



TAYLOR ENGINEERING, INC.

County-Wide Baseline Coastal Analysis and Coastal Resilience Planning for Sarasota County

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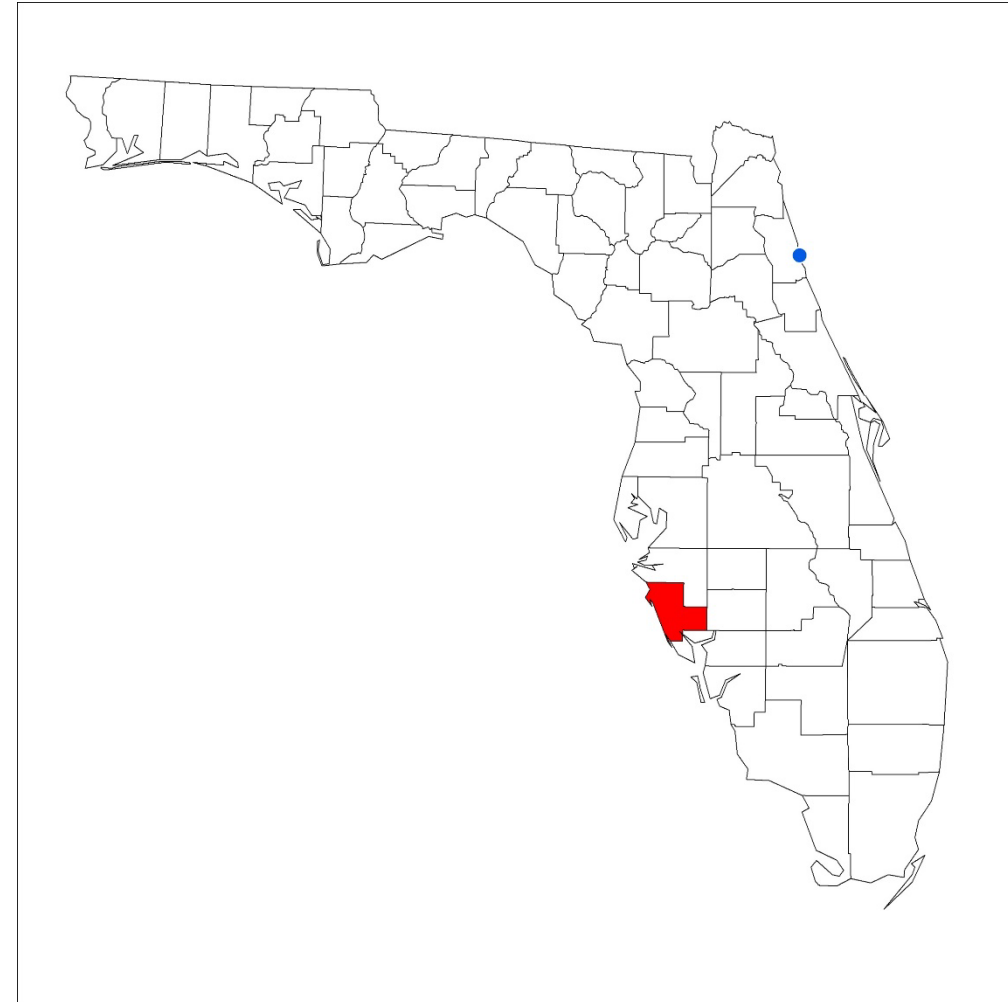
Work Plan and Funding

- Study funded by FL Resilient Coastlines Program (FRCP)
 - Grant for Resilience Planning
- Work plan tasks:
 1. Research Current Shoreline Management Approaches
 2. Conduct a Baseline Coastal Conditions Assessment
 3. Evaluate Coastal Infrastructure for Vulnerability to SLR
 4. Executive Summary of Results
 5. Public Outreach



Study Area– Sarasota County

- 37 mi of Gulf facing shoreline
 - 25 mi critically eroded (68%)
 - 14 mi actively managed (38%)
- Overview of Sarasota County Beaches
 - Focus on beaches that are not “actively managed”
 - Examine the erosion history and current beach width
 - Although the primary focus of the study was on beaches that have not been nourished, this study provided an overview of the county’s beach nourishment projects
 - Understand the impacts the projects have on adjacent shorelines and their historic performance



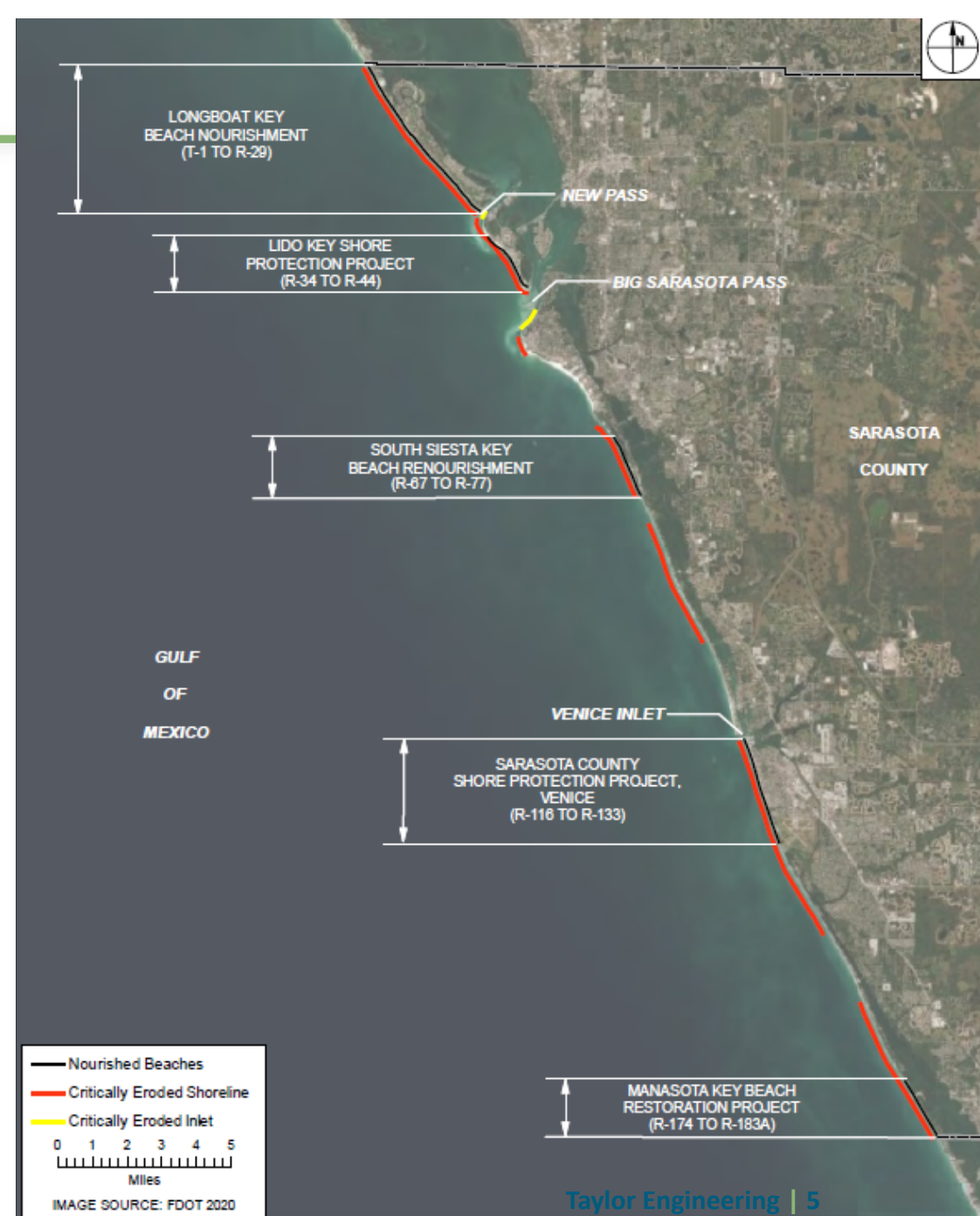
Beach Reaches

- Step 1: establish beach reaches
 - 18 beach reaches
 - 6 reaches are “actively managed”
- “Actively Managed Beach”
 - defined as a beach that has a sustained history of beach nourishment
- 16.8 million cubic yards placed in history of Sarasota County nourishment projects
 - Nourishment history and actively managed beach performance informs overall understanding of adjacent shoreline conditions

Beach Reach	R-monuments
<i>Longboat Key Beach Nourishment Project</i>	<i>T-1 to R-29</i>
Lido Key	R-30 to R-33
<i>Lido Key Shore Protection Project</i>	<i>R-34 to R-44</i>
Big Sarasota Pass South Bank	R-44A to R-44D
Siesta Key	R-45 to R-61A
Point O’ Rocks	R-62 to R-66
<i>South Siesta Key Beach Renourishment Project</i>	<i>R-67 to R-77</i>
South Siesta Key	R-78
North Casey Key	R-79 to R-88
Casey Key	R-89 to R-114
Venice Inlet	R-115
<i>Sarasota County Shore Protection Project Venice Segment</i>	<i>R-116 to R-133</i>
South Venice	R-134 to R-135
Caspersen Beach	R-136 to T-145
Manasota Key	R-146 to R-173
<i>Manasota Key Beach Restoration Project Segment 1</i>	<i>R-174 to R-177</i>
Manasota Key South	R-178 to R-180
<i>Manasota Key Beach Restoration Project Segment 2</i>	<i>R-181 to R-183A</i>
<i>*Italics indicate a beach defined as actively managed per this study</i>	

Beach Reaches– Actively Managed

- Nourishment history and actively managed beach performance informs overall understanding of adjacent shoreline conditions
- 5 ongoing beach nourishment project
- 16.8 million cubic yards placed



Beach Reaches– Actively Managed

- **Longboat Key Beach Nourishment**

- T-1 to R-29
- 20 nourishment events placing 7.5 million cubic yards, initial nourishment in 1993
- Sand sourced from New Pass, Longboat Pass, offshore, and upland

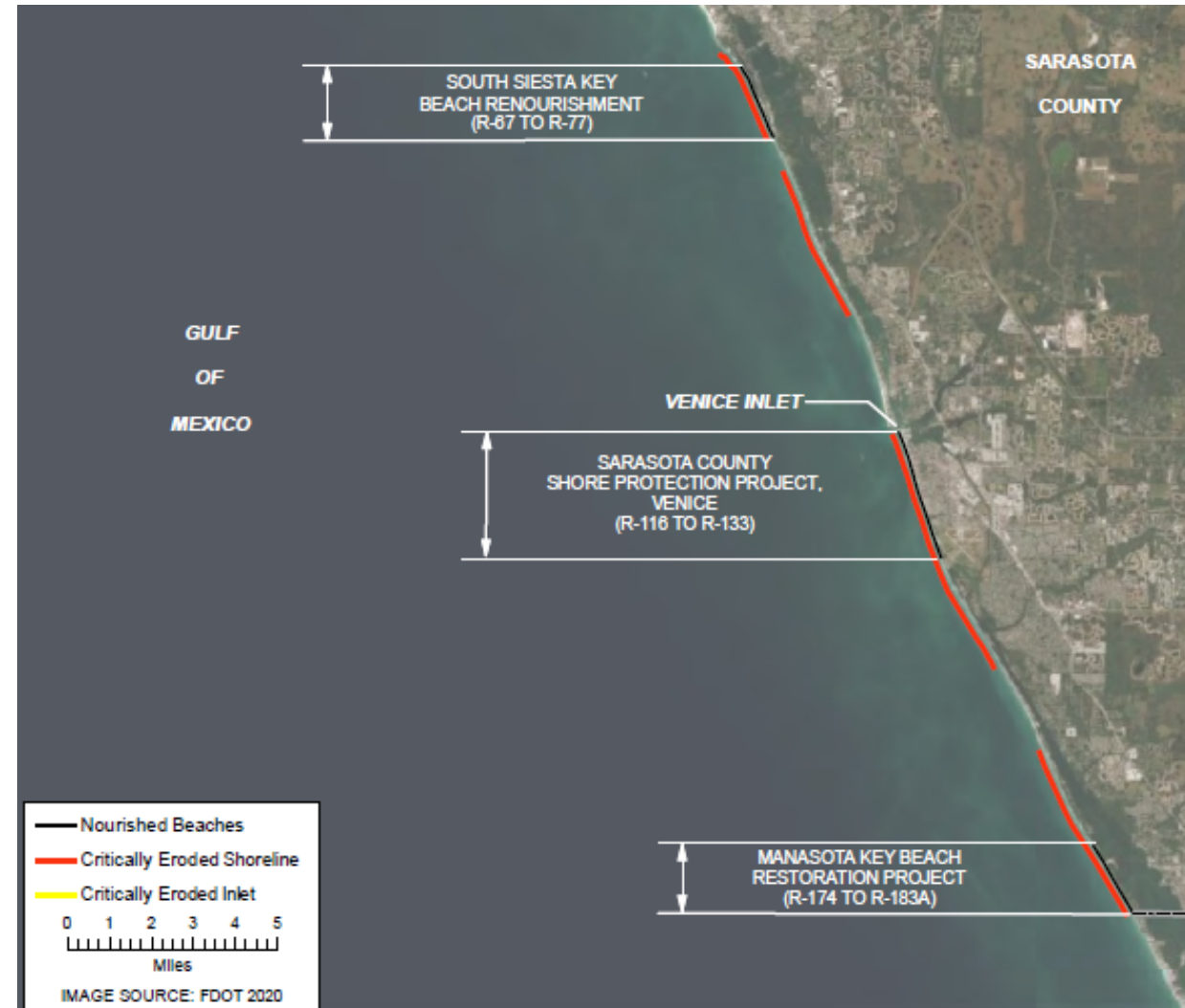
- **Lido Key Shore Protection Project**

- R-34 to R-44
- 15 nourishment events placing 4.2 million cubic yards, initial nourishment in 1964
- Sand sourced from New Pass, Big Pass, offshore, and upland

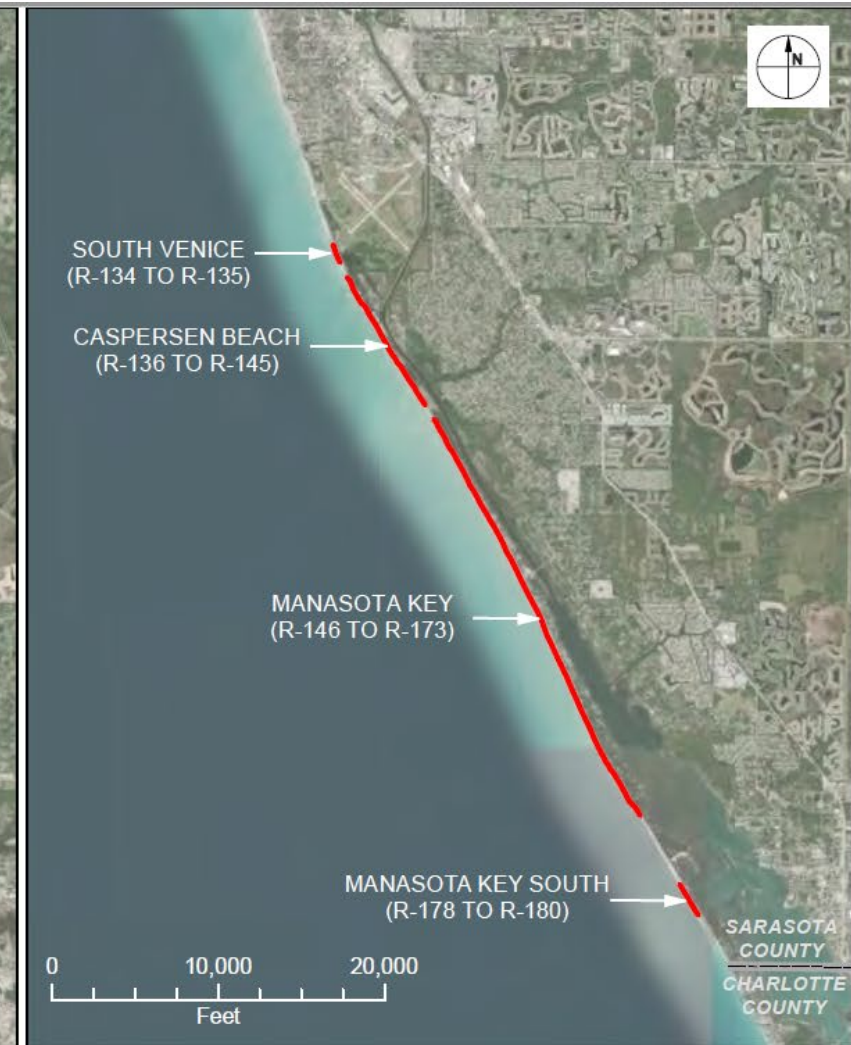
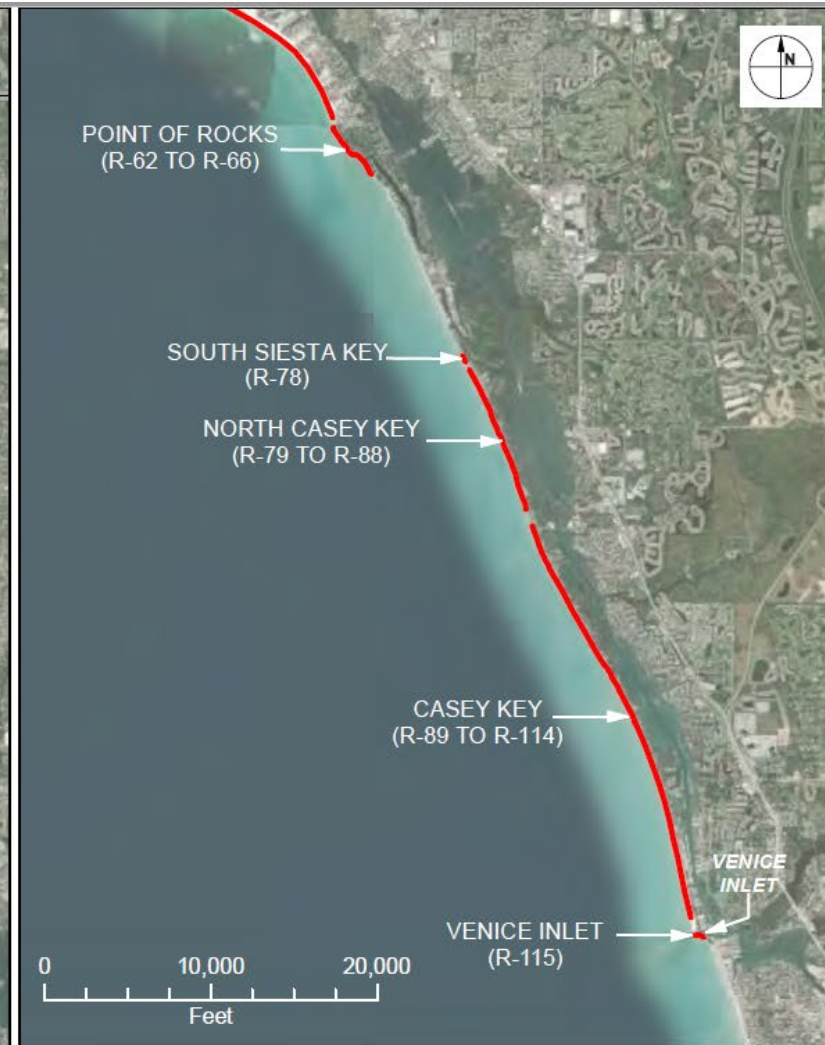
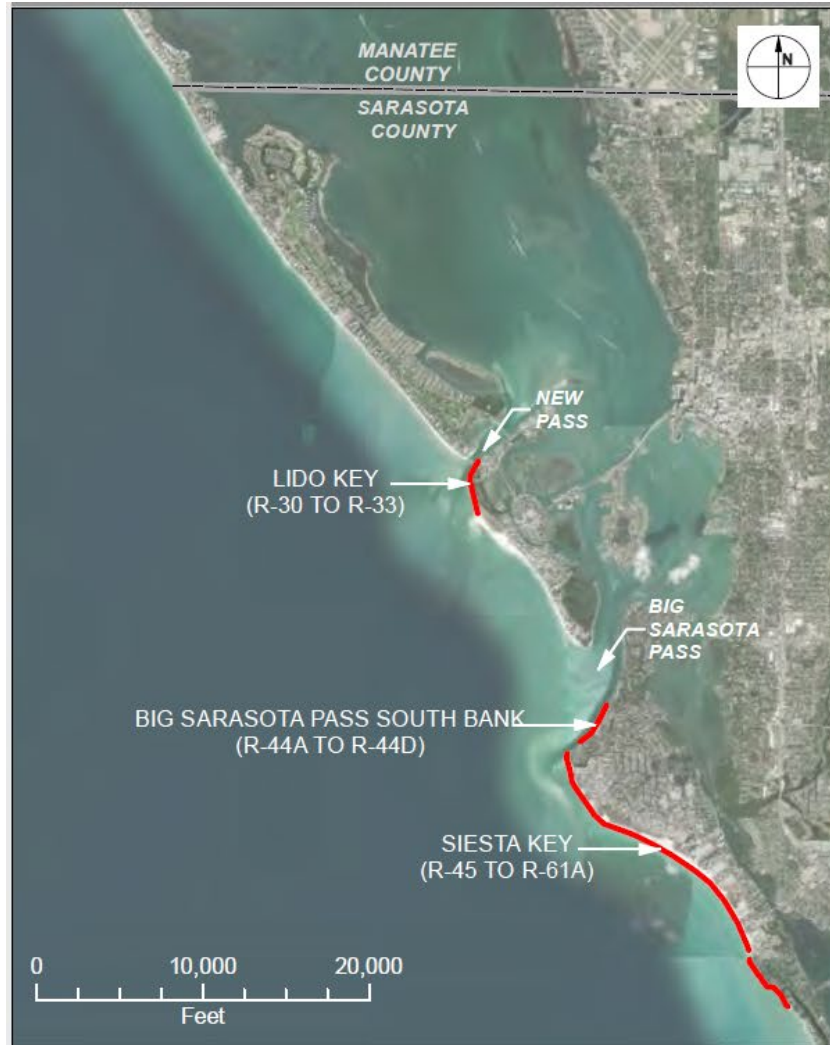


Beach Reaches– Actively Managed

- **South Siesta Beach Nourishment Project**
 - R-67 to R-77
 - 2 nourishment events placing 1.6 million cubic yards, initial nourishment in 2007
 - Sand sourced from offshore
- **Sarasota County SPP – Venice Beach**
 - R-116 to R-133
 - 3 nourishment events placing 3.3 million cubic yards, initial nourishment in 1994
 - Sand sourced from offshore
- **Manasota Key Restoration Project**
 - R-174 to R-177; R181 to R-183A
 - 1 nourishment event, 0.3 million cubic yards, initial nourishment in 2020
 - Sand sourced from offshore



Beach Reaches– Not “Actively Managed”



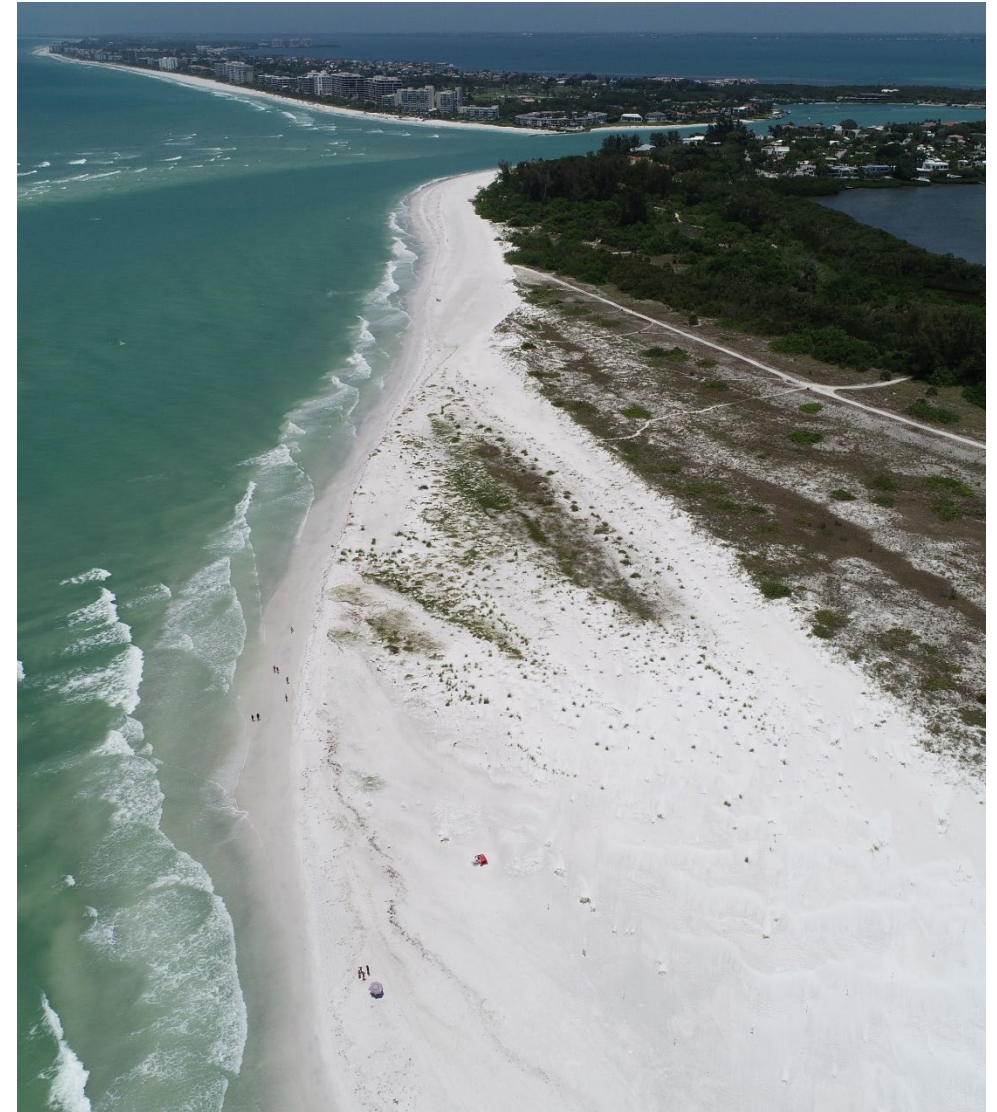
Beach Condition Assessment

Mean High Water Shoreline Position

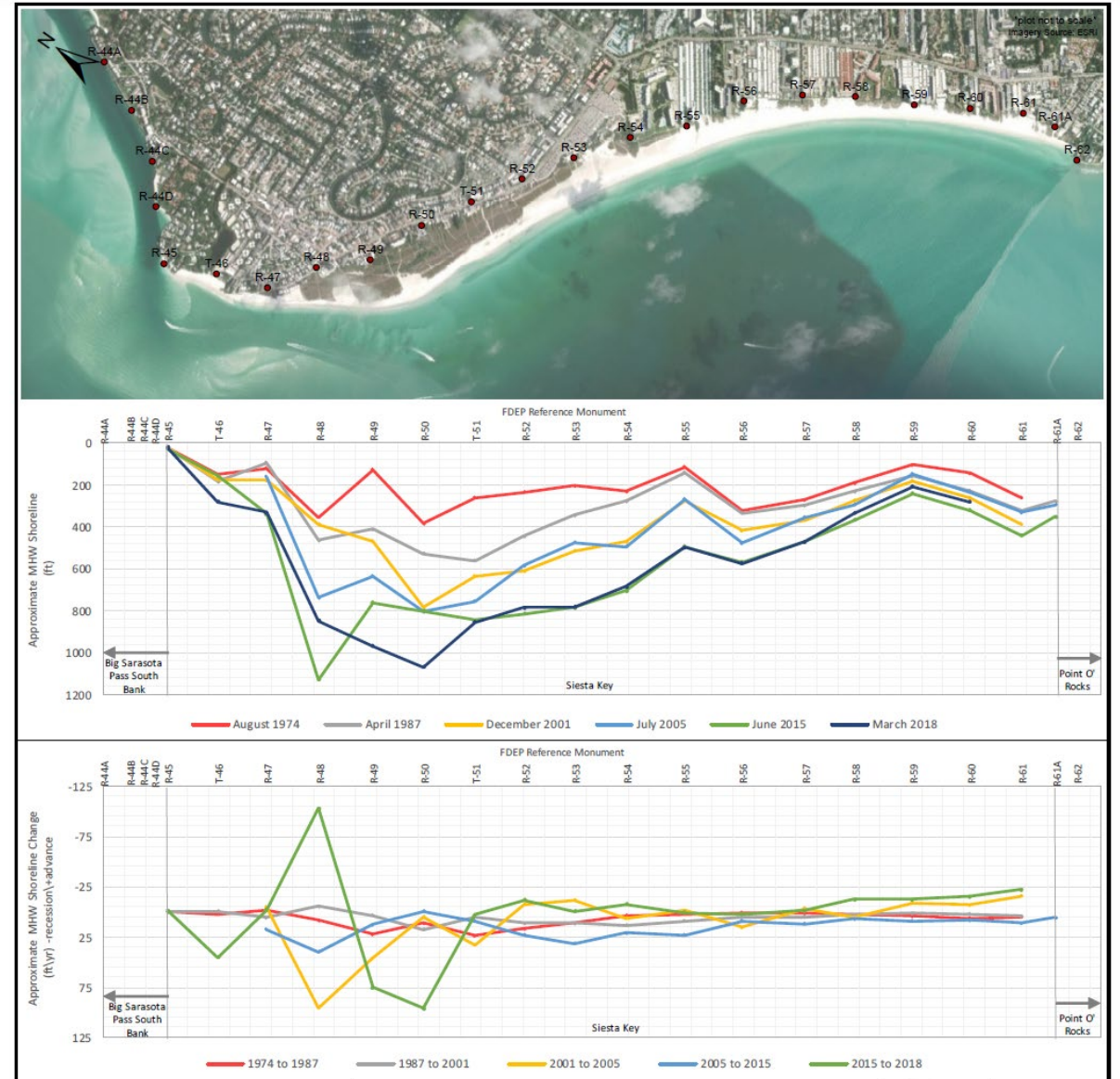
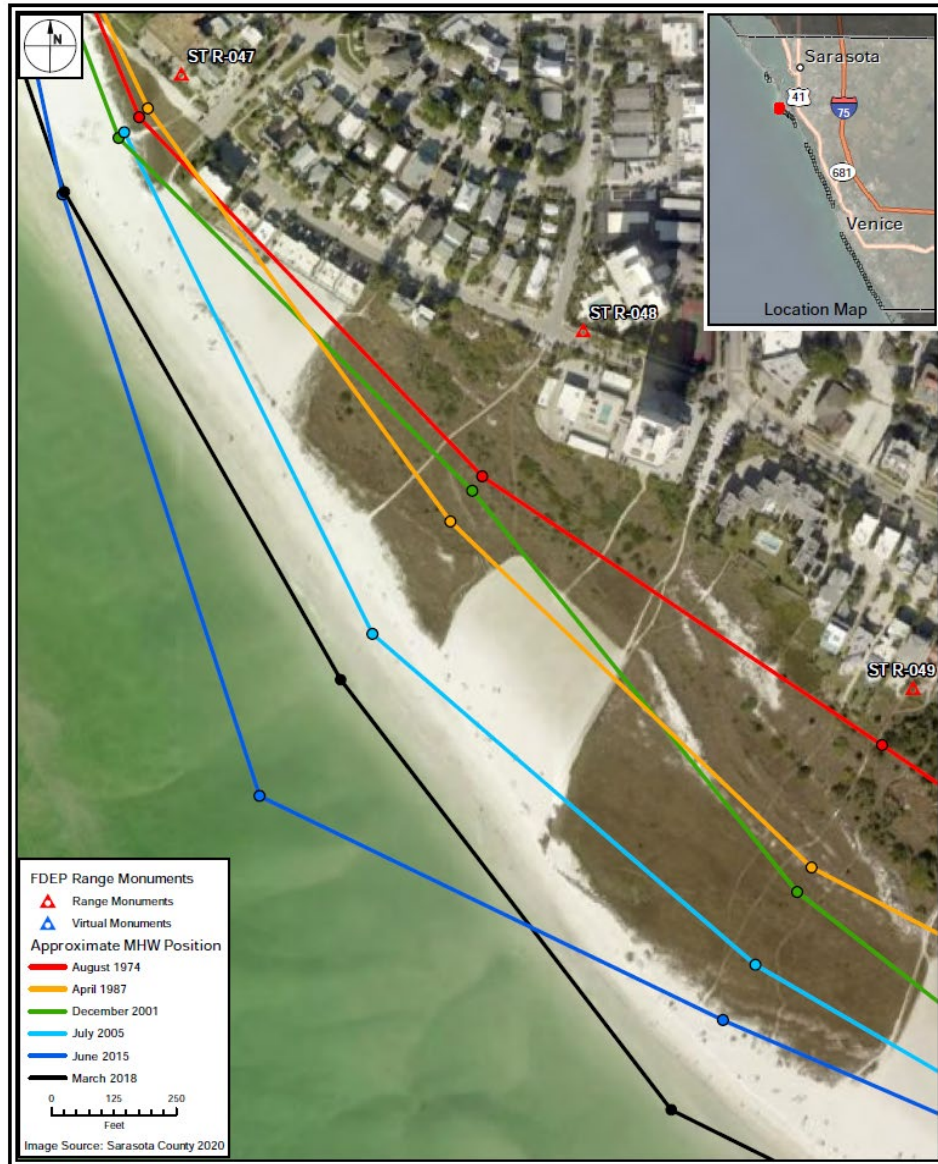
- MHW elevations vary throughout the County
 - +0.30 ft NAVD88 to +0.54 ft NAVD88
- 6 datasets available that provided >90% survey coverage along the County's not "actively managed" beaches (1974, 1987, 2001, 2005, 2015, 2018)

Available Beach Width

- Dry sandy beach berm that exists to buffer the effects of storms— "recreational beach"
- Available beach width defined as distance from derived baseline to the approximate MHW position
- Baseline delineated using the Sarasota County 2020 aerial imagery
 - edge of vegetation, shoreline armoring, dune feature, or infrastructure
- Focus on data from 2015, 2018, and 2020 due to significant shoreline recession observed in the MHW analysis



Beach Condition Assessment Example– Siesta Key



Beach Condition Assessment– Summary and Conclusions

- Increased shoreline recession between 2015-2018
 - Continued into 2020 with the beach width analysis
 - Likely due to the cumulative effect of several storm systems in a short period of time
- Caspersen Beach experienced consistent shoreline retreat and is extremely narrow and deflated
- Monitor the evolution of fill from the nourished portion of Manasota Key to the adjacent shorelines
- Continue to monitor the influence of New Pass on the northern portion of Lido Key
- In comparison to the County's other beaches, Siesta Key provides storm protection benefits, however berm elevations are lower than other beach segments
- Suggest adopting regionally-focused, long-term beach monitoring plan to better monitor the impact of storms and dispersion of fill from actively managed beaches

FRCP Planning Guidance



Florida Adaptation Planning Guidebook



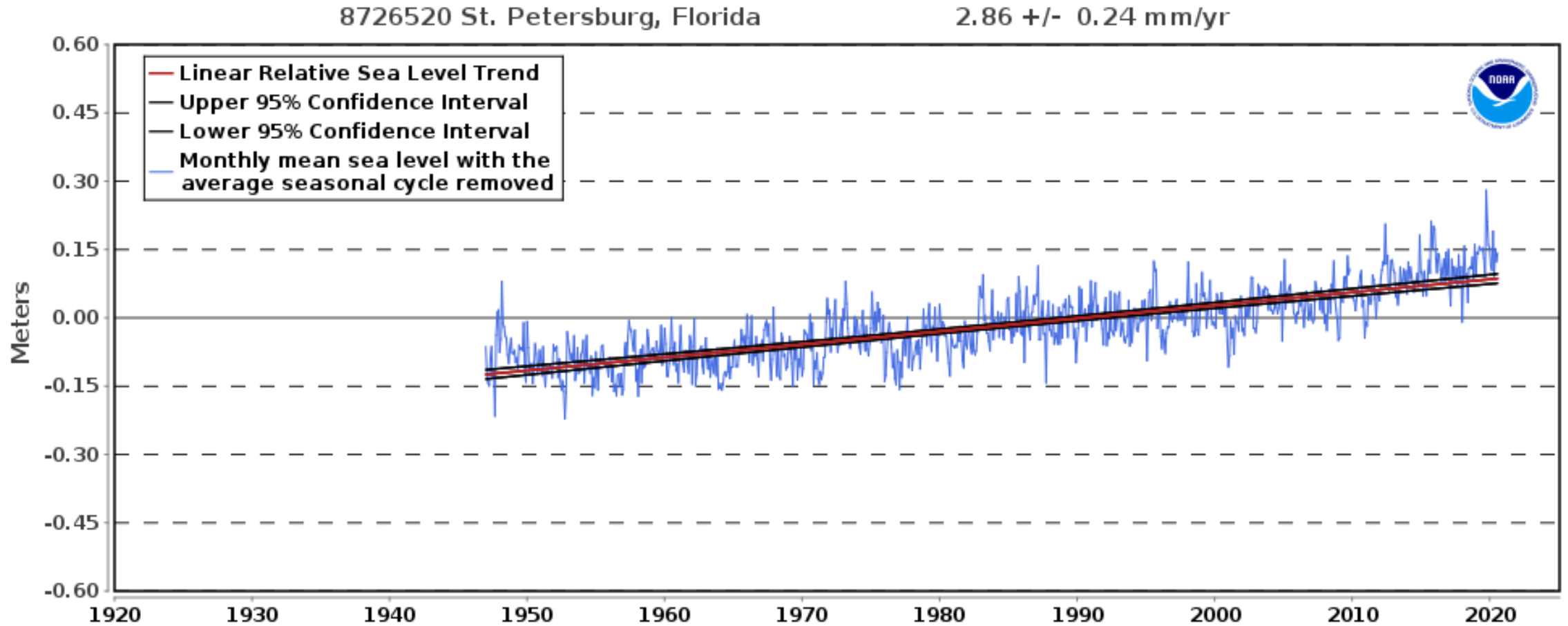
Source: floridadep.gov/ResilientCoastlines

Adaptation Planning Process



Source: Florida Adaptation Planning Guidebook

Sea Level Trend

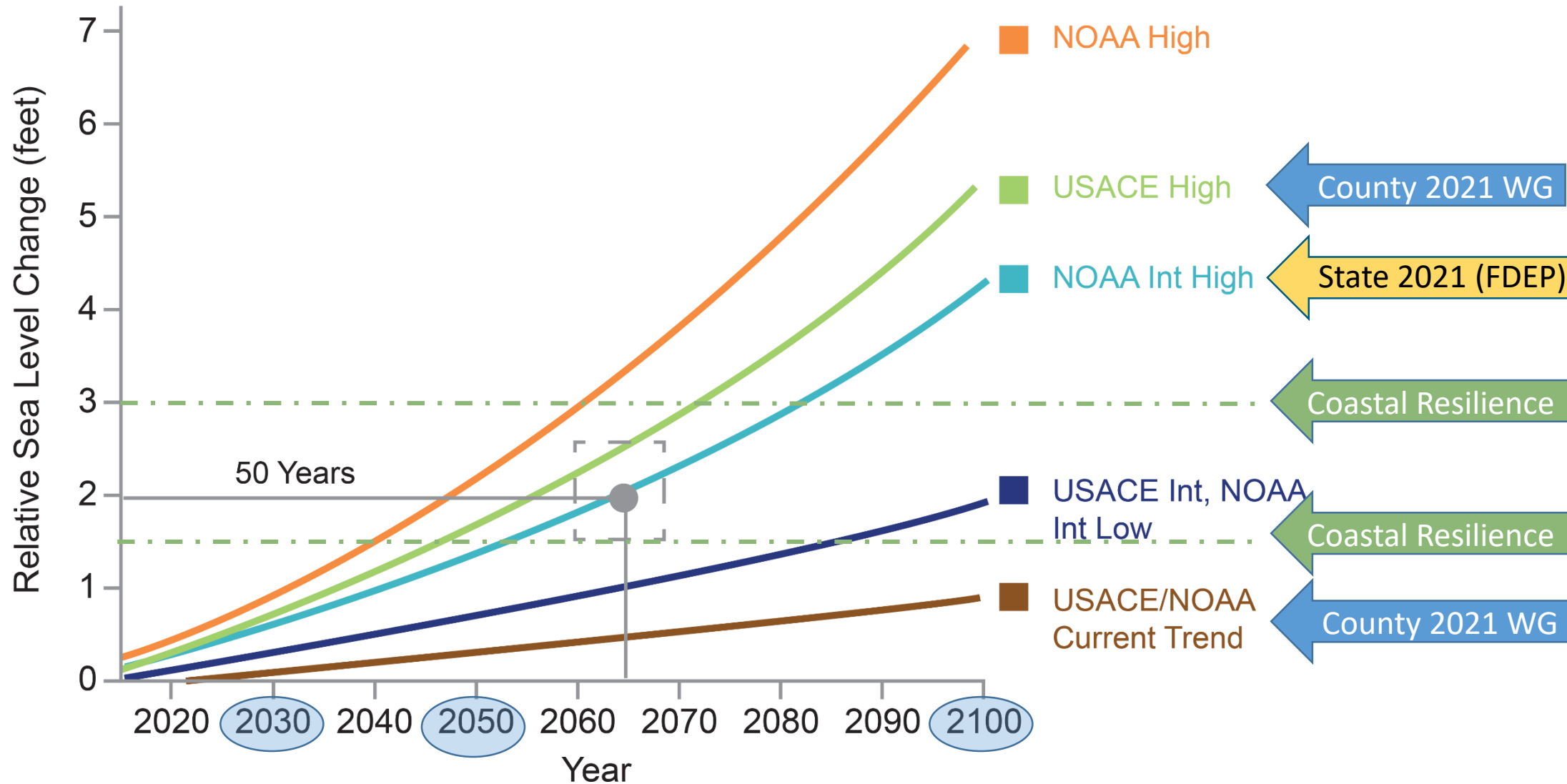


- Data at the St Petersburg NOAA Tide Gauge has been collected continuously since 1947
- This historic data shows a trend of about ~1 ft of rise over 100 yrs
- Global SLR is ~ 3mm per year, similar to this

Sea Level Projections Used in Other Local Studies

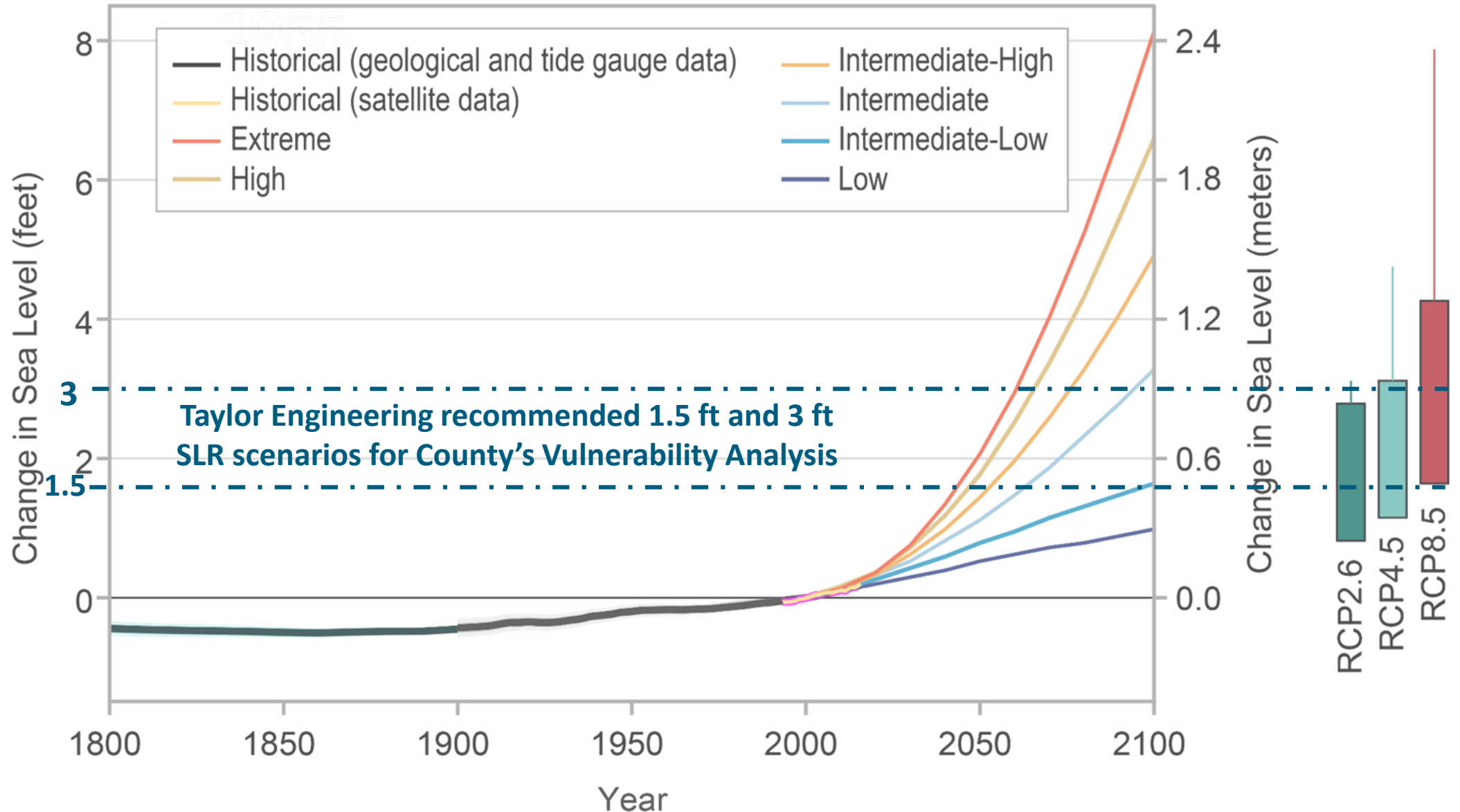
- Sarasota County Post Disaster Redevelopment Plan (2015)
 - Mapped 1 to 4 ft of sea level rise and a Category 1 storm surge
- City of Sarasota Climate Adaptation Plan (2017)
 - Studied 1 ft, 2 ft, 4 ft, and 6 ft of sea level rise above current MSL
 - Estimated 1 ft to 1.5 ft increase of sea level by 2050 (NOAA Low to NOAA Intermediate)
- Tampa Bay Regional Planning Council's Climate Science Advisory Panel (2019)
 - Estimates 1 ft to 2.5 feet by 2050 and 2 to 8.5 feet by 2100
 - Recommended using NOAA Intermediate and High scenarios as most likely
- Tampa Bay Transportation Pilot - US DOT Federal Highway Administration (2020)
 - Recommended using NOAA Intermediate-Low scenario at 2045
- Sarasota County Sea Level Rise Working Group (2021)
 - Assessed facilities at USACE Low and High sea level rise scenarios at 2030, 2050, 2100
- SW FL Regional Planning Council Climate Planning - Florida Gulf Coast University
 - (ongoing - due in 2021)

Comparison of USACE and NOAA Sea Level Projections



Source: Fourth National Climate Assessment (2018)

Global Mean Sea Level Trends and Projections



Source: Fourth National Climate Assessment (2018) and IPCC AR5 (2013)

Probabilities of Occurrence of NOAA SLR Scenarios

Sea Level Rise Scenario	RCP2.6	RCP4.5	RCP8.5
Low (0.3m)	94%	98%	100%
Intermediate-Low (0.5m)	49%	73%	96%
Intermediate (1m)	2%	3%	17%
Intermediate-High (1.5m)	0.4%	0.5%	1.3%
High (2m)	0.1%	0.1%	0.3%
Extreme (2.5m)	0.05%	0.05%	0.1%

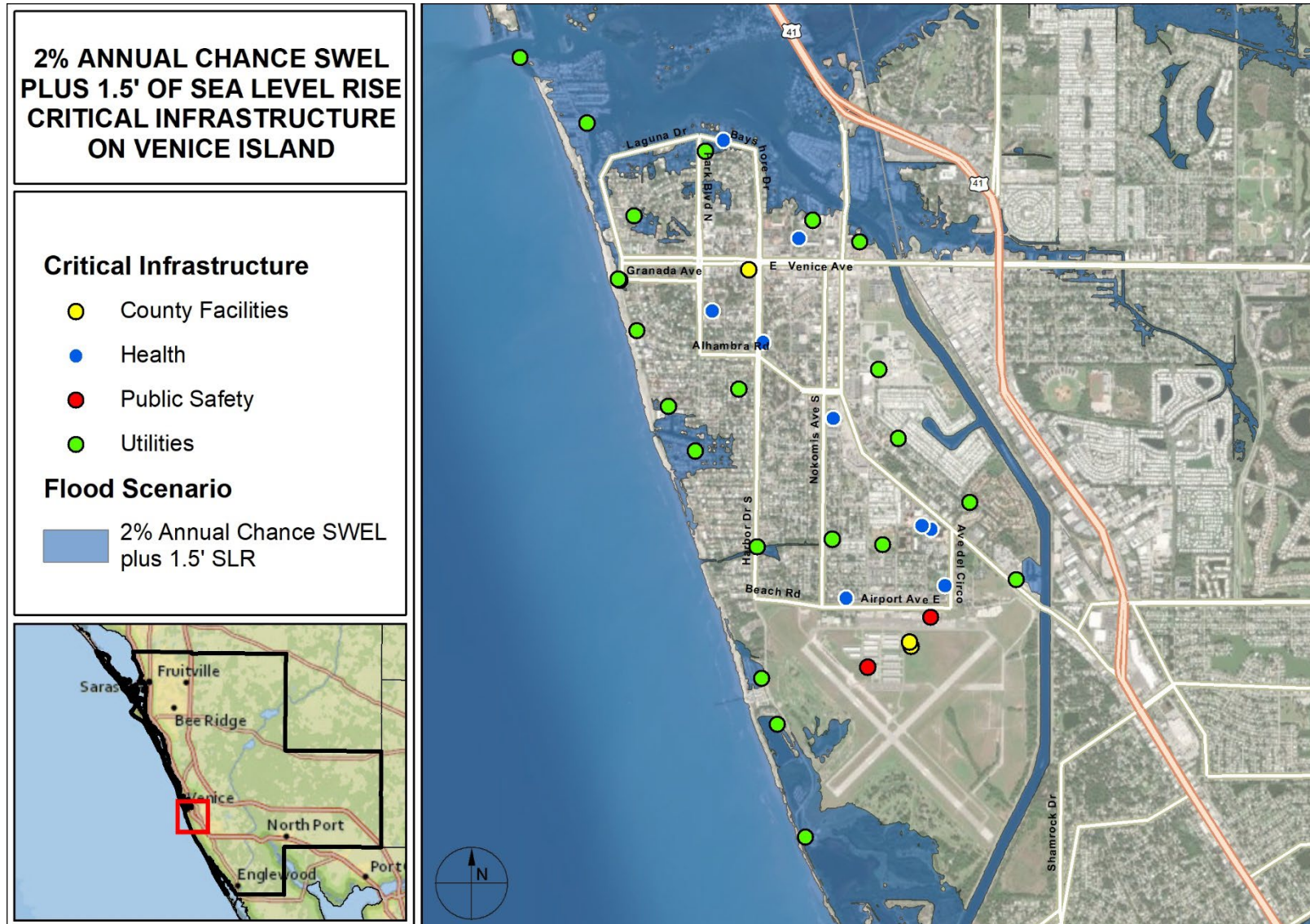
Source: Sweet et al (NOAA 2017 Technical Report CO-OPS 083)

Flood Inundation Scenarios for Infrastructure Analysis

- GIS-based analysis
- Assessed 6 different scenarios
- Compared elevations of County's chosen coastal infrastructure to each flood scenario

Flood Inundation Scenarios		
1	2020 water level (MHHW)	No storm surge
2	1.5 ft sea level rise	No storm surge
3	3 ft sea level rise	No storm surge
4	2020 water level (MHHW) + 2% annual chance flood (50 yr)	
5	1.5 ft sea level rise + 2% annual chance flood (50 yr)	
6	3 ft sea level rise + 2% annual chance flood (50 yr)	

Flood Inundation Scenario Analysis Example



Vulnerability Assessment Results – Surface Area Inundation

Percentage of Barrier Island Inundated at each of the Coastal Flood Scenarios					
Sarasota County Gulf-Fronting Coastal Areas in Resilience Study	1.5 ft SLR	3.0 ft SLR	2% Annual Chance Flood	1.5 ft SLR + 2% Annual Chance	3.0 ft SLR + 2% Annual Chance
Town Of Longboat Key	3%	8%	72%	88%	96%
City of Sarasota (Lido Key)	11%	26%	66%	88%	97%
Siesta Key	6%	24%	86%	95%	98%
Casey Key	6%	14%	32%	51%	67%
City of Venice (Island)	0%	3%	10%	15%	23%
Manasota Key	11%	21%	60%	76%	87%

Vulnerability Assessment Results – Evacuation Routes

Evacuation Route	Community	1.5 ft SLR	3.0 ft SLR	2% Annual Chance Flood	1.5 ft SLR + 2% Annual Chance	3.0 ft SLR + 2% Annual Chance
GULF OF MEXICO DR	Longboat Key	X	X	X	X	X
N BOULEVARD OF THE PRESIDENTS	Longboat Key/Lido Key	X	X	X	X	X
JOHN RINGLING CSWY	Longboat Key/Lido Key	X	X	X	X	X
JOHN RINGLING BLVD	Longboat Key/Lido Key	X	X	X	X	X
JOHN RINGLING PKWY	Longboat Key/Lido Key				X	X
MIDNIGHT PASS RD	Siesta Key	X	X	X	X	X
HIGEL AVE	Siesta Key		X	X	X	X
SIESTA DR	Siesta Key	X	X	X	X	X
STICKNEY POINT RD	Siesta Key	X	X	X	X	X
ALBEE RD W	Casey Key	X	X	X	X	X
BLACKBURN POINT RD	Casey Key	X	X	X	X	X
CASEY KEY RD	Casey Key			X	X	X
N TAMIAMI TRL	City of Venice			X	X	X
E VENICE AVE	City of Venice	X	X	X	X	X
S TAMIAMI TRL	City of Venice	X	X	X	X	X
MANASOTA KEY RD	Manasota Key		X	X	X	X
MANASOTA BEACH RD	Manasota Key	X	X	X	X	X

Vulnerability Assessment Results – Critical Facilities

Sarasota County Areas in Resilience Study	Number of Critical Facilities Inundated at each of the Coastal Flood Scenarios						
		Total of Critical Facilities Evaluated	1.5 ft SLR	3.0 ft SLR	2% Annual Chance Flood	1.5 ft SLR + 2% Annual Chance	3.0 ft SLR + 2% Annual Chance
Town of Longboat Key	PUBLIC SAFETY (Law Enforcement, Fire)	1					1
	UTILITIES (Stormwater, Freshwater, Sanitary Sewer)	19		2	17	18	19
	HEALTH (Assisted Living Facilities, Hospital)	0					
	PUBLIC FACILITIES	0					
City of Sarasota (Lido Key)	PUBLIC SAFETY (Law Enforcement, Fire)	1		1	1	1	1
	UTILITIES (Stormwater, Freshwater, Sanitary Sewer)	8	1	3	8	8	8
	HEALTH (Assisted Living Facilities, Hospital)	2			2	2	2
	PUBLIC FACILITIES	0					
Siesta Key	PUBLIC SAFETY (Law Enforcement, Fire)	1			1	1	1
	UTILITIES (Stormwater, Freshwater, Sanitary Sewer)	58	1	14	53	57	58
	HEALTH (Assisted Living Facilities, Hospital)	0					
	PUBLIC FACILITIES	0					

Vulnerability Assessment Results – Critical Facilities

Sarasota County Areas in Resilience Study	Number of Critical Facilities Inundated at each of the Coastal Flood Scenarios						
		Total of Critical Facilities Evaluated	1.5 ft SLR	3.0 ft SLR	2% Annual Chance Flood	1.5 ft SLR + 2% Annual Chance	3.0 ft SLR + 2% Annual Chance
Casey Key	PUBLIC SAFETY (Law Enforcement, Fire)	0					
	UTILITIES (Stormwater, Freshwater, Sanitary Sewer)	2				1	1
	HEALTH (Assisted Living Facilities, Hospital)	0					
	PUBLIC FACILITIES (Office)	1			1	1	1
City of Venice (Island)	PUBLIC SAFETY (Law Enforcement, Fire)	2					
	UTILITIES (Stormwater, Freshwater, Sanitary Sewer)	20		2	3	5	8
	HEALTH (Assisted Living Facilities, Hospital)	10			1	1	1
	PUBLIC FACILITIES (City Hall, Post Office, Airport)	4					
Manasota Key	PUBLIC SAFETY (Law Enforcement, Fire)	0					
	UTILITIES (Stormwater, Freshwater, Sanitary Sewer)	0					
	HEALTH (Assisted Living Facilities, Hospital)	0					
	PUBLIC FACILITIES	0					



THANK YOU

Questions?

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