State of Sebastian Inlet, Central Florida Coast: 1943-2018
An Assessment of Inlet Morphologic Processes, Shoreline Changes, Sediment Budget and Management Strategies

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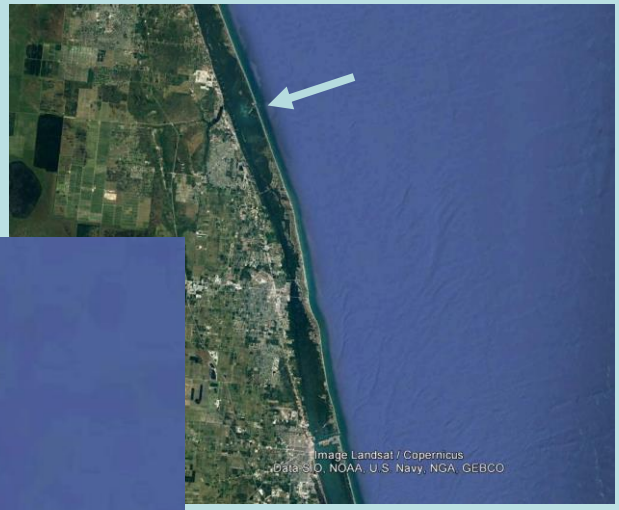
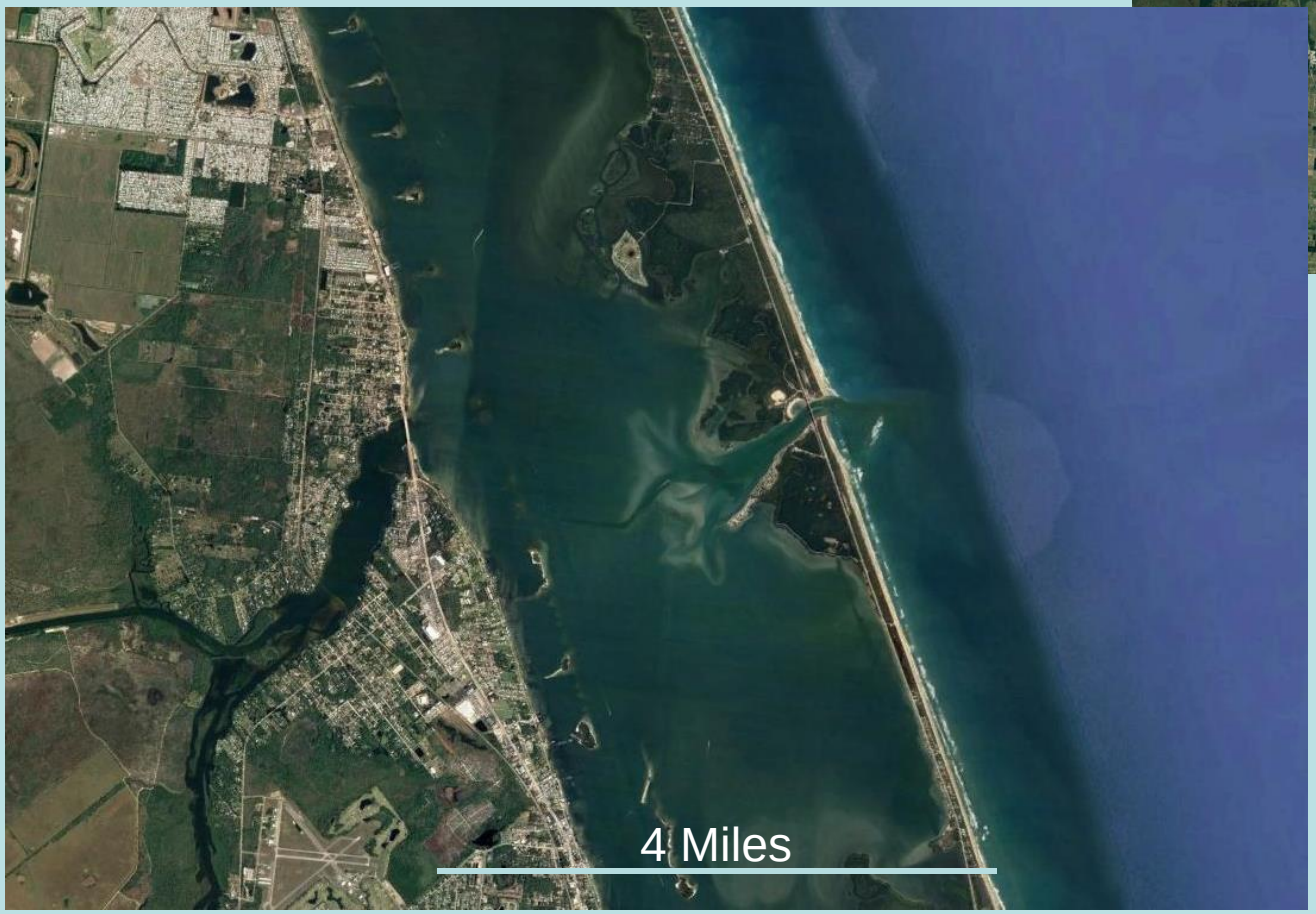
Topics

- Physical Setting and Geologic Setting
- Inlet History
- Data Sets
- Shoreline 1958-2018
- Sand Budgets and Sea Level Analysis
- Conclusions Recommendations

Location

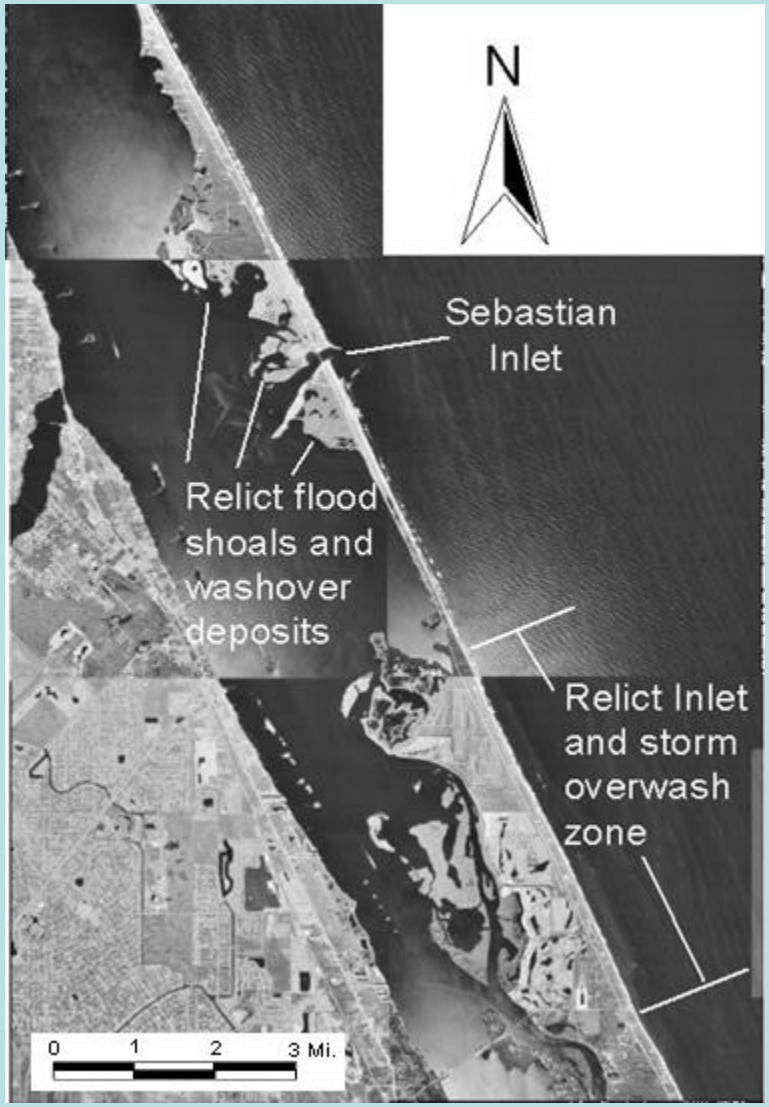




From Google Earth

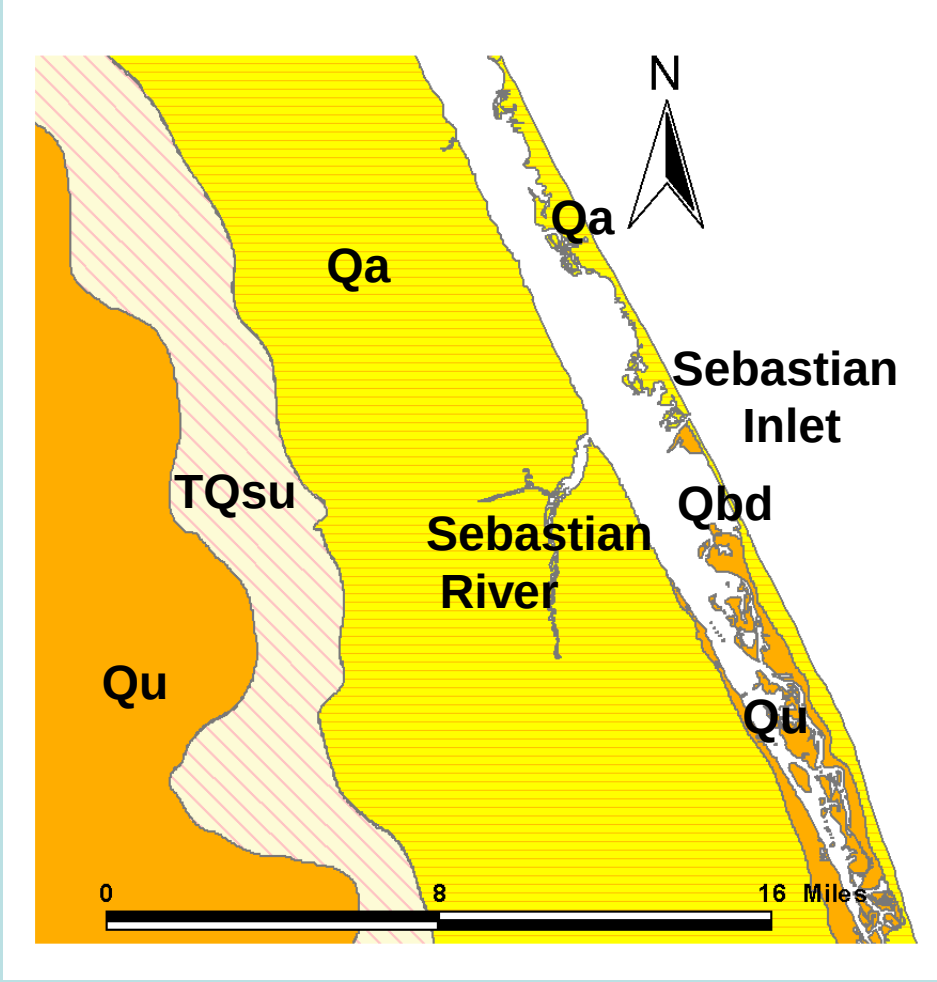
Geologic Setting

Storm and Wave Dominated Barrier Island



From Stauble, 1984

Geologic Framework



From Florida Geologic Survey

Sebastian Inlet History 1896-1955

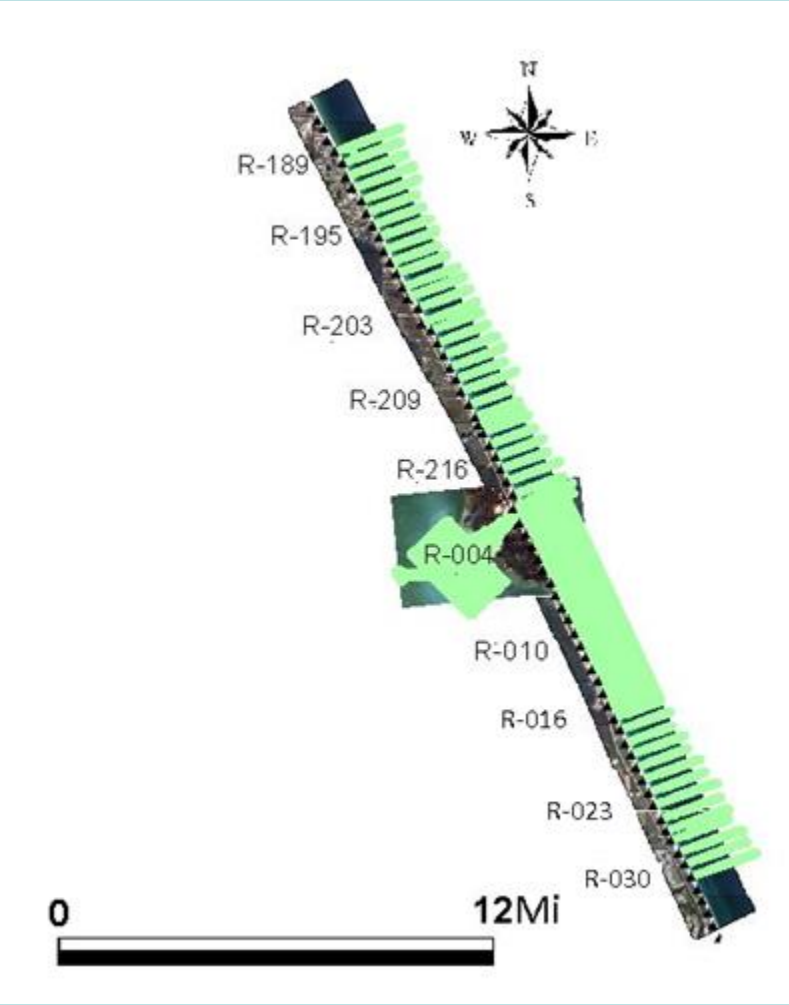
1886	**First opening attempted by hand**
1895	Opening completed, inlet closed by storm
1918	**First dredge opening completed, inlet closed by Northeaster**
1919	**Sebastian Inlet District (SITD) established by Florida Legislature to maintain the inlet**
1923	Permit obtained and beginning of dredging operations
1924	Completion of 100 feet wide and 6 feet deep channel with rock jetties extending 400 feet offshore
1939	Removal of approx. 72,000 yd^3 of sand
1941-1942	**Inlet closed by Northeaster**
1947	Opening of an 8 feet deep and 100 feet wide channel through dredging of approx. 70,000 yd^3 of sand
1948	**Channel realized in current configuration, removal of approx. 202,000 yd^3 of sand and 660 yd^3 of rock**
1950	Maintenance dredging, removal of 140,840 yd^3 of sand and 4843 yd^3 of rock
1952	**Completion of a 300 feet extension of the North jetty, dredging of 1,8000 yd^3 of sand in channel**
1955	Maintenance dredging, removal of 60,000 yd^3 of sand, North and South jetties extended 250 and 175 feet respectively

Sebastian Inlet History 1955-Present

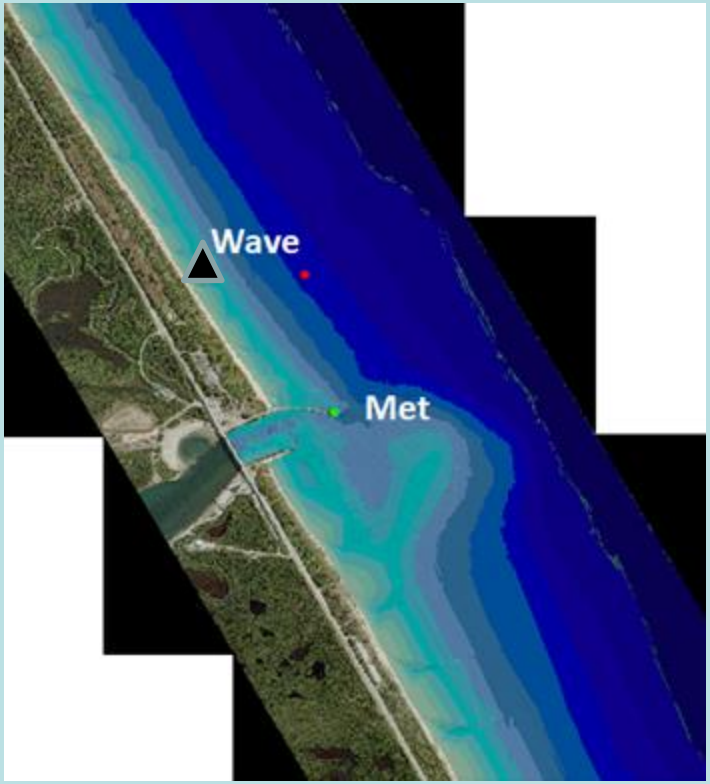
1958	Maintenance dredging, 65,000 yd^3 of sand removed
1962	Channel dredging and sand trap excavation, 282,400 yd^3 removed
1970	**North and South jetty extensions completed**
1972	**New 37 acre sand trap excavation, totaling 420,000 yd^3**
1978	Excavation of sand trap, 786,500 yd^3 removed, 187,600 yd^3 placed on downdrift beach
1985-1986	Excavation of sand trap, 133,290 yd^3 removed, 110,038 yd^3 placed on downdrift beach
1987-1988	Dredging of channel located west of sand trap
1989-1990	Dredging of channel and sand trap, 248,600 yd^3 placed on downdrift beach
1992-1993	Dredging of sand trap, 116,520 yd^3 placed on downdrift beach
1998-1999	Dredging of sand trap, approx. 237,883 yd^3 placed on downdrift beach
2007	**Dredging of sand trap, ~90,000 yd^3 placed on downdrift beach, channel extension to I.C.W. (L= 3,120 ft and V= ~ 50,000 yd^3 removed to inland material management area**)
2012	Sand trap dredging approx. 85,000 yd^3 placed on downdrift beaches
2014	**Sand trap and channel dredging approx. 140,000 yd^3 placed on downdrift beaches and DMMA**
2018	Sand trap and channel dredging approx. 100,000 yd^3 placed on downdrift beaches and DMMA

Data Resources

Topographic Surveys 1989-Present



Real Time Process Monitoring



https://research.fit.edu/wave-data/real-time-data

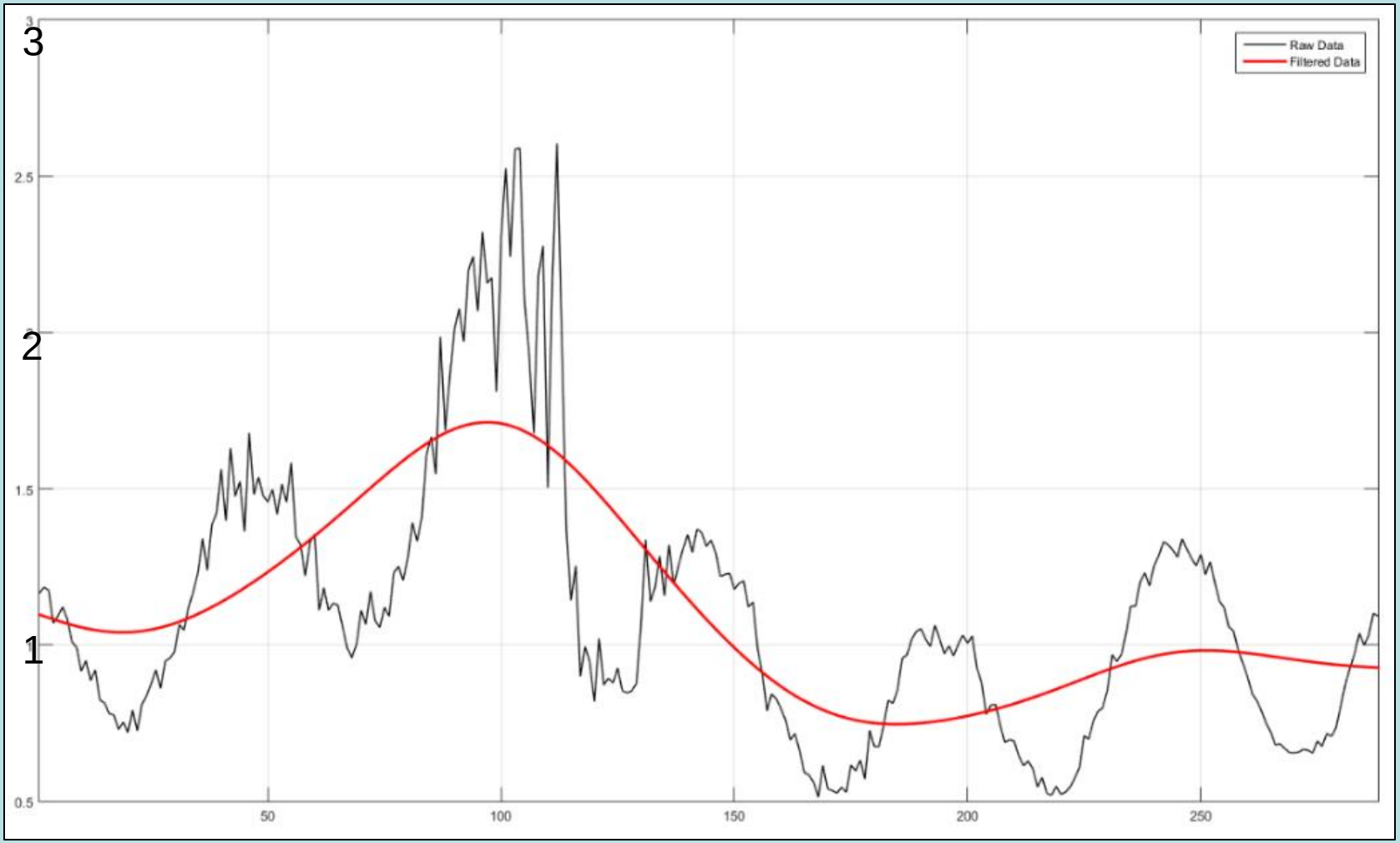
Data Resources

Meteorological Station

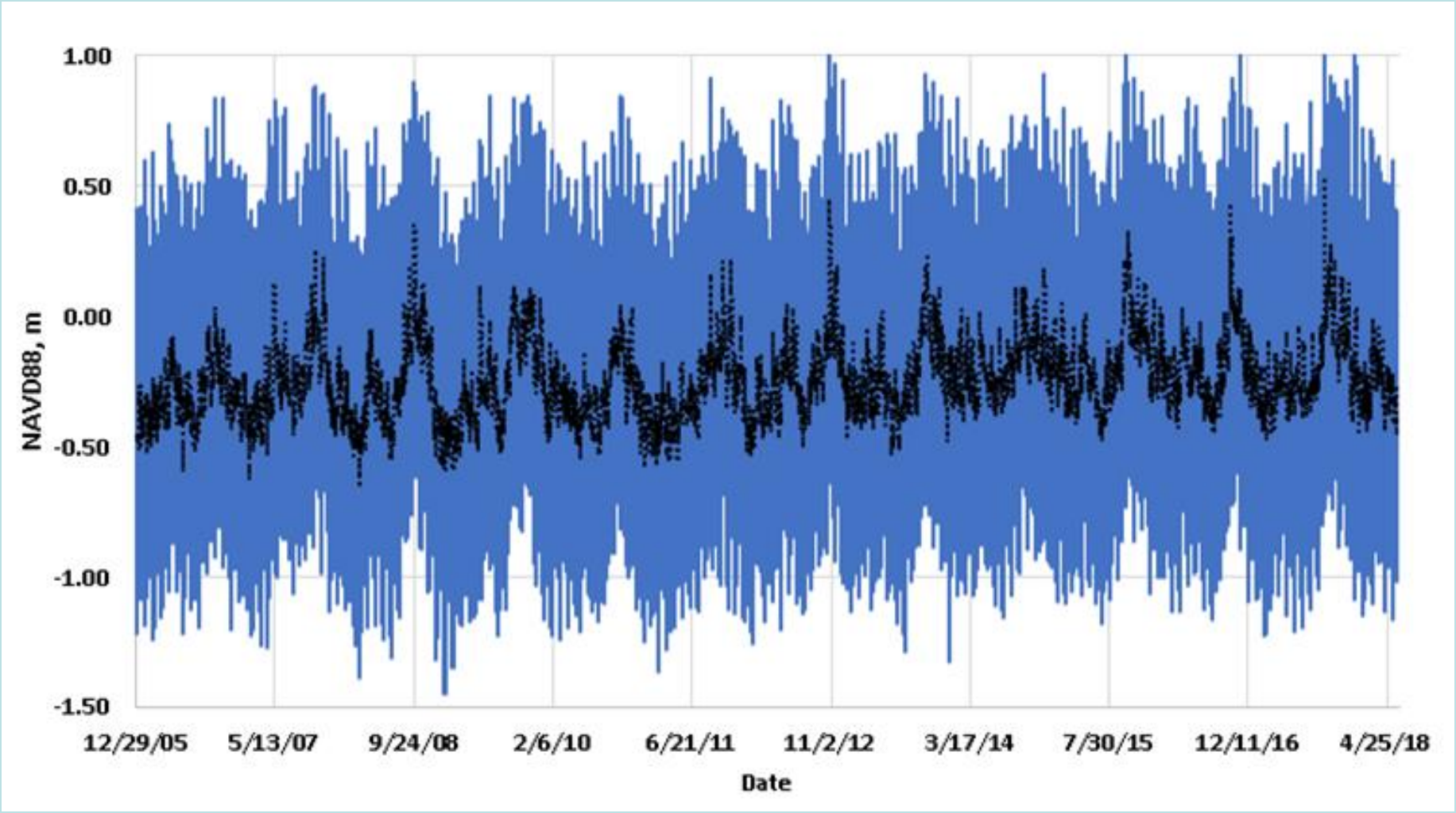
Data Resources

Water Level Sensor RADAR Technology

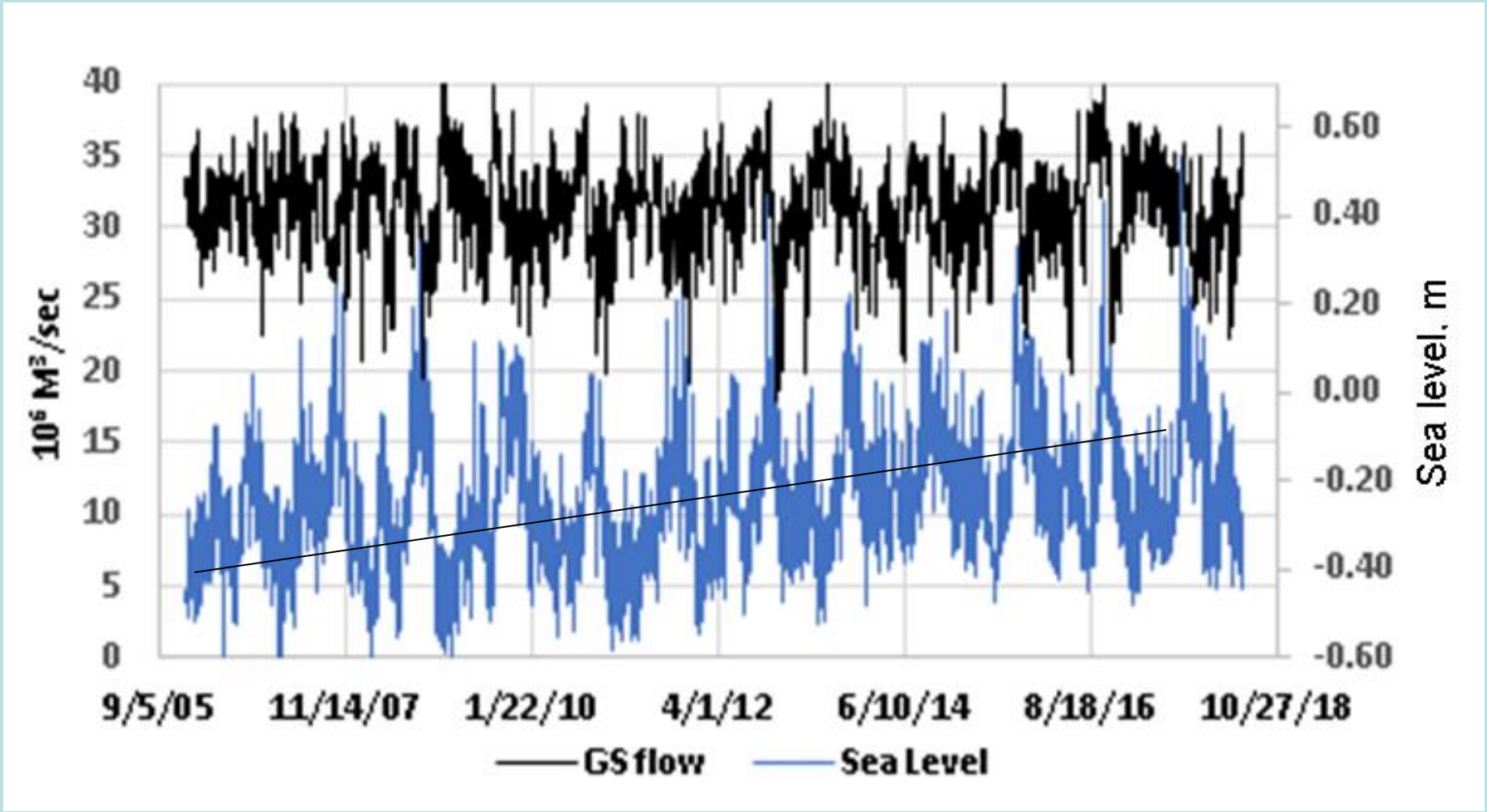
Data Hurricane Matthew: Storm Surge (meters)



Data Resources: Water Level



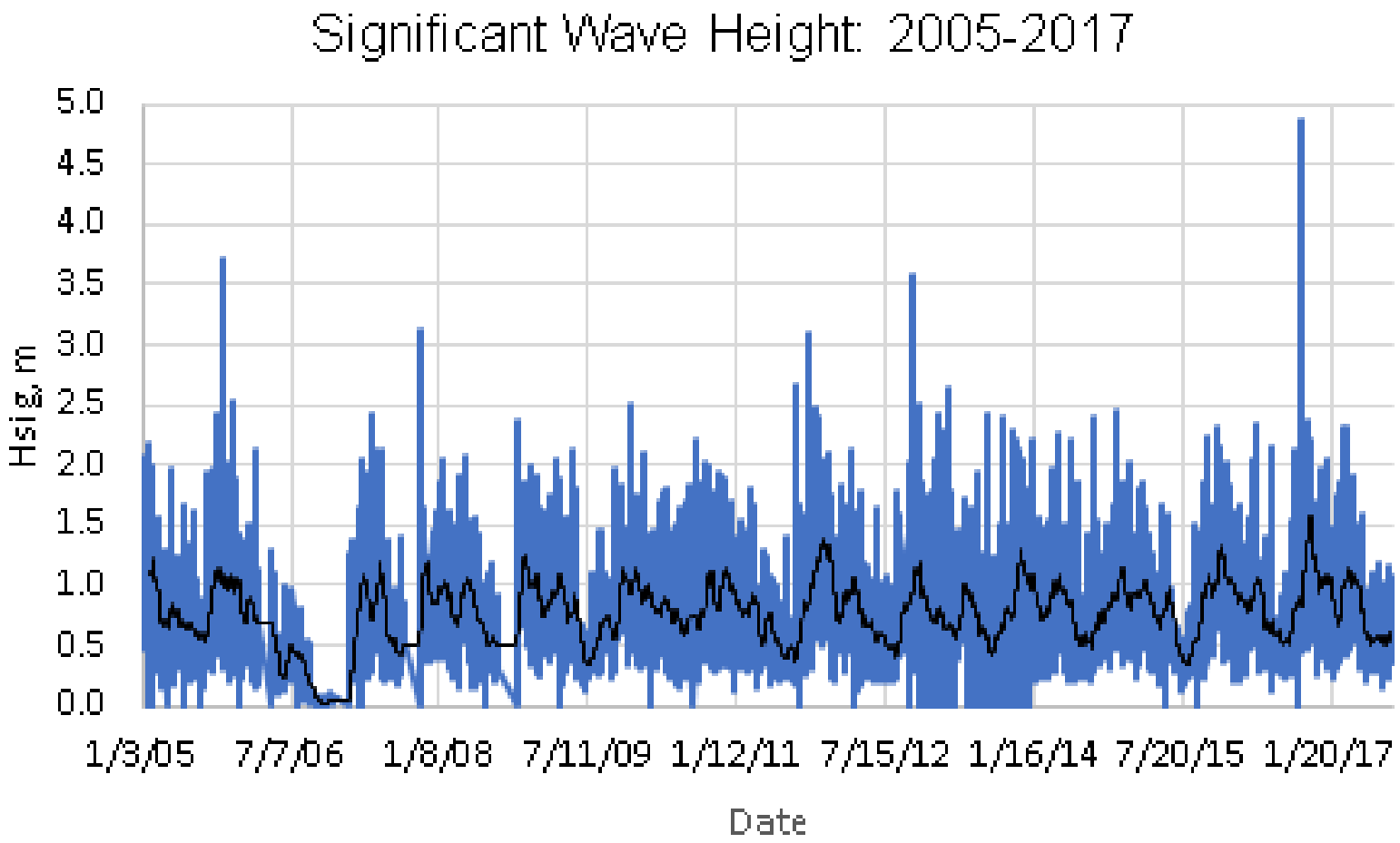
2006- 2018 Gulf Stream Flow and Water Elevation



Data Resources: Directional Wave Data

ADCP

Data Resources: Directional Wave Data



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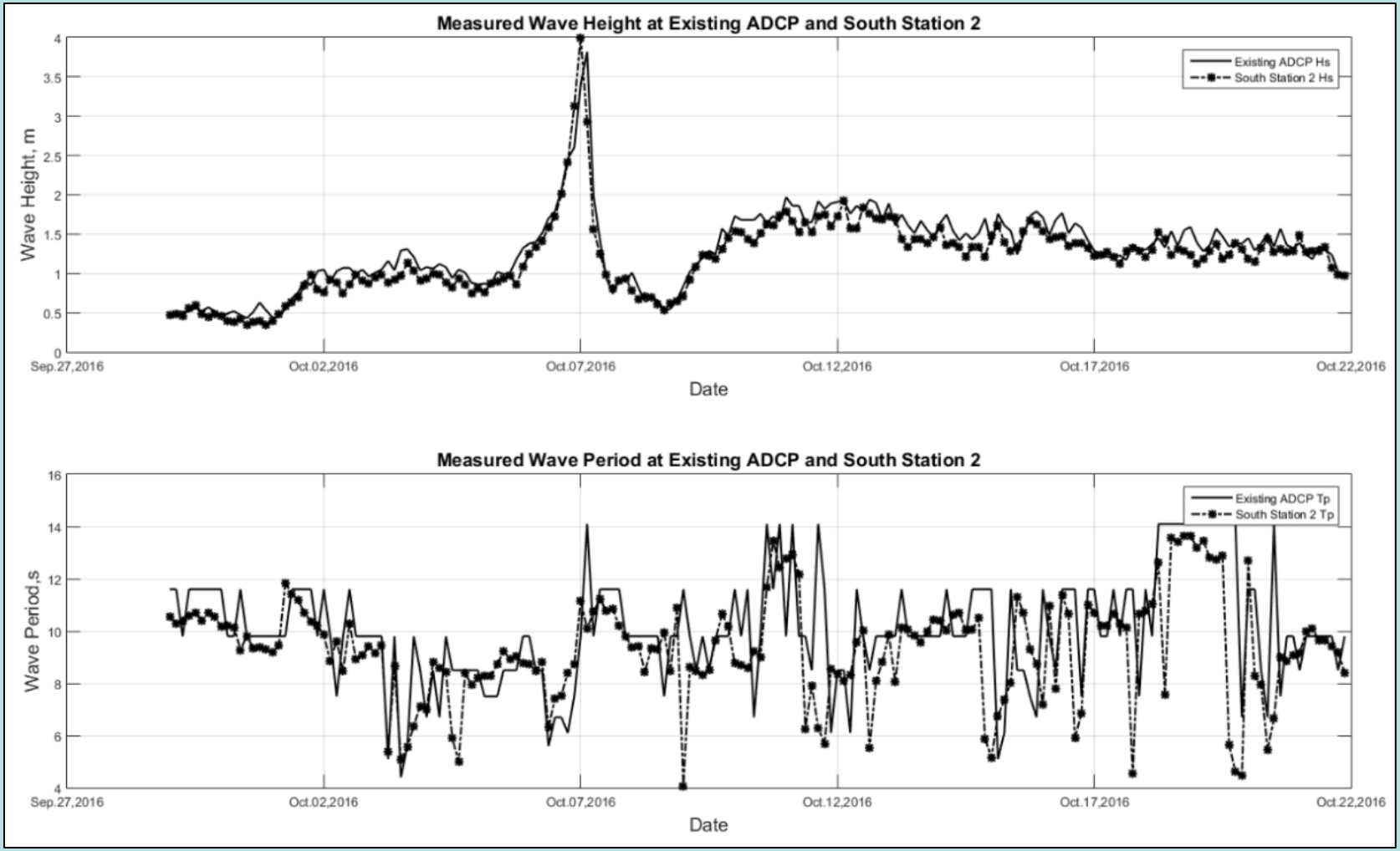
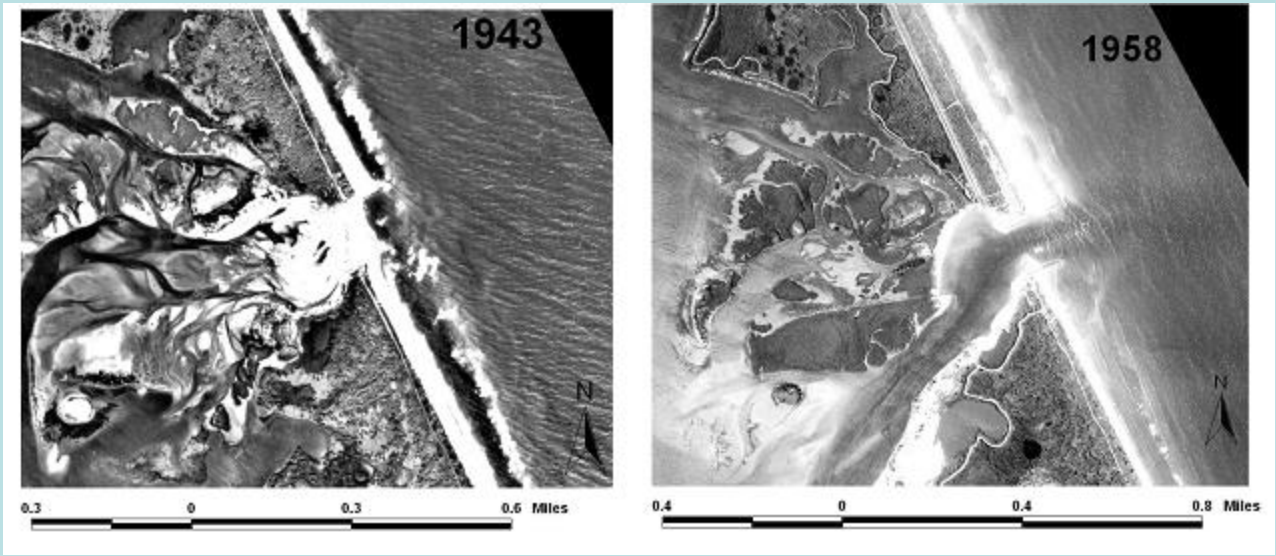
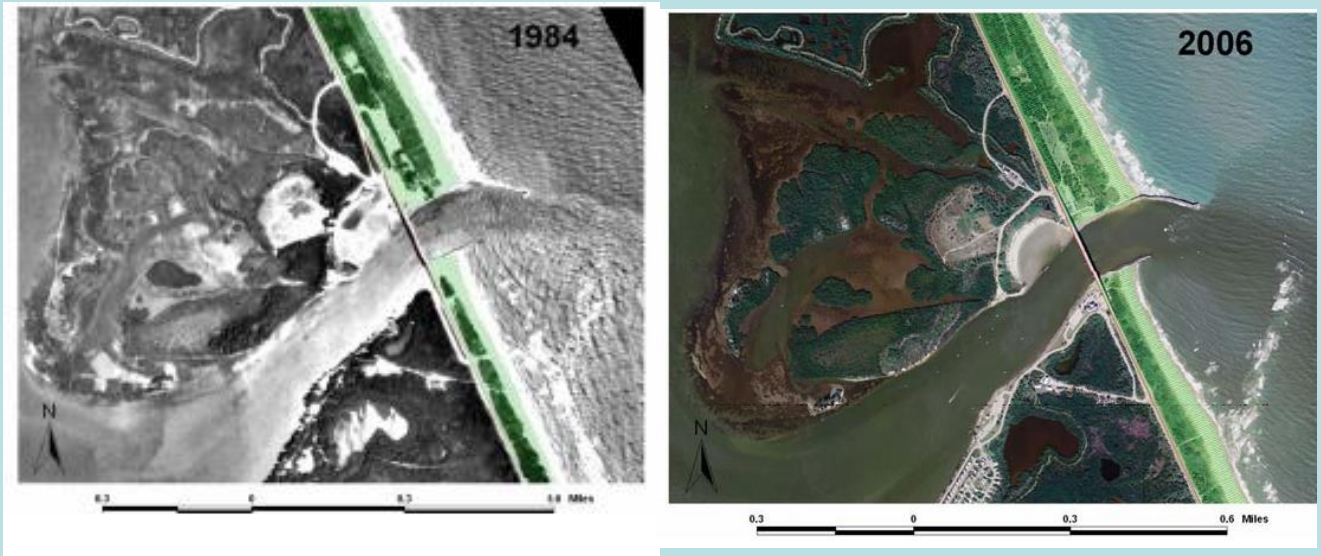
Data Hurricane Mathew: Waves



Data Resources: Aerial Imagery 1943-Present





Shoreline Changes
Aerial Imagery vs. Surveyed

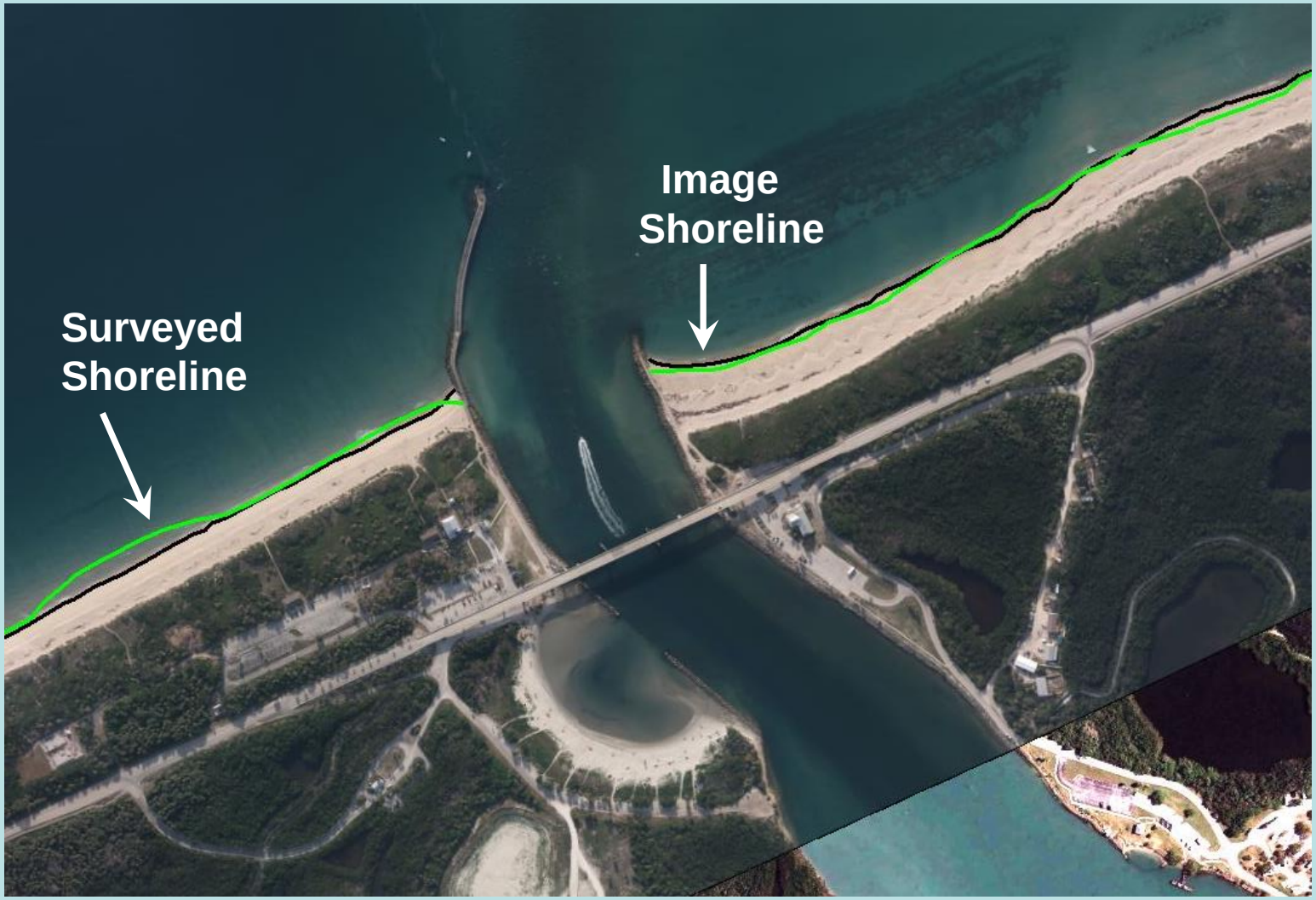
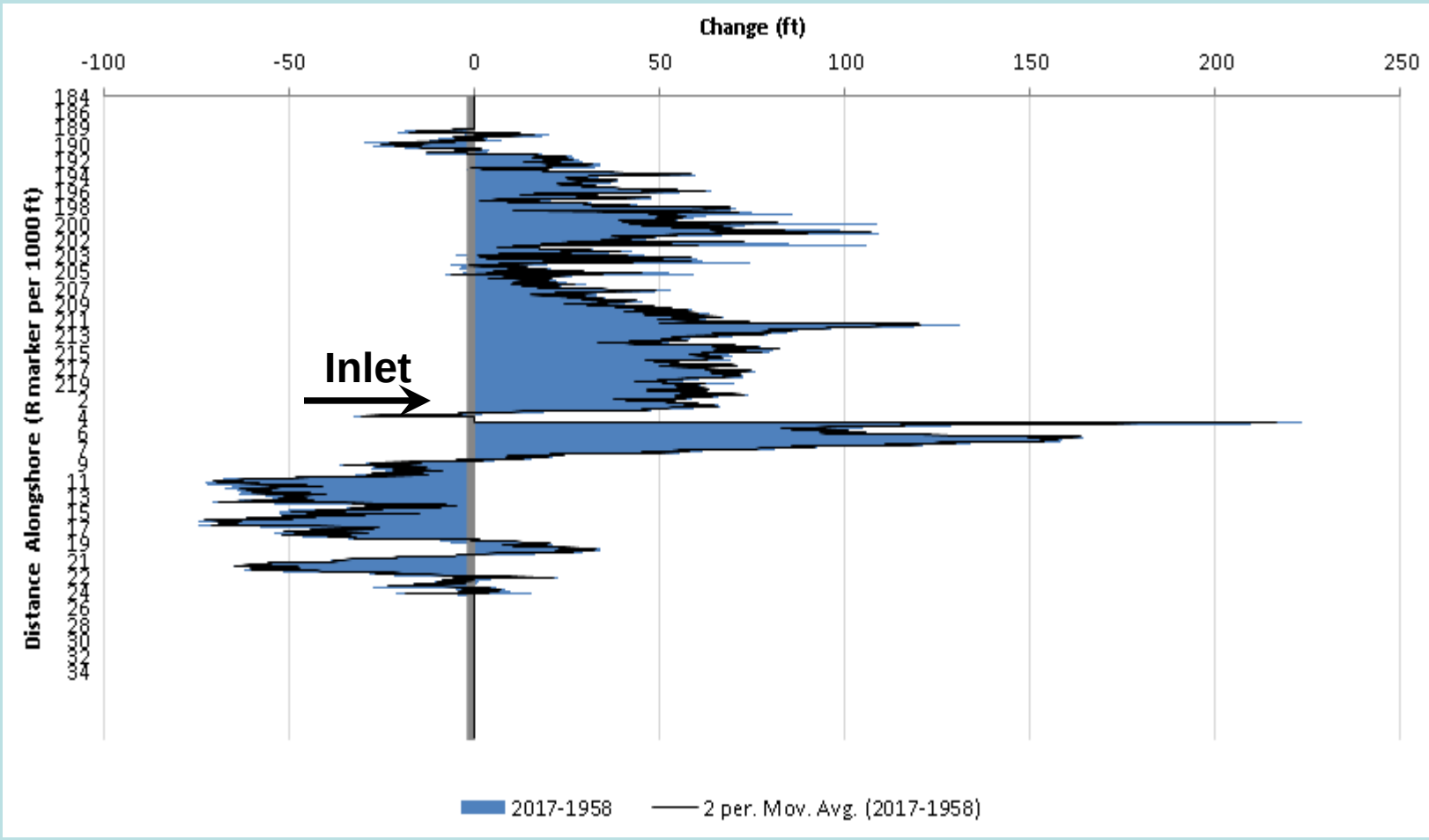


Image and Surveyed Shorelines Summer 2017

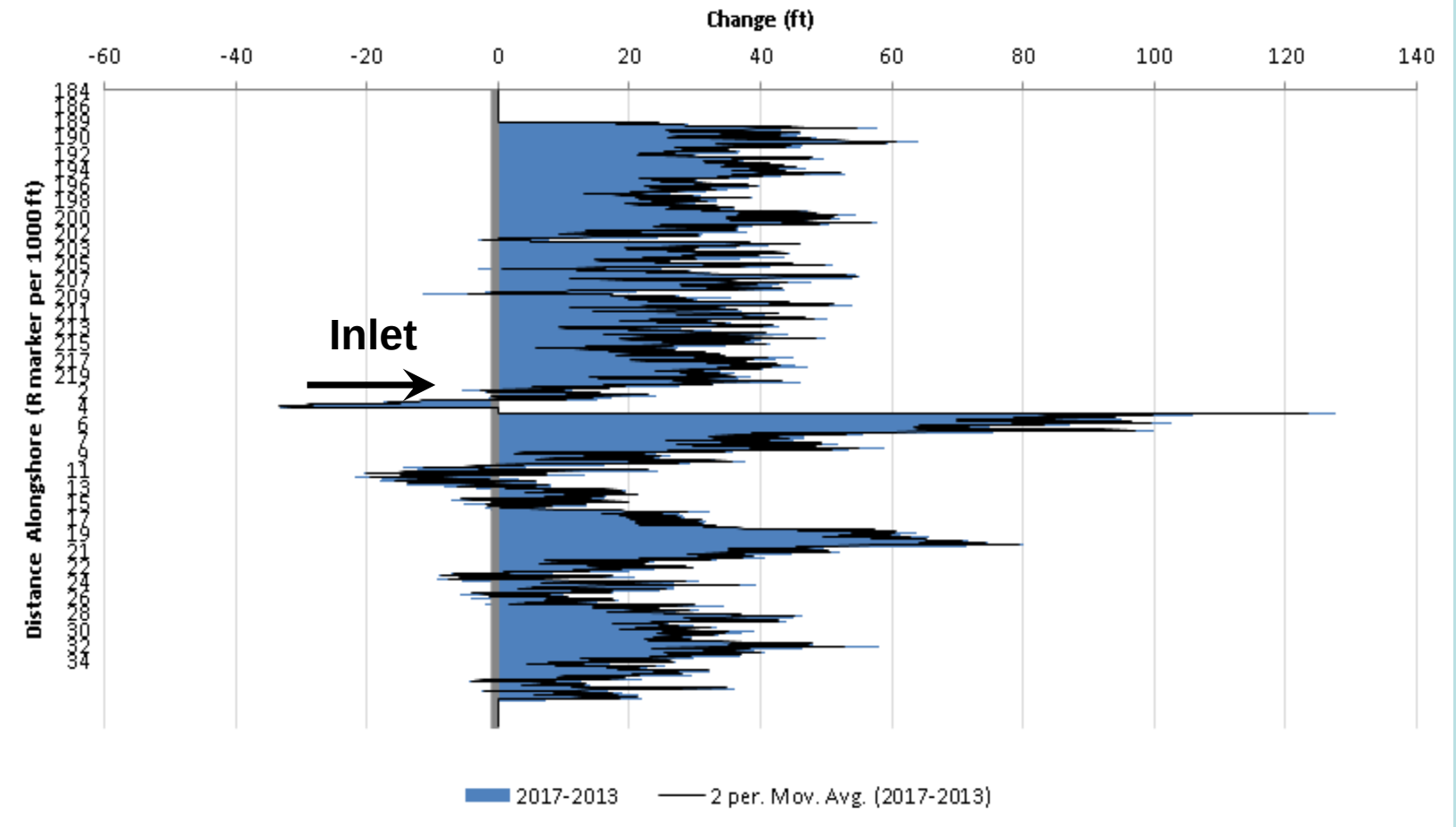
Shoreline Changes: Aerial Imagery vs. Surveyed

Surveyed Shorelines 2017-2018 NAVD88=0

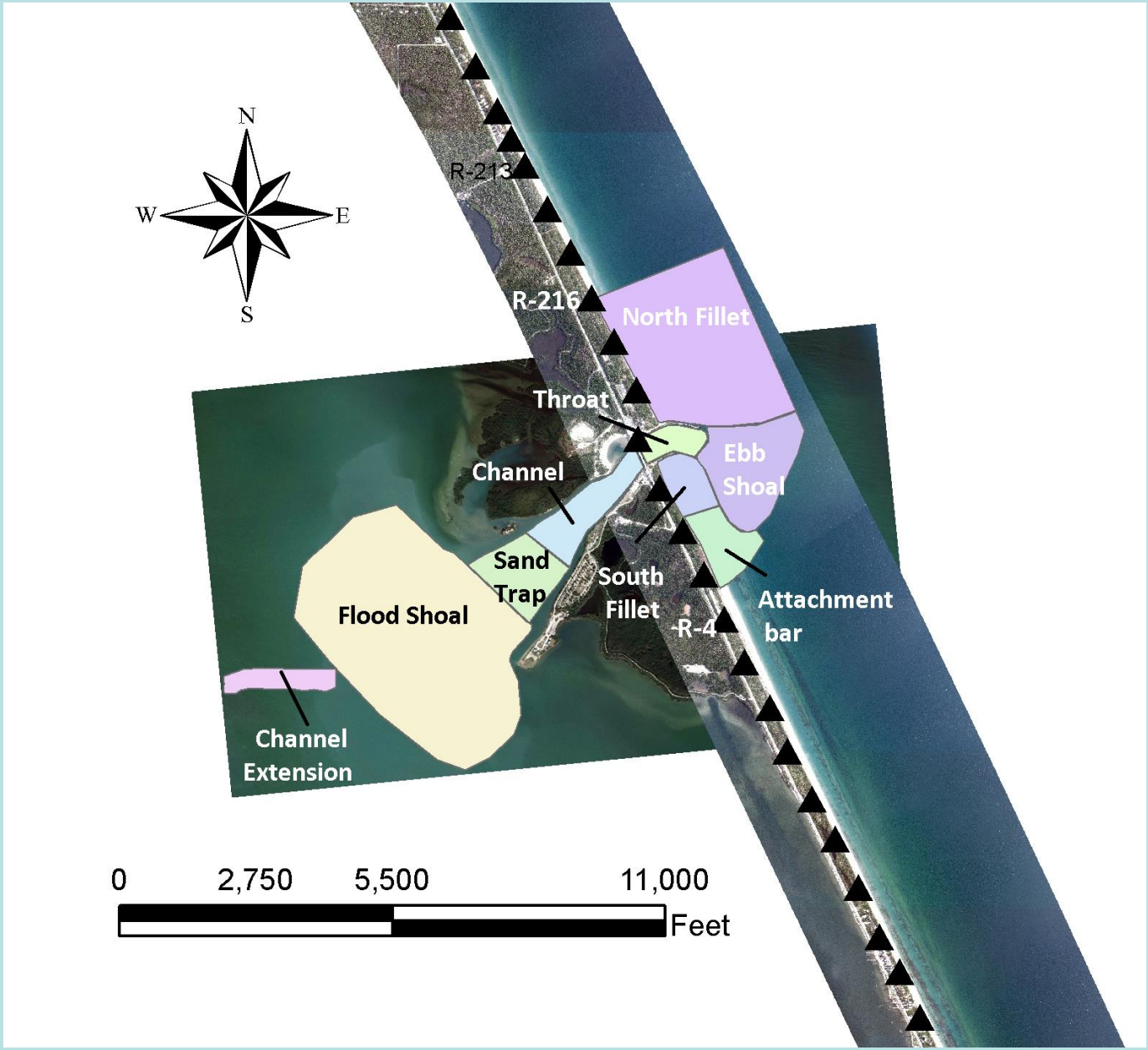
Shorelines 1958-2017



Shorelines 2013-2017

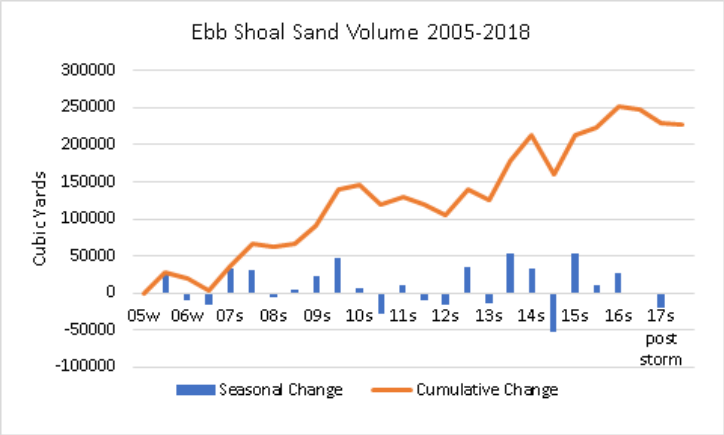


Sand Reservoirs

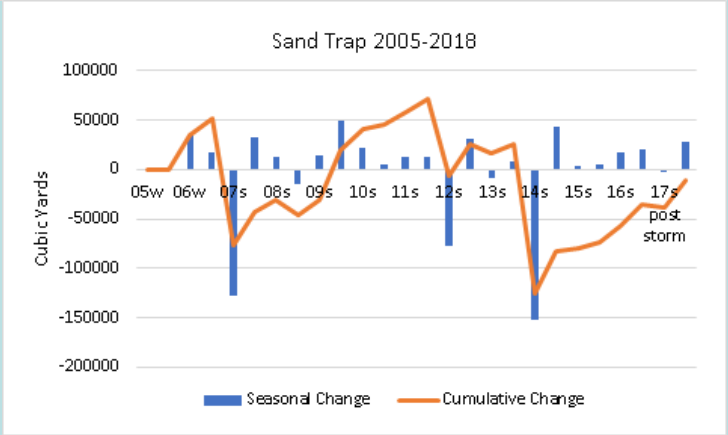


Major Sand Reservoirs: 2006- 2018

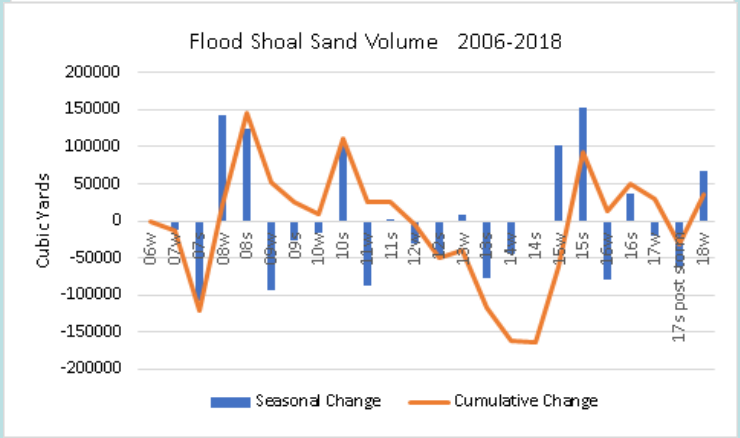
Ebb Shoal



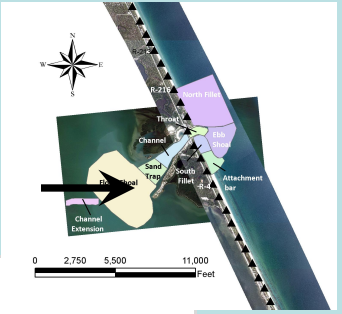
Sand Trap

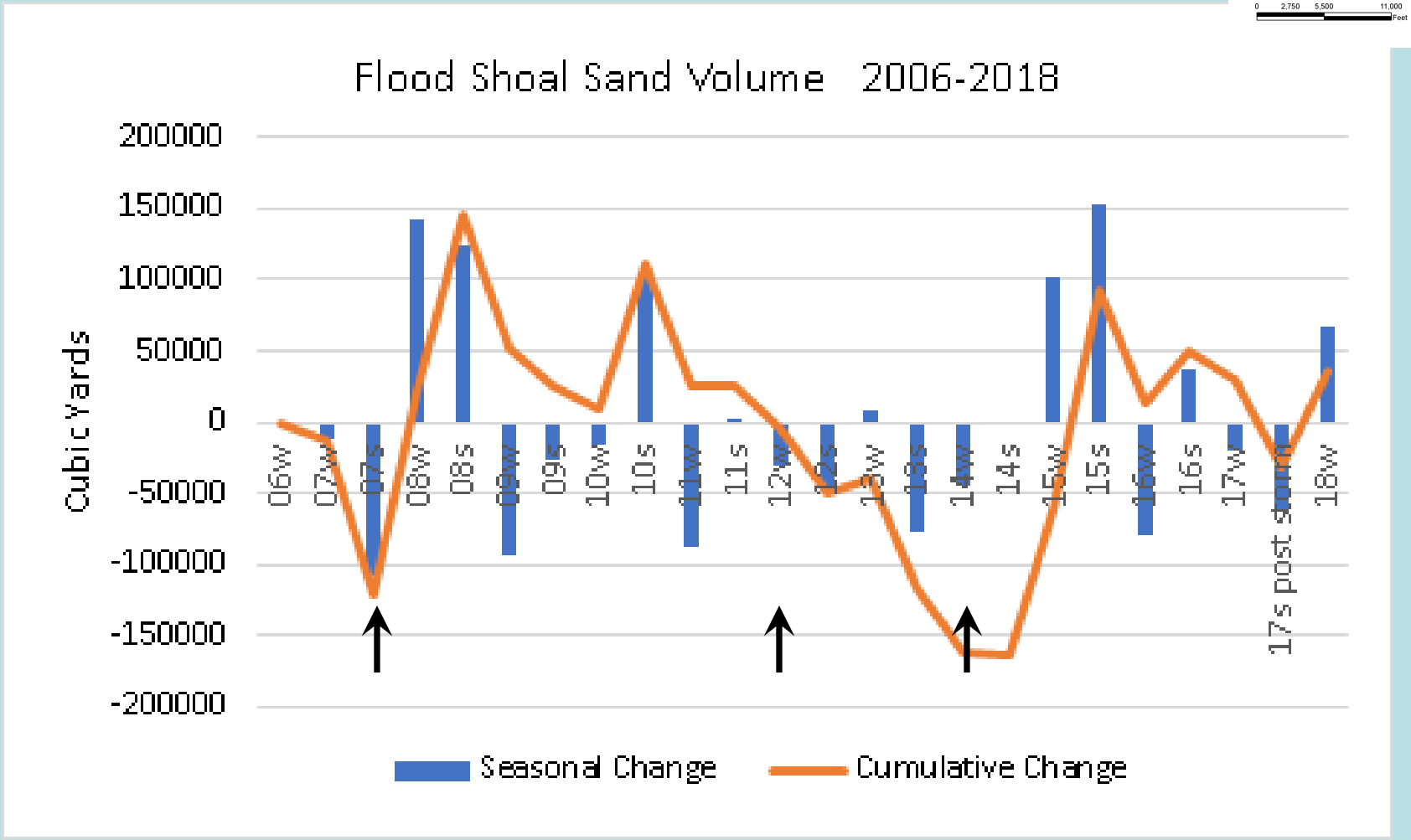


Flood Shoal



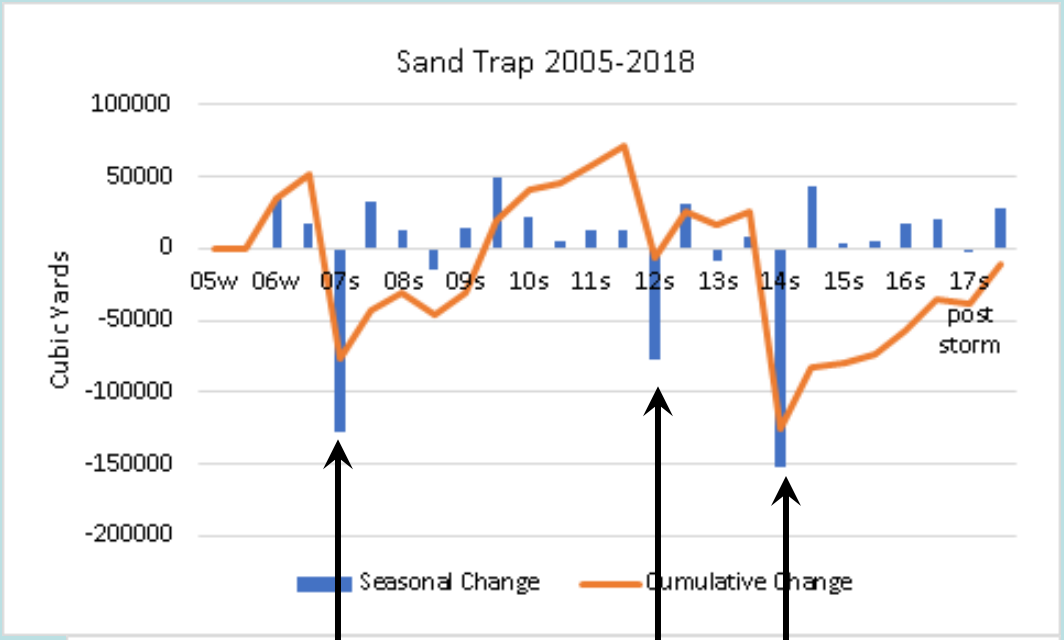
Inlet Sand Reservoirs

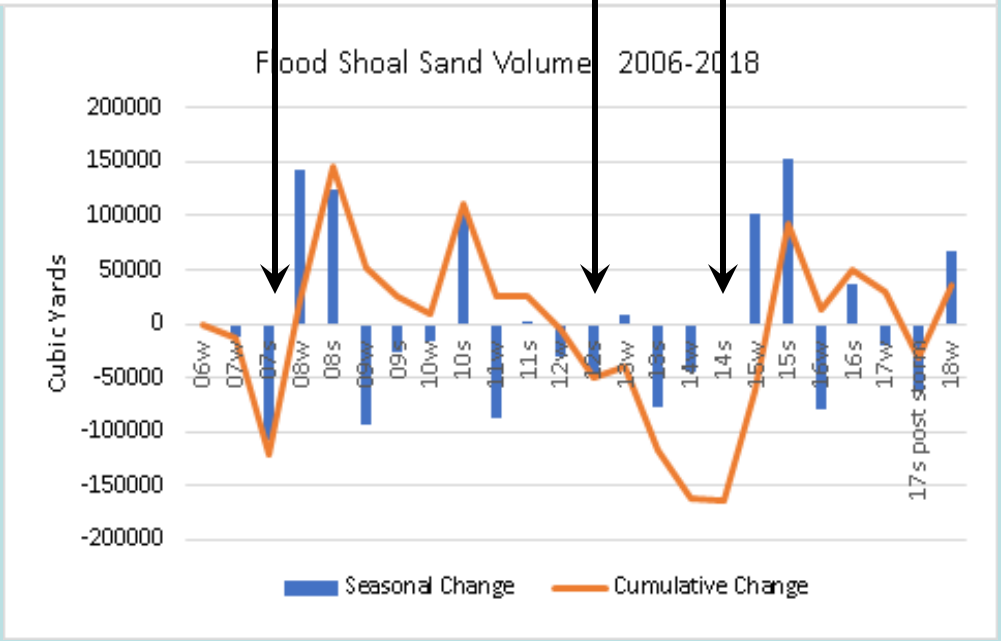


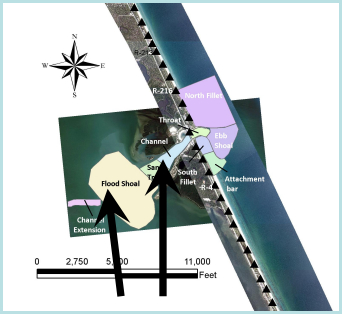


Sand Trap Dredging

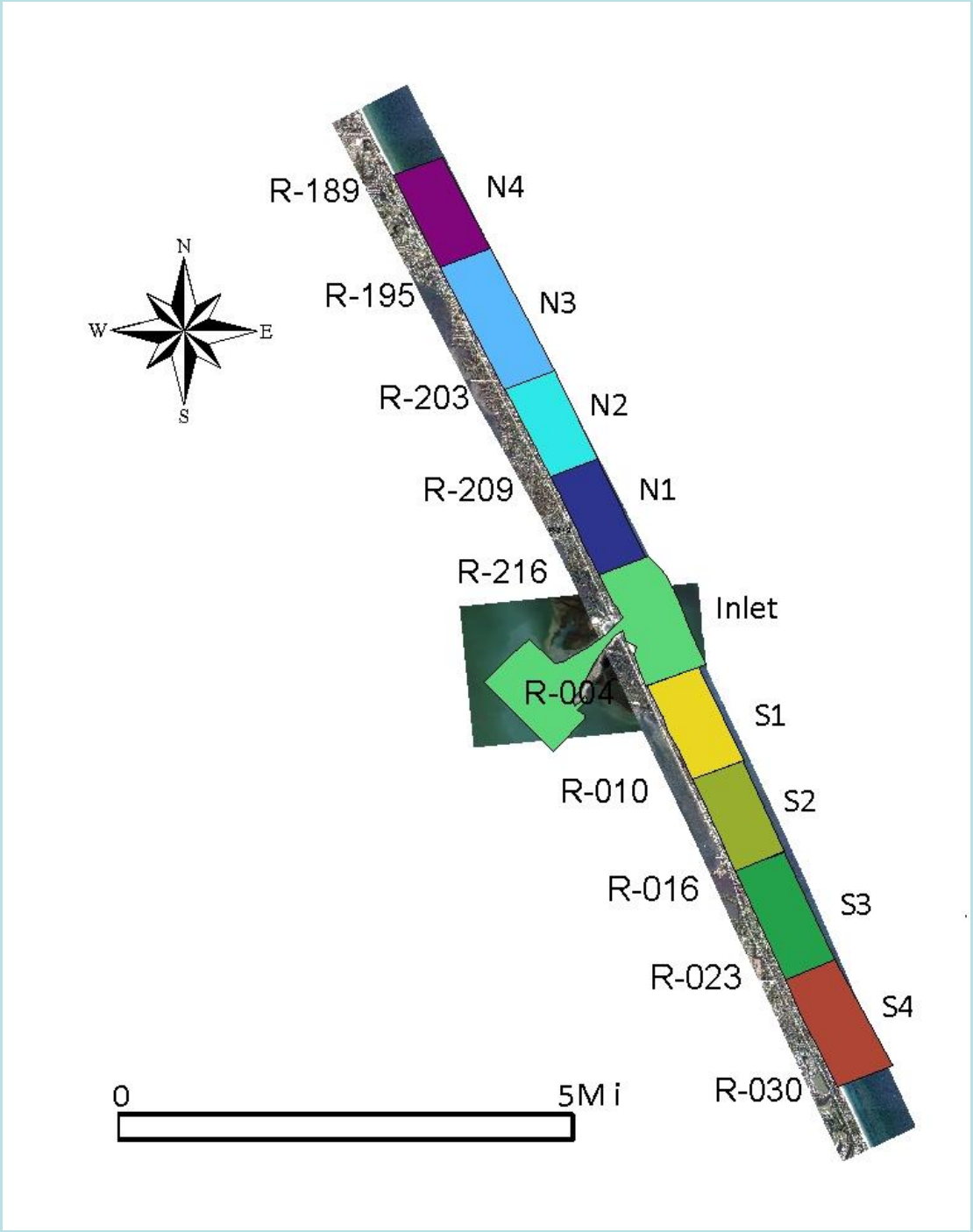
2007
2012
2014



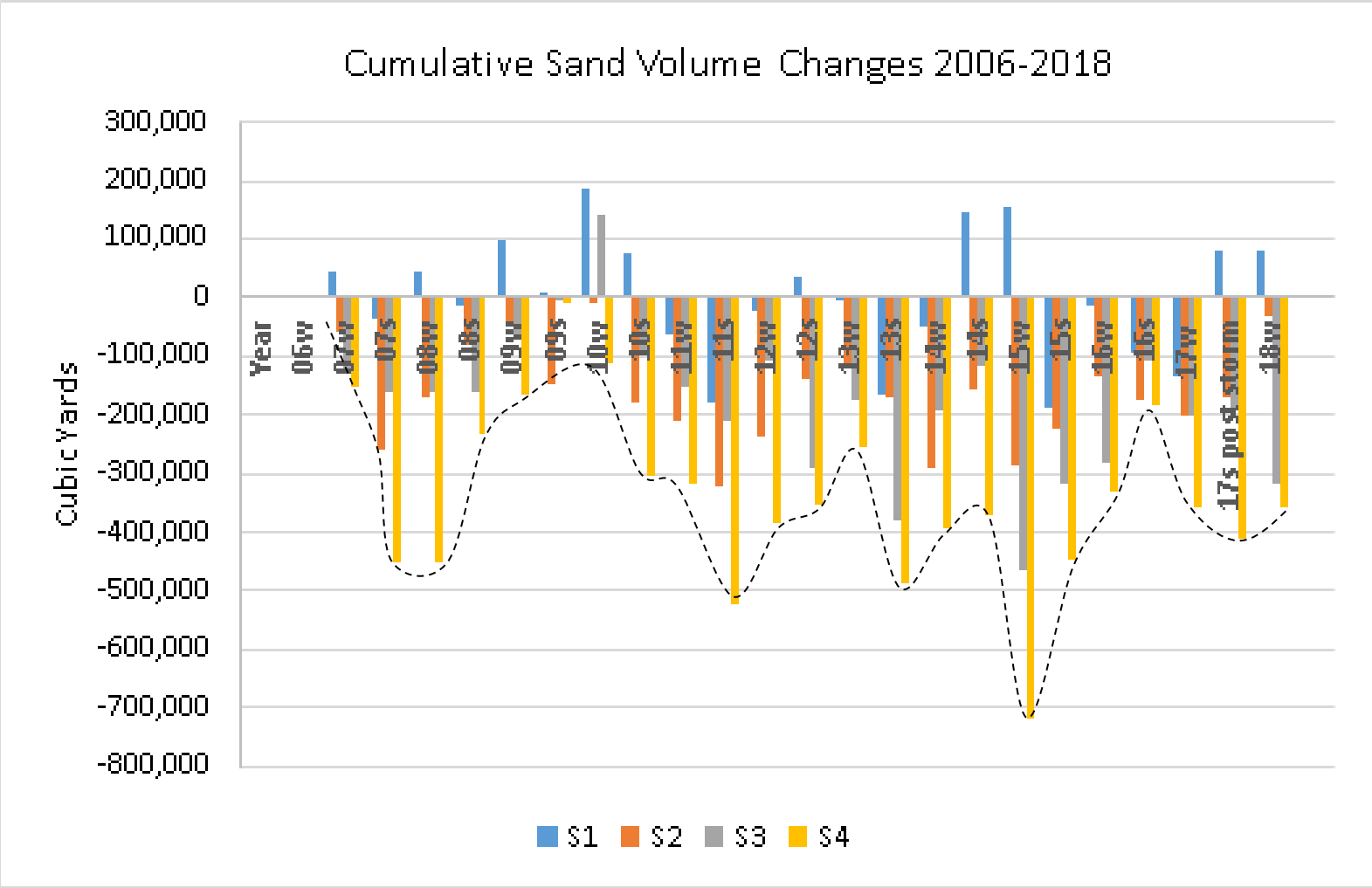




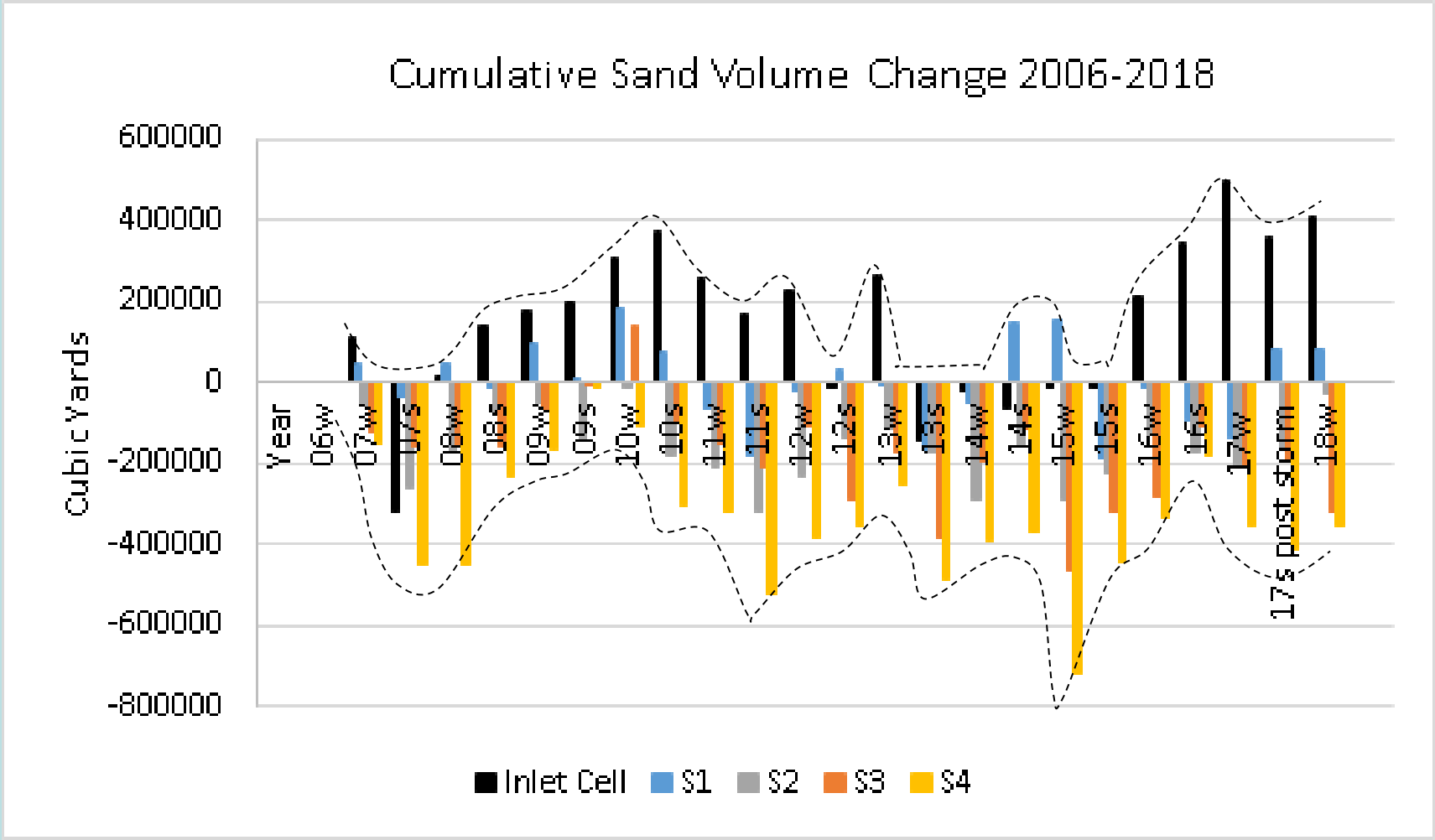
Sediment Budget Cells

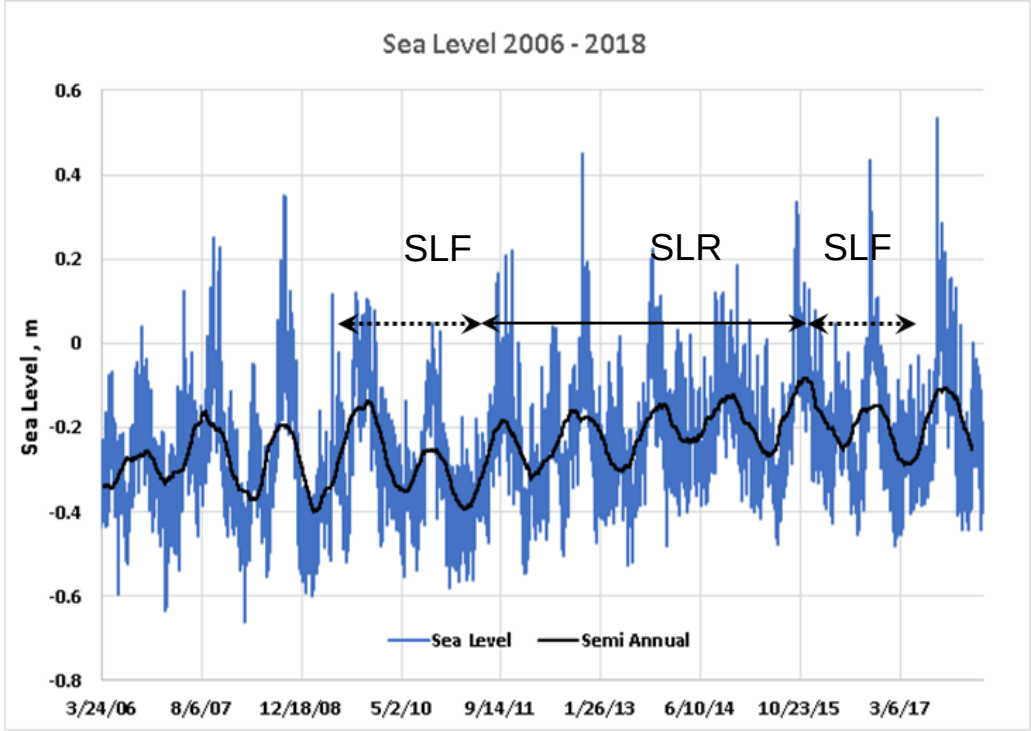


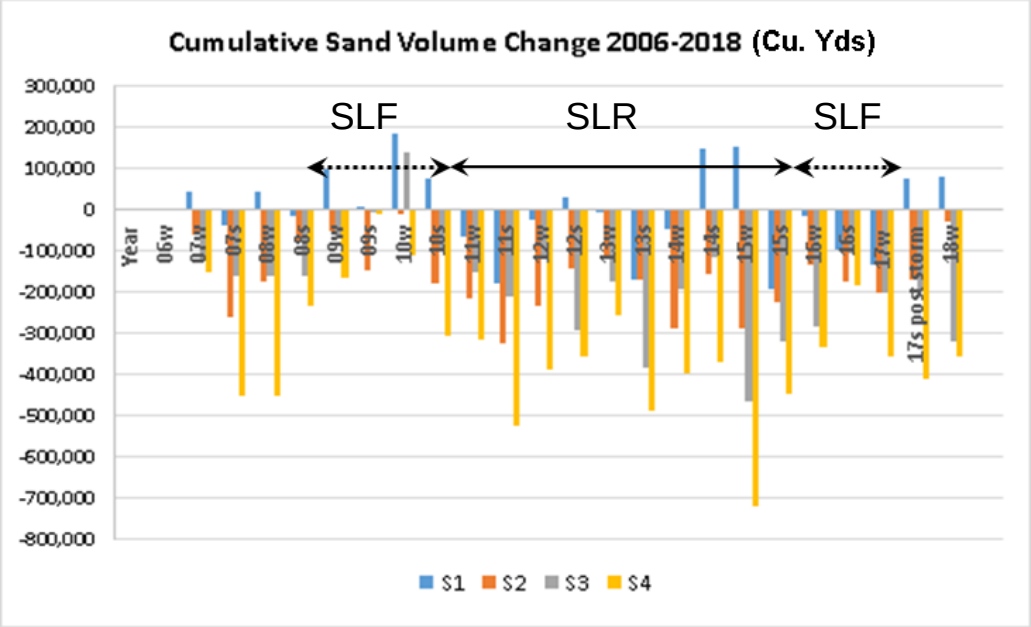
Sediment Budget Cells



Sediment Budget Cells







Sea Level and Sand Volume Trends

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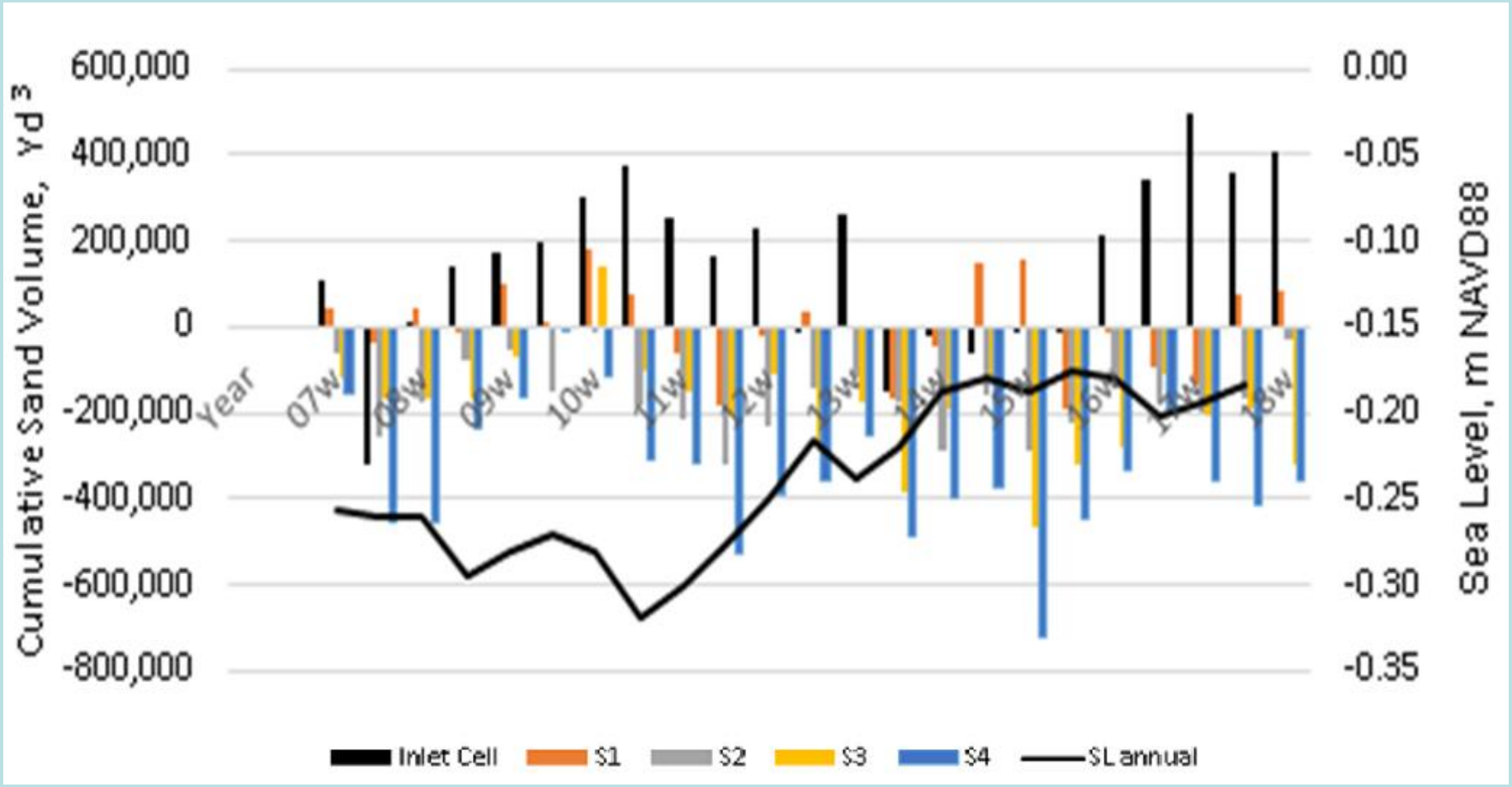
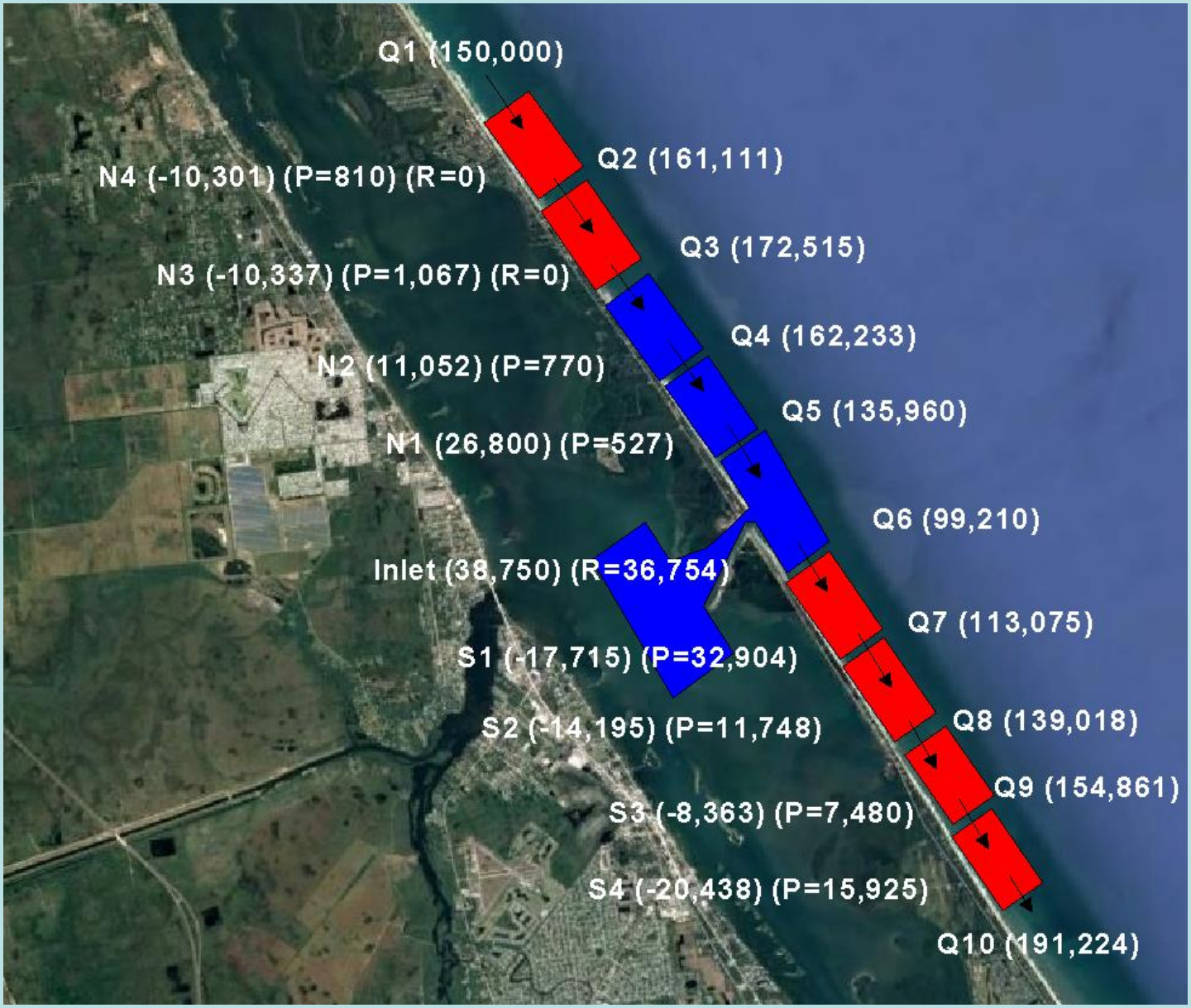
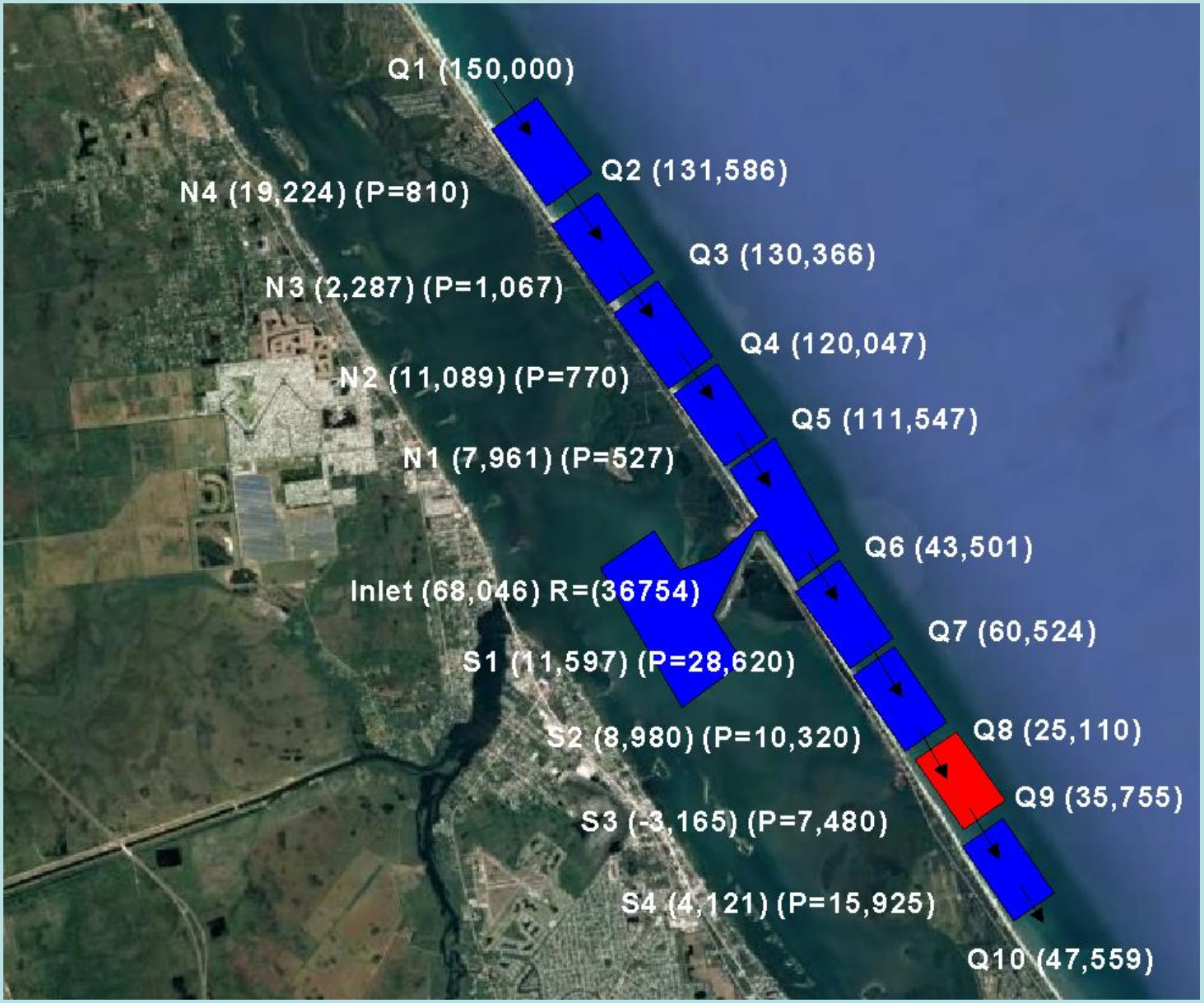


10-Year Sand Budget : Winter 2007- Winter 2017



10-Year Sand Budget : Summer 2007- Summer 2017



3-Year Sand Budget : Summer 2013 - Summer 2016

3-Year Sand Budget : Summer 2010- Summer 2013

Conclusions and Recommendations

- Inlet sand reservoirs are in a long-term dynamic equilibrium characterized by large seasonal changes in volume superimposed on longer-term trends of a lower order of magnitude.
- Sea level records measured at Sebastian Inlet indicate that periods of sand volume gains correspond to periods of falling sea level
- Periods of rising sea level correspond to periods of sand volume losses
- Management Strategies should reflect dynamics of sand resources and not extract excessive volumes from any one sand reservoir
- Plan for inter-annual sea level change impacts on sand resources

Acknowledgements

Commissioners

Marty Smithson, Administrator

James Gray, Jr. Executive Director

Staff of the Sebastian Inlet District