Level-Up Palm Beach

Future Vision for a Resilient Barrier Beach Community

Florida Shore & Beach Preservation Association

64th Annual Conference

September 17, 2021

WOODS HOLE GROUP
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Today's Presentation

Story Time

Story About Modeling and Assets?

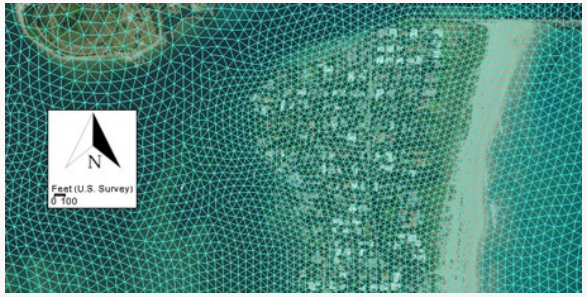
Palm Beach Flood Risk Model (PB-FRM)

Award Winning

Federal Highways – "Blueprint for Addressing Coastal Resilience"

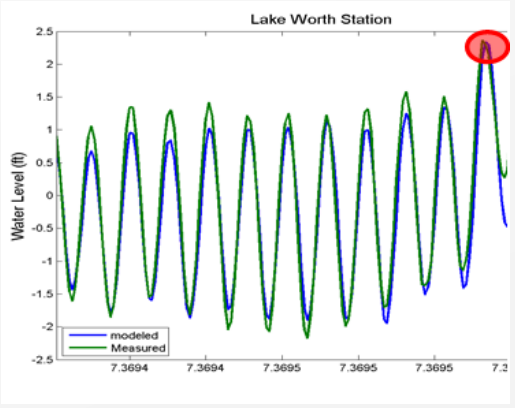
High Resolution

Simulates coastal flooding at street, asset, property level



Validated

Results proven to match measurements during key storms like Hurricane Irma



Probabilistic – Monte Carlo

Monte Carlo method applied to simulate many storms to estimate probability of flooding.

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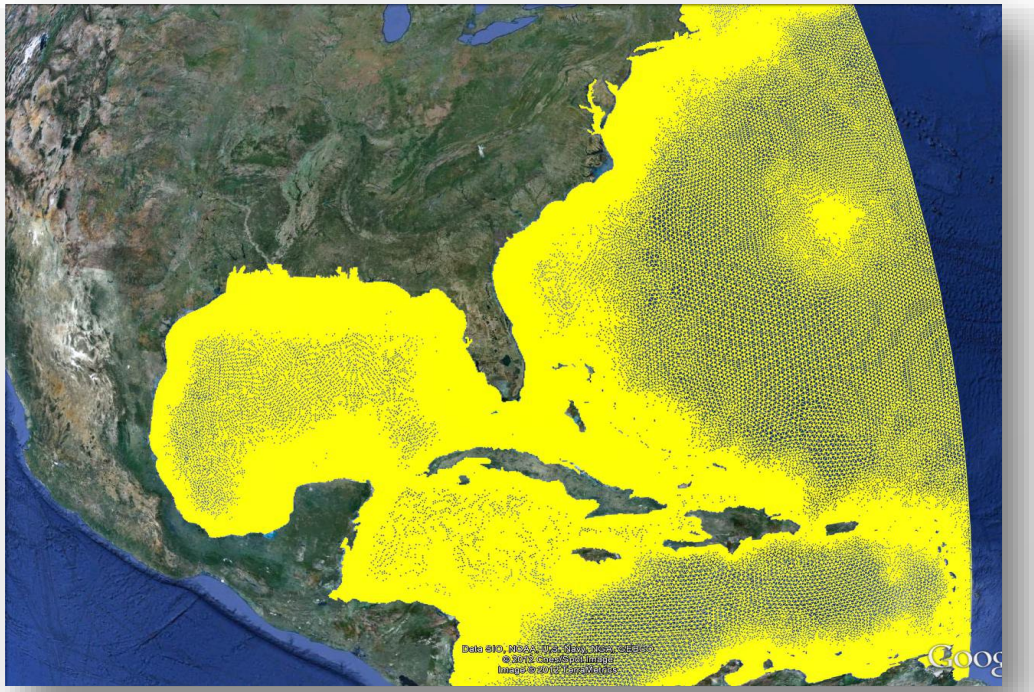
Wide Range of Conditions



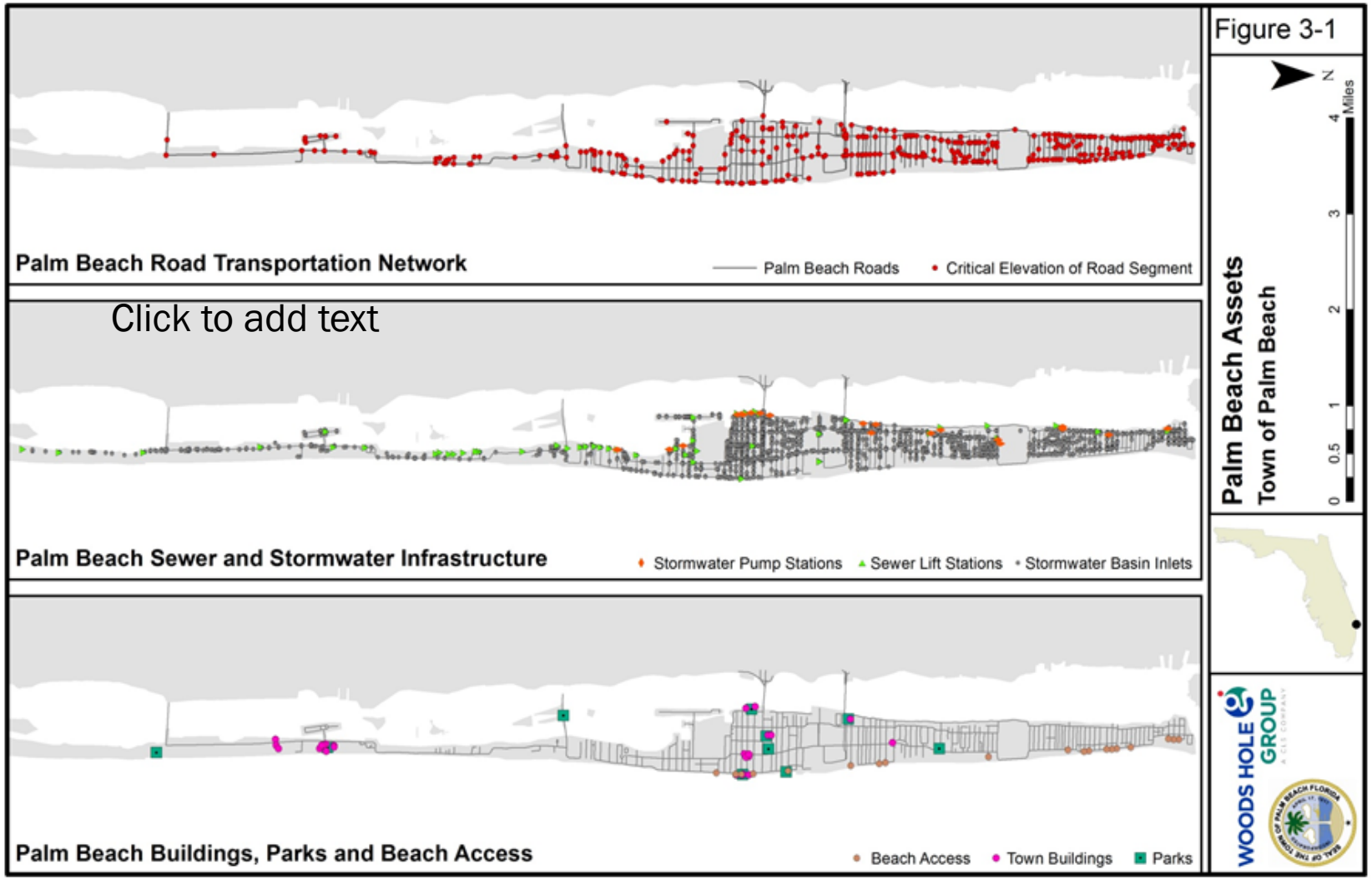
Coastal Surge Dominates

The primary source of extreme flooding, expected to increase in future is from coastal surge through the Inlet and into Lake Worth, overtopping the bulkheads.

Future Probabilities of Flooding Exceed Present

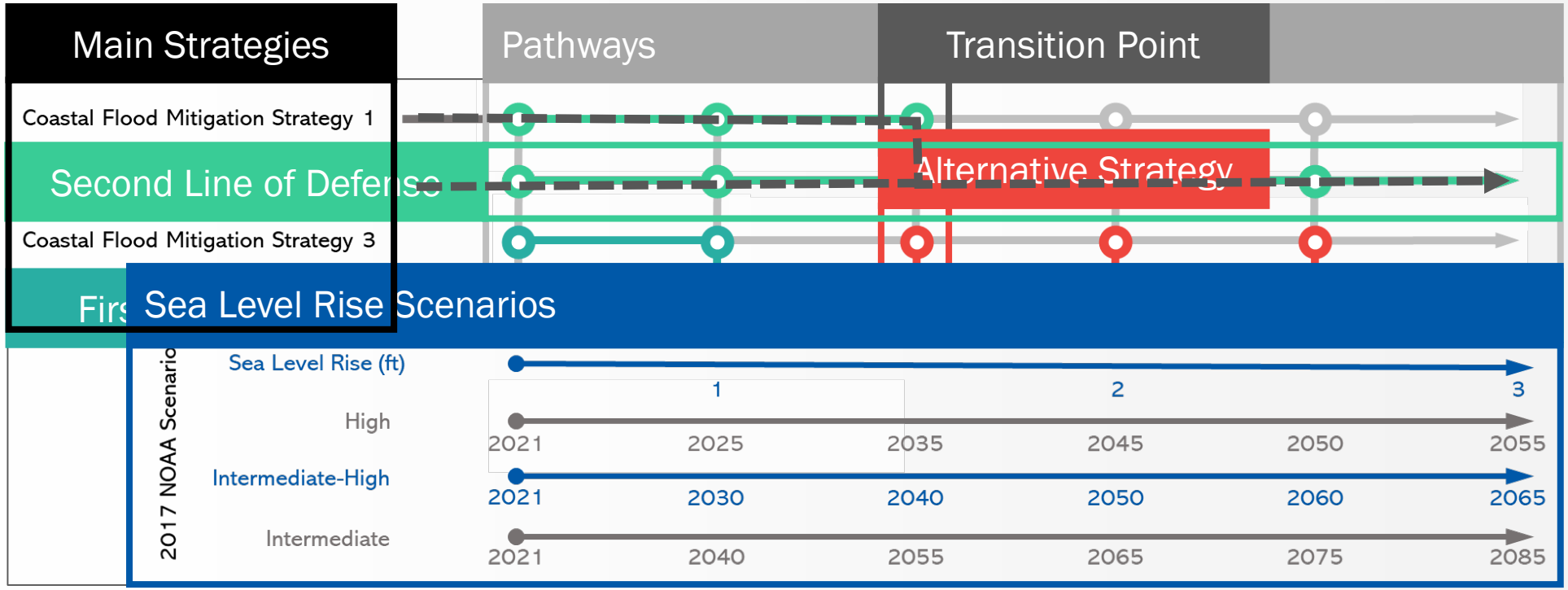
Maps were produced demonstrating future probability of flooding is expected to increase along with flooding depth

Compiled Information on > 2,000 Town Assets



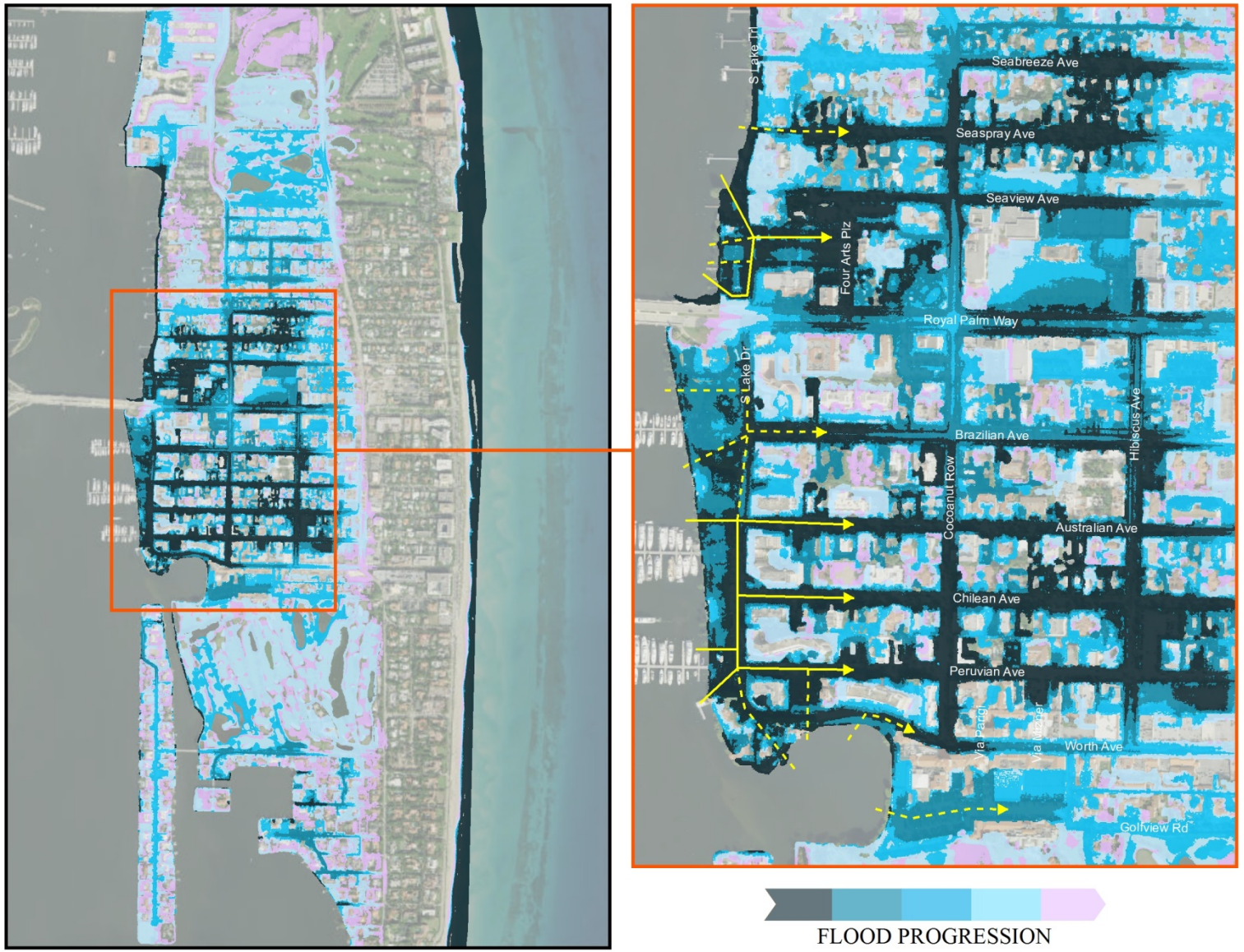
Story About Complex Decision-Making?

Adaptation Pathway Diagrams

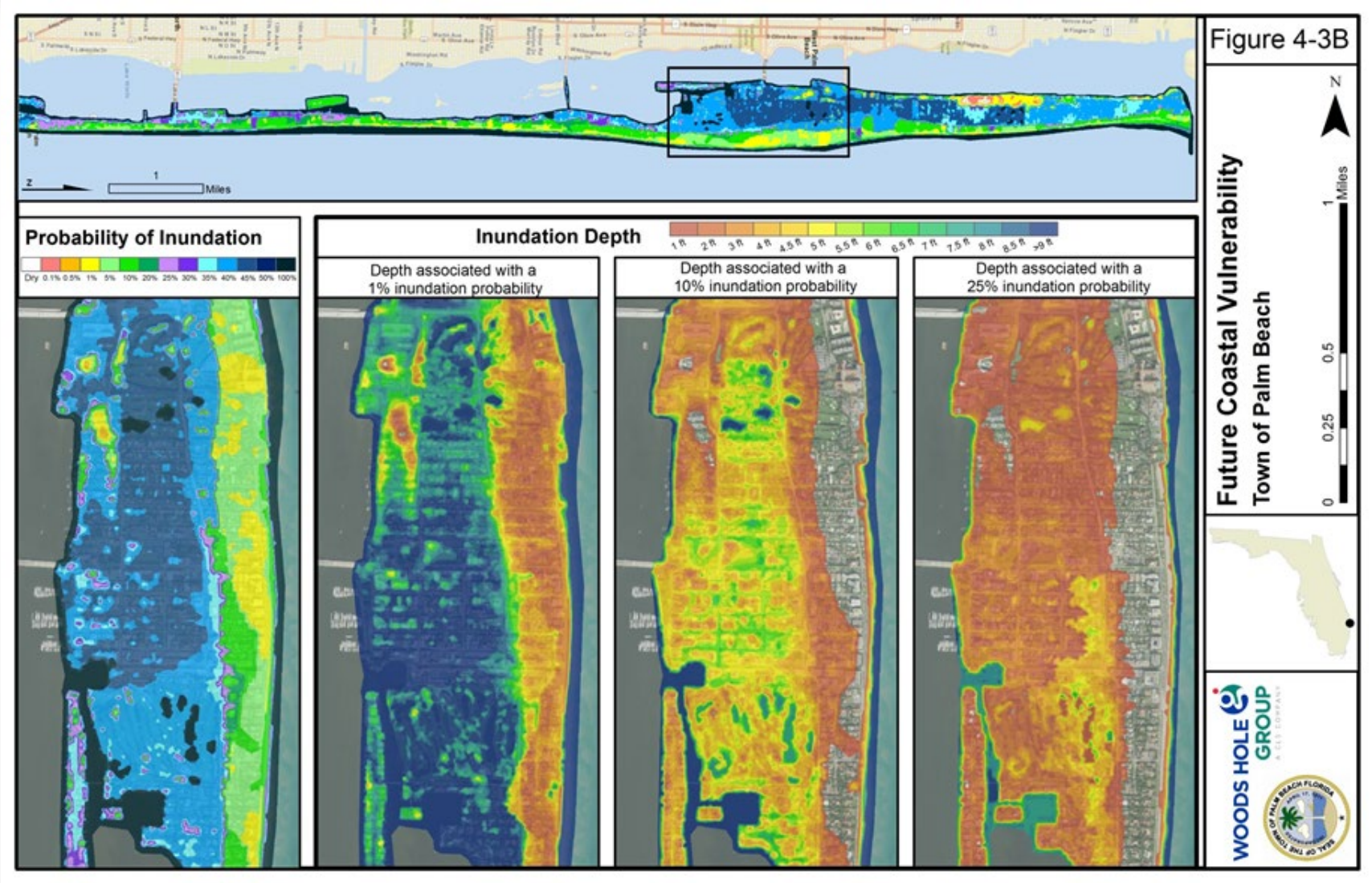


Scary Story?

Flood Pathway



Future Flood Risk



Story About Opportunity!

Get to the Meat of this…

Level-Up Palm Beach

Goal, Themes, and Objectives

Goal: to set Palm Beach on a path to achieve high standards of resilience to sea level rise, future storms, and related coastal flooding.

Resilience: *the capacity of the community to:*

- ***Anticipate*** *future coastal flooding risks in a changing climate,*
- ***Plan and implement*** *effective coastal flood mitigation strategies,*
- ***Monitor and adjust*** *strategies to changes in coastal flood risk over time, and*
- ***Recover*** *faster and stronger from coastal flooding events.*

Town Facilities and Infrastructure

Adapt Town assets to mitigate risks of damage and failure from future coastal flooding

Lake Worth Shoreline

Mitigate neighborhood and Town-wide exposure to future coastal flooding, emanating primarily from the Lake Worth shoreline

Floodplain Development

Improve the safety of buildings and their occupants from future coastal flooding

Comprehensive Planning

Integrate future coastal flood risk mitigation with other Town planning, policy, and infrastructure funding priorities

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Implementation Plan

Near- and Medium-Term Implementation Plan

Matrix consolidating recommendations and proposed phasing through the end of the 2020s, identifying candidate lead Town entities

Long-Term Adaptation Pathways

Flexible framework with decision points and scenarios for anticipating and adapting to changing conditions in 2030s and following decades

Monitoring

Summary of relevant metrics and methods for the Town to track, informing future adaptive management and decision-making

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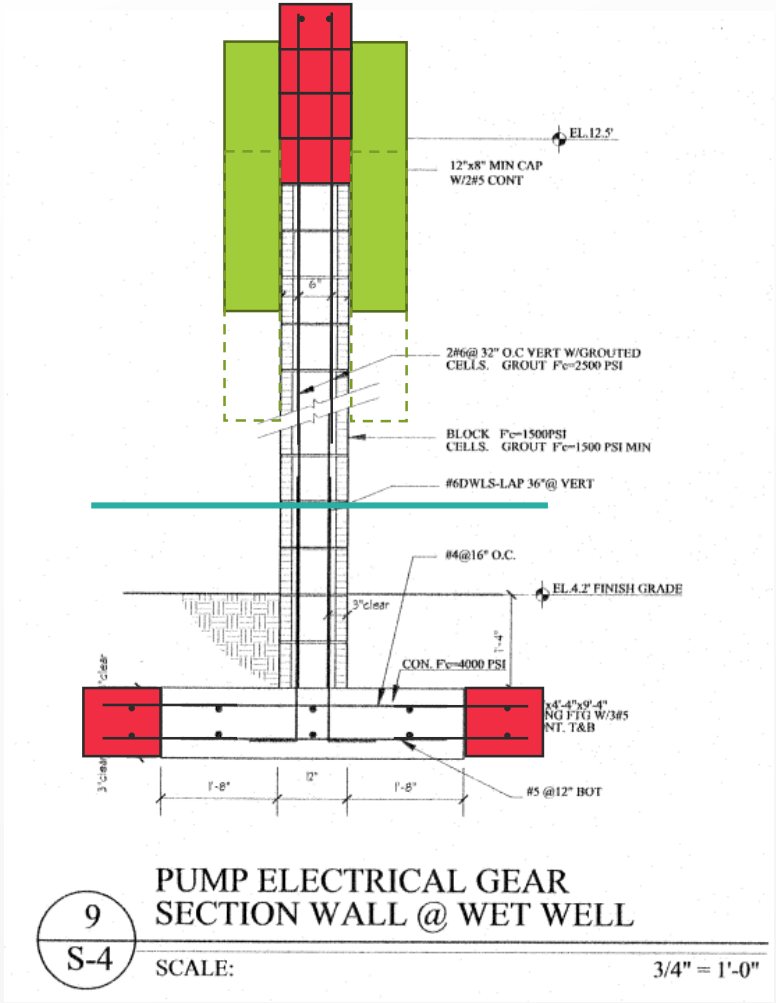
THEME 1: Town Facilities and Infrastructure

Sub-Theme	Recommended Action	Timeframe (Years)				Lead Town Entities
		1-2	3-5	6-10	10+	
Policy	Adopt interim DFEs for Town facilities and infrastructure	■				PW
	Consider revising interim DFEs based on PB-FRM updates	■	■			PW
Projects	Incorporate adaptation measures in existing 5-year capital plan projects	■	■			PW, TM
	Incorporate future flood risk in selection, design, and budget of projects for future 5-year capital plans	■	■	■	■	PW, TM
Prioritization	Conduct survey of critical elevations for Town facilities	■				PW
	Update PB-FRM to align with State standards	■				PW
	Revise probability of flooding data and risk scores for Town assets	■				PW
Public Communication	Add updated PB-FRM maps to Town GIS for public use	■	■			PZB, IT

D-12 Stormwater Pump Station: Wet Well Electrical Panels



Extend Wall/Foundation

To enable the pump electrical panels to be raised, extend the existing reinforced wall vertically and reinforced foundation horizontally, if needed.

Raise Electrical Panels

Once the wall is vertically extended, the electrical panels can be mounted at the higher elevation and wired. Protect any splices below the DFE with watertight connectors.

Provide Higher Access

If needed due to code requirements for panel access, raise the existing concrete pad or provide a platform. Backfill adjacent grade or add railing if required by code.

Town Docks

THEME 2: Lake Worth Shoreline

Sub-Theme	Recommended Action	Timeframe (Years)				Lead Town Entities
		1-2	3-5	6-10	10+	
Code of Ordinances	Revise and strengthen bulkhead construction specifications (Code of Ordinances)	■	■			PW, PZB, TM, TC
	Revise and strengthen bulkhead maintenance and certification standards (Code of Ordinances)	■	■			PW, PZB, TM, TC
	Consider revising interim DFEs based on updated PB-FRM results	■	■			PW, PZB, TM, TC
Administration	Create online seawall/bulkhead applications		■			PW, PZB, IT
	Create and maintain geospatial database and document management system for tracking bulkhead/seawall application materials, top elevation, adjacent grade, length, substantial improvements, certification, waivers, and easements		■	■	■	PW, PZB, IT
Lake Worth Water Level Monitoring	Create a water level monitoring plan	■				
	Implement water level monitoring plan (phased)	■	■	■	■	

THEME 2: Lake Worth Shoreline (continued)

Sub-Theme	Recommended Action	Timeframe (Years)				Lead Town Entities
		1-2	3-5	6-10	10+	
Neighborhood-Scale Flood Control Systems	Add "coastal flood control" to Municipal Services entity charter (Code of Ordinances)	■	■			PW, TM, TC
	Survey seawall top elevations, adjacent grades, and conditions	■				PW
	Develop prioritization criteria and collect required data		■			PW, PZB, TM, TC
	Plan priority flood control system(s)			■	■	PW, PZB, TM, TC
	Implement priority flood control systems				■	PW, TM
Storm Surge Barrier Feasibility Study	Carry out preliminary model-based evaluation of storm surge barrier effectiveness (optional)	■				PW
	Conduct outreach to USACE, FDEP, FDOT, Palm Beach County, neighboring municipalities, Port, and SFWMD for CSRM study	■				PW, TM, TC, M
	Conduct outreach to Federal elected officials for CSRM study	■				PW, TM, TC, M
	Develop and submit a proposal to USACE for CSRM study	■				PW, TM, TC, M
	Engage Federal elected officials for Congressional authorization and appropriations for CSRM study	■	■			PW, TM, TC, M
	Collaborate with USACE and partners to carry out CSRM study		■	■		PW, TM, TC, M
	Engage State and Federal elected officials and agency leadership for funding to implement CSRM study recommendations			■	■	PW, TM, TC, M

Evaluate Feasibility of Surge Barrier at Lake Worth Inlet

If feasible, could benefit the Town and its neighbors along the Lake Worth shoreline by mitigating coastal flooding from storms.

Limit the height to which bulkheads and other shoreline infrastructure need to be raised - future high tide and small storms.

Inlets to Lake Worth and the Intercoastal Waterway

US Army Corps of Engineers “Back Bay” Coastal Storm Risk Management Studies (ongoing in Miami-Dade, New Jersey)

The process is long, so start soon by collaborating with neighboring jurisdictions and stakeholders

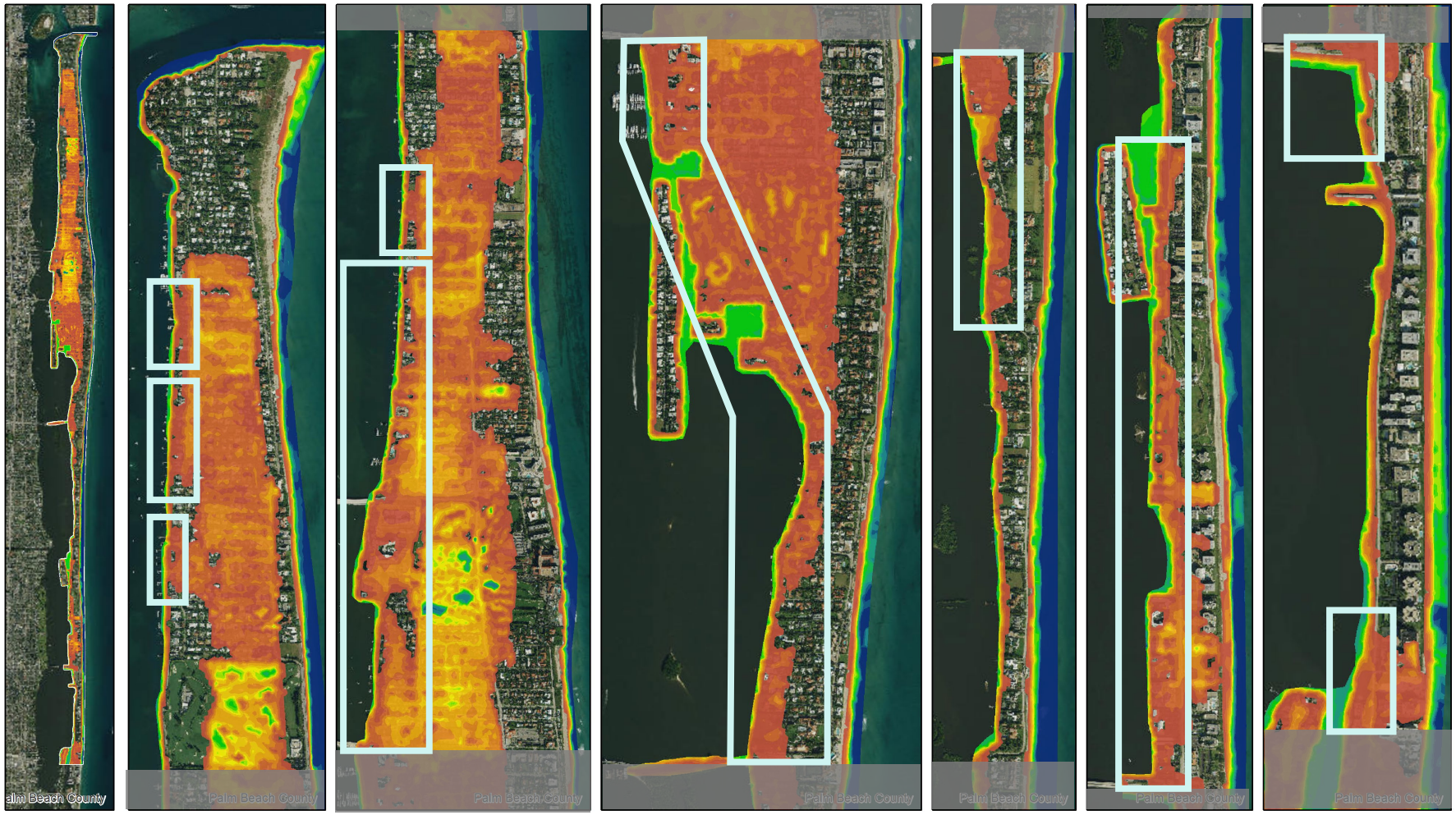
Higher Probability Shoreline Flood Pathways

There are limited opportunities to implement small, independently-effective coastal flood control projects due to the long, low-lying shoreline and expansive, interconnected floodplain

Present 10-Year Flood

Depth

- 1 ft
- 2 ft
- 3 ft
- 4 ft
- 4.5 ft
- 5 ft
- 5.5 ft
- 6 ft
- 6.5 ft
- 7 ft
- 7.5 ft
- 8 ft
- 8.5 ft
- >9 ft



THEME 3: Floodplain Development

Sub-Theme	Recommended Action	Timeframe (Years)				Lead Town Entities
		1-2	3-5	6-10	10+	
Code of Ordinances	Revise and strengthen substantial improvement and substantial damage definitions and administrative procedures	■	■			PZB, TM, TC
	Adopt higher non-residential building elevation requirements	■	■			PZB, TM, TC
	Revise and strengthen residential building elevation requirements	■	■			PZB, TM, TC
	Revise building height definitions	■	■			PZB, TM, TC
	Revise and expand flood hazard area boundaries where floodplain management and building standards apply	■	■			PZB, TM, TC
	Coordinate proposed amendments to Florida Building Code with FDEM	■	■			PZB, TM, M

THEME 4: Comprehensive Plan

Sub-Theme	Recommended Action	Timeframe (Years)				Lead Town Entities
		1-2	3-5	6-10	10+	
Comprehensive Plan	Prepare draft Comprehensive Plan amendment, hold public hearings, intergovernmental review, and adopt final amendment by ordinance	■	■			PZB, TM, TC
	Implement adopted policies and monitor progress	■	■			PZB, TM, TC

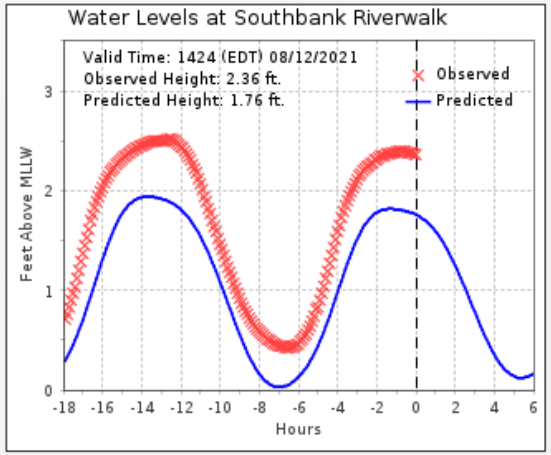
Elements

1. Future Land Use Element
2. Transportation Element
3. Infrastructure Element
4. Coastal Management/ Conservation Element
5. Intergovernmental Coordination Element
6. Capital Improvements Element

Monitoring

Monitoring conditions is needed to inform adaptive management decisions, assess whether certain thresholds are reached to change action.

A full stocktaking is recommended every 10 years, with interim status reports every 2 years.



Metrics:

- Observed sea level rise
- Updated PB-FRM and/or FEMA base flood elevations (BFEs)
- Coastal flooding disasters
- Percent of Town-owned facilities, private buildings, and Lake Worth shoreline adapted
- Coastal Storm Risk Management (CSRM) Feasibility Study
- Neighborhood-scale coastal flood control systems

Take Home Message

- Climate Change Planning Presents Tremendous Opportunities
- Use the Best Science and Technology to Guide Decision-Making
- It is NOT a Doom & Gloom Situation
- You Can Define Tangible & Affordable Short-Term Actions
- Prepare to Monitor & Adapt

Thank you

None of this work is possible without the support and creativity of Town of Palm Beach

Woods Hole Group - Coastal Resilience Implementation Plan 2021

- Draft Final Report August 2021

Woods Hole Group - Coastal Vulnerability Assessment 2019

- Shore Protection Board Mtg. PowerPoint Presentation Review 5/27/21
- TOPB - Coastal Vulnerability Assessment
- Tables TOPB CFVA
- Figures TOPB CFVA

https://www.townofpalmbeach.com/133/Coastal-Protection

Hurricane Larry 9-10-21 - Massachusetts

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It was a Team Effort – Thanks to Nasser, Brittany, Ted, Kirk, Alex, Joe, and more!

Thank You FSBPA Staff!