



# Improving Resiliency to Coastal Flooding

City of Delray Beach

**Town Hall Meeting – Palm Trail**

**March 12 & 13, 2020**



# Presentation Overview



Resilience Planning Efforts



Capital Improvement Projects



State & Federal Coordination



Comparison of Seawall Ordinances In Nearby Communities



Community Input

# Resilience Planning Efforts



Stormwater Master Plan Updates



Seawall Vulnerability Study



Dune Management

Cynthia Fuentes, PE  
*Engineering Division Manager*  
City of Delray Beach

# Stormwater Master Plan (SWMP) Update

- Update of the City's previous Master Plan from 2001
- Completed by ADA Engineering
- Identified and ranked Problem Areas
  - Including drainage problems, street flooding, tidal flooding, inadequate infrastructure, stormwater quality and recharge
- Create a plan to address issues over the next 30 Years
- Entire Plan Estimated Cost ~ \$380M



# SWMP Implementation Approach

- Current Capital Projects Under Way
  - Thomas Street Pump Station
  - Tropic Isle Improvement
  - Marine Way Drainage & Pump Station
- Future Capital Improvements Projects
  - Using recommendations in the SWMP
  - Available Funding
  - Coordination with other projects
  - Input from residents
- Repair and Rehabilitation – Continuous Effort
  - Pipe Lining
  - Backflow prevention

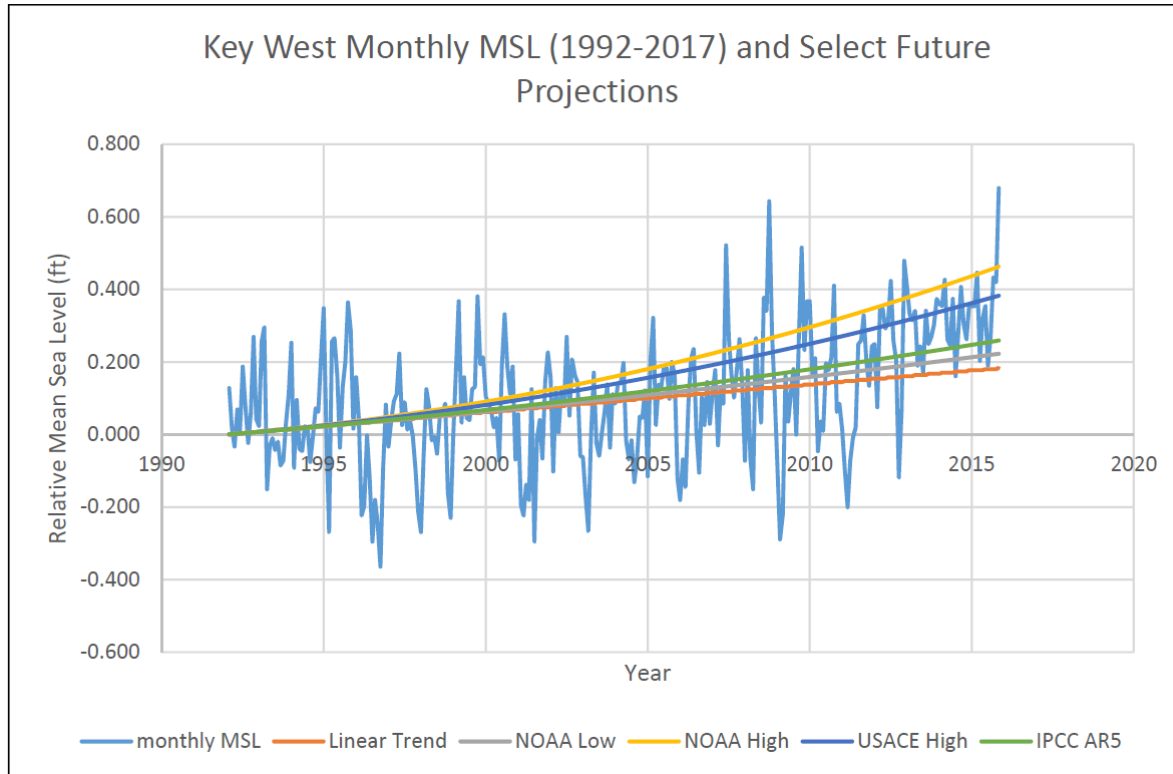


- 1 Mile of Public Seawalls
- 20 Miles of Private Seawalls
- Assessed vulnerability to flooding along ICW
  - Water level predictions for 30 years
  - Assessed current conditions of seawalls
- Identified options to protect infrastructure
  - Compared current conditions against water level predictions





# 30-Year Planning Elevation



Average Daily Maximum Water Level 2017 **1.0 ft.**

30 years of Sea Level Rise **0.6-1.1 ft.**

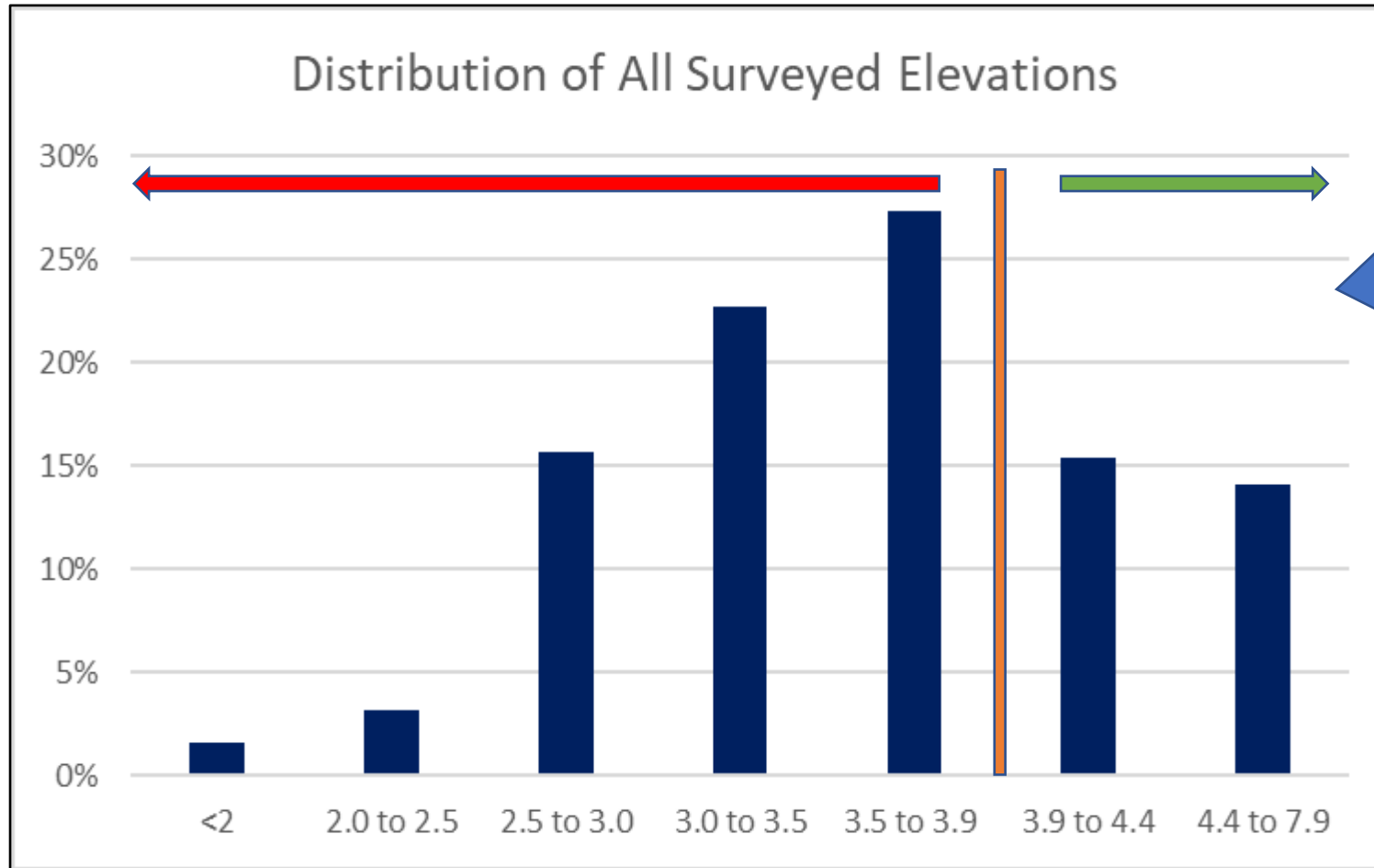
5-year Return Period Event **1.8 ft.**

Freeboard **0.5 ft.**

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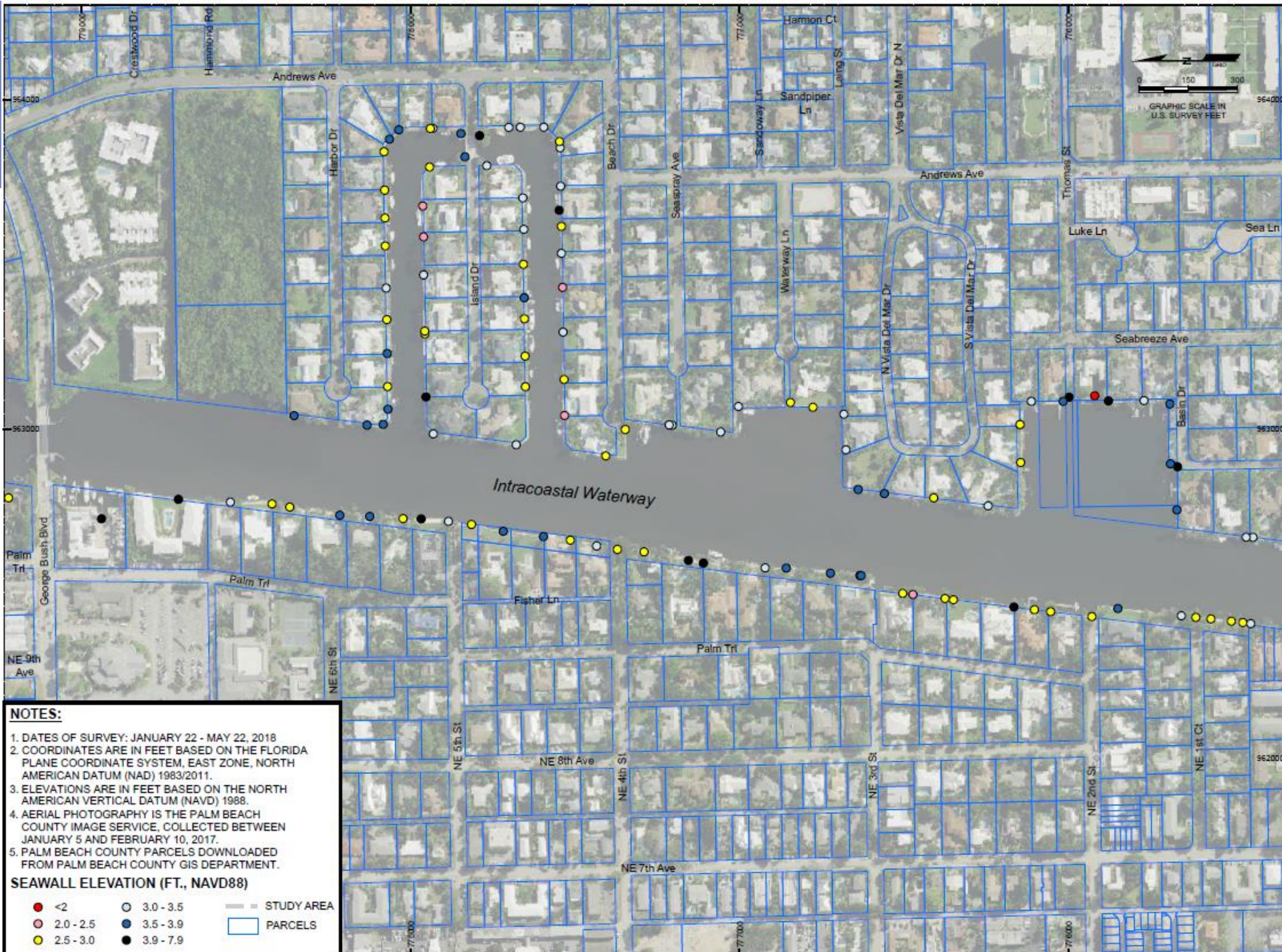
**3.9 to 4.4 ft. NAVD**

# Seawall Elevation Analysis



30-Yr  
Planning  
Elevation  
Range =  
3.9 - 4.4 Ft  
NAVD

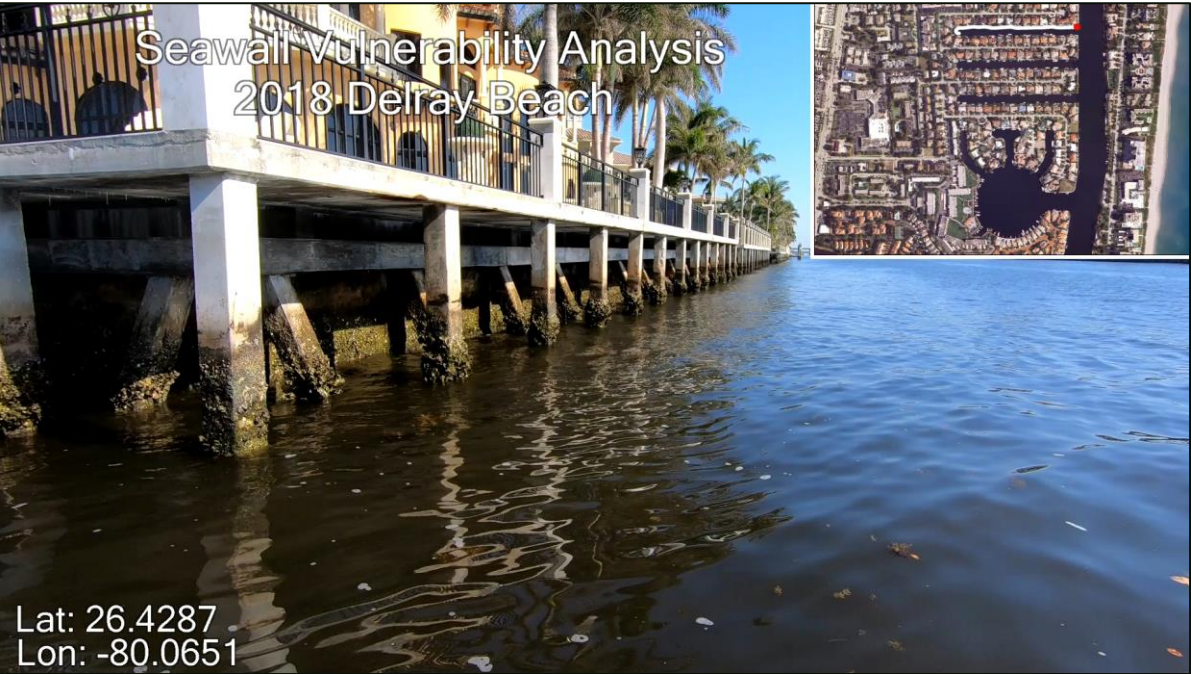






# Seawall Condition Analysis

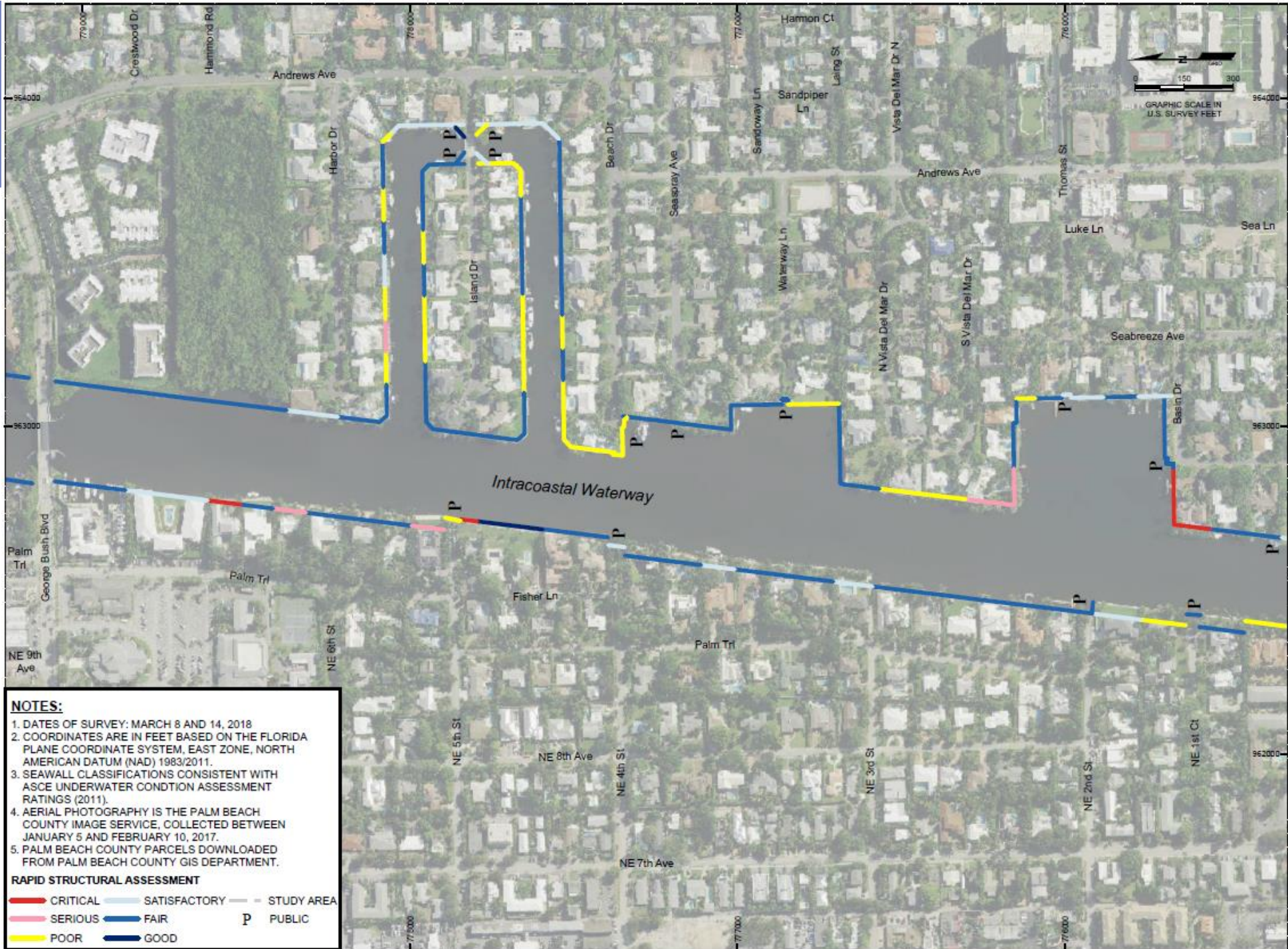
	Good	Satisfactory	Fair	Poor	Serious	Critical
Public	1	16	9	3	0	0
Private	48	170	450	152	41	7
Total %	4%	19%	53%	18%	5%	1%



Beach Drive









# Seawalls - Implementation Approach

- Public
  - Approximately half of seawalls either already raised or under way
- Private
  - City to adopt Ordinance to Protect City and Residents from Projected Sea Level Rise

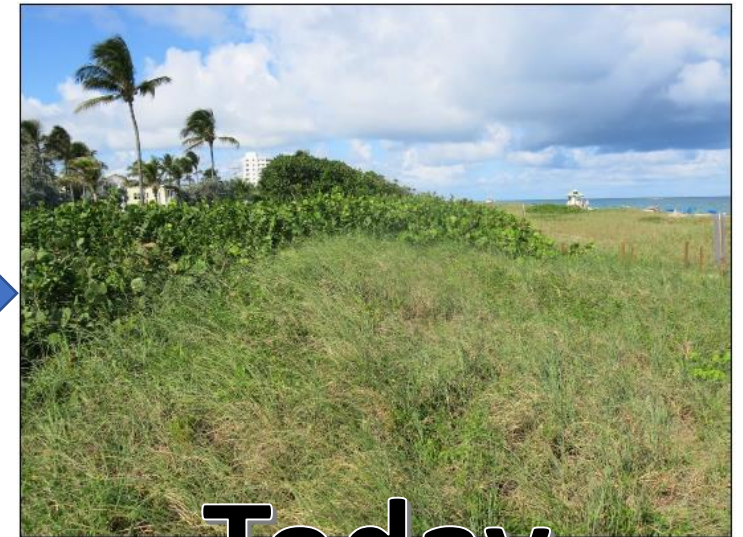


*2018 Veteran's Park Seawall Improvement*



# ● ● ● Dunes are our first line of defense

- Natural barrier to destructive forces of wind and waves
- Absorb impact of storm surge and high waves, moderating inland flooding
- Supply sand to the eroding beach during storms
- Buffer windblown sand and salt spray





# Dune Maintenance

- City Efforts
  - Dune Trimming
  - Removing Exotics
  - Keeping public off the dunes
- What you can do:
  - Use dedicated walkways to get to the beach
  - Keep recreational activities away from the dune, including boats, surfboards, and beach chairs
  - Educate friends and family about the impacts



# Capital Improvement Stormwater Project



Capital Improvement Project: Palm Trail and George Bush Boulevard Drainage Intersection Improvements

Isaac Kovner, PE  
*Principal Engineer*  
City of Delray Beach





# Capital Improvement Project Palm Trail



- Neighborhood Improvement Project Areas
  - Palm Trail and George Bush Boulevard Intersection - \$180,000

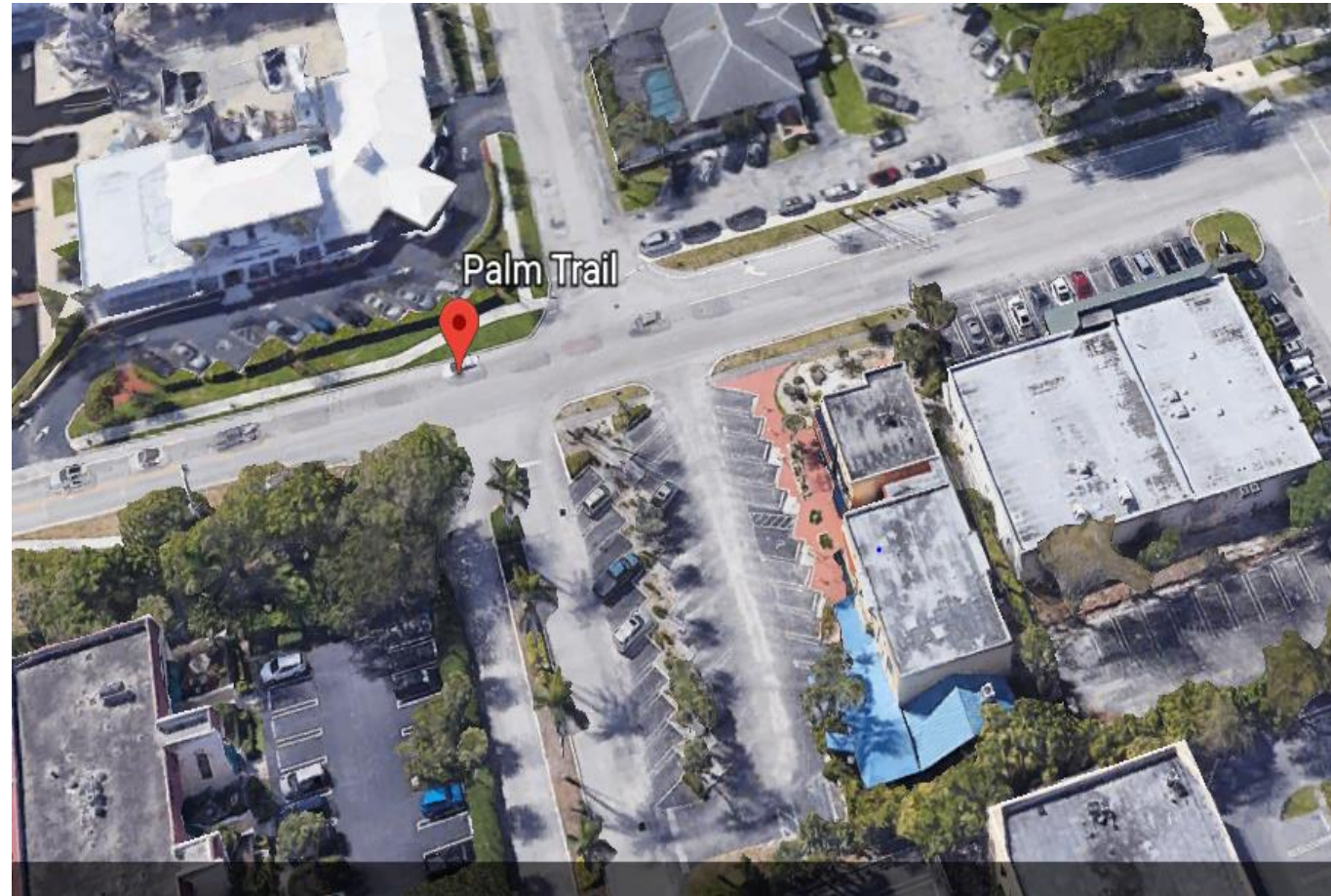
# Palm Trail/George Bush Blvd. Intersection

## Concerns:

- Roadway and Tidal Flooding
- No check valve on outfall

## Remedies:

- Install Check Valve
- Improve drainage system piping



# State and Federal Coordination



Community Rating System



National Pollutant Discharge Elimination System



Local Mitigation Strategy

Joseph Williams  
*Project Manager I*  
City of Delray Beach

# Community Rating System

## National Flood Insurance Program Community Rating System (CRS)

- The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is an organization that ranks participating communities in accordance with their level of participation and documentation of flood prevention activities.
- Cities earn credits which helps residents receive discounts on their flood insurance premiums.
- The City of Delray Beach is an active participant on the NFIP CRS program and has recently received an additional credits which equates to a 15% discount on flood insurance premiums for residents of Delray Beach.



# Community Rating System

Message	Outcome
1. Know your flood hazard	More map information inquiries
2. Insure your property for flood hazard	Increase in the number of flood insurance policies
3. Protect people from the hazard	Fewer water rescues and police citations for ignoring barricades
4. Protect your property from the hazard	Reduced property loss due to flooding
5. Build responsibly	Reduced number of building department citations
6. Protect natural floodplain functions	Improved water quality as reported in NPDES
7. Be prepared for hurricanes and storm surges	Reduced property loss from hurricanes and storm surges
8. Maintain your stormdrains	Reduced street flooding events from clogged stormdrains
9. Drive responsibly in flood events	Reduced reports of stalled cars and home flooding from traffic wake
10. Plan for sea level rise	Increased openness to freeboard restrictions and other mitigation



# National Pollutant Discharge Elimination System (NPDES)



- Created in 1972 by the Clean Water Act, the NPDES permit enables the state to enforce water pollution regulations.
- NPDES permits make sure that a state's mandatory standards for clean water and the federal minimums are being met
- City participates in countywide MS4 permit with the State of Florida
  - 2018-2019 study reported decreased pollution results!
  - Improved drainage abilities with maintenance of roadways and stormwater conveyance systems
  - Reduced phosphorus levels in shared water bodies through joint efforts with neighboring communities (such as the Lake Ida drainage basin)



# Local Mitigation Strategy (LMS2020)



- The City of Delray Beach participates in the Local Mitigation Strategy (LMS) steering committee consisting of all 38 municipalities within Palm Beach County making our City more resilient using local, state and federal funding sources to mitigate against storm surge, sea level rise and climate change hazards by:
  - Increasing the number of planning stakeholders we are working with for assessments
  - Analyzing local flooding conditions as it relates to Palm Beach County communities
  - The City includes mitigation projects in its Master Plans and Capital Improvement plans such as:
    - Tidal Check valves
    - Seawall Improvements
    - Stormwater Pump Stations







# Seawall Ordinance Comparisons



Comparison of Seawall Ordinances In Nearby Communities



Community Input

Molly Daly  
*Assistant Sustainability Planner*  
City of Delray Beach

# Definitions

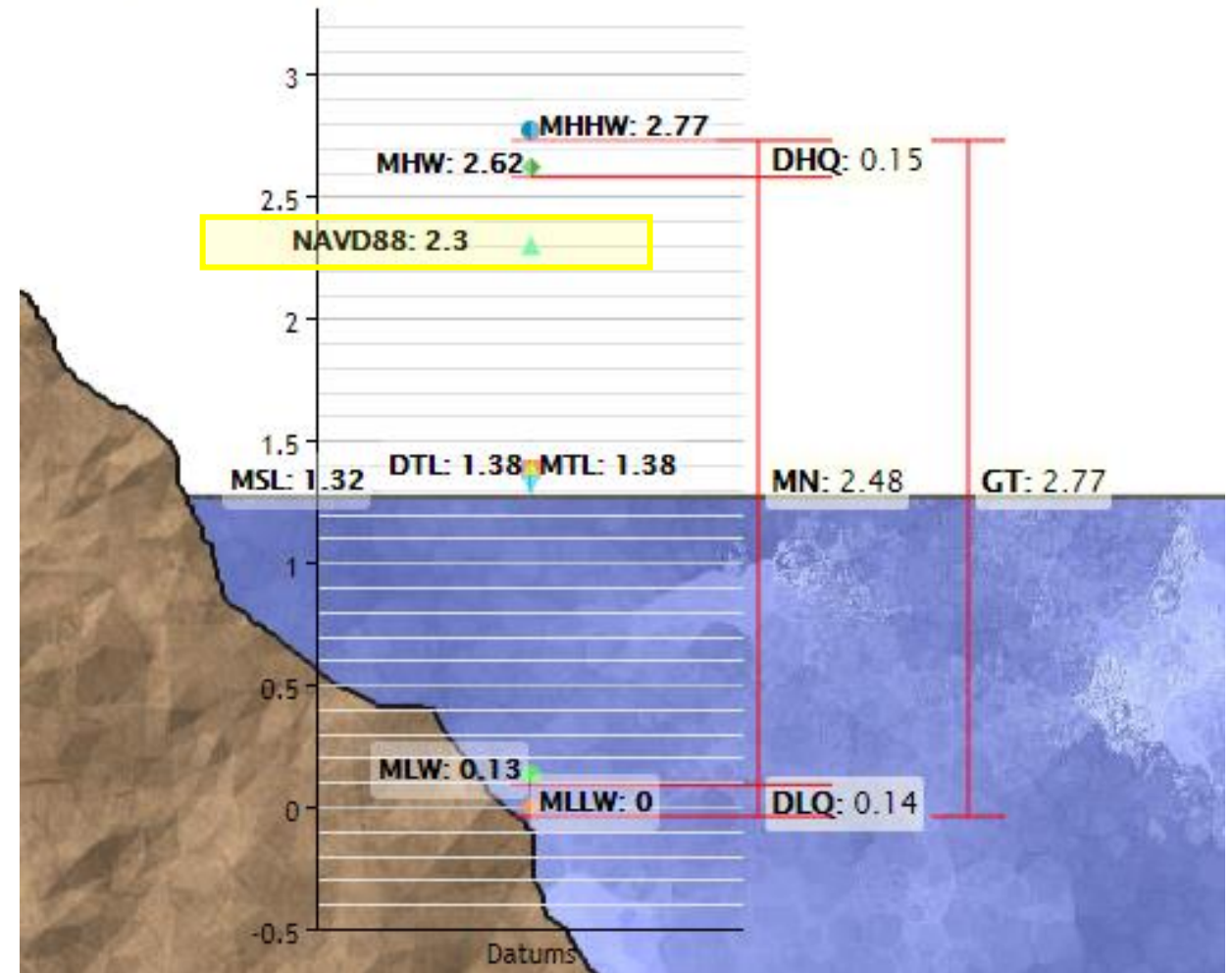
## N. American Vertical Datum of 1988 (NAVD88):

*Uses a tidal benchmark and mean sea level from 1985 to establish a vertical datum*

## Elevation (Elev.):

*Height above a reference point*

Datums for 8722746, DELRAY BEACH, FL  
All figures in feet relative to MLLW



# Seawall Ordinance

## What seawall ordinances typically include:

### *Applicability*

- E.g.: Applies to all new seawalls and to those undergoing repairs/renovations of more than 50% of length of the seawall

### *Maintenance*

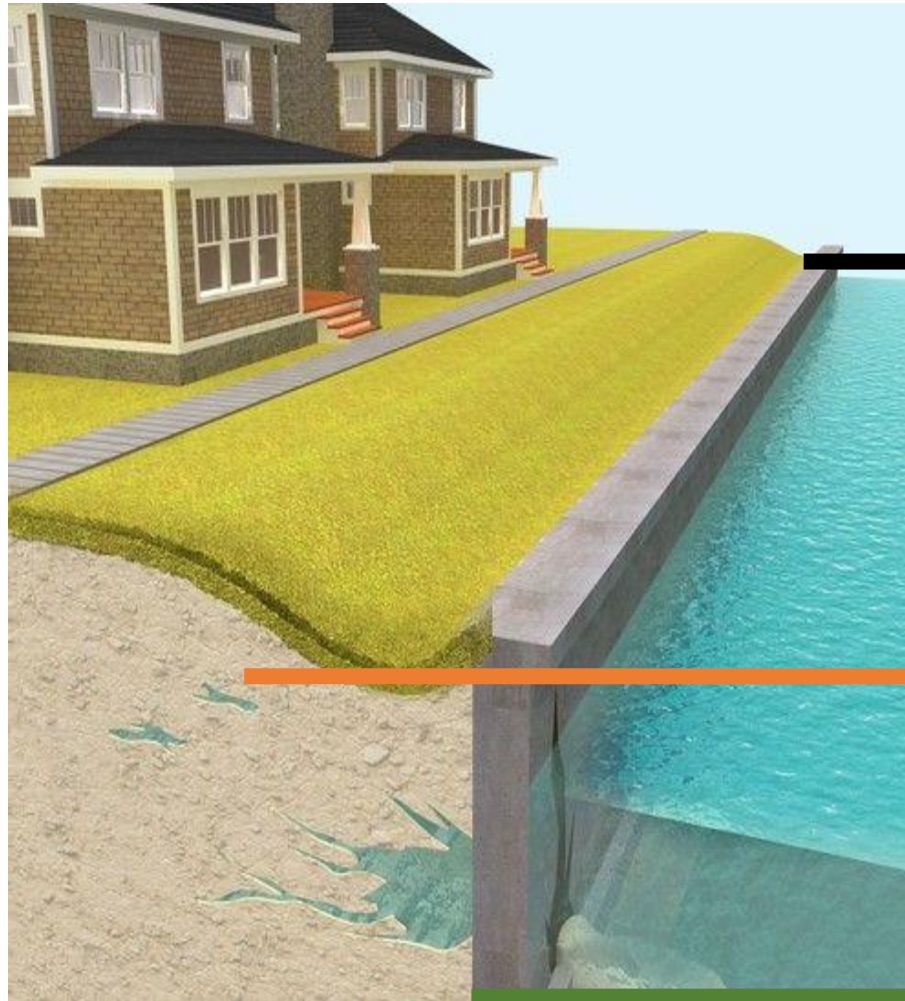
- E.g.: Must maintain the seawall in “good” condition

### *Seawall Elevation*

- E.g.: Requiring a minimum and/or maximum seawall elevation

### *Penalties for Seawall Failure*

- E.g.: If a seawall fails to prevent flooding and damages are caused

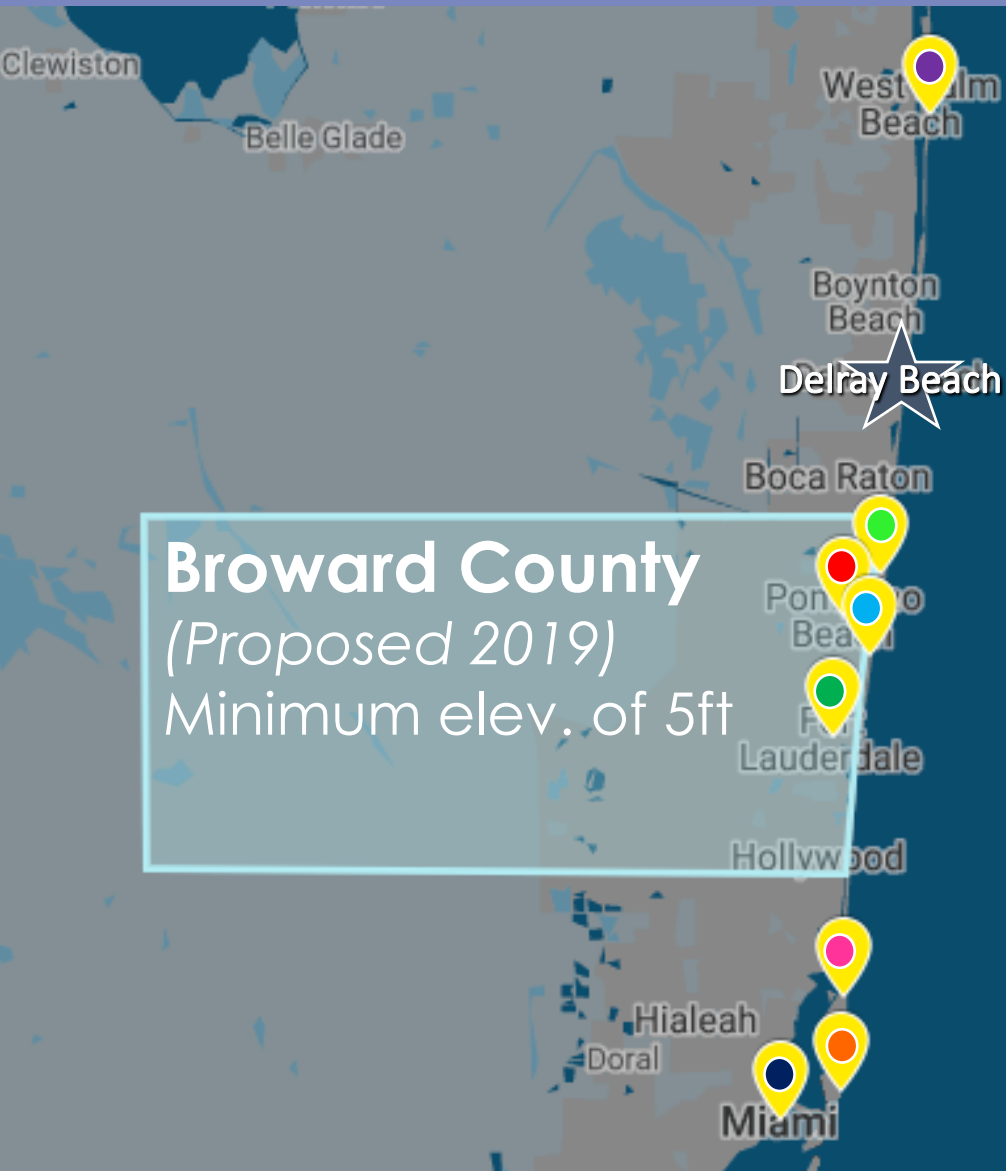


Seawall Elevation  
*(determined by survey)*

Base Elevation  
of Property

Bottom  
Elevation of  
Seawall

# Comparison of Seawall Ordinances In Other Communities (NAVD88)



## Surfside

Min. elev. of 3.5 ft

## Sea Ranch Lakes

Elev. of 5ft 10 inch

## Lighthouse Point

Max elev. of 4.0 ft

## Miami Beach

Min. elev. of 5.7 ft

## Ft. Lauderdale

Min. elev. of 3.9 ft and  
max base flood elev.  
(FEMA)

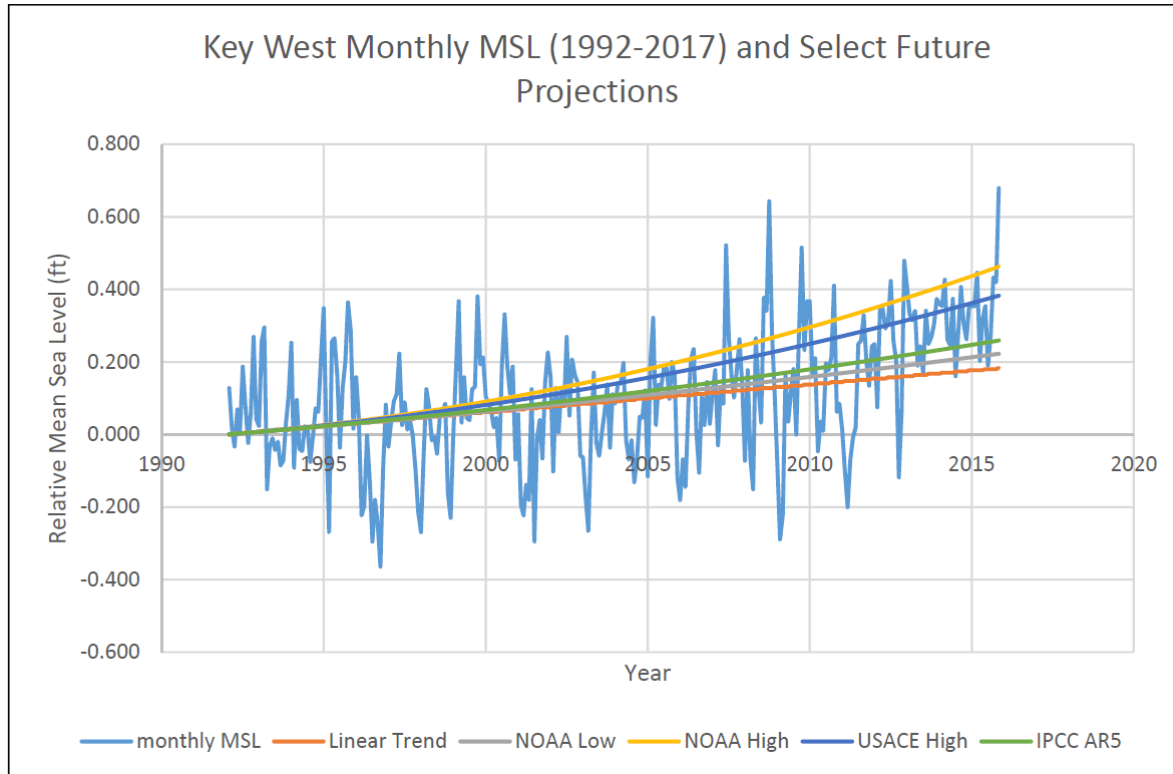
## Miami

(Proposed 2019: Elev.= 7 ft)  
North of Rickenbacker  
Causeway: Min. elev. of  
3.5 ft  
South of Rickenbacker  
Causeway: Min. elev. of  
4.45 ft

## Pompano Beach

Max elev. of 5ft 10 inch

# 30-Year Planning Elevation



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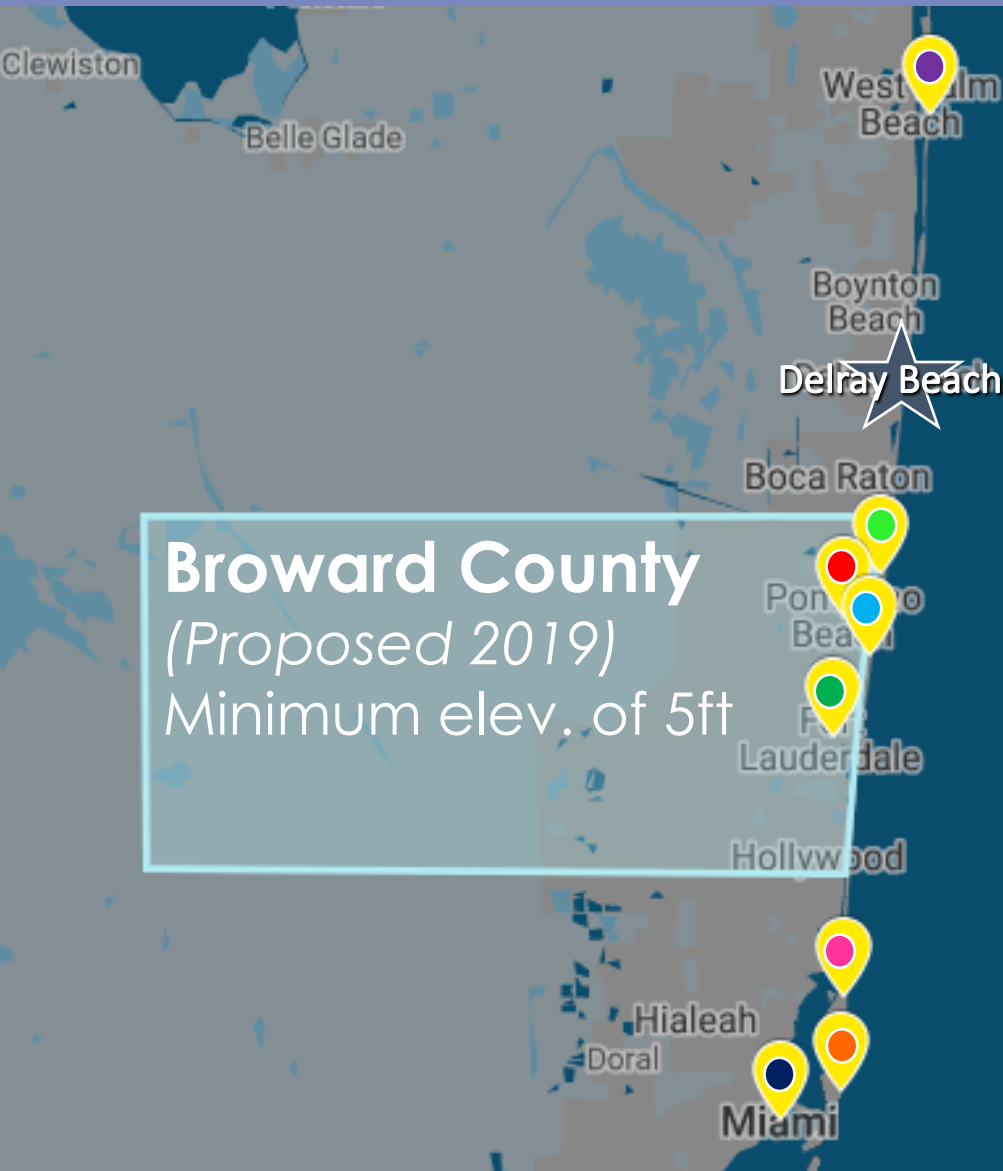
Freeboard **0.5 ft.**

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# Comparison of Seawall Ordinances In Other Communities (NAVD88)



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# Community Involvement

What type of seawall standards would you like to see in Delray Beach?



Potential Financial Assistance if HB 365 passes in 2020

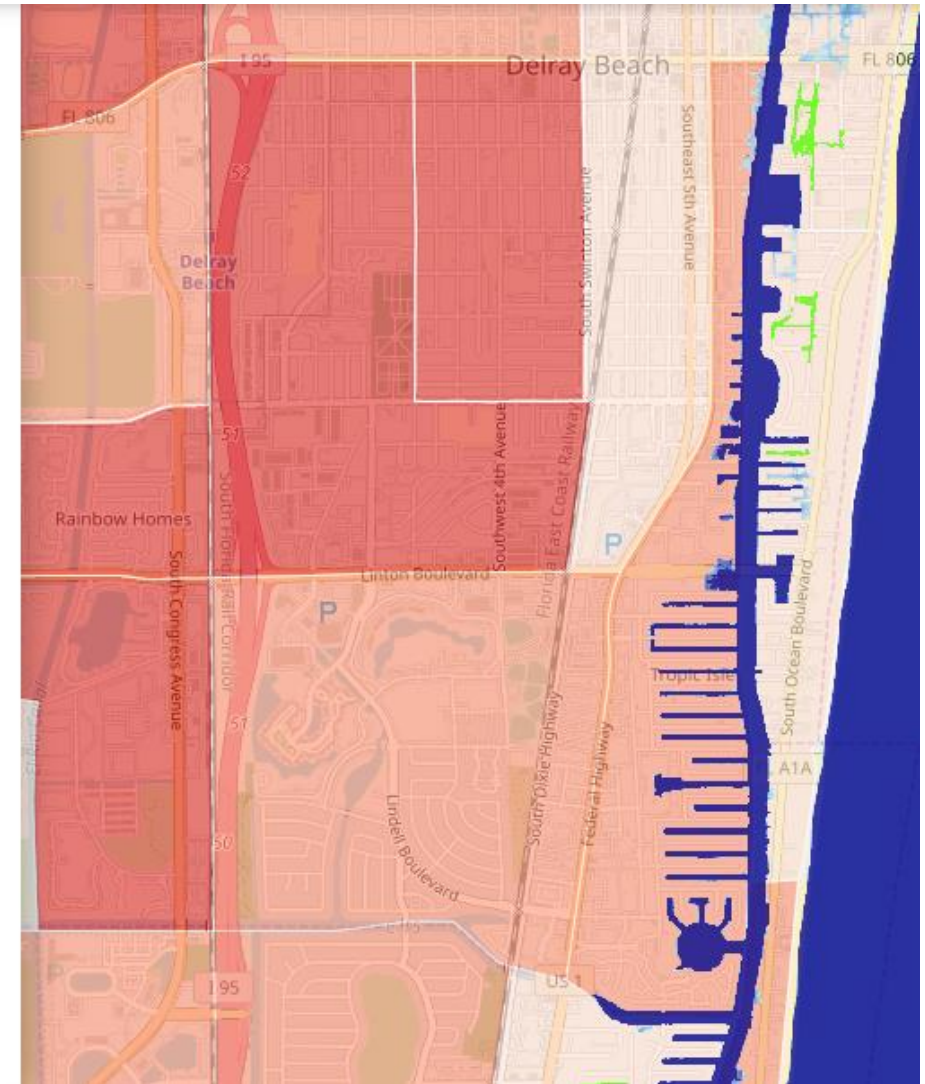
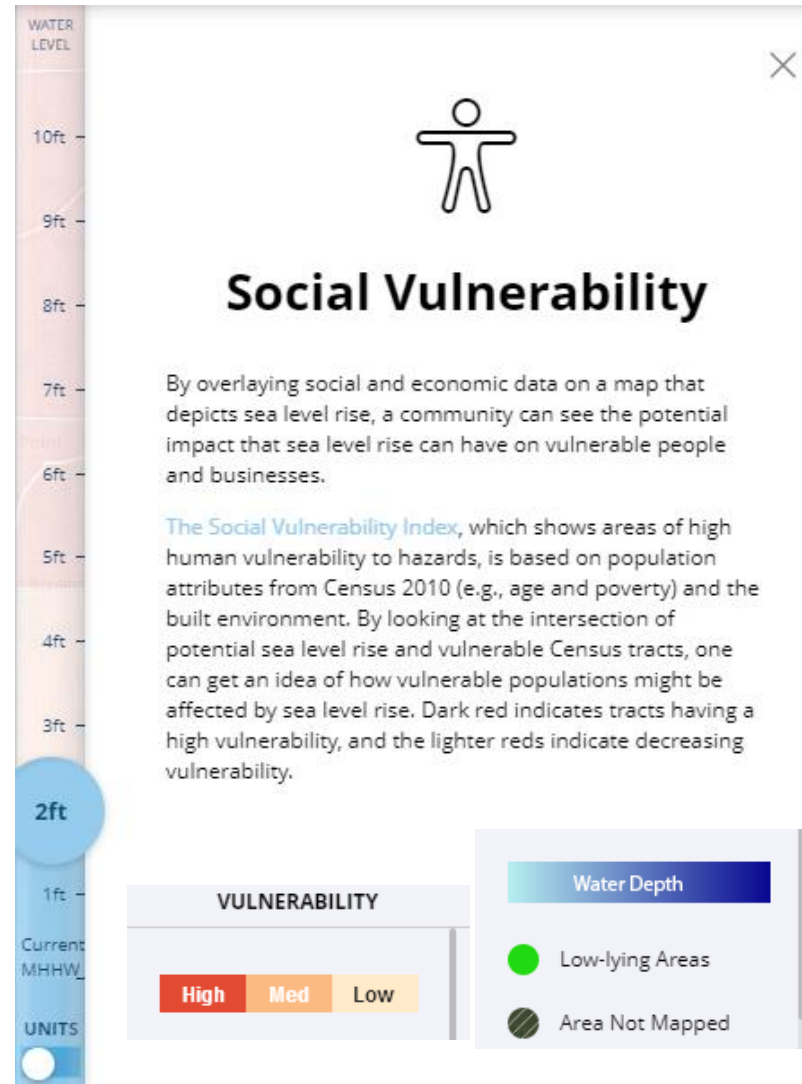




# Additional Resources

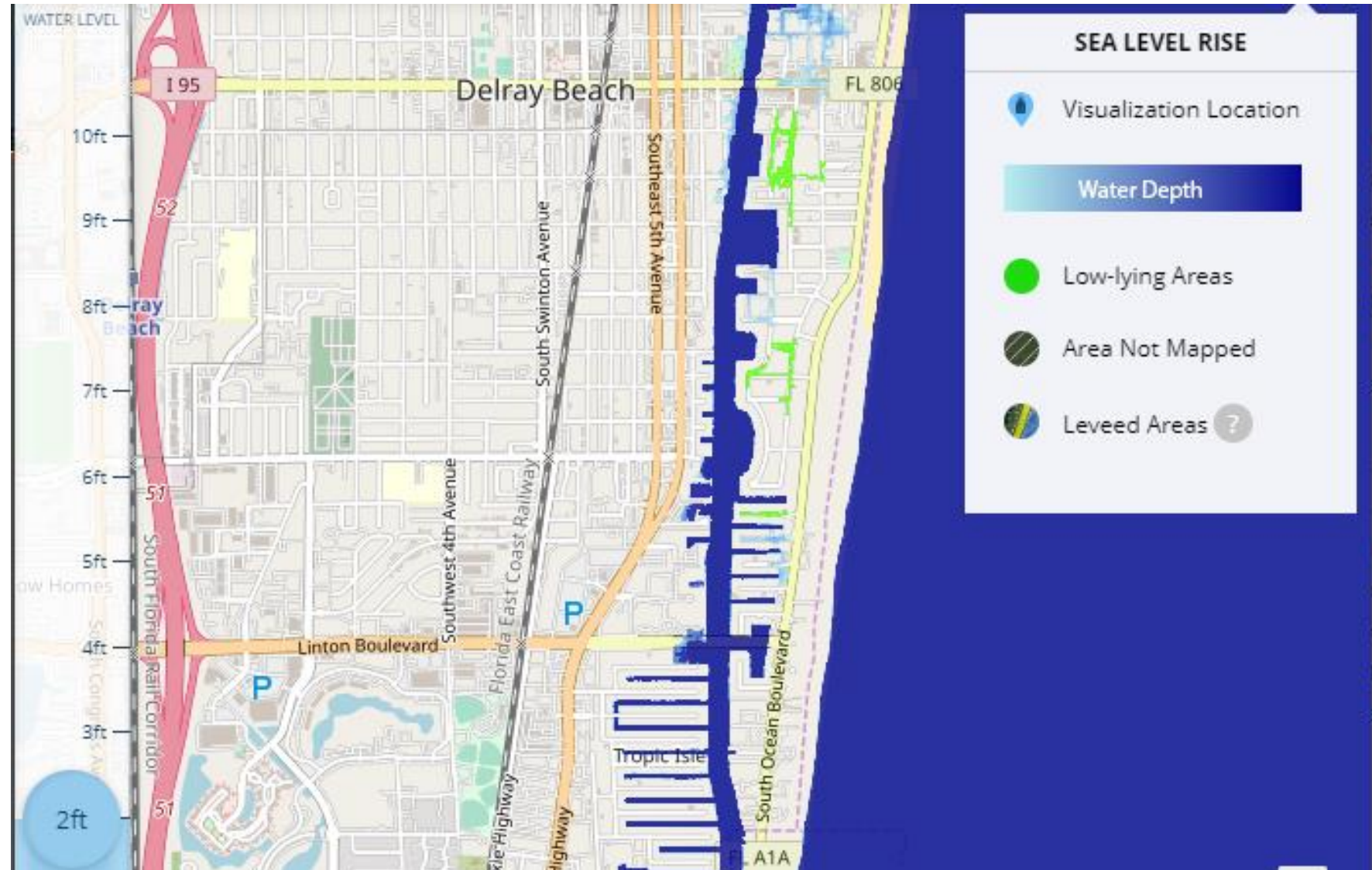
## Upcoming: Climate Change Vulnerability Analysis for SE Palm Beach County

The Palm Beach Post  
[“Palm Beach County,  
cities band together to  
study climate change  
vulnerabilities”](#)



# Additional Resources

## Upcoming: Updated Sea Level Rise Map for Delray Beach

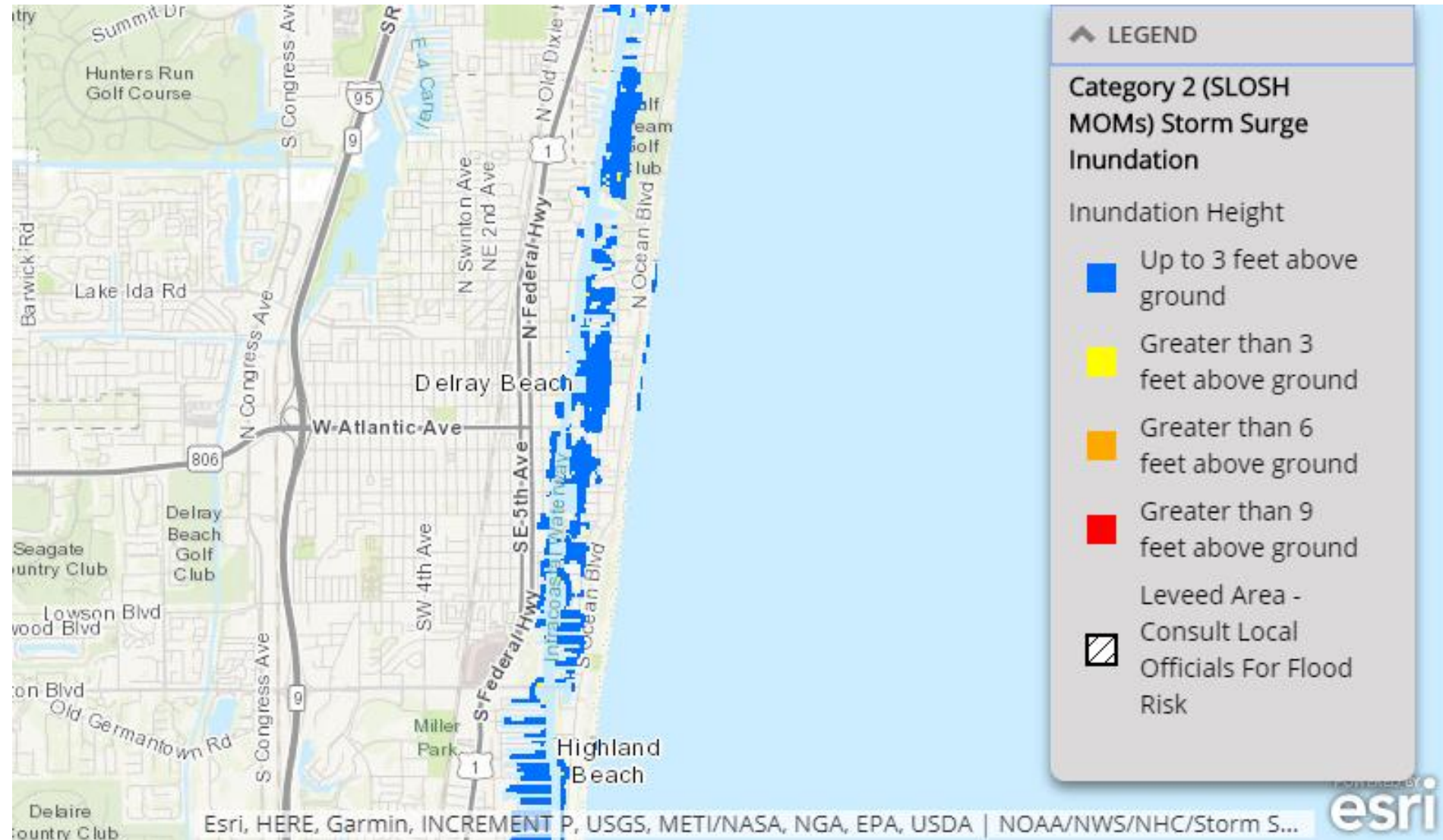




# Additional Resources

## NOAA Storm Surge Hazard Maps (Interactive)

<https://noaa.maps.arcgis.com/apps/MapSeries/index.html?appid=d9ed7904dbec441a9c4dd7b277935fad>



# Questions?



**For this presentation and more information, please go to:**

**[www.ResilientDelray.com](http://www.ResilientDelray.com)**

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