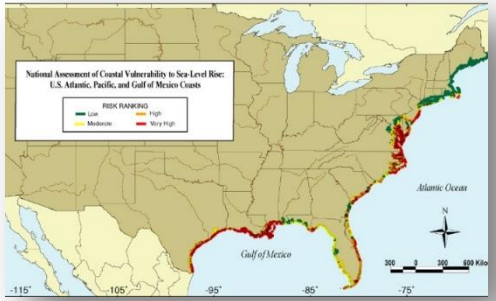
Planning for Resilience in SE Florida: Regional Collaboration and Local Action

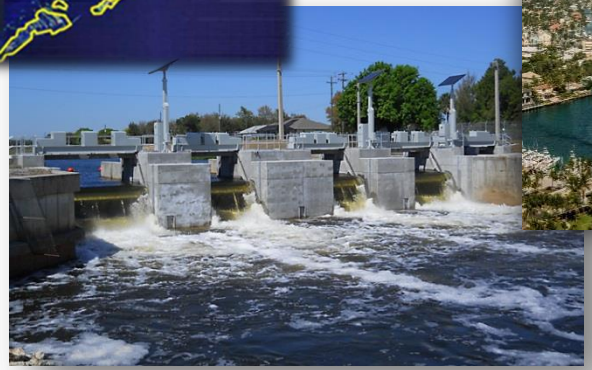
Local Solutions: Eastern Climate Preparedness Conference
May 1, 2018

Dr. Jennifer L. Jurado, CRO and Director
Environmental Planning and Community Resilience Division

BROWARD COUNTY FLORIDA

The Region of Southeast Florida

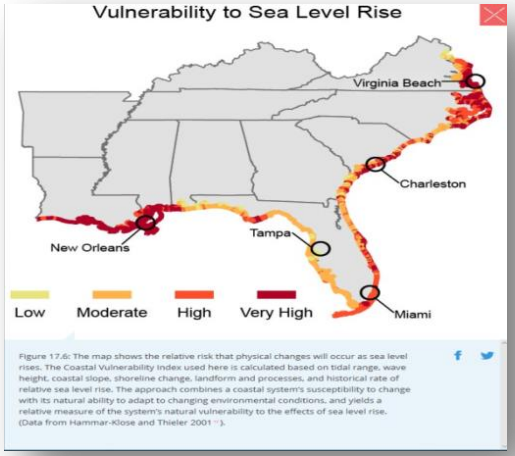




Characterized by:

- Nearly 6 million residents
- Dense urban coastal development
- One of fastest growing regions
- Flat and low-lying landscape
- 140 miles of shoreline
- Porous geology
- Active flood management
- Fragile natural resources

Sea Level Rise, Severe Weather and Flood Risk



2012 A1A Fort Lauderdale – Post Sandy

2015 Palm Beach – 22” rainfall

2016 Fort Lauderdale - Tidal Flooding

Diverse and Statewide Impacts of Irma

Naples, FL

Credits: REUTERS/Stephen Yang

Monroe County, FL

Credit: Floridatoday.com

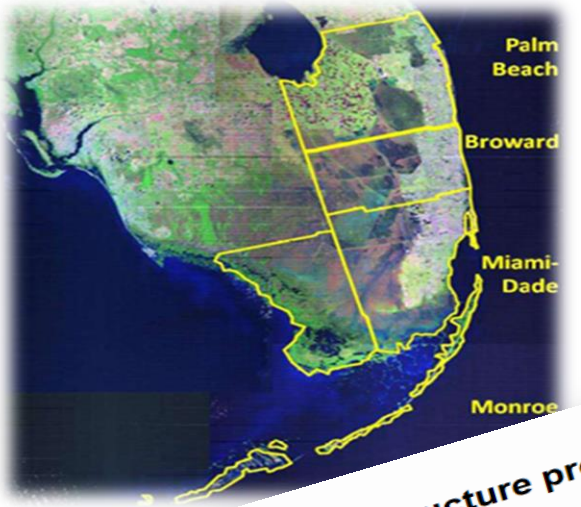
Jacksonville, FL

Credit: News.wjct.org

Collier County, FL

Credits: Liam James Doyle/Naples Daily News

The Case for Immediate Action



- 3rd largest state by population
- 4th largest urban area in country (6.5 M by 2030)
- Intense coastal development activity
- Ten-year job growth est. 42%
- 40% increase in potential annual losses (Swiss Re, 2016)

ECONOMIC YEARBOOK 2017

Civic Hardware: Infrastructure projects drive growth across Florida

| 3/28/2017

Florida population surging again

SEARCH SunSentinel

South Florida expected to create jobs faster than US

Fort Lauderdale's Riverwalk district boasts an array of arts and entertainment options.

ECONOMIC YEARBOOK 2016

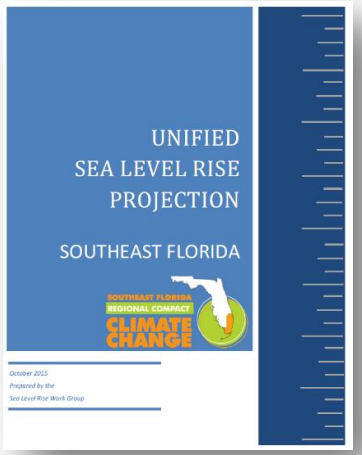
Southeast Florida: A surge of hotels and apartments

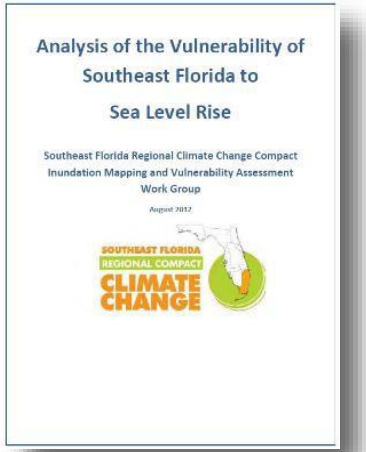
Residential development projects are spilling out from Fort Lauderdale's urban core.

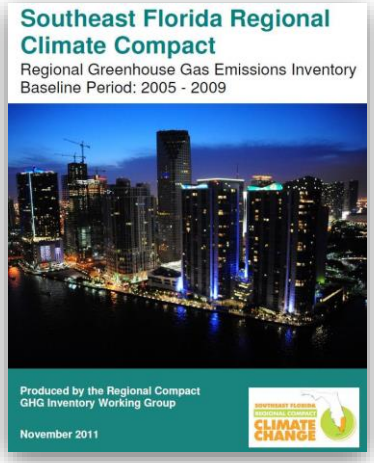
The Southeast Florida Regional Climate Change Compact

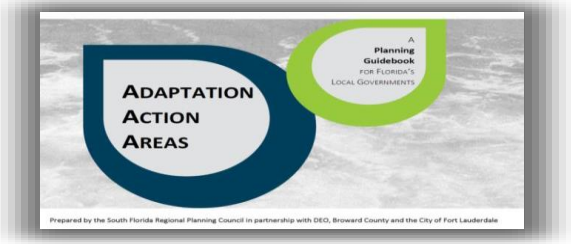
- 4 Counties/108 cities
- Initiated in October 2009
- Response to shared challenges and needs
- Commitments
  - Policy coordination
  - Common baseline
  - Regional action plan
  - Annual summits

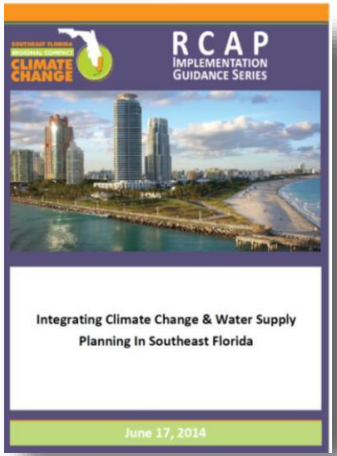
Regional Work Products





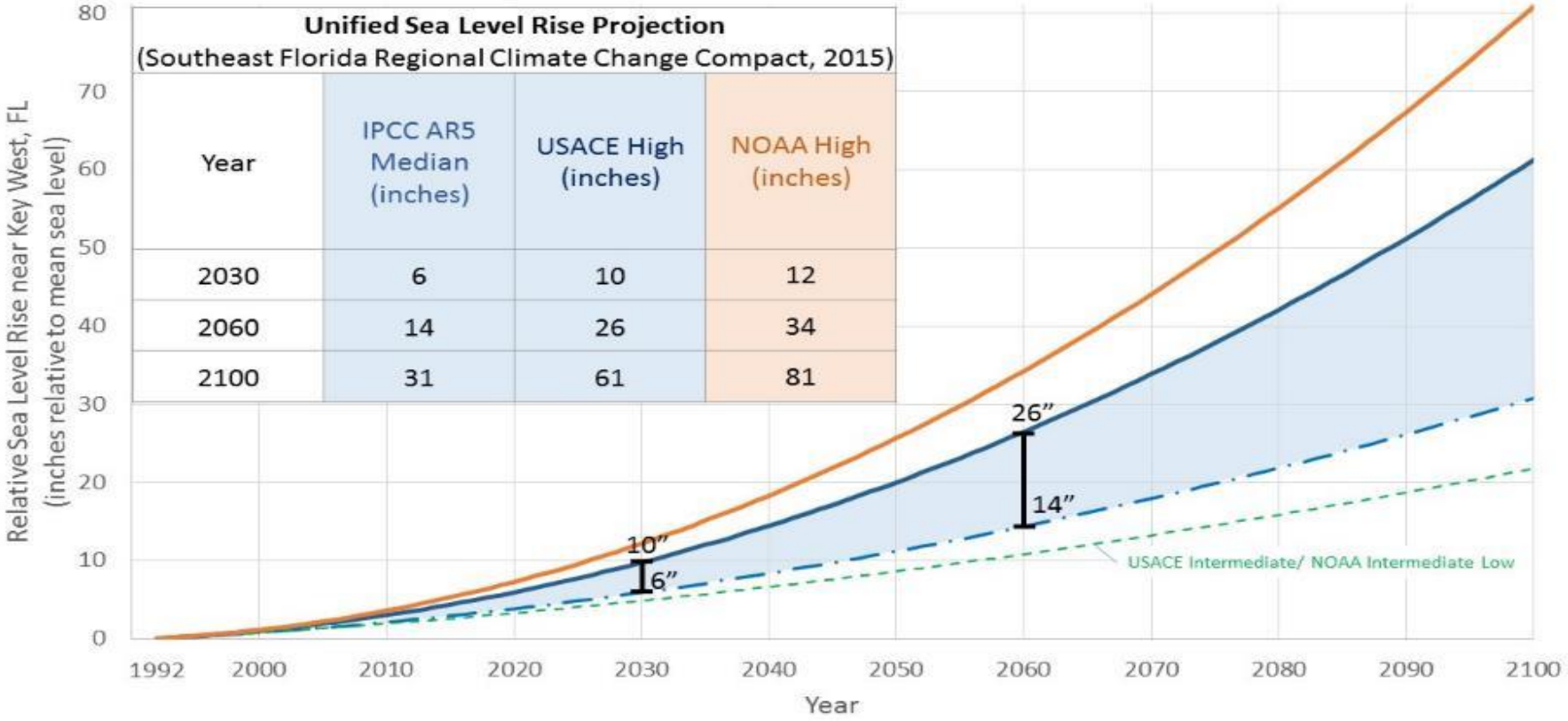






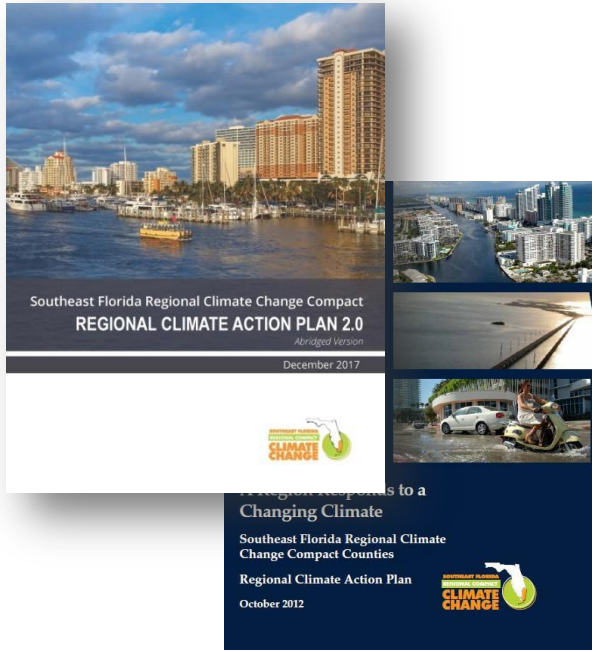
All documents available at
http://southeastfloridaclimatecompact.org/

2015 Regional SLR Projection



The Regional Climate Action Plan (RCAP)

- Mitigation and Adaptation Strategies
- Relies upon existing agency processes
- Emphasizes expanded engagement
- Initial RCAP – adopted in 2012
  - 7 focal areas / 100 recommendations
- RCAP 2.0 – 2017 Update
  - Economic Resilience
  - Equity
  - Public Health
  - Web-based

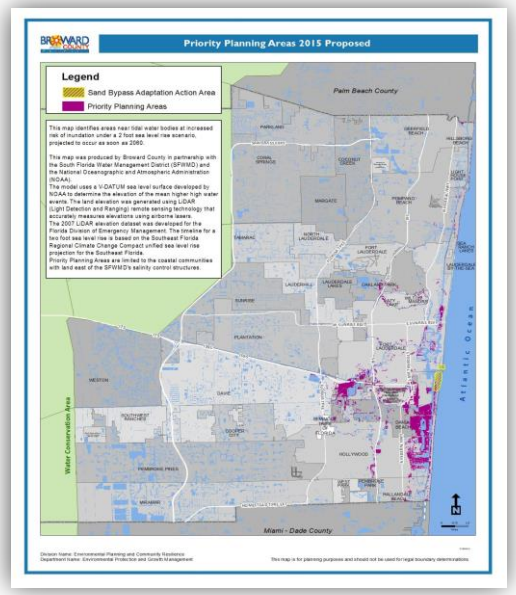


SOUTHEAST FLORIDA REGIONAL COMPACT CLIMATE CHANGE

Download at www.southeastfloridaclimatecompact.org

Translating Plans to Action: Broward Examples

- An evolving process
- Progressive Policy
  - Priority Planning Areas
  - Adaptation Action Areas
  - Comp Plan/Land Use
- Maximizing use of county authority
- Future conditions map series – code of ordinances (established May 2017)

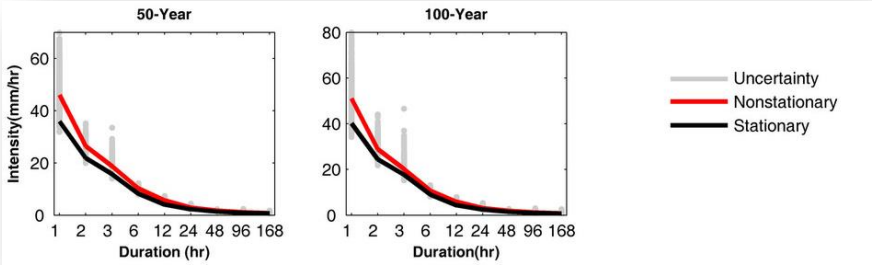


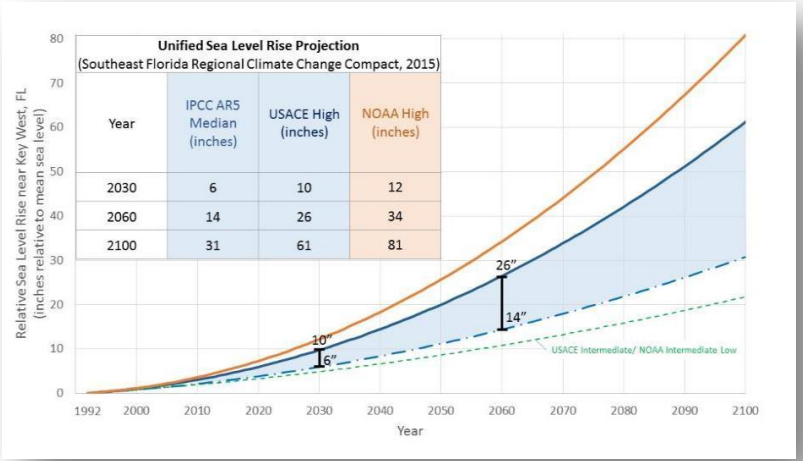
- 3-year timeline
  - Drainage infrastructure (2017)
  - Coastal flood barriers (2018)
  - Flood elevations (2019)

Primary Variables

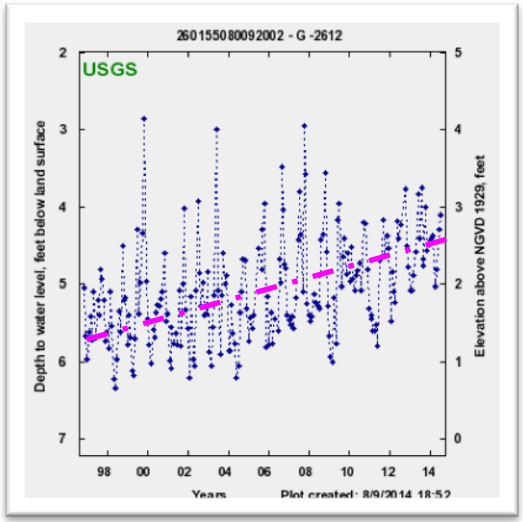
- Sea level rise
- Rising groundwater elevation
- Changes rainfall intensity

Modeled increase in rainfall intensity, duration, frequency





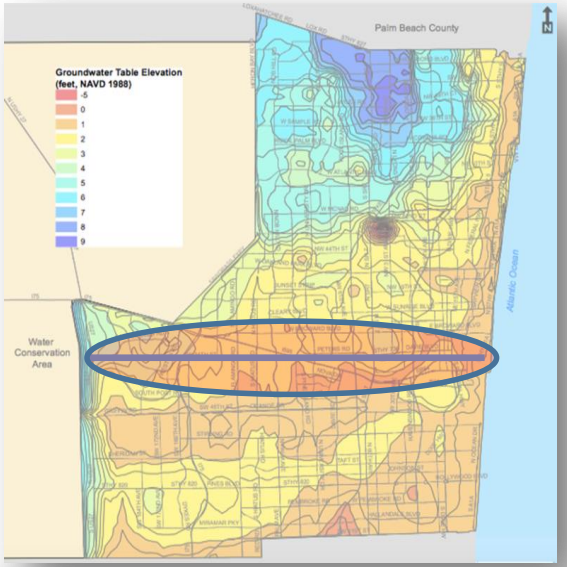
2015 SE FL Regional SLR Projection

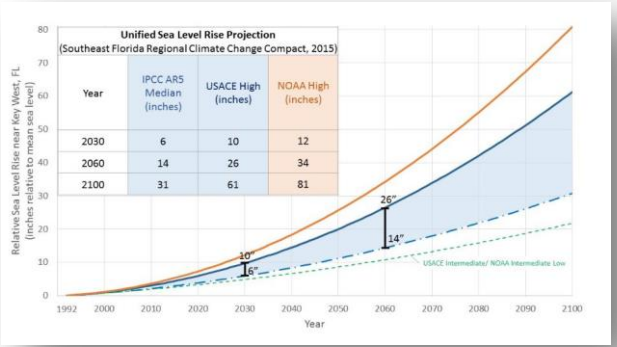


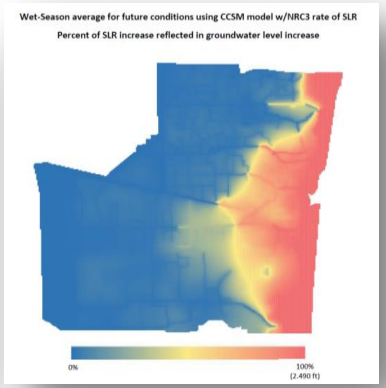
Measured Rise in Groundwater Table

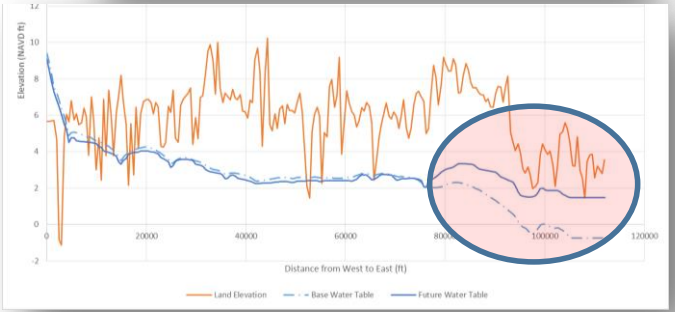
Future Condition Average Wet Season Groundwater Table Map

- 2060-2069 average groundwater conditions
- USACE high = 2 feet SLR
- CCSM model = 9% increase in rainfall
- Stakeholder engagement
- Effective July 1, 2017









SURFACE WATER MANAGEMENT

DESIGN EXAMPLE 1

SURFACE WATER MANAGEMENT

DESIGN EXAMPLE 1

Permitted Conditions

WSWT: **1.5' NAVD**

WATER QUALITY VOLUME

Required: 0.08 acre-feet

Provided
0.08 acre-feet
By 70 LF exfiltration trench

$15,225*

100-YR, 3-DAY PRE-POST MAX

Required: 9.38' NAVD

Provided
9.38' NAVD
By 1 gravity drainage well

$72,500**

SLR Scenario

WSWT: **3.5' NAVD**

WATER QUALITY VOLUME

Required: 0.08 acre-feet

Provided
0.05 acre-feet
By 70 LF exfiltration trench

100-YR, 3-DAY PRE-POST MAX

Required: 9.38' NAVD

Provided
9.65' NAVD
By 1 gravity drainage well

SLR Adjusted Design

1.6%
Increase in Total Construction Costs

Provided
0.08 acre-feet
By 110 LF exfiltration trench

$23,925*

40 LF additional exfiltration trench

Provided
9.38' NAVD
By 1 pumped drainage well

$290,000**

Added pump to drainage well

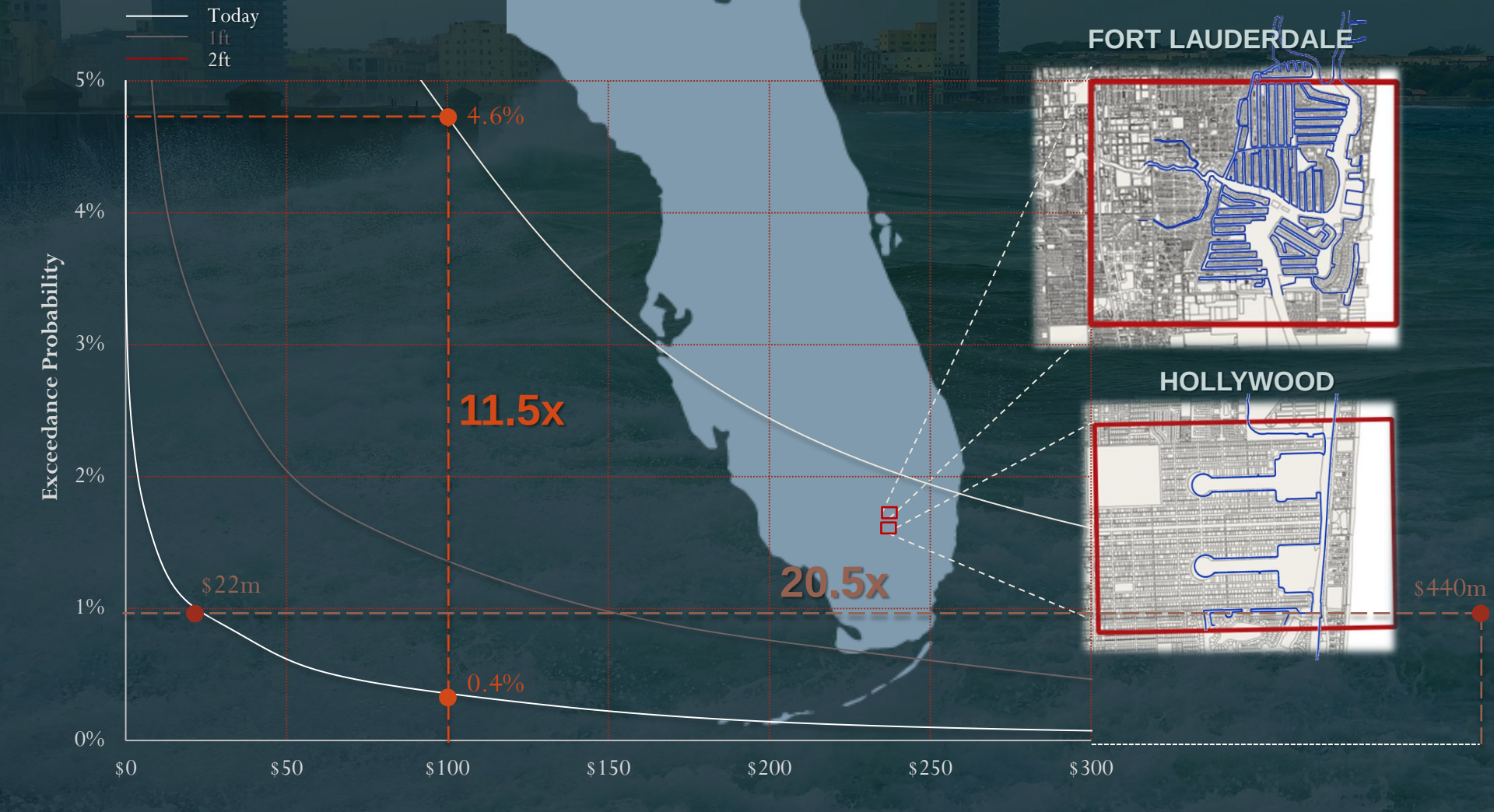
* Costs estimate assuming 18" French Drain. ** Cost estimate assuming dep well, casing 24", up to 100' drilling.

Cost estimate varies based on project location, complexity, bid quantity and contractors availability

USACE-Broward Resiliency Study

US Army Corps of Engineers®

- Resilient Sea Wall Top Elevations
- Calibrated hydrodynamic model
  - 2 feet sea level rise
  - High tides
  - 25-yr storm surge
- Economic study
  - Damage loss reduction
  - Analysis by sector



Average Annual and Return Period Losses
Storm Surge Scenarios

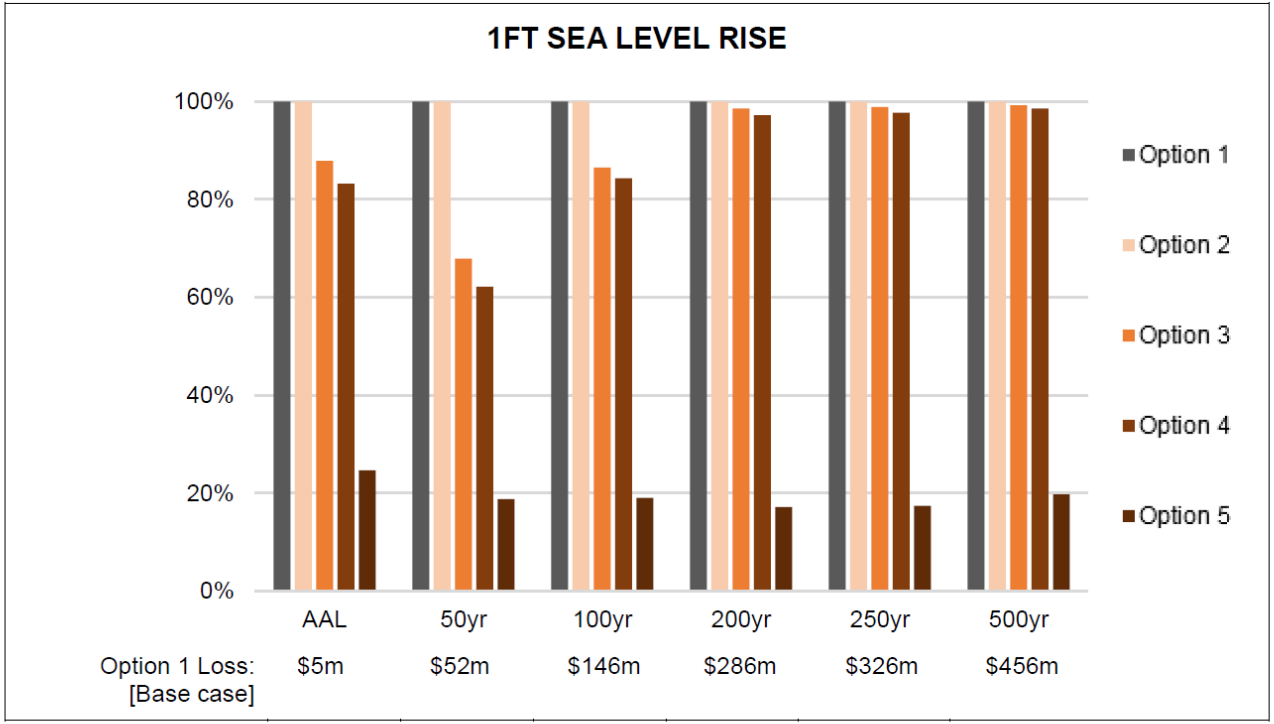
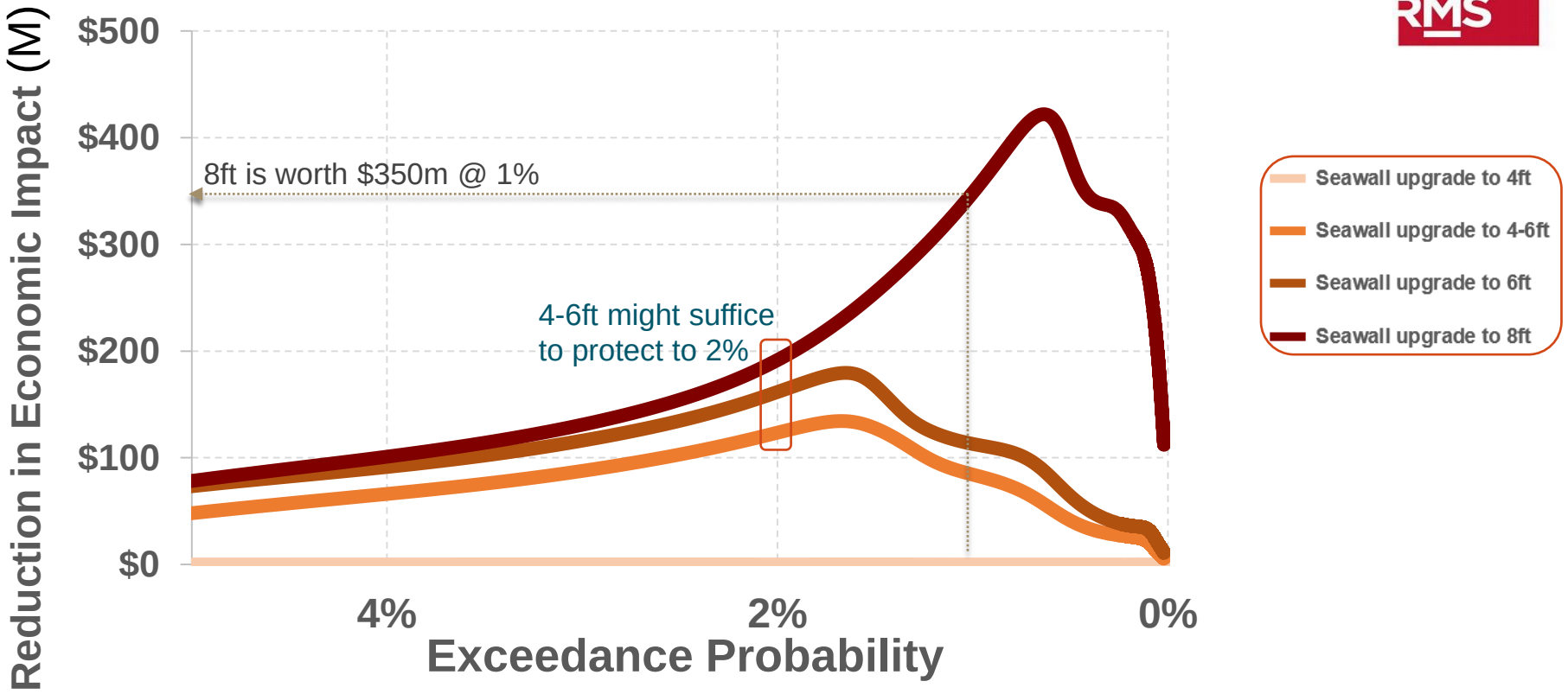


FIGURE 11: AVERAGE ANNUAL LOSS AND RETURN PERIOD LOSSES UNDER VARIOUS SEAWALL OPTIONS, AS PERCENTAGE OF CORRESPONDING OPTION 1 (BASE CASE) LOSS – 1FT SLR SCENARIO

Scenarios:

1) Base Case - no upgrades
2) 4 ft sea walls
3) 4-6 ft sea walls
4) 6 ft sea walls
5) 8 ft sea walls

Different interventions have very different ROI...
...and optimal solution is very sensitive to goals



Reinforcing the Need for a Range of Investments

Increased Free Board

Raise Sea Walls

Stormwater Improvements

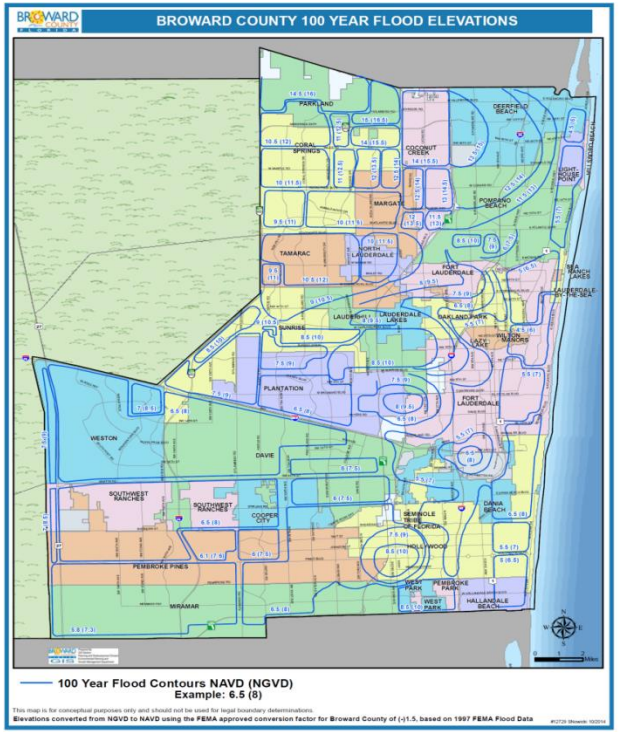
Regional Water Storage

Elevating Roads and Critical Infrastructure

Active Management

Broward 100-Year Flood Map

- One of 3 tools used to set finished floor elevations
- Historically, assumed worst case condition
- But, current map does not account for sea level rise
- Amended map will:
  - Integrate sea level rise
  - Capture changes in groundwater
  - Provide flood elevation with rainfall (non-stationarity analysis)
  - Address CRS creditable criteria
  - Reduce flood risk/higher standards
  - NOT be used to set FEMA FIRMS

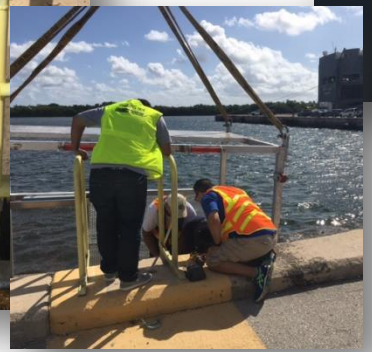


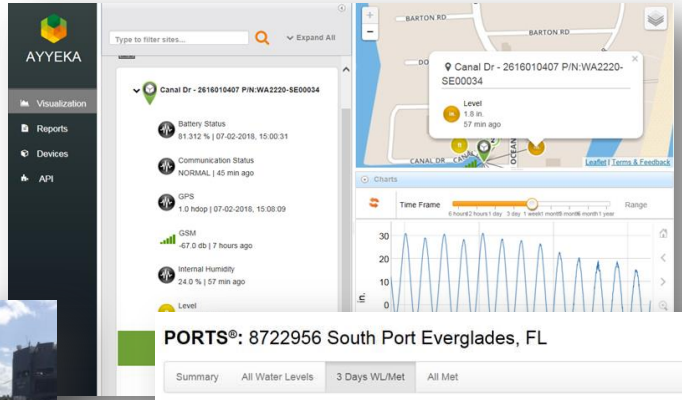

Finished Floor Elevation
14.5’ NAVD
FIRM (1992; 2014)
X Zone; 15’ NAVD
License 100-YR Elevation
14.5’ NAVD
Broward County 100-YR Elevation
12.5’ NAVD
2014 FEMA Base Flood Elevation: 15’ NAVD
Finished Floor Elevation: 14.5’ NAVD
Broward County 100-YR Elevation: 12.5’ NAVD

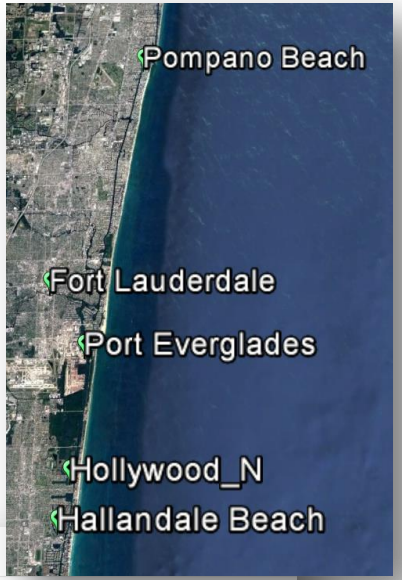

Flood Insurance Cost
Current (FFE at +1 above 2014 BFE) $650
FFE = 2014 BFE $1,817
Finished Floor Elevation: 10.25' NAVD
2014 FEMA Base Flood Elevation: 9' NAVD ≈ Broward County 100-YR Elevation: 9' NAVD
1992 FEMA Base Flood Elevation: 8.5' NAVD

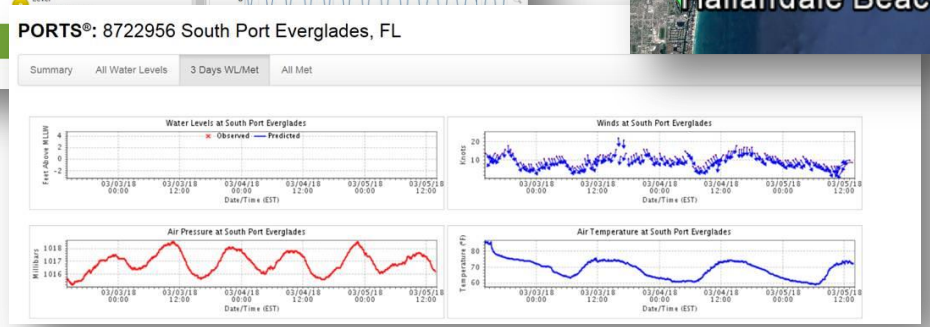
Improving Models through Collaborative Data

- 6+ active tide gauges in Broward
- Partnership with Cities
- Addition of NOAA PORTS Stations

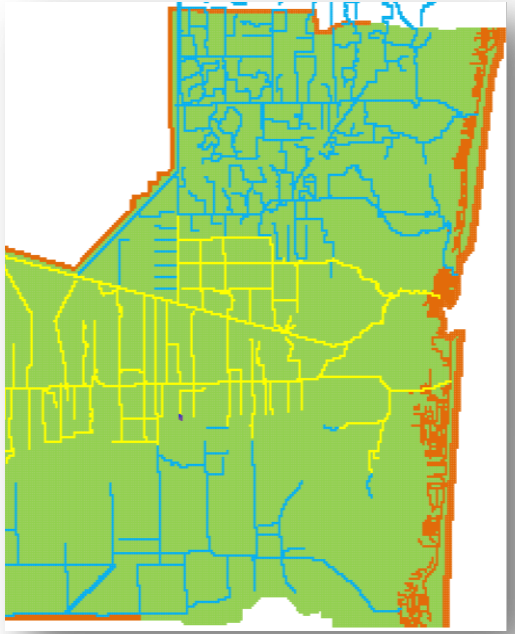




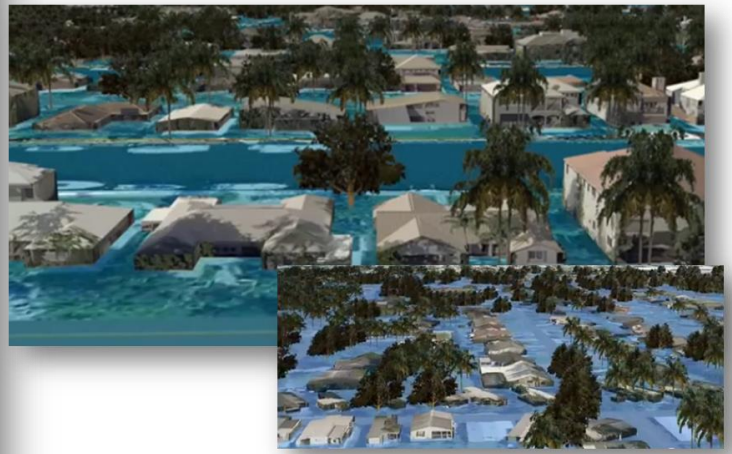




Expanded Model Applications



Telescoped Model
(USGS)

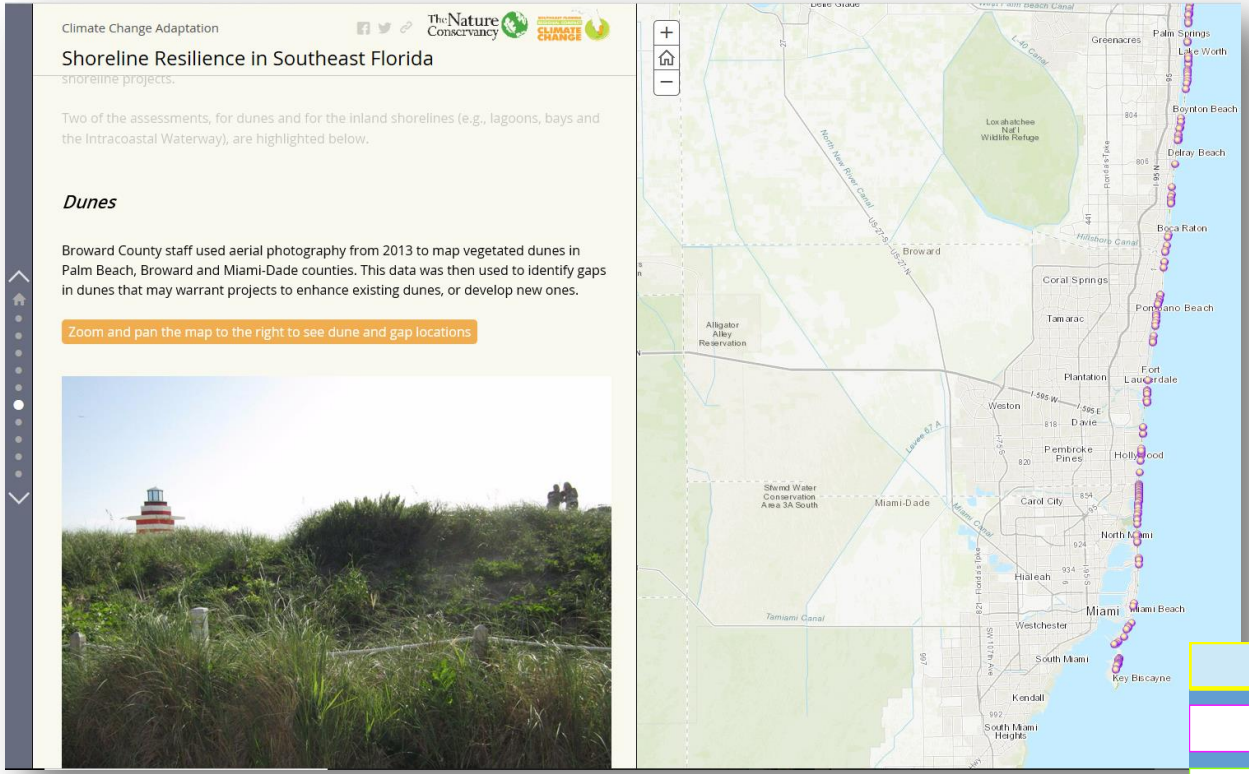


3D Flood Visualization
(NEMAC - UNC)

Future Flood Risk
Critical
Infrastructure
(Deltares)

Shoreline Resilience is a Pressing Need

Regional Living Shoreline and Gap Assessment



An Evolving Management Approach

- Elevate and reinforce infrastructure
- Maintain beaches/ reduce impacts
  - Smaller more frequent projects
  - Alternative sand sources (inland)
- Retain Sand in System and on Beach
  - Regional sediment management
  - Sand bypass
  - Resilient sand dunes

Offshore Dredge

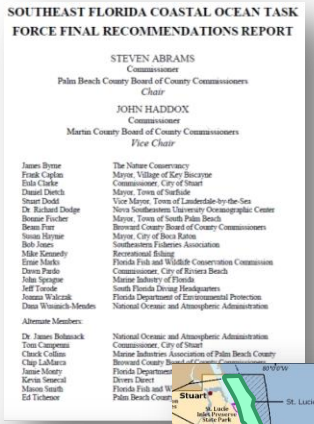
Truck Haul

Community Dune

Sand Bypass

Resilient Reefs and Coastal Oceans

- 2012 SE Florida Coastal Ocean Task Force
- Obj: Integrate science & policy to protect /enhance reefs
- Local Gov, Academy, Industry, Users, NFPs
- 2015 Final Report – Key recommendations
  - Regional water quality monitoring
  - Organized and sustained regional coordination and plan
- Legislative Advancements
  - FY ‘17 - State funding for regional monitoring (renewed)
  - FY ‘18 - Designation of Coastal Conversation Area
  - FY ’19 – Pursue Conservation Plan


SOUTHEAST FLORIDA COASTAL OCEAN TASK FORCE FINAL RECOMMENDATIONS REPORT

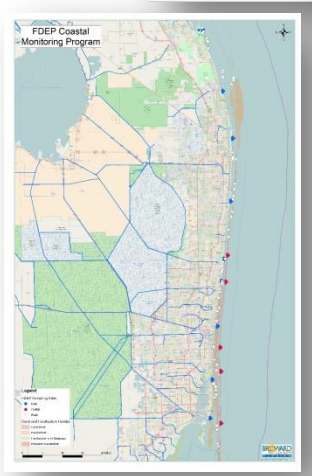
STEVEN ABRAMS
Commissioner
Palm Beach County Board of County Commissioners
Chair

JOHN HADDOX
Commissioner
Martin County Board of County Commissioners
Vice Chair

James Byrne	The Nature Conservancy
Frank Caplan	Mayor, Village of Key Biscayne
Fida Clarke	Commissioner, City of Stuart
Daniel Dietch	Mayor, Town of Surfside
Stuart Dodd	Vice Mayor, Town of Lauderdale-by-the-Sea
Dr. Richard Dodge	Nova Southeastern University Oceanographic Center
Bonnie Fischer	Mayor, Town of South Palm Beach
Beam Furr	Broward County Board of County Commissioners
Susan Haynie	Mayor, City of Boca Raton
Bob Jones	Southeastern Fisheries Association
Mike Kennedy	Recreational fishing
Ernie Marks	Florida Fish and Wildlife Conservation Commission
Dawn Pardo	Commissioner, City of Riviera Beach
John Sprague	Marine Industry of Florida
Jeff Torode	South Florida Diving Headquarters
Joanna Walczak	Florida Department of Environmental Protection
Dana Wiesnieh-Meades	National Oceanic and Atmospheric Administration

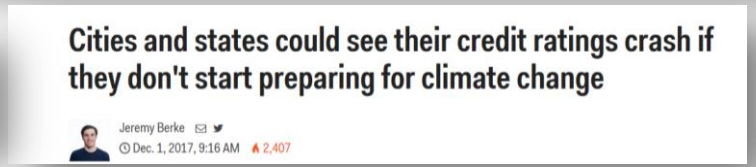
Alternate Members:

Dr. James Bohnsack	National Oceanic and Atmospheric Administration
Tom Campenni	Commissioner, City of Stuart
Chuck Collins	Marine Industries Association of Palm Beach County
Chip LaMarca	Broward County Board of County Commissioners
Jamie Monty	Florida Department
Kevin Senecal	Divers Direct
Mason Smith	Florida Fish and W
Ed Tichenor	Palm Beach Count



Economic Basis for Action

- Protect infrastructure
- Reduce flood risk and losses
- Protect credit ratings
- Improve insurance affordability
- Protect property values
- Preserve tax base
- Attract competitive financing
- Maintain competitive posture



Organizing on Economic Resilience

2016

- Regional economics workshop
- Sea level rise forum

2017

- Business resilience committees
- Regional Coastal Coalition
- Agency/chambers partnership
- 9th Annual Compact Summit theme
  "The Business of Resilience"

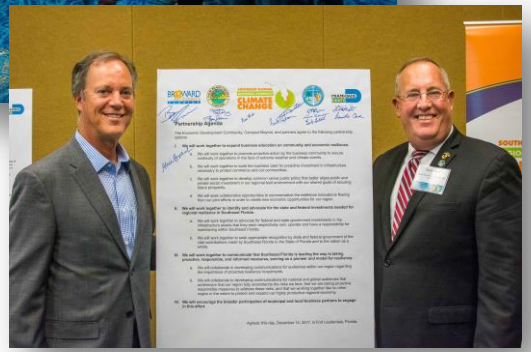
2018

- Statement of collaboration

Business Roundtable

9th Annual Summit – nearly 700 attendees

Celebrating Expanded Collaboration



SFRPC
South Florida Regional Planning Council
Proudly serving South Florida since 1974

CHAMBER of COMMERCE
OF THE PALM BEACHES

GREATER FORT LAUDERDALE
CHAMBER OF COMMERCE

The Beacon Council

GREATER
HOLLYWOOD
CHAMBER OF COMMERCE

TREASURE COAST
TCRPC
REGIONAL PLANNING COUNCIL
"Destroying One Neighborhood At A Time" - Est. 1976

greater
miami
chamber
of commerce

greater
fort lauderdale
alliance | broward
county
Life. Less taxing.

BROWARD
WORKSHOP

Summary

- Compact serves as an ongoing catalyst for accelerated resilience planning in SE Florida
- Multiagency collaborations and partnerships have been vital
- Advancements have employed policy, land use and regulatory tools
- Scenario-based assessments present options and foster community-based decision-making
- Near-term economic implications have spurred private sector participation
- Priority next steps include sustained engagement and a detailed investment plan with spatial and temporal elements

Questions?

Dr. Jennifer L. Jurado
Chief Resilience Officer, Director
Environmental Planning and Community Resilience Division
Broward County
jjurado@broward.org
954-519-1464