

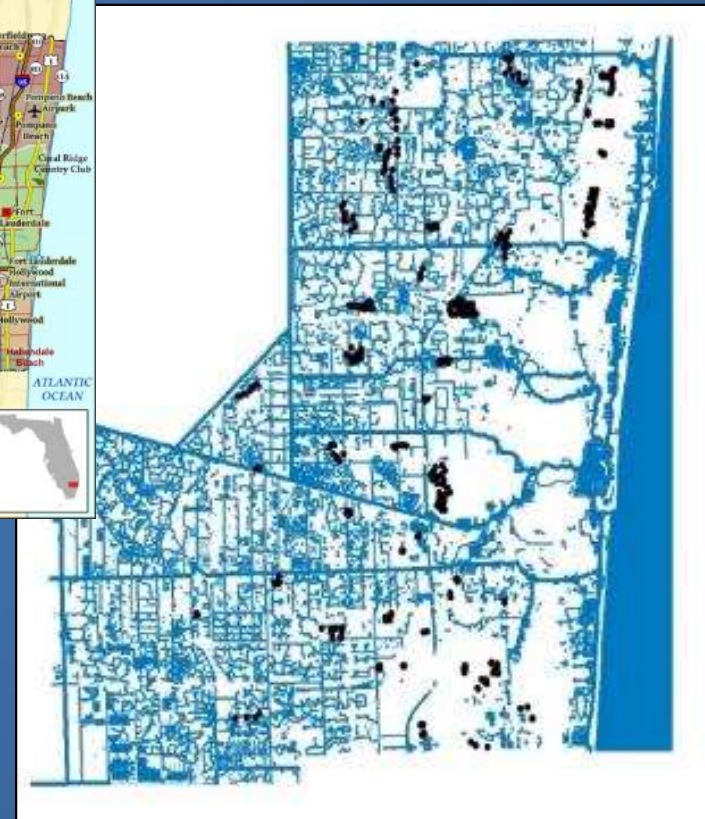
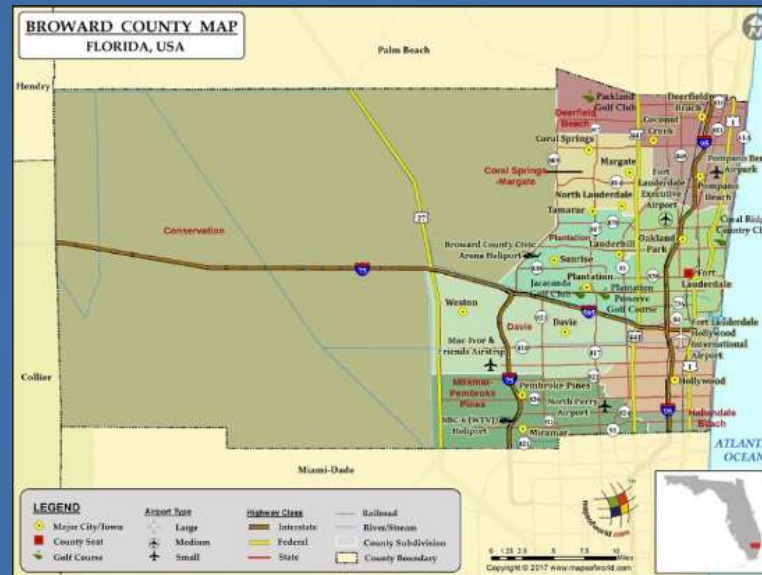


Water, Water Everywhere: *Broward County's Response to (Ever More) Chronic Flooding*

*Broward County Environmental Planning and Community Resilience Division
NACo Resilient Counties Luncheon
2 March 2019*

Broward County

- Nearly 2 million people
- 24 miles of coastline
- 23% land, 30% total area < 4 feet above mean sea level
- 1,800 miles of canals



SE FL Regional Climate Change Compact

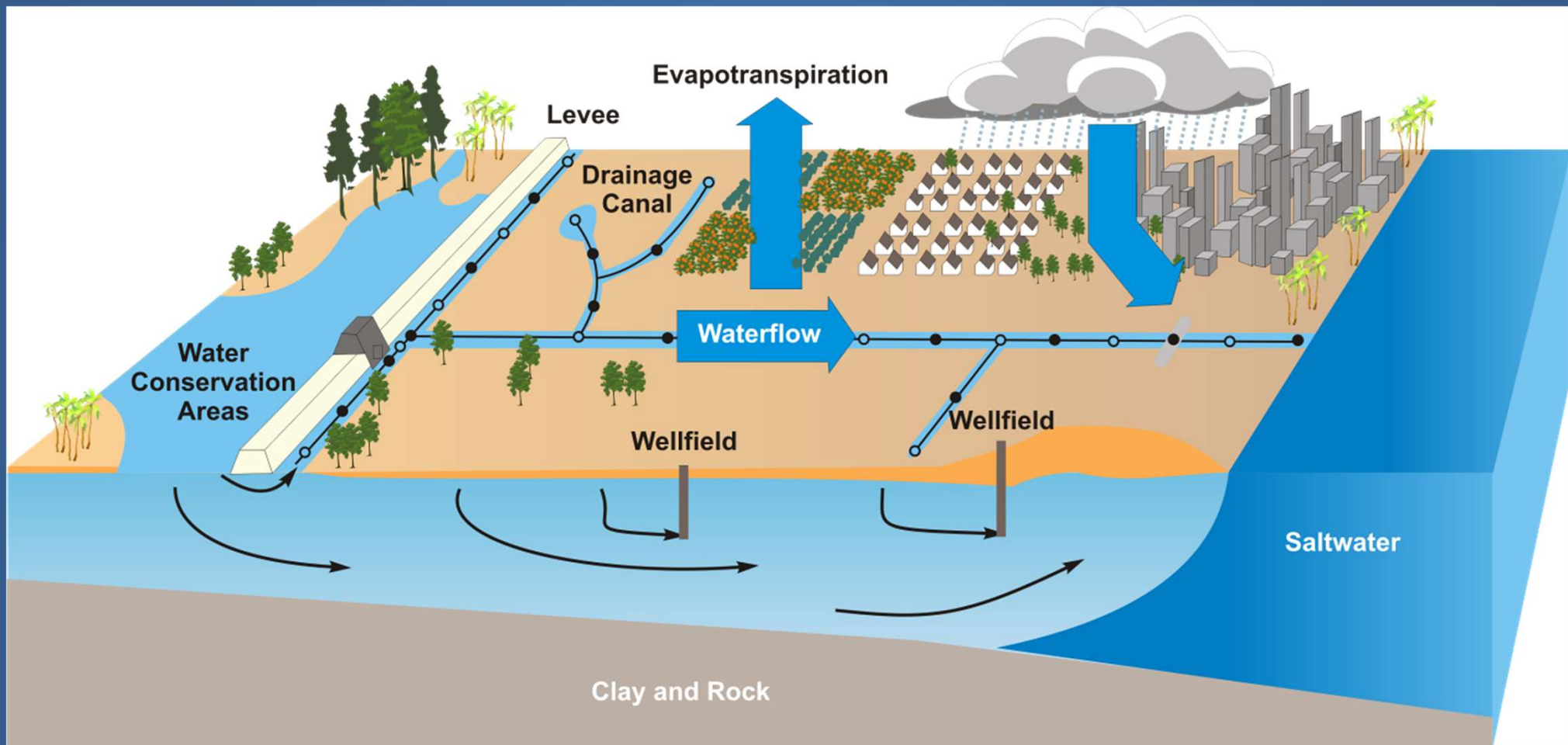
- Broward, Miami-Dade, Monroe, and Palm Beach Counties
- Collaboration now includes cities and many other stakeholders
- 6 million residents and 1/3 of Florida economy
- Founded 2010
- Regional data and analyses, plans, workshops, summits, policy coordination, community of practice

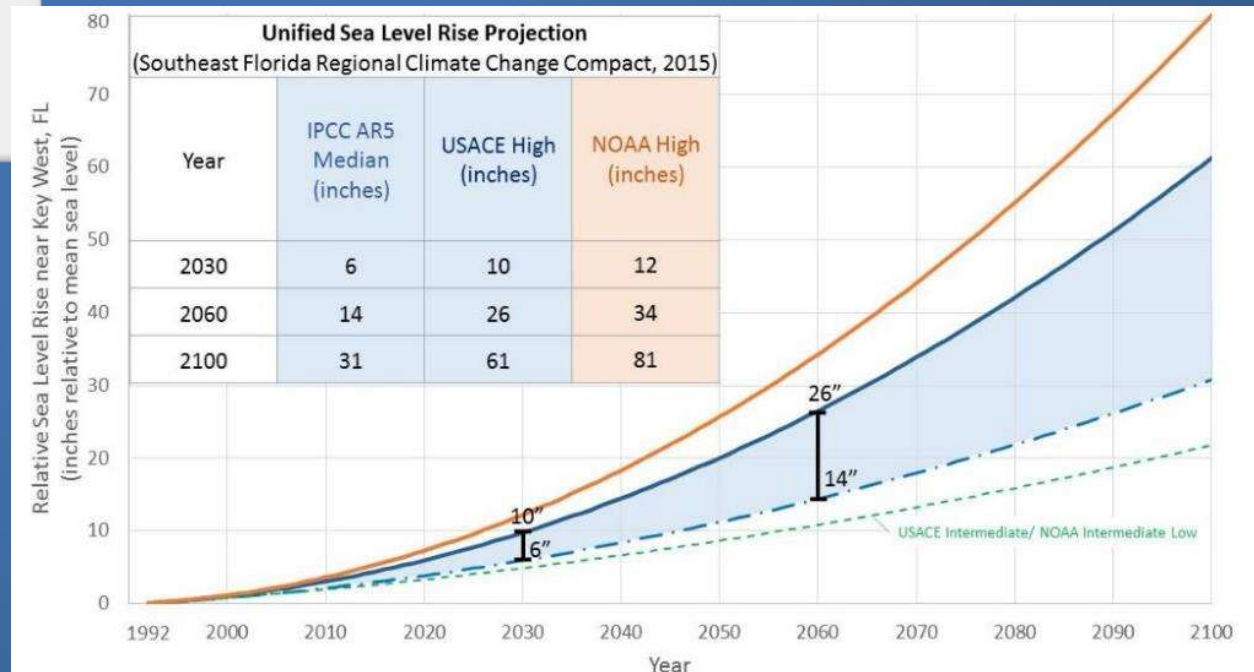
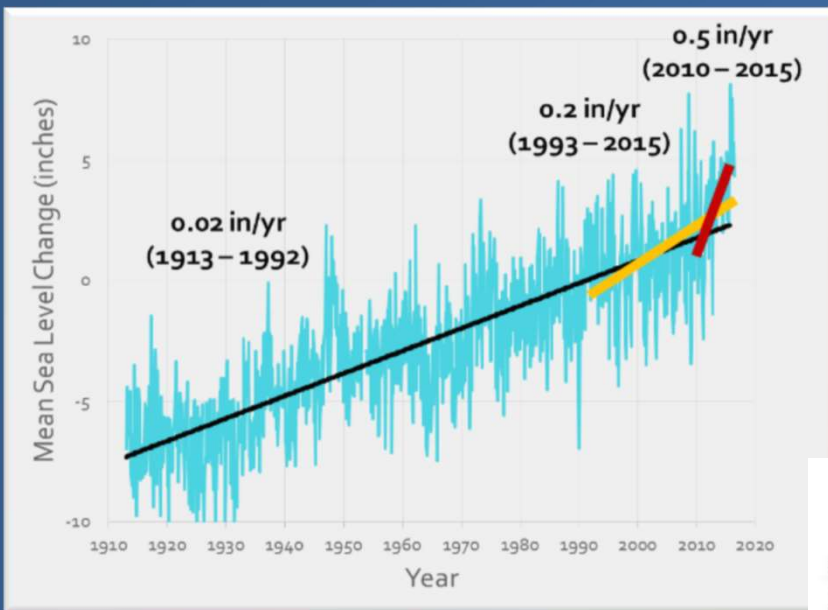


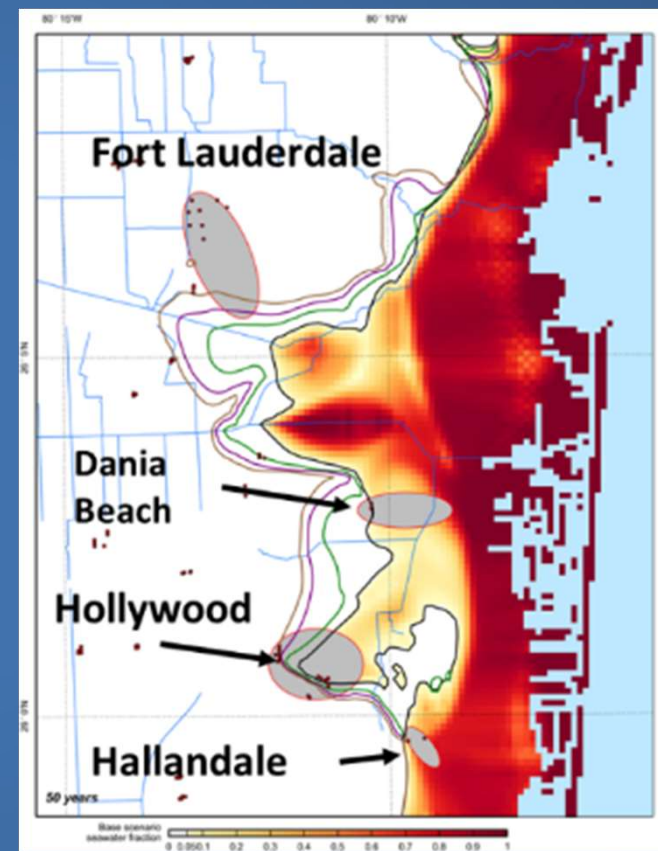
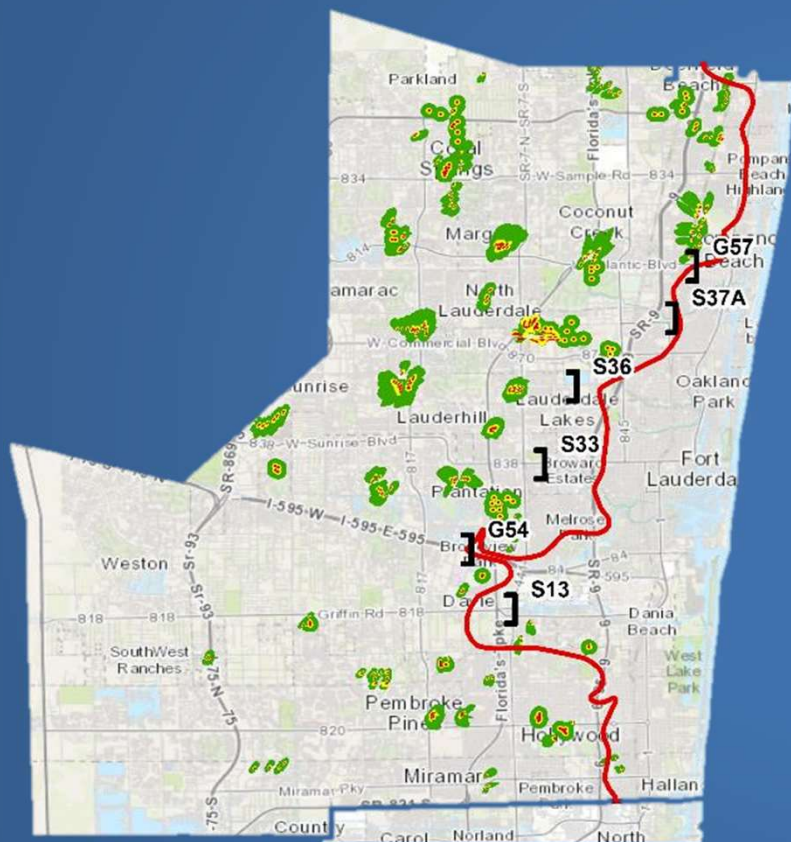
Changing Conditions

- Sea level rise
- Rising temperatures
- Extreme rainfall and drought
- Coastal and inland flooding
- Increased storm intensity
- Beach erosion
- Saltwater intrusion
- Ocean acidification



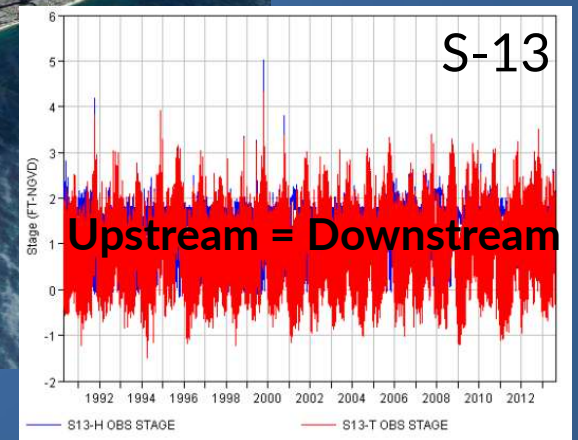
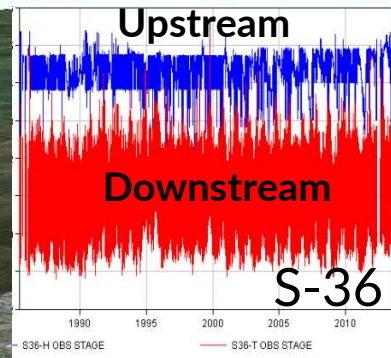
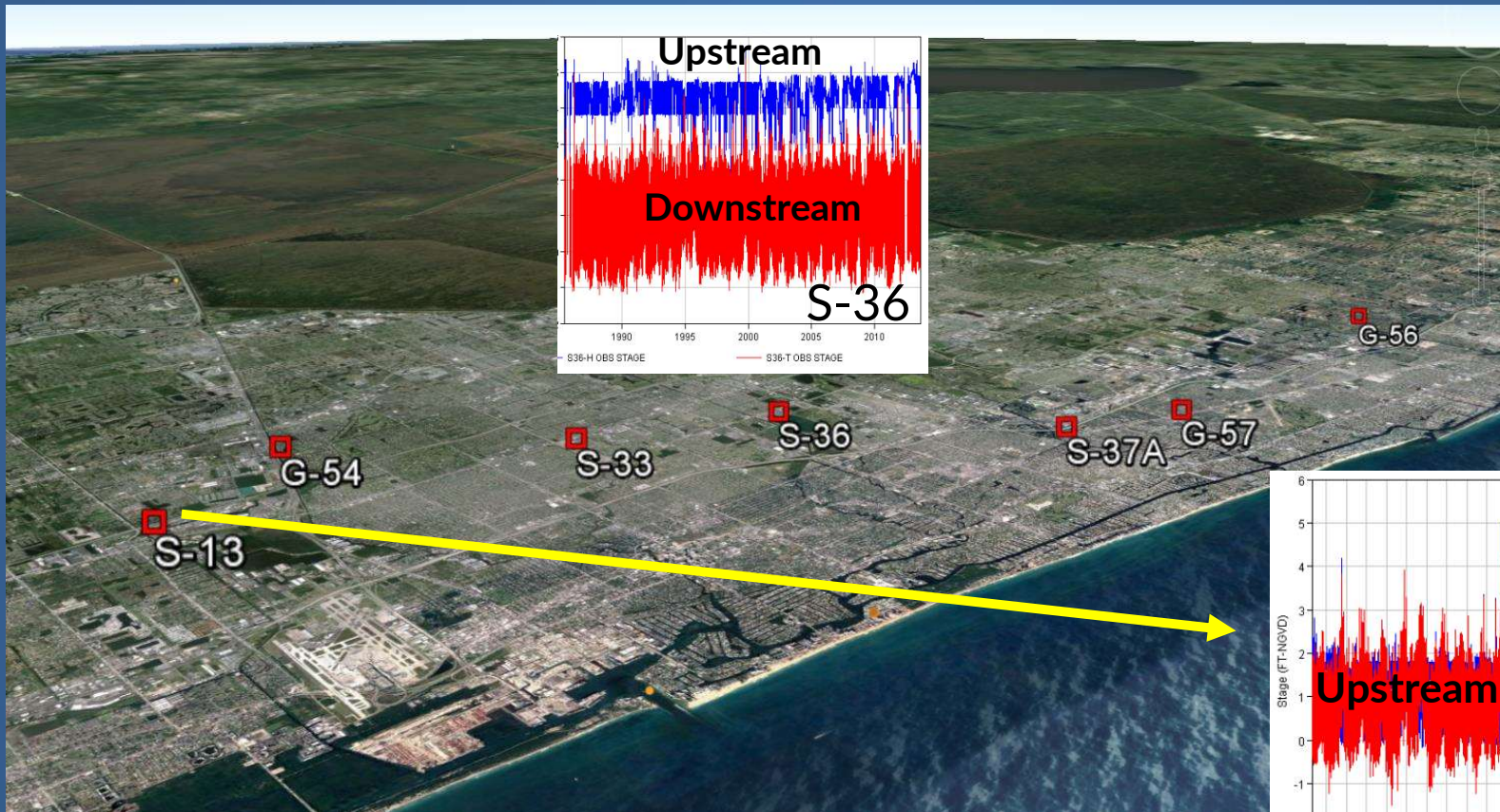






Upstream
(canal)

Downstream
(ocean)











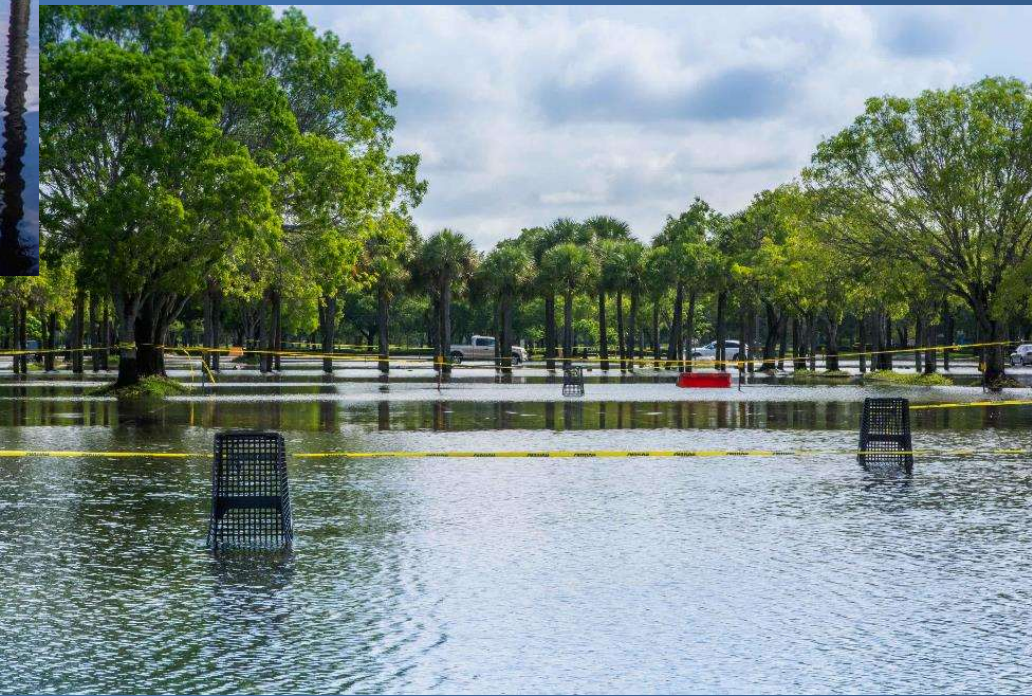




Photo credit: Gary Coronado, Palm Beach Post

Flood Risk is Prominent, and On the Rise

- Climate impacts
 - Rainfall and storms
 - Storm surge
 - Tidal flooding
- Development trends
 - Value of assets
 - Location of people

Climate change 'triple threat' increases severe flooding risk in biggest US cities

Hurricanes are slowing, which could be a big problem



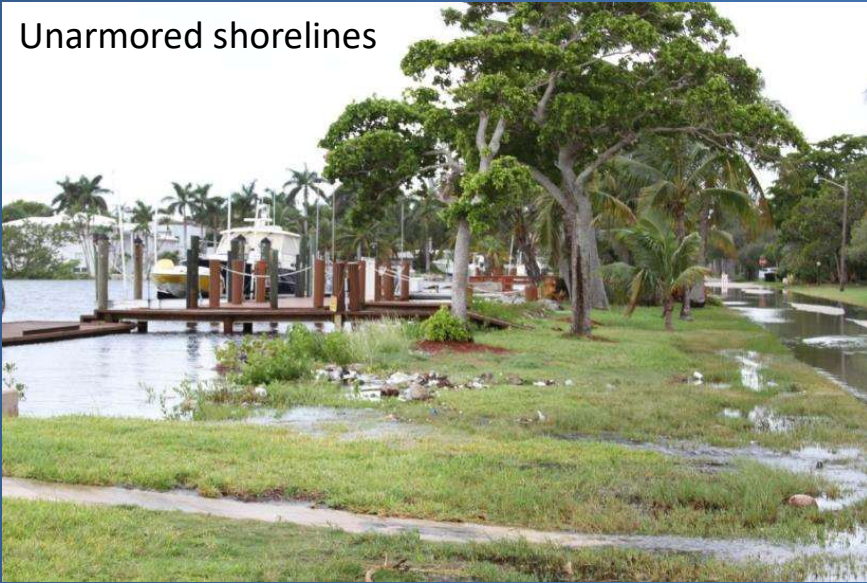
By Brandon Miller, CNN

Updated 2:40 PM ET, Thu June 7, 2018



Additional Challenges

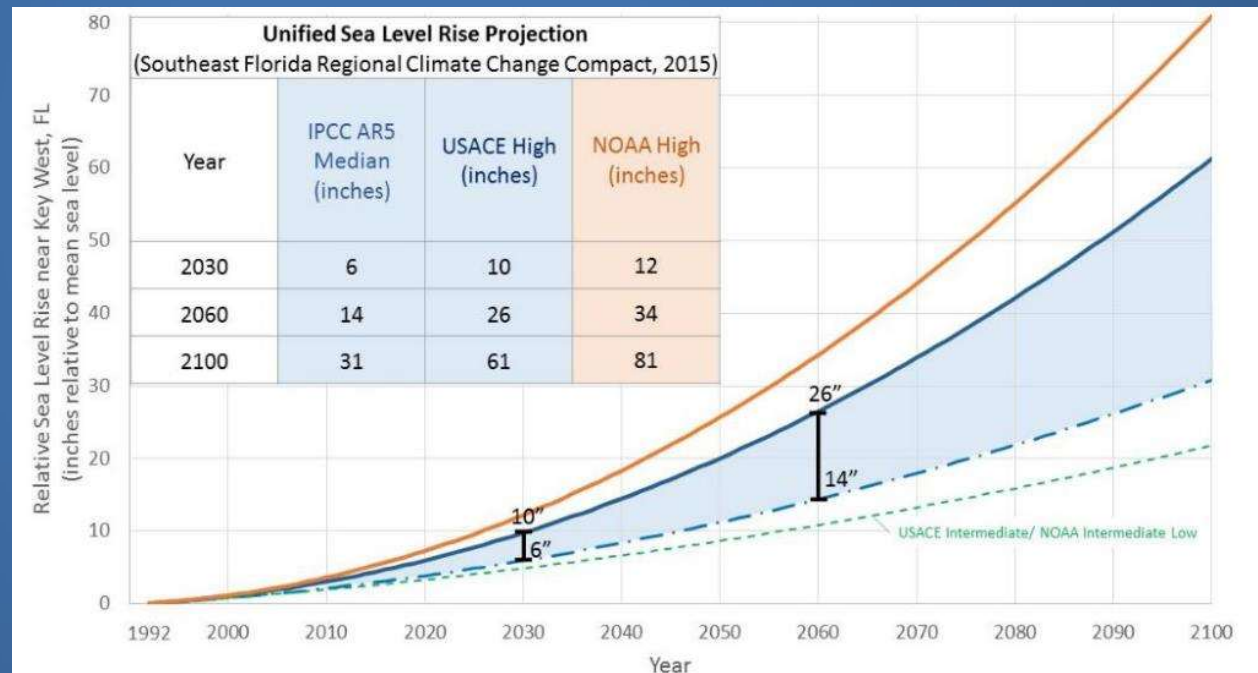
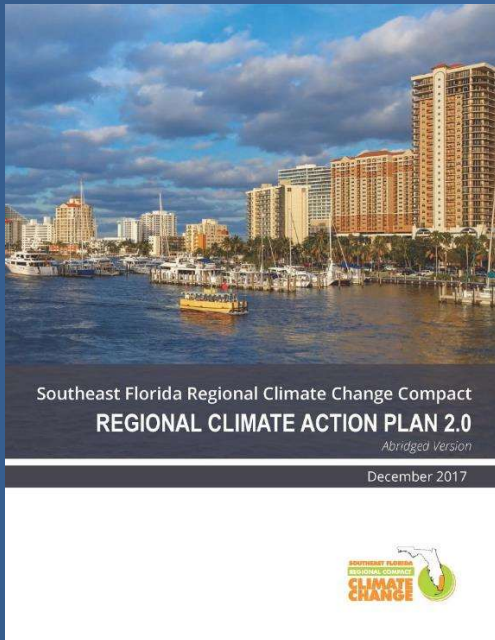
Unarmored shorelines



Overwhelmed stormwater systems



Regional Baseline

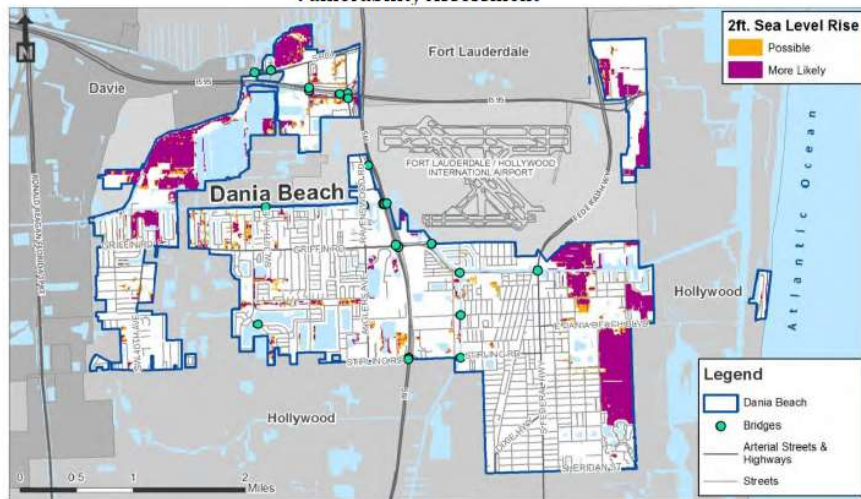


NOAA Assistance

Funded Through: DEP AGREEMENT NO. CM238

Working Towards Resilient Coastal Communities

Bridges Vulnerability Assessment



This Map identifies areas at increased risk of inundation up to a two foot sea level rise scenario, projected to occur as soon as 2060. This map is for conceptual purposes only and should not be used for legal boundary determinations.



Prepared By: Hannes Ziegler
Environmental Protection and Growth Management Department
Natural Resources Planning and Management Division

Date: 12/4/2013
DEP Agreement No. CM238 DEP 55-236(08/11)

Adaptation Action Areas: Policy Options for Adaptive Planning For Rising Sea Levels

Prepared by the
South Florida Regional Planning Council



In collaboration with the
Florida Department of Economic Opportunity,
Broward County and the City of Ft. Lauderdale



November 6, 2013



This report was funded in part, through a grant agreement from the Florida Department of Environmental Protection, Florida Coastal Management Program, by a grant provided by the Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act of 1972, as amended, National Oceanic and Atmospheric Administration Award No. 12N054190028. The views, statements, findings, conclusions and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida, NOAA or any of their subagencies.

Our Region is Responding

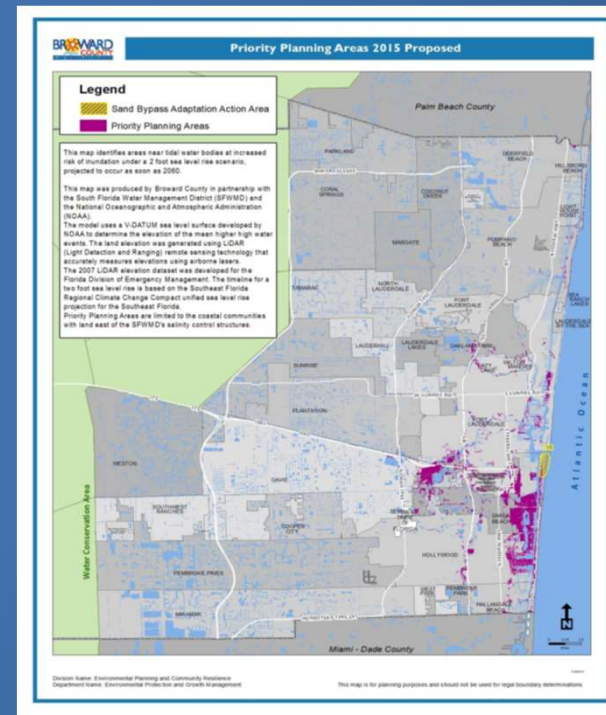
Shoreline protection - beach dunes



Local data – tidal gauges



Land use regulations



Our Region is Responding

Pumping infrastructure



One-way stormwater valves



Berms and coastal flood barriers



Elevated sea walls



But we have lacked consistency -
in infrastructure

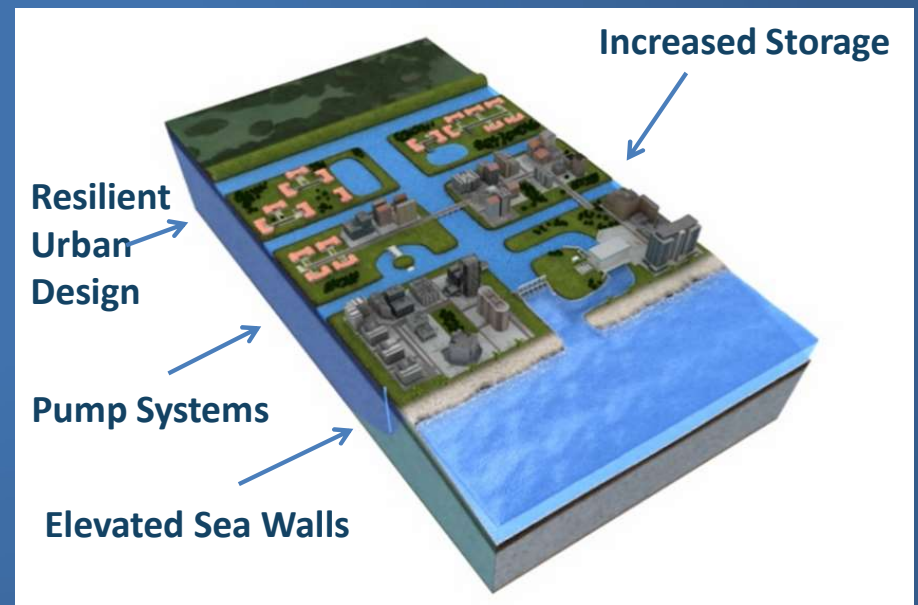


But we have lacked consistency -
and in development requirements



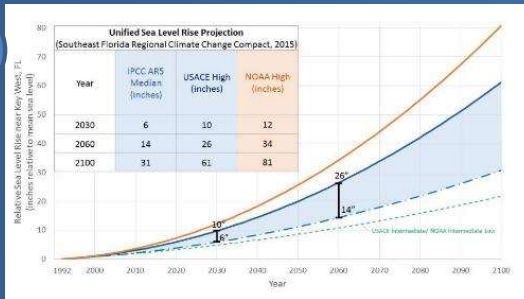
Holistic Path Towards Resilience

- Coastal barriers
- Improved stormwater management
- Updated maps
- Modernized design standards
- Upgraded infrastructure
- Resilient redevelopment
- Long-term strategic plan
- Partnerships

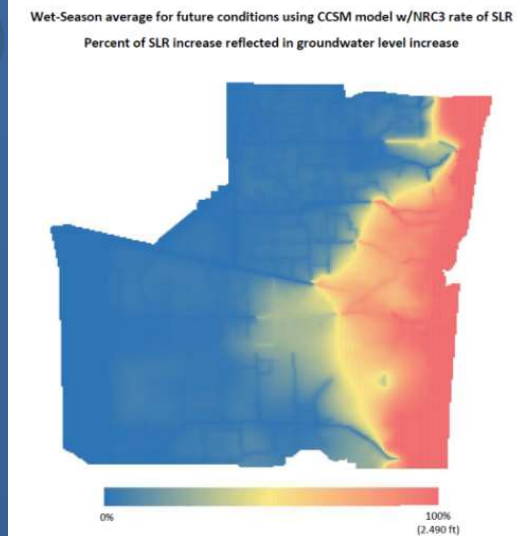


Future Conditions Standards: Drainage and Water Management

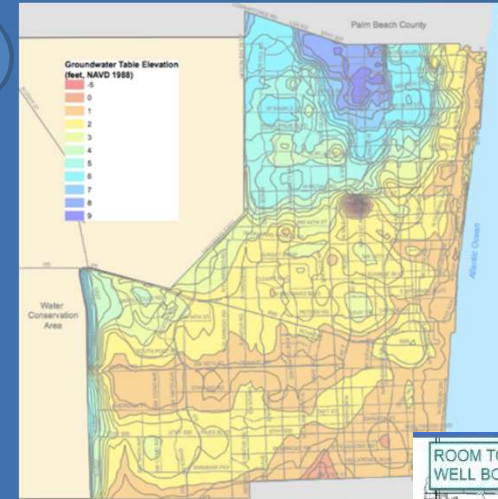
1



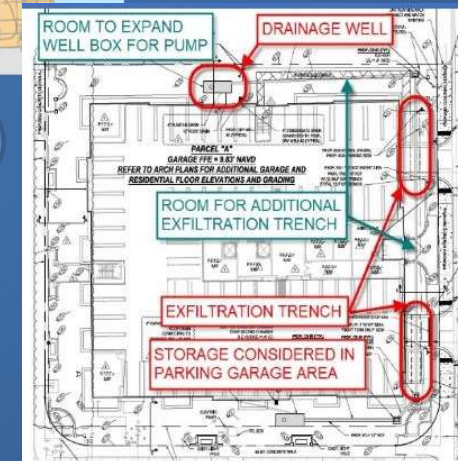
2



3



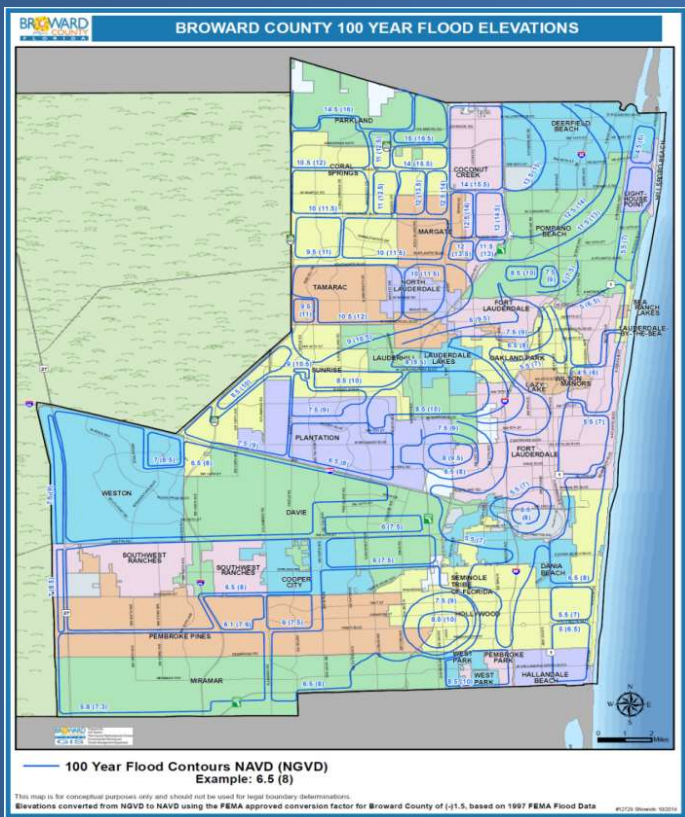
4



Wet Season Water Table Map

- Accounts for 2' SLR
- 9% increase in rainfall
- 2060-2069 conditions
- Adopted July 2017

Future Conditions Flood Elevations: 1-in-100 Year Community Flood Map



Flood Insurance

Current (FFE at +1 above 2014 BFE)	\$650
FFE = 2014 BFE	\$1,817



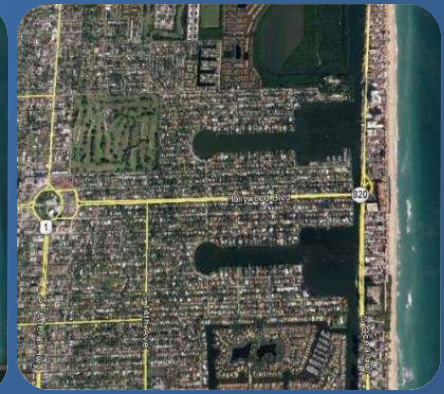
Finished Floor Elevation:
10.25' NAVD

2014 FEMA Base Flood Elevation: 9' NAVD ≈
Broward County 100-YR Elevation: 9' NAVD

1992 FEMA Base Flood
Elevation: 8.5' NAVD

Future Conditions Coastal Water Levels: Sea Wall Standards

- 2016-2018 project w/Army Corps
- Model risk reduction measures with 2 feet sea level rise, high tides, 25-yr storm surge
- Includes economic study
- Recommendation: 4 feet NAVD 88 by 2035, 5 feet by 2050
- Regulations forthcoming



Return on Resilience

- Reduce personal flood losses
- Deliver quality of life and community
- Preserve property values
- Improve flood insurance affordability
- Provide hazard mitigation

*NIBS reports a 6:1 return on investment
(20:1 on flood resilience projects)*



Cities and states could see their credit ratings crash if they don't start preparing for climate change



Jeremy Berke  
Dec. 1, 2017, 9:16 AM  2,407

Milliman to design new flood risk rating plan for NFIP

 16th November 2017 - Author: [Staff Writer](#)

The Federal Emergency Management Agency (FEMA) has selected flood risk innovator Milliman to design a new rating plan for National Flood Insurance Programme (NFIP) policies nationwide.

The U.S. government programme to provide

Partnerships

- Local governments
- Federal agencies
- Compact
- Business community



Summary

- Flood risk is an immediate and growing threat across the region
- Sea level rise and increased rainfall exacerbate flood hazards
- Community flood protection requires a holistic approach
- Regional resilient design standards will help ensure the necessary return on investment for infrastructure
- Current flood conditions and imminent investments necessitate coordinated action
- Failing to act compromises current and future investments



<http://www.broward.org/climate>

Jason Liechty

Senior Environmental Project Coordinator

Broward County Environmental Planning and Community Resilience Division

954-519-0310

jliechty@broward.org