

Planning for Resilience in SE Florida: Extreme Weather and Sea Level Rise

ACCL/ACOEL
2018 Joint Program
April 27, 2018

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



The Region of Southeast Florida



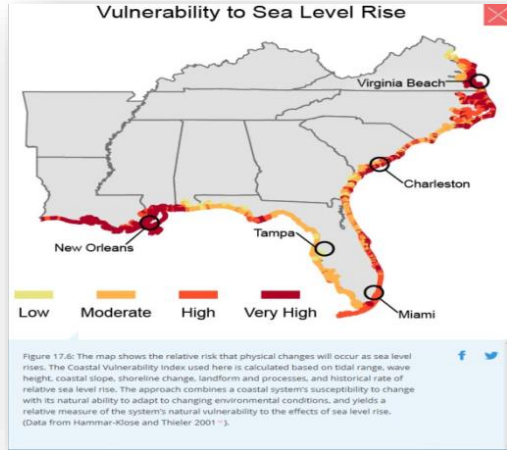
Characterized by:

- 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



2016 Fort Lauderdale - Tidal Flooding



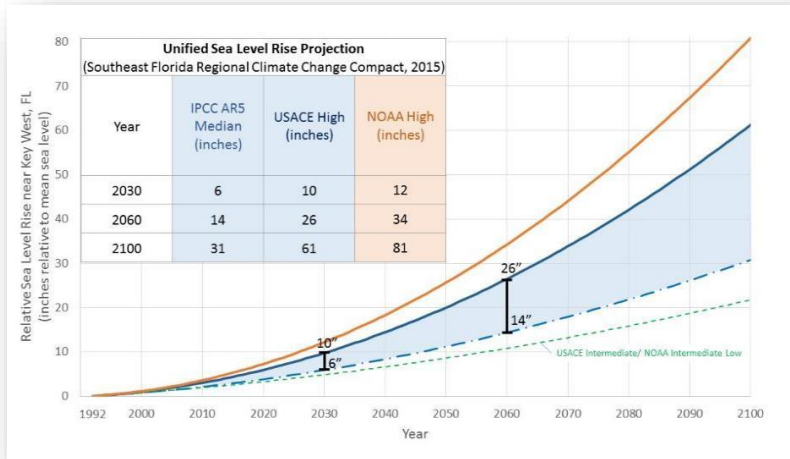
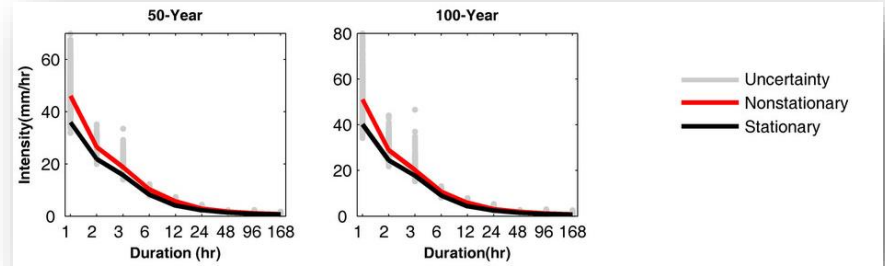
2015 Palm Beach – 22” rainfall



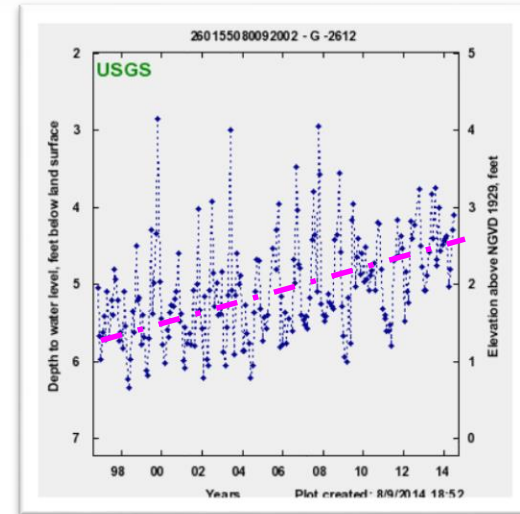
Primary Variables

- ❑ 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

Diverse and Statewide Impacts of Irma

Naples, FL



Credits: REUTERS/Stephen Yang
Jacksonville, FL



Credit: News.wjct.org

Monroe County, FL

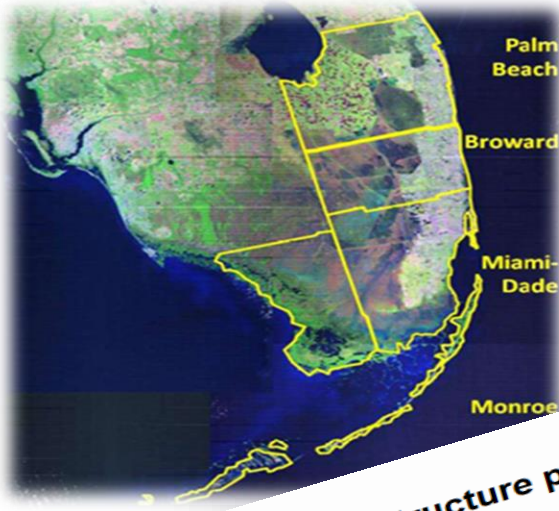


Credit: Floridatoday.com
Collier County, FL



Credits: Liam James Doyle/Naples Daily News

The Case for Immediate Action



- 3rd largest state by population
- 4th largest urban area in country
- 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
1 3/28/2017

Florida population surging again

SunSentinel

SEARCH

South Florida expected to create jobs faster than US

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

Recommend +4

Tweet 0

Share

Small view

ECONOMIC YEARBOOK 2016

Southeast Florida: A surge of hotels and apartments

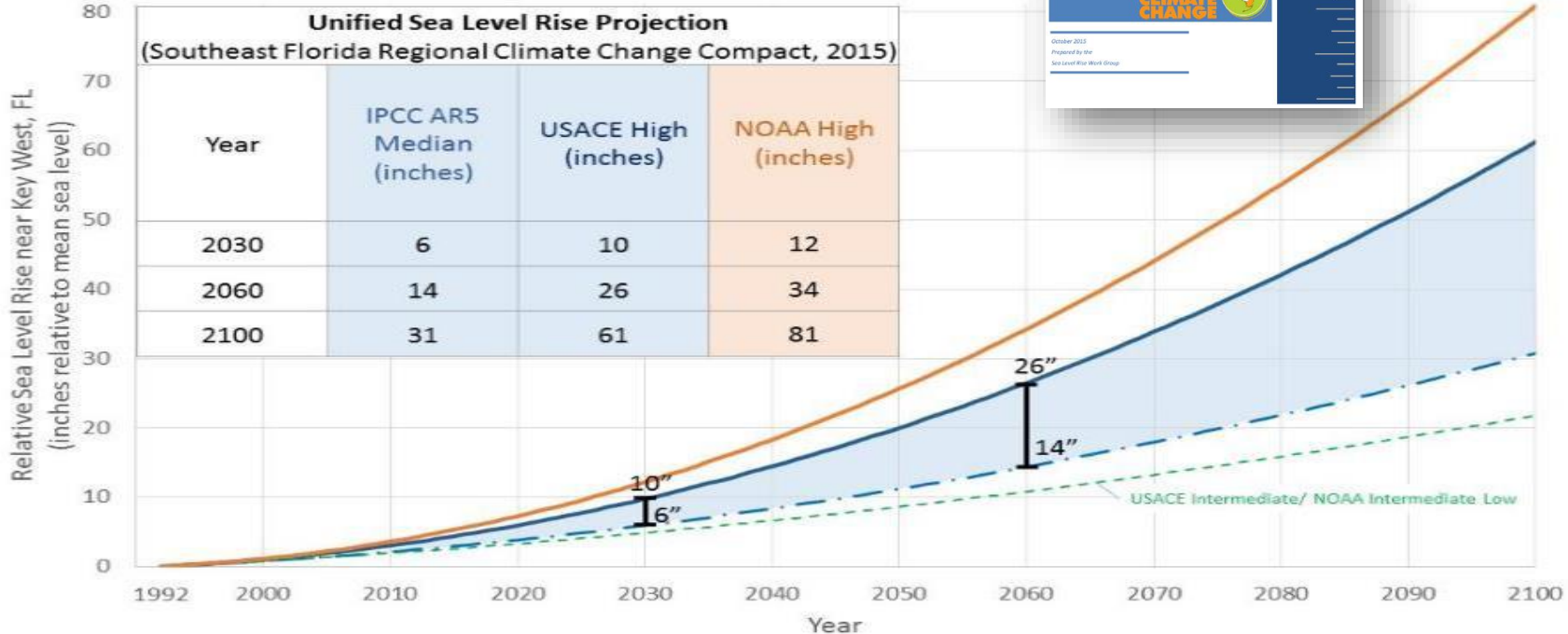
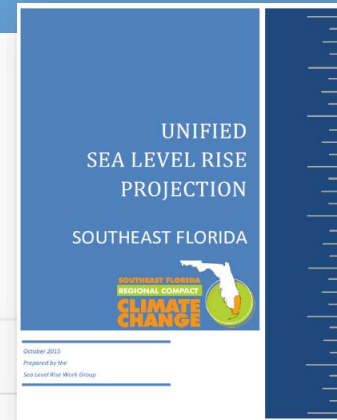
Residential development projects are spilling out from Fort Lauderdale's urban core.

SE Florida Regional Climate Change Compact

- ❑ 4 Counties, 110 Cities, 1/3 GDP
- ❑ Initiated in October 2009
- ❑ Response to shared challenges
- ❑ Voluntary collaboration
- ❑ Commitments
 - Policy coordination
 - Common baseline
 - Regional action plan
 - Annual summits



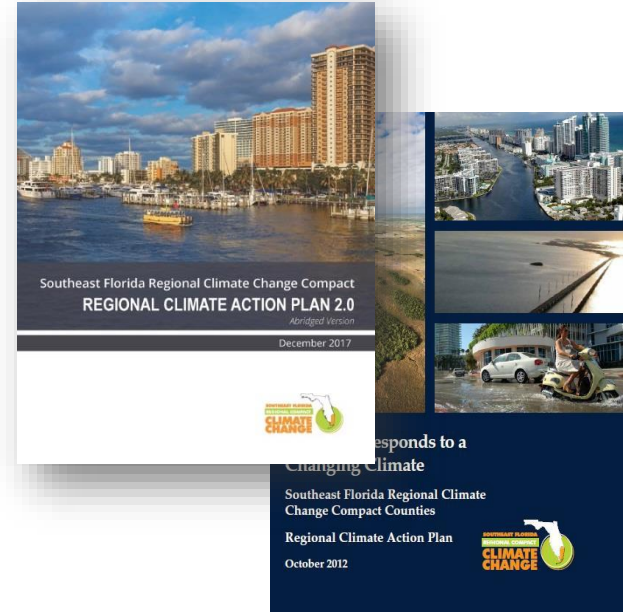
Planning Tools



The Regional Climate Action Plan

Focal Areas:

- ❑ Economic Resilience
- ❑ Sustainable Community and Transportation Planning
- ❑ Water Management
- ❑ Risk Reduction and Emergency Management
- ❑ Energy and Fuel
- ❑ Natural Systems
- ❑ Agriculture
- ❑ Outreach and Public Policy



Web-based, implementation resources

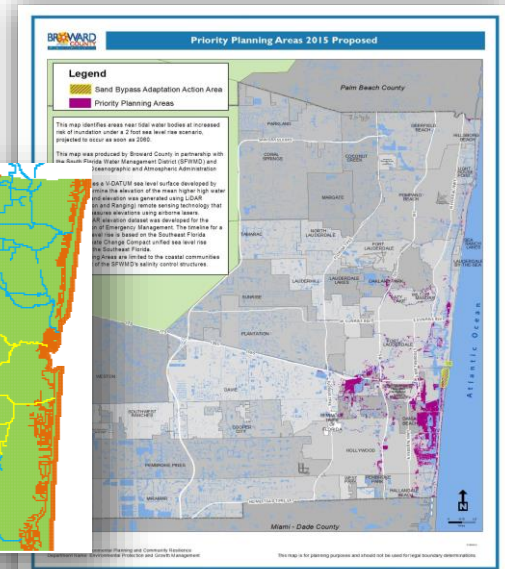
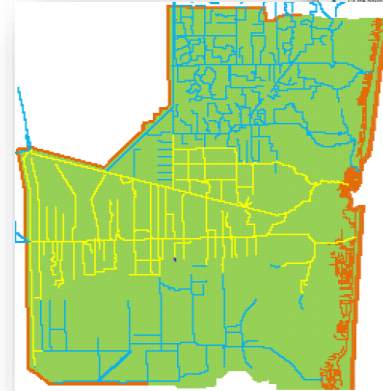
*>100 Recommendations
Adaptation and Mitigation*



[Download at www.southeastfloridaclimatecompact.org](http://www.southeastfloridaclimatecompact.org)

Translating Plans to Action: Broward Examples

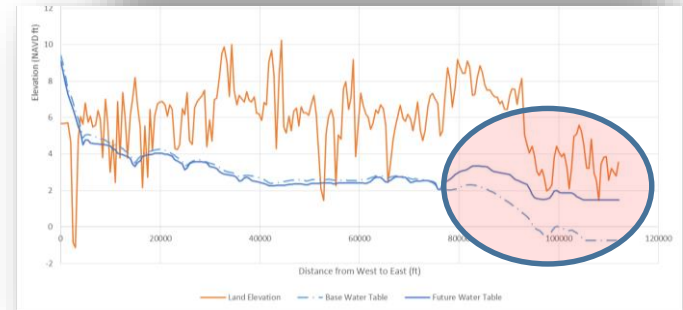
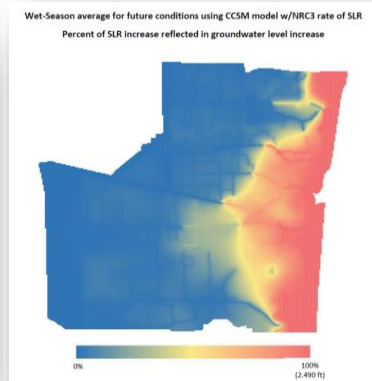
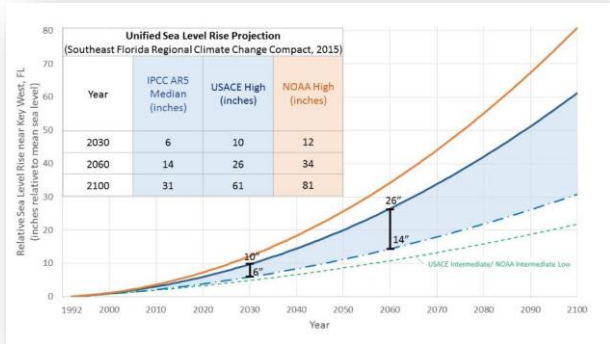
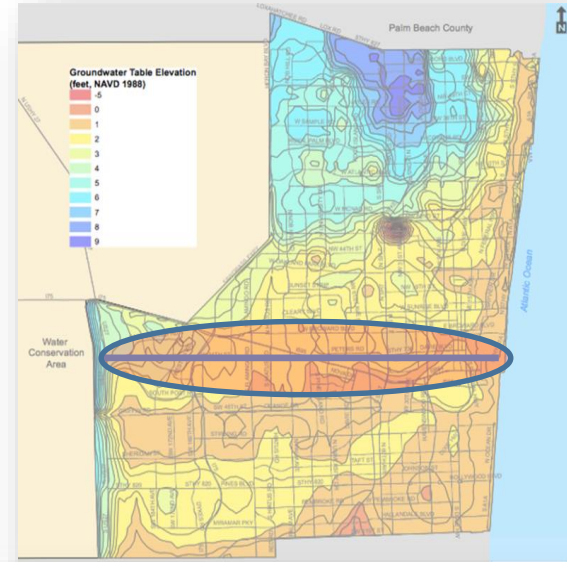
- ❑ A process of evolution
- ❑ Progressive Policy
 - Priority Planning Areas
 - Adaptation Action Areas
 - Comp Plan/Land Use
- ❑ Future conditions map series – code of ordinances (established May 2017)



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

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, 2018



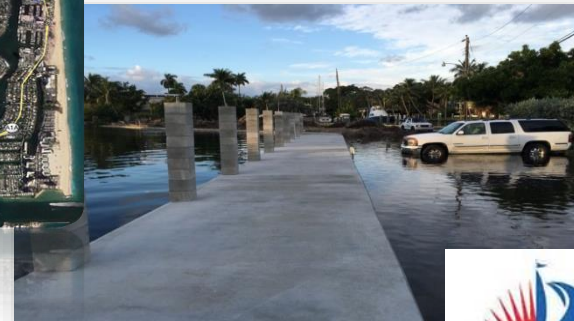
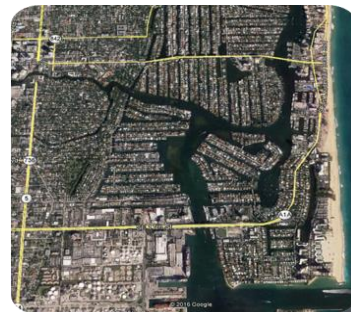


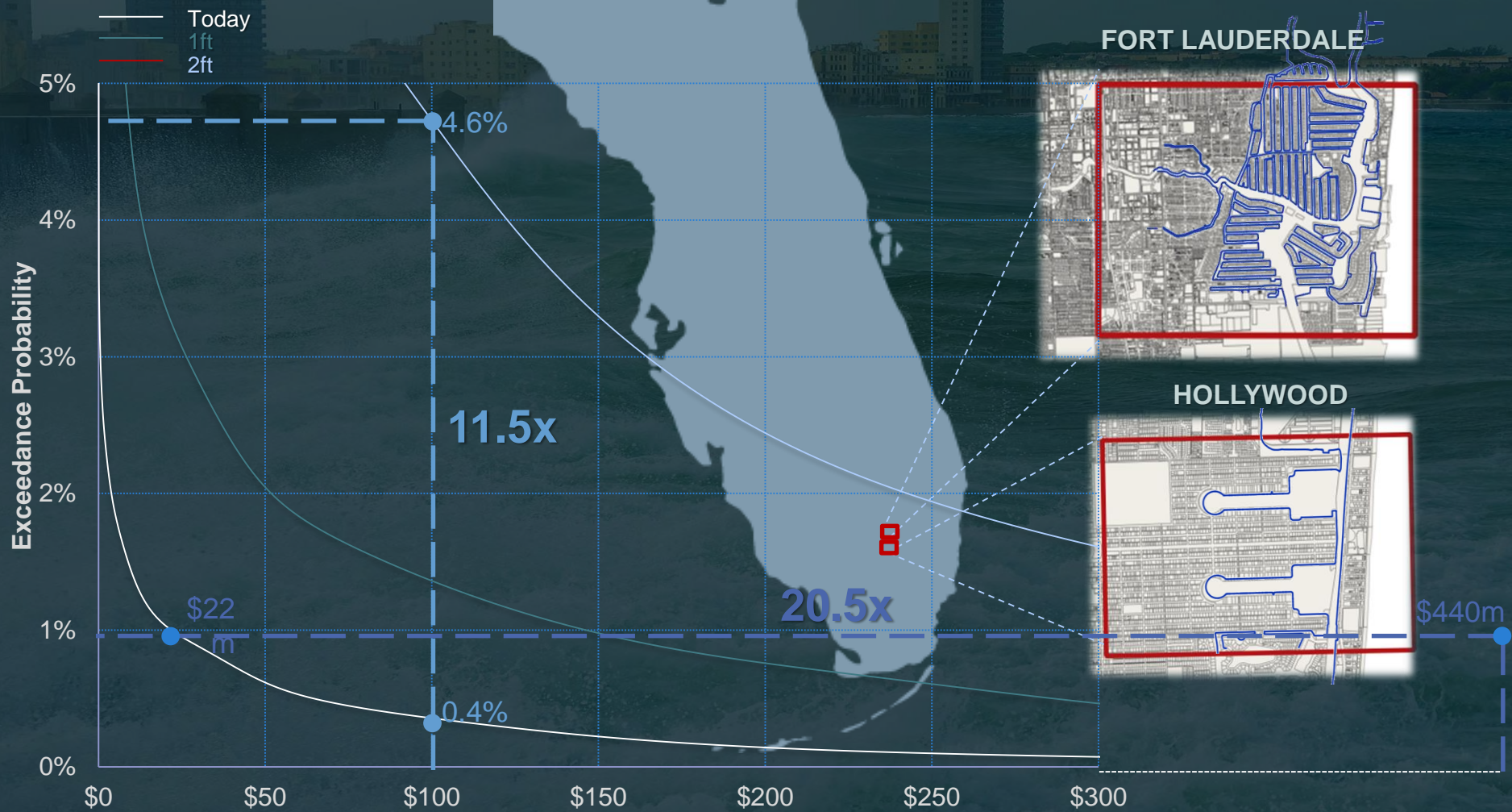
US Army Corps
of Engineers®

USACE-Broward Resiliency Study

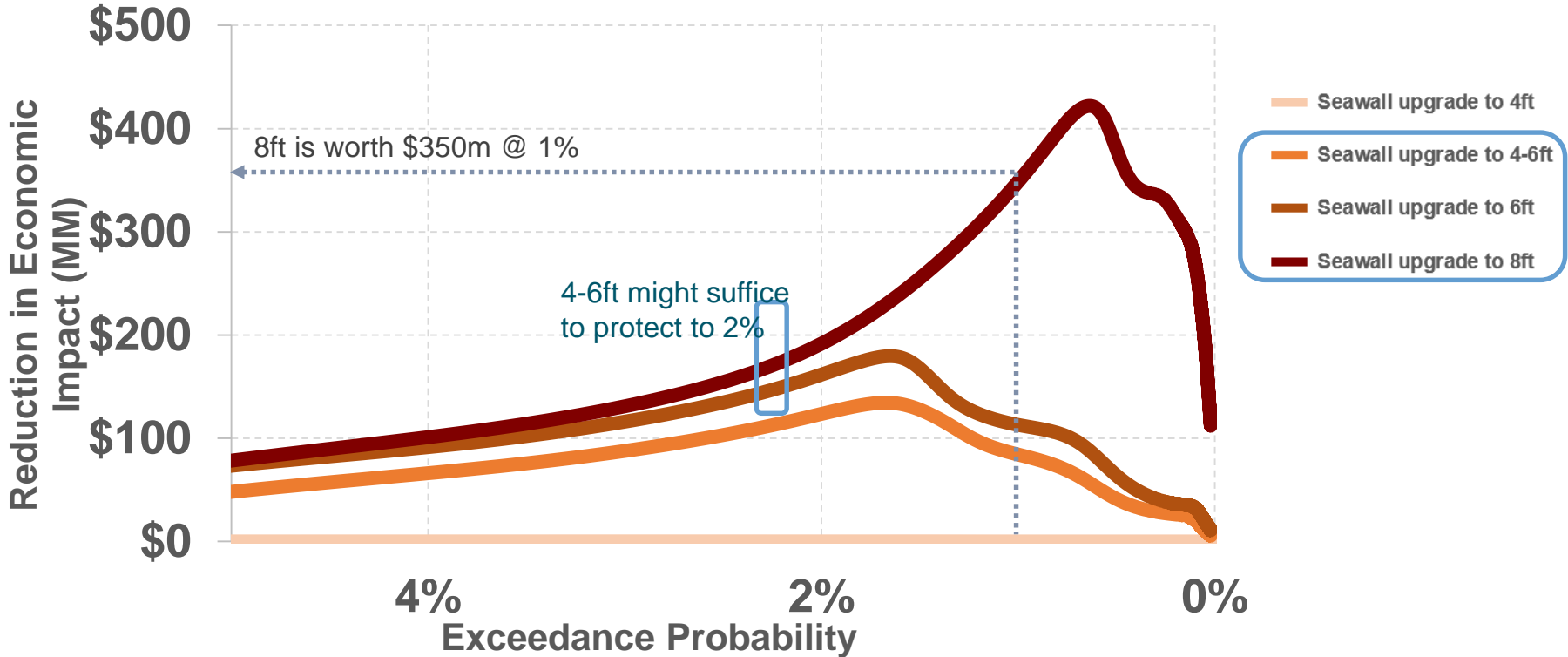


- ❑ Resilient Sea Wall Top Elevations
- ❑ Calibrated hydrodynamic model
 - 2 feet sea level rise
 - High tides
 - 25-yr storm surge
- ❑ Economic study
 - Damage loss reduction
 - Commercial activity





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



But Resilience Requires Coordination and Consistency

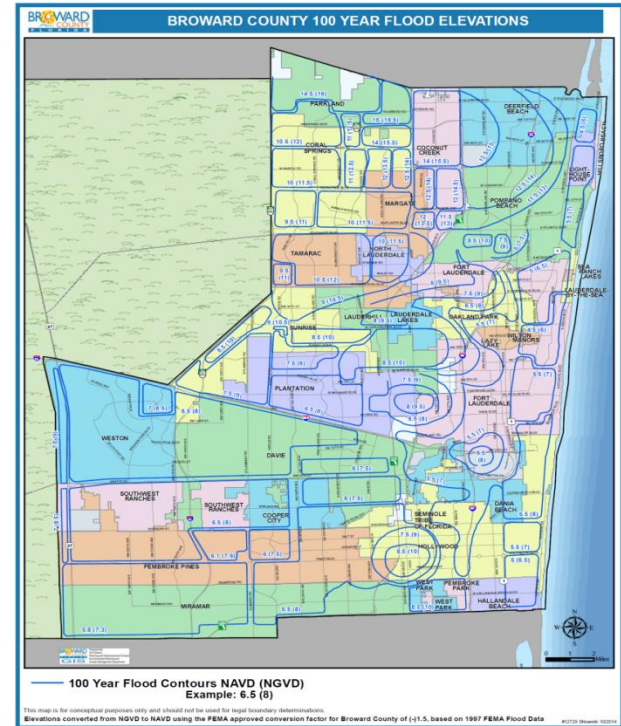


Update to Broward 100-Year Flood Map

Justification:

- One of 3 tools used to set finished floor elevations
- Historically - worst case condition
- Does not account for sea level rise

- Amended map will:
 - Integrate sea level rise
 - Capture changes in groundwater
 - Provide flood elevation with rainfall
 - Address CRS creditable criteria
 - Reduce flood risk/higher standards
 - NOT be used to set FEMA FIRMS



Future Conditions Flood Map

Integration of Climate Data:

- ❑ Compact's SLR Projection (2060 and 2100)
- ❑ SFWMD – Future Condition IDF curves
 - Statistical and dynamic down-scaling
- ❑ Non-stationarity and Review of Return Period Frequency



Community Benefit – NFIP and CRS

- ❑ 204,211 policies (12% state total)
- ❑ 22 participating CRS cities and county

CRS Credits:

- ❑ Planning for SLR USACE Calculator
- ❑ Setting higher standards – Special hazards
- ❑ Participation in new study - Higher Standard Study
- ❑ Higher regulatory standards (weather patterns and altered flood height)
- ❑ Related activities - Targeted Outreach, Neighborhood Specific

Organizing on Economic Resilience

2016

- ❑ Regional economics workshop
- ❑ Sea level rise forum

2017

- ❑ Business resilience committees
- ❑ Focal area in RCAP 2.0
- ❑ Agency/chambers partnership
- ❑ Summit theme “ Business of Resilience”

2018

- ❑ Statement of collaboration



Business Roundtable



Economic Basis for Action

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



Bloomberg

South Florida's Real Estate Reckoning Could Be Closer Than You Think

*Environmental risks
Evaluating the impact of climate change on
US state and local issuers*

MOODY'S
INVESTORS SERVICE

Moody's Warns Cities to Address Climate Risks or Face Downgrades

By **Christopher Flavelle**
November 29, 2017 4:00 AM
From **Climate Changed**

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

Next Steps for Region

- ❑ Sustain private sector collaboration
- ❑ Advance regional resilience standards
- ❑ Secure Federal/State engagement
- ❑ Advance a formal, phased regional resilience strategy
- ❑ Focus on funding and financing
- ❑ Partner in regional media campaign



Summary



- ❑ Flooding is the most pressing resiliency challenge for SE Florida
- ❑ Requiring more than site-specific design, with treatment of systems and regional standards
- ❑ Compact is an effective model for regional collaboration, but private sector participation is vital for scaled investments
- ❑ Land use and regulatory tools are being effectively employed in advancing resilience standards
- ❑ Economic arguments expand basis for coordinated resilience investments
- ❑ Effective strategy requires a more complete regionally coordinated strategy, 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

