

FLAGLER COUNTY, FLORIDA BEACH MANAGMENT

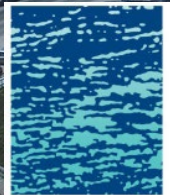
Florida Shore and Beach
Preservation Association
36th Annual National
Conference of Beach
Preservation Technology
Ft. Myers, FL

February 2, 2023

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olsen
associates, inc.
Coastal Engineering





Gulf of Mexico

199 mi

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

Imagery Date: 12/13/2015 27°46'46.95" N 82°48'38.59" W elev 0 ft eye alt 791.83 mi

Google Earth

Ft. Myers

Flagler County

The Bahamas

FLORIDA



St. Johns County

R-1

Marineland

R-10

Matanzas Shores

Washington Oaks Gardens State Park

R-20

Sea Colony

R-30

Hammock Beach

R-40

Hammock Dunes

R-50

Painter's Hill

R-60

Town of Beverly Beach

R-70

R-80

City of Flagler Beach

R-90

R-101

R-1

18 miles

R-101

FLAGLER COUNTY

Flagler

Volusia
County

Atlantic Ocean

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Data SIO, NOAA, U.S. Navy, NGA, GEBCO





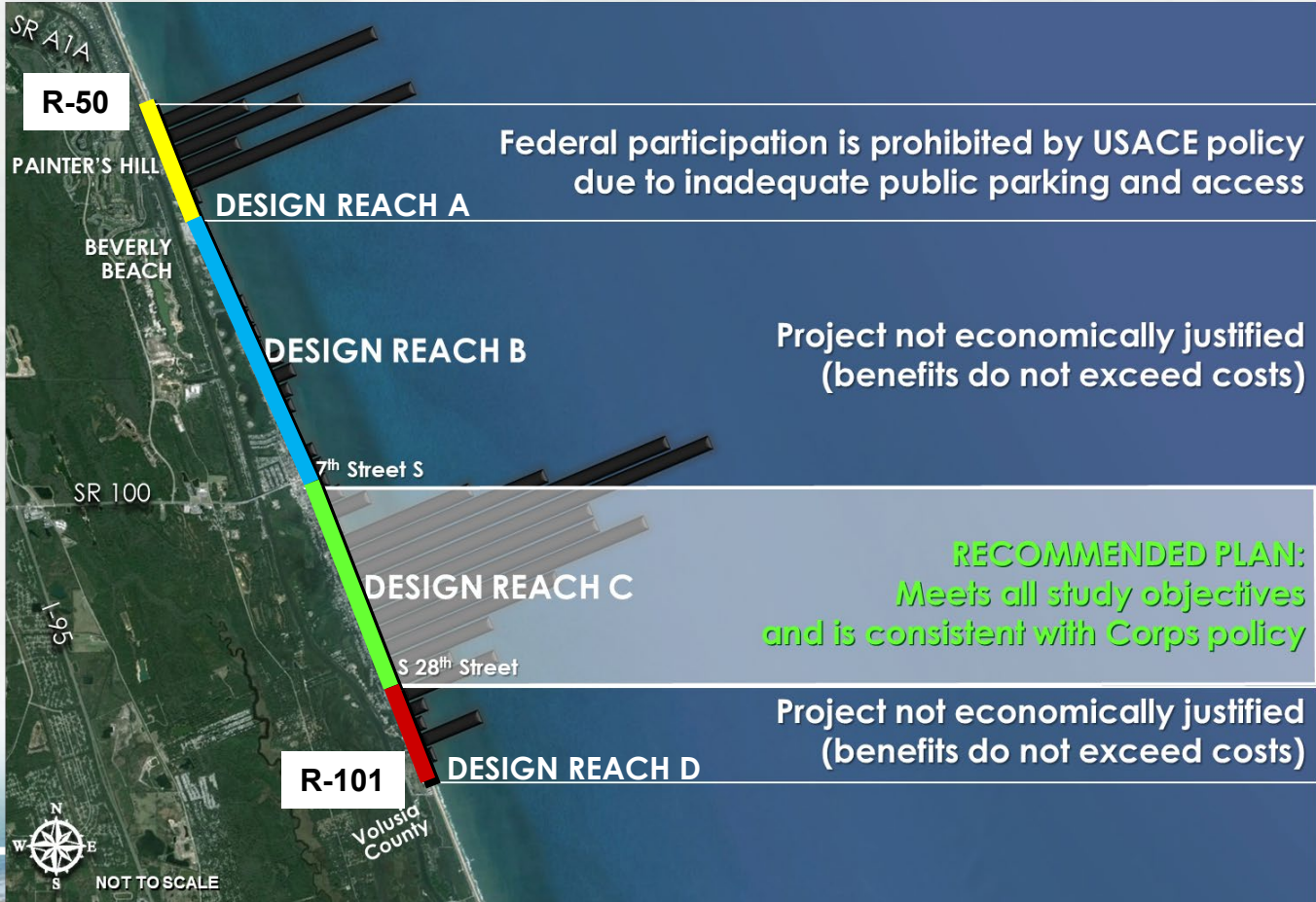
- Presently, Flagler County does not have a programmatic beach management plan for all 18 miles of Atlantic Ocean shoreline.
- County-wide need was not apparent prior to Hurricane Matthew (2016).
- Prior to Matthew, only two localized problematic areas.
- In 2014, USACE feasibility study identified only a 2.4 mile reach of shoreline in southern Flagler County as being the most vulnerable and eligible for Federal funding assistance.



KEY FINDINGS FROM 2014 FLAGLER STUDY



BUILDING STRONG





Game Changer – Hurricane Matthew (2016)

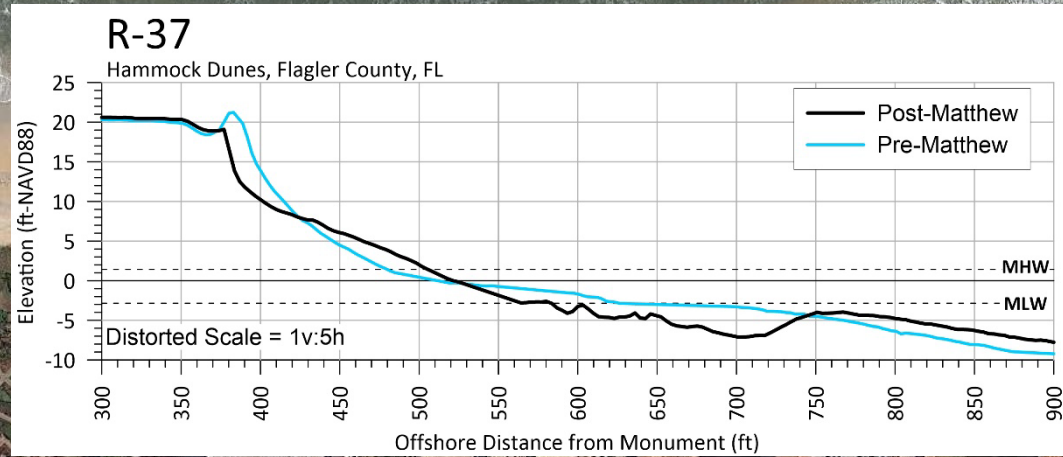
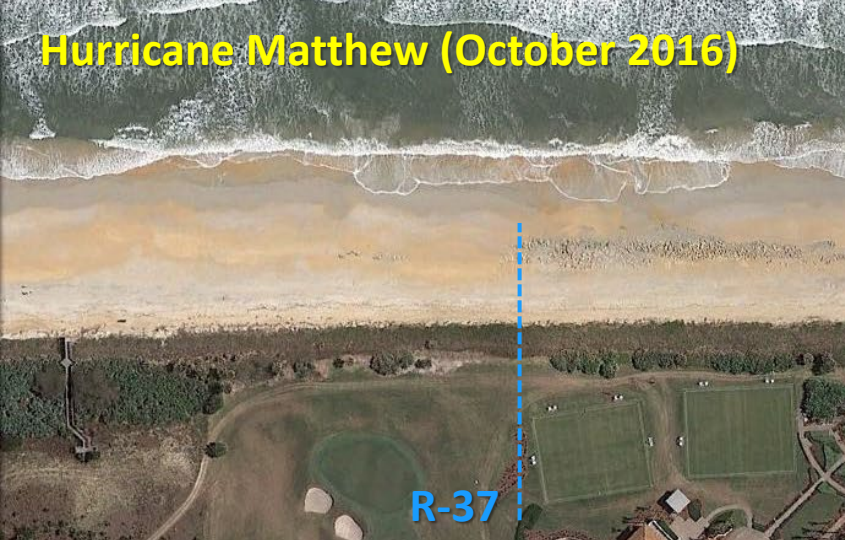


All 18 miles of county beach and dune severely impacted



Hurricane Matthew (October 2016)

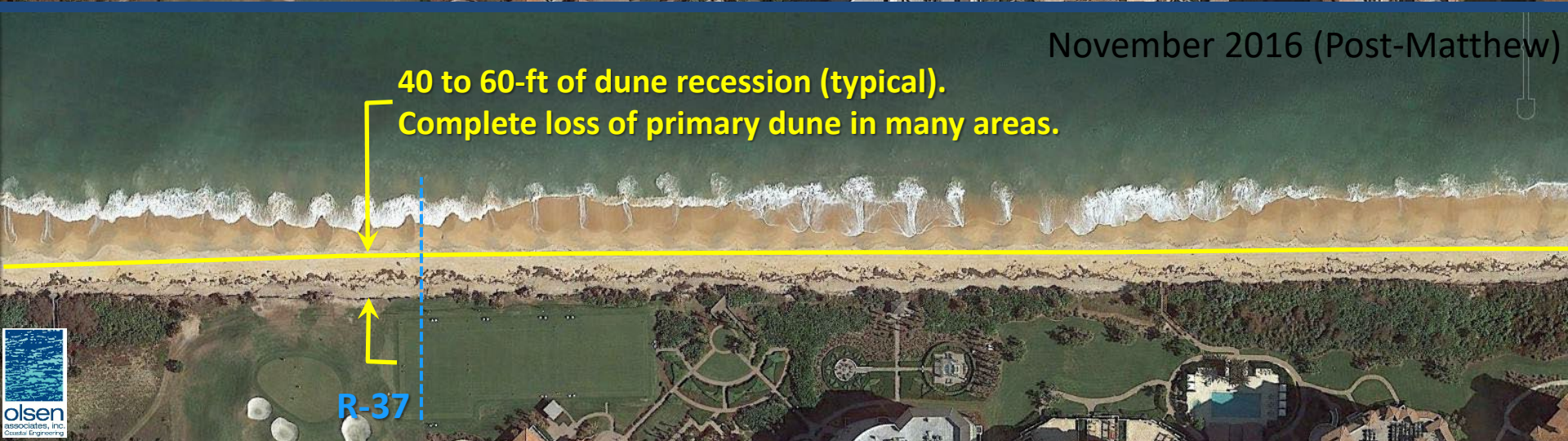
February 2016 (Pre-Matthew)



R-37

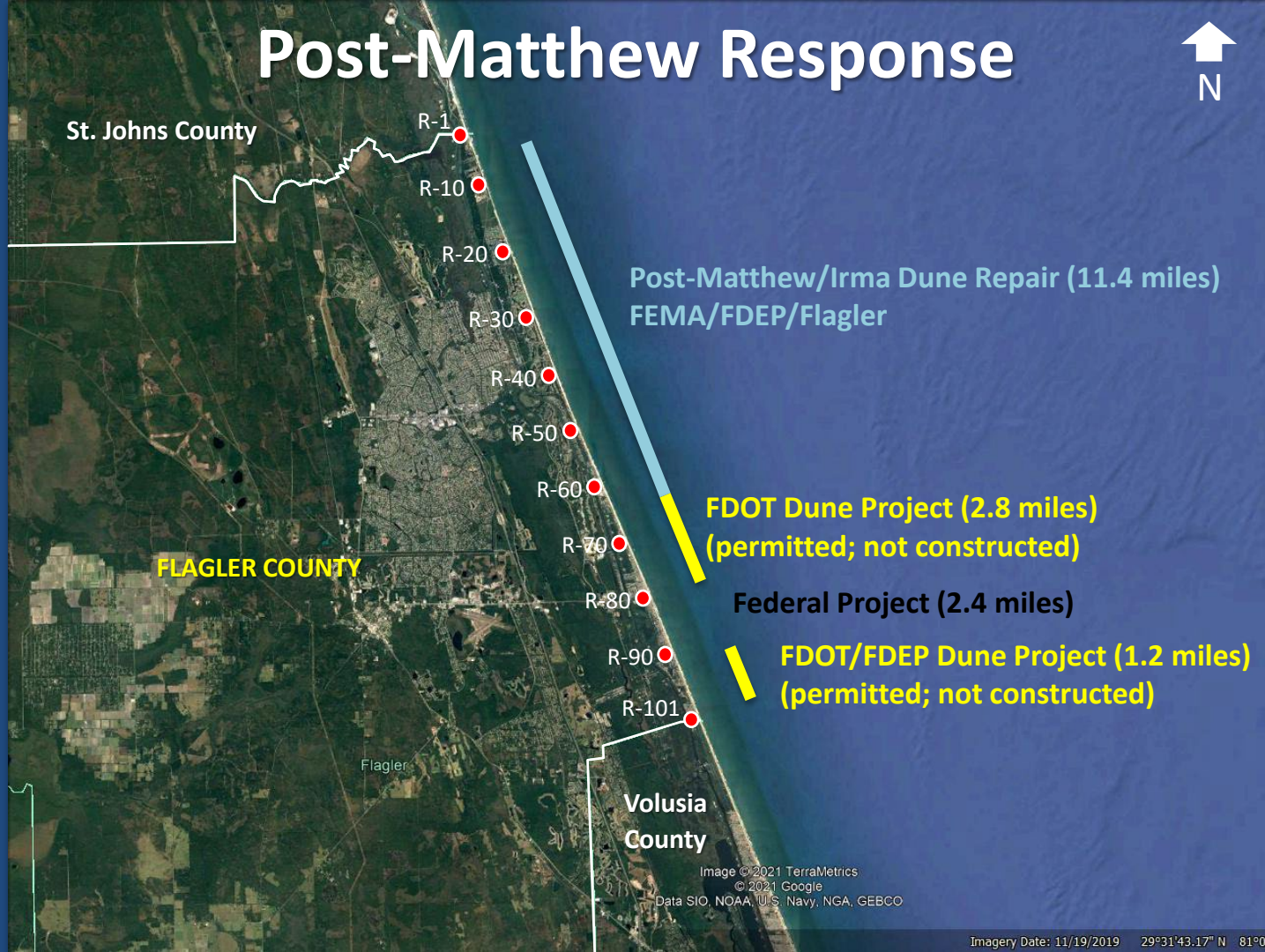
November 2016 (Post-Matthew)

**40 to 60-ft of dune recession (typical).
Complete loss of primary dune in many areas.**



R-37

Post-Matthew Response



St. Johns County

R-1

R-10

R-20

R-30

R-40

R-50

R-60

R-70

R-80

R-90

R-101

Volusia
County

Post-Matthew/Irma Dune Repair (11.4 miles)
FEMA/FDEP/Flagler

FDOT Dune Project (2.8 miles)
(permitted; not constructed)

Federal Project (2.4 miles)

FDOT/FDEP Dune Project (1.2 miles)
(permitted; not constructed)

FLAGLER COUNTY

Flagler

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- Subsequent storms following Matthew and associated increase of long-term regional erosion rate threatening the County coastline.
- In 2020, Flagler County identified need for a comprehensive long-term strategy to address existing and expected future beach management needs;
 - Sponsored beach management study (BMS) to...
 - focus on comprehensive beach and dune restoration and maintenance
 - identify scope of beach and dune restoration and long-term maintenance needs; and
 - identify funding requirements and sources to implement a long-term management plan.

Benefits of Comprehensive Beach Management

- Storm protection, recreational space, environmental habitat
- Consistent beach and dune conditions along all 18 miles
- Resiliency to future sea level rise
- Proactive storm response strategy (physical, permitting and financial)
- Maximize beach grant assistance opportunities

St. Johns County

No current plan
Plan with permits; no long-term funding
Plan with permits; 50-yr Federal funding



R-1

R-10

R-20

R-30

R-40

R-50

R-60

R-70

R-80

R-90

R-101

R-2 to R-65 (11.4 miles)

R-65 to R-80 (2.8 miles)

R-80 to R-94 (2.4 miles)

R-94 to R-101 (1.2 miles)

FLAGLER COUNTY

Flagler

Volusia
County

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St. Johns County

R-1

Marineland

R-1

R-10

Matanzas Shores

Washington Oaks Gardens State Park

R-20

Sea Colony

R-30

Hammock Beach

R-40

Hammock Dunes

R-50

Painter's Hill

R-60

Town of Beverly Beach

R-70

R-80

City of Flagler Beach

R-90

R-101

R-101

**BMS
Study
Area**

FLAGLER COUNTY

Flagler

**Volusia
County**

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BMS (18 miles)

- Review of Historical Conditions and Existing Beach and Dune
- Identify Physical / Environmental / Regulatory Constraints
- Identify Sand Source Options
- Summarize Implementation Considerations
- Develop Project Approach / Project Concepts
- Develop Probable Cost-to-Construct
- Conduct Comparative Cost Analysis
- Outline Funding Needs and Considerations

Typical Beach and Dune



Varn Park



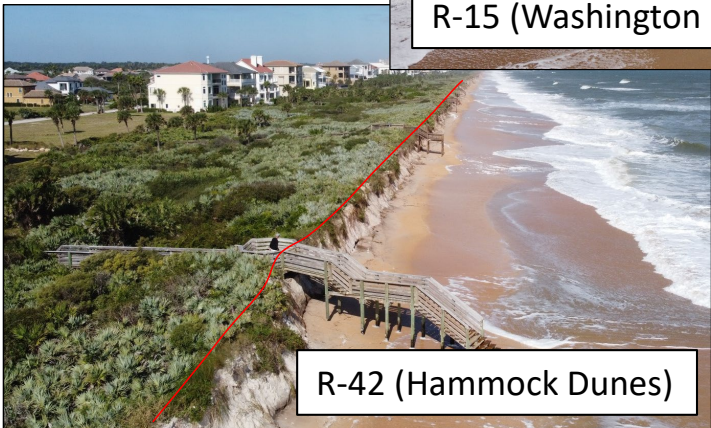
R-7 (Matanzas Shores)



R-55 (Painters Hill)



R-15 (Washington Oaks SP)

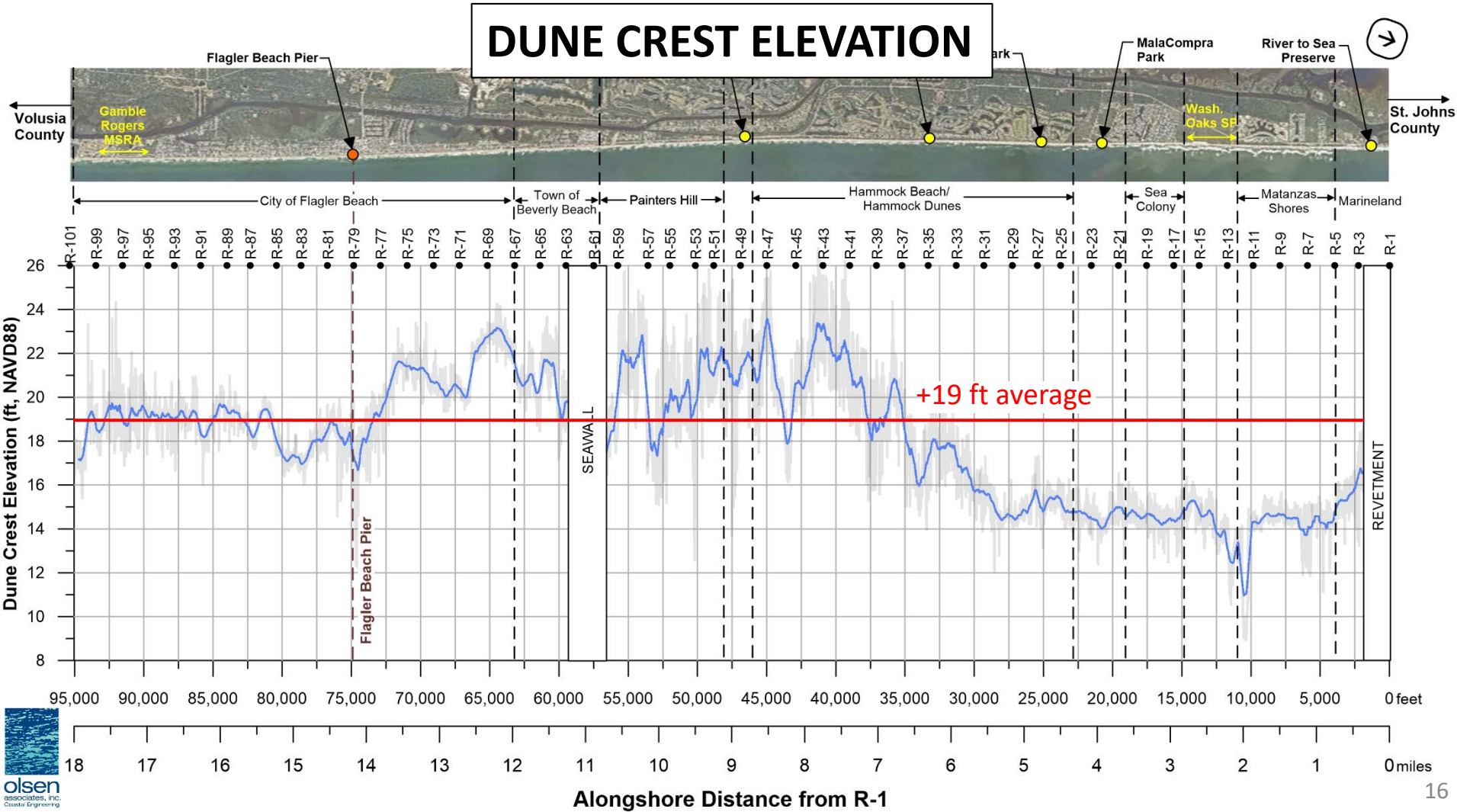


R-42 (Hammock Dunes)

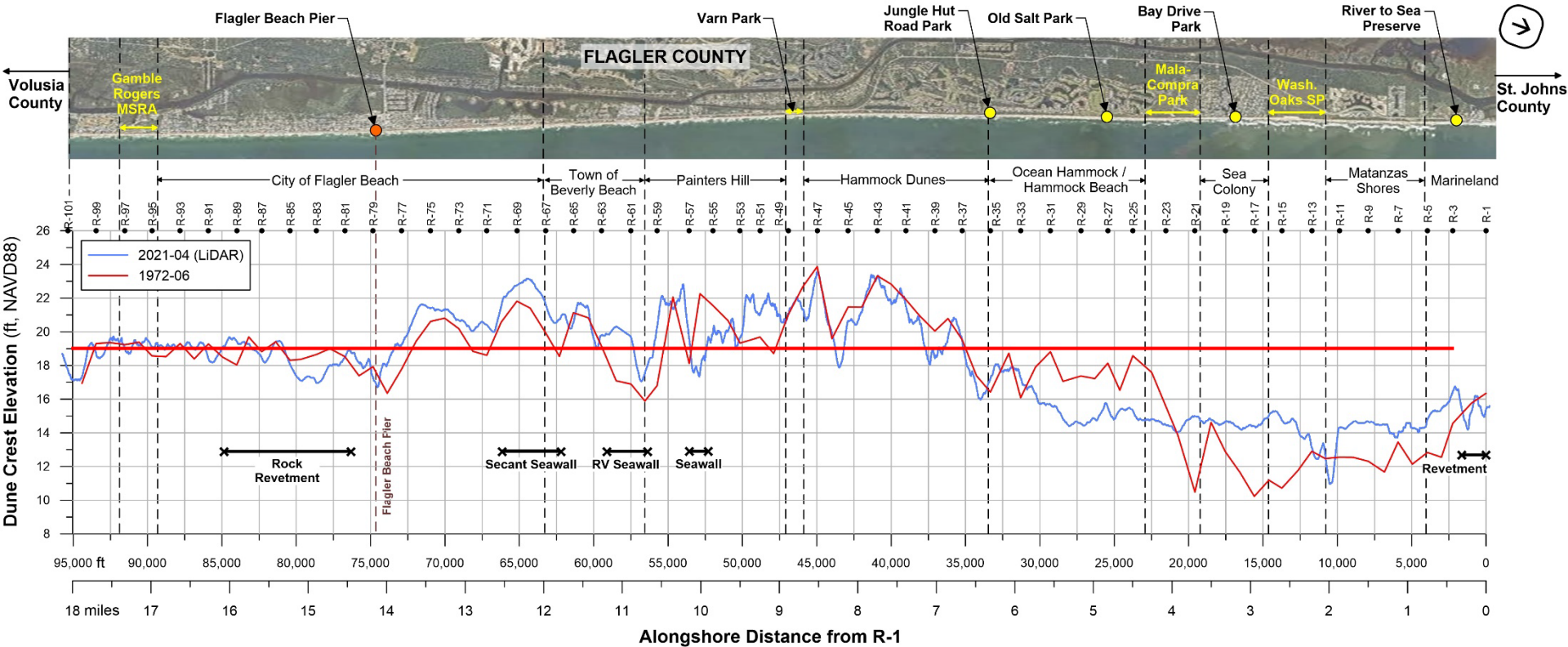


R-87 (Flagler Beach)

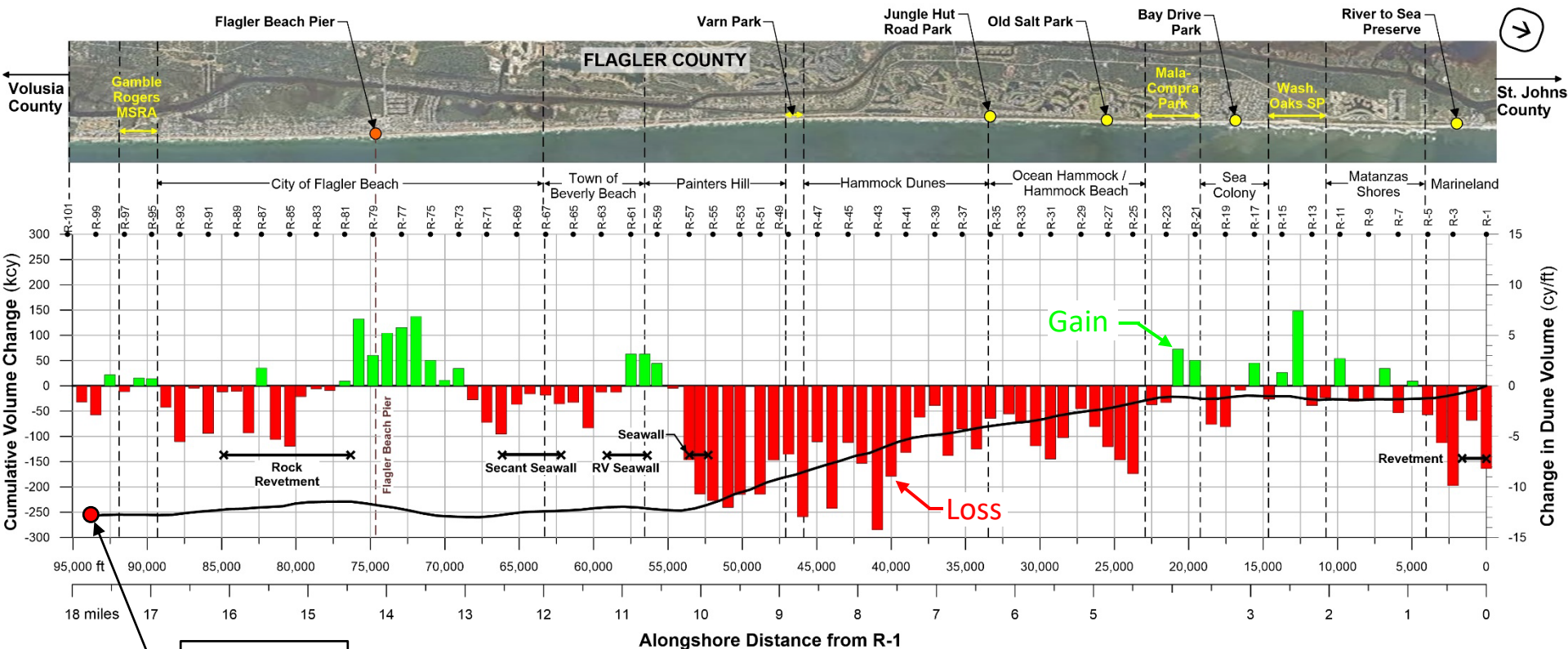
DUNE CREST ELEVATION



DUNE CREST ELEVATION



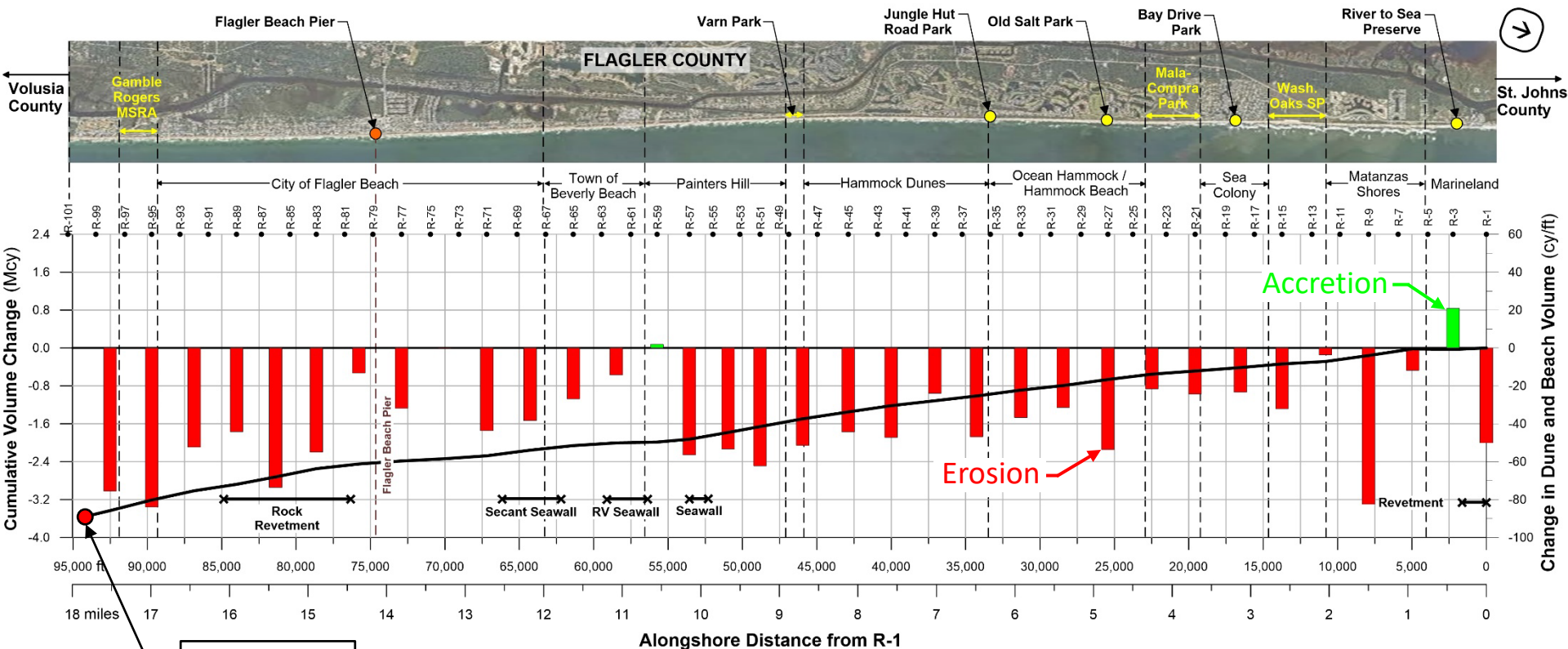
DUNE VOLUME CHANGE (1972-2021)

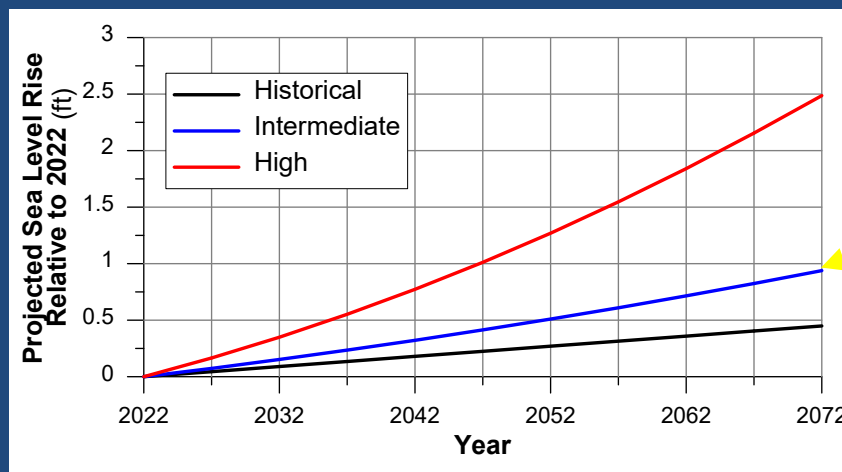


-260k cy



BEACH and DUNE VOLUME CHANGE (1972-2021)



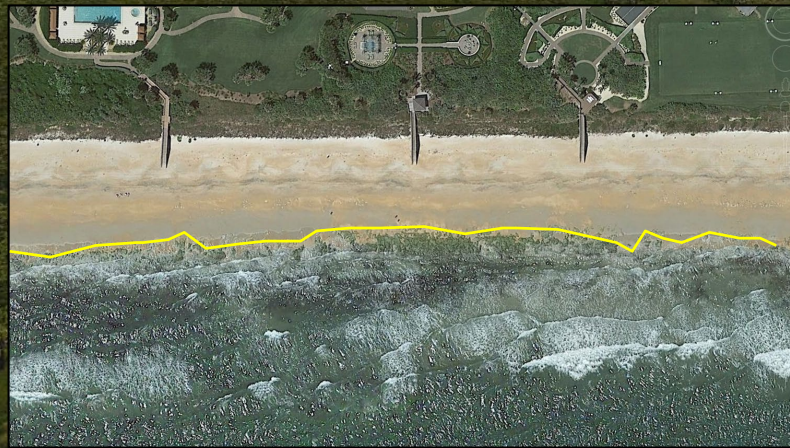


~1-ft of SLR
in 50 years

Timeframe	Deficit	Annual erosion rate	Estimated loss due to Intermediate* SLR	Annual erosion rate with Intermediate* SLR
	<i>cy</i>	<i>cy/yr</i>	<i>cy/yr</i>	<i>cy/yr</i>
1972 to 2021	3,500,000	71,600	34,800	106,400
2011 to 2021	1,100,000	112,700	34,800	147,500

* National Research Council (1987) Curve I, modified by IPCC (2007)

Nearshore Hardbottom / Coquina Rock



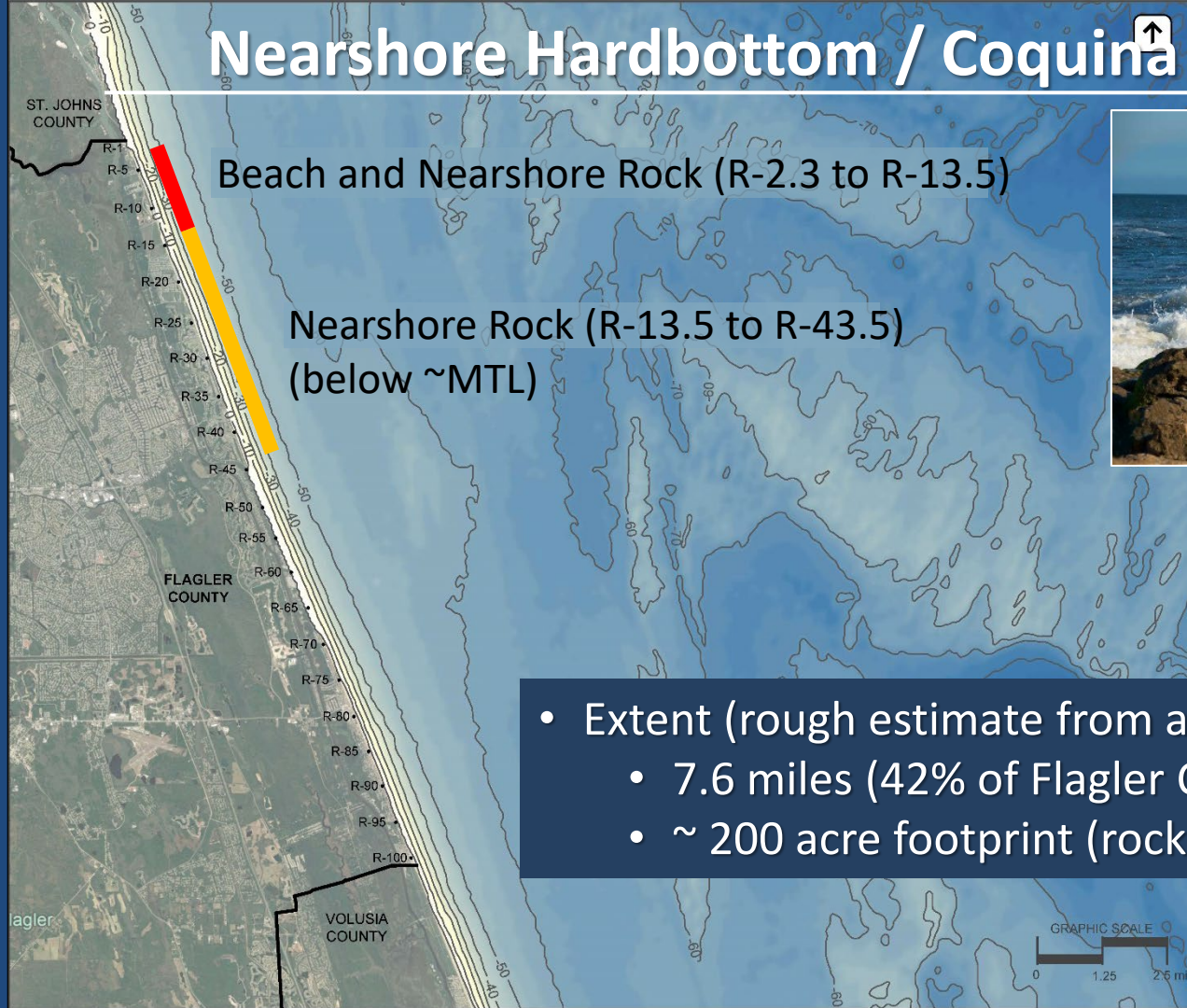
Nearshore Hardbottom / Coquina Rock

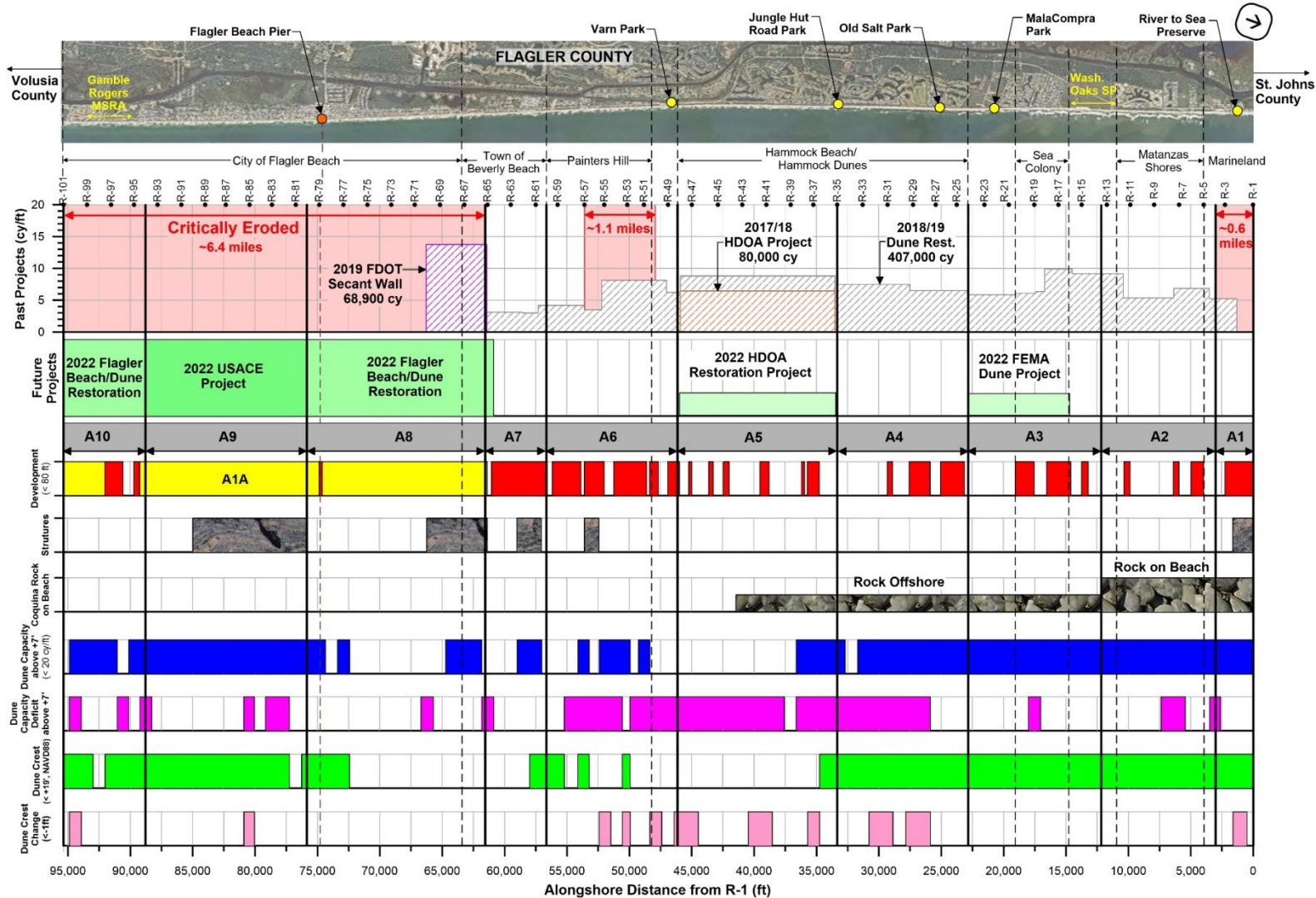


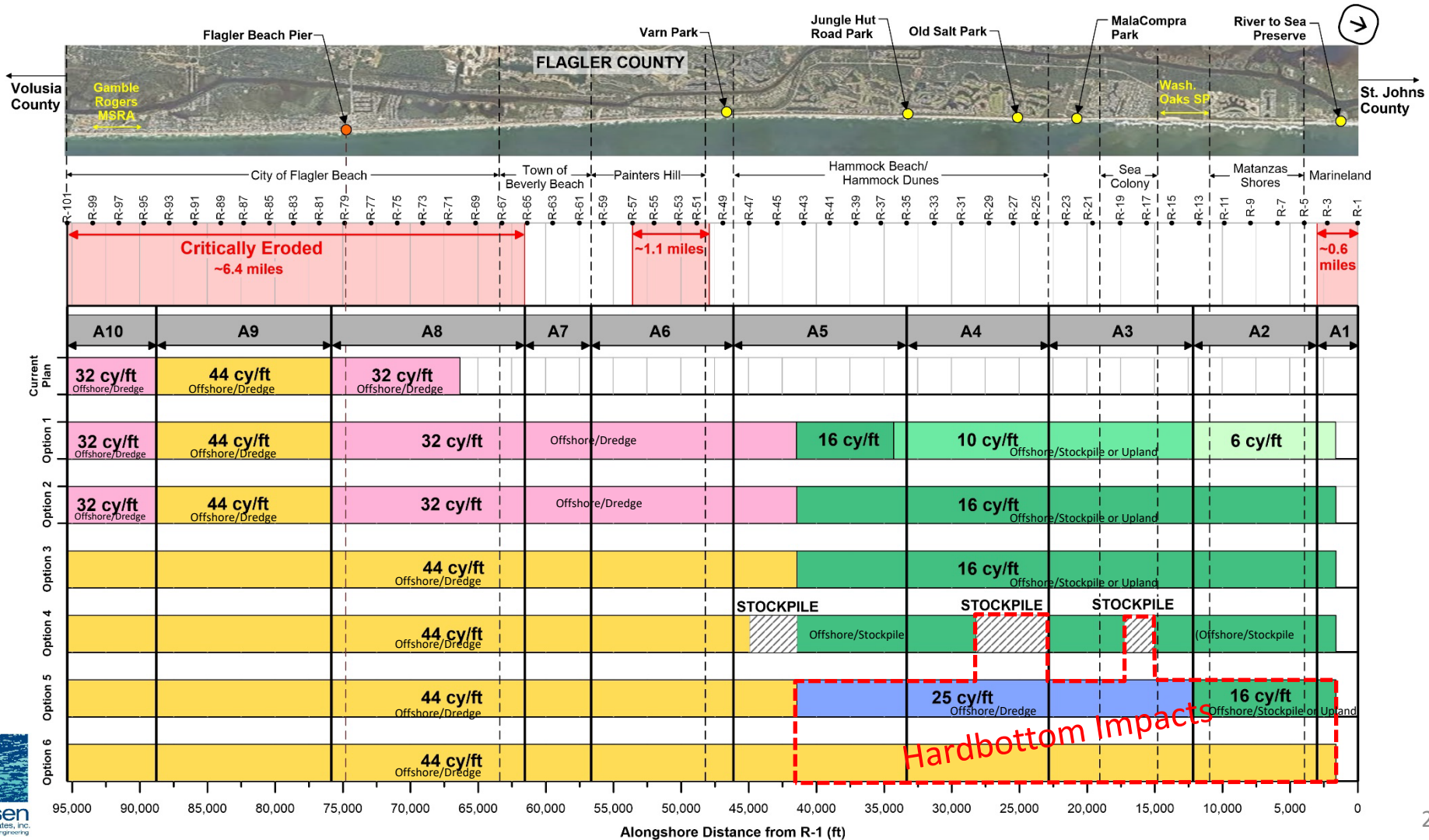
Beach and Nearshore Rock (R-2.3 to R-13.5)

Nearshore Rock (R-13.5 to R-43.5)
(below ~MTL)

- Extent (rough estimate from aerial photos)
 - 7.6 miles (42% of Flagler County)
 - ~ 200 acre footprint (rock and sand)







Sand Requirement

(50-year restoration and maintenance)

	Initial			Future			Total	Total with Intermediate SLR
	Hydraulic Placement	Mechanical Placement	Total	Hydraulic Placement	Mechanical Placement	Total		
1	1,938,000	405,000	2,343,000	1,170,000	150,000	6,930,000	9,273,000	10,782,000
2	1,938,000	643,000	2,581,000	1,170,000	150,000	6,930,000	9,511,000	11,020,000
3	2,398,000	643,000	3,041,000	1,170,000	150,000	6,930,000	9,971,000	11,480,000
4	2,398,000	643,000	3,041,000	1,170,000	562,500	6,930,000	9,971,000	11,480,000
5	3,125,000	178,000	3,303,000	1,588,000	144,500	6,930,000	10,233,000	11,742,000
6	4,165,000	0	4,165,000	1,732,500	0	6,930,000	11,095,000	12,604,000

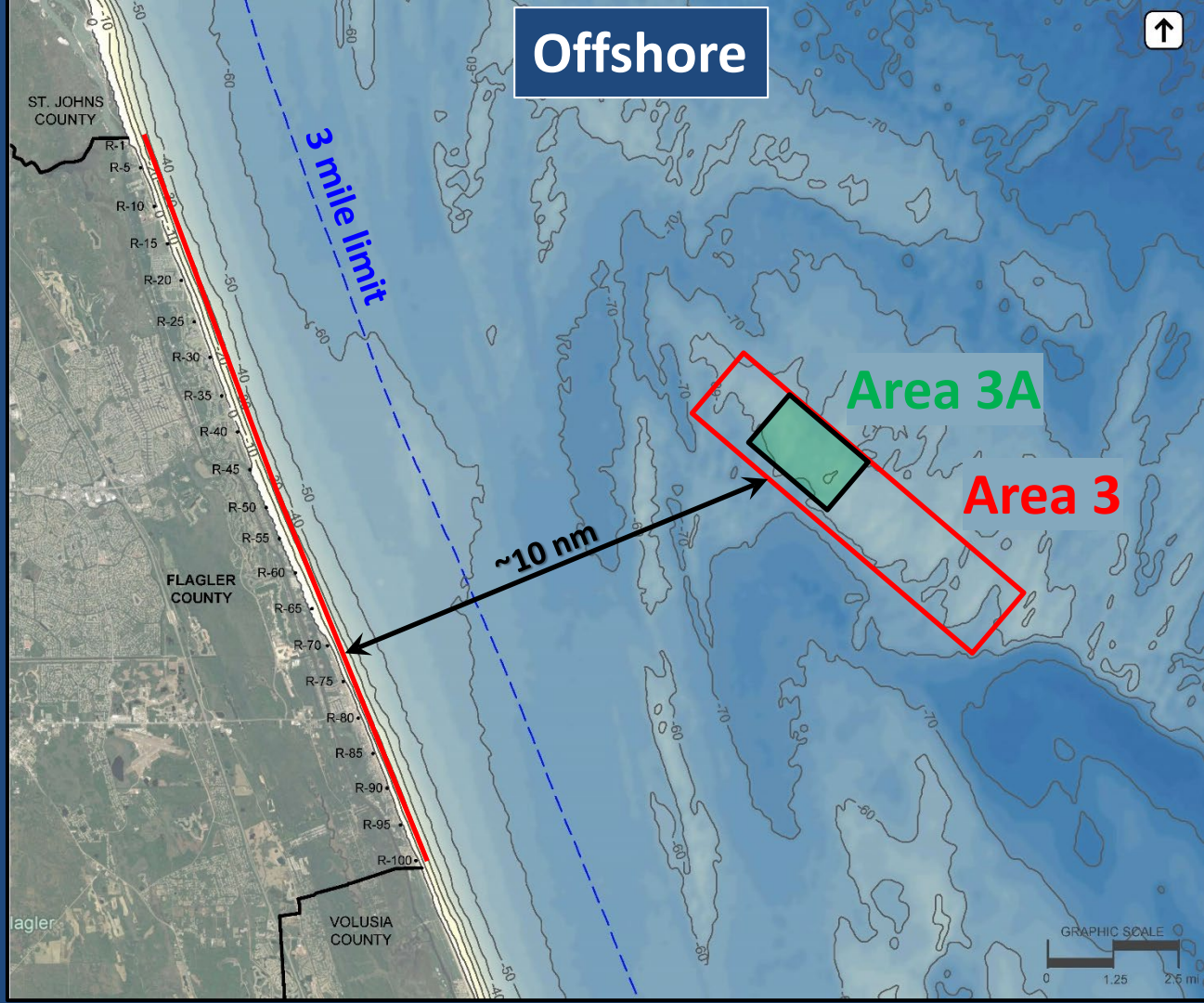
9 to 13 Mcy over 50 years

Sand Sources

- Offshore
 - Upland
- 6 to 8 FDEP approved sources in vicinity

Above -62.5 FT:

- Area 3A = 14.8 Mcy
- Area 3 = 103.9 Mcy



Comparison of Alternative Cost

Option	Construction Cost					Average Annual Equivalent Cost (Planning Period: 50 years - Discount Rate: 3%)				
	Initial Cost	Future Dredge		Future Mechanical		Total	USACE	FDEP	Local	FDOT
			Freq. (yrs)		Freq. (yrs)					
1	\$ 70,481,000	\$ 23,554,300	11	\$ 10,752,500	3	\$ 7,889,000	\$ 724,100.00	\$ 1,260,300.00	\$ 5,471,800.00	\$ 432,800.00
2	\$ 85,592,250	\$ 23,554,300	11	\$ 10,752,500	3	\$ 8,476,300	\$ 724,100.00	\$ 1,314,000.00	\$ 6,005,400.00	\$ 432,800.00
3	\$ 94,792,250	\$ 23,554,300	11	\$ 10,752,500	3	\$ 8,833,900	\$ 724,100.00	\$ 1,361,200.00	\$ 6,315,700.00	\$ 432,800.00
4*	\$ 100,157,514	\$ 23,554,300	11	\$ 38,582,500	11	\$ 8,465,900	\$ 724,100.00	\$ 1,327,000.00	\$ 5,981,900.00	\$ 432,800.00
5**	\$ 128,712,991	\$ 23,554,300	11	\$ 38,582,500	11	\$ 9,575,800	\$ 724,100.00	\$ 1,433,300.00	\$ 6,985,500.00	\$ 432,800.00

Potential Range of Local Share (AA) = ~\$5.5M to \$7.0M / yr
(w/o SLR; minimal to no impacts to beach rock / hardbottom)

Ex: Option 3 - Alongshore Distribution of Local (Non-Federal) Share

Type	Shoreline Length (ft)	Sand Volume (cy)	Total Initial Cost	Percent of Total Initial Cost	Distribution of Average Annual Local Requirement
State Parks ⁽¹⁾	5,980	192,000	\$ 5,304,000.00	7.08%	\$ 447,205.01
Flagler County ⁽²⁾	5,980	134,900	\$ 4,955,500.00	6.62%	\$ 417,821.35
Local Government ⁽³⁾	39,600	1,584,760	\$ 29,317,800.00	39.14%	\$ 2,471,920.65
Private	43,710	1,099,000	\$ 35,329,000.00	47.16%	\$ 2,978,752.99
Total	95,270	3,010,660	\$ 74,906,300.00	100.00%	\$ 6,315,700.00

(1) Washington Oaks SP and GRMSRA

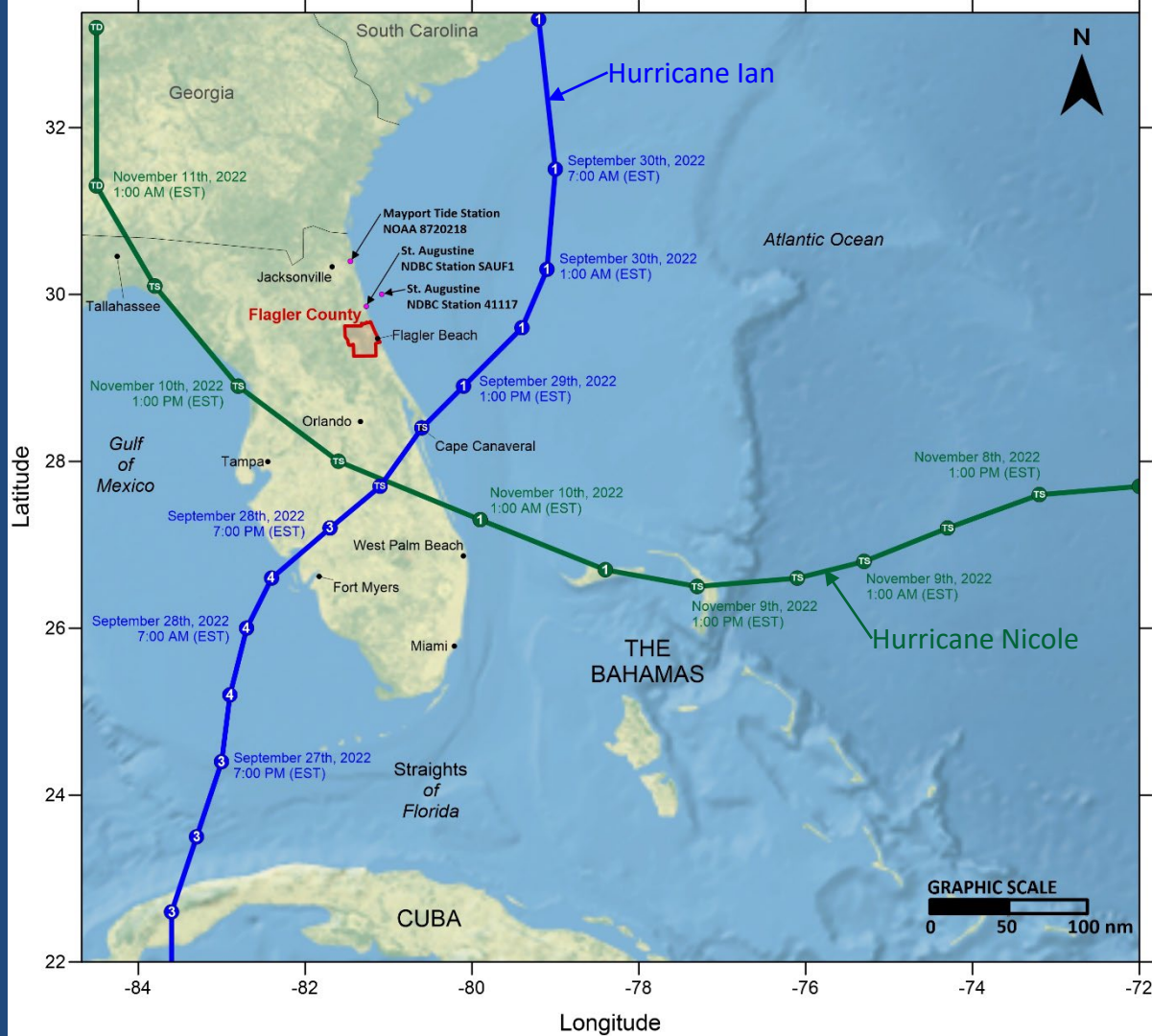
(2) Flagler County control shorefront (County parks)

(3) Town of Marineland, Town of Beverly Beach, and City of Flagler Beach

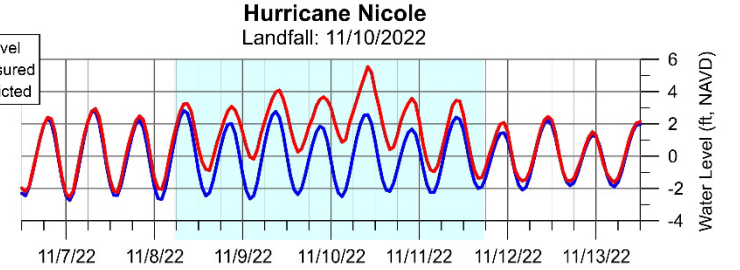
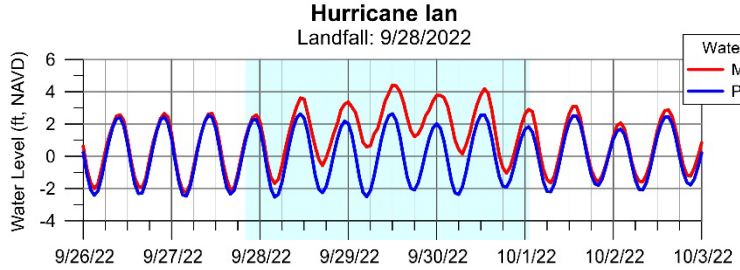
(4) Distribution of local share can be based upon "Total Cost", "Shoreline Length", "Volume of Sand Placed", etc...

Current Activities...

- Evaluating scope of Preferred Plan / Approach
- Developing Administrative Strategy for Project Implementation and Management
- Studying feasible options for long-term local funding source
- Evaluating feasibility of scope expansion of USACE project and extent of shoreline eligible for FDEP Funding Assistance (any increase will reduce local contribution)
- **Restoring Ian and Nicole Damage**



Water Levels:
 → Mayport
 Wind/Waves:
 → St. Augustine



9/26/22 9/27/22 9/28/22 9/29/22 9/30/22 10/1/22 10/2/22 10/3/22

11/7/22 11/8/22 11/9/22 11/10/22 11/11/22 11/12/22 11/13/22

9/26/22 9/27/22 9/28/22 9/29/22 9/30/22 10/1/22 10/2/22 10/3/22

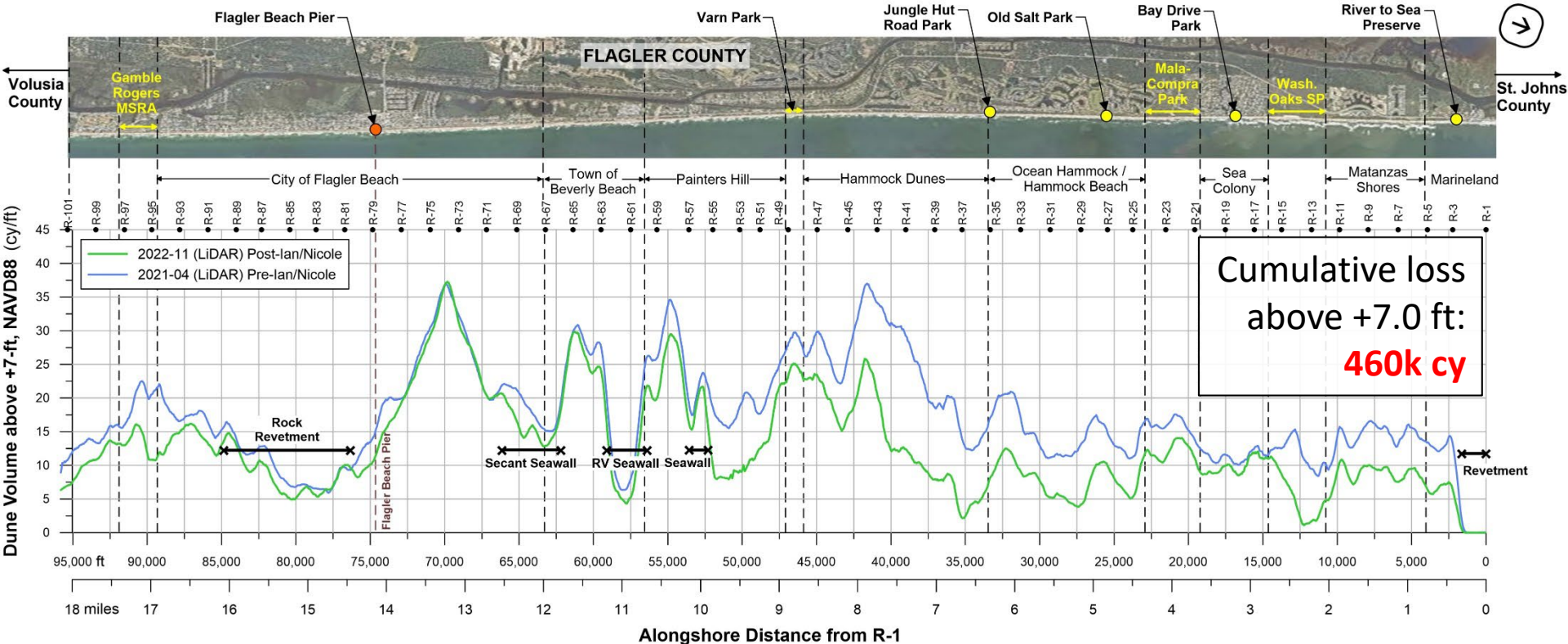
11/7/22 11/8/22 11/9/22 11/10/22 11/11/22 11/12/22 11/13/22

9/26/22 9/27/22 9/28/22 9/29/22 9/30/22 10/1/22 10/2/22 10/3/22

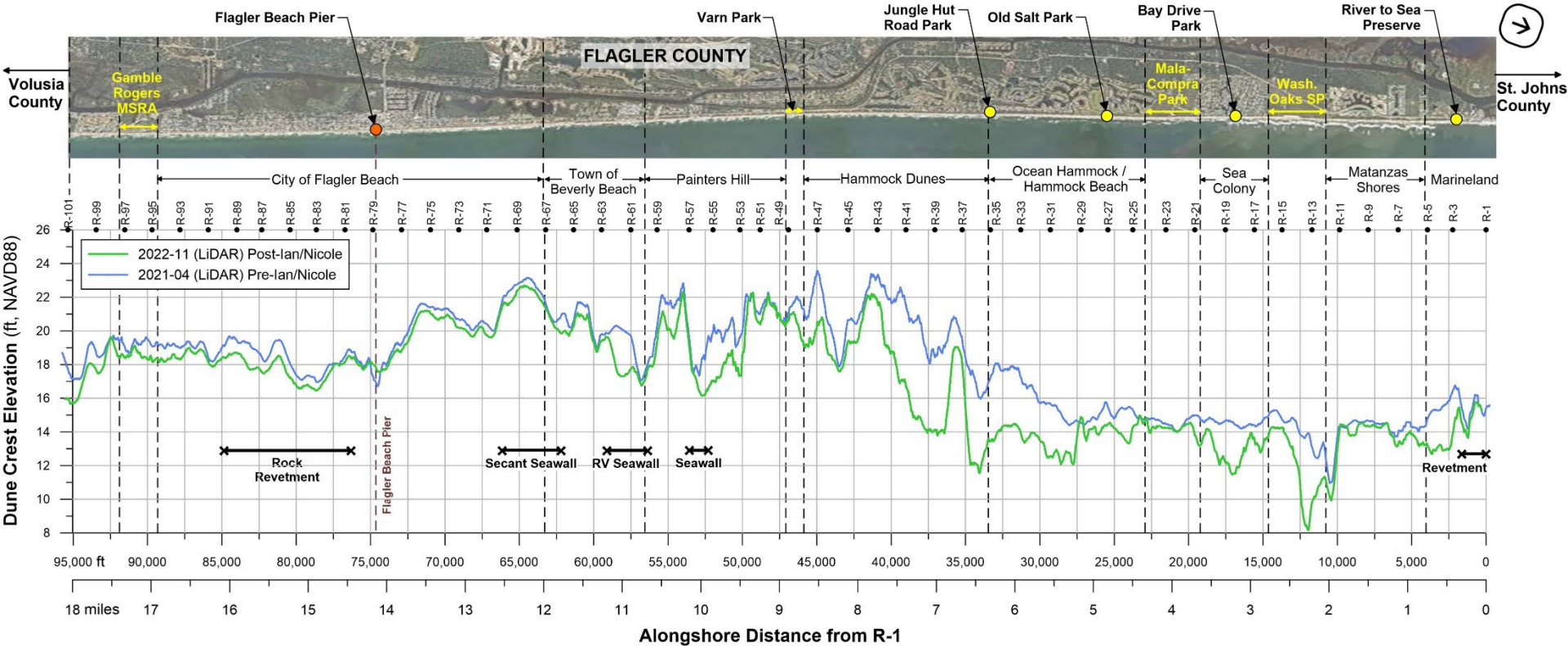
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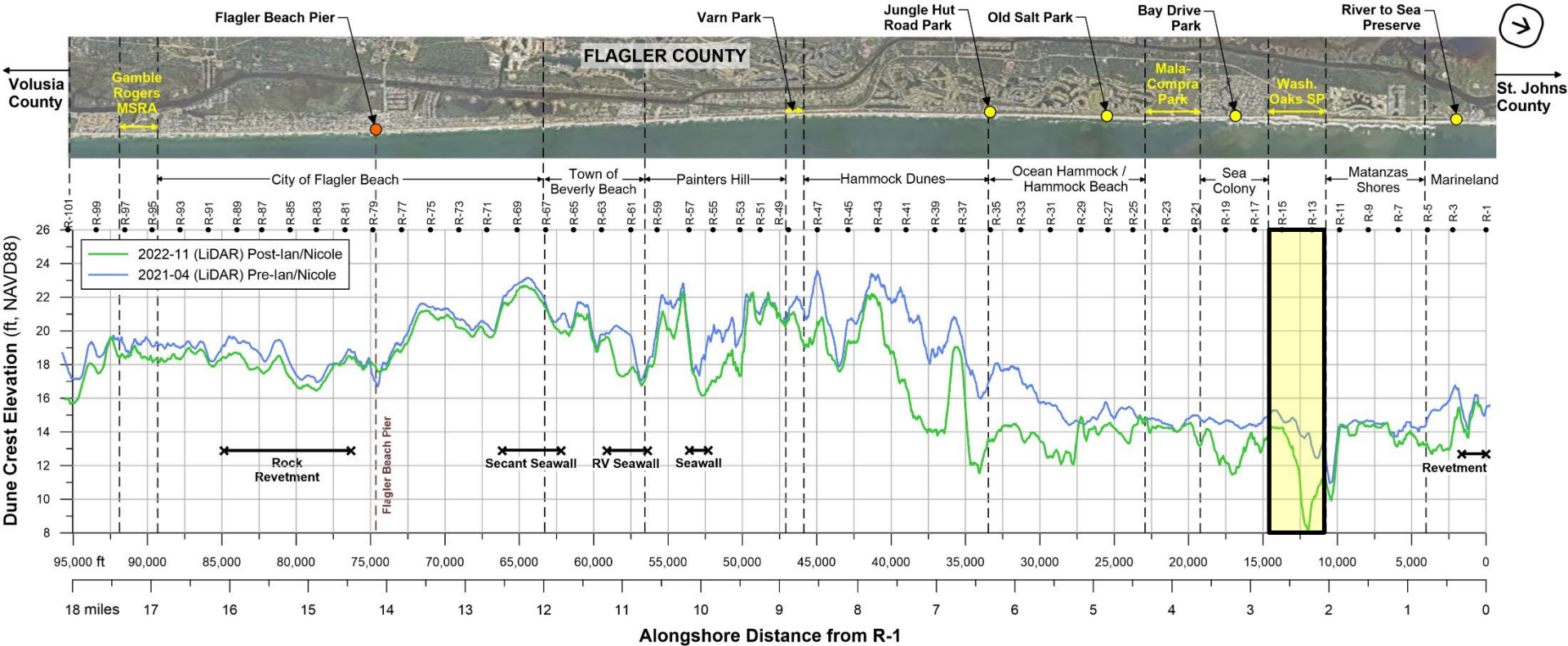
Dune Volume Change



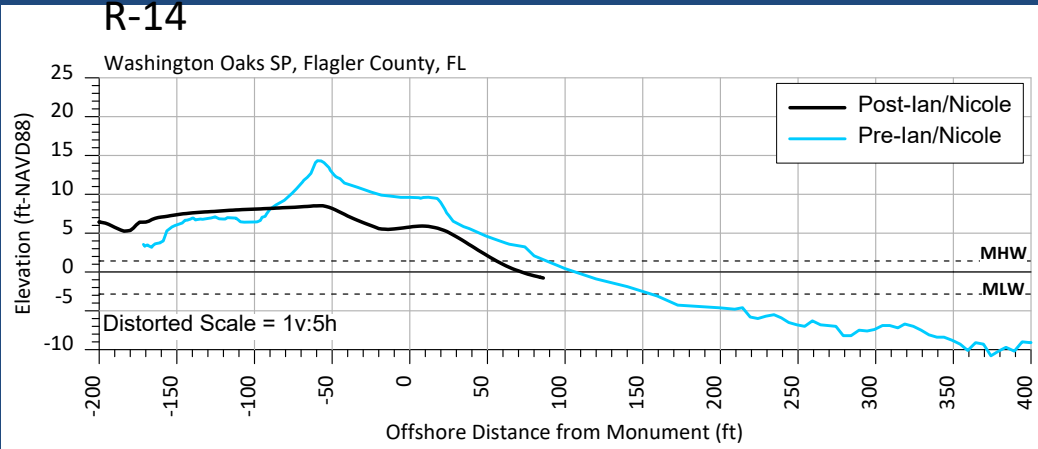
Dune Crest Elevation



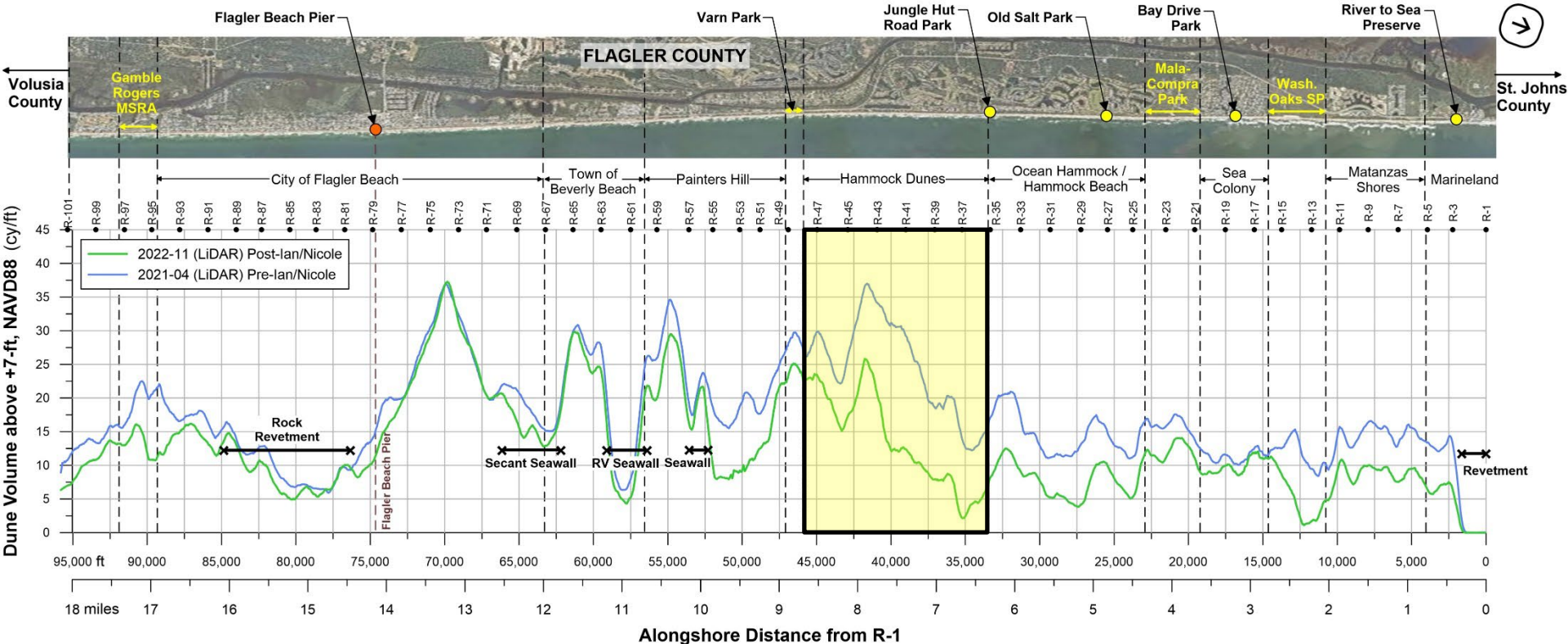
Dune Crest Elevation



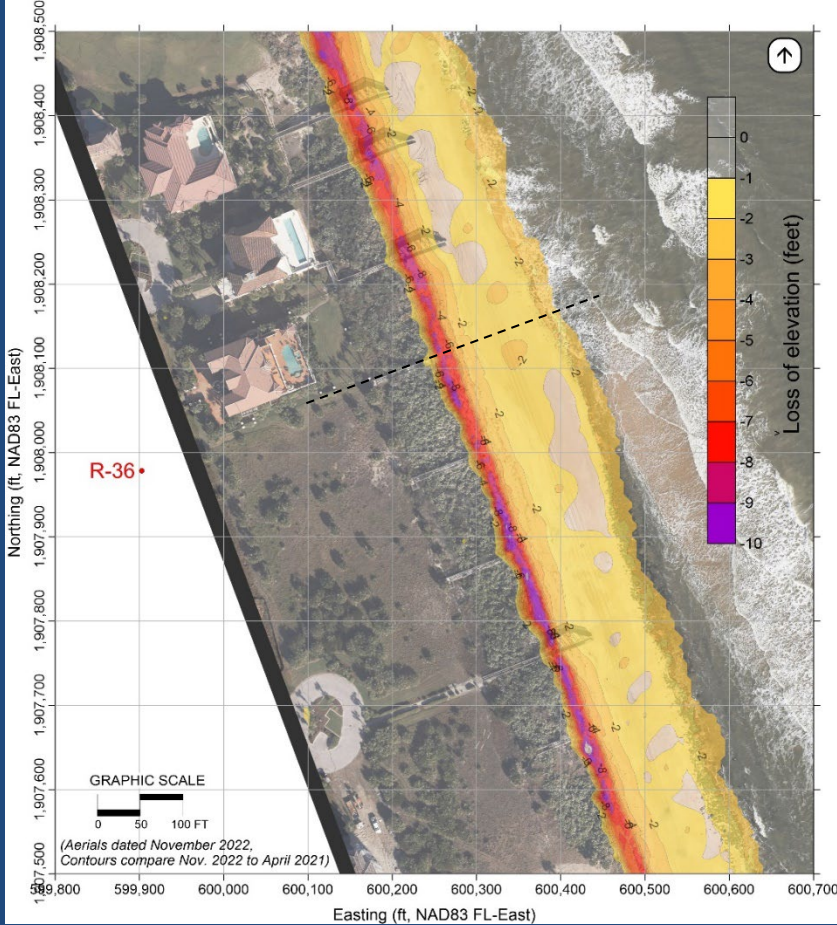
Washington Oaks State Park, Flagler County



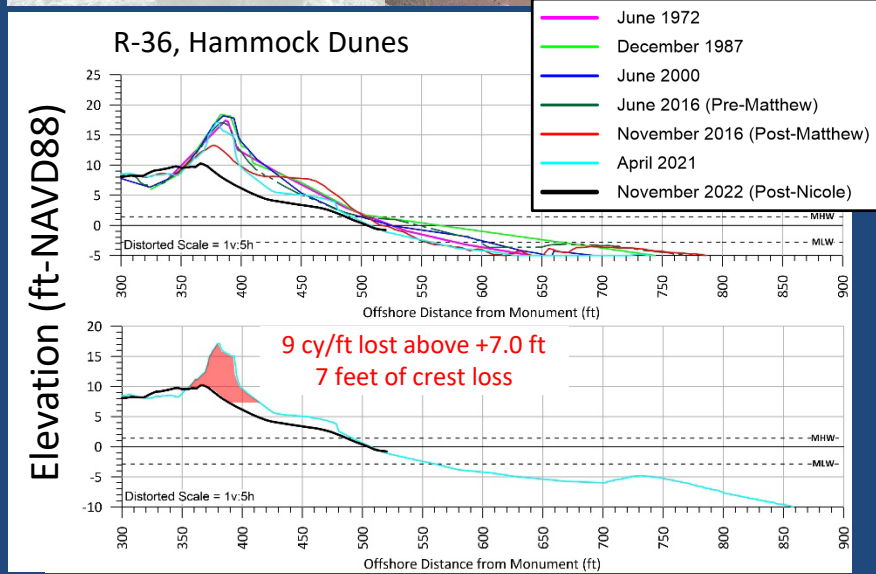
Dune Volume Change



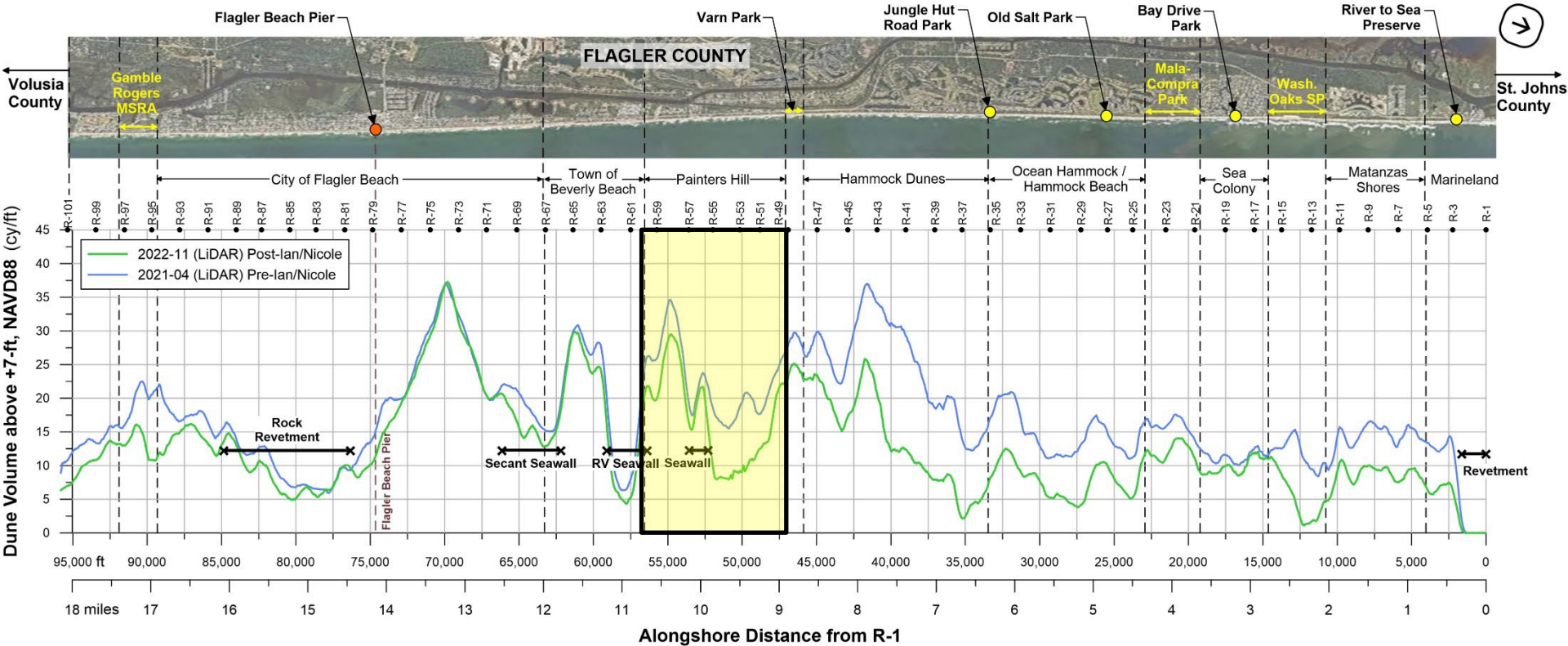
Hammock Dunes (R-36)



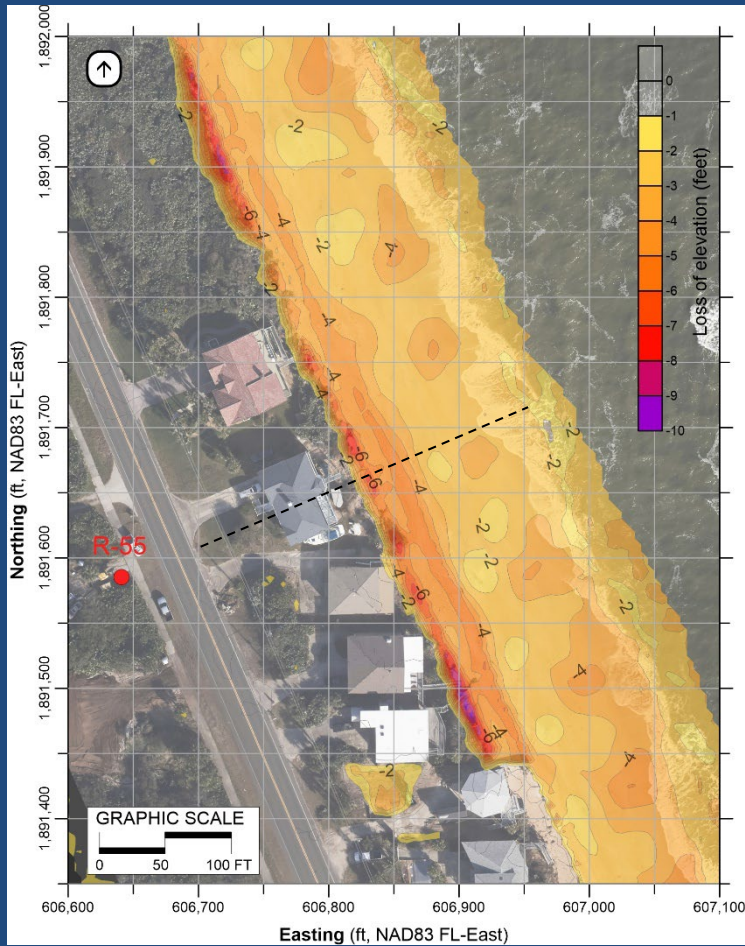
Post-Hurricane Nicole
(image date: 11/17/2022)



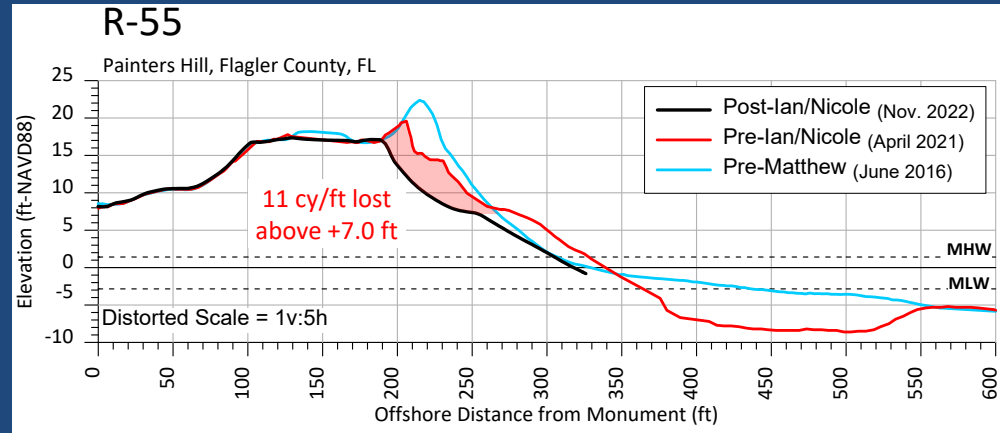
Dune Volume Change



Painters Hill (R-55)

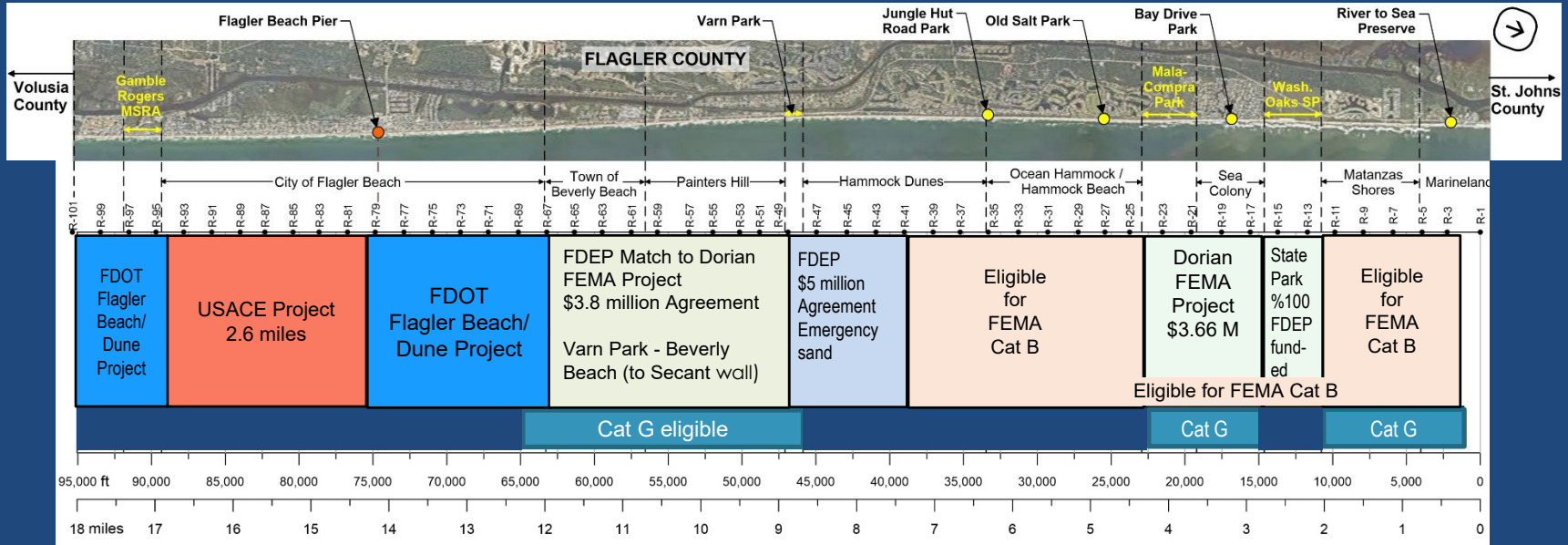


Post-Hurricane Nicole
(image date: 11/11/2022)



Overview of funded and potentially funded projects in Flagler County

Some projects are still pending - Work in Progress



- Grand total of 473,000 CY truck-hauled sand in the northern 11.4 miles after Hurricanes Ian and Nicole
- Estimated funding = \$64 million for all projects approved and under review along the county-maintained shoreline



Flagler County, FL Beach Management

Thank you!

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