PLANNING, LAW AND POLICY FOR FLOOD RESILIENCY IN A CHANGING CLIMATE

IMPROVING COASTAL RESILIENCE & POLICY RESPONSES TO THE THREATS OF SEA LEVEL RISE AND CLIMATE CHANGE

JANUARY 26, 2024

ERIN L. DEADY, AICP, ESQ.

RESILIENCY-RELATED STATE LAW AND POLICY

- EO 07-127: Reduction of emissions to 2000 levels by 2017, to 1990 levels by 2025, and by 80% of 1990 levels by 2050& California vehicle emission standards reductions (22% by 2012 and 30% by 2016).
- Building Efficiencies/Energy Code, Chapter 553, F.S. increasing standards
- HB 7123: Model Green Building Code (2007)
- HB 697 (GHG reduction strategies in local government's Comprehensive Plan). Some requirements later eliminated.
- HB 7135 (State and Local Government Buildings "greener" and FF landscaping) (Section 255.2575 & 255.259, F.S.)- many don't realize this is law
- HB 7179 (PACE)- financing wind resistance/energy efficiency initiatives
- Adaptation Action Areas (2011) for local government Comprehensive Plans
- 2015- 5 Bills Passing Related to flood insurance, wind insurance, construction standards/building codes, Citizen's insurance, Peril of Flood (Section 163.3178, F.S.)
- 2020 & 2023 Section 161.551, F.S. Sea Level Impact Projection Studies for state-funded projects (Rule 62S-7, F.A.C.) and expansion of affected areas
- 2021 & 2022 & 2023 - Section 380.093, F.S. Always Ready and Resilient Florida program (Rule 62S-8, F.A.C. rulemaking 2022)

SECTION 380.093, F.S. OVERVIEW

STATUTORY FRAMEWORK

Section of the Law	Significance
Intent and definitions	• Coastal and inland communities can participate • Critical assets defined
Resilient Florida Grant Program	• Items that can be funded (planning and projects) • **Standards for vulnerability assessments**
Comprehensive Statewide Flood Vulnerability and Sea Level Rise Dataset and Assessment	Dataset to support a comprehensive statewide flood vulnerability and sea level rise assessment (inland and coastal infrastructure, geographic areas and vulnerable communities and their risk).
Statewide Flooding and Sea Level Rise Resilience Plan (local governments, flood control districts, regional resilience entities or WMDs).	Due to Legislature 12/1, 3-year planning horizon & ranked projects that address risks of flooding and sea level rise to coastal and inland communities. First one submitted for this year, December 1, 2021, will be a "preliminary plan" to address risks already identified in existing local government vulnerability assessment. 50% cost share unless disadvantaged community. Includes ranking criteria.
Regional Resilience Entities	(a) providing technical assistance to counties and municipalities, (b) coordinating multijurisdictional vulnerability assessments and (c) developing project proposals to be submitted for inclusion in the Statewide Flooding and Sea Level Rise Resilience Plan.
Florida Flood Hub for Applied Research and Innovation (USF)	Lead institution and engage other academic and research institutions, private partners, and financial sponsors to coordinate efforts to support applied research and innovation to address the flooding and sea level rise challenges of the state
Annual assessment of Florida's water resources and conservation lands	Expand the requirements of the existing annual assessment of Florida's water resources and conservation lands (conducted by the Office of Economic and Demographic Research) to now include flooding information

REQUIRED COMPONENTS OF VULNERABILITY ASSESSMENTS FOR FLORIDA

- Required assets for evaluation prioritized by area or immediate need and identify the flood scenario impacting the assets (can be determined by local community because the flood scenarios may differ for inland v. coastal)
- 2040/2070 NOAA Intermediate Low and High Sea Level Rise
  - Tidal flooding (+ future high tide)
  - Current/future storm surge > or = to 100-year flood event,
  - Rainfall for 100-year and 500-year + future conditions (to extent practicable) (required for non-coastal communities) (using spatiotemporal analysis or *existing* hydrologic and hydraulic modeling results)
  - Combination flooding (to extent practicable)
- Compliance with FDEP Checklist is a requirements for VAs and Grant Agreements

Appendix E: Vulnerability Assessment Compliance Checklist

VULNERABILITY ASSESSMENT COMPLIANCE CHECKLIST

In accordance with subsection 380.093(3), F.S., the following components, scenarios, data, and information are required for a comprehensive Vulnerability Assessment (VA). The checklist must be completed and submitted with the final VA Report deliverable, pursuant to Attachment 3, Grant Work Plan. The Grantee must abide by the Department's GIS Data Standards found on the Resilient Florida Program webpage at the link below:

https://floridadep.gov/rcp/resilient-florida-program/documents/resilient-florida-program-gis-data-standards

Part 1 – Subparagraph 380.093(3)(c)2., F.S.

Item ID	Check if Included	Item Description	Page Reference in VA Report (if applicable)
a	☐	Final Vulnerability Assessment Report that provides details on the results and conclusions, including illustrations via maps and tables.	
All electronic mapping data used to illustrate flooding and sea level rise impacts that are identified in the VA must be provided in the format consistent with the Department's GIS Data Standards and include the following three (3) items:			
b	☐	Geospatial data in an electronic file format.	
c	☐	GIS metadata.	
d	☐	List of critical assets for each jurisdiction, including regionally significant assets, that are impacted by flooding and sea level rise. The list must be prioritized by area or immediate need and must identify which flood scenario(s) impacts each asset	

Part 2 – Subparagraphs 380.093(3)(d)1. and 380.093(3)(d)2., F.S.

Item ID	Check if Included	Item Description	Page Reference in VA Report (if applicable)
e		Peril of Flood Compliance Plan amendments developed that address paragraph 163.3178(2)(f), F.S., if applicable. ☐ Not applicable ☐ Already in compliance	
f		Depth of tidal flooding, including future high tide flooding, using thresholds published and provided by the Department.	
g		To the extent practicable, analysis geographically displays the number of tidal flood days expected for each scenario and planning horizon. *(optional)*	
h		Depth of current and future storm surge flooding using publicly available NOAA or FEMA storm surge data. (*check one*) ☐ NOAA data ☐ FEMA data	
i		Initial storm surge event equals or exceeds current 100-year flood event.	
j		Higher frequency storm analyzed for exposure of a critical asset. *(optional, but must provide additional detail if included)*	

Exhibit I
2 of 4

Rev. 6/1/2022

EVALUATING ASSETS

Definition: "Critical asset" includes:

1. Transportation assets and evacuation routes, including airports, bridges, bus terminals, ports, **major roadways**, marinas, rail facilities, and railroad bridges.
2. Critical infrastructure, including wastewater treatment facilities and lift stations, stormwater treatment facilities and pump stations, drinking water facilities, water utility conveyance systems, **electric production and supply facilities**, solid and hazardous waste facilities, military installations, communications facilities, and disaster debris management sites.
3. Critical community and emergency facilities, including schools, colleges, universities, community centers, correctional facilities, disaster recovery centers, **emergency medical service facilities**, emergency operation centers, fire stations, **health care facilities**, hospitals, law enforcement facilities, local government facilities, logistical staging areas, **affordable public housing**, risk shelter inventory, and state government facilities.
4. Natural, cultural, and historical resources, including conservation lands, parks, shorelines, surface waters, **wetlands**, and historical and cultural assets.

Definition: "Regionally significant assets" means critical assets that support the needs of communities spanning ***multiple geopolitical jurisdictions***, including, but not limited to, water resource facilities, regional medical centers, emergency operations centers, regional utilities, major transportation hubs and corridors, airports, and seaports.

Why are some of these "tricky"?

WHAT ELSE IS TRICKY?

What are some of the statutory interpretation issues as applied to VAs?

1. What is meant by "**critical assets**"- does that mean all?
2. Security **concerns** related to asset data provided to the Florida Flood Hub.
3. How many **scenarios are required** to meet the criteria (tidal, storm surge, rainfall (non-coastal), compound)? (347 total possible scenarios)
4. Metadata from **existing data v. new maps / GIS created for the project**?
5. Timing of projects for inclusion in the next Statewide Flooding and Sea Level Rise Resilience Plan (by 2024) that must be **identified in vulnerability assessments** that meet the requirements of Subsection 380.093(3), F.S.

* Questions? **DEP** has been great about **answering** these and other questions.

Flexibility in the Planning Process

CHALLENGES FOR: VULNERABILITY ASSESSMENTS & ASSETS

Figure 14: Potable Water Analysis Example

Table 18: Vulnerable Potable Water Infrastructure

Potable Water Infrastructure	Infrastructure Impacted by Year at MHHW			Total Features in Dataset
	2040 (16")	2070 (38")	2100 (70")	
Dead End	2 (1.65%)	4 (3.31%)	10 (8.26%)	121
Fitting	5 (0.35%)	18 (1.25%)	51 (3.53%)	1443
Flush Point	2 (0.47%)	4 (0.94%)	7 (1.64%)	427
Hydrant	2 (0.08)	10 (0.40%)	50 (2.01%)	2493
Manhole	0	0	6 (18.75%)	32
Service Point	0	0	22 (2.22%)	992
Valve System	8 (0.11%)	31 (0.44%)	159 (2.25%)	7073
Valve Control	0	0	1 (9.09%)	11
Wells	0	0	0	11

Table 19: Vulnerable Potable Water Infrastructure (Linear Miles)

Potable Water Infrastructure	Infrastructure Impacted by Year at MHHW			Total Length of Features in Dataset
	2040 (16")	2070 (38")	2100 (70")	
Casing	0	0	0.001 (0.04%)	2.32
Drain	0	0	0	0.47
Main Distribution	1.5 (0.27%)	6.3 (1.12%)	32.1 (5.70%)	562.72
Service Line	0	0.2 (1.82%)	1.2 (10.95%)	10.96
Zone	0.3 (3.26%)	0.3 (3.26%)	0.3 (3.26%)	9.21

Best available data on assets is important:

- GIS locations
- Top of structure elevations
- Invert elevations
- Locations of controls and supporting components

Severity of impacts to system

- How many structures?
- How many impacted v. overall total?
- What is the projected year of impact?
- How many days of flooding anticipated under what scenario/condition?

Not all of this may exist….

ALIGNING VULNERABILITY ASSESSMENT OUTPUT WITH POLICY AND LAW

OTHER REASONS VULNERABILITY PLANNING IS VALUABLE: ESTABLISHING POLICY PRIORITIES

1. Position the community for future grant opportunities by having a plan of action (and its required in Section 380.093(5), F.S. to qualify for capital project funding after 2024)

2. Establish adaptation project priorities, examples:
   - Road elevation, drainage and infrastructure
   - Protection of shorelines and policies (natural and hardening)

3. Establish other implementing policies, examples:
   - Addressing vulnerable neighborhoods
   - Framing infrastructure LOS commitments (deficiencies, maintenance and enhancements/upgrades)

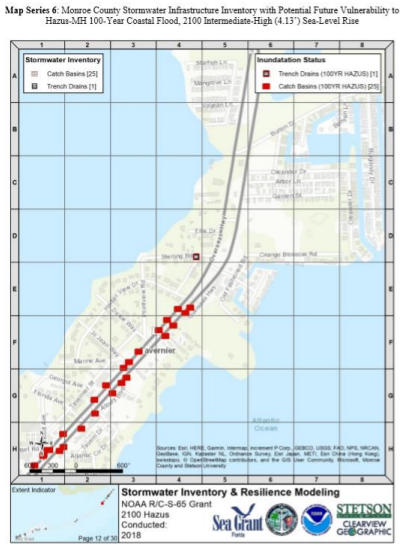
4. Priorities for land acquisition (not buying land going under water)

5. Flexibility in development/design criteria that better captures individualized risk of areas

6. Integration of adaptation response fully into Comprehensive Plan / Code (example infrastructure design criteria)

WMP: MORE ACCURATE DATA AND TOOLS

1. Planning and implementation of projects for sea level rise has helped facilitate the award of 5 successful grants to date
   - Mobile LiDAR countywide
   - NOAA Grant included:
     - ✓ Collaboration with FEMA and development of CRS Class 4 compliant Watershed Management Plan analyzing SLR
     - ✓ Real time assessment of stormwater structures countywide
     - ✓ 4- State Roads Analysis on Legal Liability
2. Linkages with CRS in pursuit of Class 4
   1. Repetitive Loss Analysis
   2. Stormwater Maintenance & Capital Plan
   3. Flood insurance outreach
   4. Watershed Management Plan



Map Series 6: Monroe County Stormwater Infrastructure Inventory with Potential Future Vulnerability to Hazus-MH 100-Year Coastal Flood, 2100 Intermediate-High (4.13') Sea-Level Rise


Roads to Nowhere in Four States:
State and Local Governments in the
Atlantic Southeast Facing Sea-Level Rise

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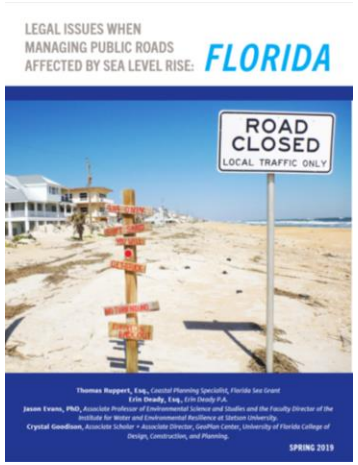

T DOES THE MONROE WMP D

1. SUMMARIZES:

- Results of field inventory for Monroe County's Public Works and Engineering Services of County-owned stormwater drainage infrastructure started in June 2017 over 1 year:
  - 300 catch basins
  - 41 injection wells
  - 67 manholes
  - 84 trench drains, and
  - 37 pipe outfalls stormwater drainage systems
- High quality point elevation data collected for 98 catch basins and 1 outfall (mostly along US 1)
- *Analyzes impacts to stormwater structures-* In 2030, 2060 and 2100

2. MAKES RECOMMENDATIONS FOR CURRENT AND FUTURE DATA COLLECTION AND PLANNING EFFORTS

3. MAP SERIES

Map Series 1: Monroe County Stormwater Infrastructure Inventory with Vulnerability to Existing Tidal Flooding, 1992 – 2010 Sea Level

NOAA INTERMEDIATE HIGH PROJECTION FOR 2100 SEA LEVEL RISE

Structure/Facility Type	2030 (.69' SLR)		2060 (1.82' SLR)		2100 (4.13' SLR)	
	Low	*High*	*Low*	*High*	*Low*	*High*
Catch Basins (300 Total)	0	9	3	148	260	295
Injection Wells (41 Total)	0	0	0	24	35	40
Manholes (67 Total)	0	0	2	41	59	62
Trench Drains (84 Total)	0	3	4	60	48	67
Pipe Outfalls (37 Total)	16	32	29	37	37	37

"LOW"

MEAN LOWER LOW WATER (MLLW)

IMPACT AT MLLW MEANS CONTINUOUSLY NON-FUNCTIONAL (NO FUNCTIONALITY AT ALL).

"HIGH" = MONROE COUNTY AND FDOT STORMWATER DRAINAGE INFRASTRUCTURE WITH CALCULATED BARE GROUND HEIGHTS LOWER THAN

Monroe County

Plan

County Staff:

Rhonda Haag
Chief Resilience Officer

Judith S. Clarke, P.E.
Director of Engineering Services

MONROE COUNTY

HDR wood.

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ADAPTATION PLAN AND PROC COS

$1.6 Billion* (Avg $9.6 Million / Mile)

$3.0 Million (Annual Operation & Maintenance)

49 Neighborhood areas	10 Neighborhood areas	10 Neighborhood areas	28 Neighborhood areas
Areas for 2025	Areas for 2025	Areas for 2035	Areas for 2035
$888,825,245	$179,591,227	$159,316,236	$378,007,456
$1,630,803 (O&M)	$339,356 (O&M)	$307,851 (O&M)	$683,432 (O&M)

Projected **SLR + King Tides** will affect the following:

(SLR Condition: NOAA 2017 Intermediate-High + King Tides)

2045

Unincorporated Countywide %

Miles of Vulnerable and Critical County Maintained Roadways	166 MI	53%
# of Residential Units along County Maintained Roadways	13,399 Res. Units	76%

* Cost estimate is conceptual and does not include design, right-of-way acquisition, harmonization/cost to cure, and legal fees. Cost estimates are preliminary and subject to change. Cost Estimate is based on 2020 Dollars.

OTHER WMPs AND BEST PRACTICES TO CONSIDER

- Sea Isles City, NJ Watershed Management Plan (from 2016), First Watershed Management Plan in U.S. with sea level rise:
- Some WMPs in Florida approved for credit, include:
  - Monroe County, FL Watershed Management Plan (from 2019), Watershed Management Plan with sea level rise (CRS Class = 3)
  - Pinellas County (CRS Class = 3)
  - City of Ocala (CRS Class = 3)
  - Palm Coast (CRS Class = 4)
  - Cutler Bay (CRS Class = 3)

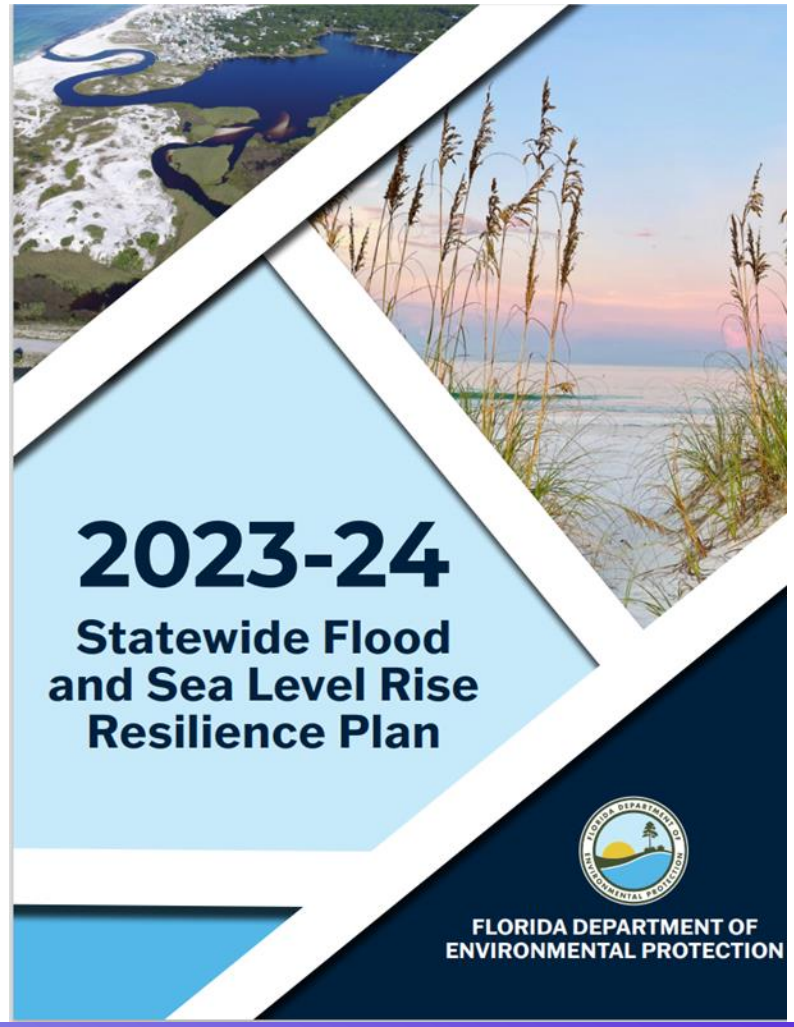
Important and Critical Tips for success:

- Use a modeling approach that **explicitly** models the consequences of the community's structures- "regional structures" are not likely to be sufficient and the WMP wont' receive credit according to ISO
- Do not use form templates or models that have not be **explicitly accepted by ISO**
- **Coordinate with ISO UPFRONT on your modeling approach** to make sure it will be accepted
- Coordinate **multiple times** to "check in" with ISO on your approach
- Factor in use of **individualized data for community, not regional data and structures**

PROGRAM

Grant	Funding Amount
Resilient Florida 21-22	$404 Million
Regional Resilience Entities 21-22	$1.9 Million
Resilient Florida-Planning 21-22	$19 Million
Statewide Flooding and Sea Level Rise Resilience Plan 2022	$270 Million
Resilient Florida 22-23	$275 Million
Resilient Florida-Planning 22-23	$28 Million
Statewide Flooding and Sea Level Rise Resilience Plan 2023	198 projects with $187 Million projected cost

Approximately $1,184,900,000 Billion awarded to date



THANK YOU

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MONROE COUNTY ROADS ADAPTATION PLAN AND COSTS

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$3.0 Million (Annual Operation & Maintenance)

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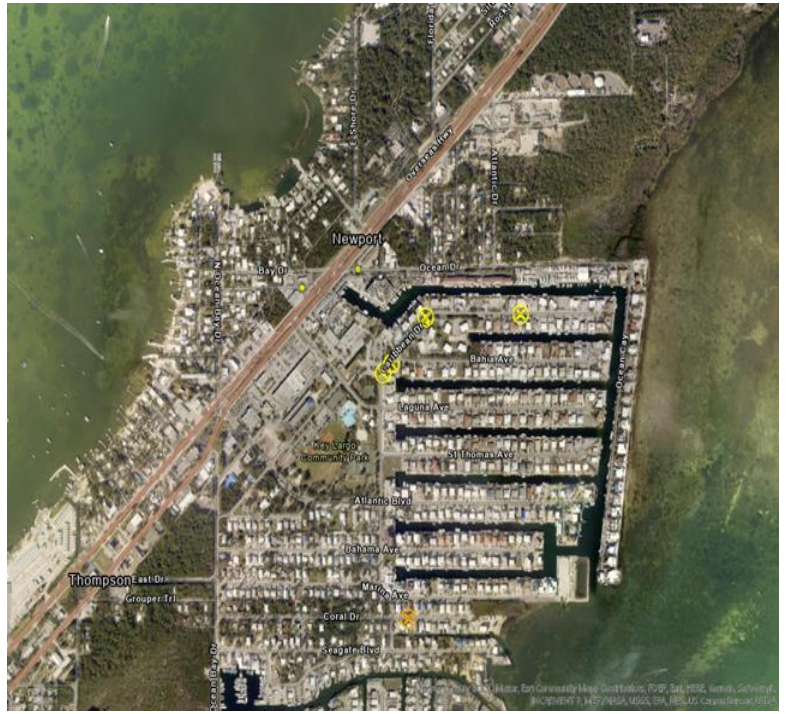
Stock Island

Duck Key

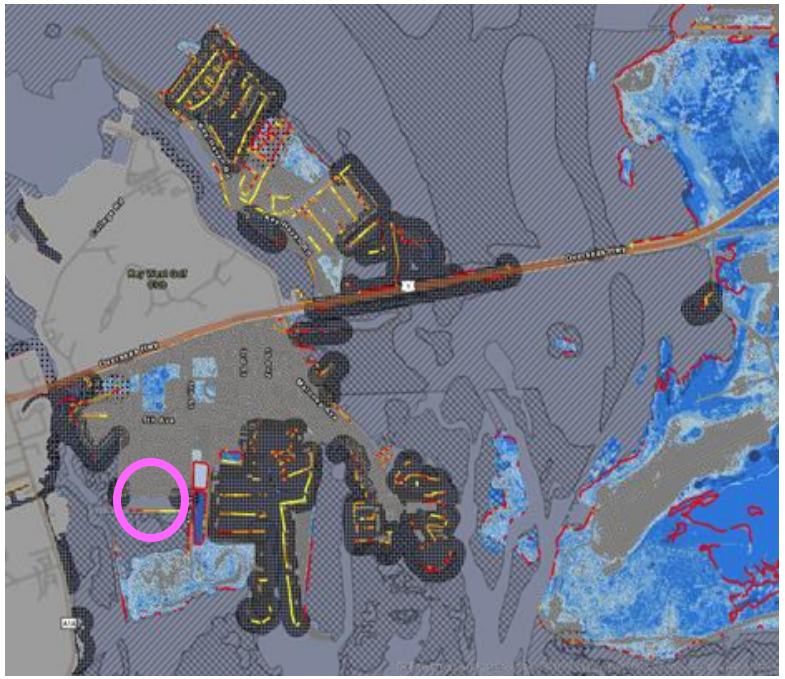
Port Largo



DRAFT STORMWATER IMPACTS
THE YEARS OF IMPACT ARE:
RED X = 2040
ORANGE X = 2070
YELLOW X = 2100

Still working on addressing "manholes" in the stormwater data set supplied by the County.

Stock Island



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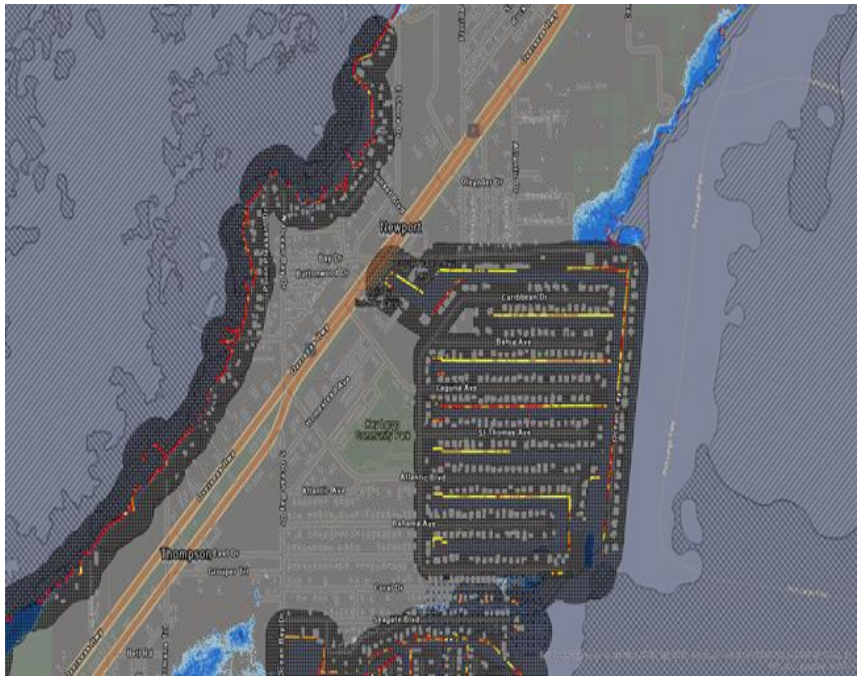
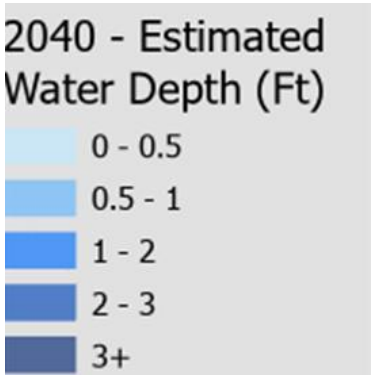


DRAFT SHORELINE IMPACTS/GAPS

RED X = 2040 (17”)

ORANGE X = 2070 (40”)

YELLOW X = 2100 (74”)

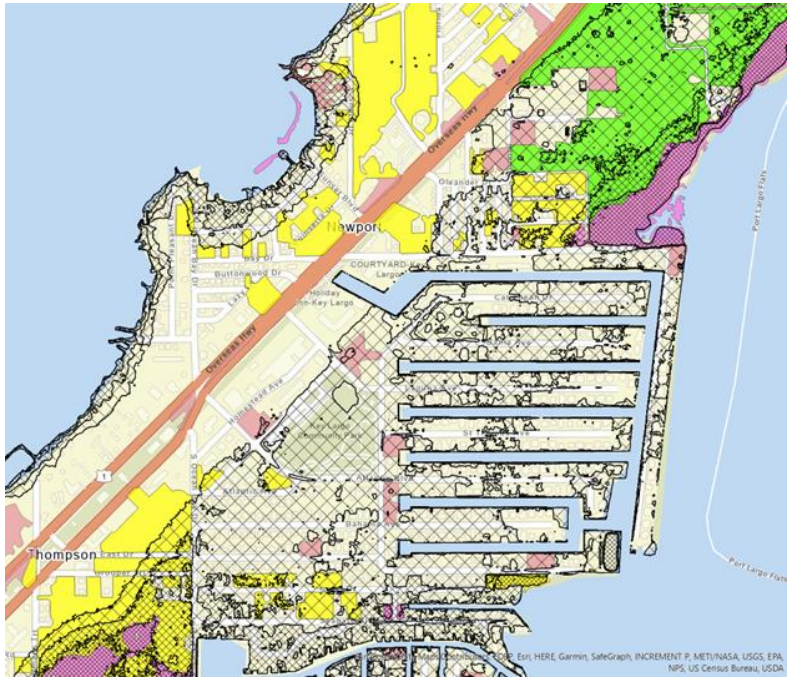


What shoreline solutions might work where?

Stock Island

Duck Key

Port Largo



DRAFT SPECIES FOCUS AREAS

RED X = 2040 (17”)

ORANGE X = 2070 (40”)

YELLOW X = 2100 (74”)

- Eastern Indigo Snake
- Cape Sable Thoroughwort
- Tree Cactus
- Woodrat
- Marsh Rabbit
- Beyond Study Area

Year

- 2040
- 2070
- 2100

Vulnerable species depend on geographic locations throughout the County

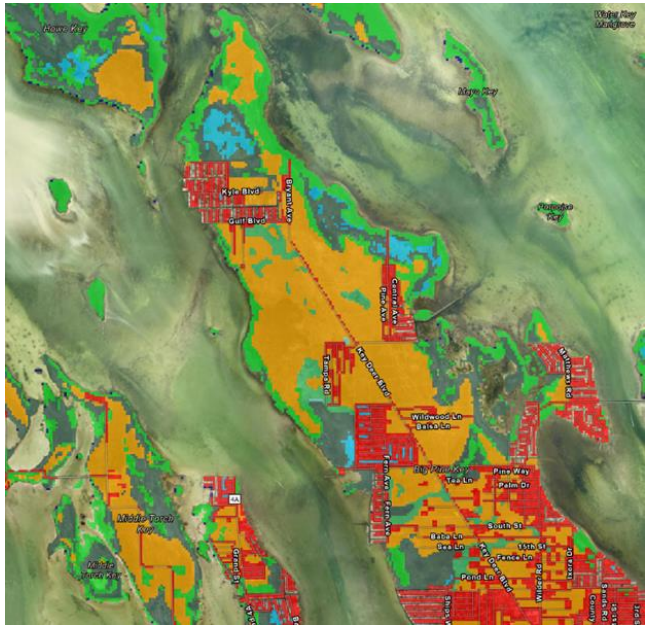
PRELIMINARY OUTPUT FOR HABITAT CHANGE (SLAMM AT A GLANCE)

	NOAA IH SLR Projection								
	Acres of land area; "present" is cross walk from FWC CLC Nov - 2019 to SLAMM NWI categories.								
		"No Protection"							
					Change from			Change from	
	Present	2040	Change	2070	start	2040	2100	start	2070
Approx SLR (eustatic) - Inches		10		33			67		
Developed Dry Land	19526	19097	-2%	18963	-3%	-1%	18654	-4%	-2%
Undeveloped Dry Land	14031	12890	-8%	12516	-11%	-3%	11252	-20%	-10%
Swamp	35125	6511	-81%	4656	-87%	-28%	1564	-96%	-66%
Cypress Swamp	31814	1564	-95%	442	-99%	-72%	121	-100%	-73%
Inland-Fresh Marsh	147869	18043	-88%	17379	-88%	-4%	2484	-98%	-86%
Trans. Salt Marsh	0	26		417		1496%	940		125%
Mangrove	350244	387975	11%	185635	-47%	-52%	81923	-77%	-56%
Tidal Flat	3688	543	-85%	328	-91%	-40%	236	-94%	-28%
Ocean Beach	164	165	0%	164	0%	-1%	157	-5%	-4%
Rocky Intertidal	8230	4657	-43%	3495	-58%	-25%	2109	-74%	-40%
Inland Open Water	578	347	-40%	322	-44%	-7%	306	-47%	-5%
Estuarine Open Water	17664	146292	728%	352467	1895%	141%	476343	2597%	35%
Open Ocean	1596	1741	9%	1811	13%	4%	1877	18%	4%
Tidal Swamp	16	15	-5%	15	-7%	-1%	13	-15%	-9%
Flooded Developed Dry Land	0	429		562		31%	872		55%
Flooded Forest	0	30250		31372		4%	31693		1%
Aggregated Non Tidal	33556	32415	-3%	32042	-5%	-1%	30778	-8%	-4%
Freshwater Non-Tidal	214808	26118	-88%	22477	-90%	-14%	4169	-98%	-81%
Open Water	19838	148380	648%	354599	1687%	139%	478526	2312%	35%
Low Tidal	12082	5365	-56%	3987	-67%	-26%	2501	-79%	-37%
Transitional	350244	418252	19%	217424	-38%	-48%	114555	-67%	-47%
Freshwater Tidal	16	15	-5%	15	-7%	-1%	13	-15%	-9%

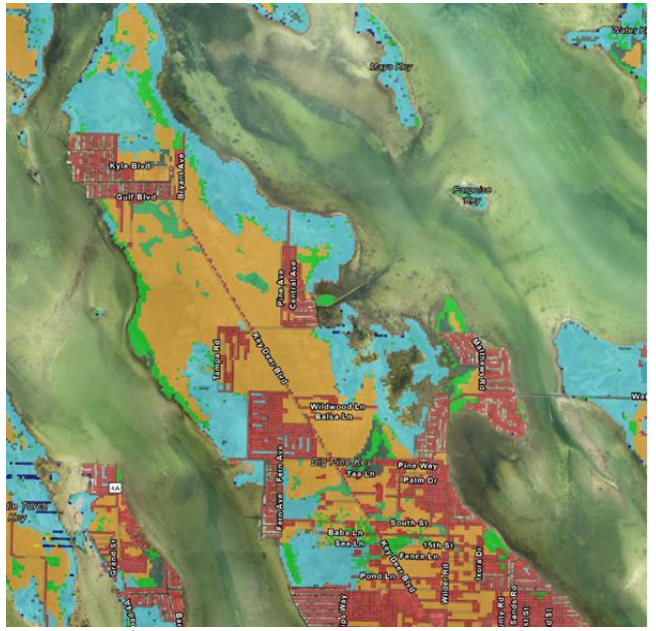
Assumptions:

- No flood mitigation measures have been put in place
- Shows: what acreage and percentage changes occur over 2040, 2070 and 2100
- The SLAMM output TECHNICALLY is the same as the other map series, but because the habitat data was from 2019 – the program moved the base year from 2000 MSL to 2019 MSL along a linear trend:
  2040 -> 10 inches
  2070 - > 33 inches
  2100 -> 67 inches
- We still need to reconcile these results with other project modeling ***

Big Pine
Current Habitat
2019 FWC



Big Pine
Projected Habitat Impacts
2100 - SLAMM



DRAFT HABITAT CHANGES FROM SEA LEVEL RISE IMPACTS

2040 -> 10 INCHES
2070 - > 33 INCHES
2100 -> 67 INCHES

THANK YOU

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QUESTIONS?