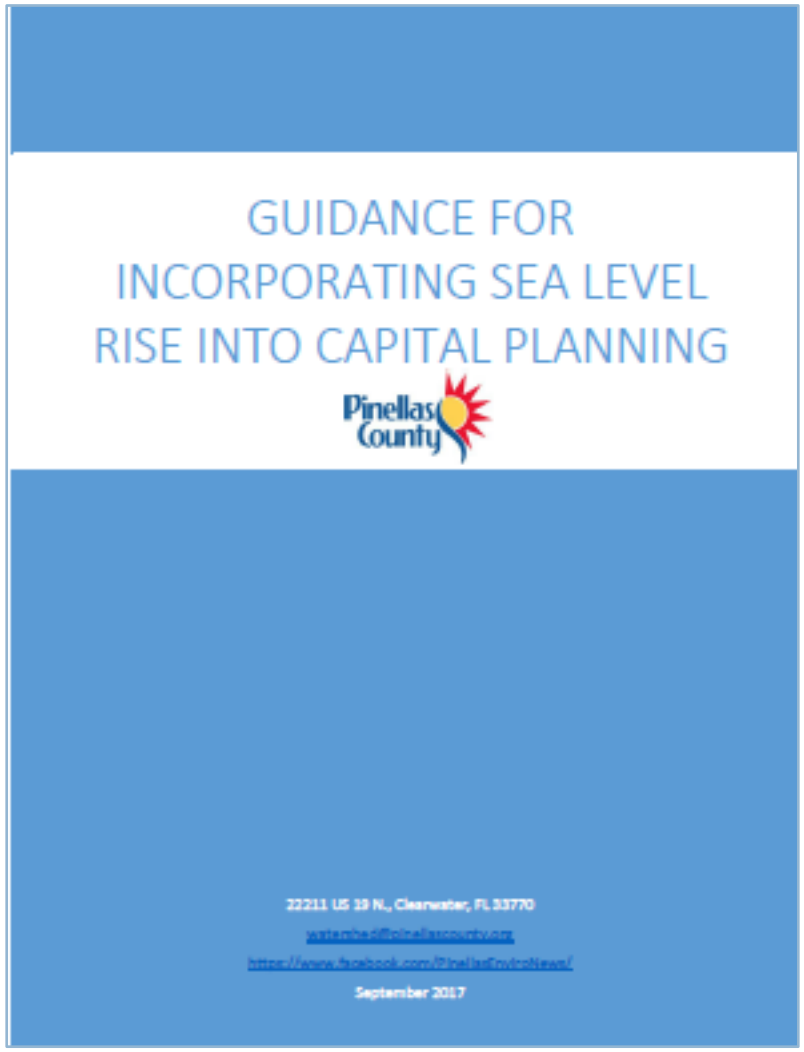
Incorporating Sea Level Rise into Capital Planning

Kelli Hammer Levy, Division Director

Pinellas County Environmental Management

Guidance

- Four key steps
  - Climate Science: What is the current science and what are the local projections for SLR?
  - Vulnerability Assessment: Which assets are vulnerable to SLR?
  - Risk Assessment: Which assets are at greatest risk to SLR?
  - Adaptation Measures: What can we do to improve the asset's resiliency to impacts from SLR?

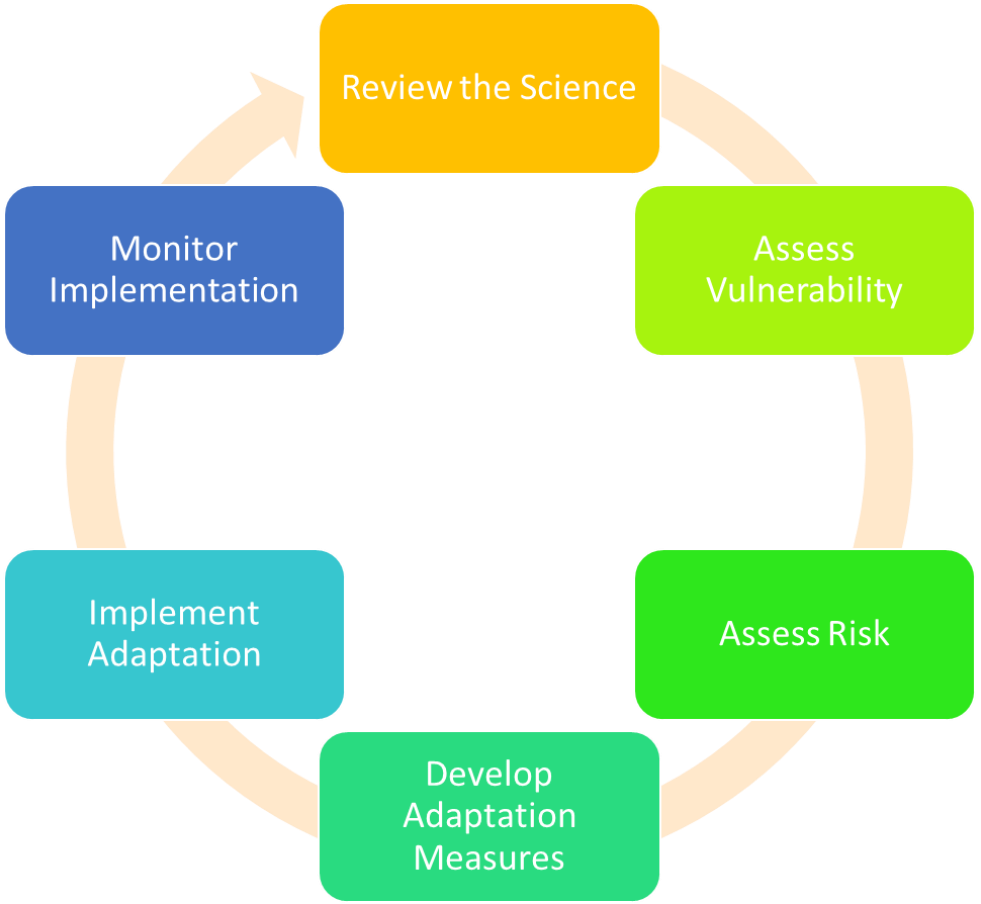


Guidance

- County's capital planning program:
  - Step-by-step approach for considering SLR within capital plans and projects
  - Improved asset function and longevity – maximizing ROI
  - Scalability – regional versus individual project
  - Consistency – common approach across all project types
  - Collaborative – across all departments
  - Accountability – Department Director sign off required
- Guidance updates
  - National Climate Assessment, CSAP
  - LiDAR flown in December 2017; Deliverables due late Spring; SLR maps updated with new DEM.
  - Other County mapping tool updates as best available data changes

Review the Science

- Review the Science
  - Sea level rise estimates
  - Sea level rise scenario selection
  - Sea level rise inundation mapping



Review the Science

SLR Estimates (CSAP, 2015)

YEAR	NOAA LOW (FT)	NOAA INT LOW (FT)	NOAA INT HIGH (FT)	NOAA HIGH (FT)
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

Review the Science

Sea Level Rise Scenario Selection

- **Functional Lifespan**: How long the project is at the location including O&M
- **Location:** Is the project located in a vulnerability zone during its lifespan
- **Planning Horizon:** The date construction is complete + the functional lifespan.
  - Project construction closed out date: 2020
  - Design life + O&M = 75 years
  - Planning horizon = 2020 + 75 = 2095
- If an asset must be functional when inundated it may be appropriate to plan at the high end.
- If the asset is not critical and can be out of service for a period of time or can be modified at a later date, a lesser scenario may be appropriate.

Review the Science

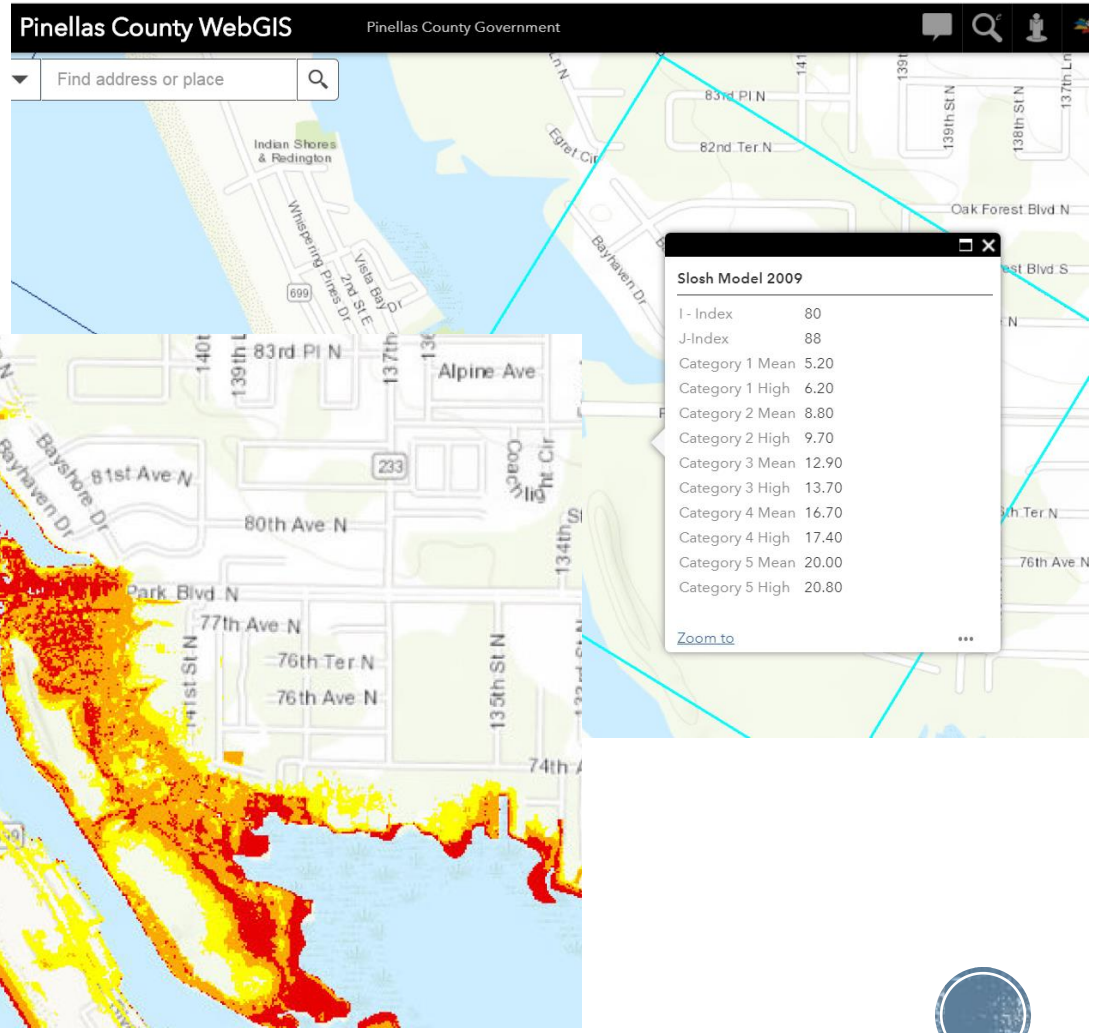
Sea level rise inundation mapping

- Internal County WebGIS Layers: Sea Level Rise Projections, FEMA flood maps, Flood Prone Areas, Storm Surge, Stormwater Hot Spots, and other data pertinent to the project.

- University of Florida Sea Level Scenario Sketch Planning Tool

- NOAA Sea Level Rise Viewer

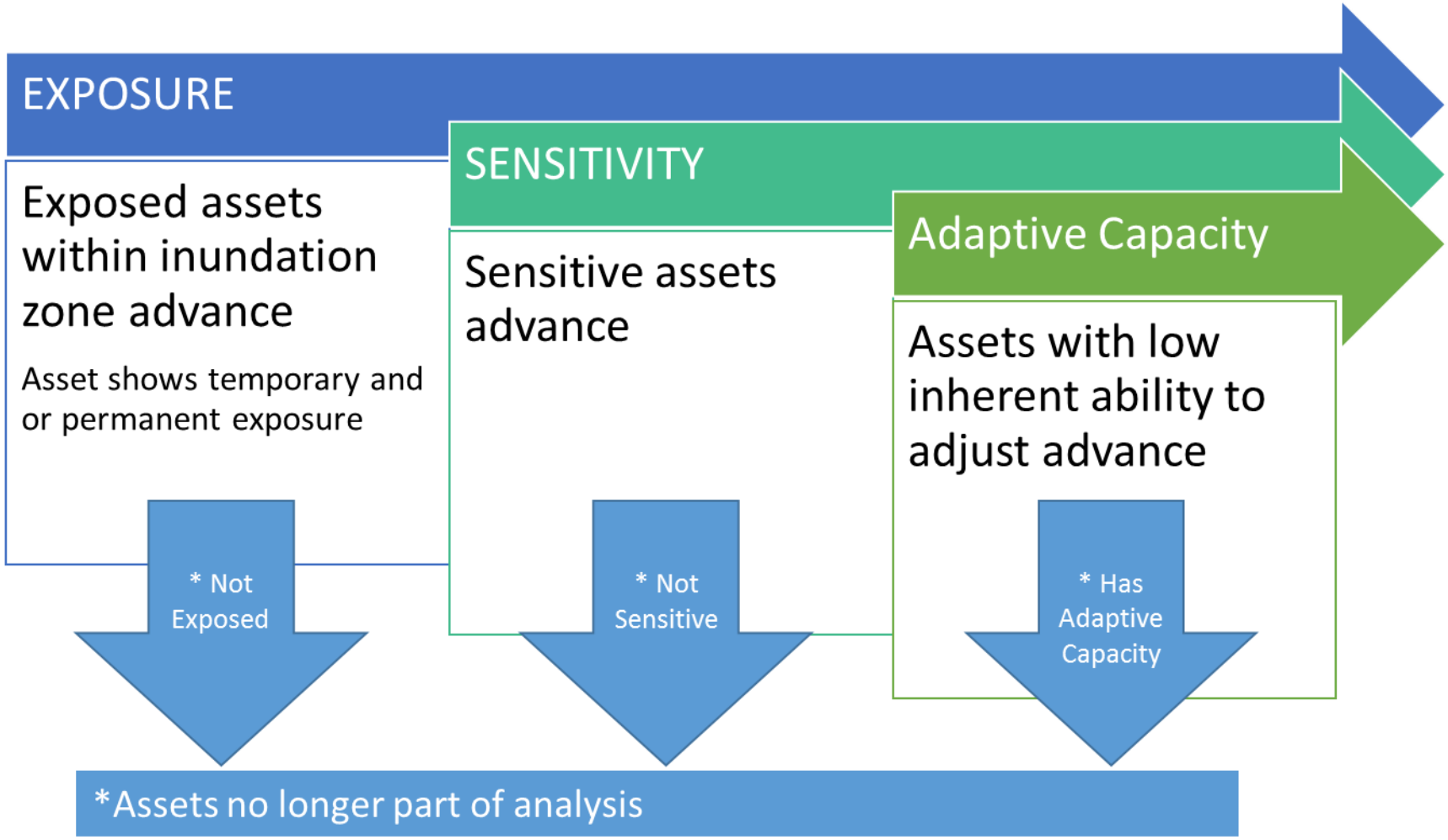
(Note that these maps, however, do not consider rainfall or tidal driven flooding. The County Web GIS and the University of Florida tool do include storm surge data)



Vulnerability Assessment

- Exposure: degree to which an asset is unprotected or left in a vulnerable state (e.g., depth of flooding due to SLR)
- Sensitivity: degree to which an asset is impacted (e.g., temporary flooding causes minimal impact or results in complete loss of asset or shut-down)
- Adaptive Capacity: ability of an asset to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or cope with the consequences

Vulnerability Assessment



Vulnerability Assessment

Asset	Exposure to NOAA Int-High 2050 Sea Level Rise		Sensitivity		Adaptive Capacity		Total Score
	SLR	Storm Surge	SLR	Storm Surge	SLR	Storm Surge	
#1	None	None	n/a	n/a	n/a	n/a	0
#2	None	Low (1)	n/a	Low(1)	n/a	High (1)	3
#3	Low (1)	Low (1)	Low (1)	Med (2)	Med (2)	Med (2)	9
#4	Med (2)	Med (2)	Med (2)	High (3)	Low (3)	Med (2)	14
#5	High (3)	High (3)	High (3)	Med (2)	Low (3)	Low (3)	17

Risk Assessment

- Damage:
  - What is the level of damage to the asset?
  - Can the asset be repaired, or would the asset require complete replacement?
- Disruption:
  - Is there a disruption in service?
  - If yes, what is the length of that disruption, i.e., hours, days, weeks? Does the disruption threaten public health and safety?
- Cost:
  - What is the cost to repair or replace the asset?
  - What are the economic costs associated with the disruption in service?
  - What are the public health and safety costs of the service disruption?
  - Are there secondary impacts that need to be considered (i.e., costs to the environment or recreational activities)?

Risk Assessment

Evaluate consequences to help set priorities for adaptation planning (i.e., cost of reconstruction or repair, economic impact of disruption, length of disruption, irreversibility of impact)

Asset	Damage		Cost (Repair/Replace)		Disruption		Total Score
	SLR	Storm Surge	SLR	Storm Surge	SLR	Storm Surge	
#1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
#2	n/a	Low (1)	n/a	Med (2)	n/a	High (3)	6
#3	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	6
#4	Med (2)	High (3)	Med (2)	High (3)	Med (2)	High (3)	15
#5	High (3)	High (3)	Low (1)	Med (2)	Low (1)	Low (1)	11

Adaptation Measures

- Identify, prioritize, and incorporate means to reduce, mitigate, or protect from unacceptable risks.
- Identify adaptation strategies and approaches to protect assets and increase adaptive capacity
- Prioritize strategies based on risk levels, sequence of expected impacts, and adaptive capacity
- Timing of strategies: when do they need to be implemented?

Example Project

- Oakwood Drive bridge over Stephanie's Channel
- Original construction
  - 1958
- Major renovation
  - 2002
- Design life 50 years
- Replacement scheduled
  - ~2023
- Functional Life 65 years