



Guidance for Incorporating Sea Level Rise into Capital Improvement Programs

Kelli Hammer Levy, Division Director

Overview

- Local challenges
- Climate Science Advisory Panel (CSAP)
 - Regional projections
 - Guidance
- Accounting for SLR in capital improvements - examples
- Pinellas County guidance
- Next steps & Other planning efforts
- Questions

Redington Shores

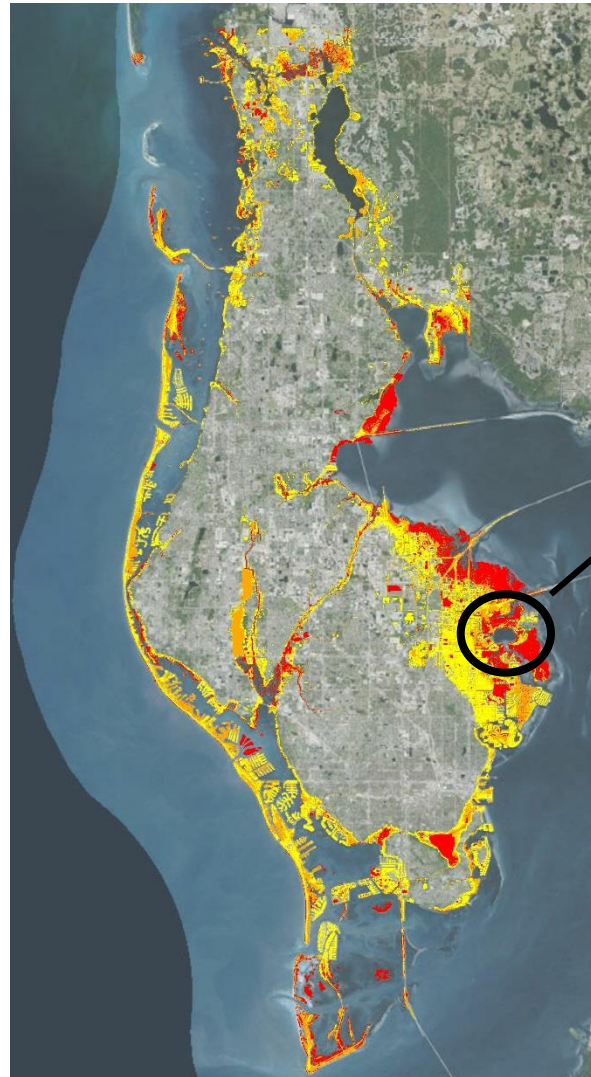


Elena 1985



A resilient Tampa Bay, one that acknowledges and responds to coastal vulnerabilities, is one that can support the economic, environmental, and cultural prosperity of this unique and highly valuable region

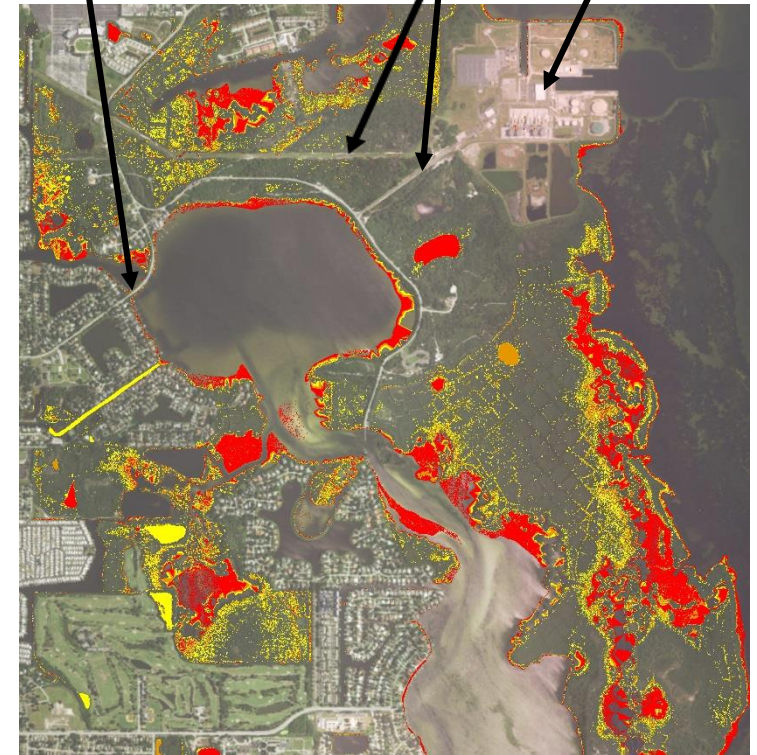
Local Challenges



Bridge replacement currently under design

Access roads

Duke Energy



2025 Inundation Maps (without tidal impacts and no storm surge)

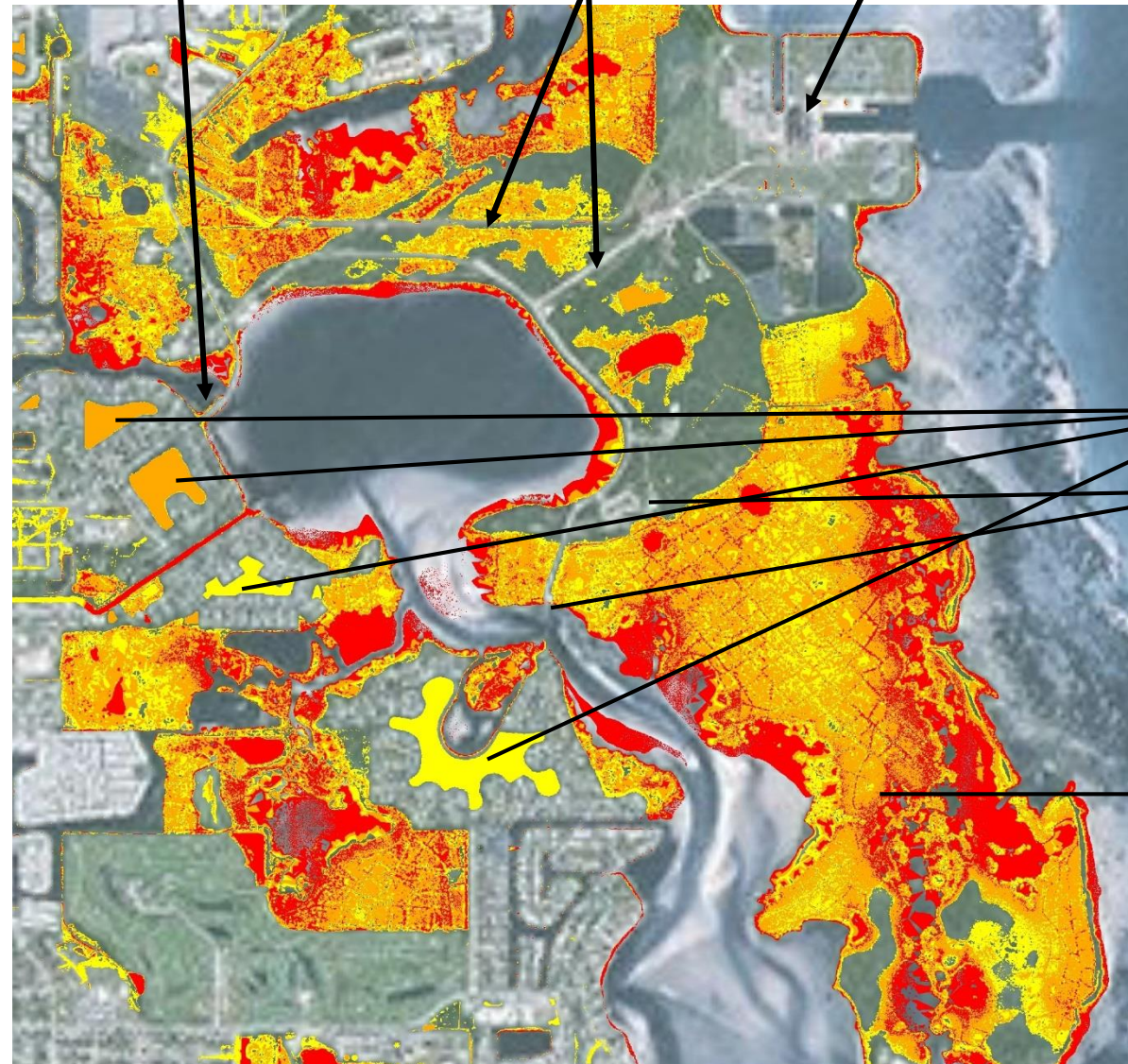
- Intermediate Low (0 – 0.38ft)
- Intermediate High (0.38-0.6ft)
- High – High (0.6 – 0.84ft)

Local Challenges 2050

Bridge replacement
currently under design

Access
roads

Duke
Energy

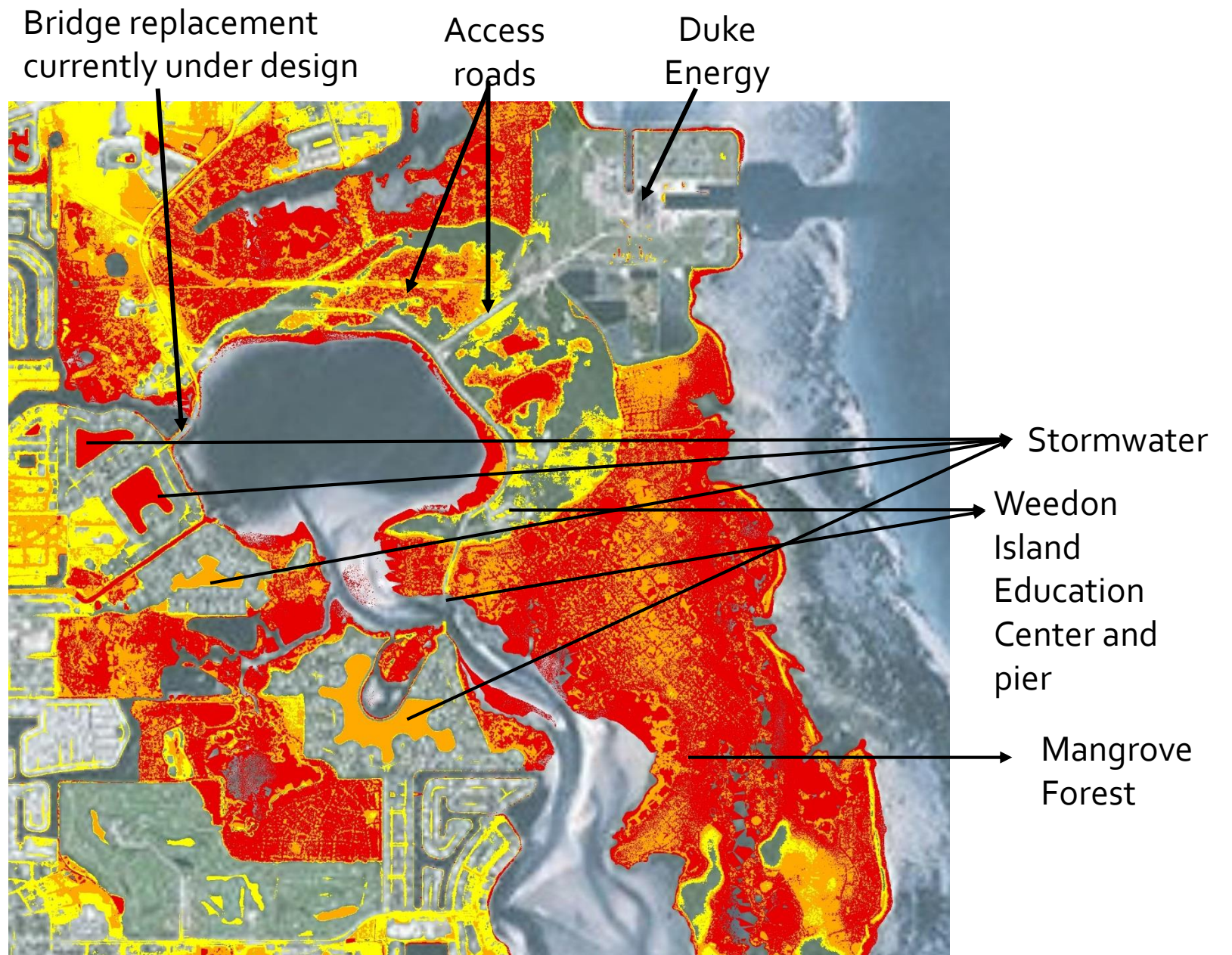


Stormwater

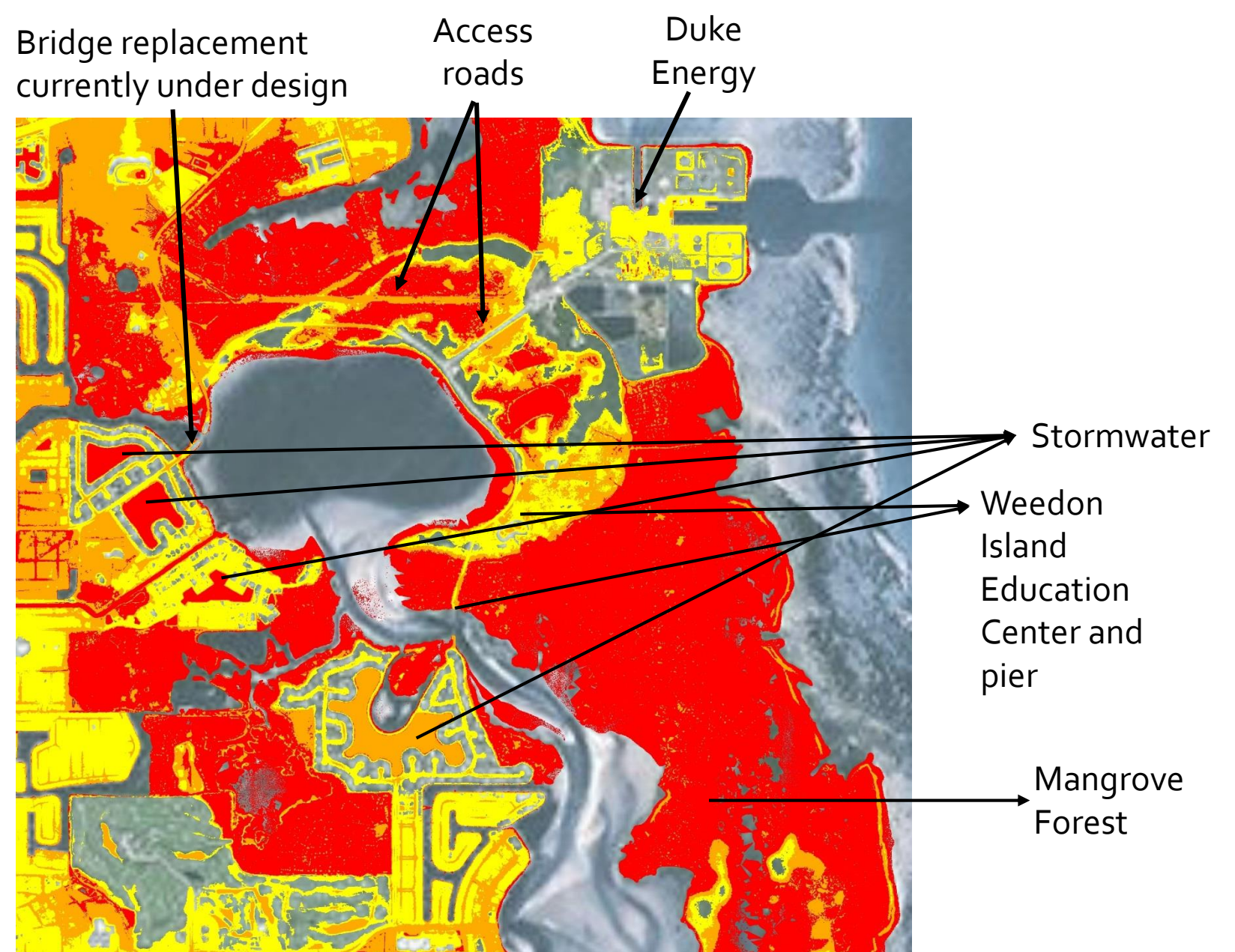
Weedon
Island
Education
Center and
pier

Mangrove
Forest

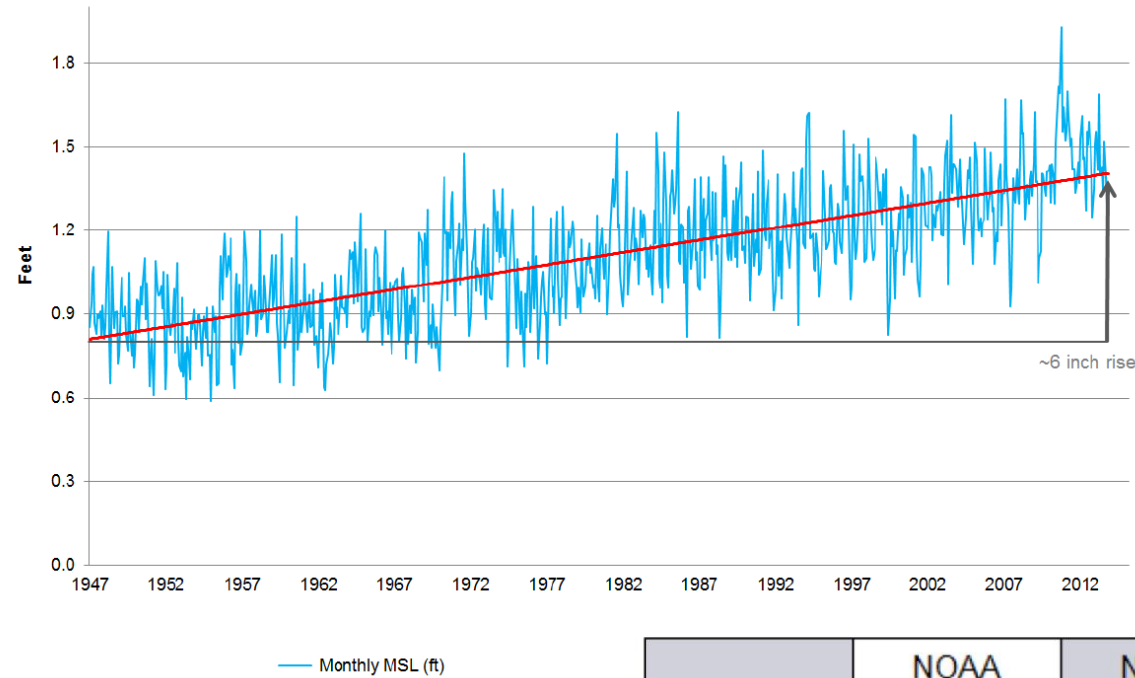
Local Challenges 2075



Local Challenges 2100



CSAP Regional Projections for Tampa Bay



Year	NOAA Low (Feet)	NOAA Int Low (Feet)	NOAA Int High (Feet)	NOAA High (Feet)
1992 ¹³	0.00	0.00	0.00	0.00
2025	0.28	0.38	0.60	0.84
2035	0.37	0.53	0.90	1.31
2050	0.50	0.80	1.46	2.22
2065	0.63	1.10	2.15	3.35
2075	0.71	1.33	2.68	4.23
2100	0.93	1.97	4.26	6.89

CSAP Guidance

- Use SLR scenarios to inform policy and planning
- In developing adaptation strategies consider
 - Multiple scenarios
 - Location
 - Lifespan of project
 - Project cost
 - Criticality of function
- Make decisions based on an acceptable level of risk
- Projections of SLR should be consistent with present and future National Climate Assessment estimates and methods
- Projections of SLR should be regionally corrected using the St. Petersburg tide gauge data

What is going
on out there?

What resources are available to guide local governments on how to incorporate SLR in capital planning efforts?

Accounting for SLR in Capital Improvements

U.S. Department of Transportation, Federal Highway Administration Gulf Coast Study

Resilience


- Adaptation Framework
- Ongoing & Current Research
- Policy & Guidance
- Publications
- Case Studies
- Pilots
- Tools
- Webinars
- Workshops & Peer Exchanges

Sustainable Highways Initiative

Energy and Emissions

Newsletter

Contacts

 Sign up for Sustainability updates.

Contacts

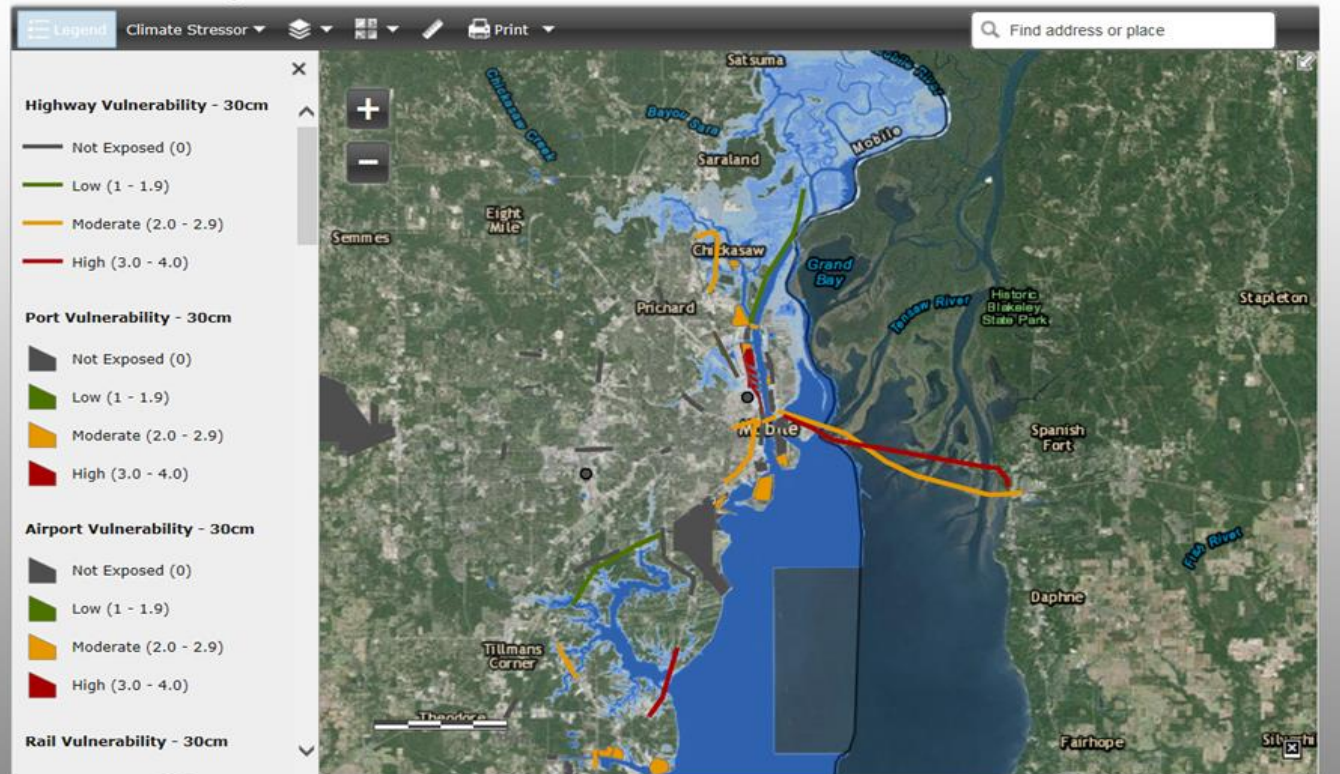
For more information, please contact **Robert Hyman**.

FHWA → Environment → Sustainability → Resilience → Ongoing And Current Research → Gulf Coast Study → Phase 2, Task 3

Geospatial Viewer

This map shows vulnerability for selected transportation assets for different climate stressors and scenarios, by transportation mode. Vulnerability is rated on a scale of 1 to 4, with 4 being most vulnerable. Click on an individual asset in the map for more information on its vulnerability.

Vulnerability Sea Level Rise



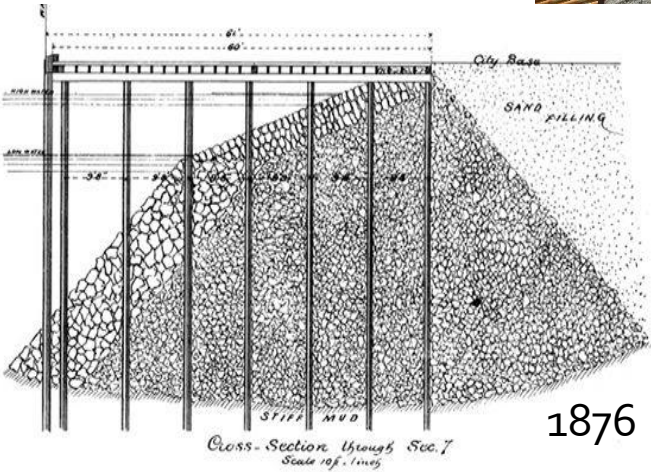
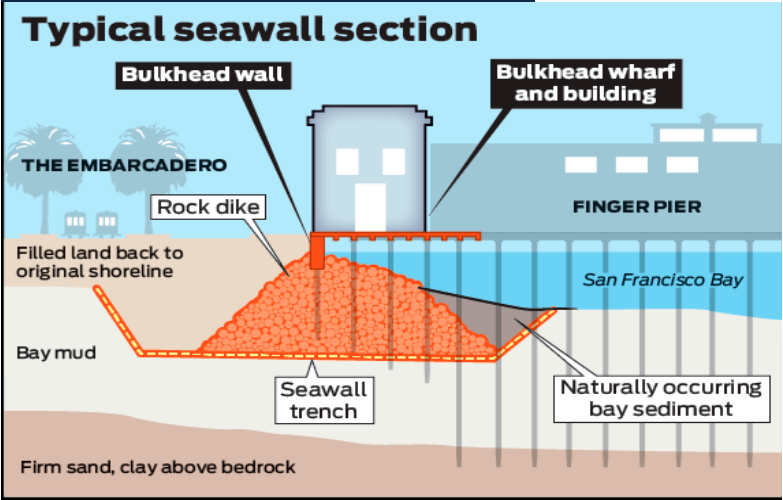
State Owned and Critical Facility Exposures to Sea Level Rise

County/City	State Owned Facilities			Critical Facilities			Square mi. (land area)
	High Risk (0-2 ft RSLR)	Moderate Risk (2-5 ft RSLR)	Low Risk (5-10 ft RSLR)	High Risk (0-2 ft RSLR)	Moderate Risk (2-5 ft RSLR)	Low Risk (5-10 ft RSLR)	
Anne Arundel County	7	4	6	151	92	95	415.9
Baltimore County	6	1	4	70	55	122	598.6
Calvert County	1	0	20	24	22	13	215.2
Caroline County	0	0	333	47	8	48	320.1
Cecil County	0	0	2	57	21	22	348.1
Charles County	0	0	0	28	6	6	461.0
Dorchester County	5	14	45	123	56	39	557.5
Harford County*	–	–	–	–	–	–	440.4
Kent County	0	1	1	44	33	24	279.4
Prince George's County*	–	–	–	–	–	–	485.4
Queen Anne's County	0	1	9	75	54	49	372.2
Somerset County	8	55	21	69	66	36	327.2
St. Mary's County	150	76	3	40	27	42	361.3
Talbot County	1	0	23	61	33	40	269.1
Wicomico County	0	19	3	49	42	56	377.2
Worcester County	2	98	1	71	180	148	473.2
City of Baltimore*	–	–	–	–	–	–	80.0
Grand Total	180	269	471	909	695	740	6381.9

*Vulnerability data not available from MDDNR

Accounting for SLR in Capital Improvements

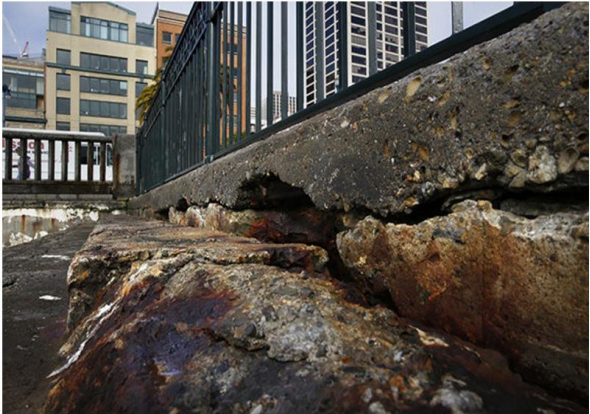
One San Francisco



1876

2016

A study commissioned by the port warns that the seawall is in danger of severe damage in a major earthquake. The price tag for strengthening it — and raising the height in anticipation of sea level rise — could reach \$5 billion, according to a memo from port staff.



The seawall along the Embarcadero, with buildings in the background on filled land that once was shallow bay. *Michael Macor, The Chronicle*

SLR Planning for CIP where do you start?

1. Research who is doing what and what information is available
2. Don't reinvent the wheel
3. Develop a framework
4. Engage others
5. Provide clear and easy to understand guidance
6. Test, adjust, test, adjust...



**DON'T TRY AND REINVENT
THE WHEEL – JUST WORK
ON MAKING IT BETTER**

Pinellas County Guidance for Incorporating Sea Level Rise into Capital Planning

- What information is needed to use the tool
- What questions are asked
- How is the outcome used
- Level of authority (Accountability)



Pinellas County Guidance for Incorporating Sea Level Rise into Capital Planning

- Pre-check
 - Location
 - SLR vulnerability zone
 - Project cost
- SLR Checklist
 - Project information
 - Asset type
 - Remaining or future functional lifespan
 - Planning horizon



Pinellas County Guidance for Incorporating Sea Level Rise into Capital Planning

- Vulnerability Assessment
 - Exposure
 - Site specific information
 - Lowest ground elevation (LGE) and MHHW
 - SLR at the end of the planning horizon
 - Questions
 - $MHHW - LGE = X$
 - Vulnerability to permanent inundation during functional lifespan during various scenarios
 - Vulnerability to temporary flooding from 100-yr coastal flood
 - Is the project seaward of the CCCL?



Pinellas County Guidance for Incorporating Sea Level Rise into Capital Planning

- Vulnerability Assessment
 - Sensitivity
 - Low – minimal impact
 - Medium – ability to maintain most functions
 - High – complete loss of function
 - Adaptive Capacity
 - High- tolerance to flooding impacts is good
 - Medium – response needed to restore function
 - Low – no ability to adapt



Pinellas County Guidance for Incorporating Sea Level Rise into Capital Planning

- Risk Assessment
 - Anticipated level of damage
 - Low – Asset is easily repaired/replaced
 - Medium – Complete replacement or costly repairs
 - High – Asset cannot be replaced at same location
 - Service Disruption
 - Low – No loss of service
 - Medium – Loss of service does not threaten public health and safety (non-critical)
 - High – Loss of service is high and a threat to public welfare

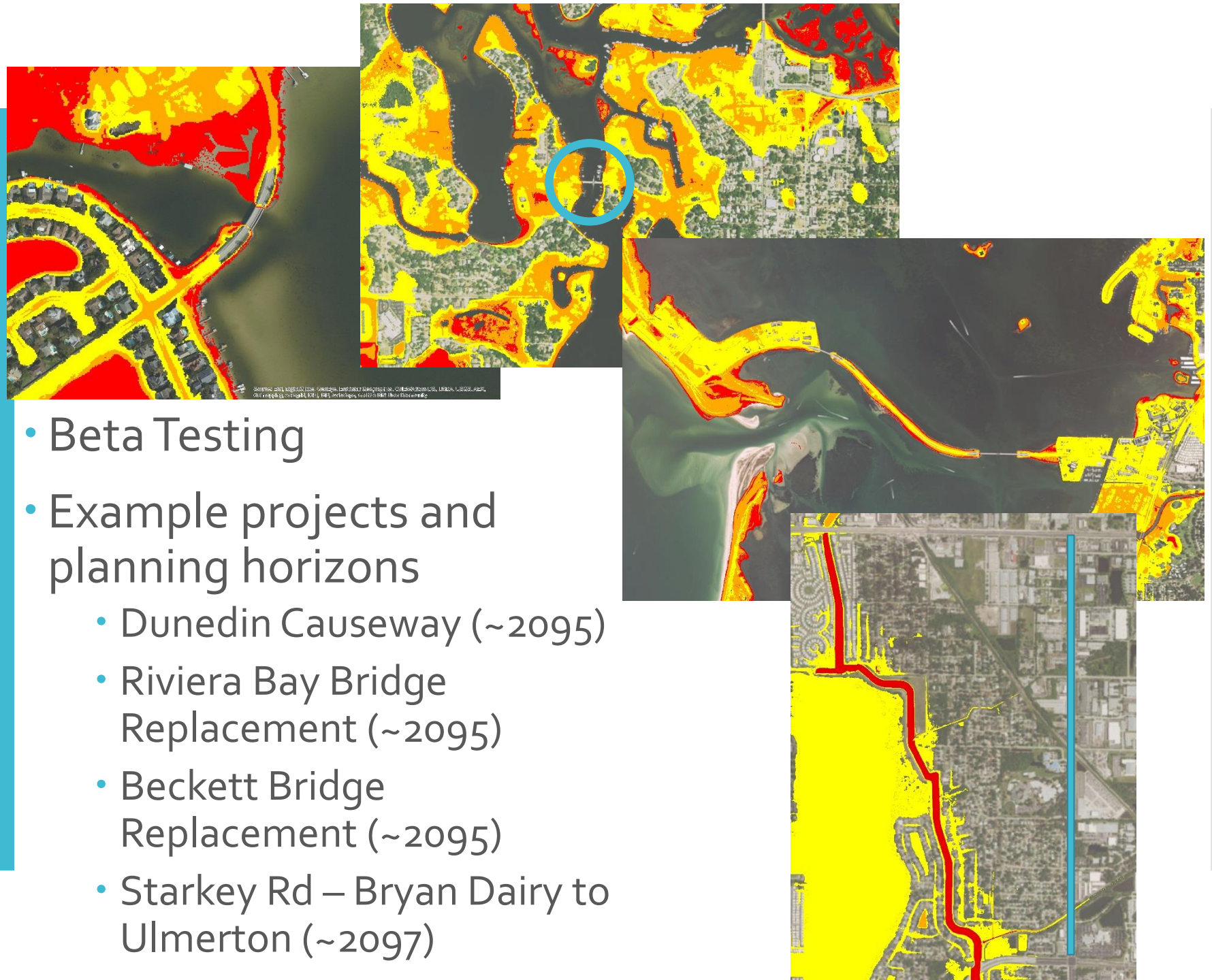


Pinellas County Guidance for Incorporating Sea Level Rise into Capital Planning



- Risk Assessment
 - Cost to replace/repair for public health and safety
 - Low – No or little cost to restore asset
 - Medium – Moderate costs
 - High – High costs to fully replace or high secondary costs
- Adaptation strategy & Project Production Team Review
- Department Certification

Pinellas County Guidance for Incorporating Sea Level Rise into Capital Planning



- Beta Testing
- Example projects and planning horizons
 - Dunedin Causeway (~2095)
 - Riviera Bay Bridge Replacement (~2095)
 - Beckett Bridge Replacement (~2095)
 - Starkey Rd – Bryan Dairy to Ulmerton (~2097)

Next Steps and Other Efforts

- Next Steps
 - Finish testing and feedback on v.1
 - Deploy v.2 to Project Production Teams
 - Share
 - Vulnerability Assessment of Critical Infrastructure
 - Complete ~2019/2020
 - Critical infrastructure identified
 - GIS support tool – SLR + storm surge/tide cycles
 - Adaptation plans and costs analysis for priority areas
 - Update capital planning tool
 - New stormwater code effective April 1, 2017
 - New tailwater conditions to address SLR
 - Working groups
 - CSAP
 - SPC – Suncoast Sea Level Rise Collaborative
 - Next event, May 24th: Insuring Uninsured Flood Risk: Flood, Sea Level Rise, and Natural Catastrophes
- <https://solutions.spcollege.edu/>



Questions

Kelli Hammer Levy klevy@pinellascounty.org 727.464.3317

Visit us on Facebook: *Pinellas County Environmental News*