Building Resilience to a Changing Climate:

A Technical Training in Water Sector Utility Decision Support

WUCA
Water Utility Climate Alliance

WATER RESOURCES RESILIENCE IN BROWARD COUNTY

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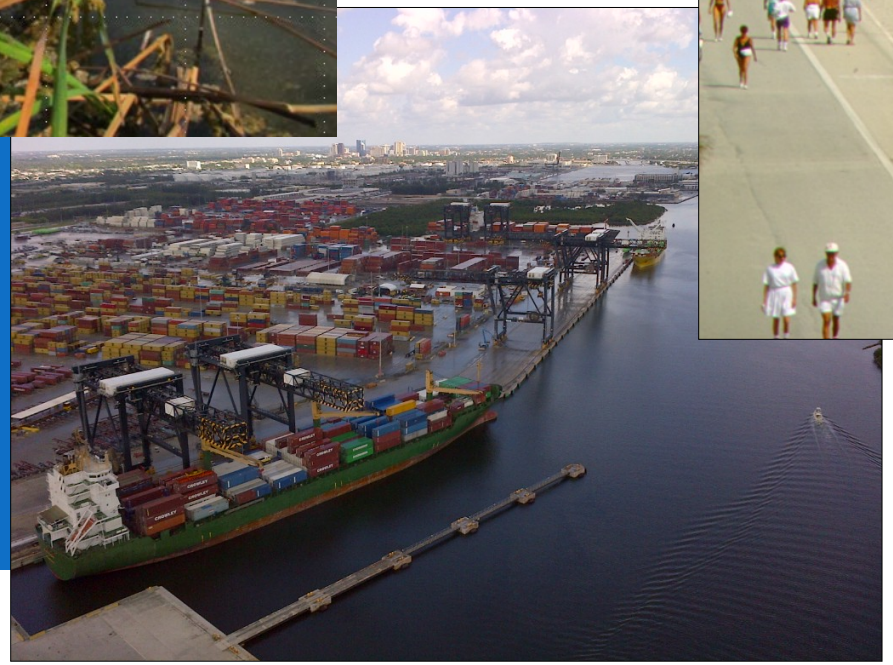
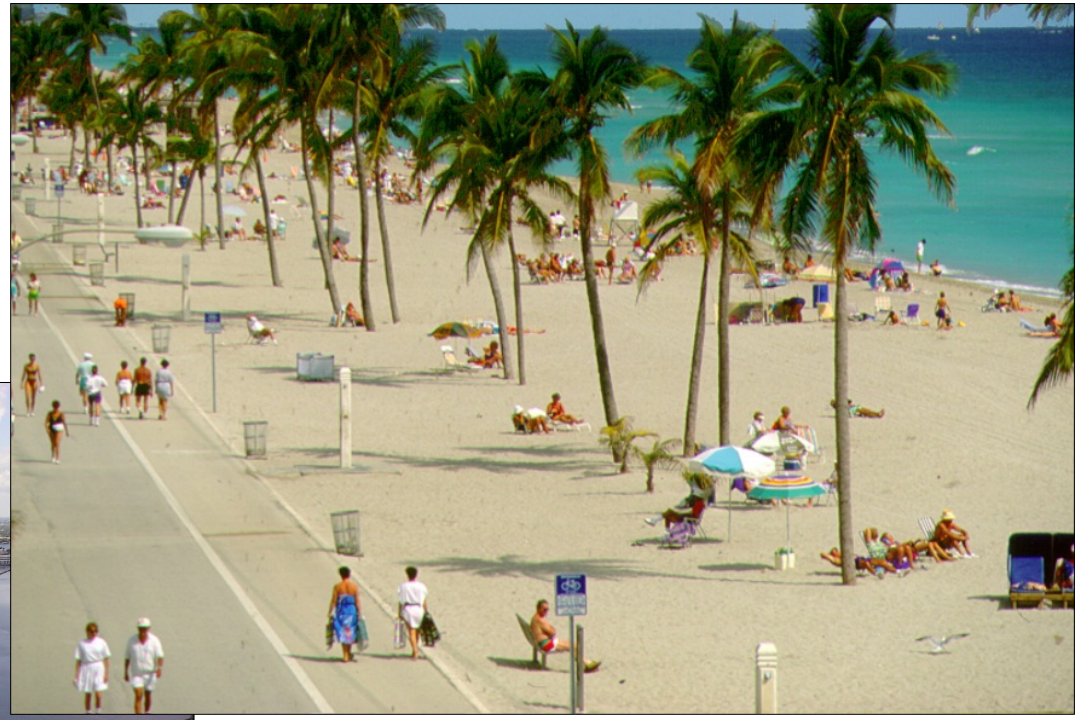
Water Resource Manager, Environmental Planning and Community Resilience Division

May 29, 2019

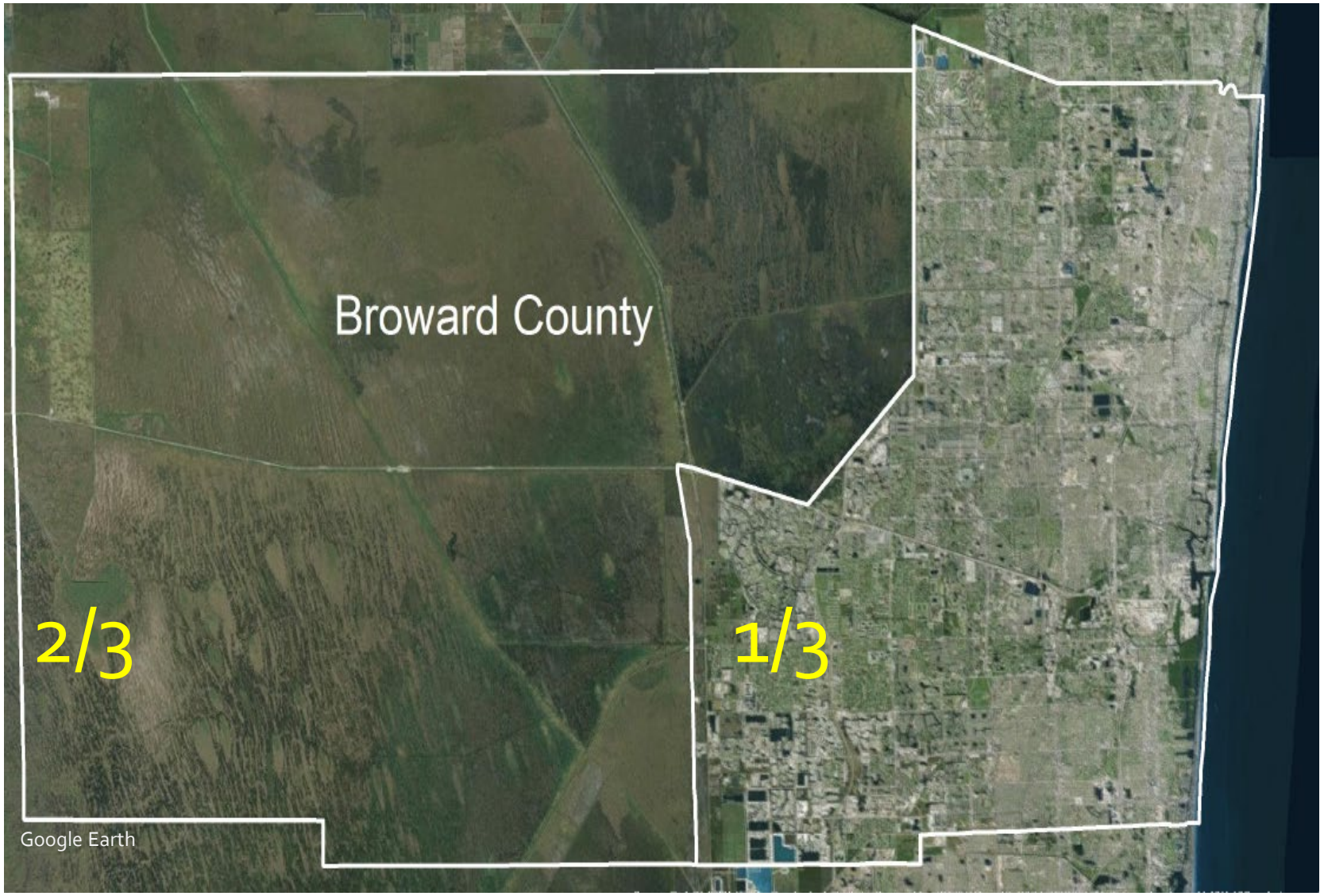
BROWARD COUNTY FLORIDA

Broward Water Resources Abundance





Broward and the Everglades

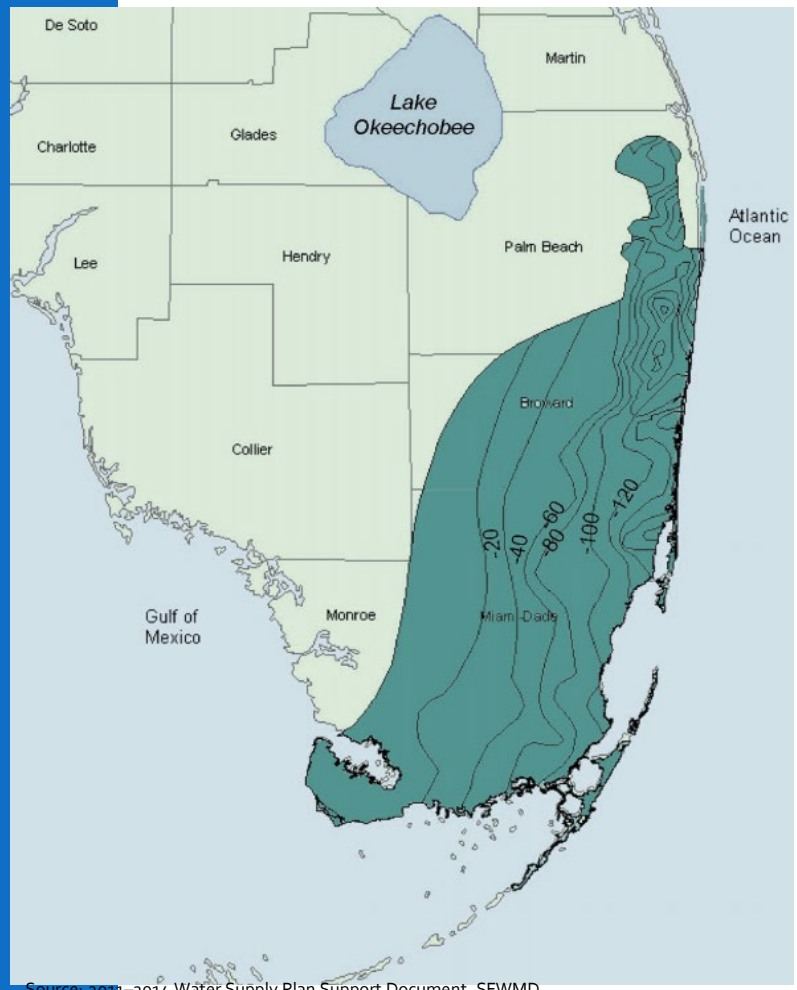


Land Use and Water Management

Source: Broward County Historical Commission

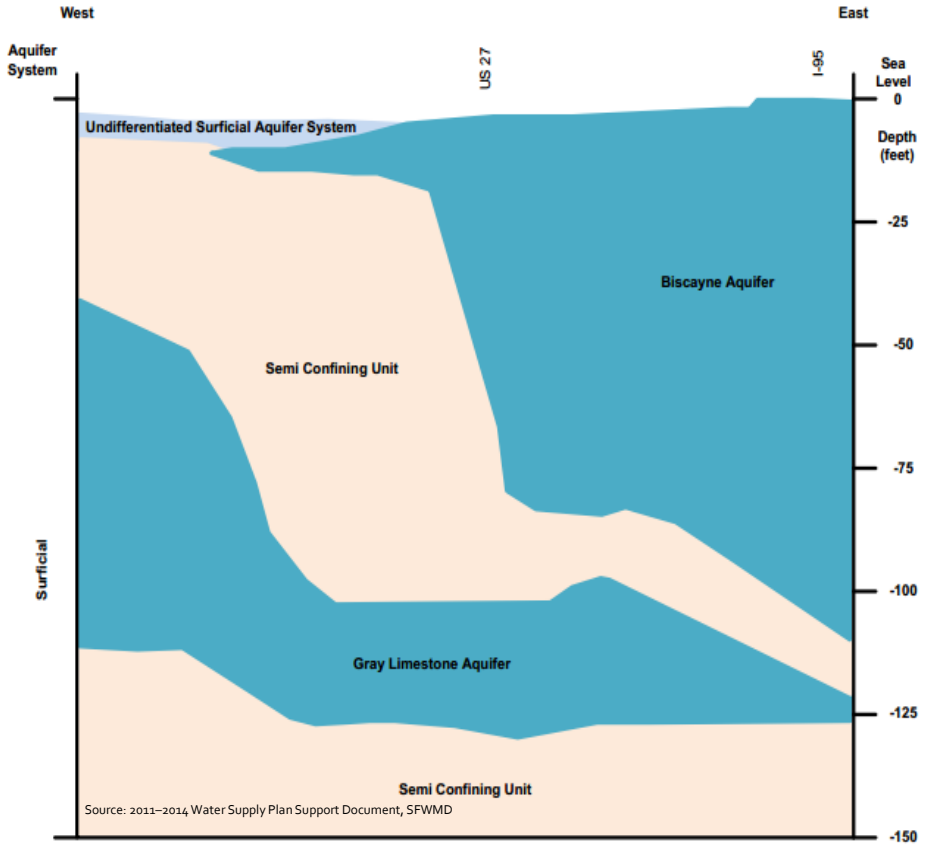
Source: SFWMD

Biscayne Aquifer as Water Source



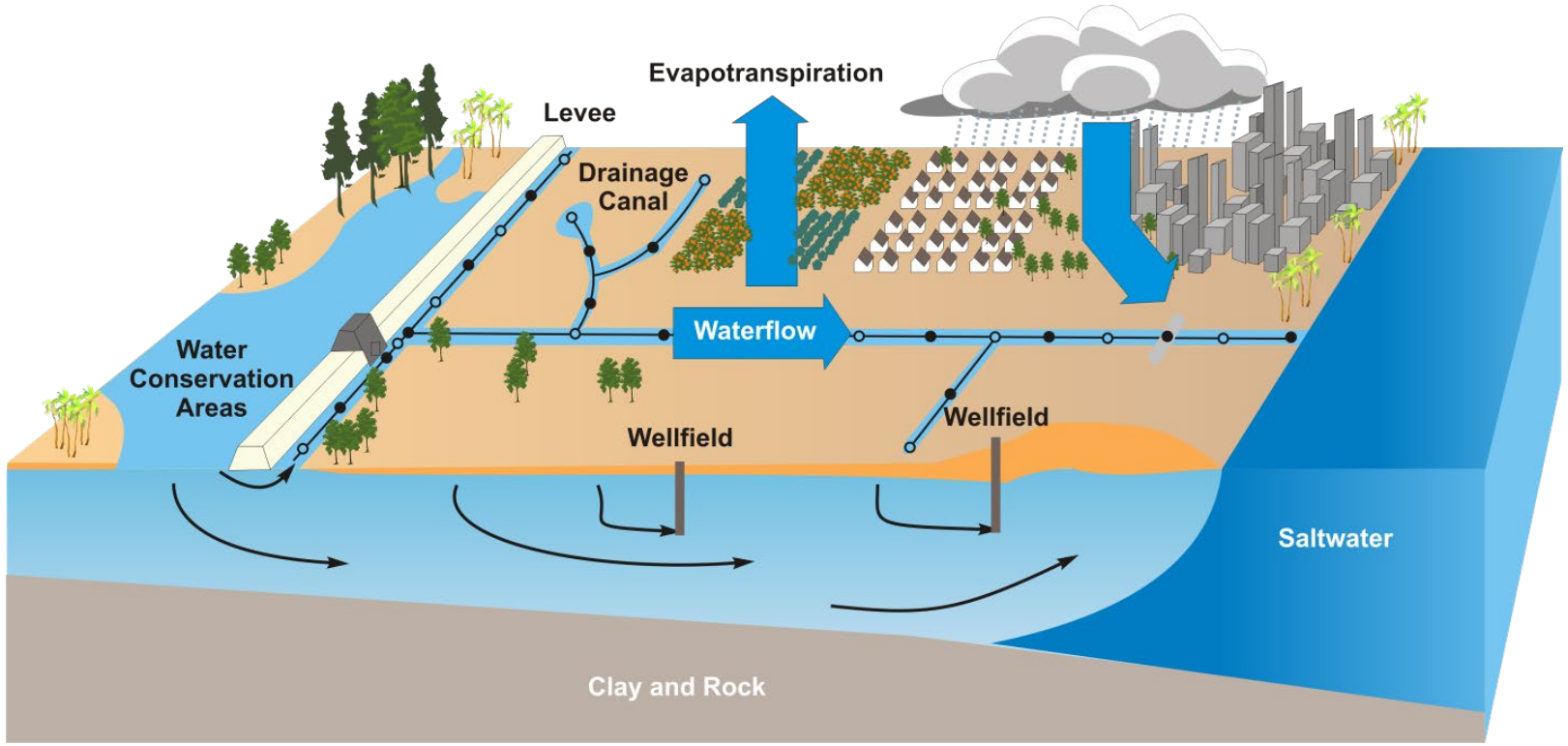
Source: 2011–2014 Water Supply Plan Support Document, SFWMD

Coastal Aquifer



Source: 2011–2014 Water Supply Plan Support Document, SFWMD

Water System Integration



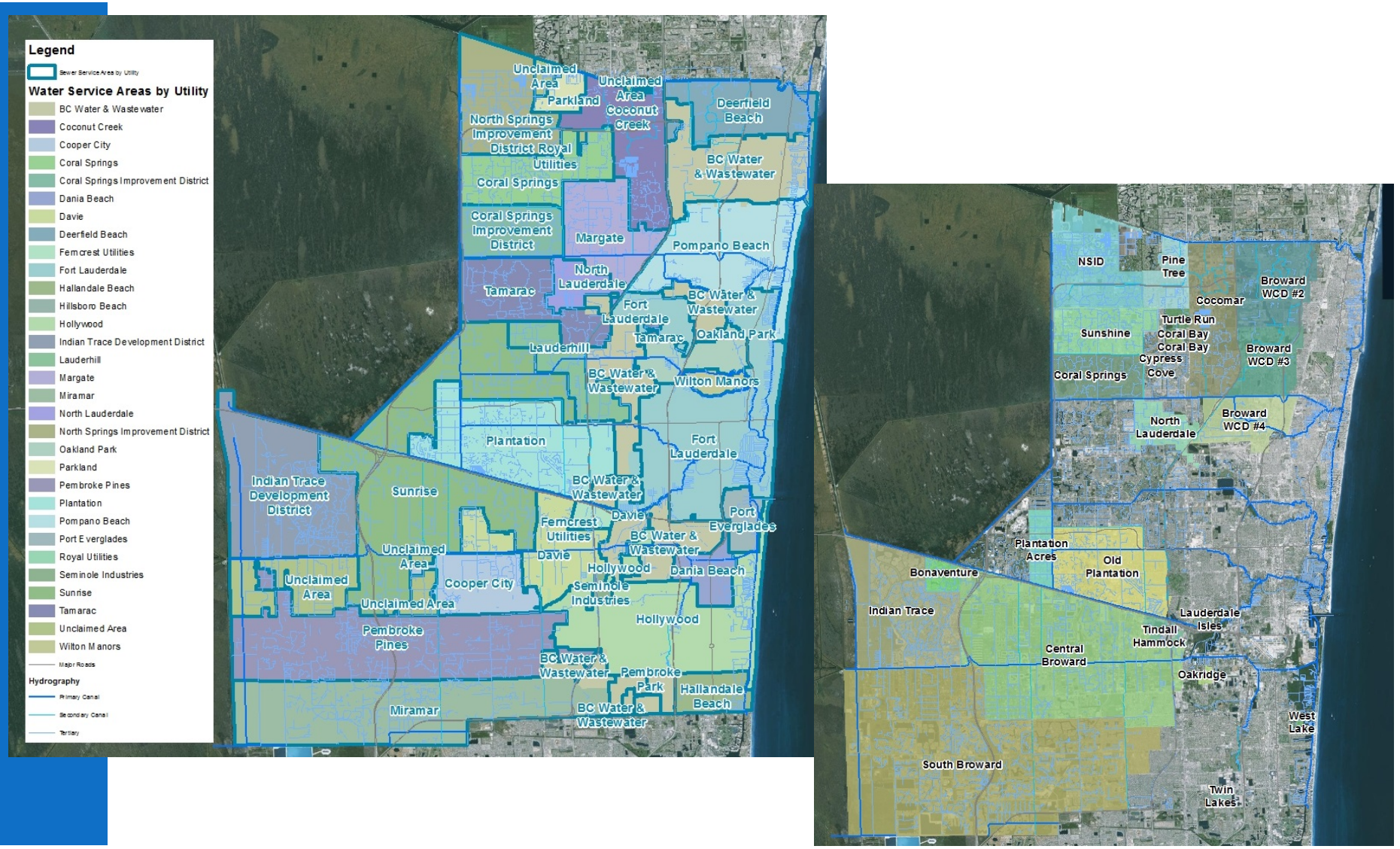
Water System Stressors

- Human-induced Stresses:
  - Urban Development
  - Wellfield pumping
  - Canal water level management
  - Everglades Drainage
  - Agricultural Needs
  - Lake Okeechobee Levels Regulation Schedules

- Natural Stresses (and Climate Change):
  - Sea level rise
  - Extreme events

Diverse Water Managers:

Utilities and Drainage/Water Control Districts



A History of Evolving Water Policy

1972 – Land and Water Management Act (Areas of Critical State Concern) and Florida Water Resources Act

1985 – Growth Management Act (+ later amendments)
Water Supply Facility Work Plans

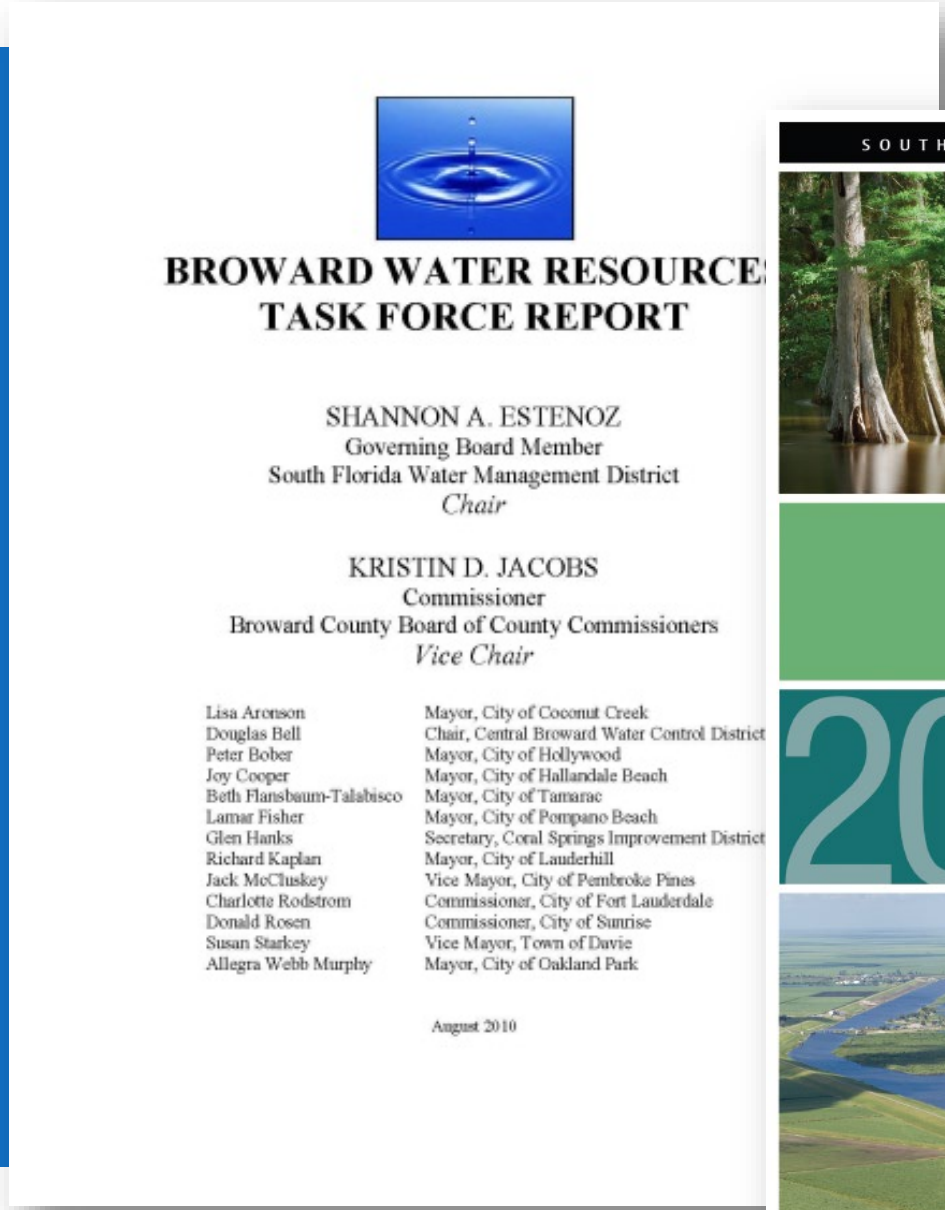
2002 – Florida Water Conservation Initiative

2007 – Regional Water Availability Rule
- Alternative Water Supply

2008 – Ocean Outfall Legislation
- Mandated Beneficial Reuse

2011 – Numeric Nutrient Criteria
- Stricter water quality protections

Planning for Tomorrow



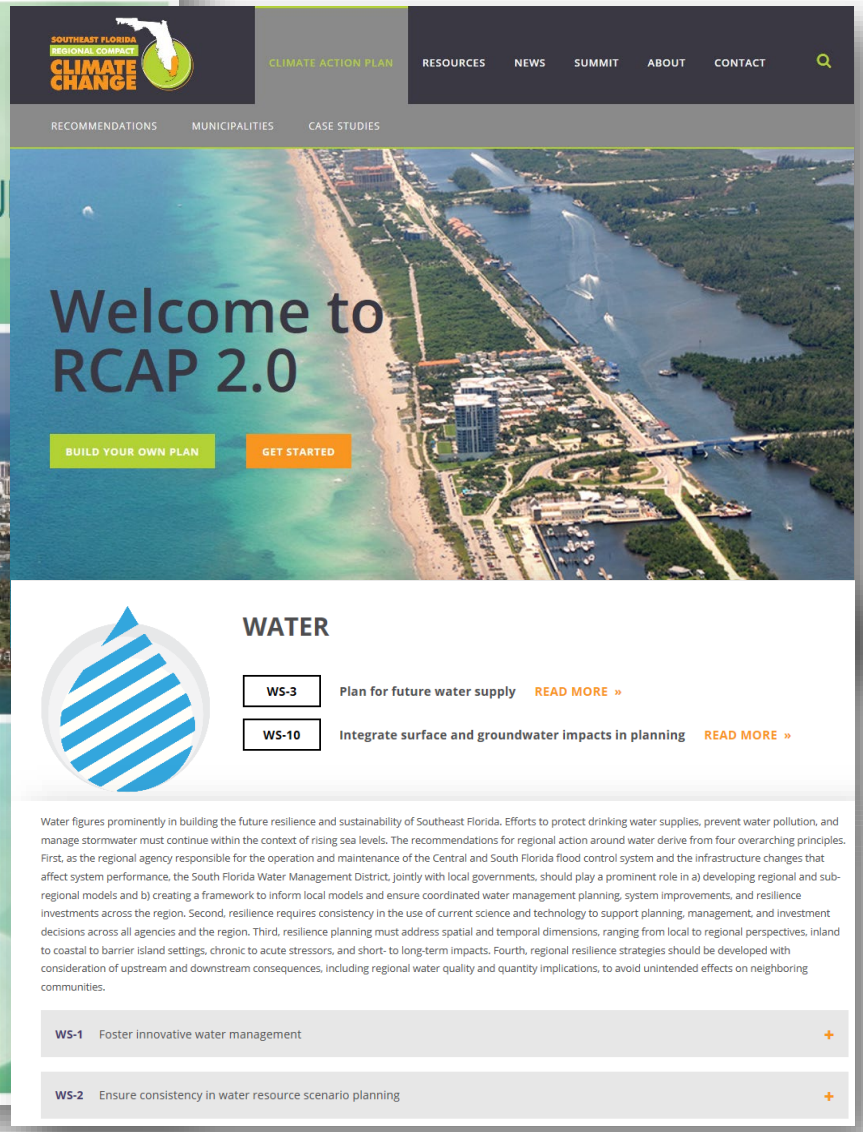
BROWARD WATER RESOURCES
TASK FORCE REPORT

SHANNON A. ESTENOZ
Governing Board Member
South Florida Water Management District
Chair

KRISTIN D. JACOBS
Commissioner
Broward County Board of County Commissioners
Vice Chair

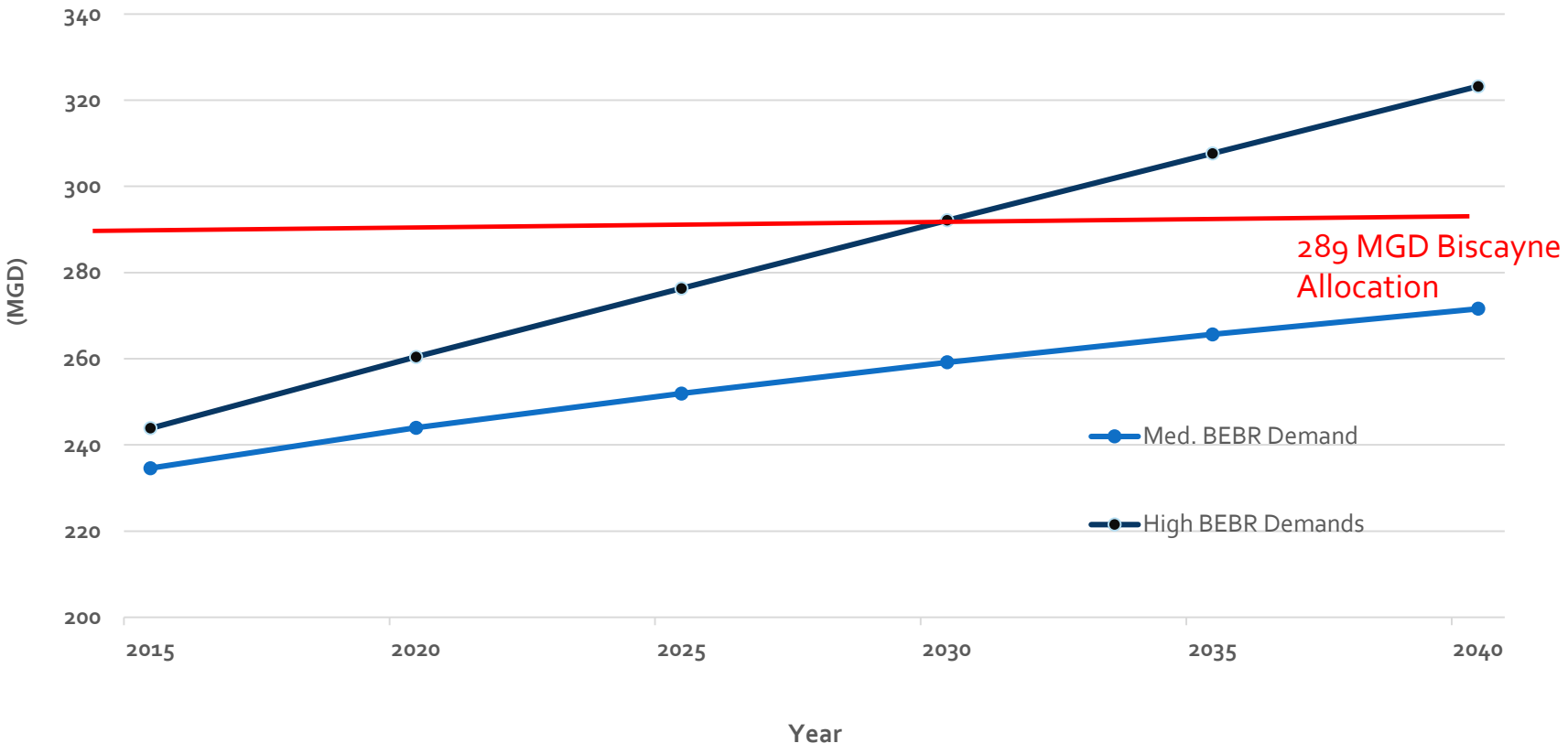
Lisa Aronson	Mayor, City of Coconut Creek
Douglas Bell	Chair, Central Broward Water Control District
Peter Bober	Mayor, City of Hollywood
Joy Cooper	Mayor, City of Hallandale Beach
Beth Flansbaum-Talabisco	Mayor, City of Tamarac
Lamar Fisher	Mayor, City of Pompano Beach
Glen Hanks	Secretary, Coral Springs Improvement District
Richard Kaplan	Mayor, City of Lauderhill
Jack McCluskey	Vice Mayor, City of Pembroke Pines
Charlotte Rodstrom	Commissioner, City of Fort Lauderdale
Donald Rosen	Commissioner, City of Sunrise
Susan Starkey	Vice Mayor, Town of Davie
Allegra Webb Murphy	Mayor, City of Oakland Park

August 2010



Long-term Growth Trends

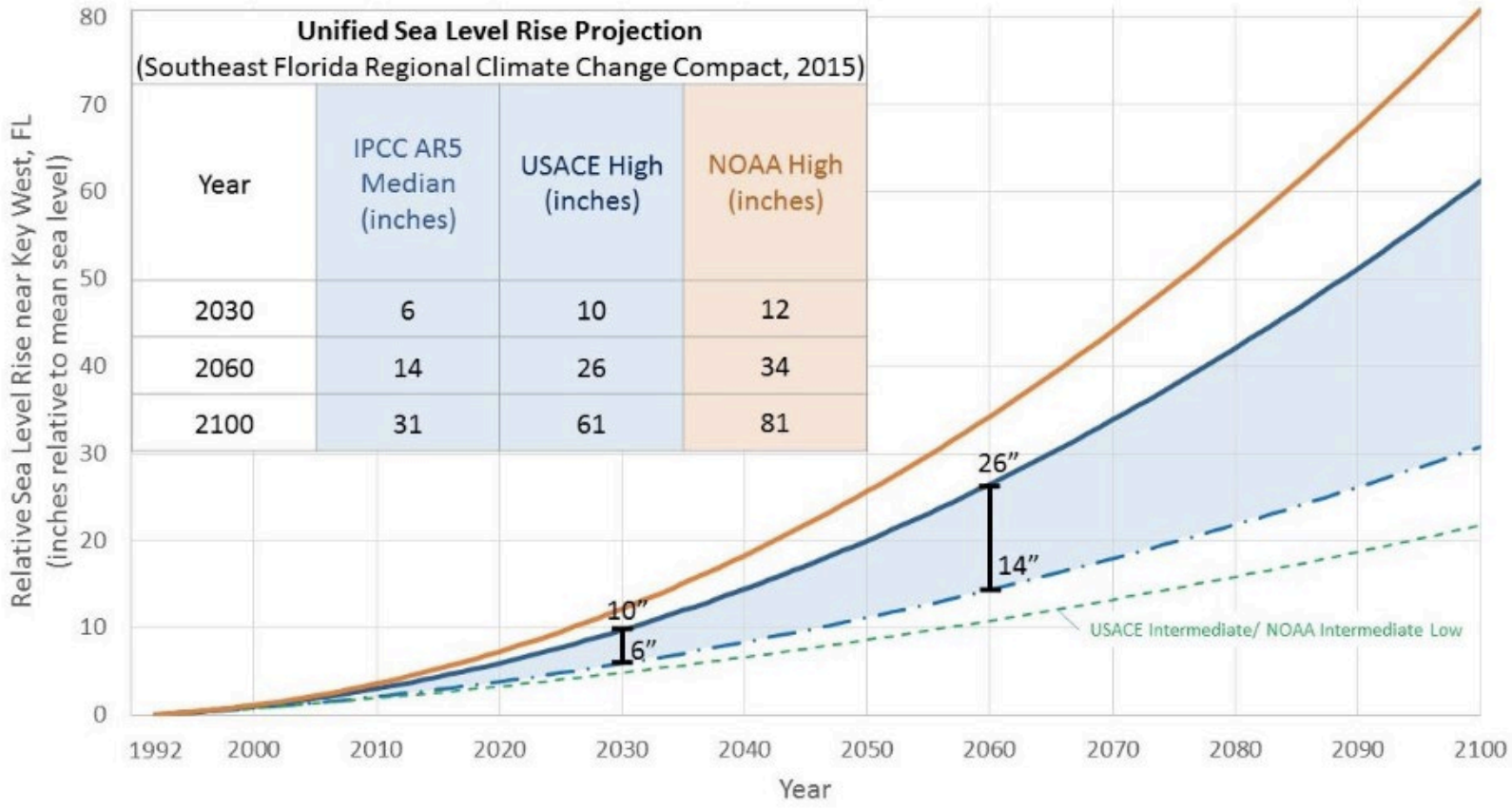
Water Demands for Med/High BEBR



Unified Sea Level Rise Projections

Unified Sea Level Rise Projection
(Southeast Florida Regional Climate Change Compact, 2015)

Year	IPCC AR5 Median (inches)	USACE High (inches)	NOAA High (inches)
2030	6	10	12
2060	14	26	34
2100	31	61	81

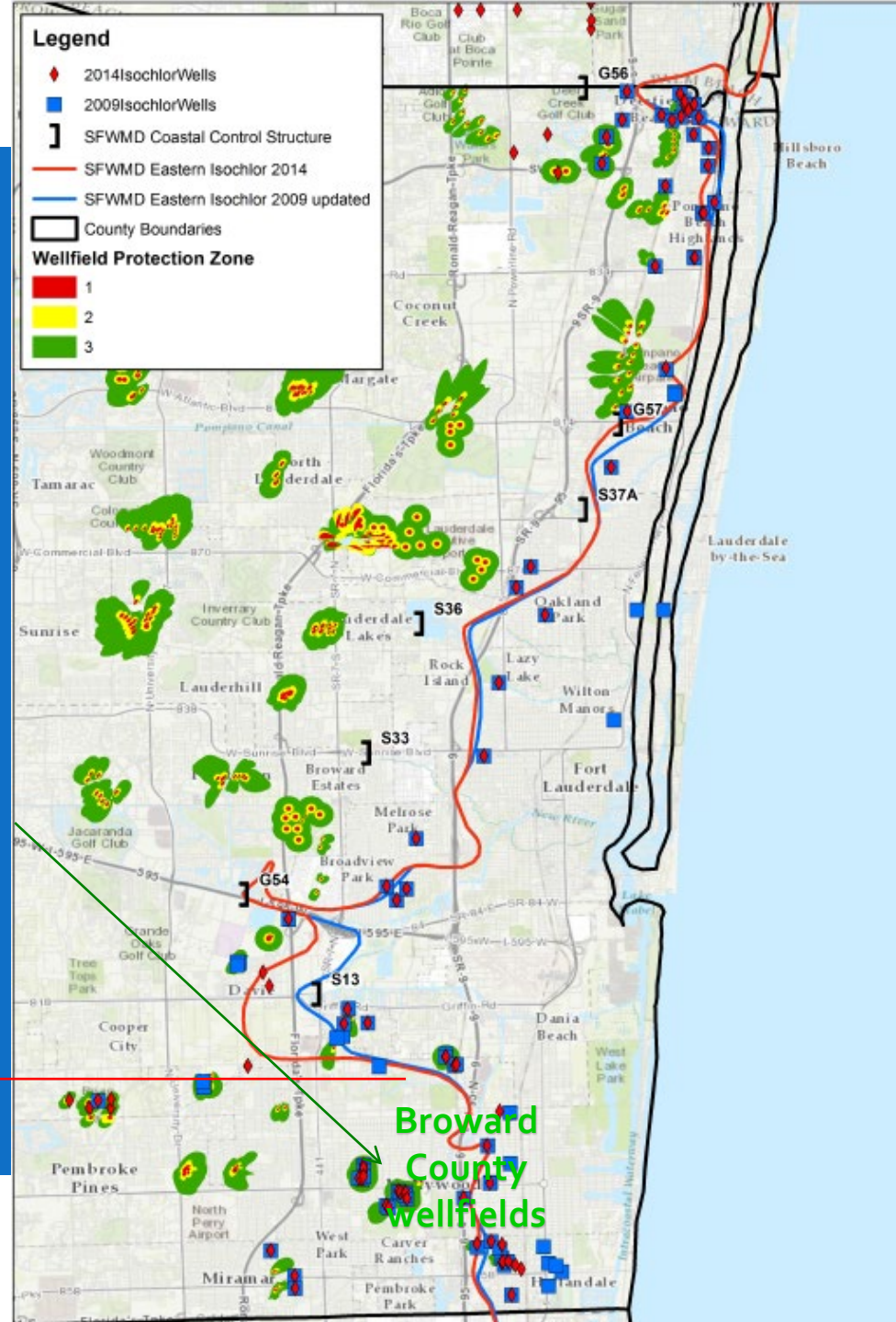


SOUTHEAST FLORIDA
REGIONAL COMPACT
CLIMATE CHANGE

Biscayne Wellfields Impacted by Saltwater Intrusion

220 MGD withdrawals in Broward County (2013)

- 86 MGD are within the coastal area (39% of total)
- 35 MGD of those coastal withdrawal would be threatened by SWI in a 2060 - 3 ft. SLR scenario (16% of total)



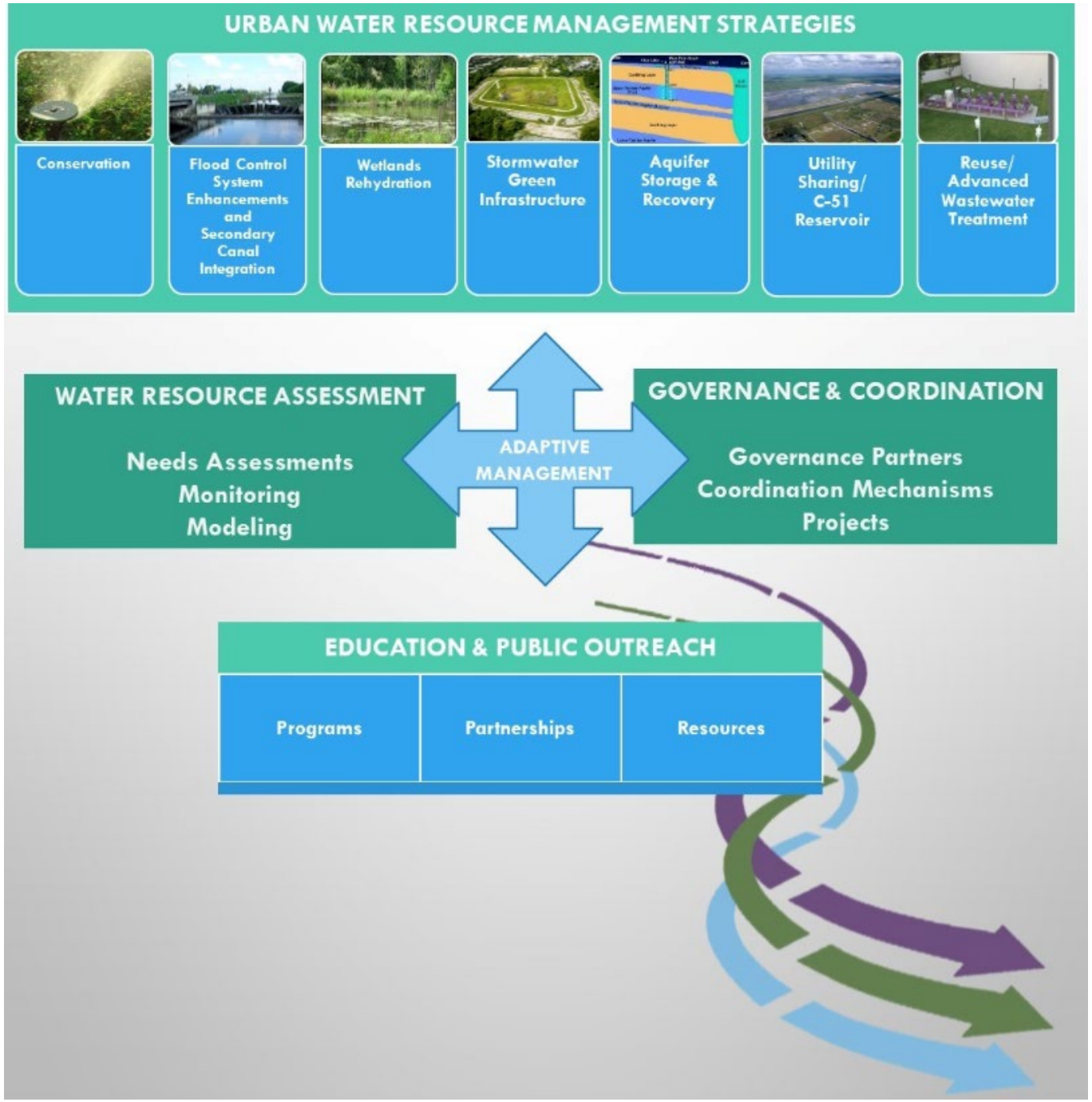
Water Resource Plan Update: Building Resiliency in Water Management






Broward County-wide Integrated Water Resource Plan

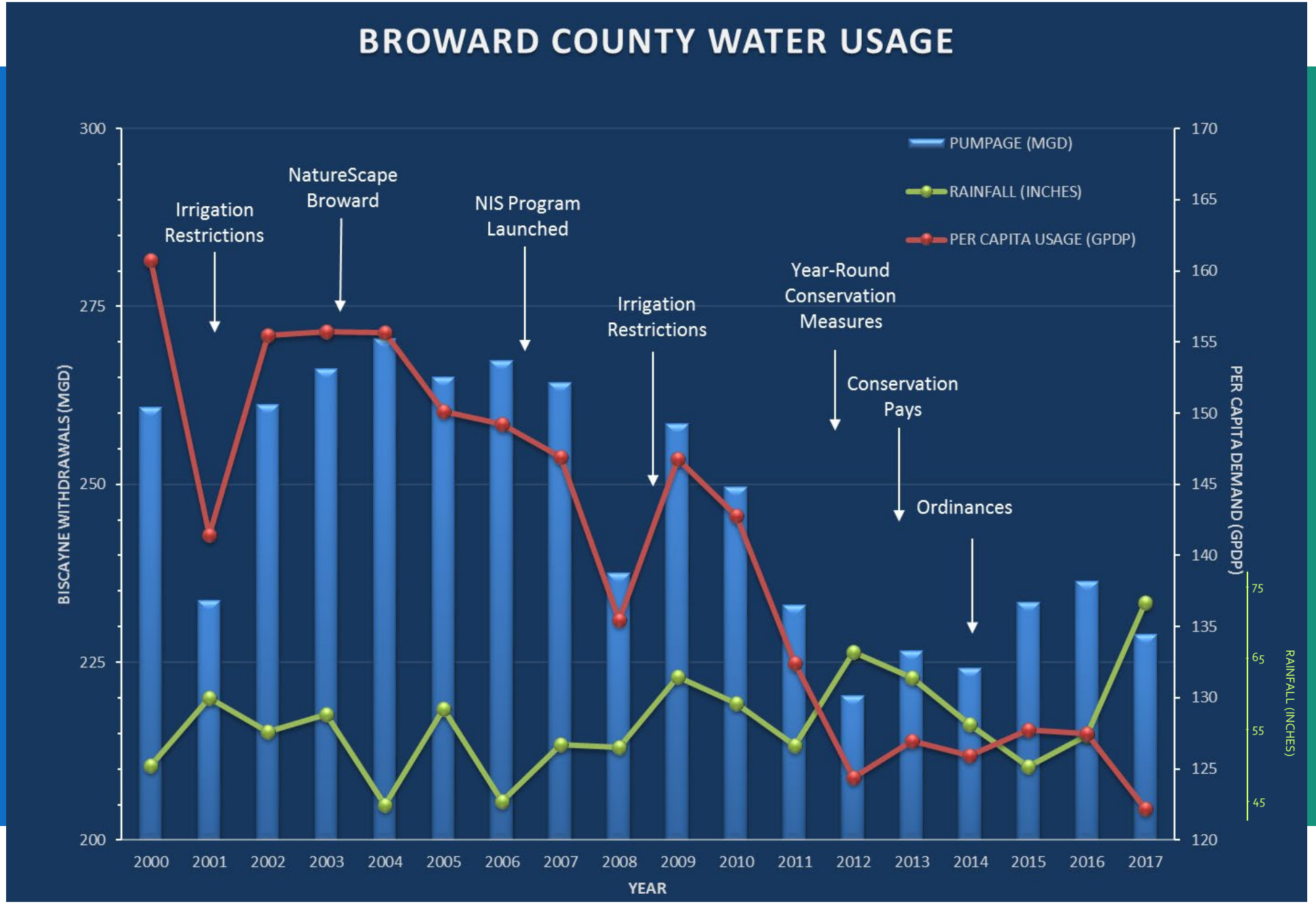
2019 Report



Goals of the 2019 IWRP Report

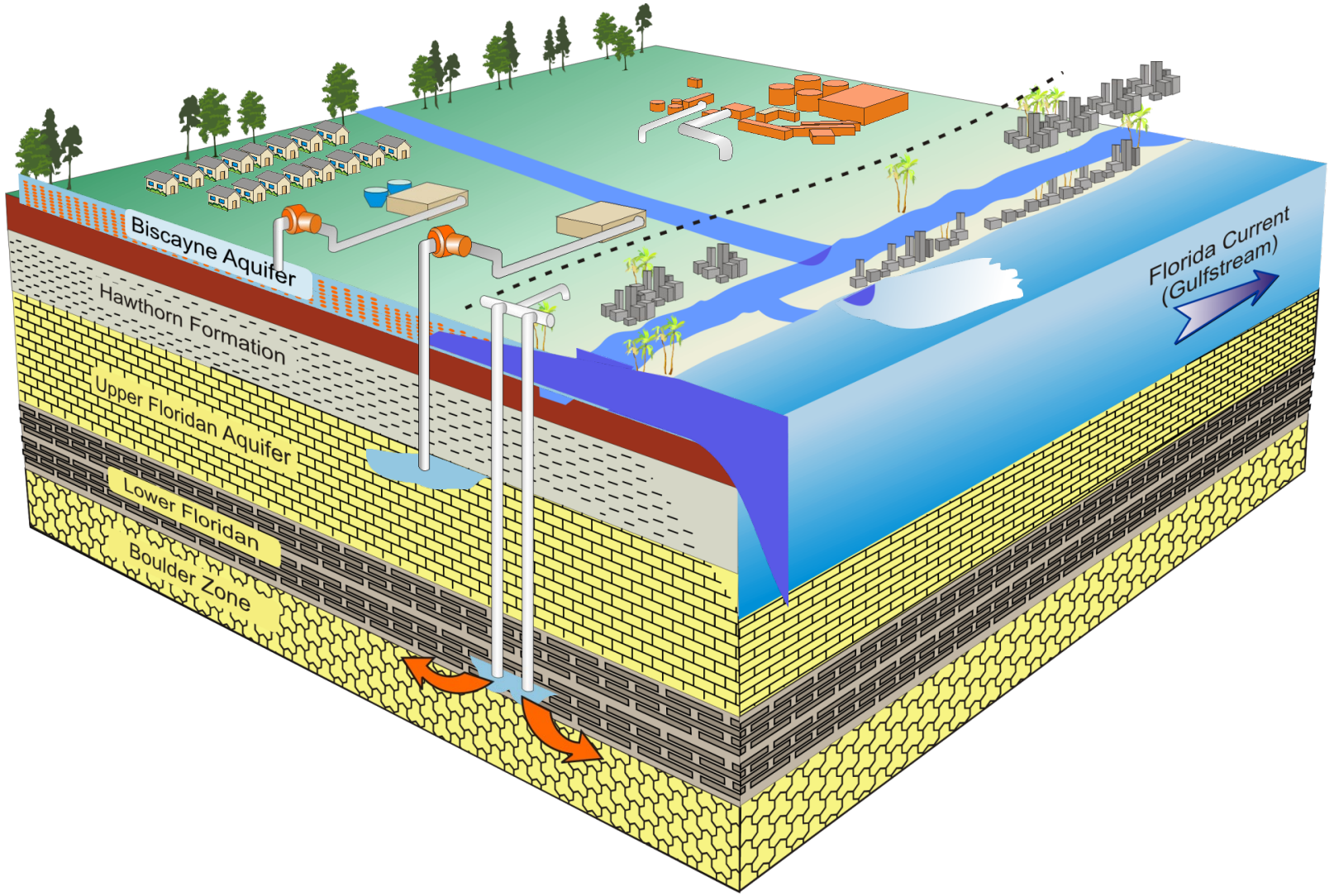
- To make the most of our local water resources to meet long-term water supply needs
- To coordinate a diverse water management community to ensure efficient and effective management of resources
- To match local water sources and users to ensure supplies are available when and where needed
- To diversify water supplies to create flexibility to create flexibility and options to meet urban and natural system needs under wet and dry conditions
- To promote water resources resiliency by evaluating future conditions, including potential climate impacts and adopt strategies to mitigate, adapt, and prevent disruptions to our overall goal of more efficient and effective water management

Investments in Conservation

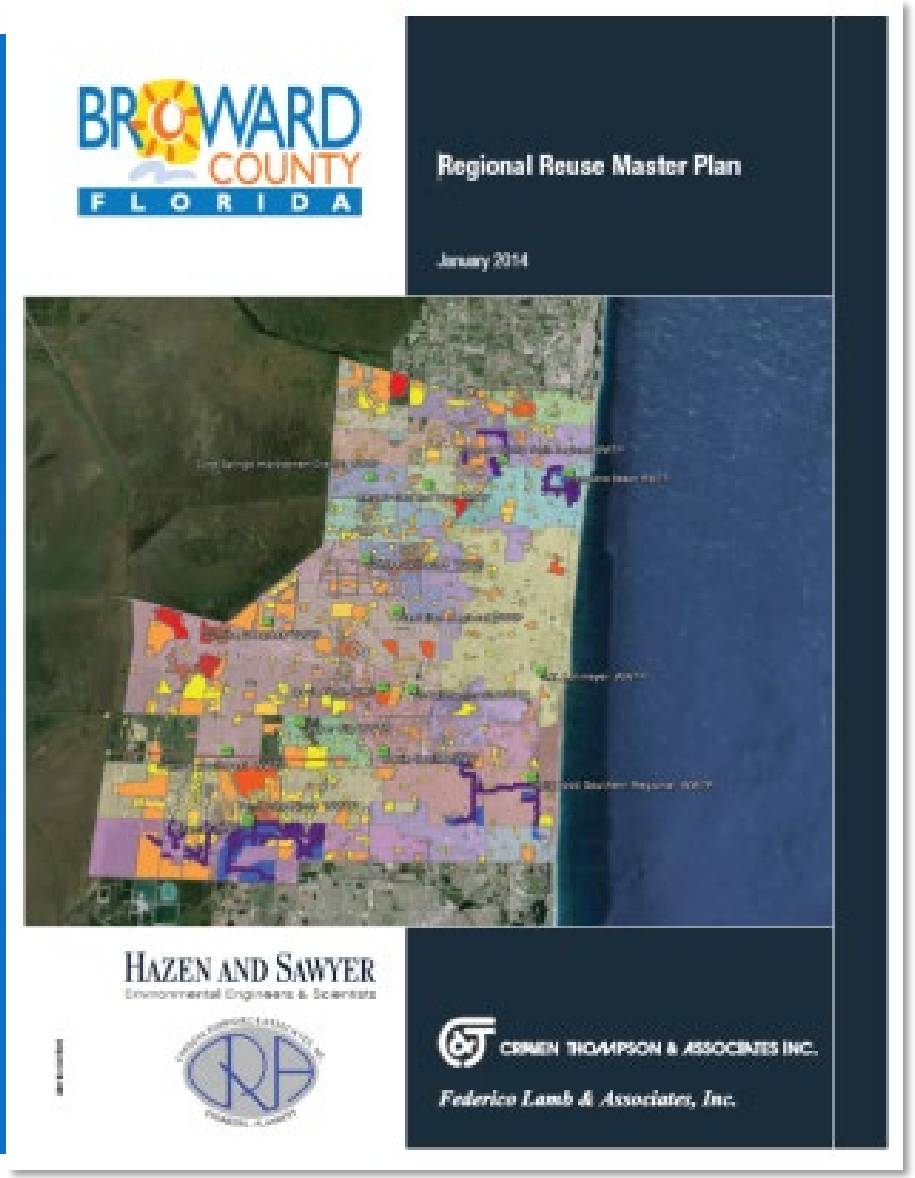


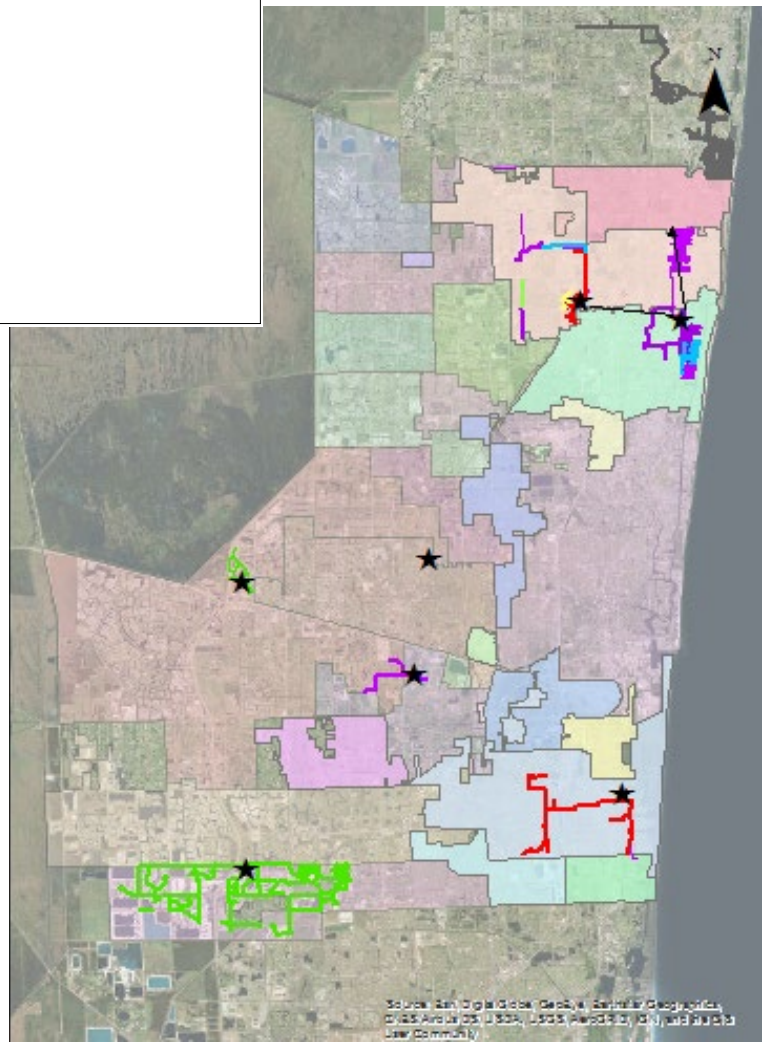
Water Management Strategies:

Beyond the Biscayne



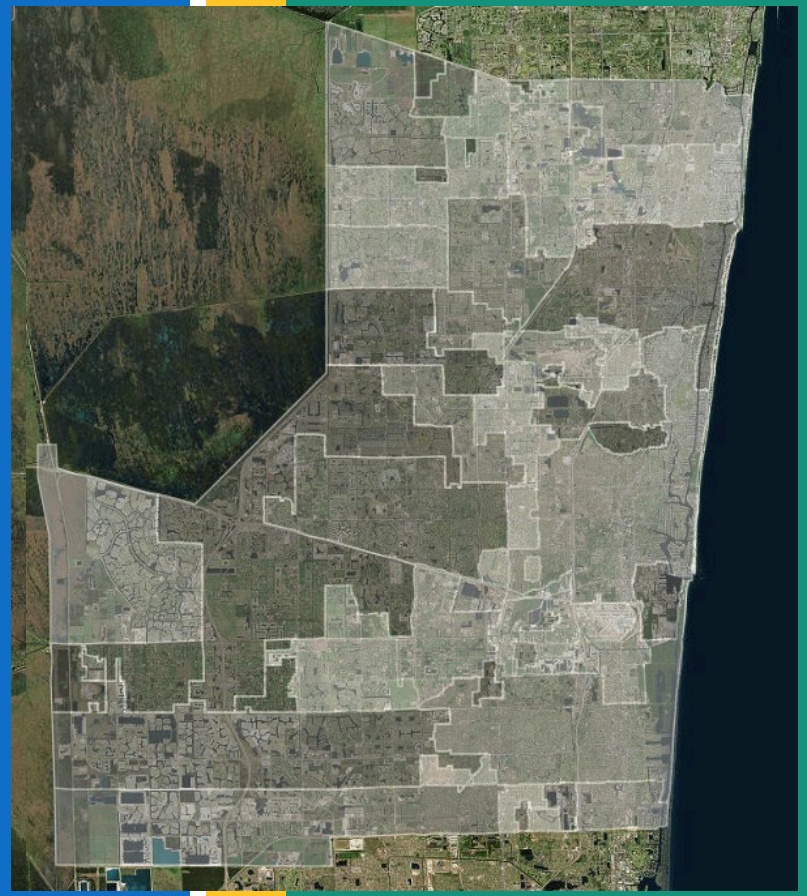
Regional Reuse Master Plan

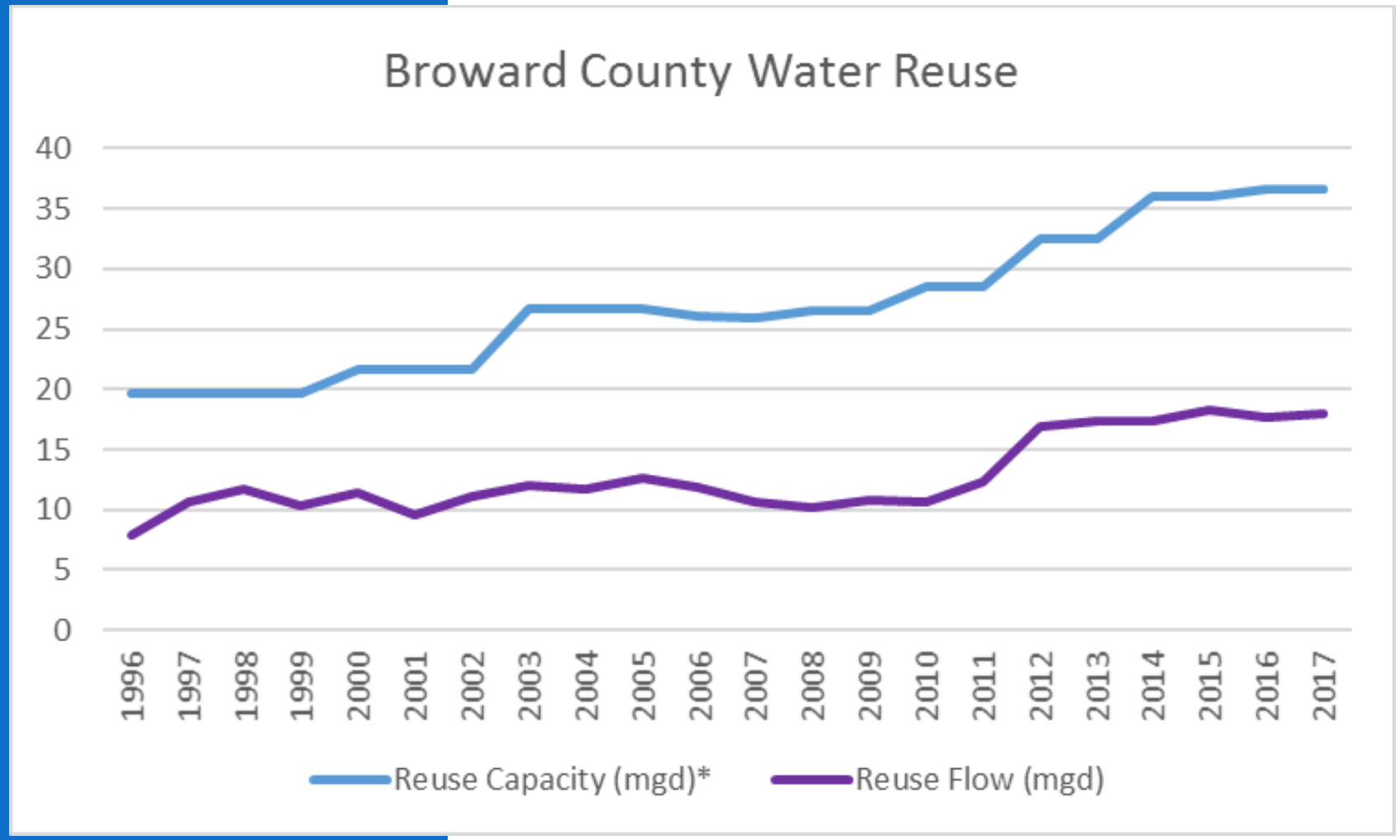




Broward Challenges to Traditional Reclaimed Water Implementation

- Developed urban areas - densely populated urban core with developed infrastructure
- Current parcel occupation/size limits the reclaimed water demand (and cost efficiency)
- 25 distinct water providers (and additional wholesale agreements)
- 15 distinct wastewater providers (and additional wholesale agreements)
- Seasonal demand fluctuations
- Treatment costs/disposal options





Current Reuse Capacity in Broward: 36 MGD

Current Total Reuse Flows in Broward: 18 MGD

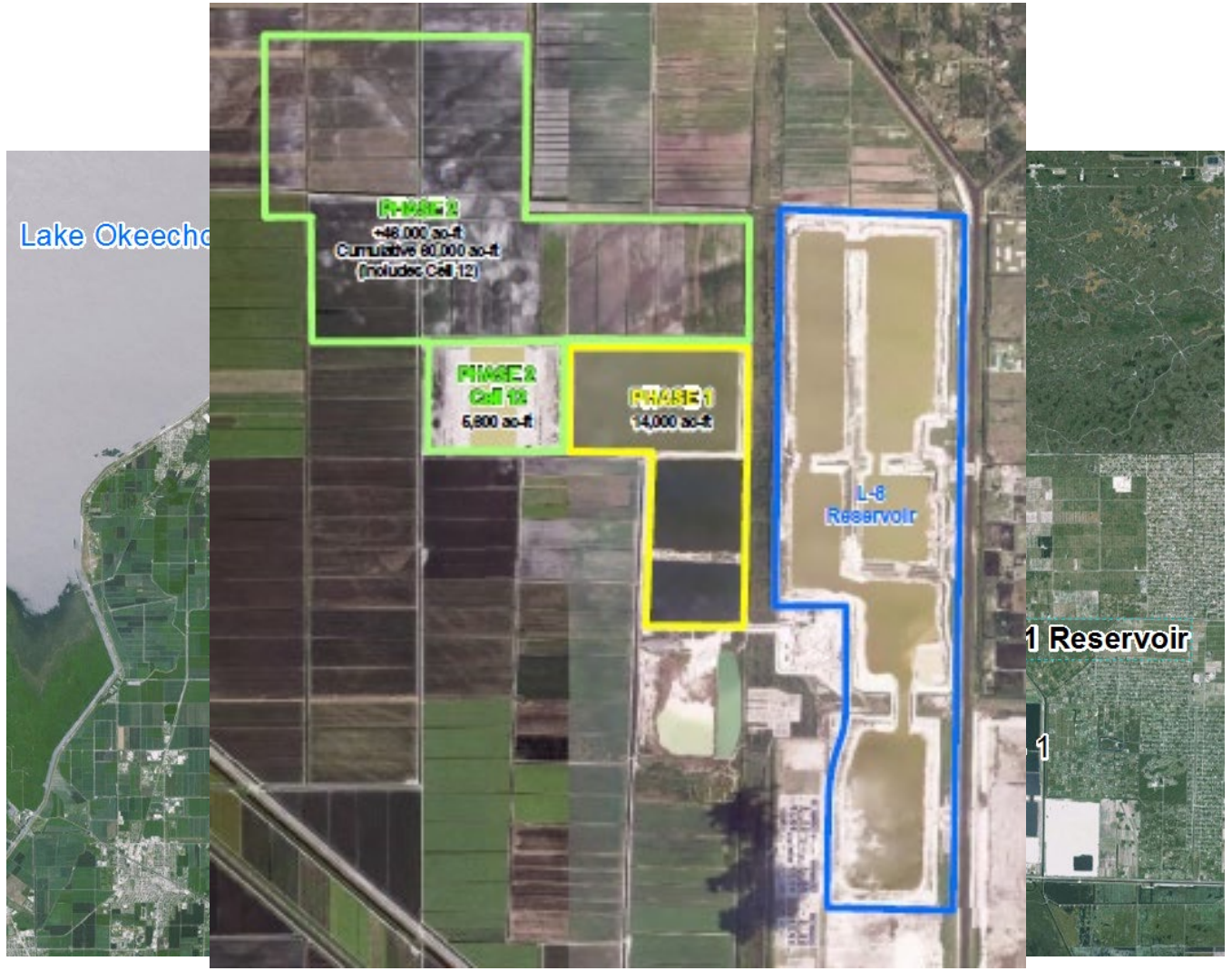
Total Reuse

C-51 Reservoir: Regional Alternative Water Supply and Stormwater Management Project

Capacity Allocation Agreement signed with WWS, Sunrise, Dania Beach and Hallandale

Consumptive Water Use Permit issued for WWS and Hallandale

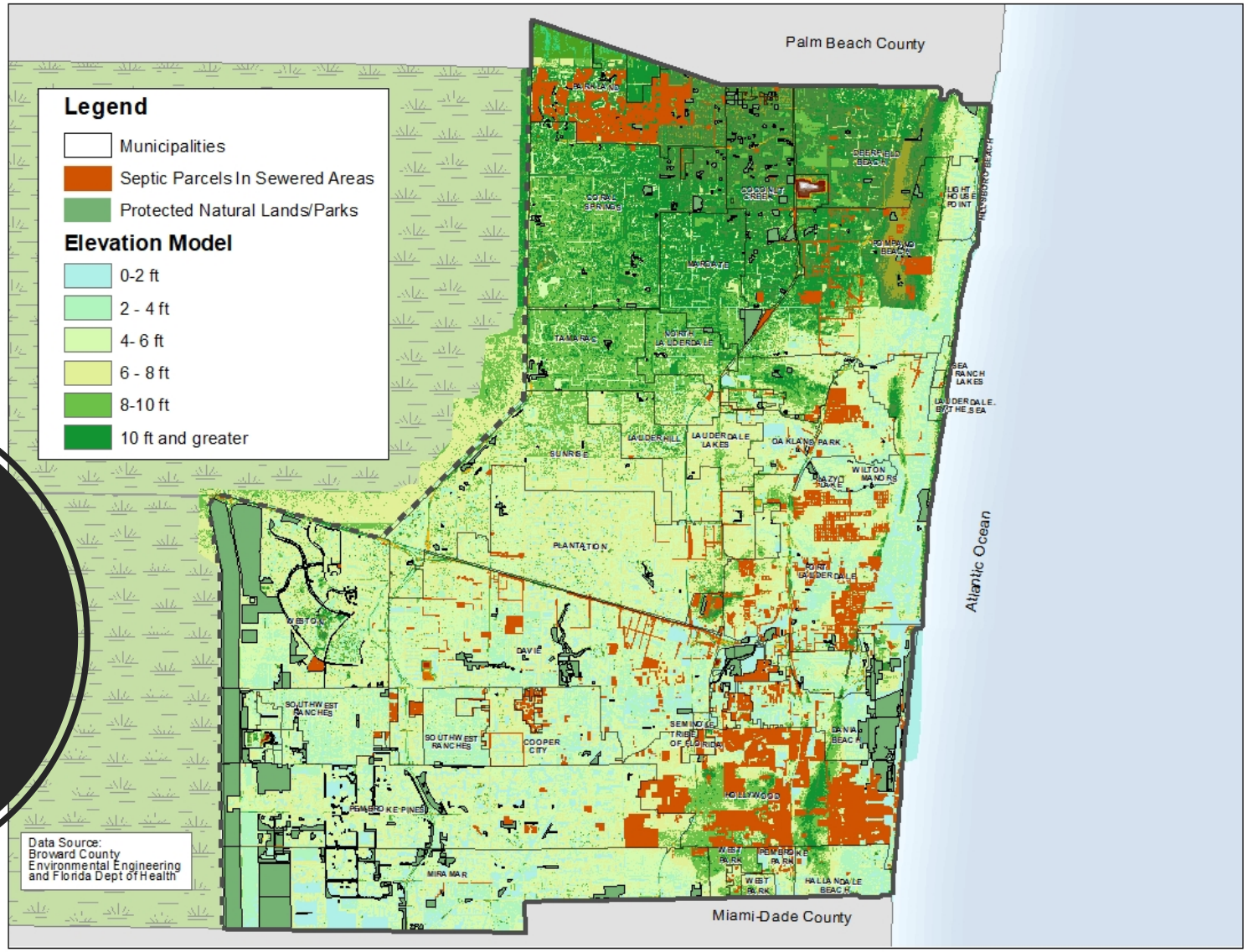
SB10 (2017): $30 million in funding for Phase 1 implementation – Draft loan document



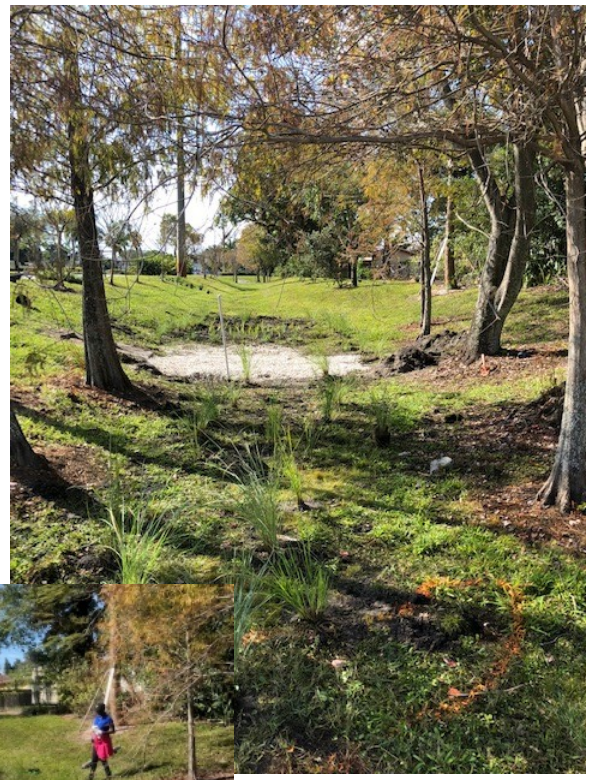
Septic Tank Ordinance

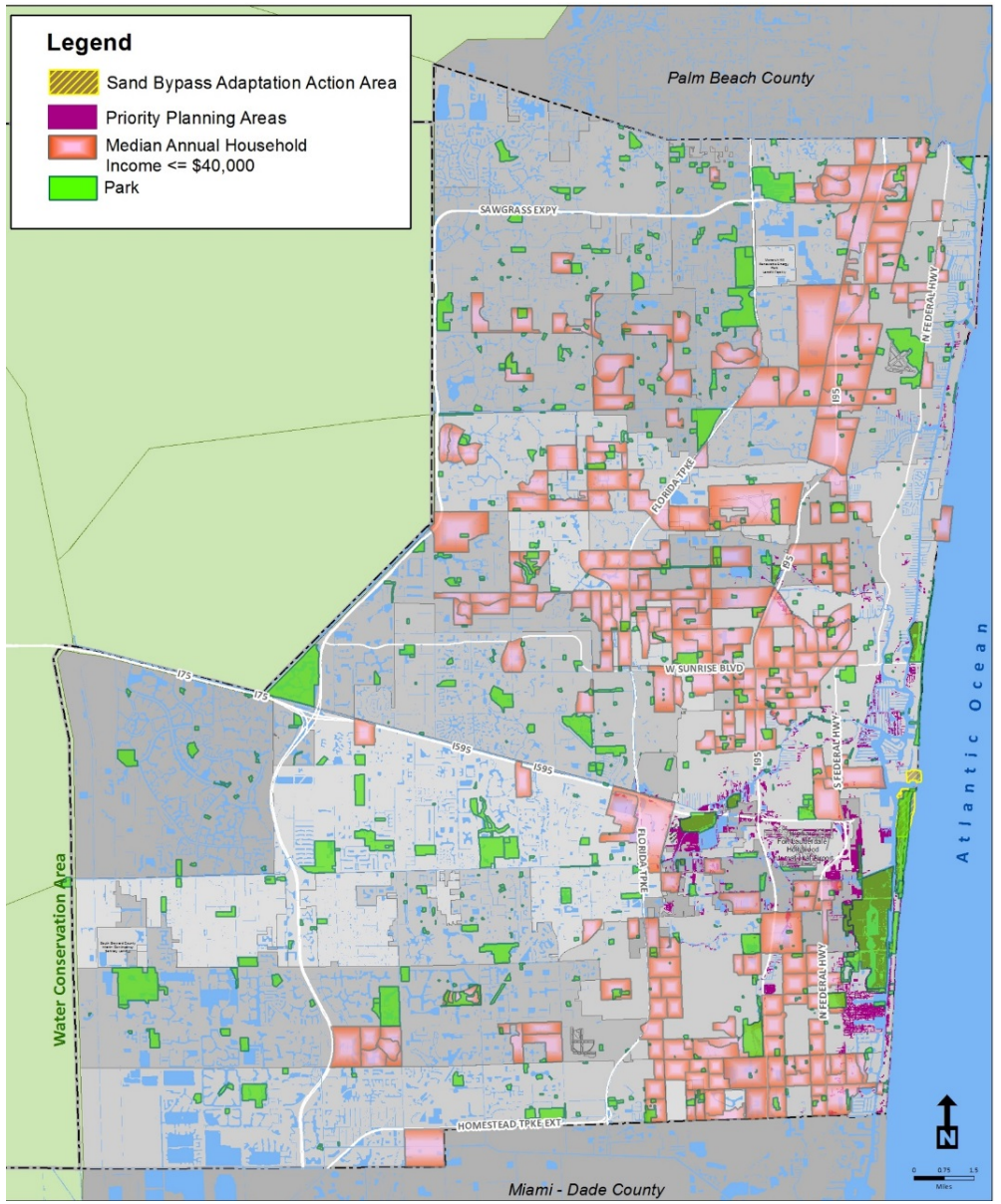
(under discussion)

Many areas in Broward County have low land elevation and high groundwater tables



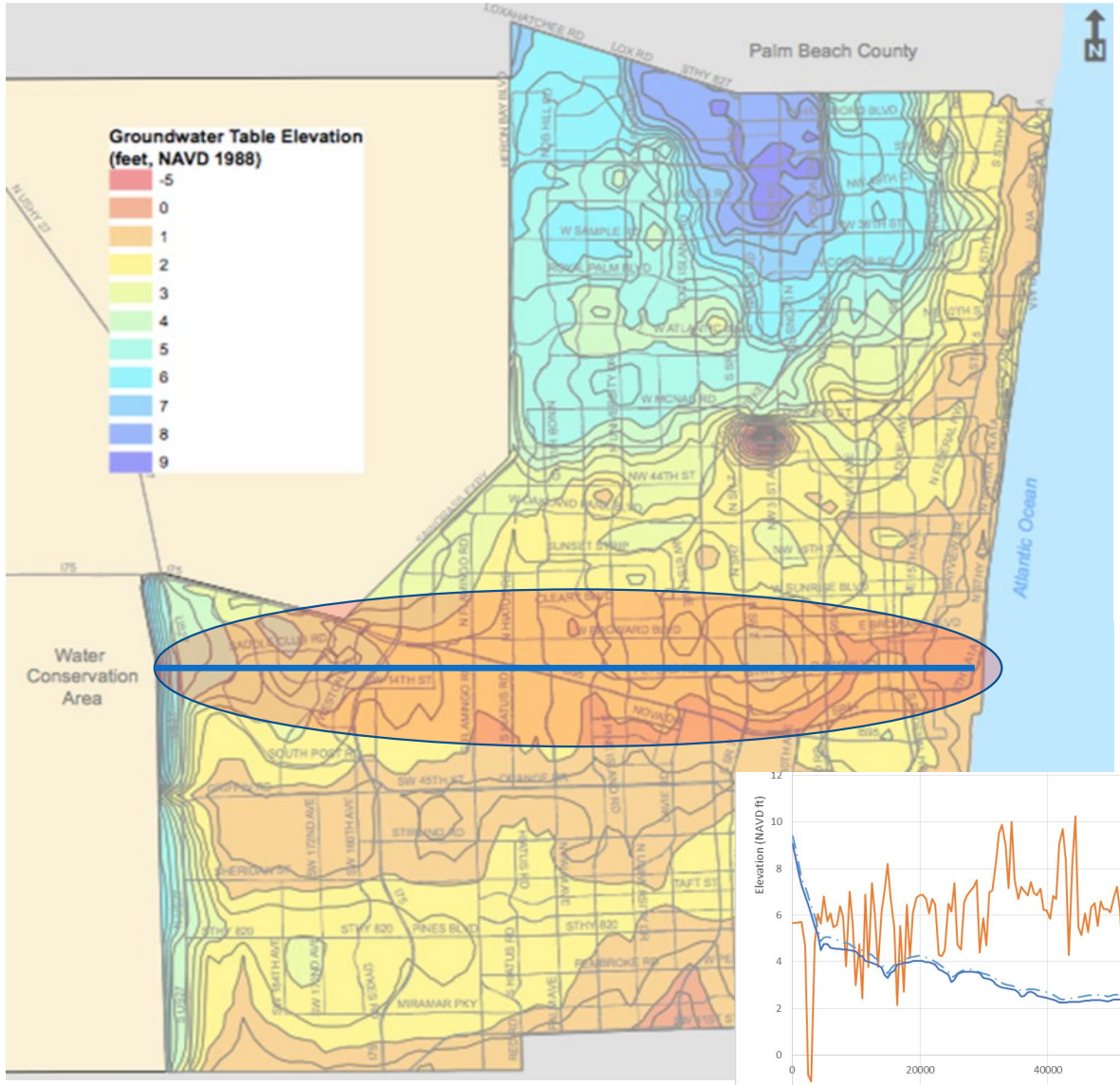
Stormwater Green Infrastructure Initiatives

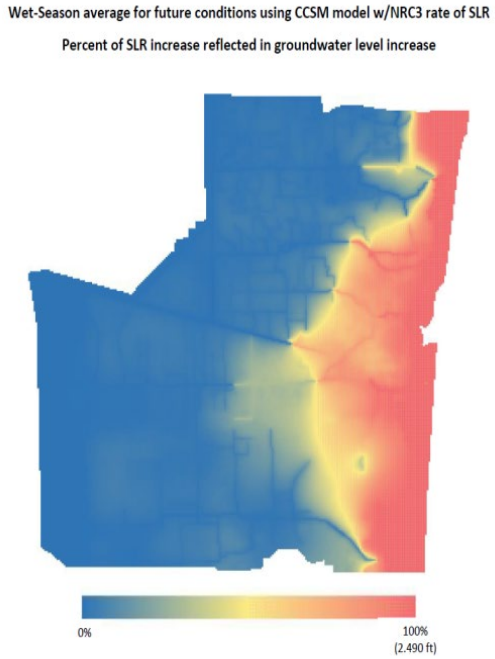


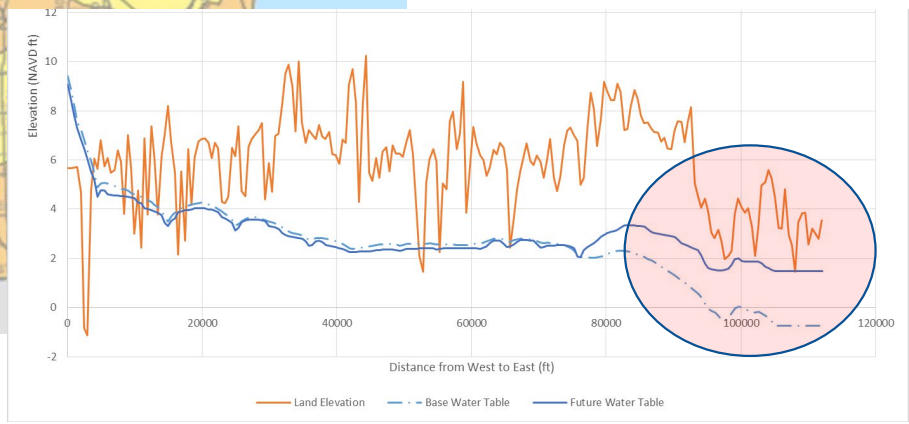


Future Conditions Map Series

Future Average Wet Season Groundwater Elevation Map

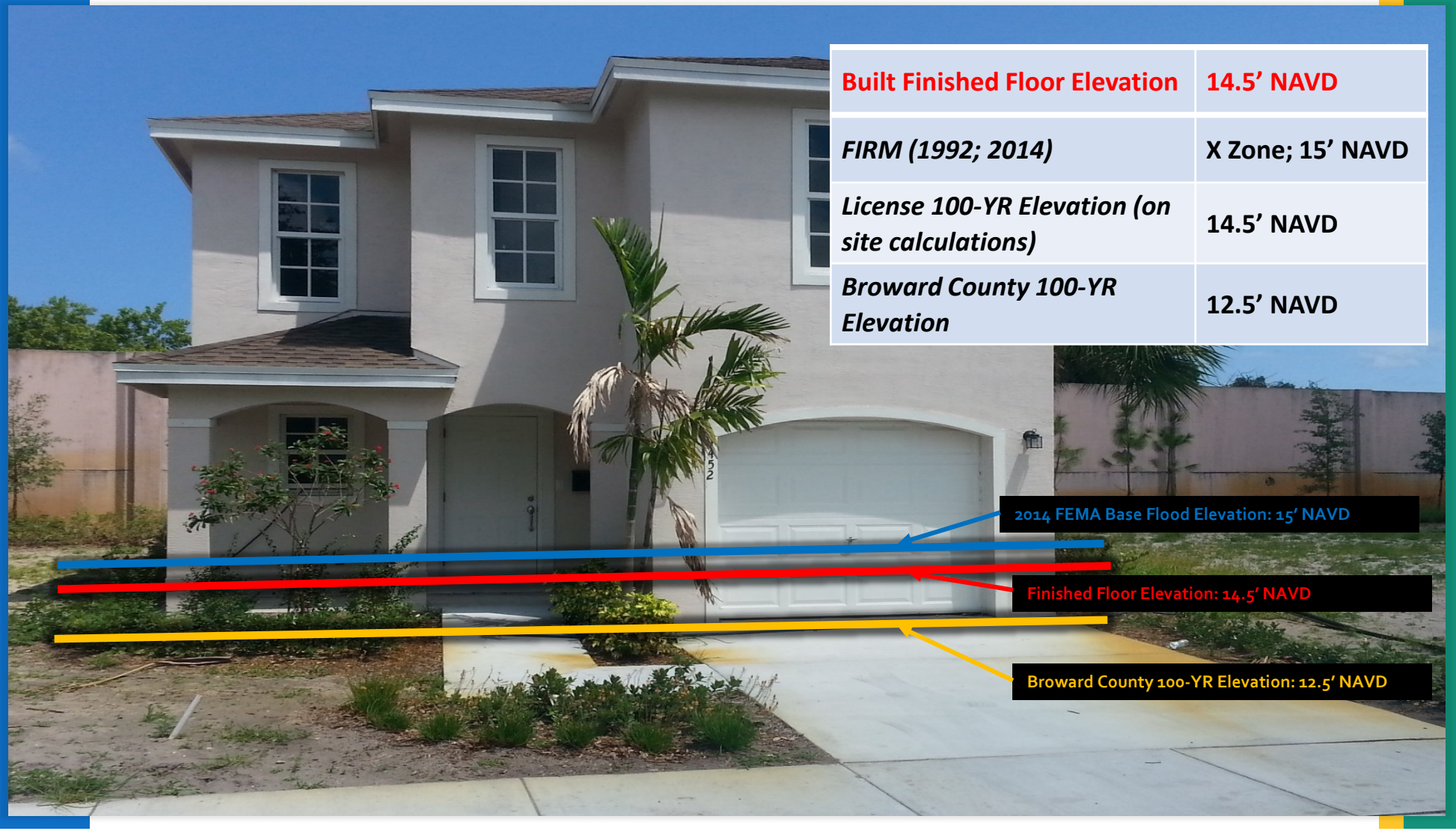






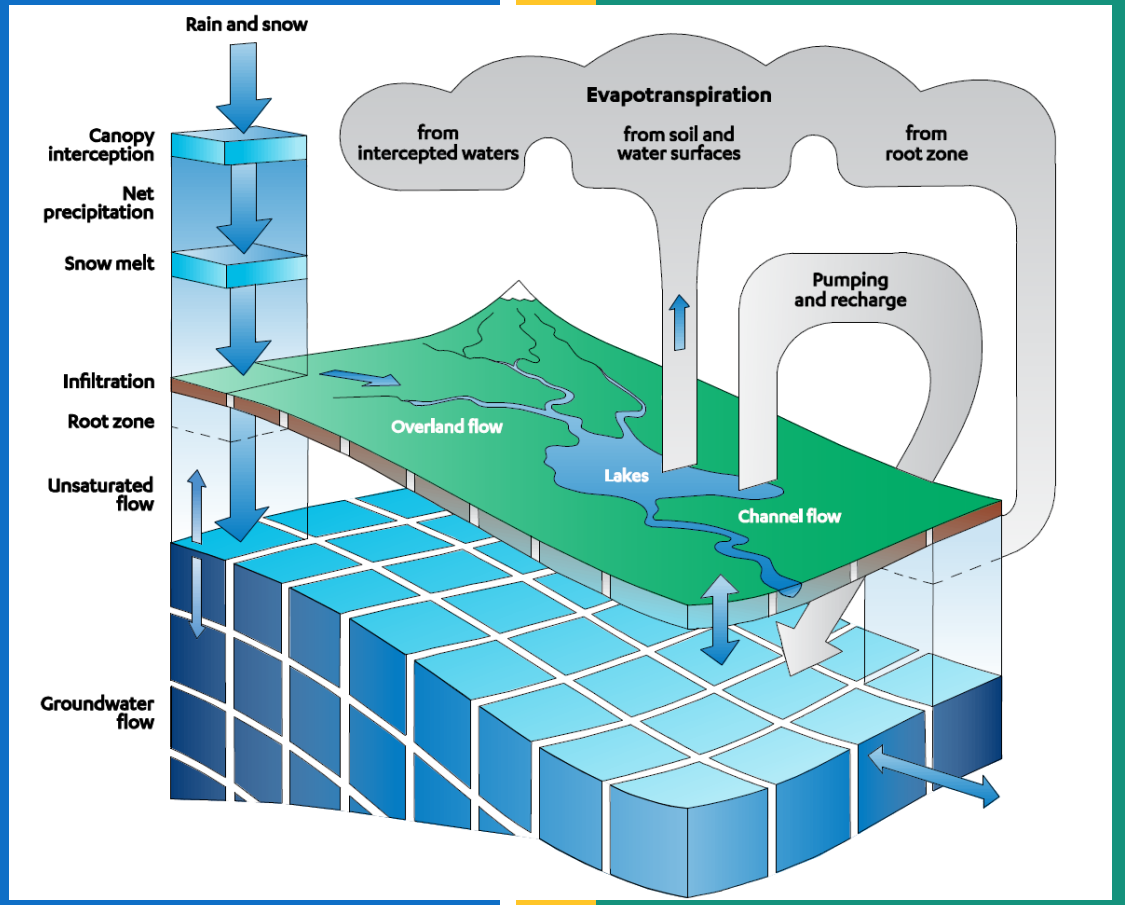
Future Conditions Map Series

Future Conditions Flood Elevation Map



Future Conditions Flood Elevation Map

- Mapping Future Floodplains:
  - Increased rainfall due to warming climate
  - Year 2060-2069 sea level rise
  - Increased runoff due to higher water tables
  - Land use changes
    - Accomplished through integrated GW/SW modeling
- Enhance infrastructure resilience:
  - Regulatory purpose
  - Finished floor elevations, streets, sanitary manholes, etc.



Source: DHI, Inc.

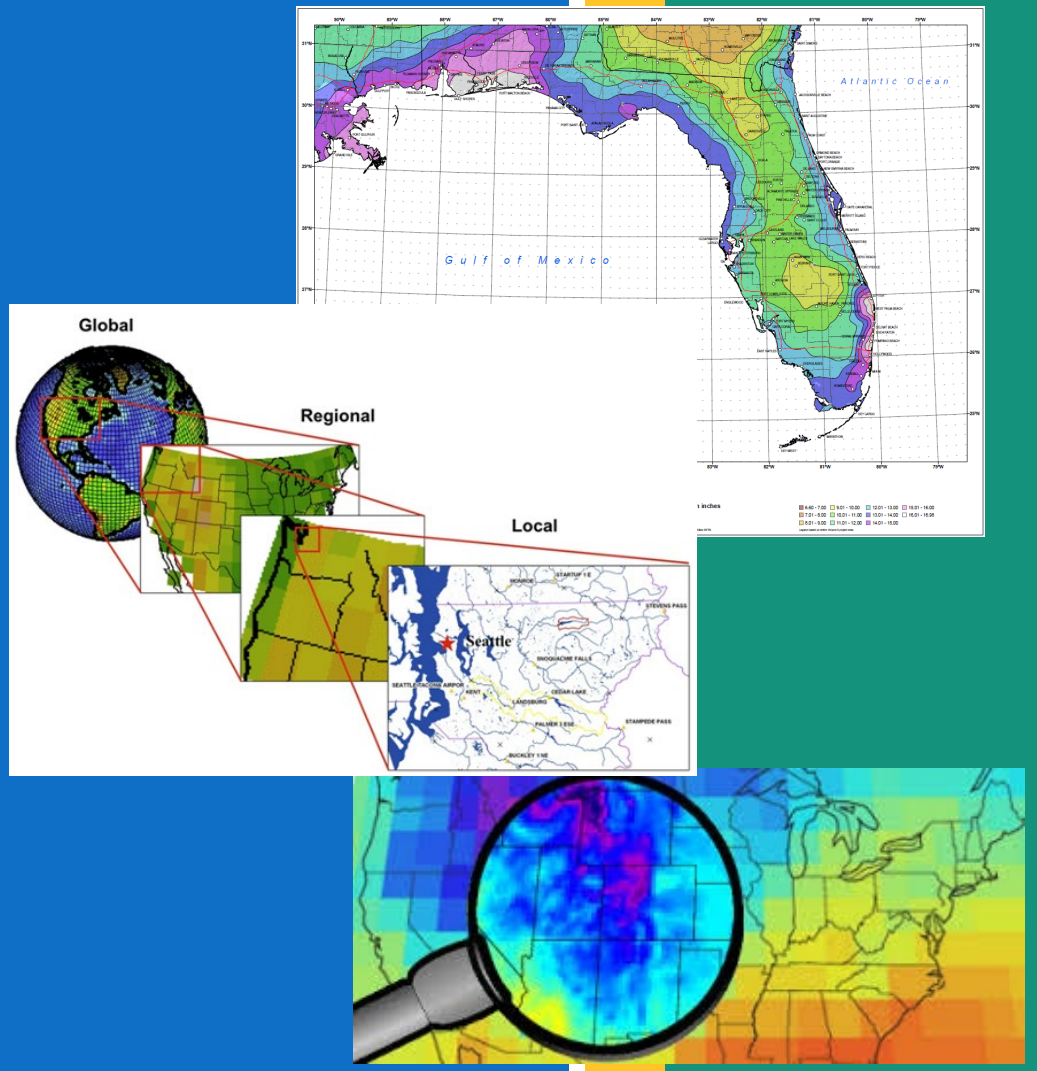
Future Rainfall Conditions

Develop Rainfall Data Set (options under evaluation)

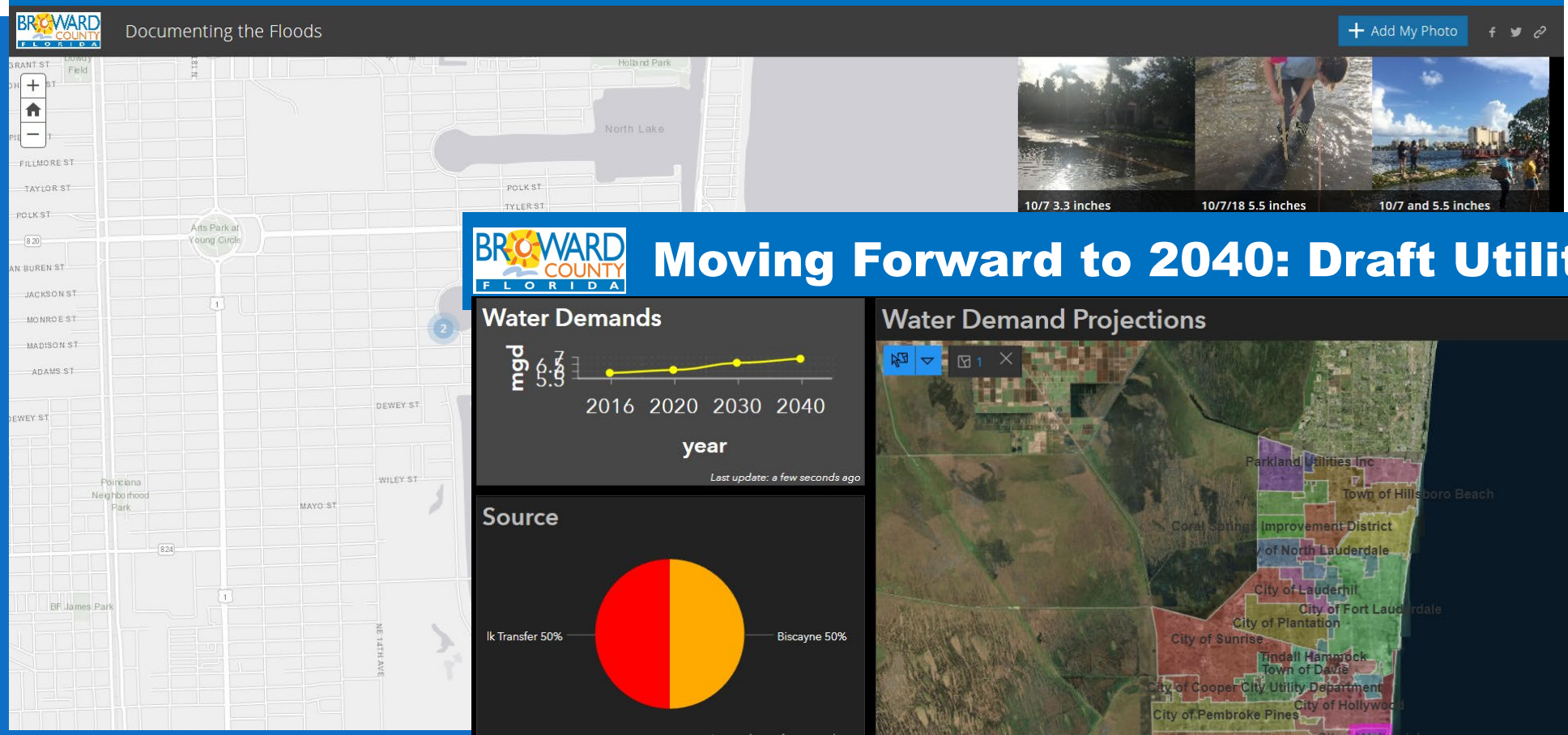
- Use NOAA Atlas 14 data
- Statistically downscaled localized constructed analogs (LOCA)
- Dynamically downscaled data from COAPS
- Dynamically downscaled data from CORDEX
- Hyperion Group Data
- Probabilistic approach

Other considerations

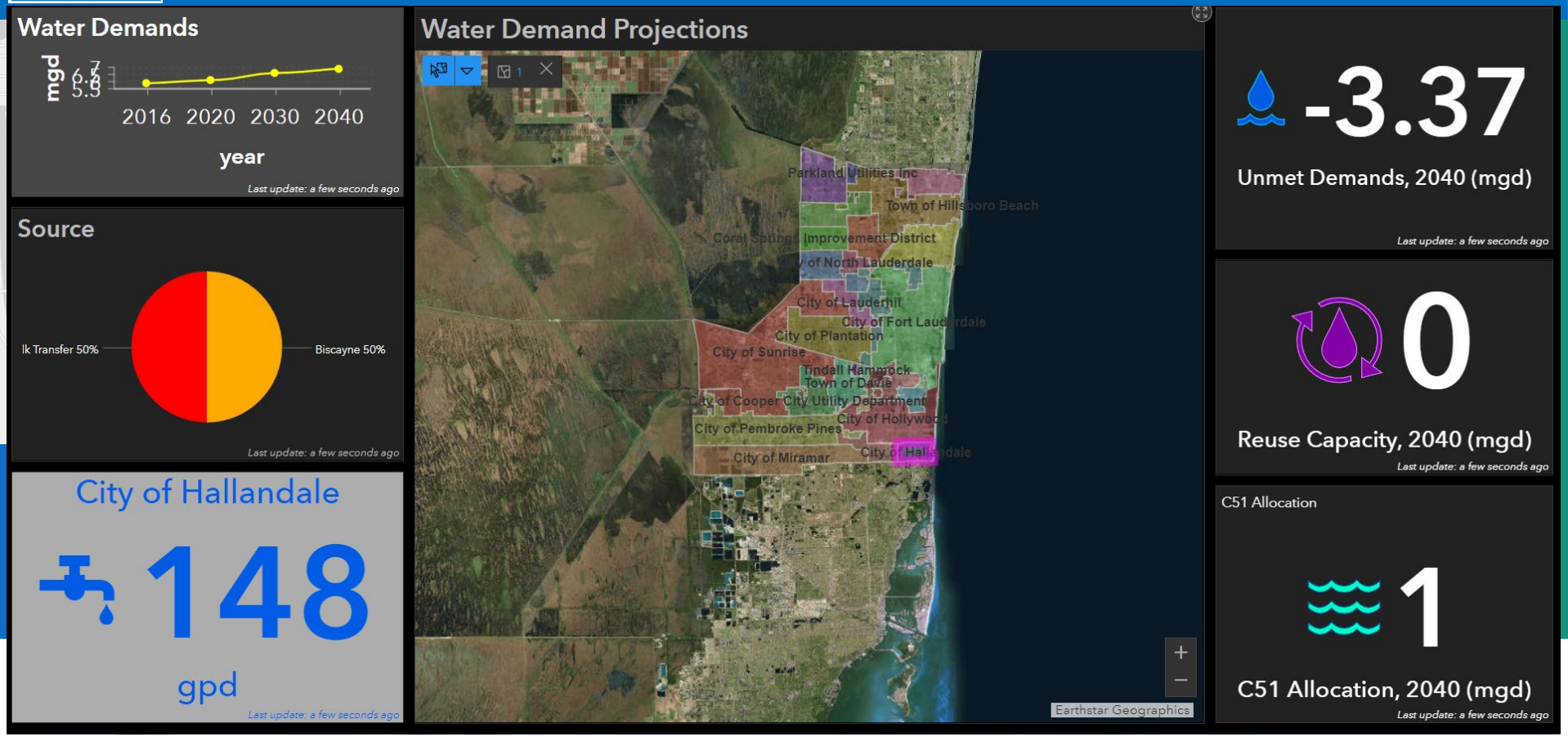
- Future average GW levels from BC MODFLOW models
- Future Land Use
- Future Structure Operations
- Planned Infrastructure Improvements
- No storm surge (FEMA Coastal Zone A)
- No joint probabilistic distribution analysis



King Tide and Flood Crowdsourcing Tools



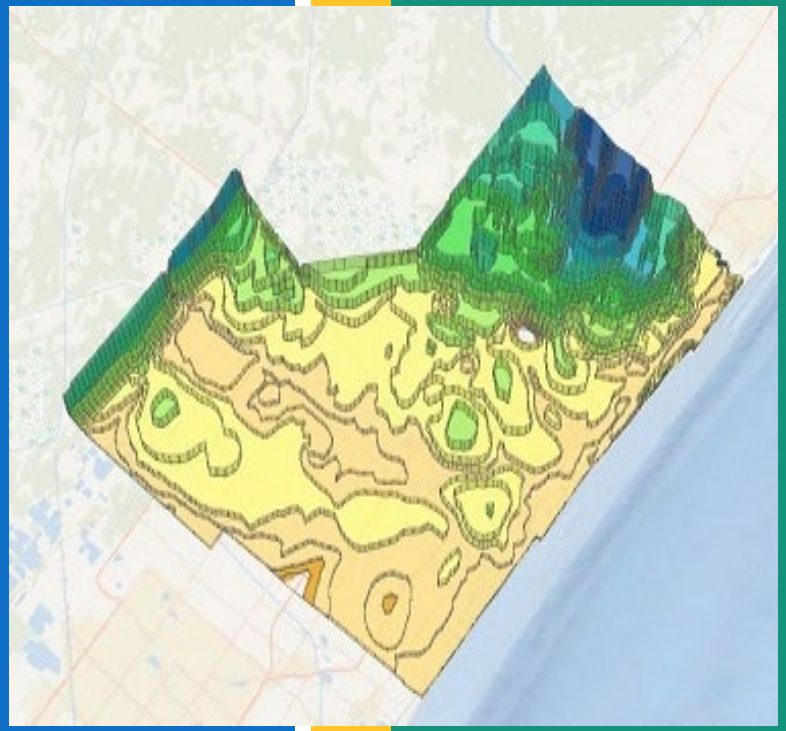
Moving Forward to 2040: Draft Utilities Dashboard



Water Utilities Resilience Aspects

- Complex Water Management System – Integration GW and SW
- Reliance on Biscayne Aquifer as main source of water supply (more affordable alternative)
- Alternative Water Supply Options (Reuse, C-51 Reservoir, Floridan) & Conservation Goals
- Future Conditions - Flood and Droughts (extremes events impacts)
- Future Water Supply Demands and Integration with Flood Protection System
- Stormwater Green Infrastructure
- SSOs, Septic Tanks and Water Quality Issues
- Hardening Infrastructure and Redundancy

Resilient Utility Coalition



Resilient Utility Coalition: Operationalizing Resilience

Benchmarking: develop regional guidelines and best practices manuals for utilities' **i**nformation **s**haring: implement a sharing platform for with databases, contacts, guidelines and other information

Data Management: data analytics and coordinated software platforms for utilities

Foster Innovation: partnerships with universities for research and development, technology committees, internships

Emergency Preparedness: formulate tools for regional integration

Partnerships and Community Outreach: develop key partnerships with stakeholders and encourage community involvement

Resilient Utility Coalition

Florida's Water Utilities:

Adapting to Long and Short Term Resilience Stressors

Resilient Utility Coalition

Miami-Dade County Increased Building Elevation

The Future

Sustainable water resources management solutions will require:

- Addressing of future conditions and the potential impacts of climate change
- Community-wide conservation ethic
- Continued partnerships
- Participation of both public and private sectors
- Integration of new technologies and advanced solutions
- Continued leadership

Thanks!

Questions?

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FLORIDA