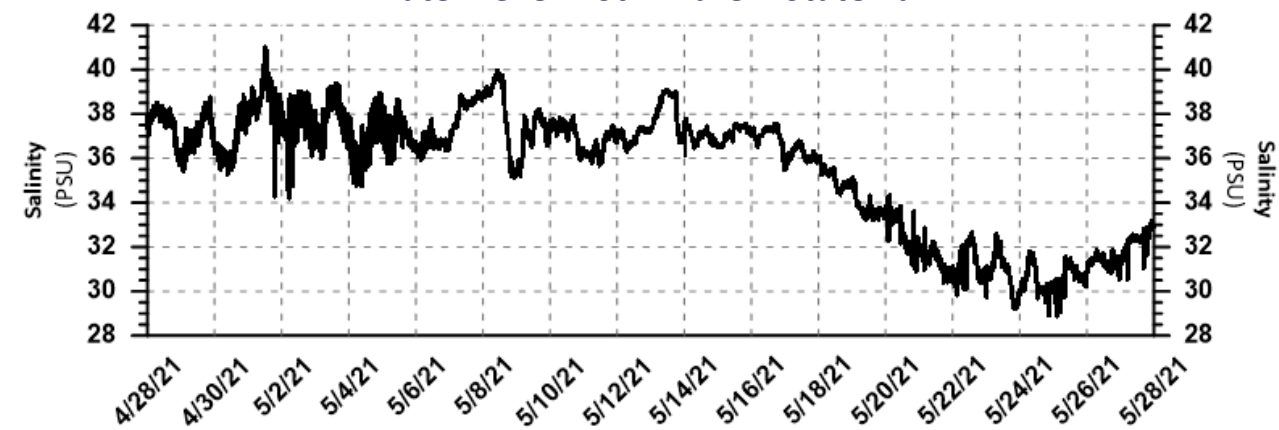


Wave Height and Direction – Deep Water AWAC

**Data collected by MRD between
April 27 and June 10, 2021
Water Levels, Currents, Discharge, and Salinity**

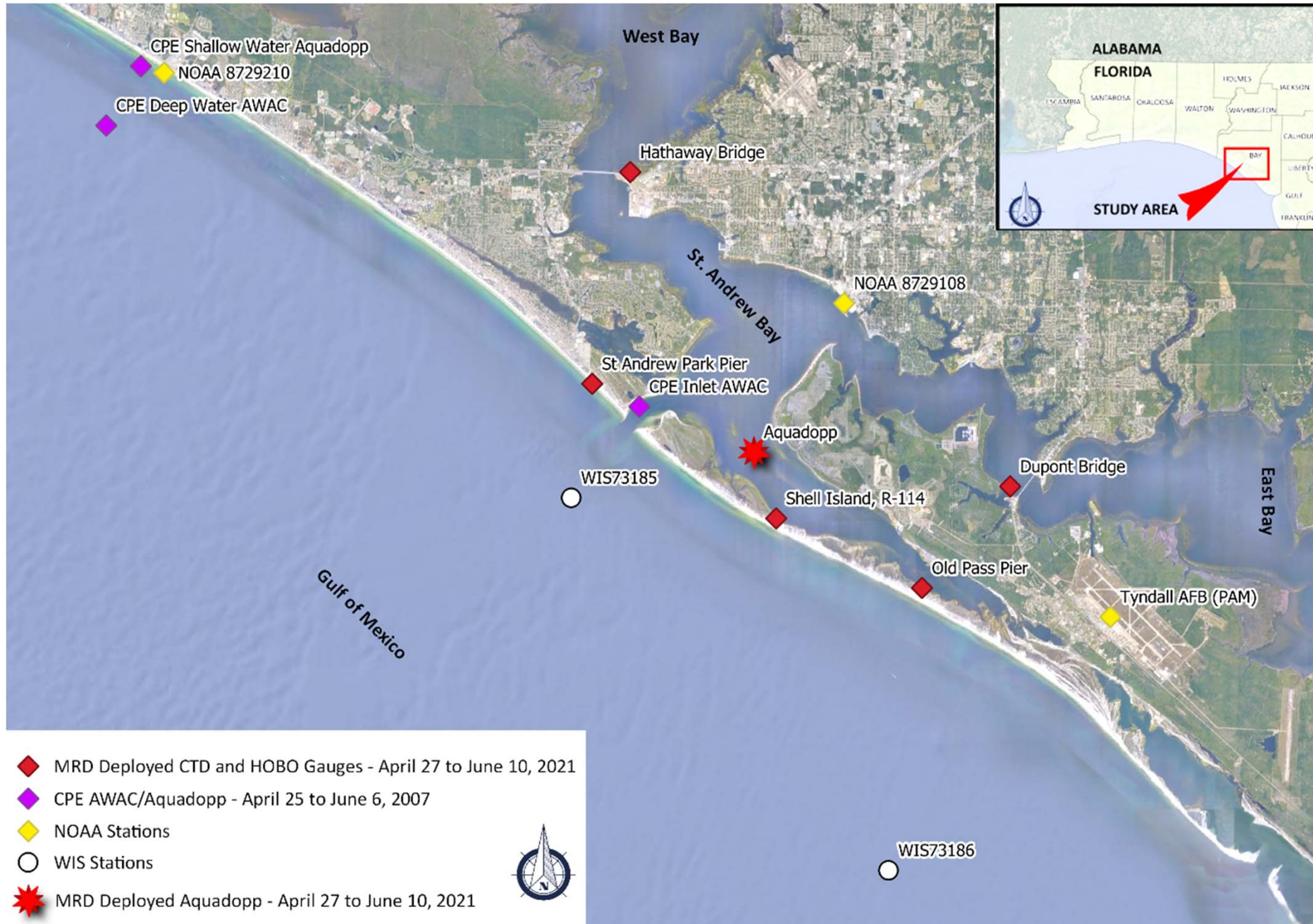
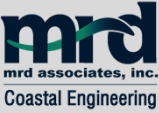


Water Level – St. Andrew State Park

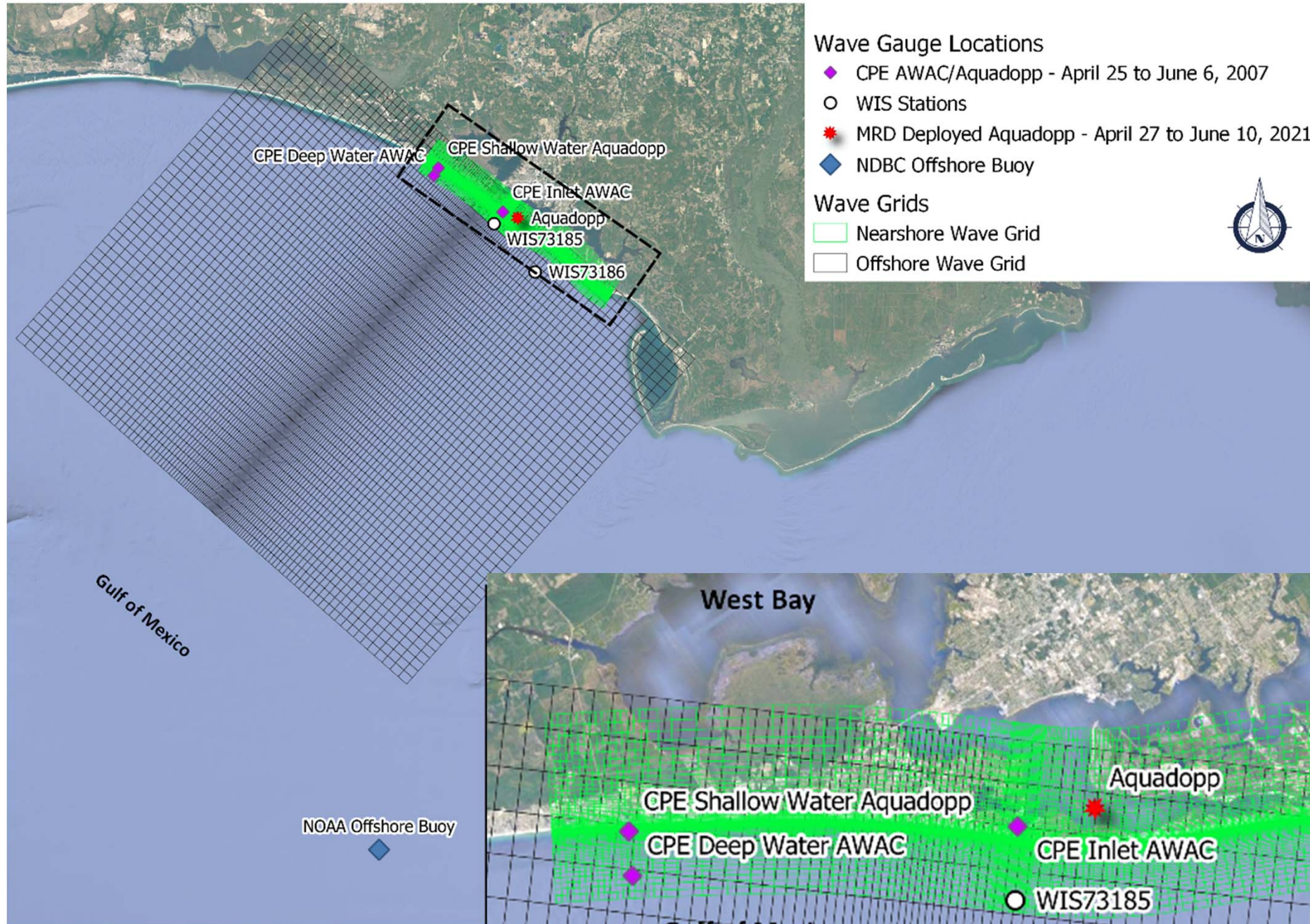
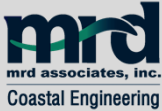


Salinity – St. Andrew State Park

Data Sources



Model Setup – Wave Model



Wave Gauge Locations

- ◆ CPE AWAC/Aquadopp - April 25 to June 6, 2007
- WIS Stations
- ★ MRD Deployed Aquadopp - April 27 to June 10, 2021
- ◆ NDBC Offshore Buoy

Wave Grids

- ▭ Nearshore Wave Grid
- ▭ Offshore Wave Grid

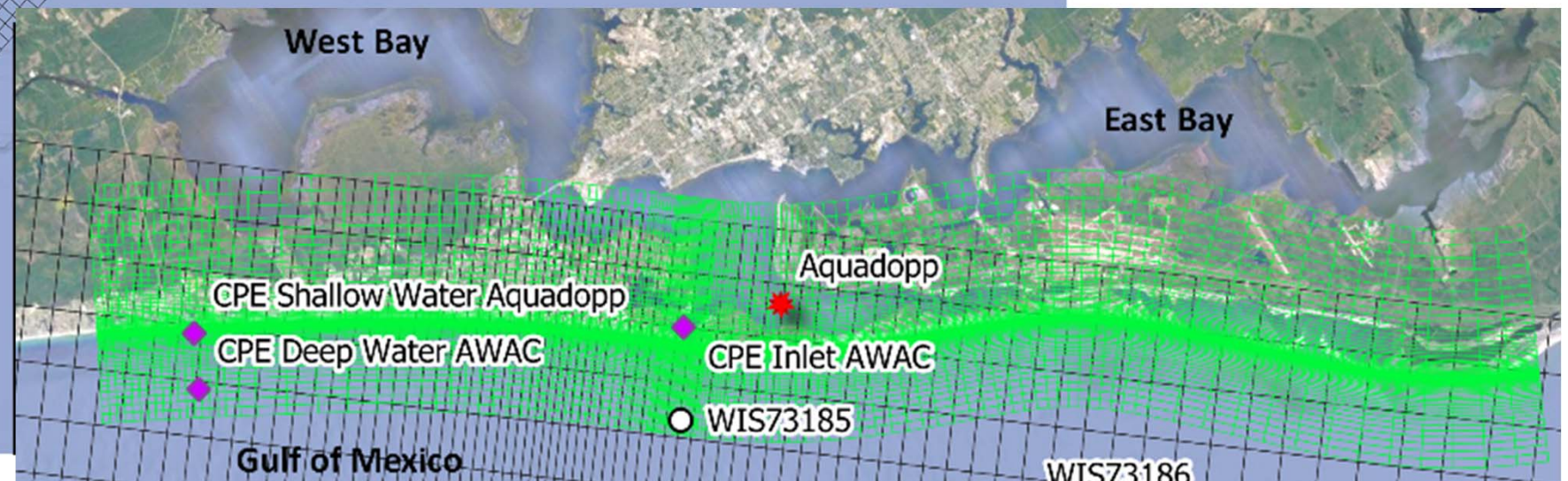


Offshore Wave Grid

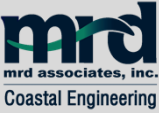
- 5,550 elements
- Grid sizes between 300 x 2,000 m and 2,000 x 2,000m

Nearshore Wave Grid

- 7,965 elements
- Grid sizes between 30 x 90 m and 100 x 200 m



Model Setup – Flow Model

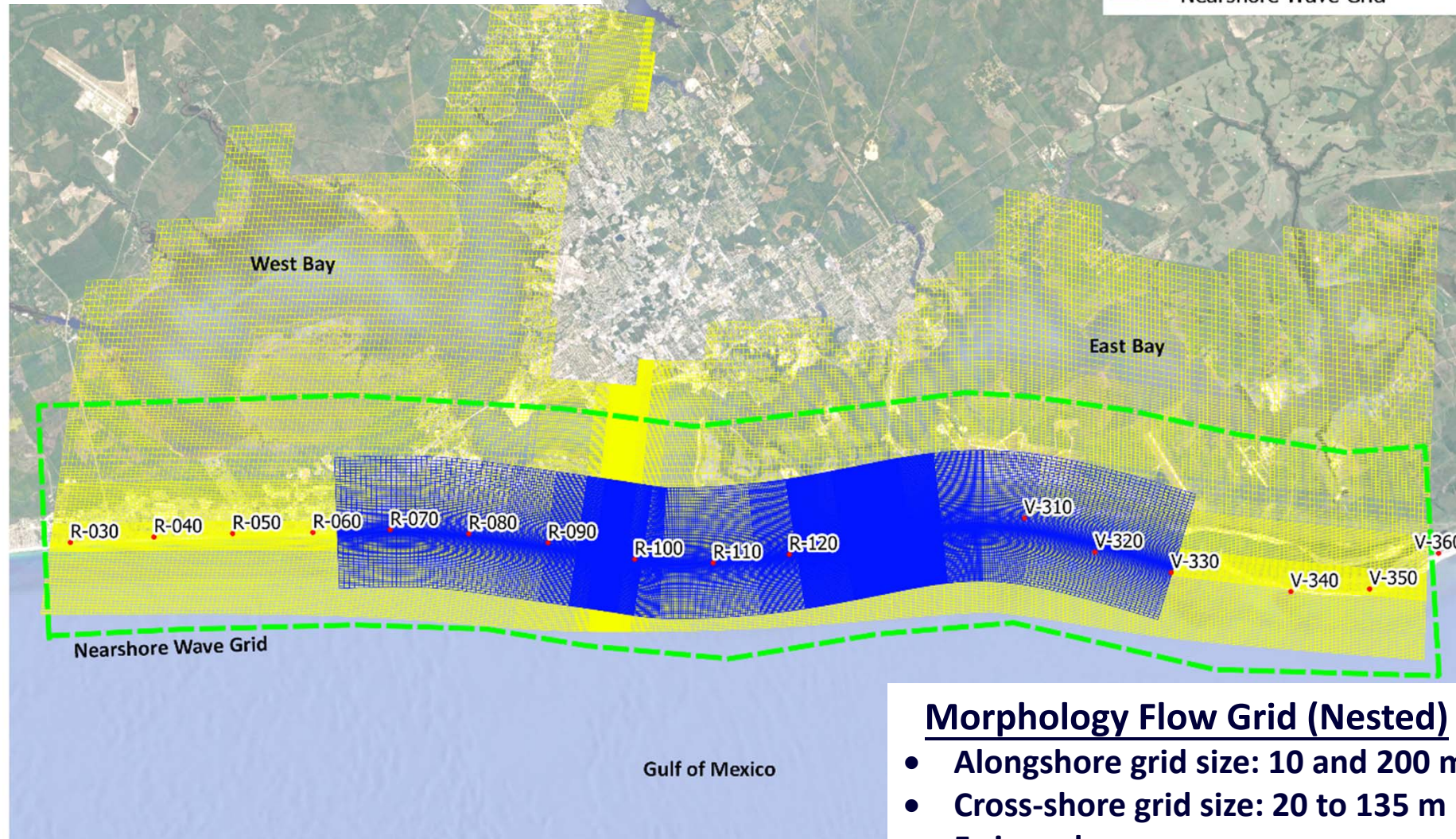


Regional Flow Grid (Coarse)

- Alongshore grid size: 10 and 210 m
- Cross-shore grid size: 26 to 262 m
- 5 sigma layers



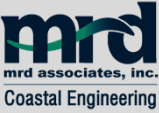
- DEP R-Monuments
- Model Grids
- Flow-morphology Grid (Nested)
 - Regional Flow Grid (Coarse)
 - Nearshore Wave Grid



Morphology Flow Grid (Nested)

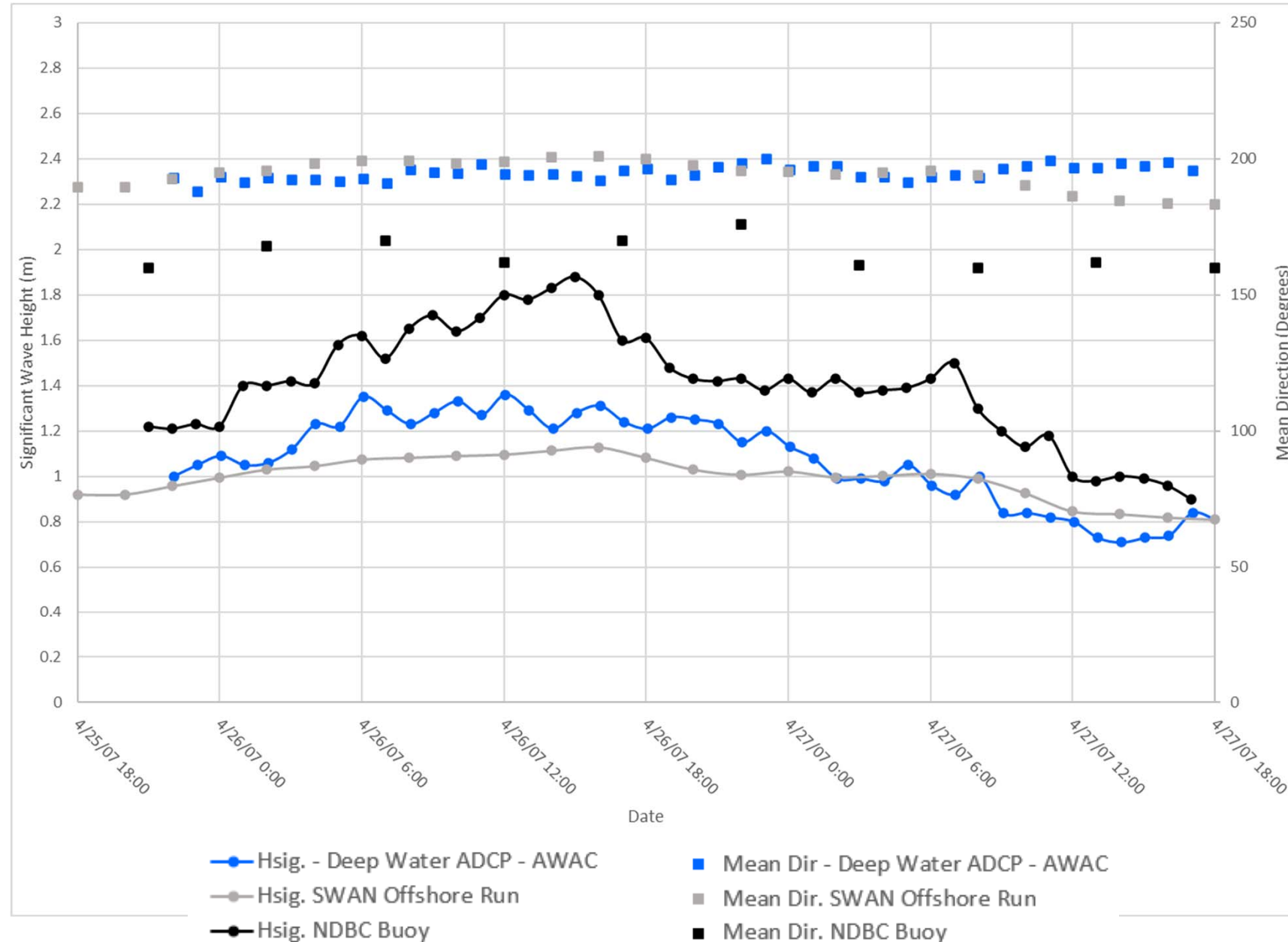
- Alongshore grid size: 10 and 200 m
- Cross-shore grid size: 20 to 135 m
- 5 sigma layers

Model Calibration – Offshore Waves



- Modeled Time Frame: April 25 to April 27, 2007
- Forcing Data: Wave data from NDBC Offshore Buoy
- Calibration Data: Wave heights and directions from CP&E Deep Water AWAC
- Model Parameters: Chosen based on calibrated Delft3D model done by CP&E in 2007

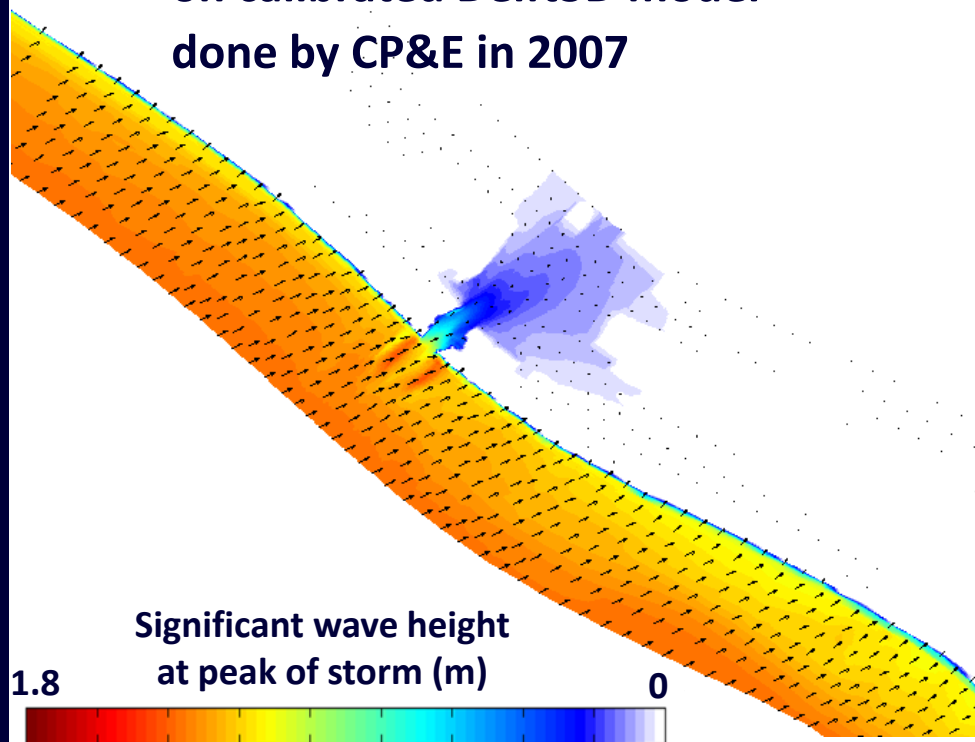
Measured vs. Simulated at Deep Water AWAC Location



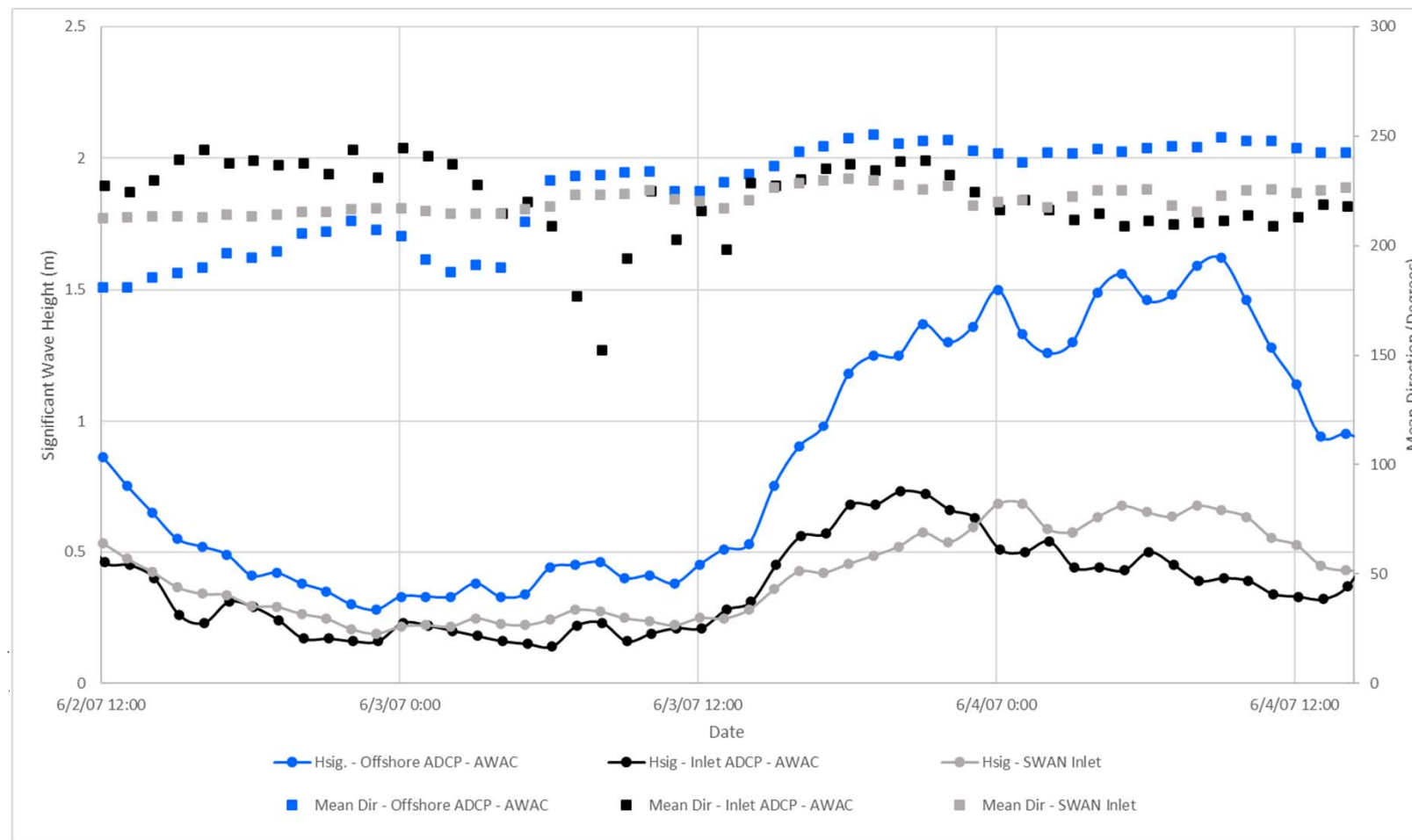
Model Calibration – Nearshore Waves



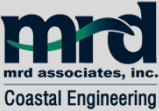
- Modeled Time Frame: June 2 to June 4, 2007
- Forcing Data
 - Water Levels: CP&E Deep Water AWAC
 - Waves: CP&E Deep Water AWAC
- Calibration Data: Wave heights and directions at CP&E Shallow Water Aquadopp and CP&E Inlet AWAC
- Model Parameters: Chosen based on calibrated Delft3D model done by CP&E in 2007



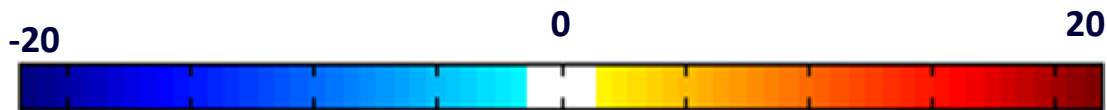
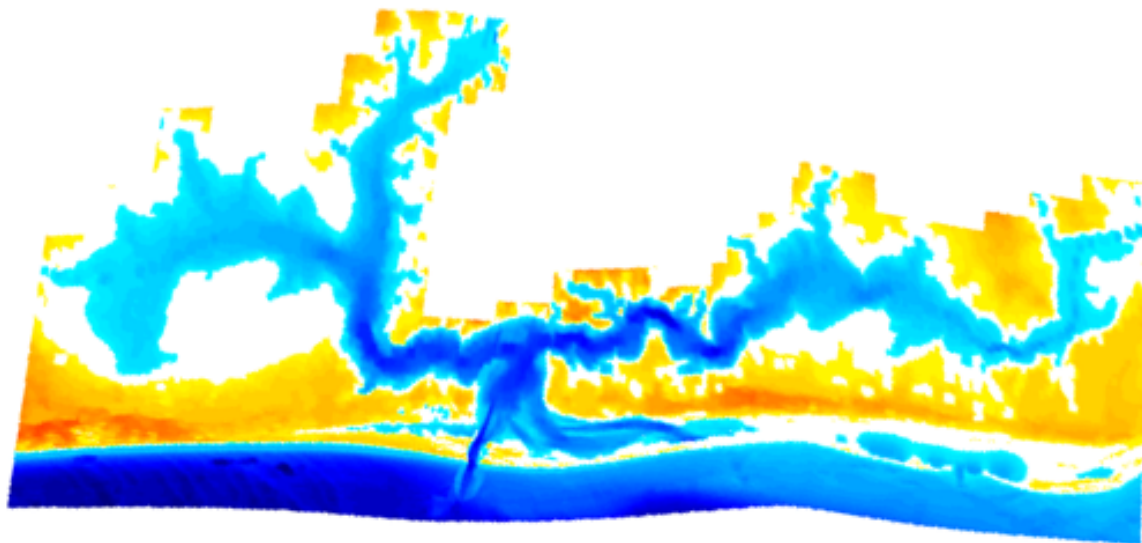
Measured vs. Simulated at Inlet AWAC Location



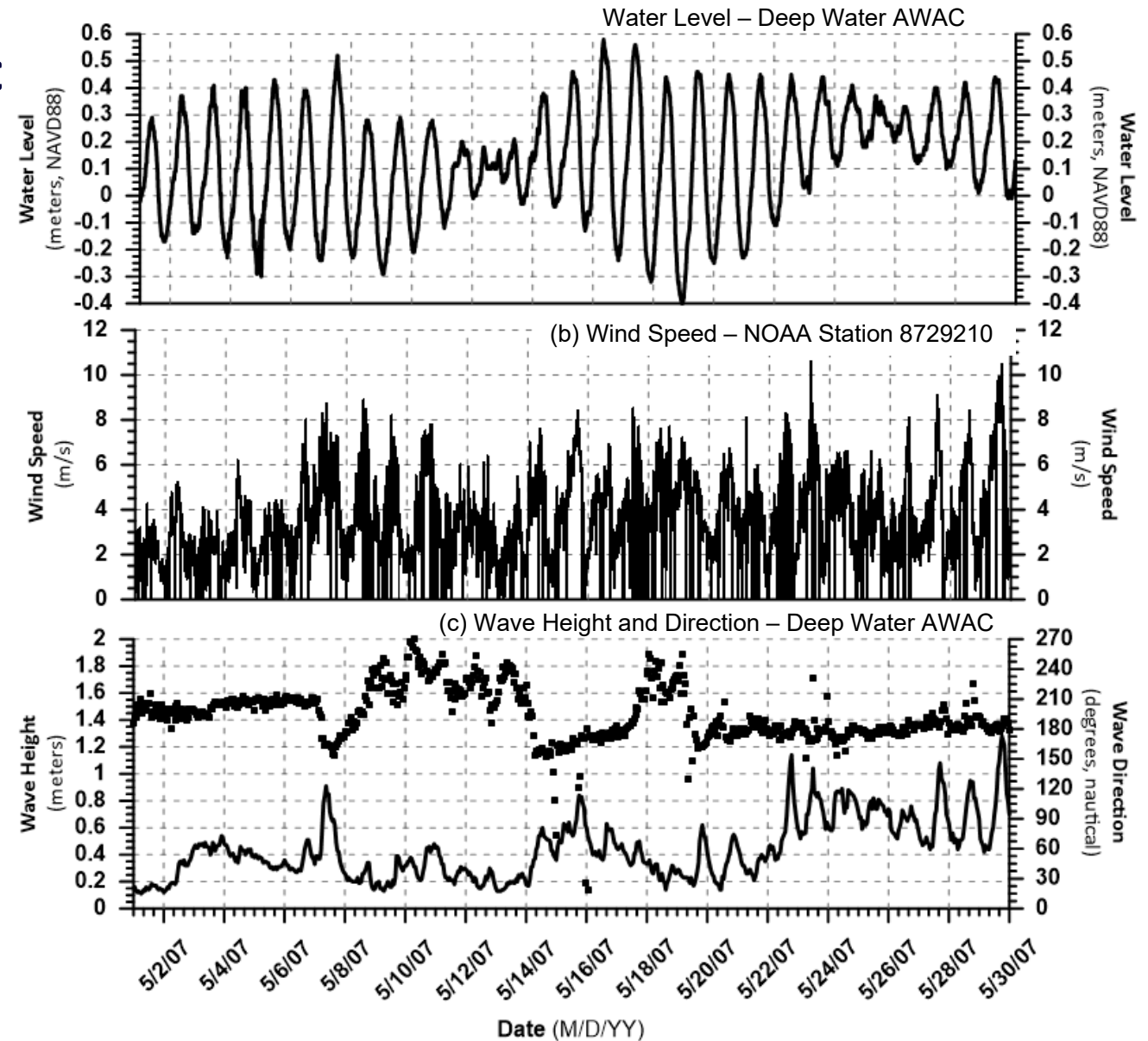
Model Calibration – Flows



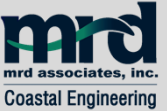
- Modeled Time Frame: May 1 to May 30, 2007
- Forcing Data
 - Water Levels: CP&E Deep Water AWAC
 - Wind: NOAA Station at PCB Pier
 - Waves: CP&E Deep Water AWAC
- Calibration Data: Depth averaged velocities at CPE Inlet AWAC



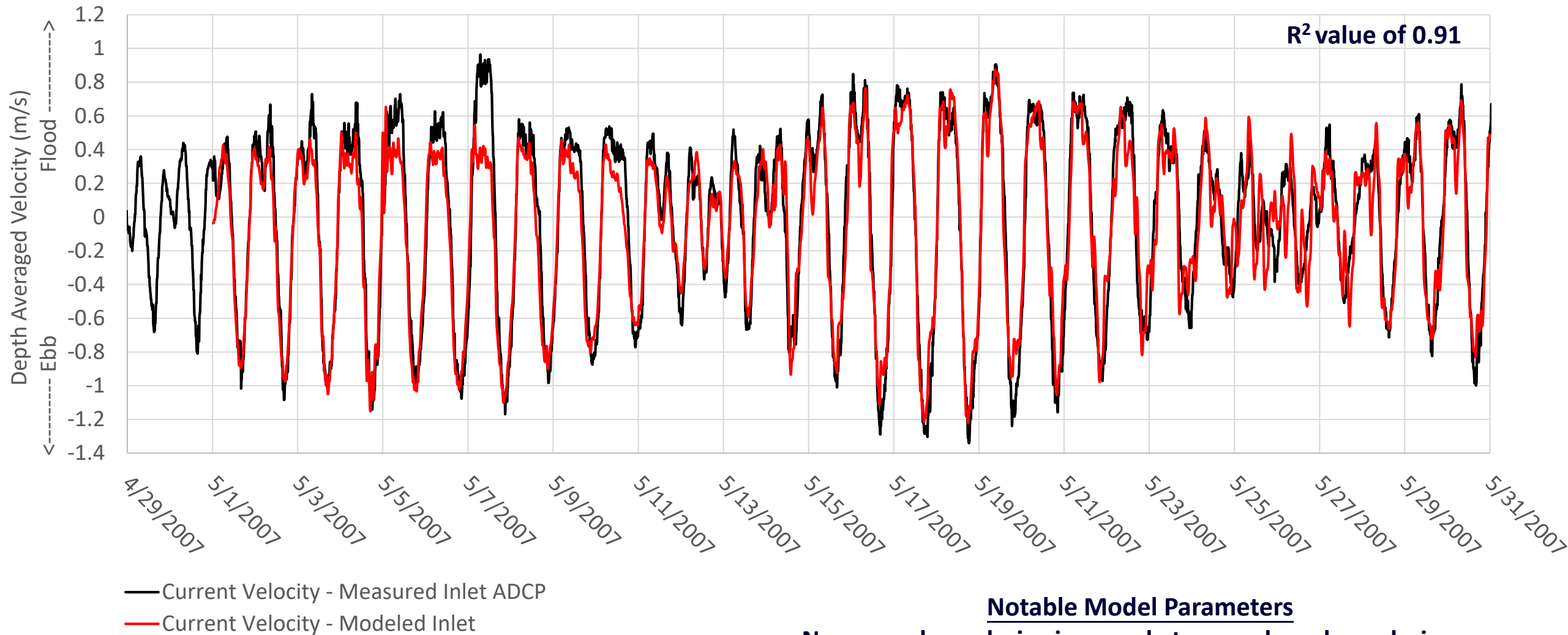
Forcing Data for Calibration of Flows



Model Calibration – Flows



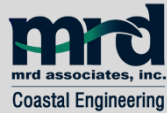
Measured vs. Simulated Depth-Averaged Velocities at Inlet AWAC



Notable Model Parameters

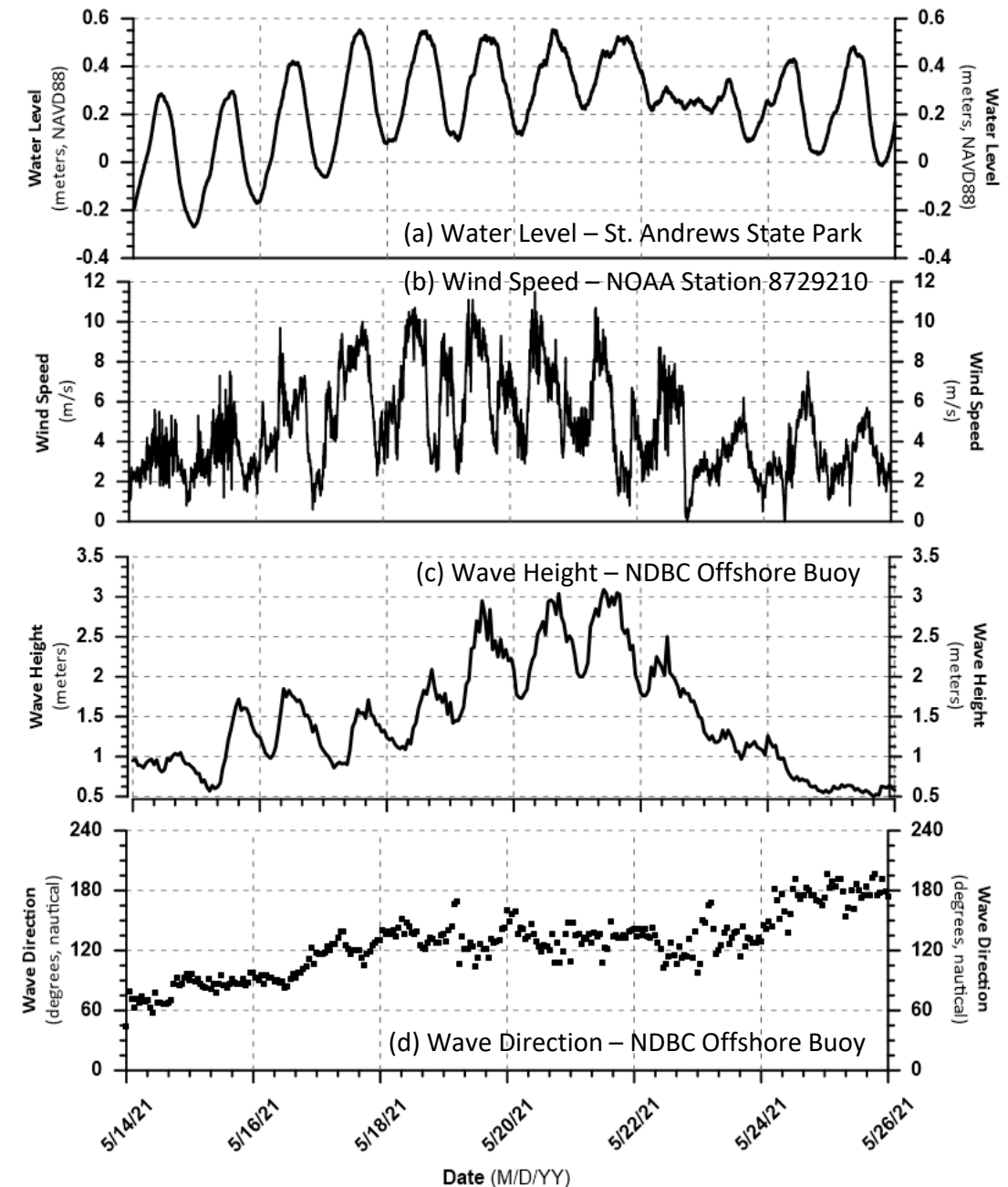
- Neumann boundaries imposed at cross-shore boundaries
- Bottom Roughness using Chezy with Default value of 65

Model Validation – Flows



- **Modeled Time Frame: May 14 to May 26, 2021**
 - Start time coincides with when the Aquadopp was deployed in Old Pass Lagoon
 - Ended the simulation when water levels at St. Andrew State Park became questionable due to biofouling
- **Forcing Data**
 - Water Levels: MRD CTD Gauge St. Andrew State Park
 - Wind: NOAA Station at PCB Pier
 - Waves: Translated waves from NDBC Buoy using offshore wave grid
- **Calibration Data**
 - Depth averaged velocities at MRD Aquadopp in Old Pass Lagoon
 - Discharge through St. Andrew Bay Entrance and Old Pass Lagoon

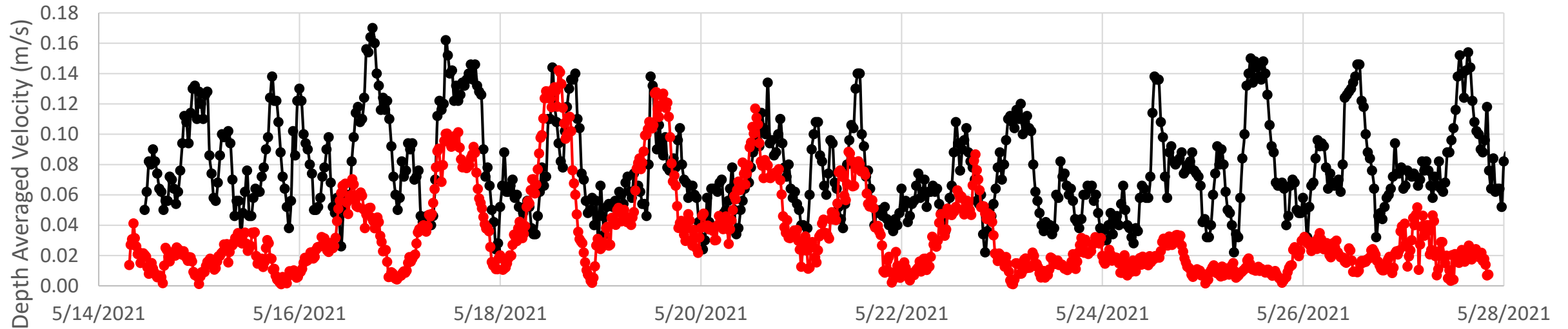
Forcing Data for Validation of Flows



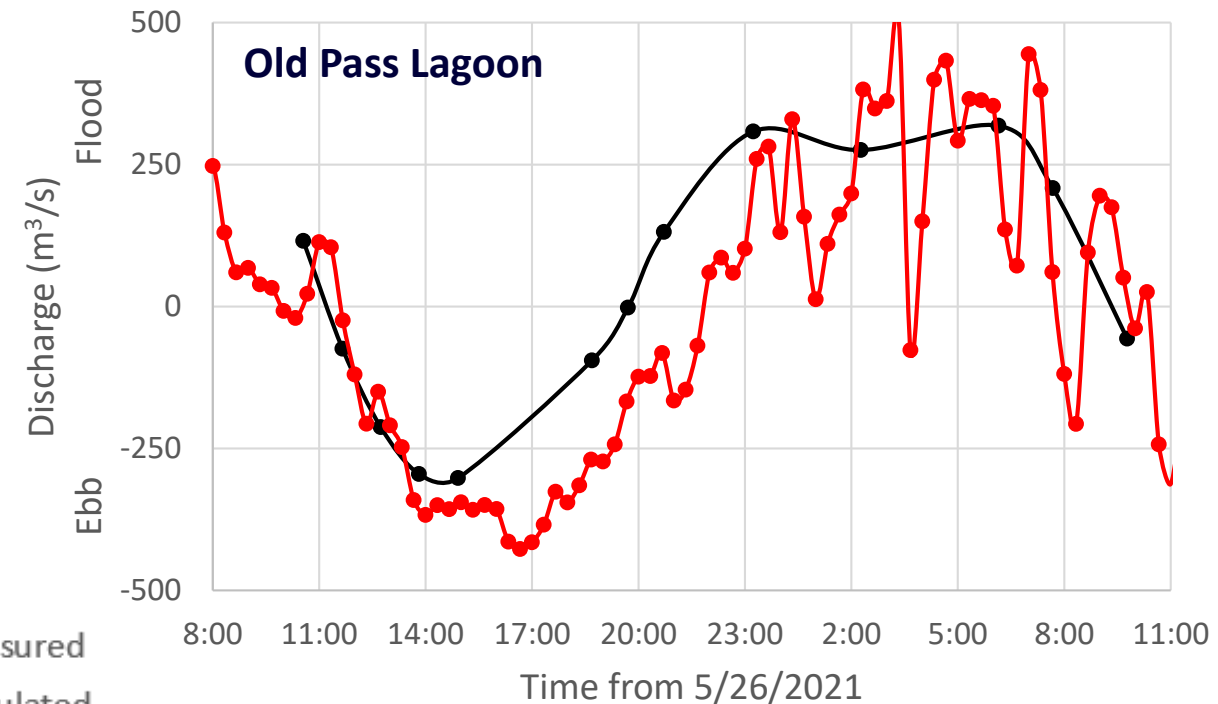
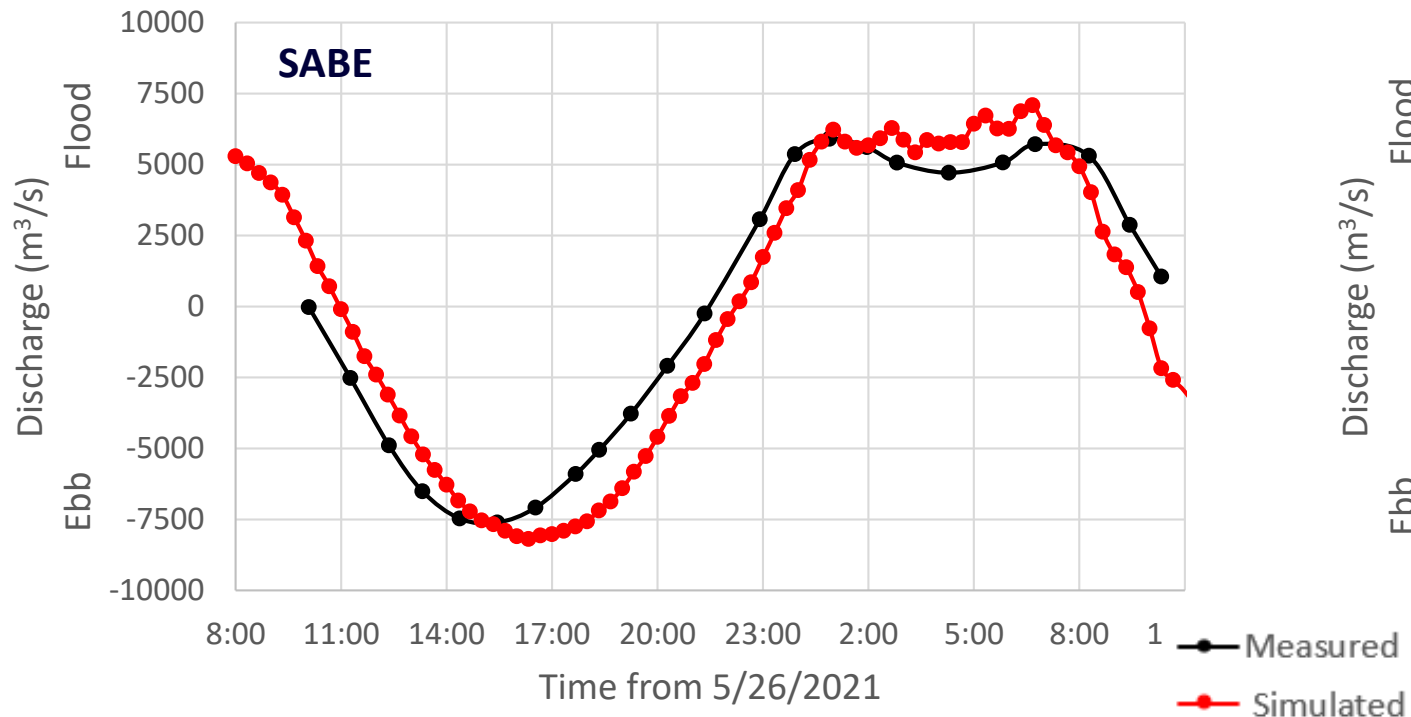
Model Validation – Flows



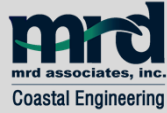
Measured vs. Simulated Depth-Averaged Velocities at Old Pass Lagoon Aquadopp



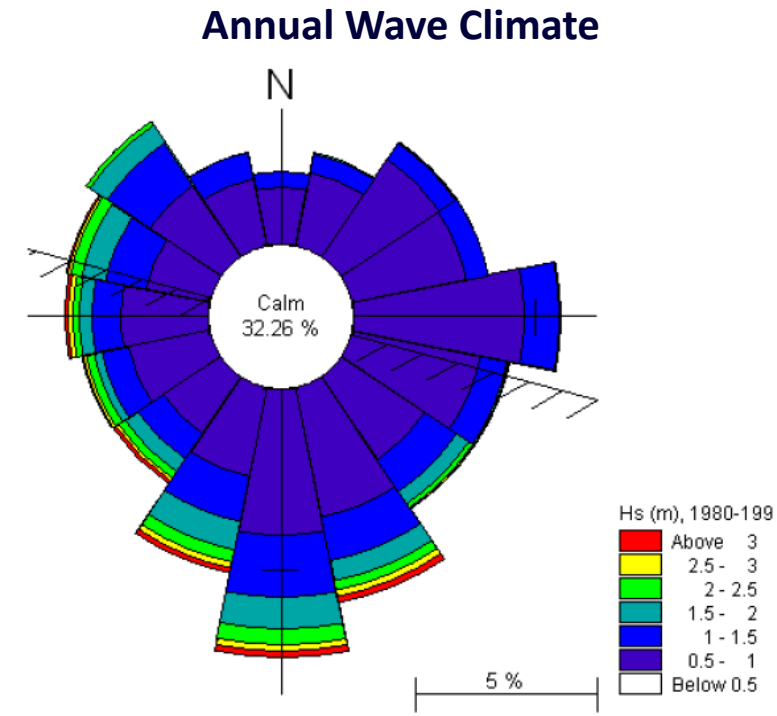
Measured vs. Simulated Discharge



Sediment Transport Rates Calibration



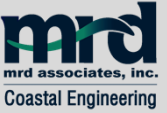
- Modeled Time Frame: May 1 to May 31, 2007
- Morphological factor of 12 to simulate a year period
- Forcing Data
 - Water Levels: Predicted tides at PCB Pier
 - Waves: Annual Wave Climate developed by CPE during calibration of Delft3d
 - Wind: Wind speed and direction from annual wave climate developed by CPE



- Calibration Data
 - Net Sediment Transport rates from previous studies (60K-80K cy/yr)
 - GenCade results
 - Net Sediment Transport Rates from Mike-21 ST modeling by CP&E

Wave Case	Percent of Record	RMS Height (feet)	Mean Period (sec.)	Wave Angle (deg.)	Wind Speed (mph)	Wind Dir. (deg.)
1	9.14%	2.8	4.7	165	11.0	149
2	7.77%	3.2	4.8	186	11.1	186
3	5.00%	3.2	4.7	209	11.5	225
4	3.81%	3.0	4.5	233	11.6	251
5	4.86%	2.7	4.3	255	11.5	269
6	0.71%	9.7	7.0	165	27.2	150
7	0.85%	8.8	7.0	187	22.6	184
8	0.63%	8.6	6.9	209	21.1	226
9	0.39%	8.4	6.8	232	22.2	261
10	0.36%	8.5	6.7	255	24.3	278

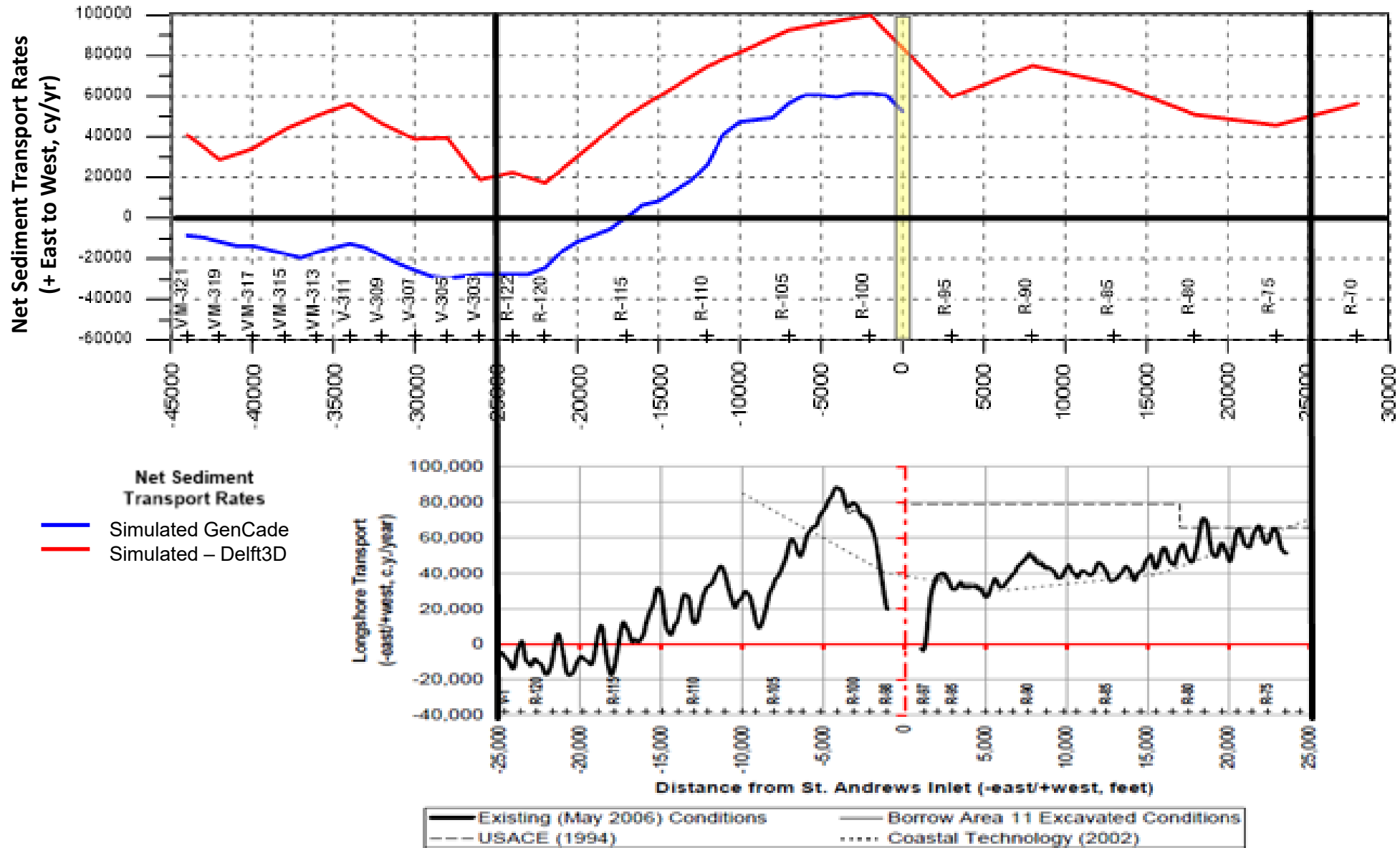
Sediment Transport Rates Calibration



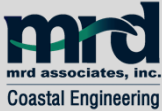
GenCade Results (Blue)

MIKE-21 ST Results (CP&E, 2007)

Net Sediment Transport Data for Calibration

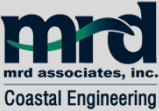


Next Steps for Morphology Modeling

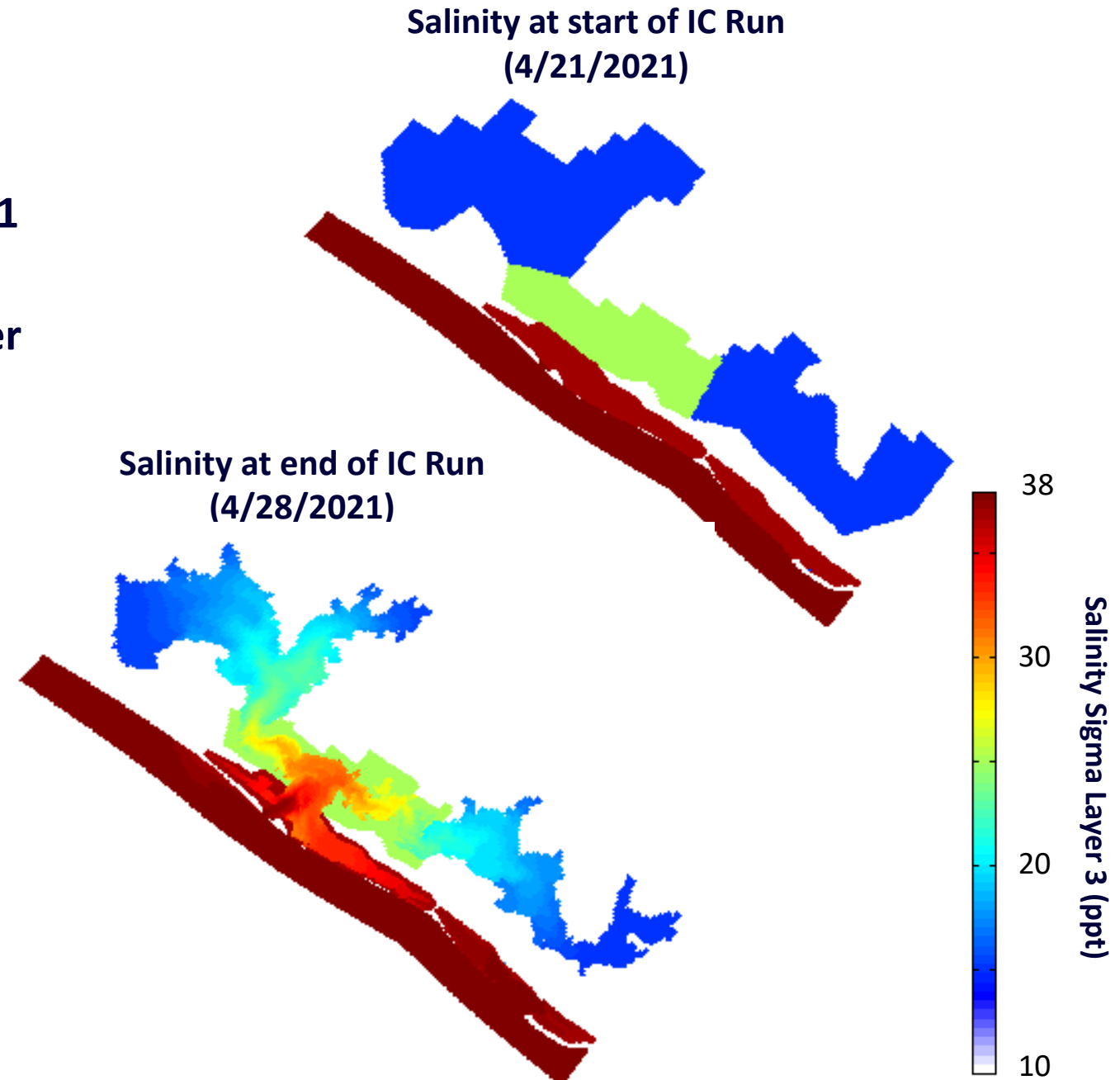


- **Calibration of Sediment Transport Rates to match GenCade/MIKE results**
- **Sensitivity Analysis of Model Parameters including but not limited to:**
 - **Transport Equations (van Rijn 1993 vs 2003)**
 - **Wave and Current-related sediment transport factors**
 - **Erosion of adjacent cells factor**
 - **AlfaBn and AlfaBs**
- **Run Inlet infilling model run for 2001 conditions with final calibrated parameters**
- **Run for major storm event (Hurricane Dennis)**
 - **Initial bathymetry – Post-Ivan Lidar (Dec 2004)**
 - **Final bathymetry for comparison – Post-Dennis Lidar (July 2005)**

Water Quality Modeling



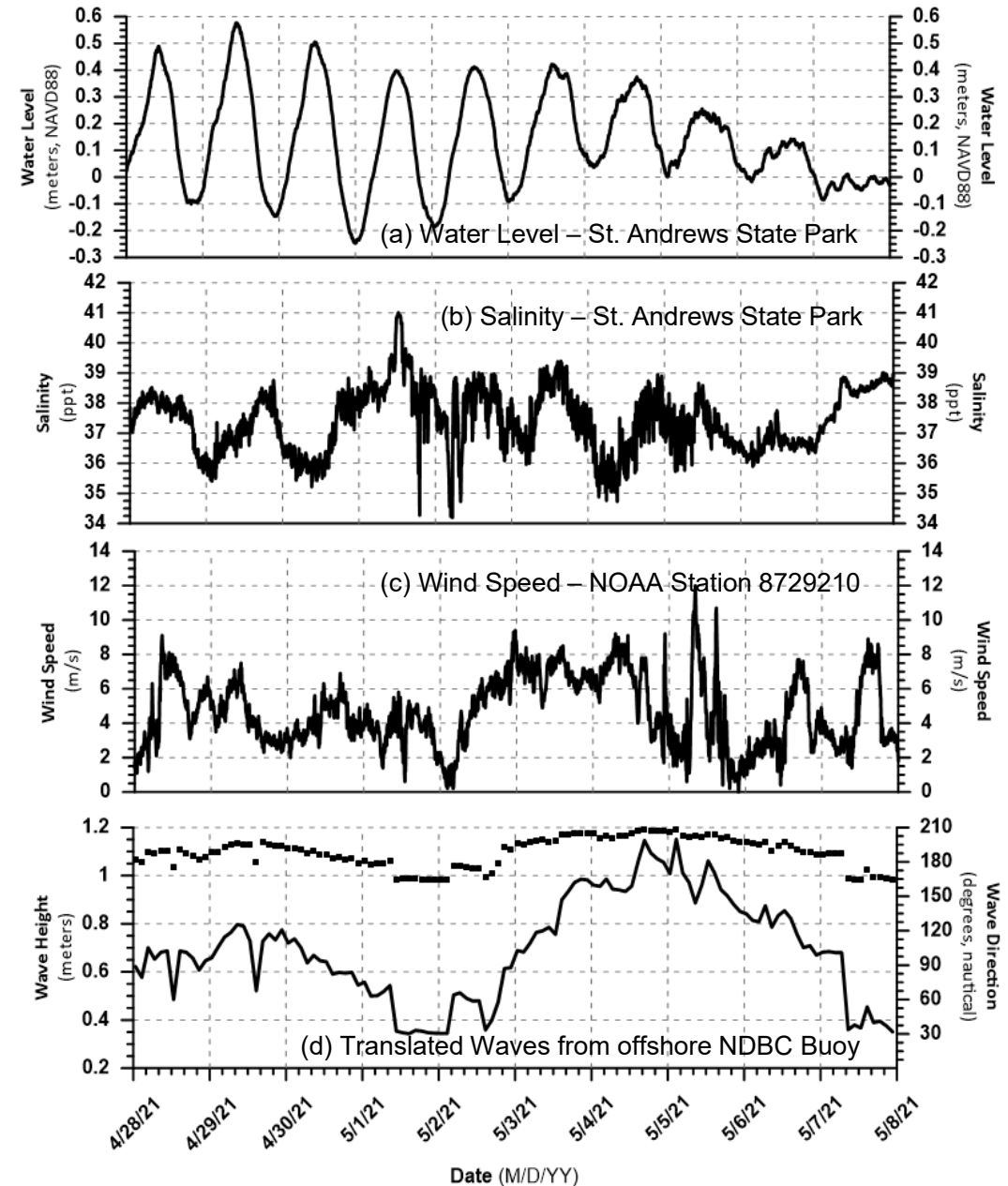
- Modeled Time Frame:
 - Initial Conditions: April 21 to April 28, 2021
 - Calibration Run: April 28 to May 8, 2021
- Initial Conditions Run Forcing Data
 - Water Levels: NOAA Station at PCB Pier
 - Wind: NOAA Station at PCB Pier
 - Waves: Translated waves from NDBC Buoy using offshore wave grid
 - Salinity: Constant of 38 ppt based on measured data
- Final time step was used as initial conditions for calibration run



Water Quality Modeling – In Progress



- Calibration Run Forcing Data
 - Water Levels: MRD CTD Gauge at St. Andrew State Park
 - Wind: NOAA Station at PCB Pier
 - Waves: Translated waves from NDBC Buoy using offshore wave grid
 - Salinity: MRD CTD Gauge at St. Andrew State Park
- Calibration Data: Salinity measured at Shell Island (R-114), Old Pass Pier, and Dupont Bridge



Discussion



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1935