Inlet Management Study of the John's Pass – Blind Pass Dual-Inlet System, Pinellas County, Florida

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Study Objectives

A. This inlet management study - initiated 5/2014 - is being conducted by the University of South Florida Coastal Research Lab under contract with the Florida DEP (contract no.# BS032).

B. Provide an updated sediment budget for Blind Pass and John's Pass.

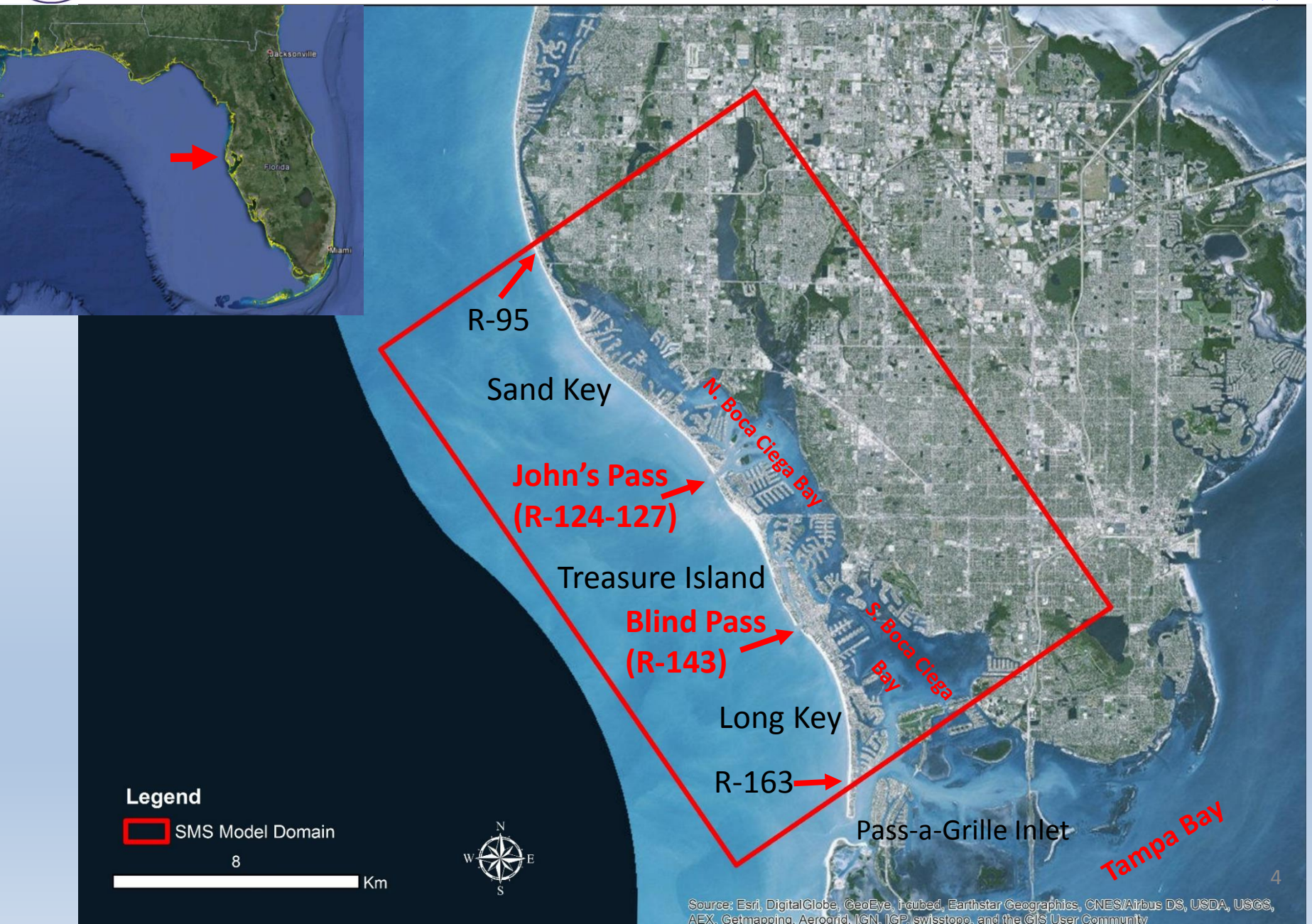
C. Identify and quantify system-wide sediment pathways in order to update inlet management plans pursuant to Section 161.142, Florida Statutes.

D. Provide an evaluation of inlet management implementation strategies.

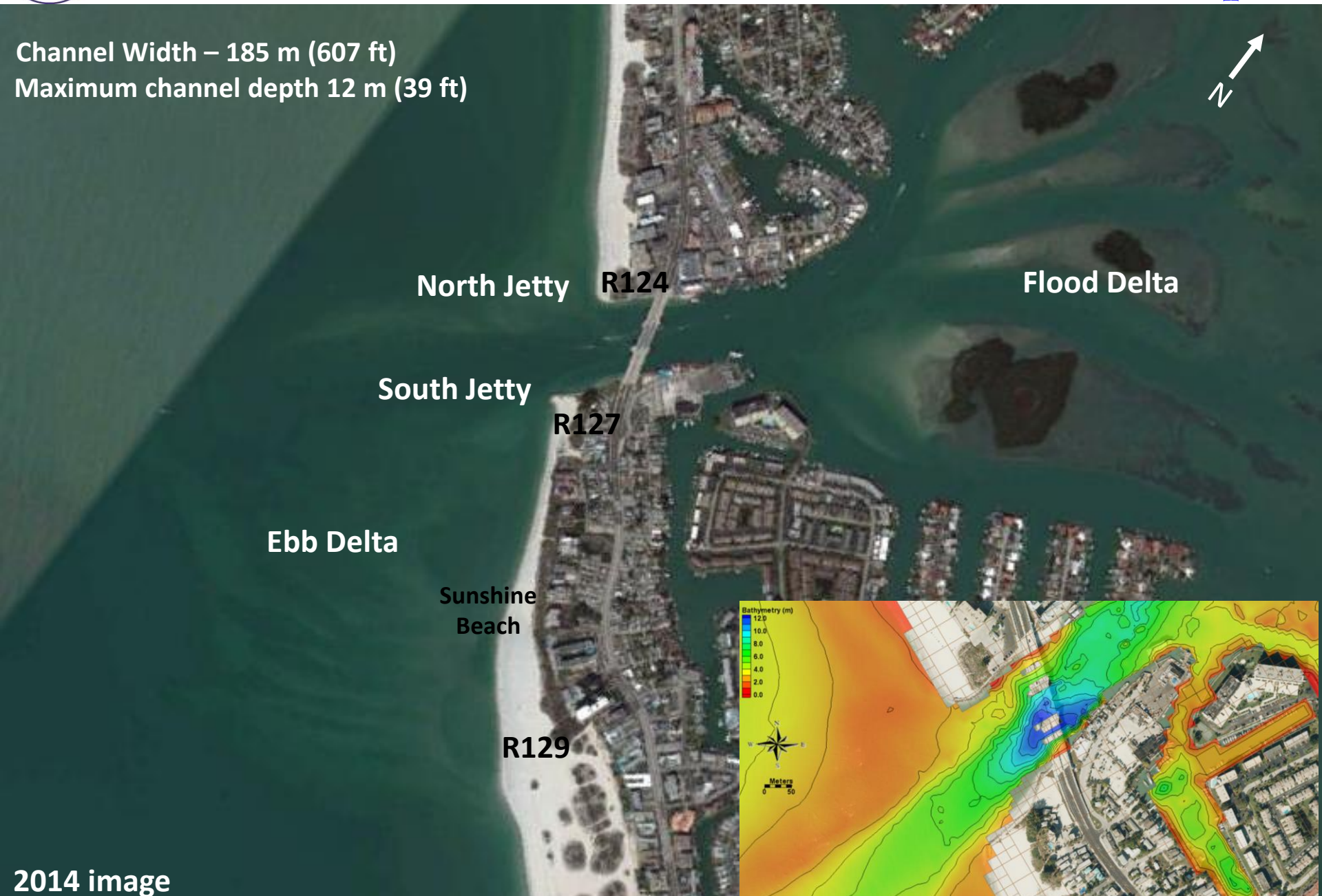
ASBPA October 2015 – Talk Outline

1. Introduction/Background
    a) Study area
    b) Regional hydrodynamic conditions
    c) Sediment characteristics
2. Sediment Budget and Sediment Pathways
    a) Sediment budget
    b) Sediment pathways
3. Concluding remarks

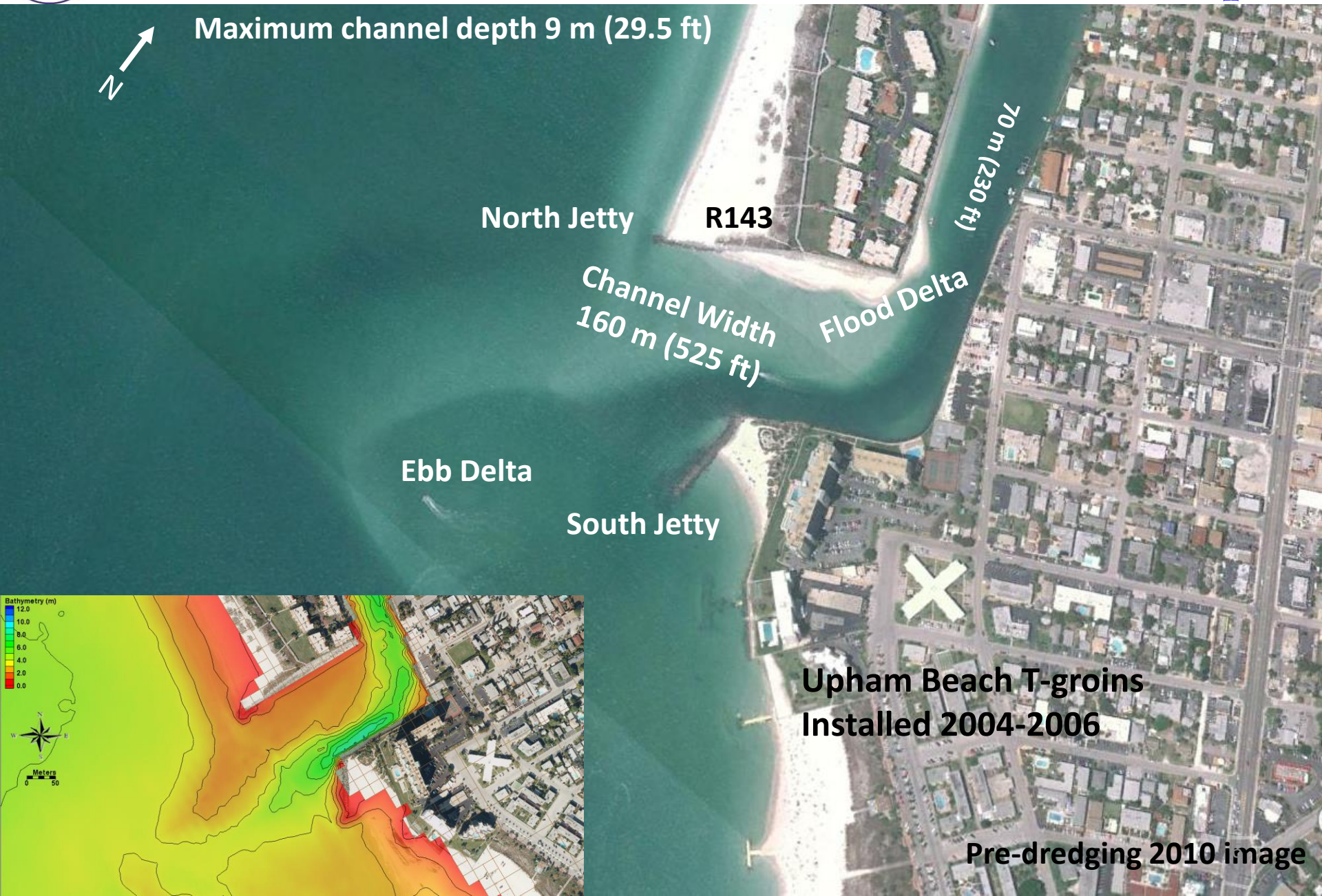
Study Area


Jacksonville
Florida
Miami
R-95
Sand Key
N. Boca Ciega Bay
John's Pass
(R-124-127)
Treasure Island
Blind Pass
(R-143)
S. Boca Ciega Bay
Long Key
R-163
Pass-a-Grille Inlet
Tampa Bay
Legend
SMS Model Domain
8
Km
N
W
E
S
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

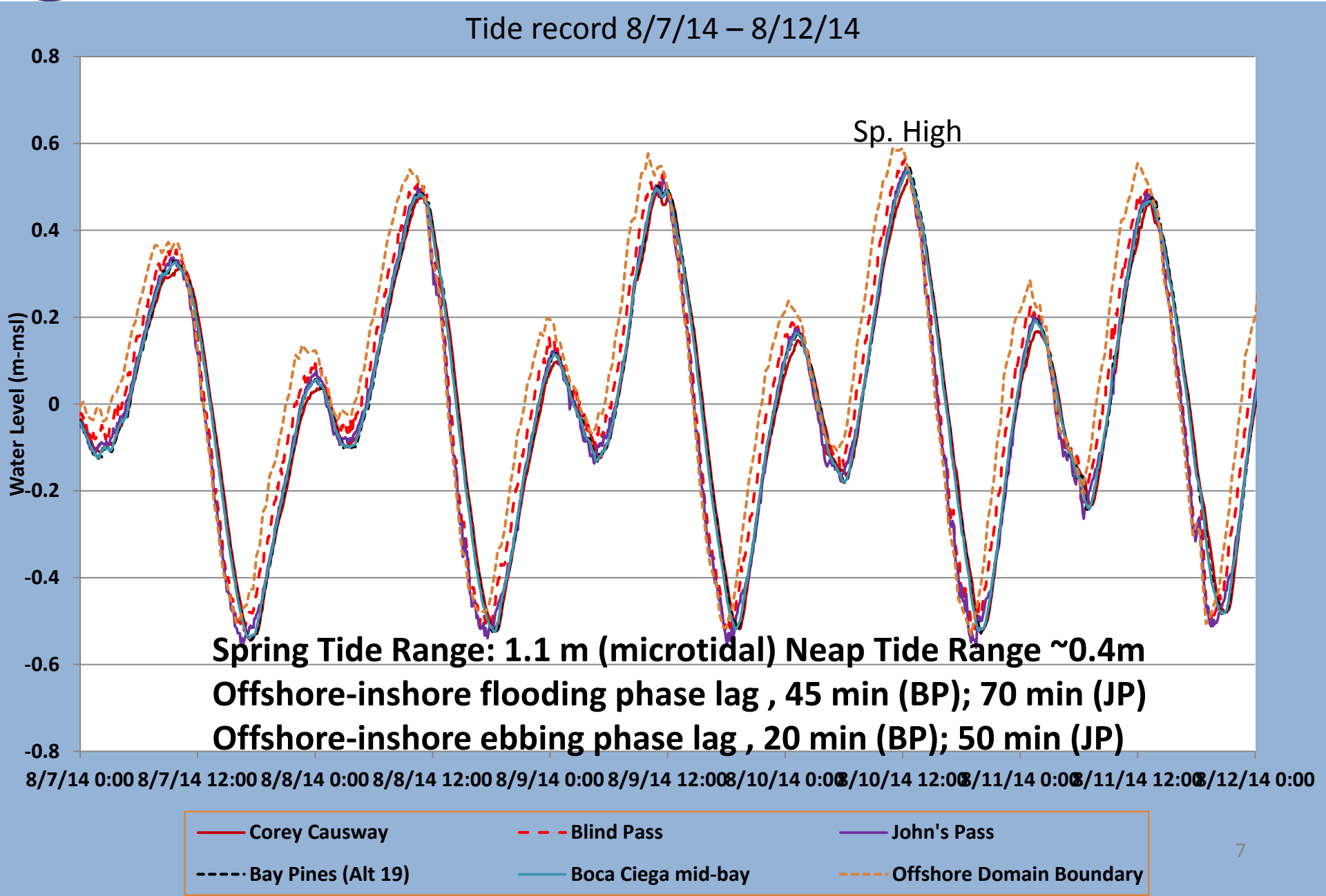
John's Pass
Mixed Energy Tidal Inlet



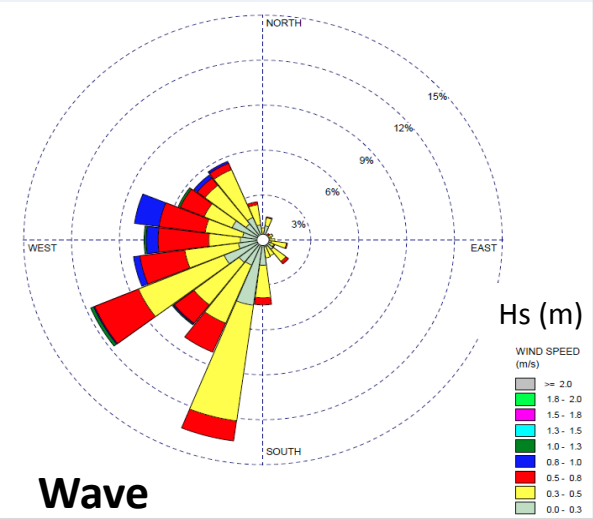
Blind Pass
Wave Dominated Tidal Inlet

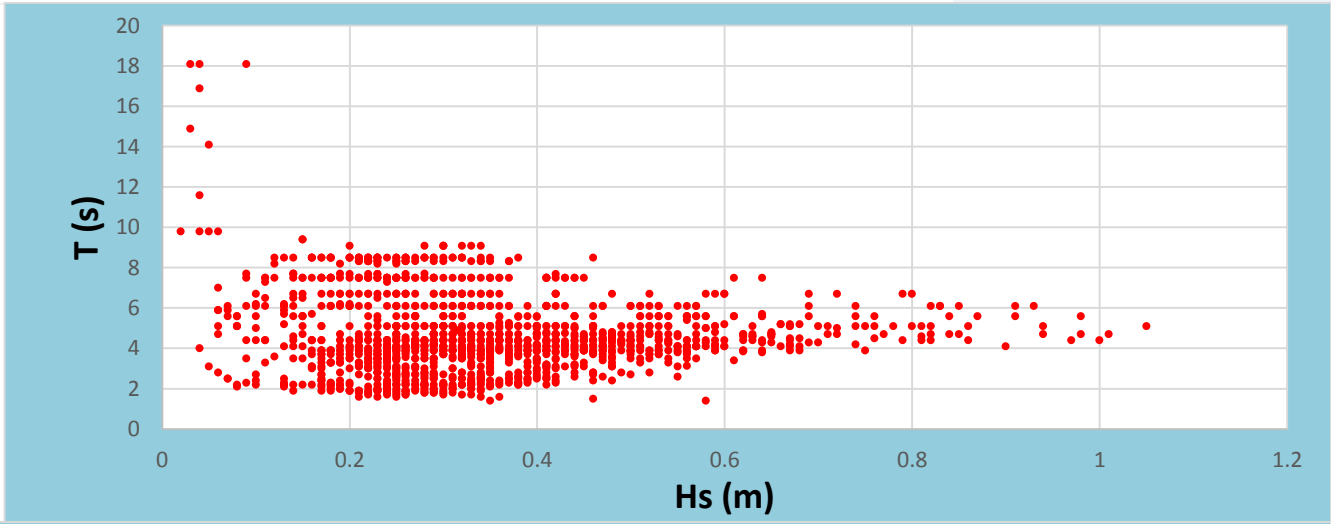


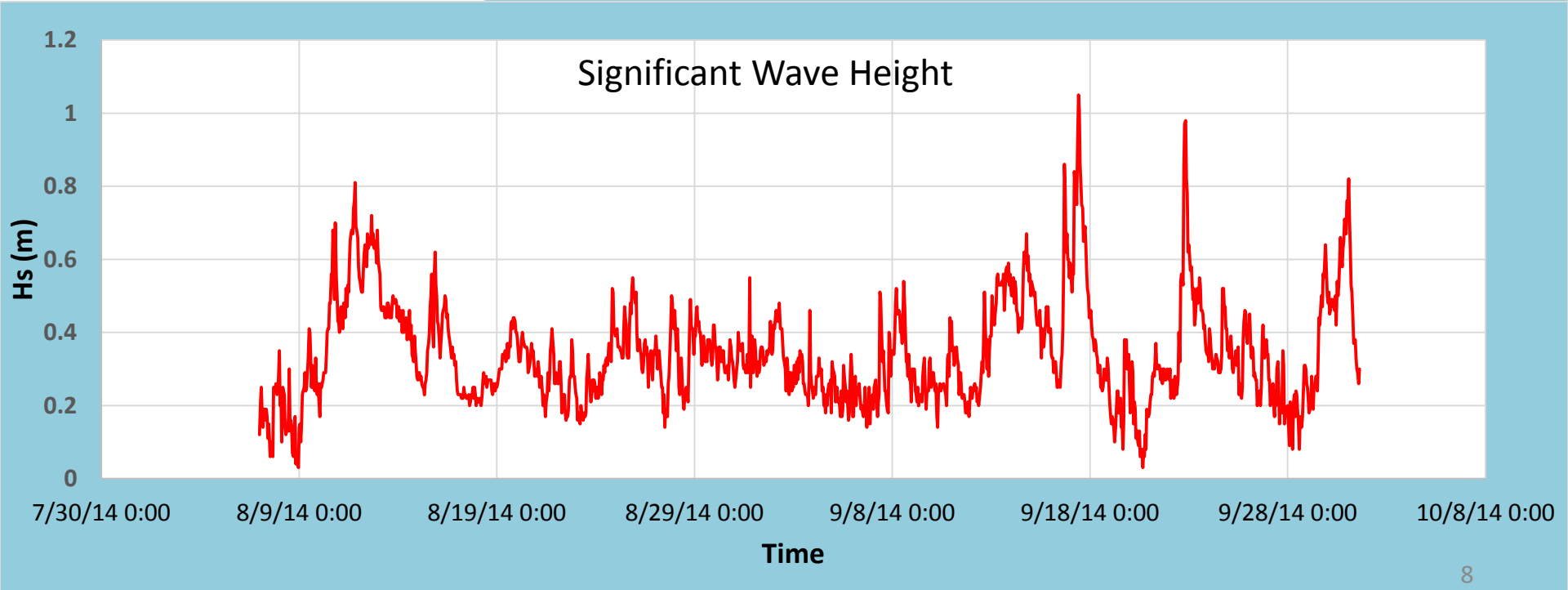
Offshore and Inshore Water Level Measurements



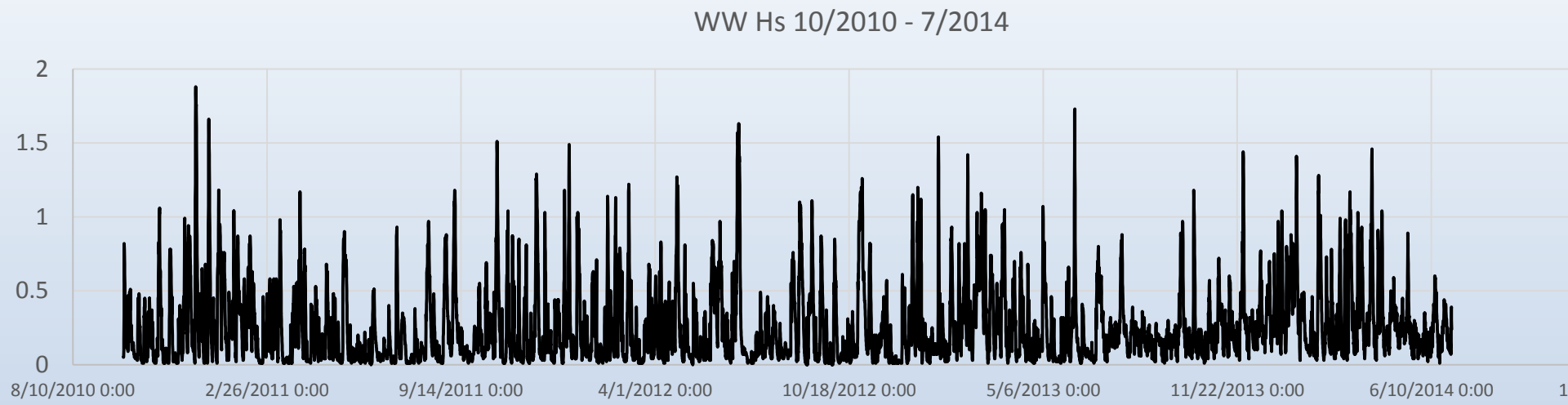
Domain Boundary Measured Wave
8/8/2014 – 10/7/2014

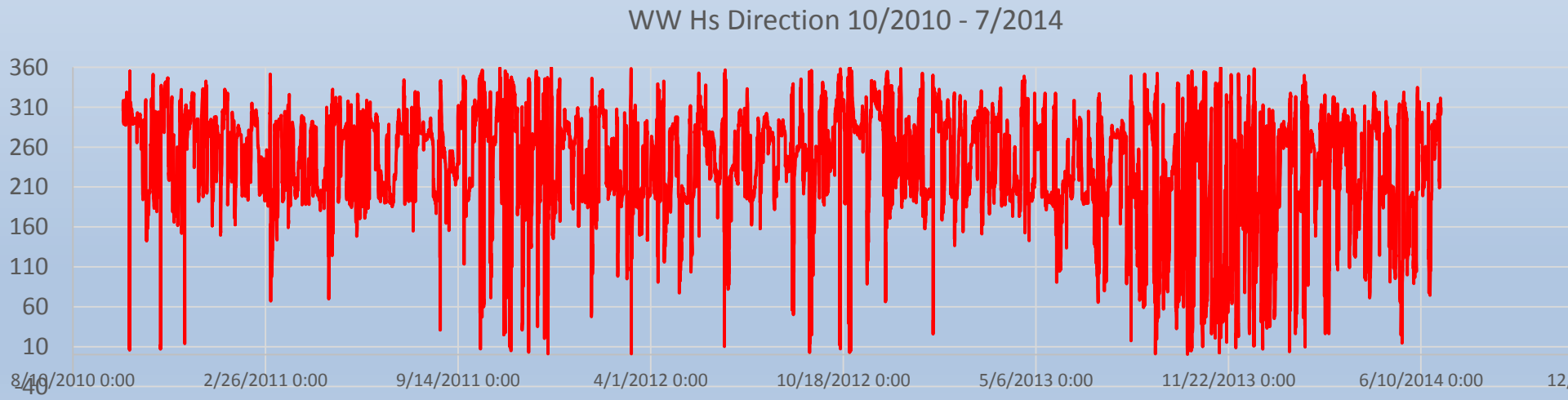




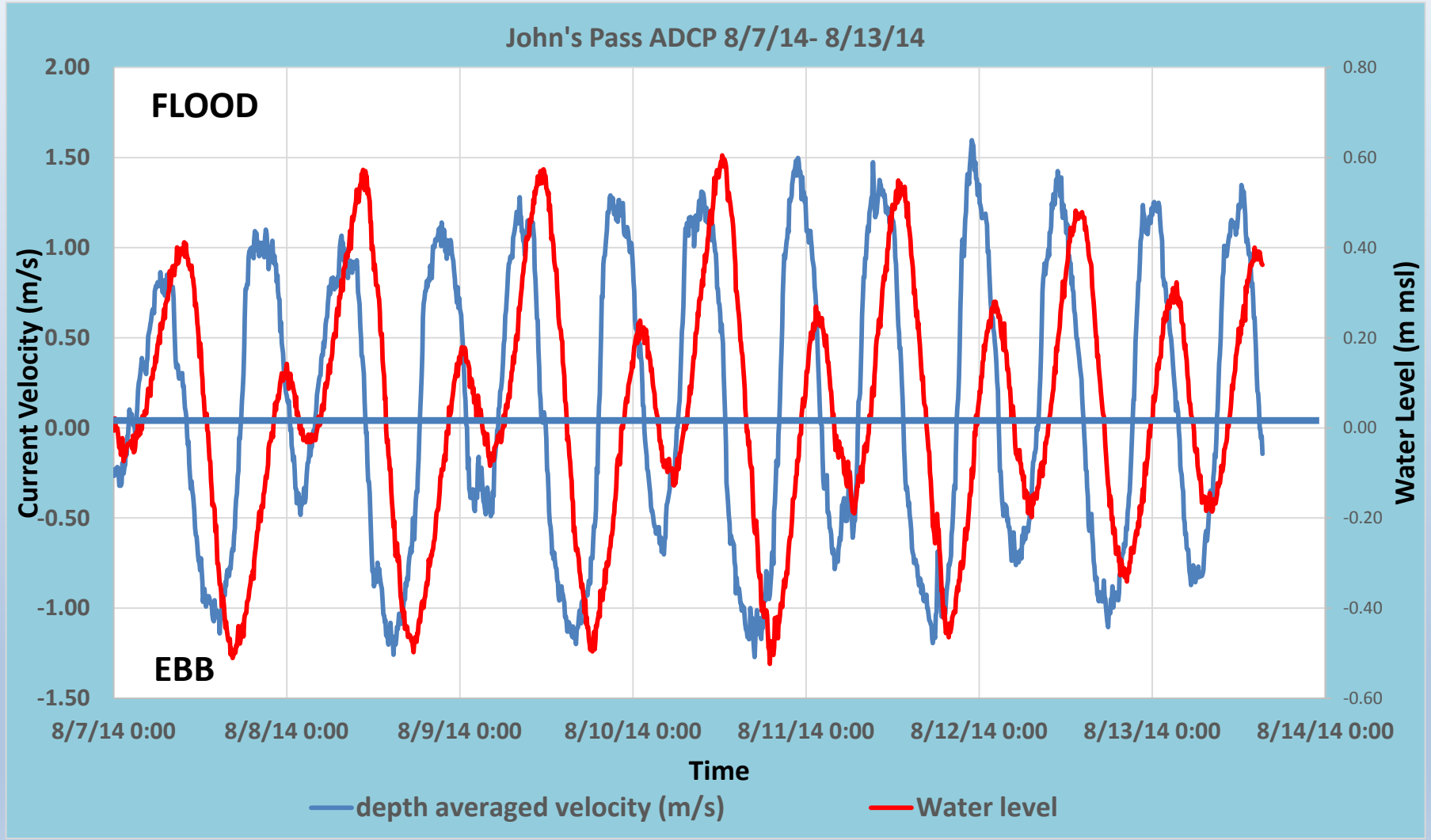


Domain Wave Conditions

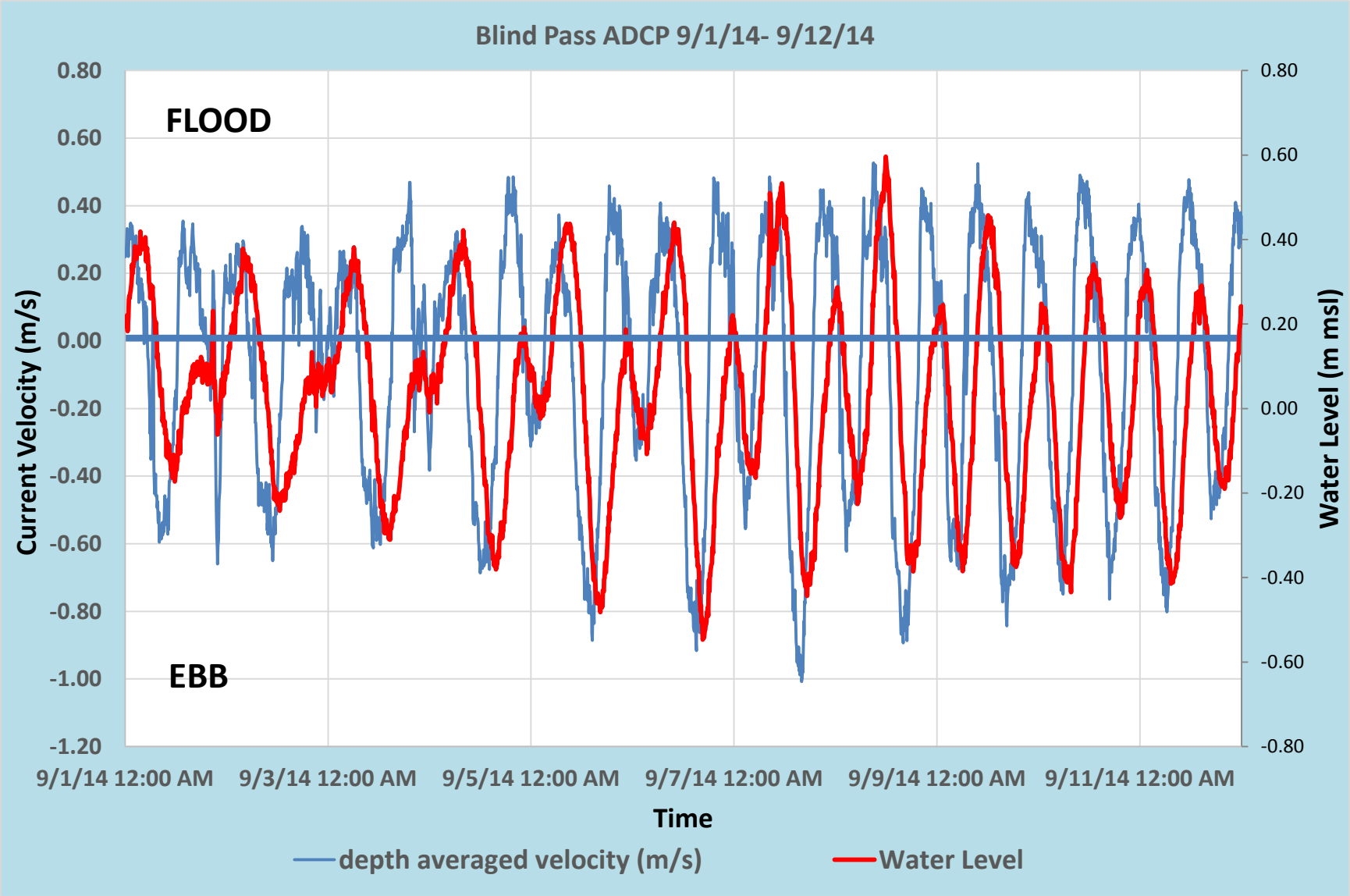




John's Pass V-ADCP Current Measurement – Deployed 7/22/14 – 8/13/14



Blind Pass Current Measurement – Deployed 8/14/14 – 9/11/14



John's Pass - Blind Pass Sediment Data

Distribution of sediment mean grain size (in millimeters)

John's Pass

Blind Pass

Overall mean grain-size (D_{50}) 17 mm

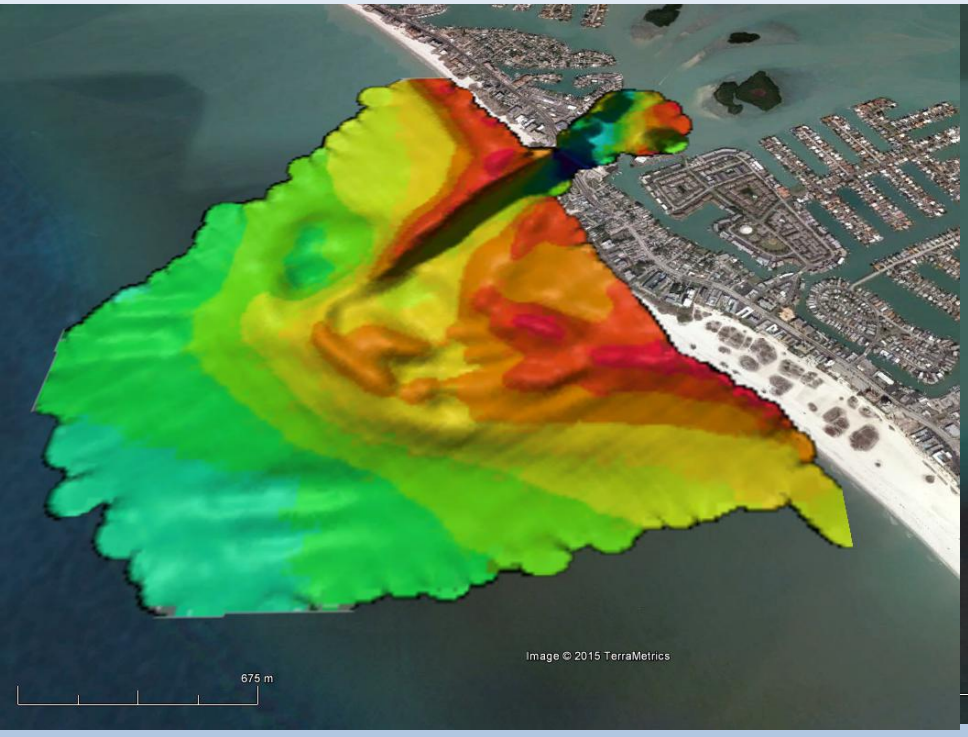
D_{10} 0.08 D_{50} 0.17 D_{90} 10.0

Section 2

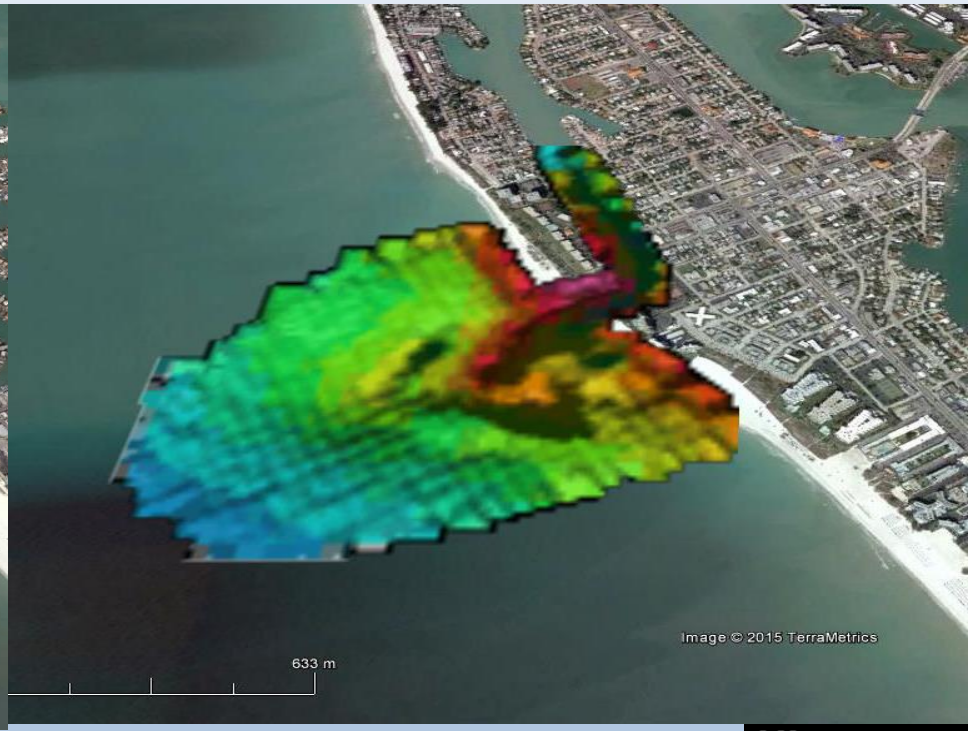
- Ebb Shoal Volumes
- Sediment Budget
- Sediment Pathways

Ebb Shoal Volume Changes

John's Pass 6/2010



Blind Pass 6/2010

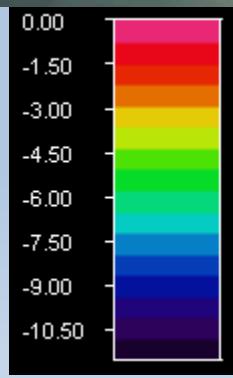


Time series bathymetric surveys:

- 6/2010 pre-dredging (single beam)
- 10/2010 post-dredging (single beam)
- 1/2011 (single beam)
- 10/2011 (single beam)
- 7/2012 (single beam)
- 7/2014 (multi-beam)

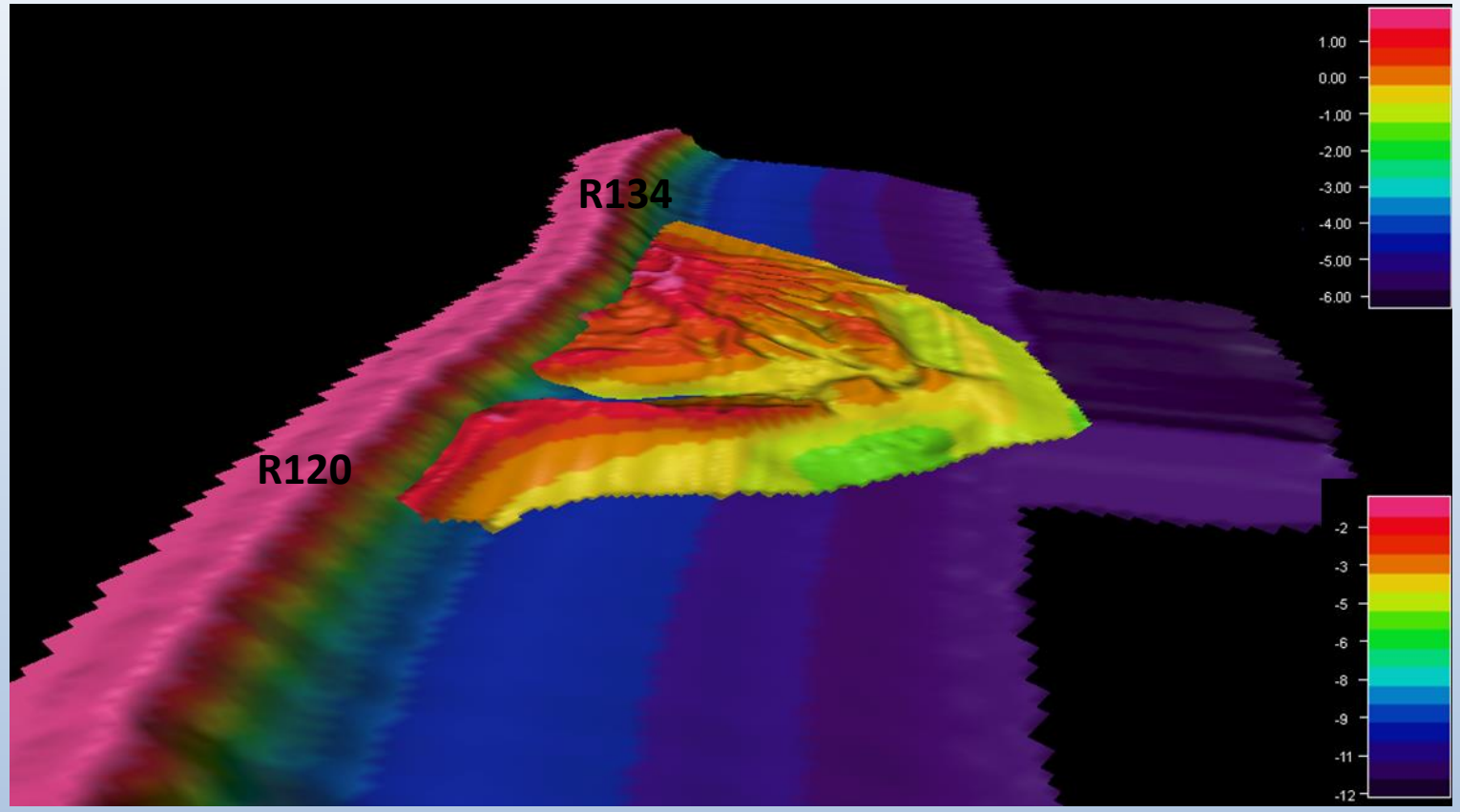
Beach Survey Data:

- USFCRL R-monument monthly to bi-monthly surveys of SK, TI, LK 2006-present.
- USFCRL annual bathymetric offshore survey extensions of R-monument surveys.



Ebb Shoal Volumes

John's Pass Ebb Shoal - 2014

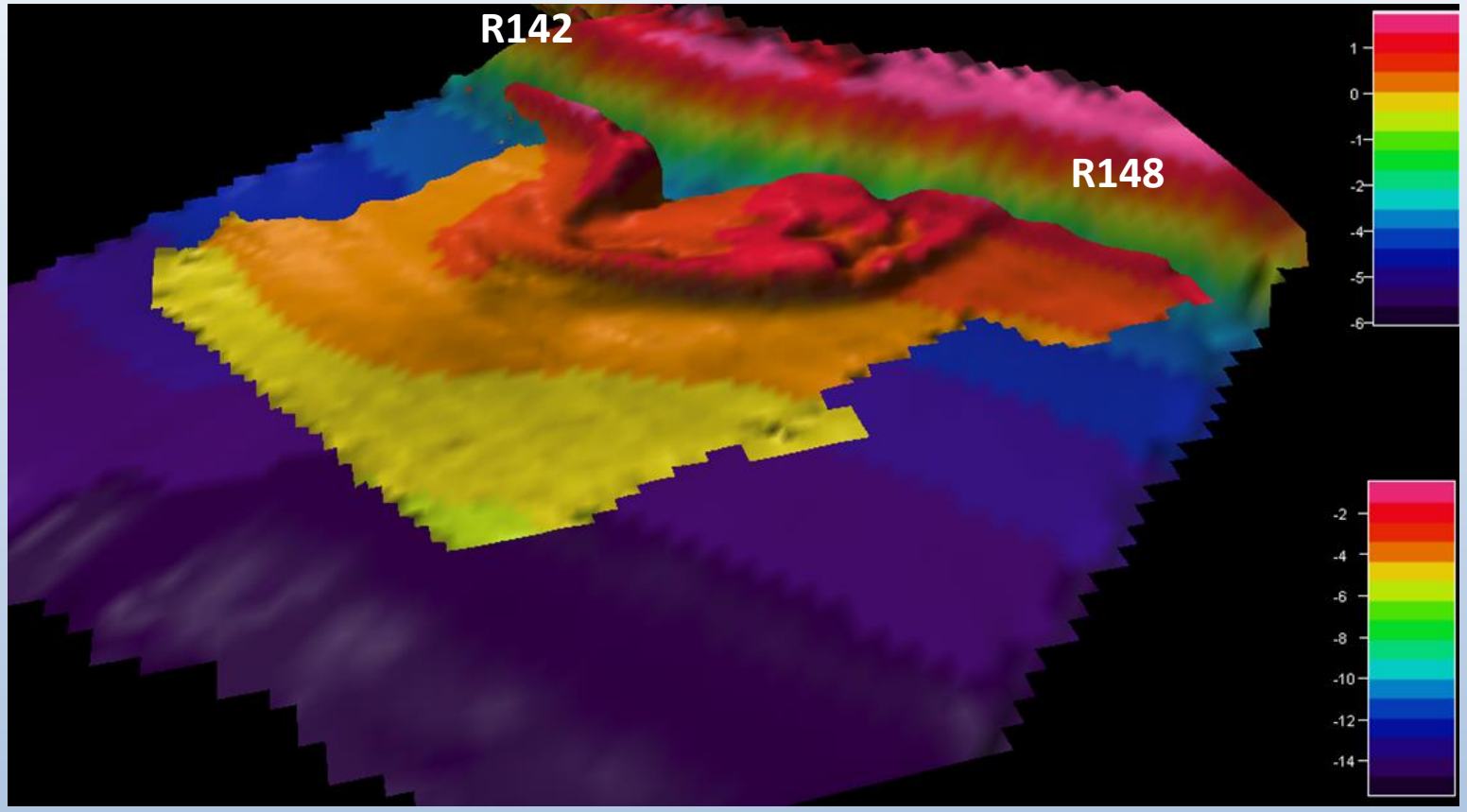


The John's Pass ebb shoal, July 2014, overlaying synthetic bathymetry, with 20X vertical exaggeration. Different color scales are used for the two bathymetry images to more clearly illustrate the ebb shoal.

Area of ebb shoal is 2,043,000 m^2
Volume = 3,286,000 m^3 (4,298,000 yd^3)

Ebb Shoal Volumes

Blind Pass Ebb Shoal - 2014



The Blind Pass ebb shoal, July 2014, overlaying synthetic bathymetry, with 20X vertical exaggeration. Different color scales are used for the two bathymetry images to more clearly illustrate the ebb shoal.

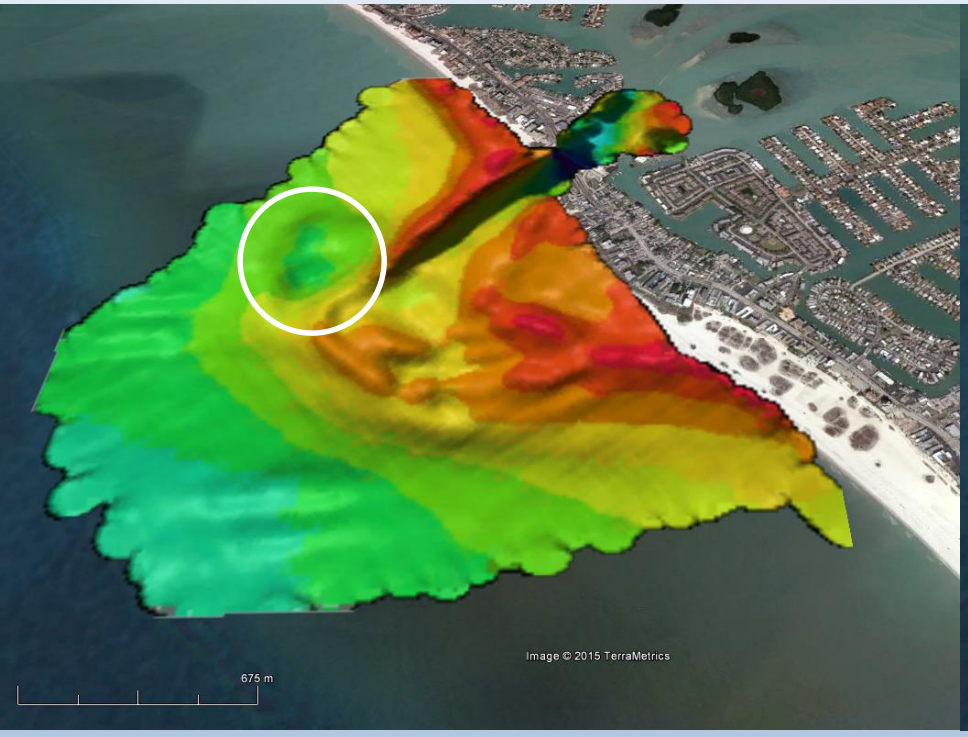
Area of the ebb shoal is 899,000 m^2

Volume 515,000 m^3 (673,000 yd^3)

Ebb Shoal Volume Changes

Survey Data: 6/25-30/2010 (pre- 7/2010 dredging) single beam survey of JP ebb shoal and channel.

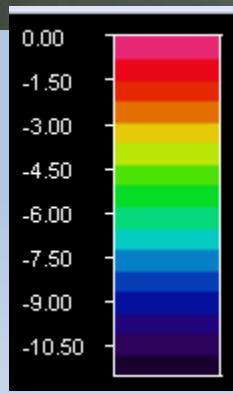
Survey Data: 10/24-26/2010 (post 7/2010 dredging) limited single beam survey of JP ebb shoal focused over dredged regions.



1988 dredge pit ~405,000 m^3 (529,200 c.y.) (CTC, 1993)
base of dredge pit -5.1 m NAVD

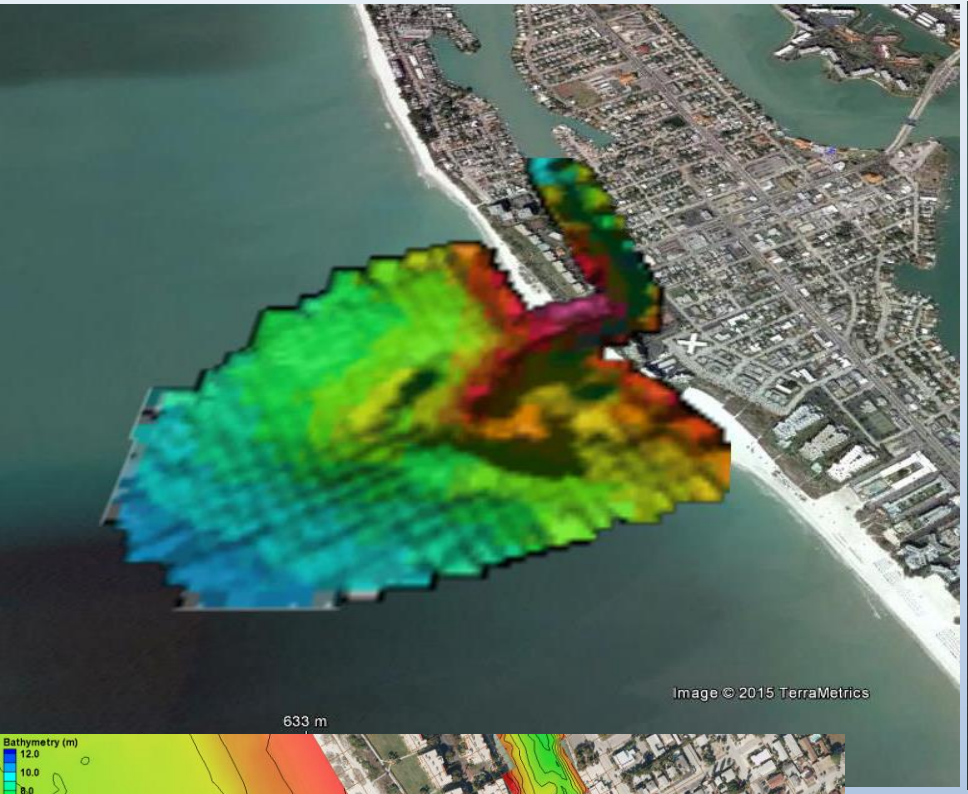
Infilling rate 6/2010 -7/2014 gained 9,000 m^3
Annualized 300 m^3/yr

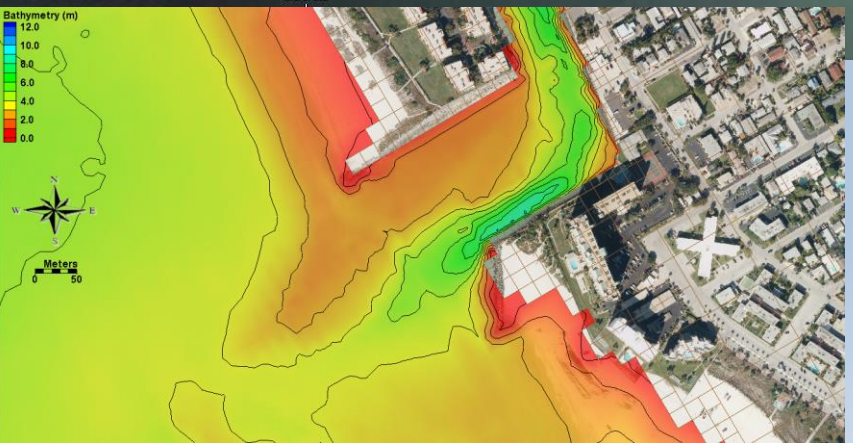
2010 dredge pits
Terminal lobe –west pit -4.25 m NAVD; 153,000 m^3 (200,000 c.y.)
Channel margin linear bar -4.5 m NAVD; 130,000 m^3 (170,000 c.y.)
TOTAL- 280,000 m^3 (366,000 c.y.)



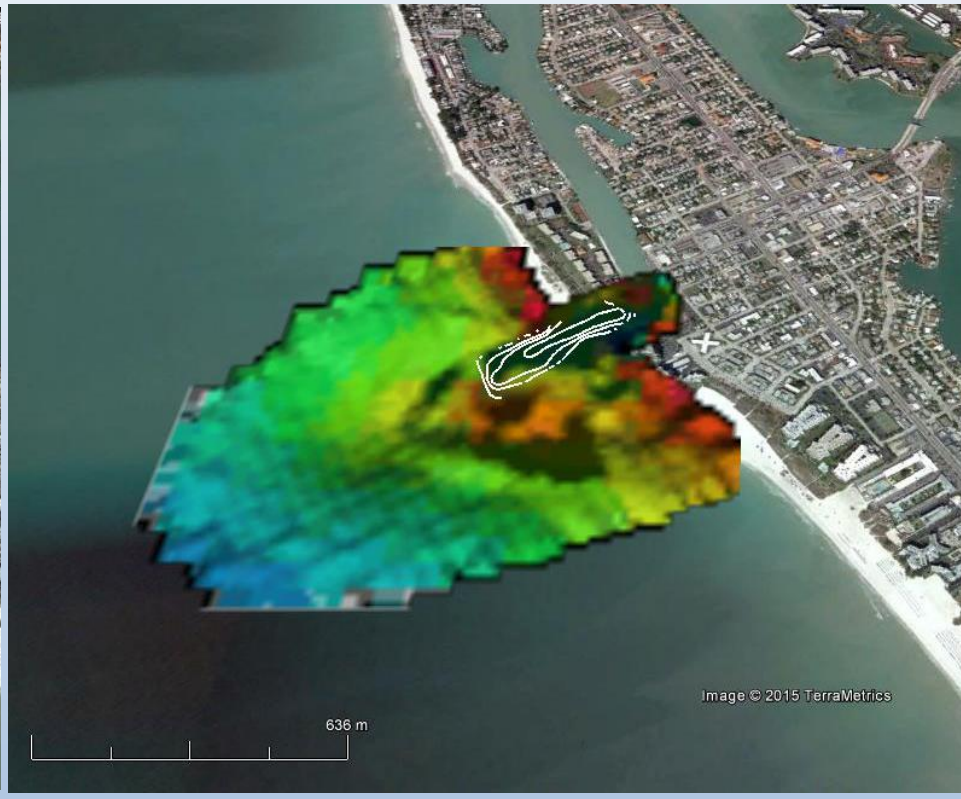
Ebb Shoal Volume Changes

Survey Data: 6/28-29/2010
single beam survey

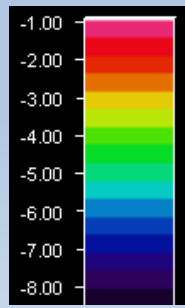




Survey Data: 10/22-23/2010
single beam survey



2010 dredge pit (-4.7 m NAVD)
120,000 m^3 (157,000 c.y.)



Section 2

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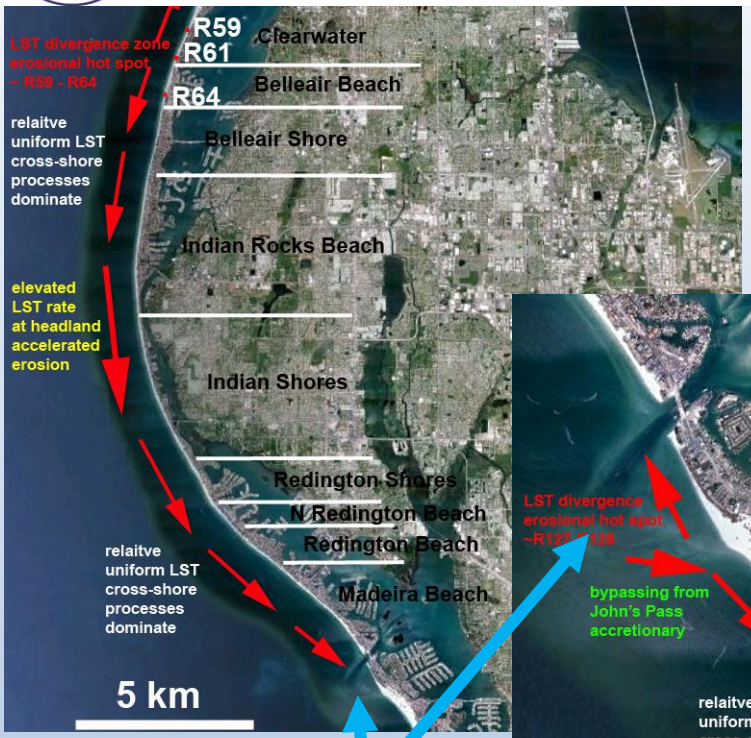
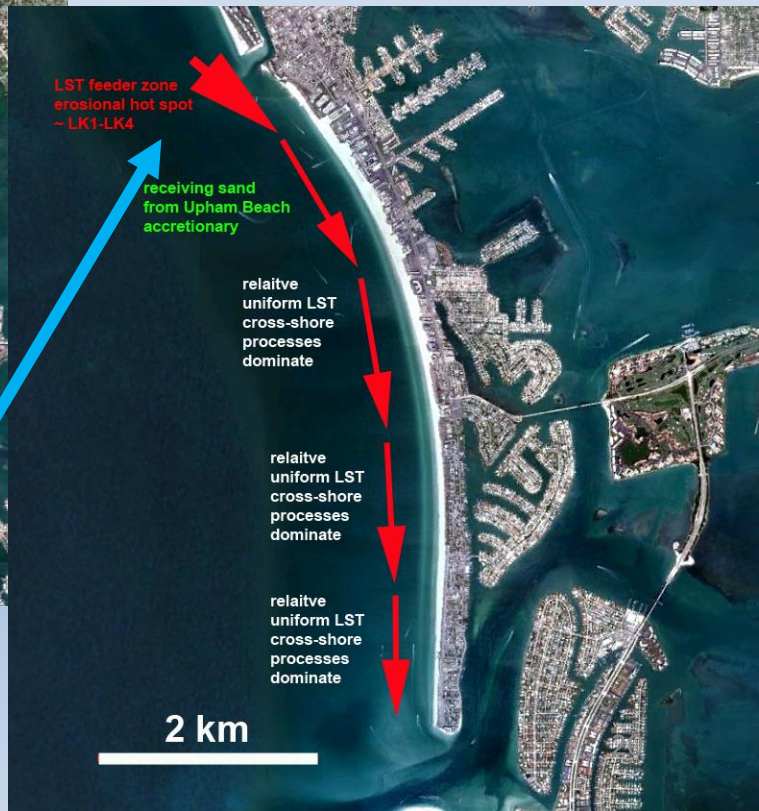
- Sediment Budget
- Sediment Pathways

SK-TI-LK Longshore Transport Vectors



John's Pass

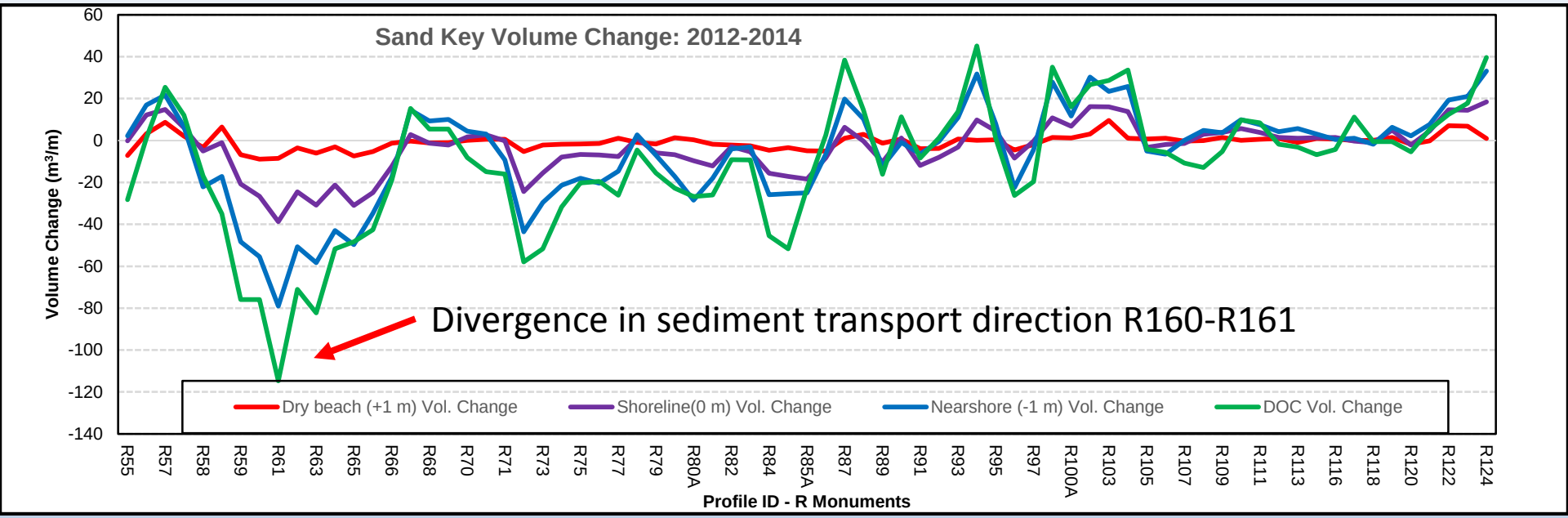
Blind Pass



Sediment Budget – N. End (SK)

Clearwater Pass

John's Pass



Regional Sediment Budget
10/2010 – 6/2014
R60 – R165

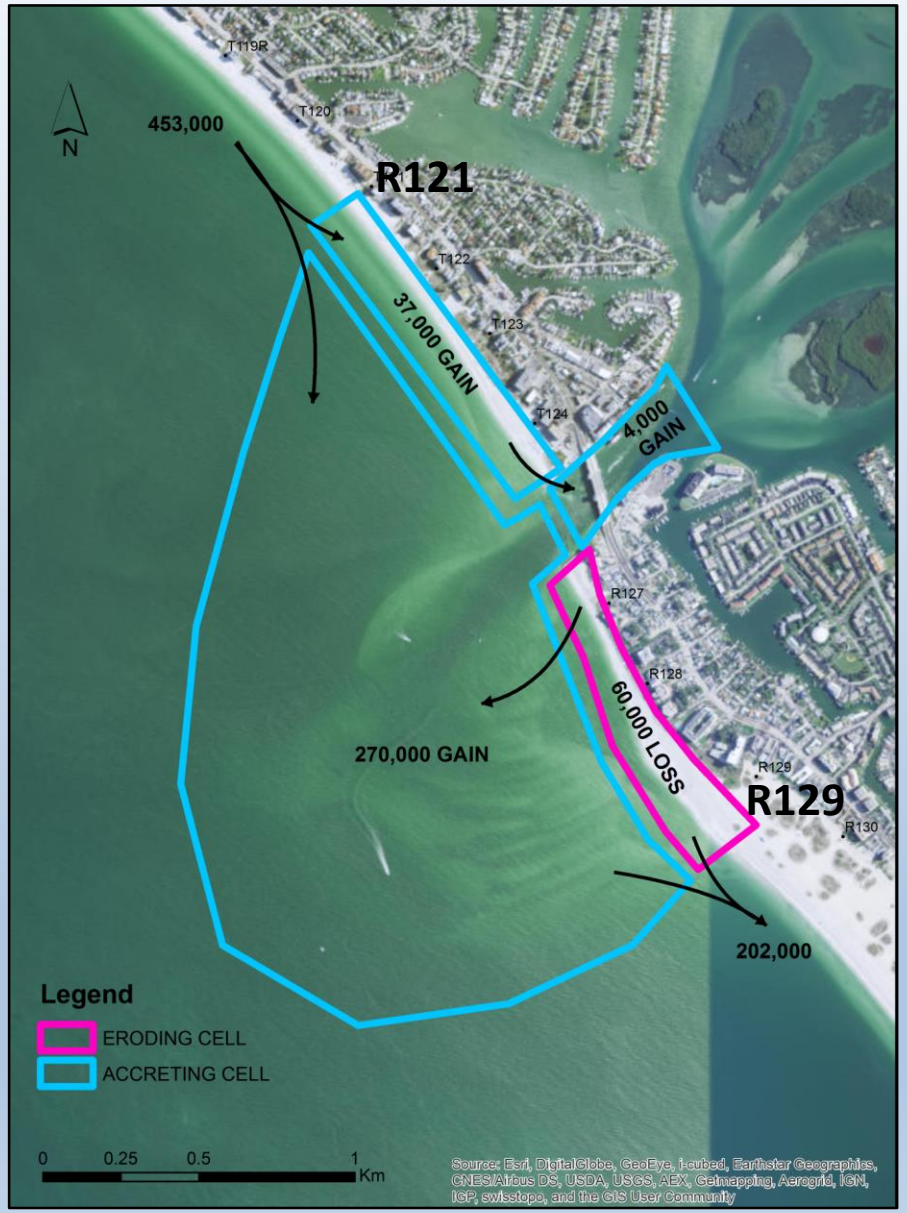
Regional Sediment Budget 10/2010-6/2014

887,000 m³ placed on SK
R60-R66, R71-R107 11/2012

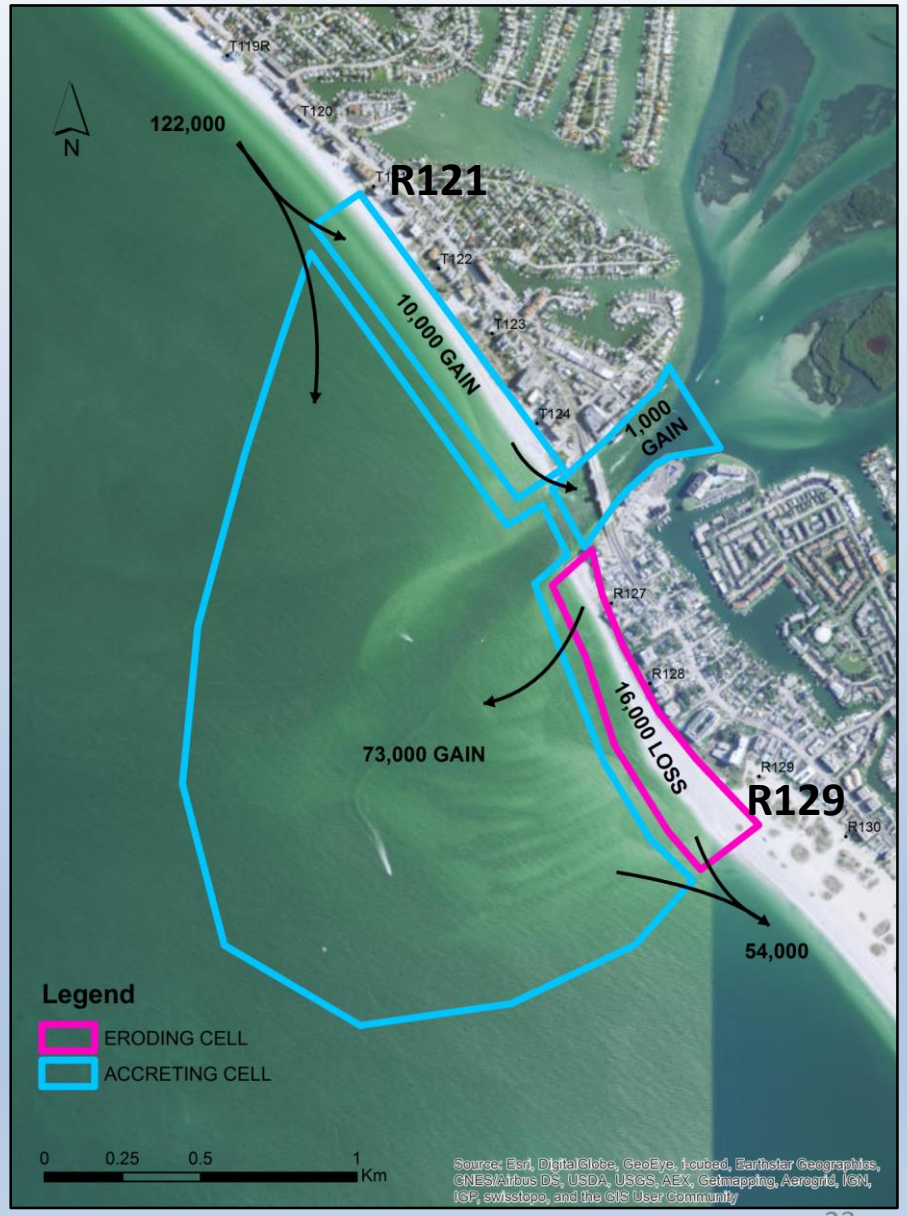
3.7 years

Annualized

Sediment Budget 10/2010-6/2014

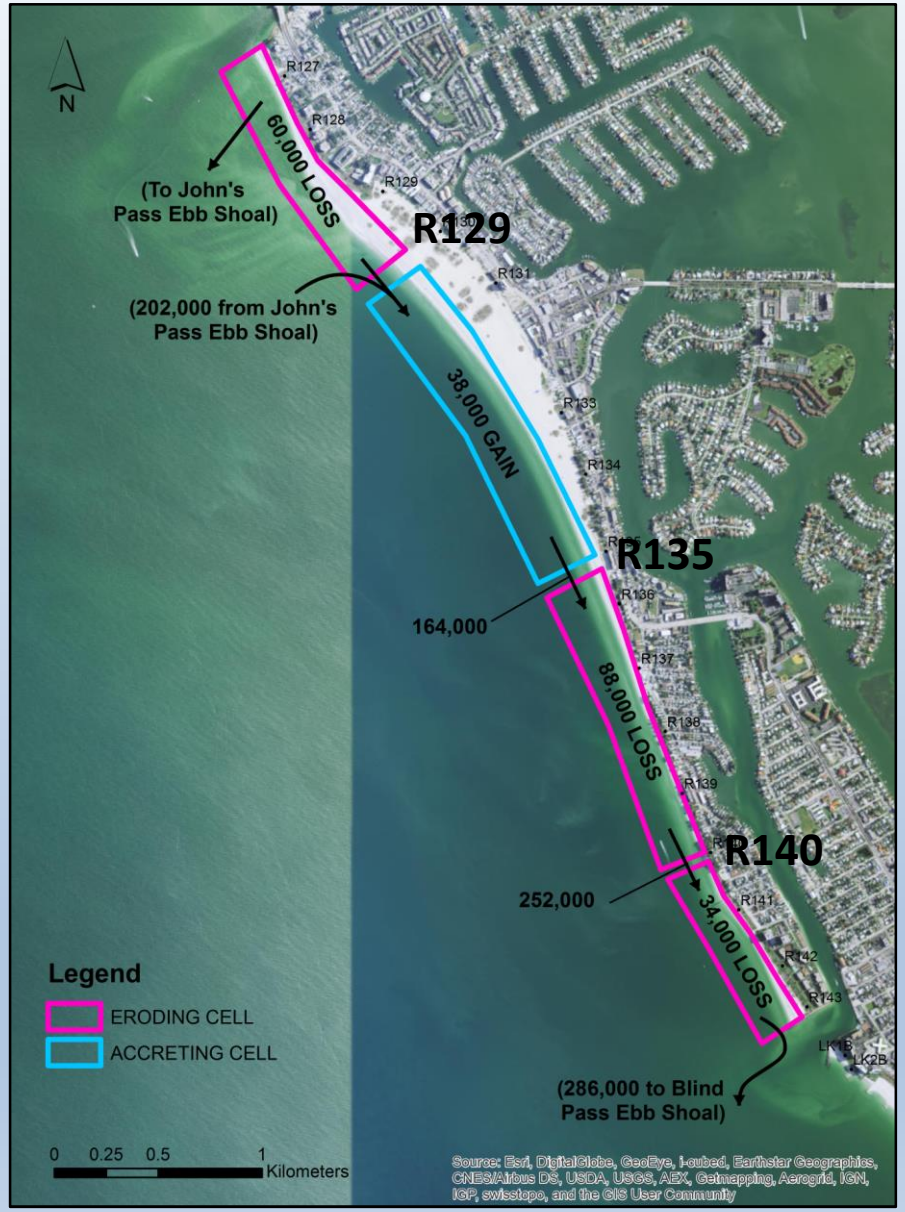


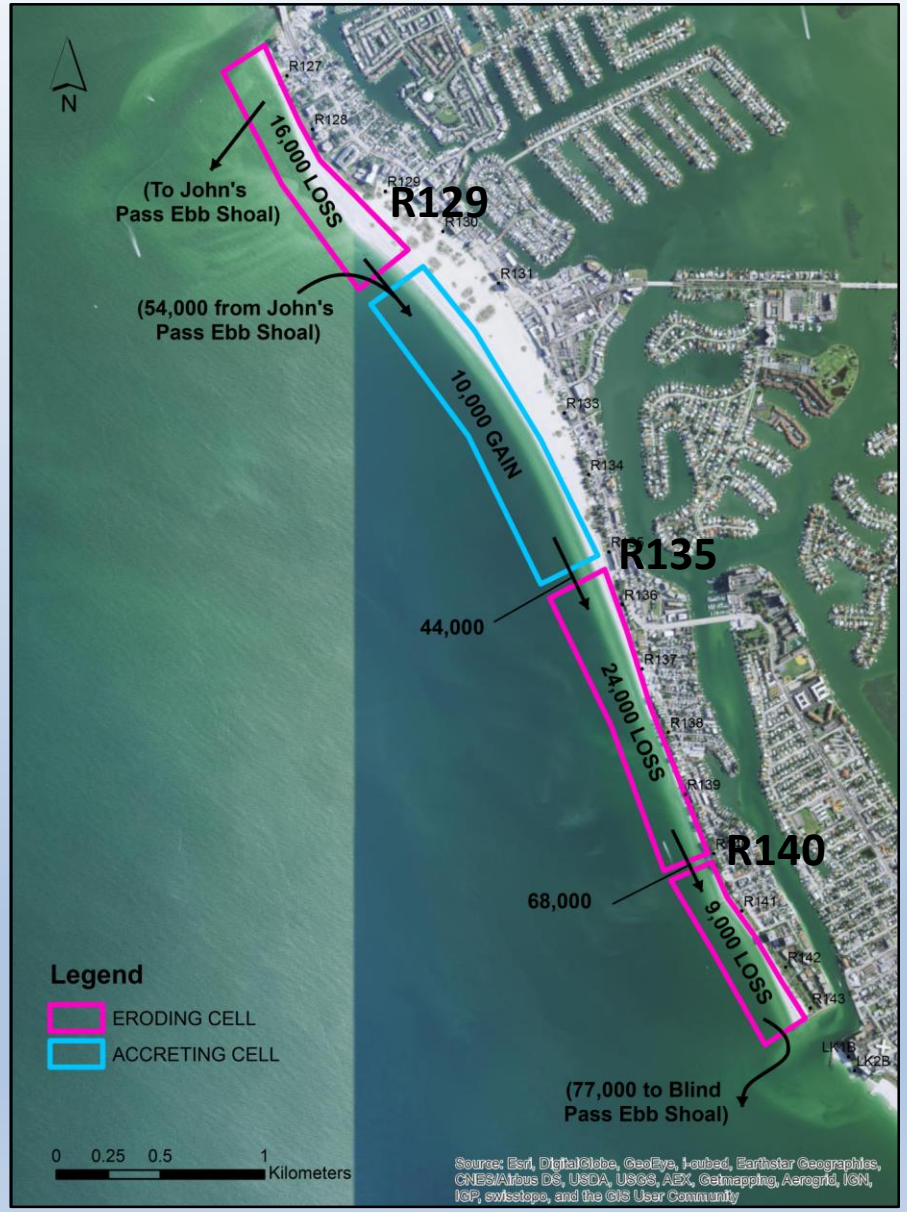
3.7 years



Annualized

Sediment Budget 10/2010-6/2014

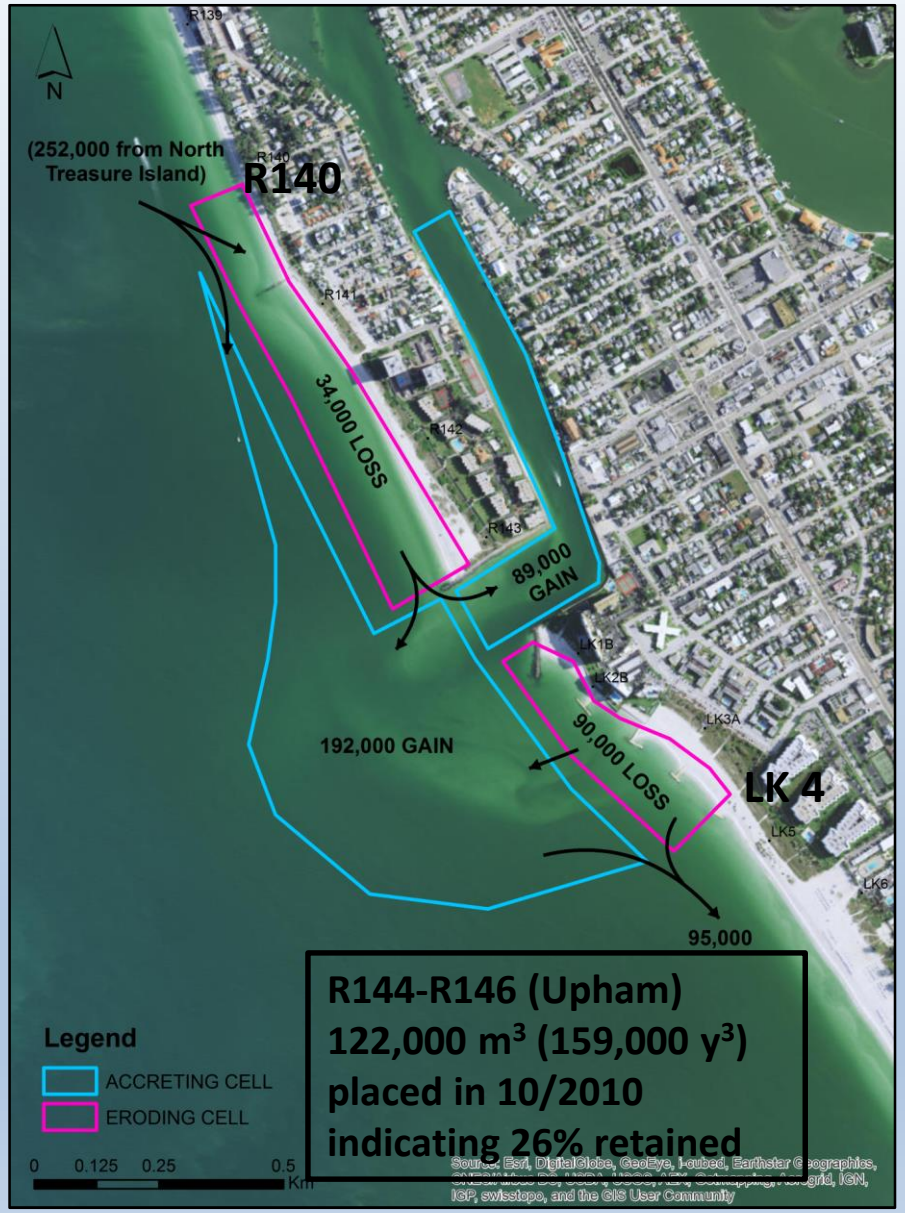




3.7 years

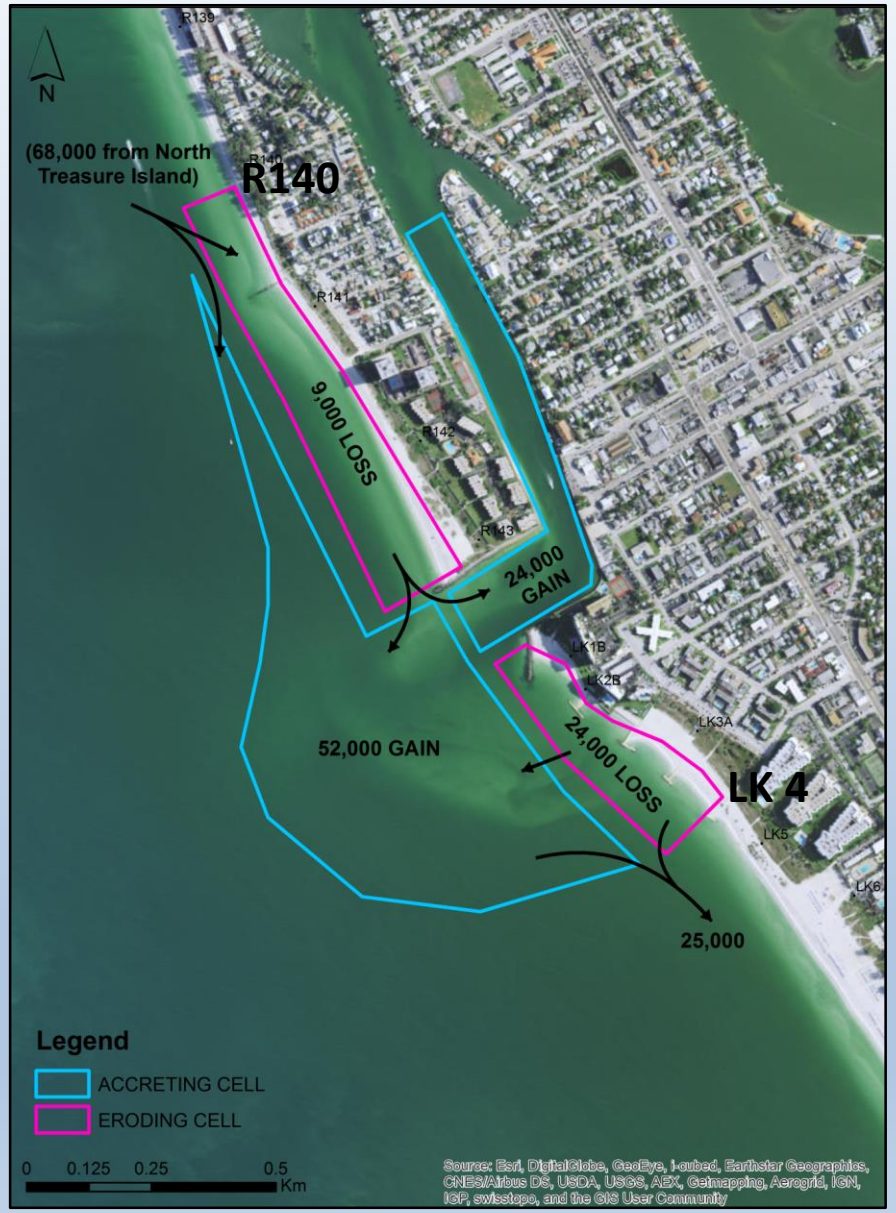
Annualized

Sediment Budget 10/2010-6/2014



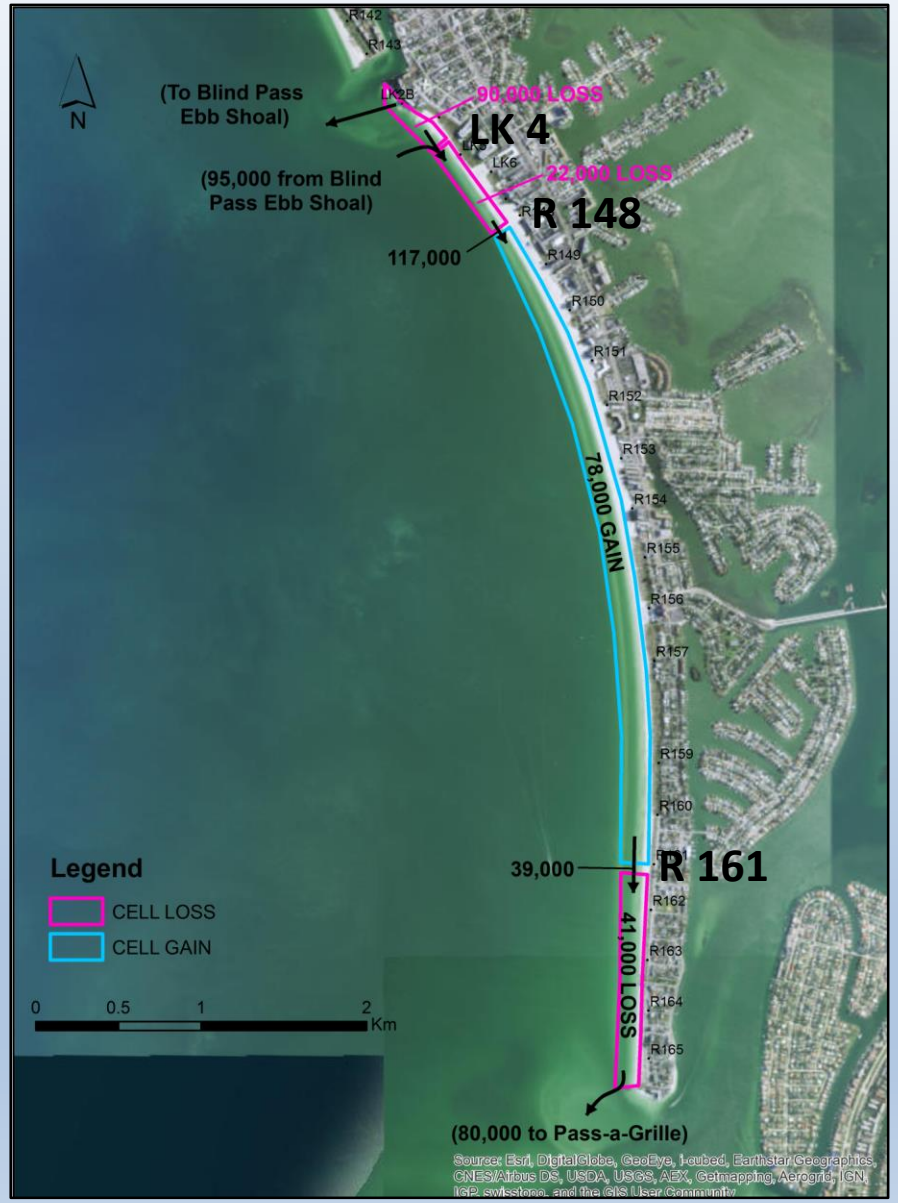
R144-R146 (Upham)
122,000 m³ (159,000 y³)
placed in 10/2010
indicating 26% retained

3.7 years

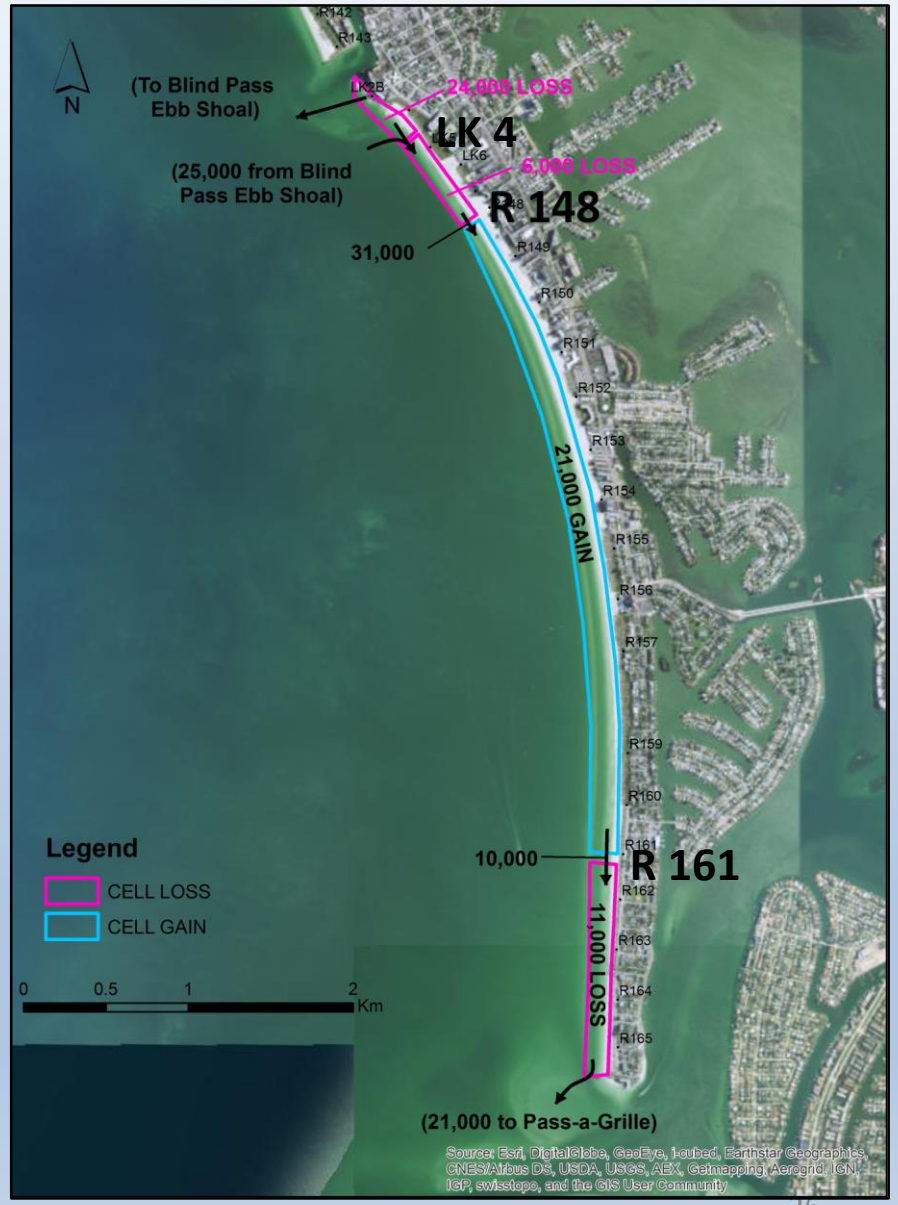


Annualized

Sediment Budget 10/2010-6/2014



3.7 years



Annualized

Section 2

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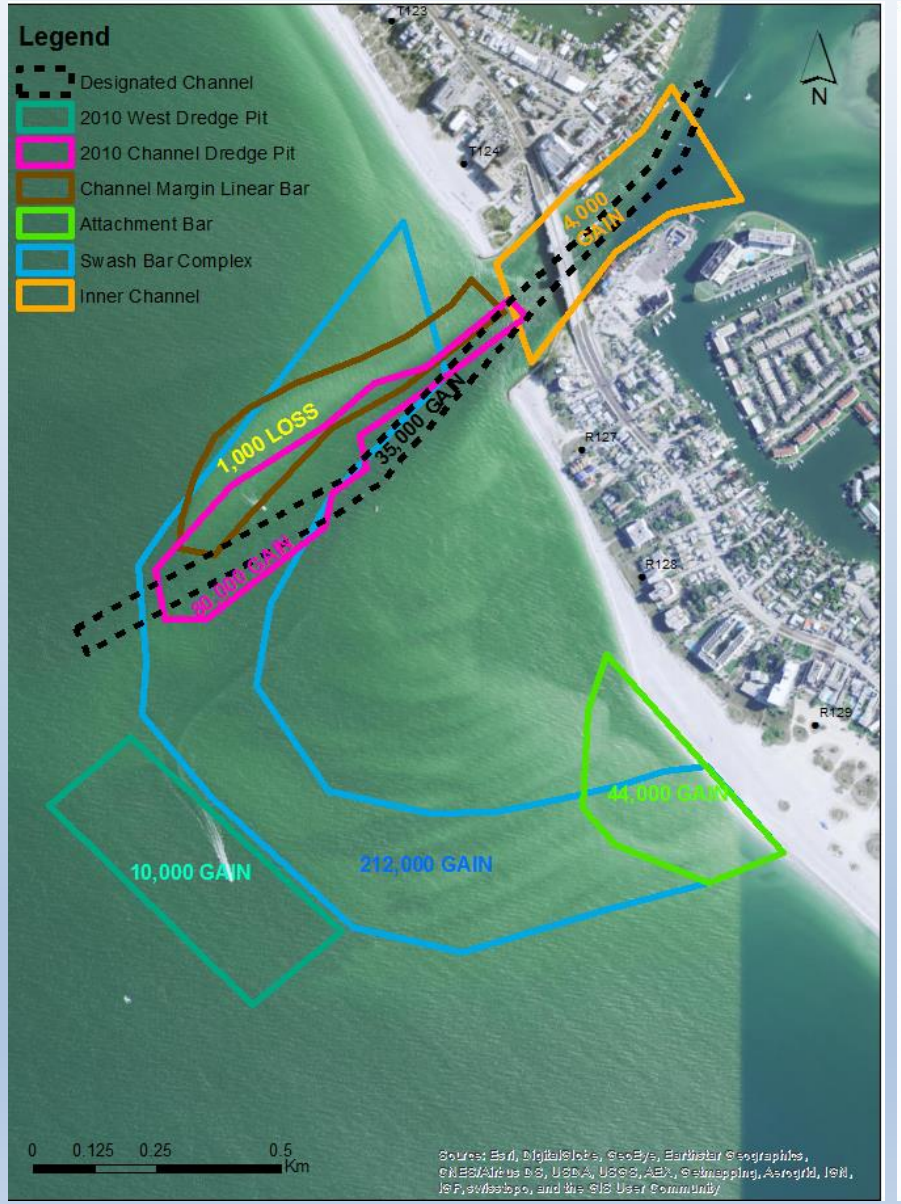
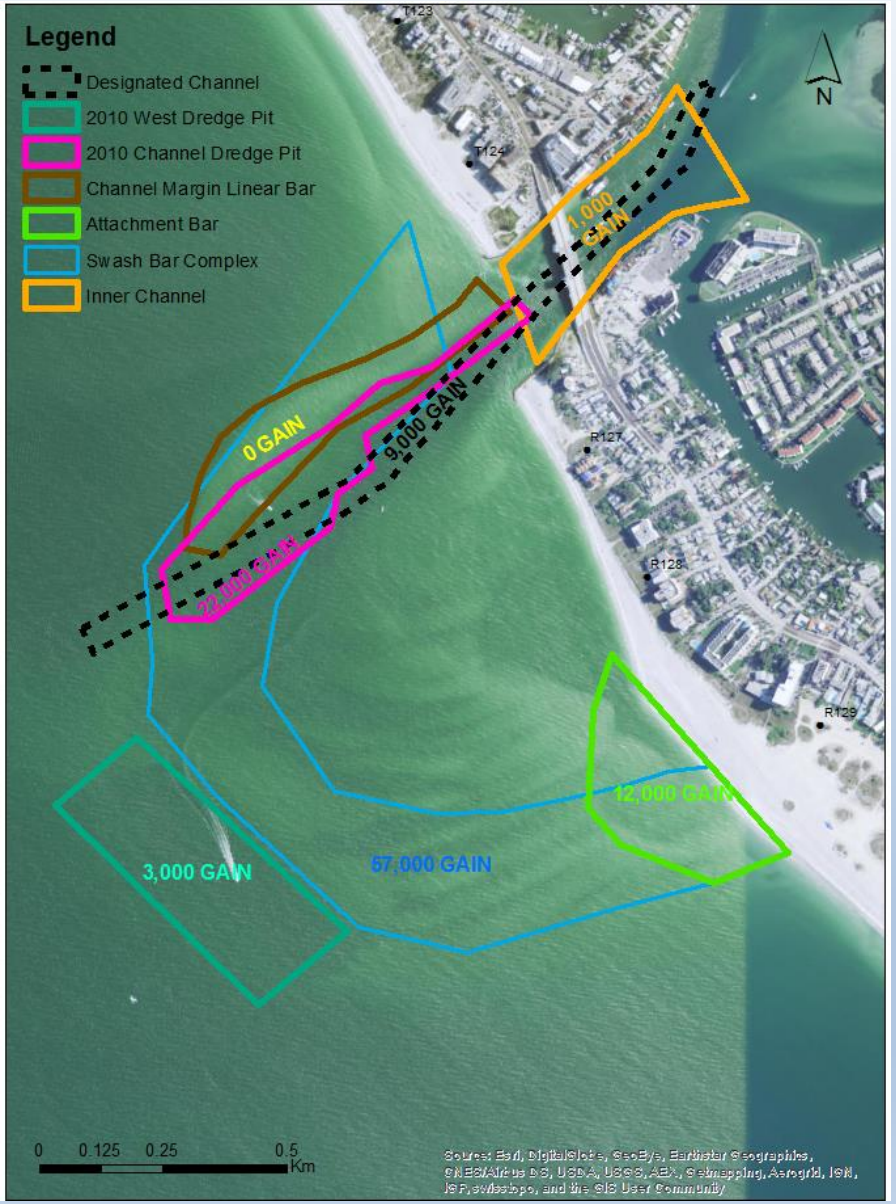
- Sediment Budget
- Sediment Pathways

Sediment Pathways John's Pass

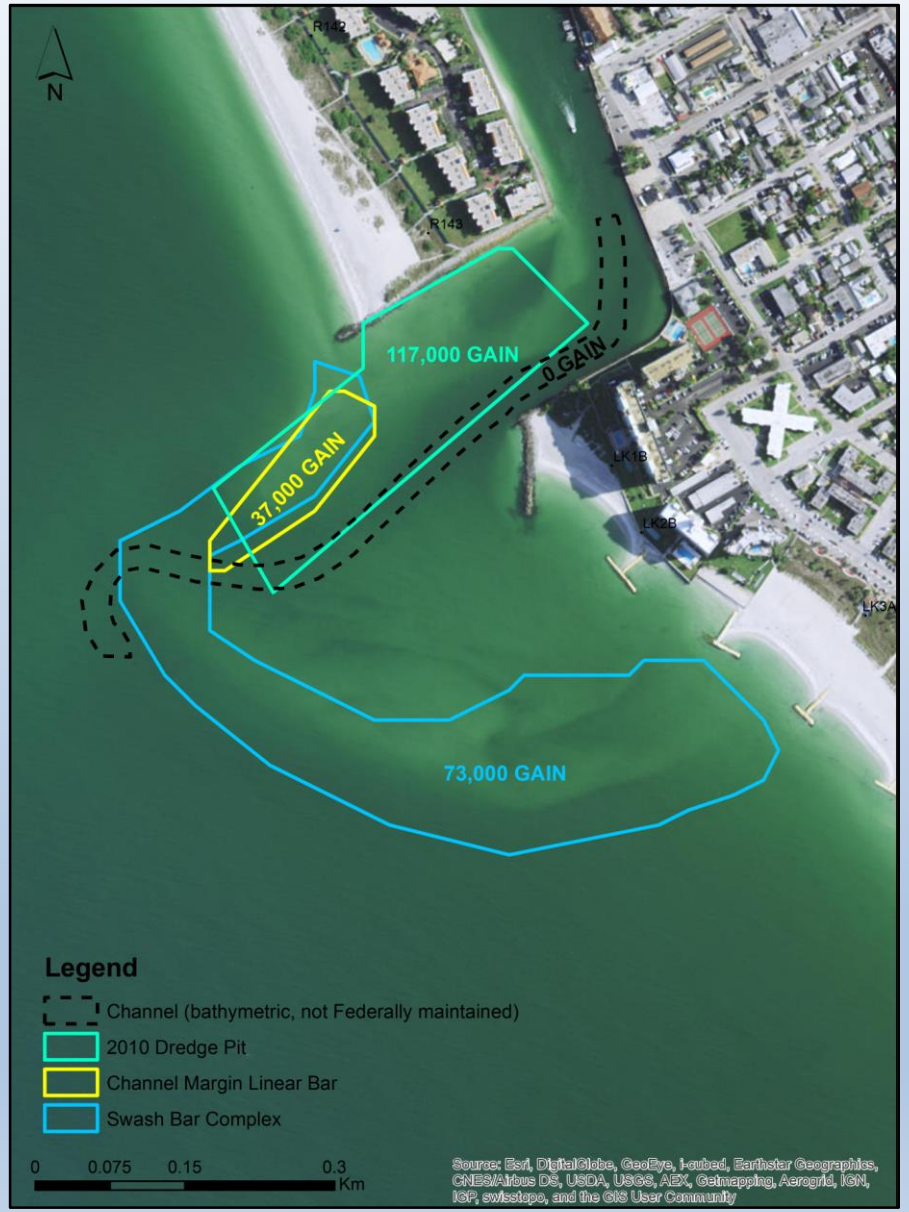




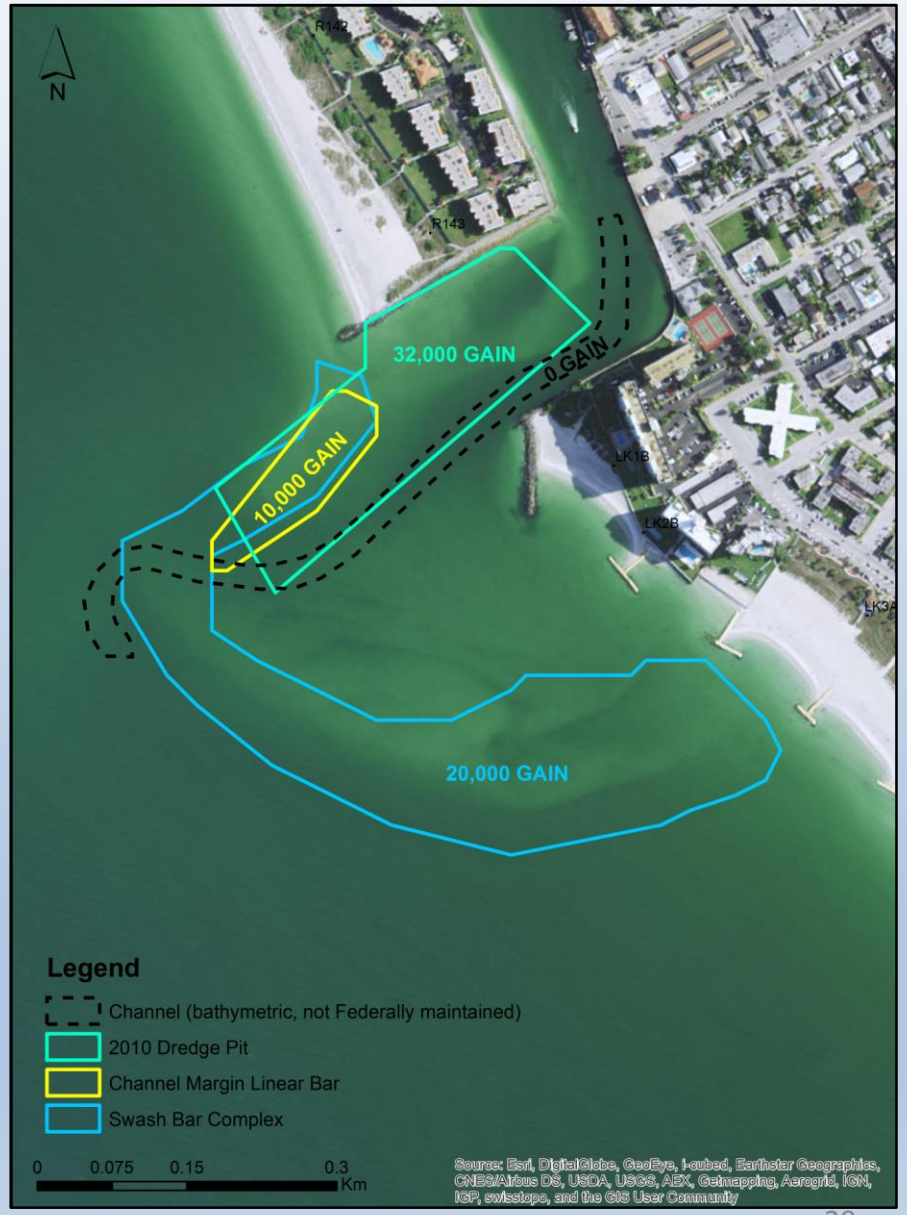
3.7 years

Annualized

Sediment Pathways Blind Pass



3.7 years



Annualized

Conclusions

- Infilling of the JP 2010 terminal lobe dredge pit (below -5 m NAVD) will take ~ 15 to fill.
- Infilling of the John's Pass channel dredge pit will take ~ 8 years.
- Infilling of the Blind Pass inner shoal dredge pit will take ~ 4 years.
- Dredging of the Blind Pass inner shoal inhibits development of the ebb delta and sand bypassing to the downdrift beaches

Conclusions

- The majority of the sediment placed on and eroded from the beaches immediately downdrift of the inlets migrates onto the downdrift bypass bars of the adjacent ebb deltas (ie. Sunshine beach on TI and Upham on LK).

- 30% or less of the sediment placed on Upham beach in 2010 was transported to the south end of Long Key and Pass-a-Grille inlet.

Acknowledgments

- Florida Department of Environmental Protection (Bob Brantly, Ralph Clark, Guy Weeks)
- Pinellas County (Andy Squires, John Bishop)
- Ping Wang, the co-author of this talk
- And ASBPA for providing the forum here today

The End
Questions?