Who We Are and What We Do

Presented by:

Lorraine Mayers, Regional Representative

and

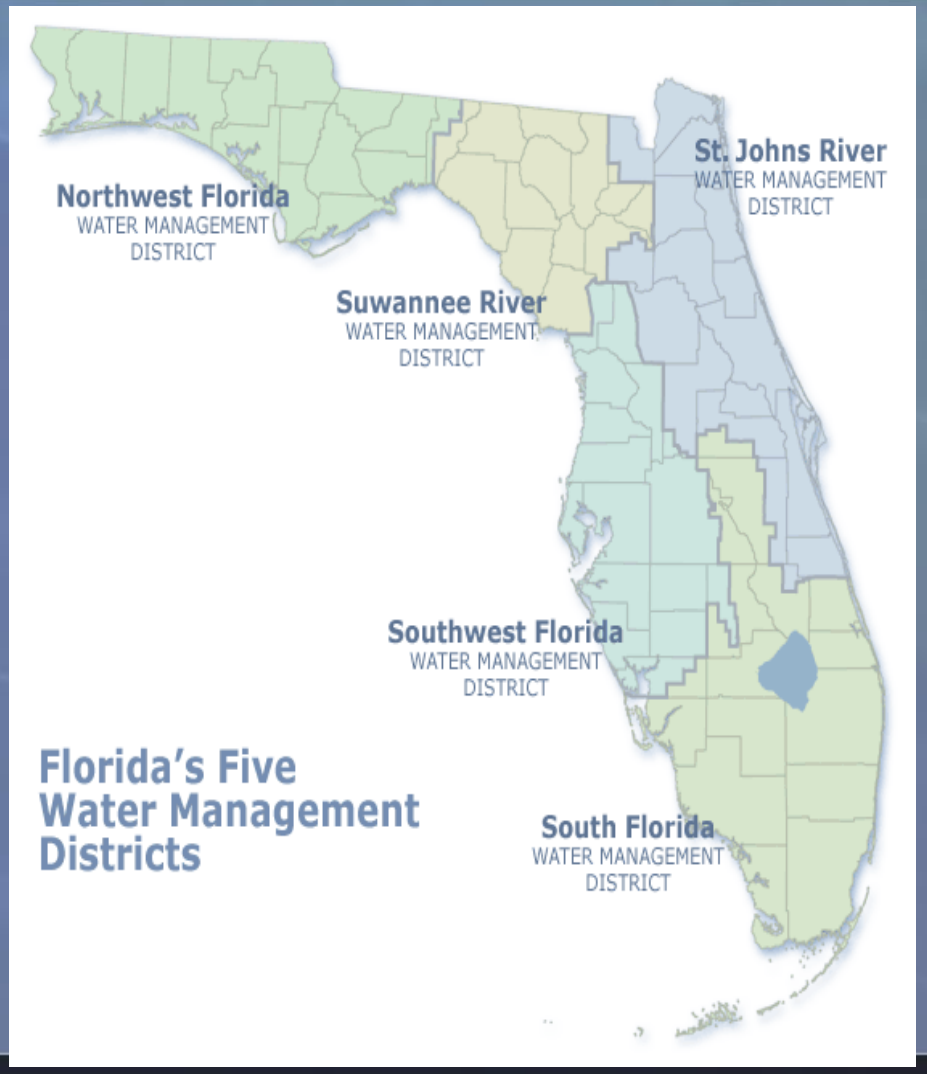
Mike Worley, Superintendent

South Florida Water Management District-Broward County

Who We Are

Our District

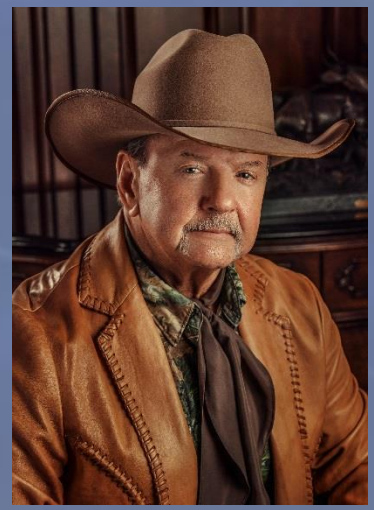
- Oldest and largest of the state's five regional water management districts



Who We Are

OUR MISSION: To safeguard and restore South Florida's water resources and ecosystems, protect our communities from flooding, and meet the region's water needs while connecting with the public and stakeholders.

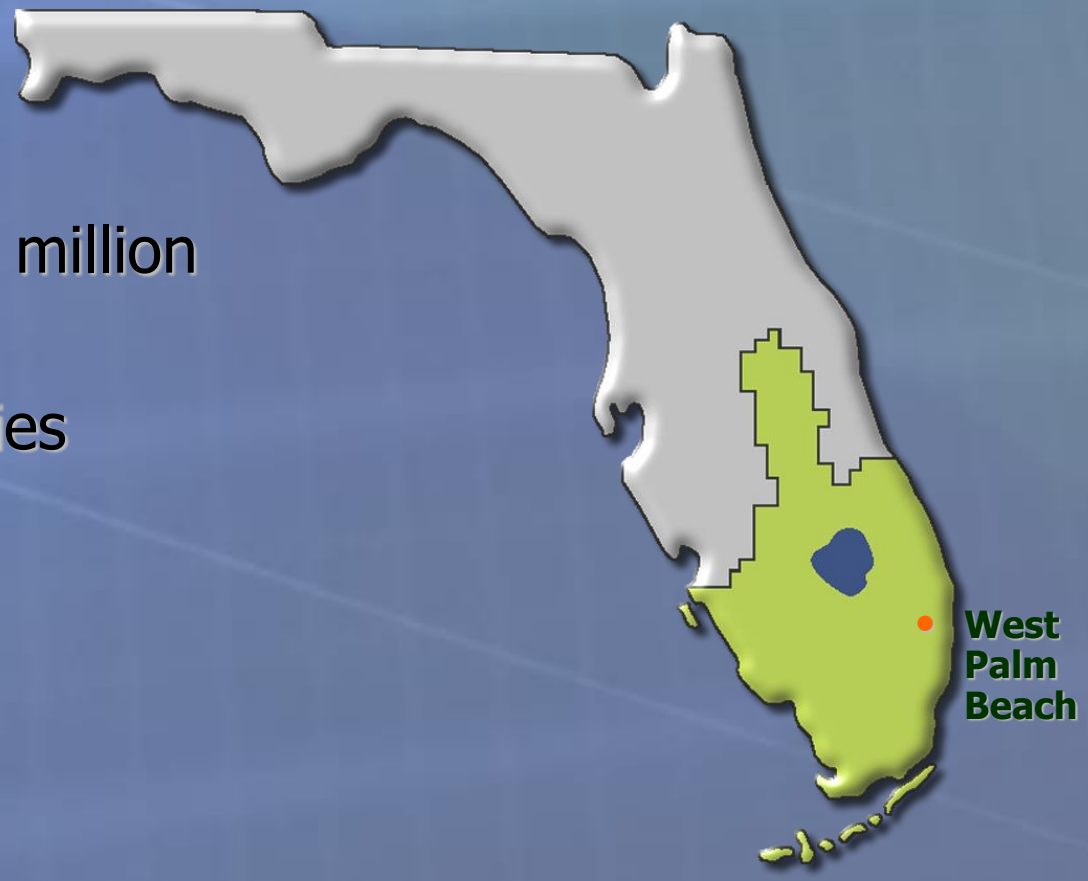
Ron Bergeron Sr.-Governing Board Member-Broward County



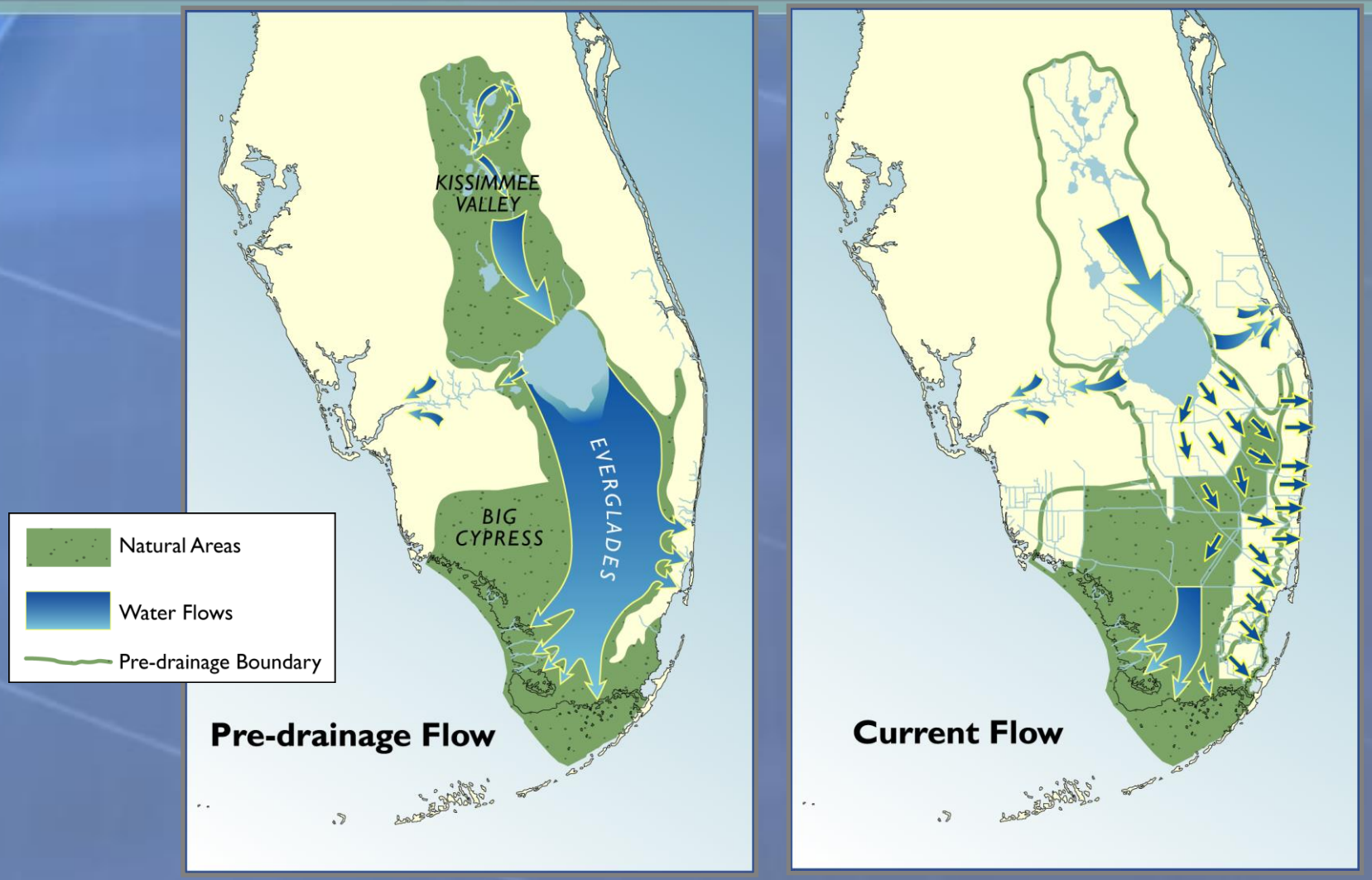
Who We Are

Covers an 18,000 square-mile region:

- 16 counties; Nearly 9 million residents
- Regional responsibilities
  - Flood Protection
  - Water Supply
  - Natural Systems
  - Water Quality



Our History

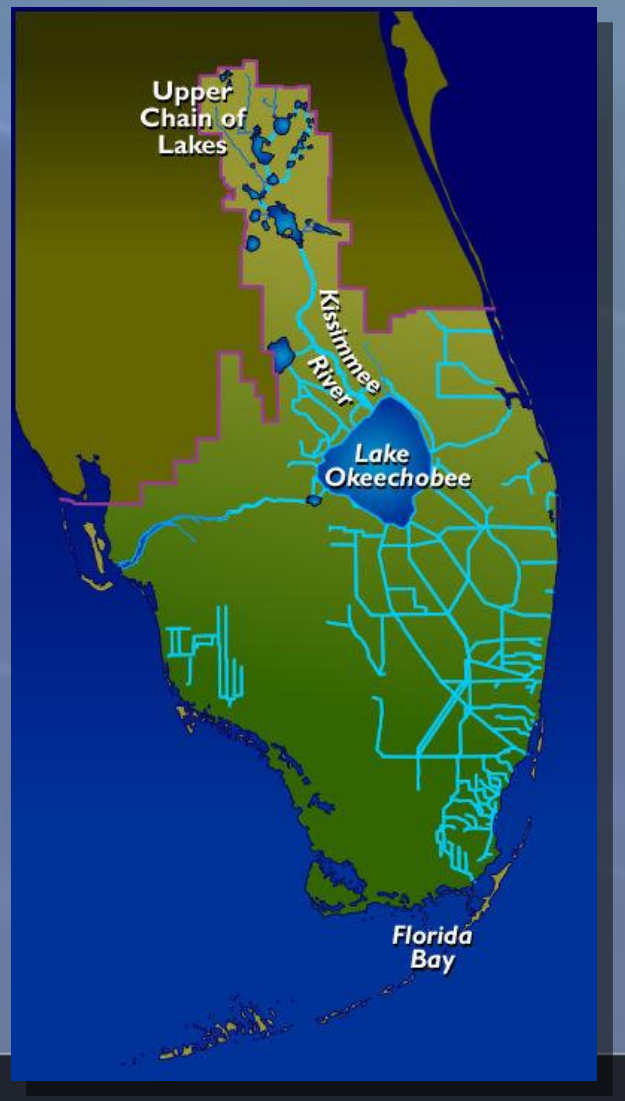

KISSIMMEE VALLEY
EVERGLADES
BIG CYPRESS
Natural Areas
Water Flows
Pre-drainage Boundary
Pre-drainage Flow
Current Flow

Who We Are

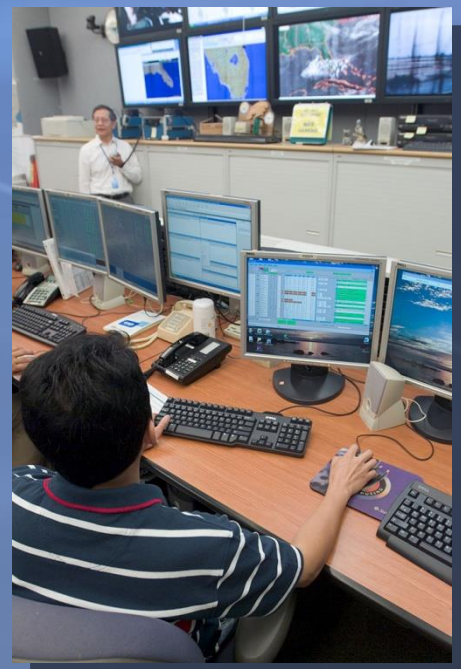
In 1949, the state of Florida created a regional agency to operate the system

Our History

Canals crisscross the southern peninsula



Who We Are



We manage water flow and provide flood protection

Who We Are

Today's system consists of:

- 2,200 miles of canals
- 2,100 miles of levees/berms
- more than 778 water control structures
- 621 Project culverts

Who We Are

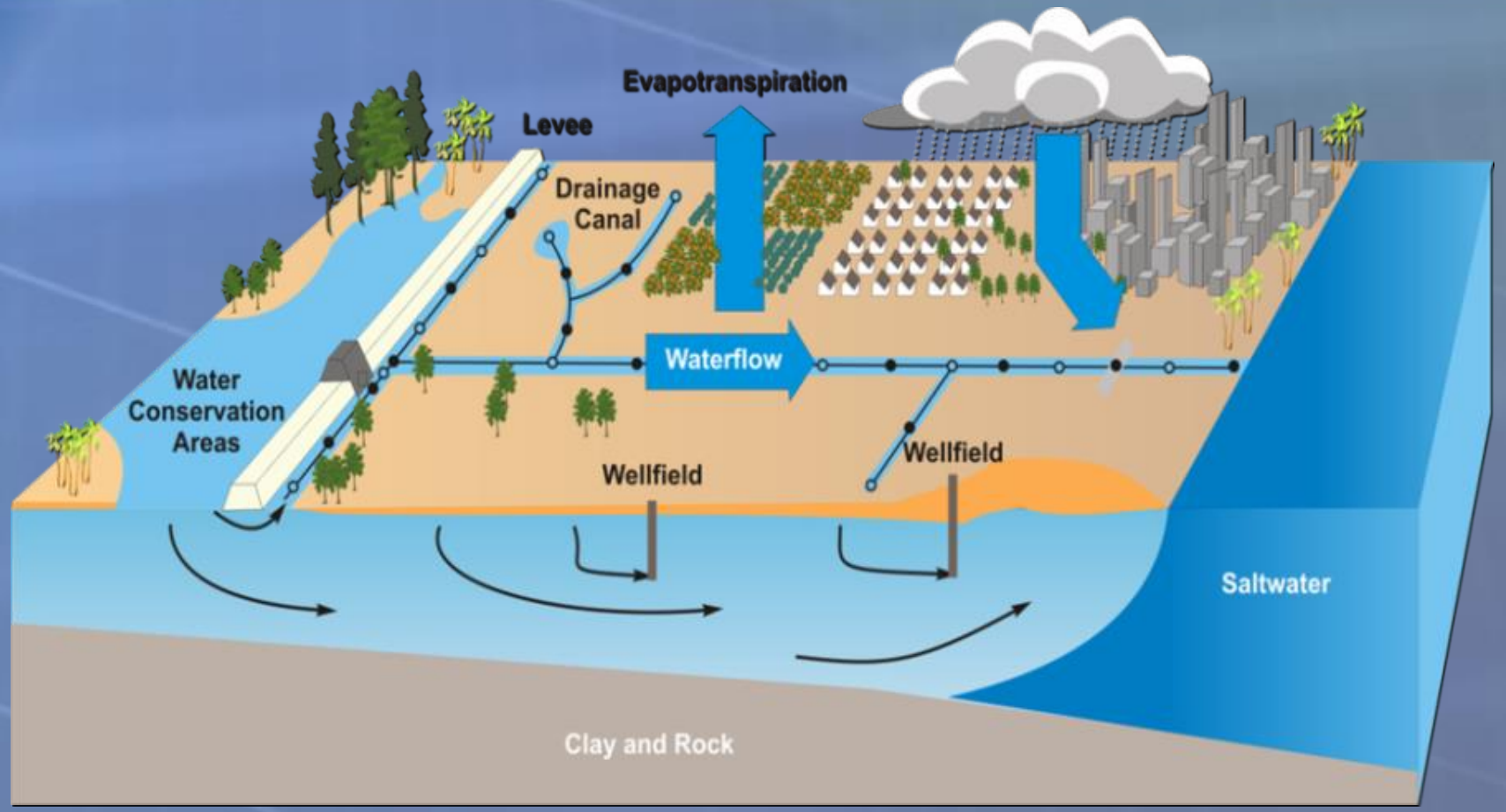
84 major pump stations send water throughout the region

- **Nearly 3,500 hydrological monitoring stations at 650+ flow sites**
- **200 rain gauges**
- **26 weather stations**
- **Canal levels are monitored daily**

Who We Are

- Numerous ecosystem restoration projects are being planned, built and operated to protect and preserve South Florida's unique ecosystems, including the Everglades, the Kissimmee River, Lake Okeechobee and a diverse array of coastal wetlands.
- Comprehensive Everglades Restoration Plan is a 50-50 partnership between the State of Florida and the federal government to protect and preserve the greater Everglades ecosystem.

Saltwater Intrusion

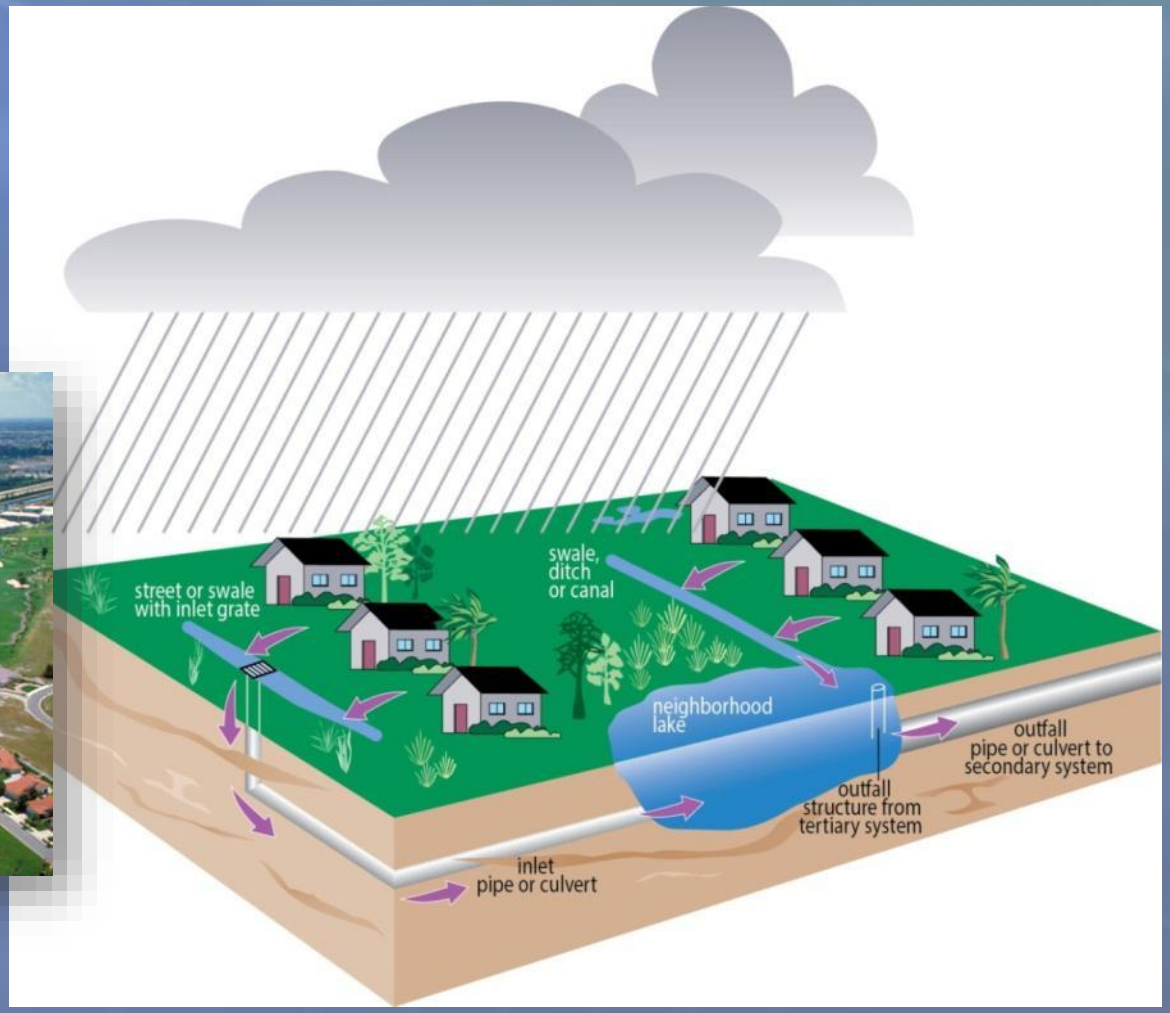


Before and After the Storm

Optimum flood control is a three-tiered system – functioning much like a roadway system

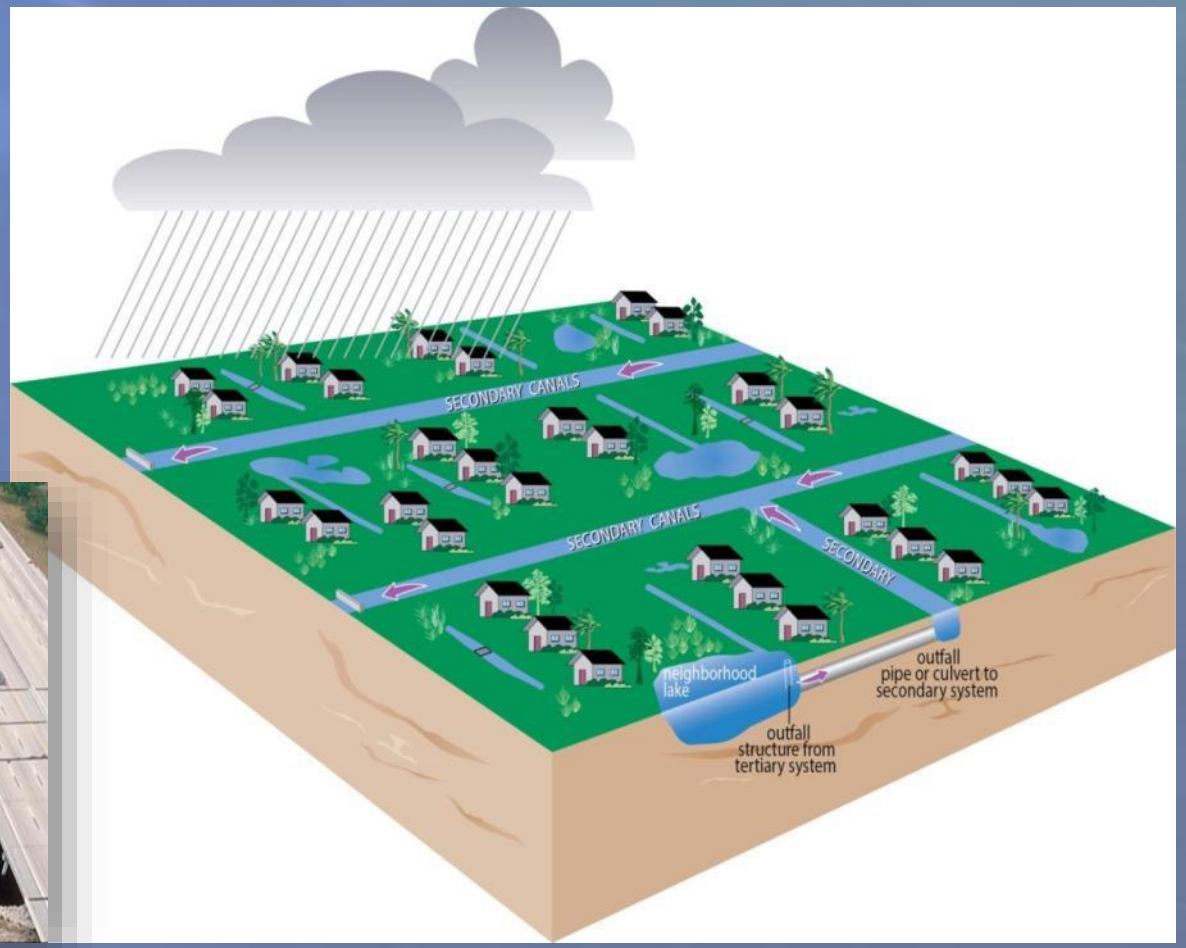
Before and After the Storm

It starts in your community…



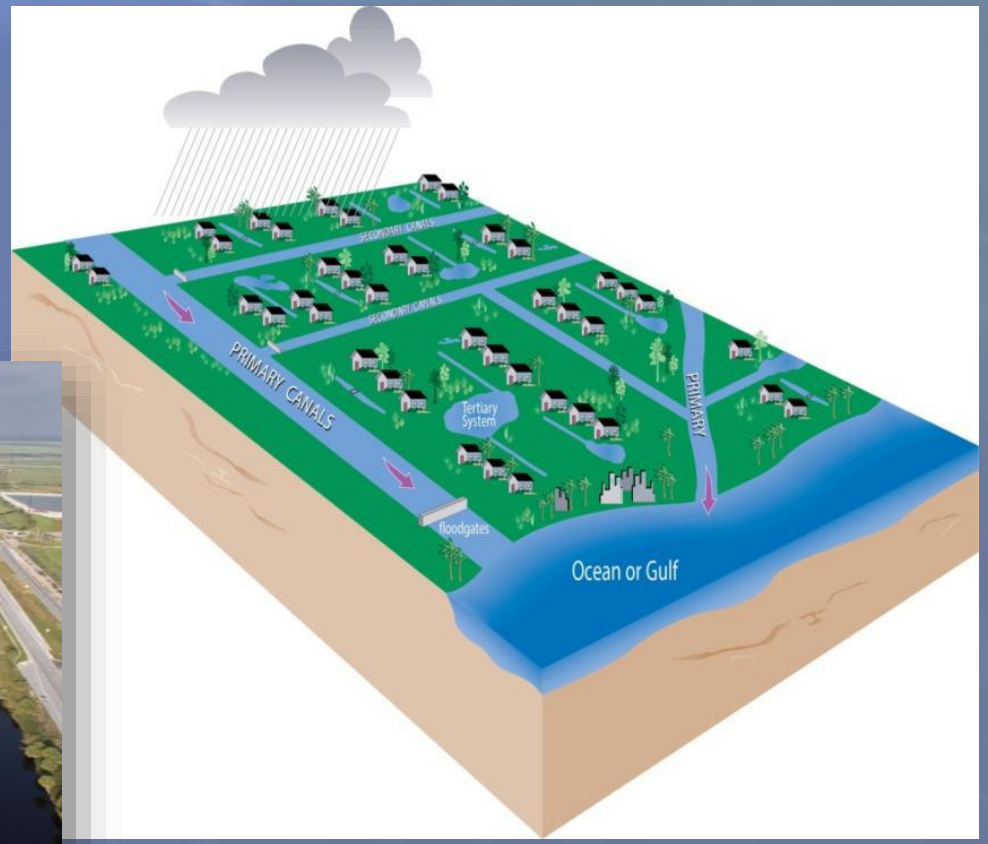
Before and After the Storm

Secondary canals connect to farm and neighborhood systems

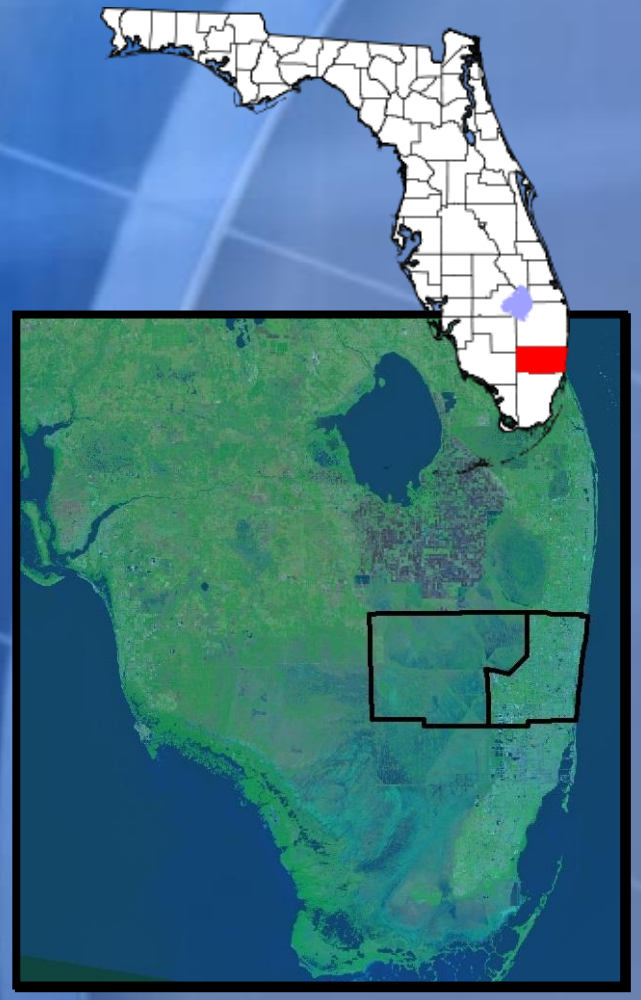


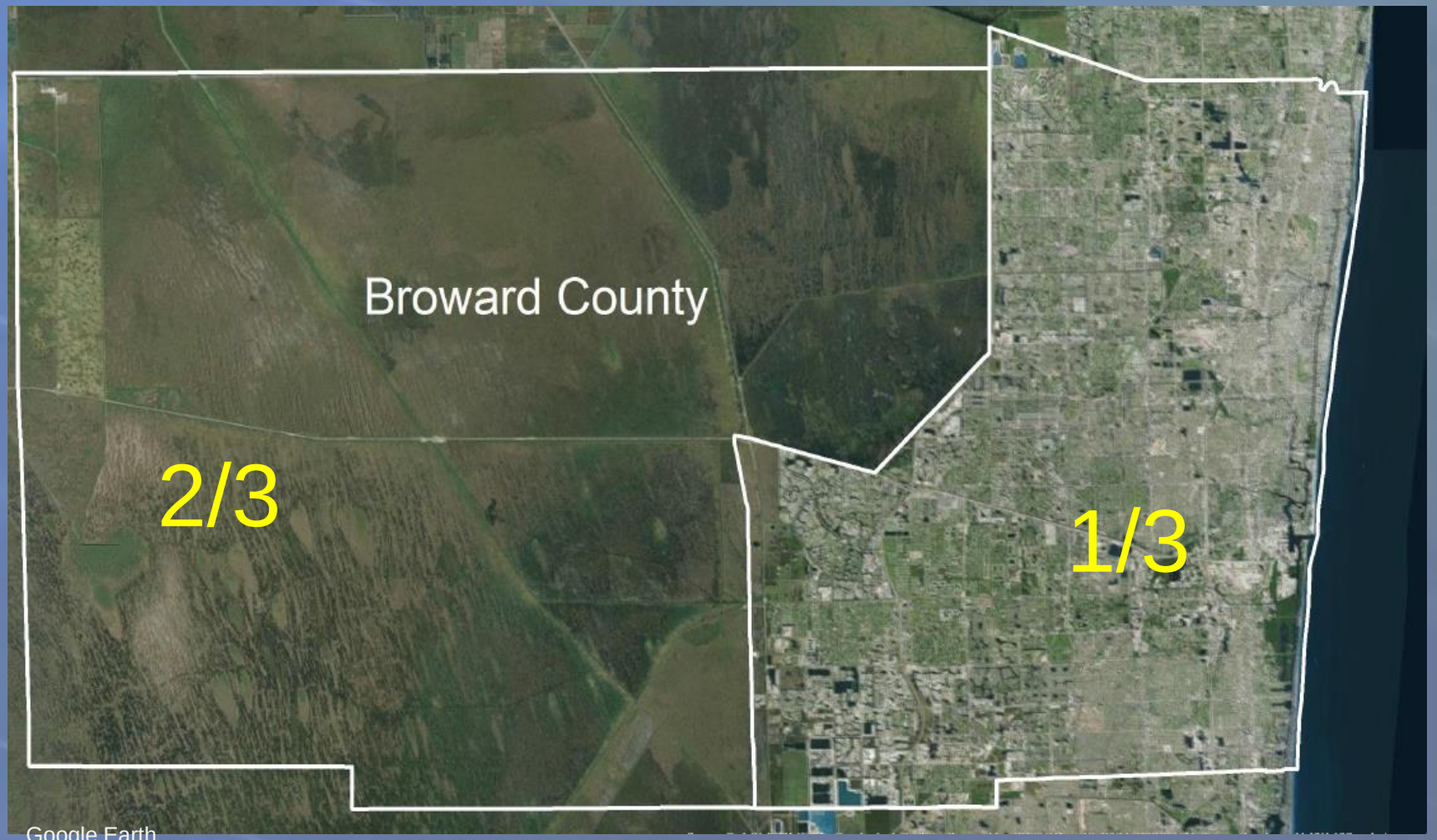
Before and After the Storm

Major canals receive inflows & move water to storage or to the coast



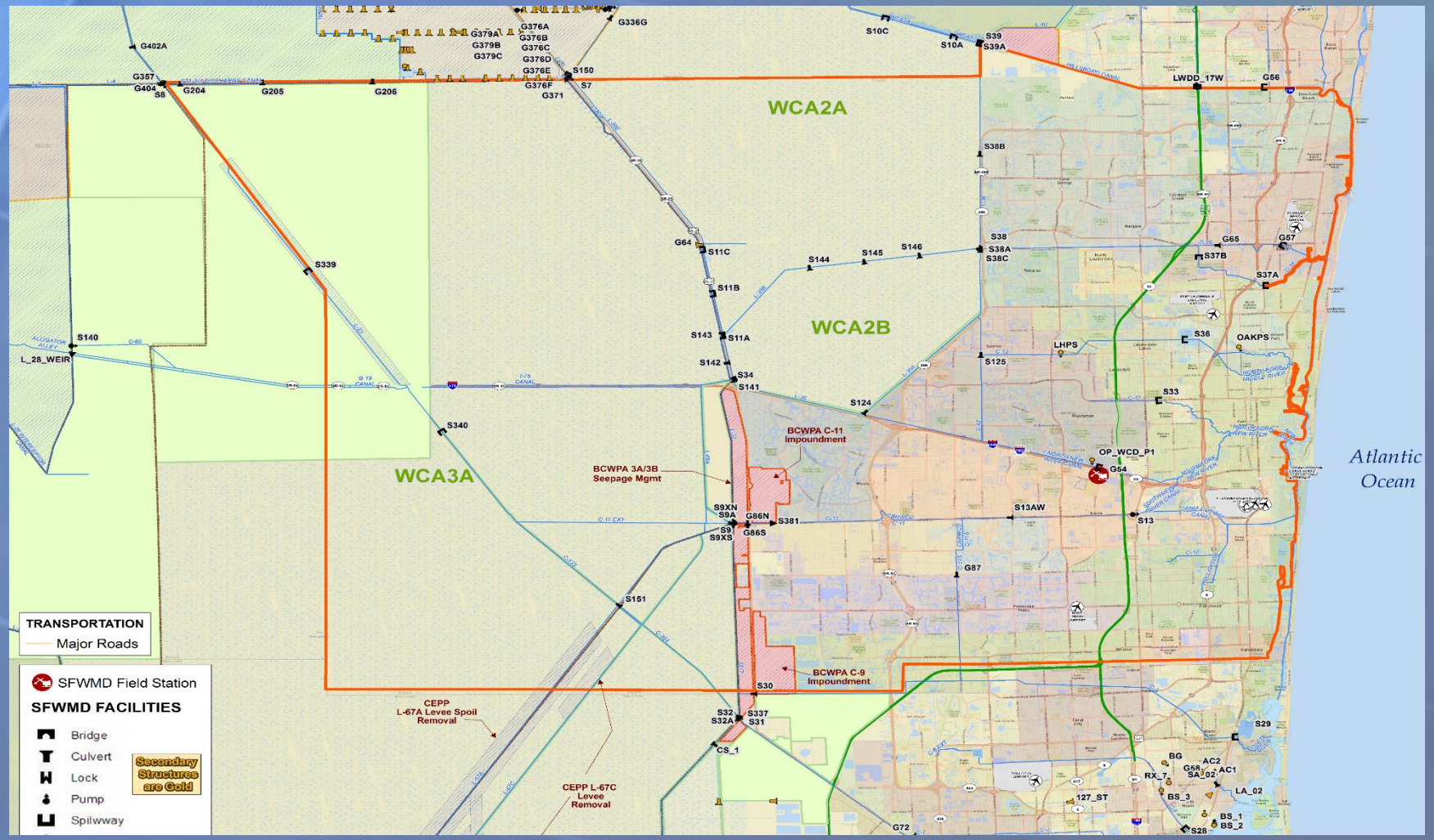
66% of BROWARD COUNTY *is Everglades*





Fort Lauderdale Field Station

Fort Lauderdale Field Station AOR



Who We Are--Ft. Lauderdale Field Station

- Population: 1.96 million
- 939 Square Miles
- 52 employees
- 213 Miles of Canals
- 127 Miles of Levees
- 37 Water Control Structures
- 238 Access Gates
- 15 Project Culverts
- 4 Manned Pump Stations
- 1 Unmanned Pump Stations
- 42 Field Station Vehicles,
  - Including 6 Vehicles for other SFWMD Sections
- 50 Pieces of Field Station equipment

What We Do

The employees at the FTL FS are responsible for operating, inspecting, maintaining and overhaul of SFWMD assets.

Maintain the Canals, Levees, Water Control Structures, Pump Stations, Facilities, Equipment and Vehicles in Broward County.

Also, the South-End Trades Support Team is housed out of the FTL FS. This team handles all of the “heavy maintenance” at the pump stations in Miami-Dade, Collier, & Broward Counties.

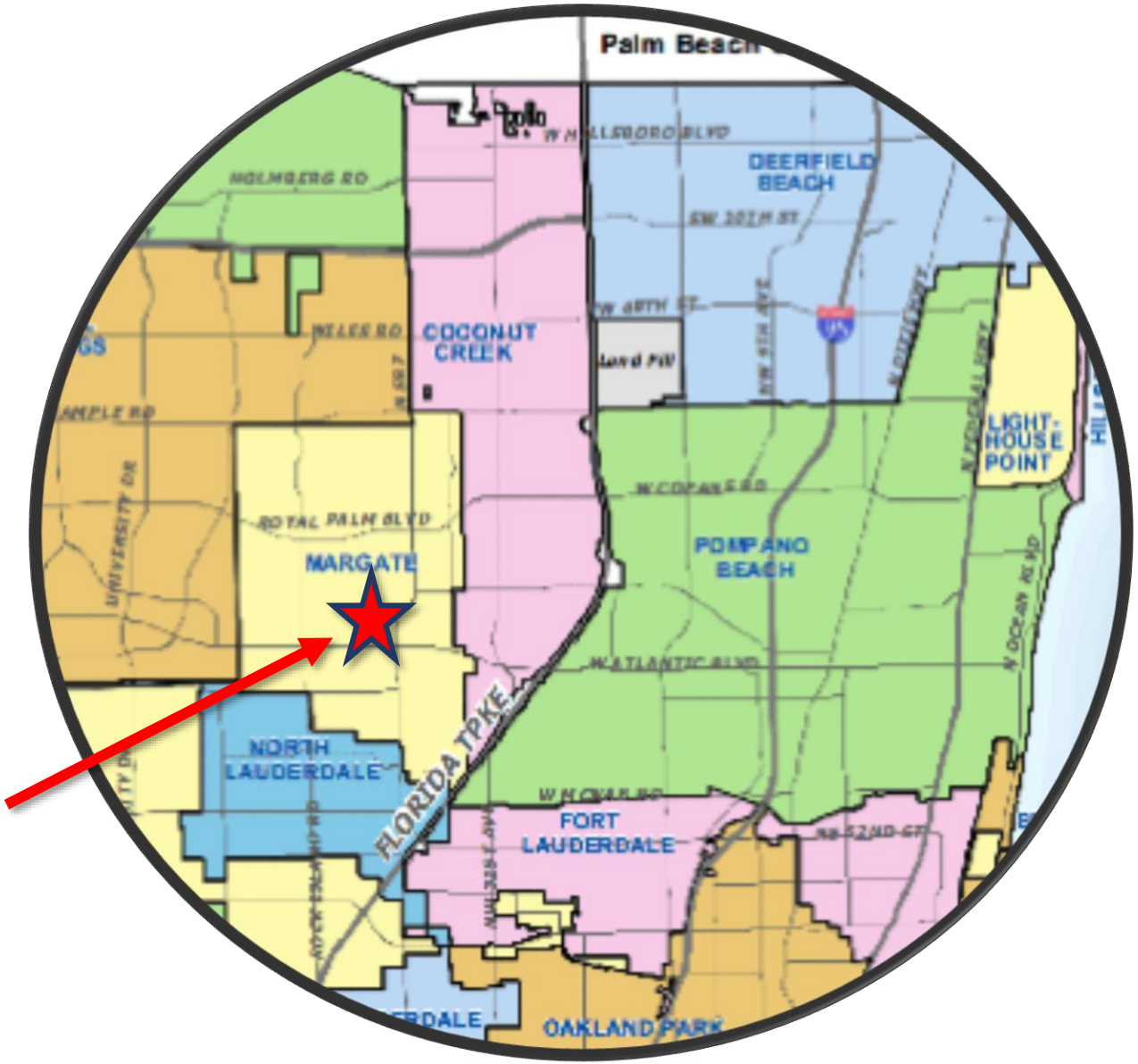
Questions?

Broward County Water Control Districts

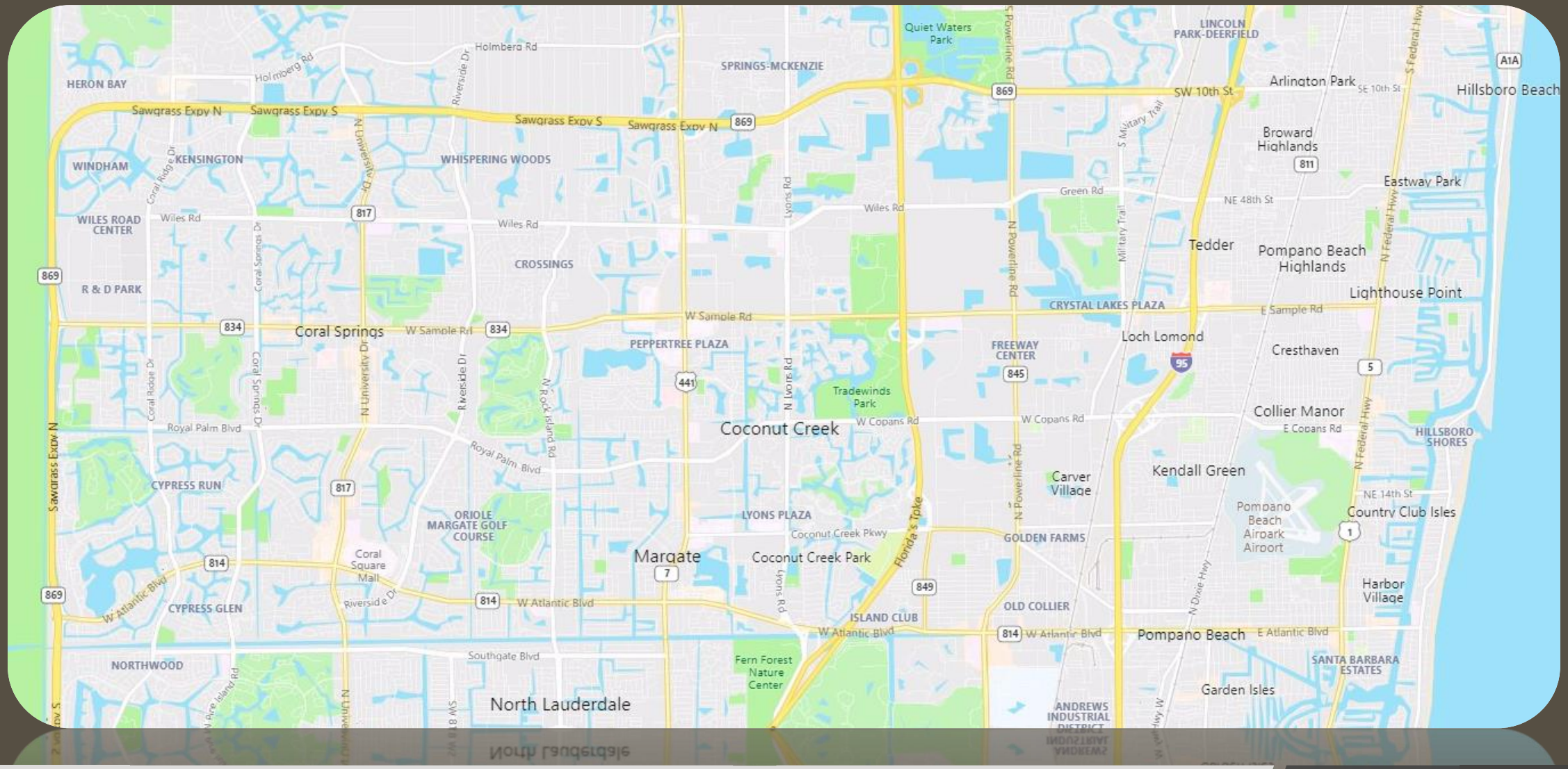
Margate Planning and Zoning Special Meeting on Water Management
July 30, 2019

Susan Bodmann, PG, PMP
WWS Water Management Division

Northern Broward County



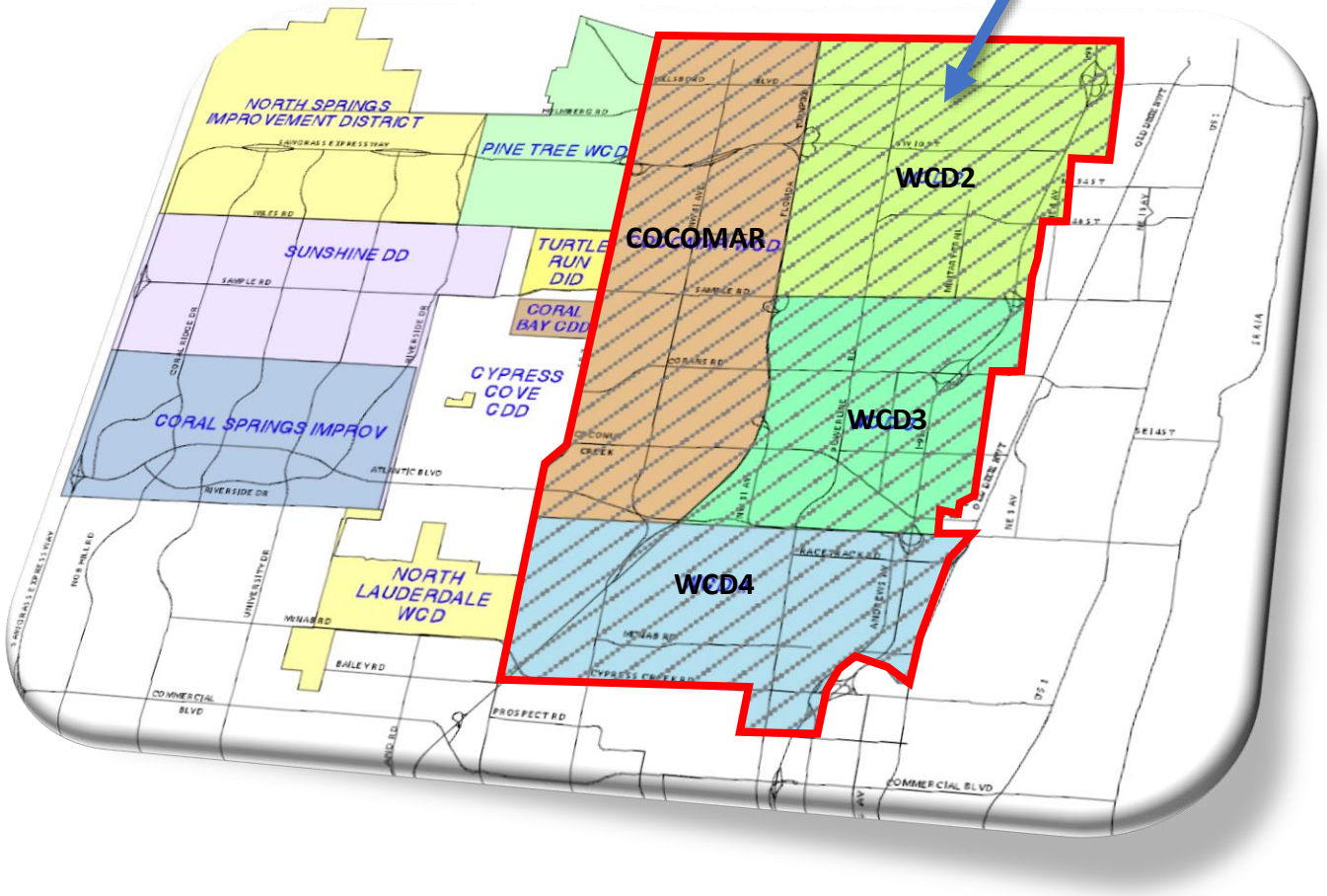
And you are here!



We are Surrounded by Water

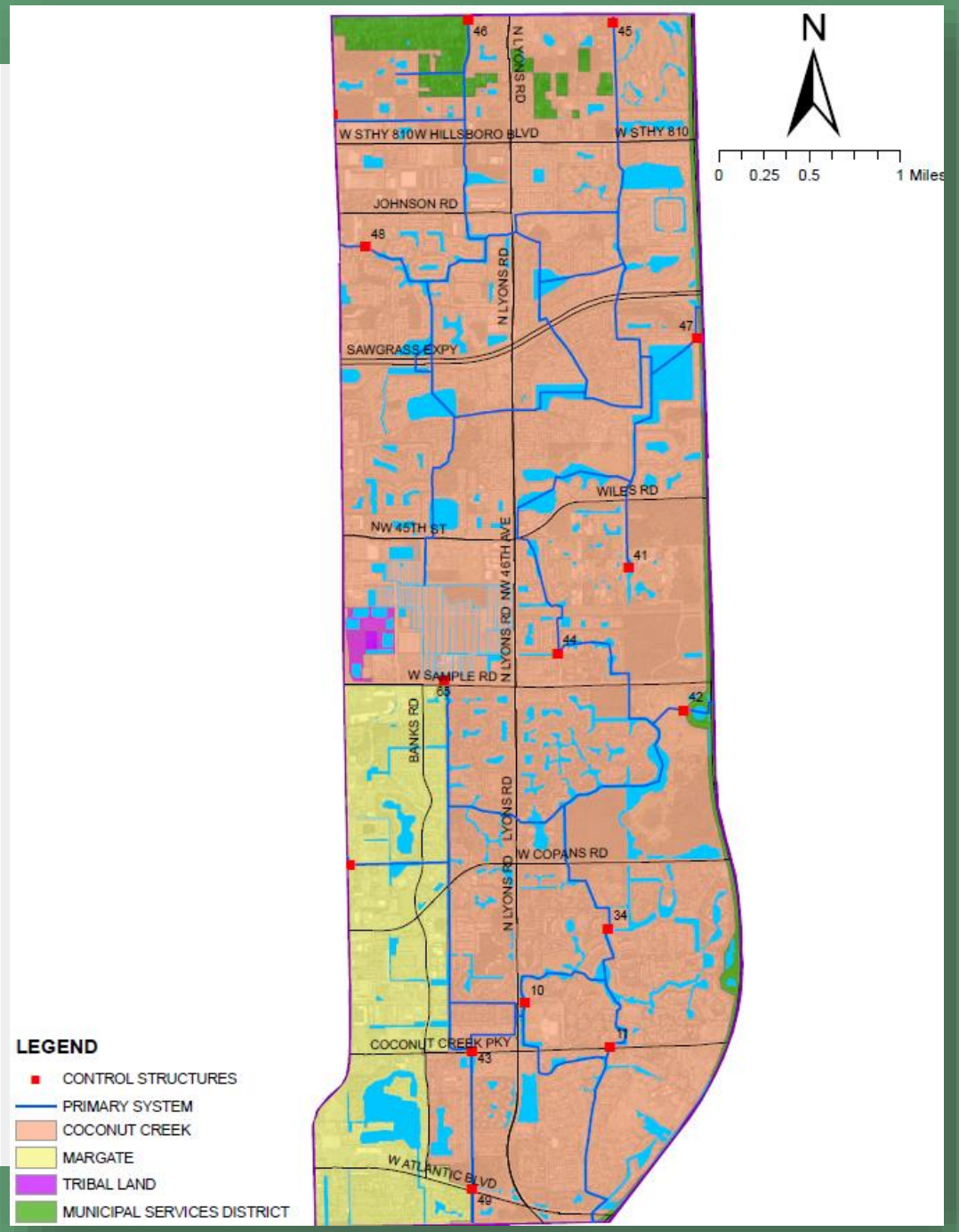
North County
Water Control Districts

Broward County WWS
Water Management Div. Water Control Districts (WCD)
2, 3, 4 & Cocomar



COCONUT CREEK
+
MARGATE
=
COCOMAR
Water Control District

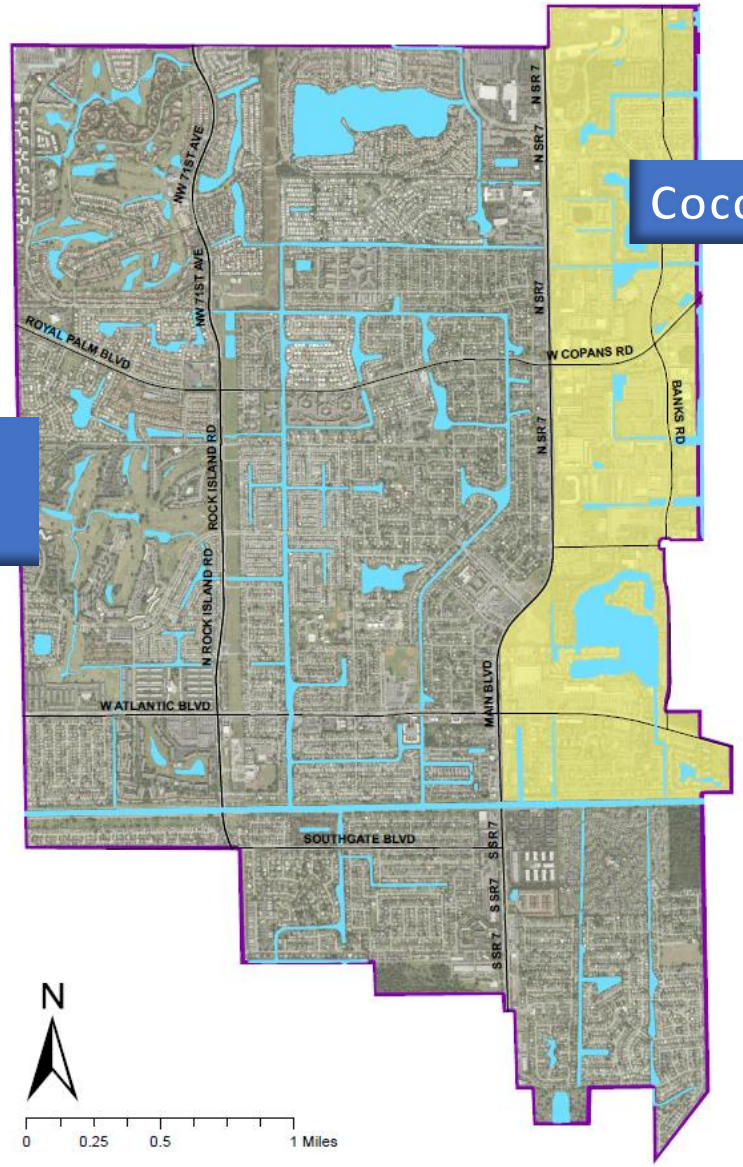
--2 Sub Basins North & South of Sample Road
--North Basin Control Water Level at 9.5 feet
--South Basin Control Water Level at 5.5 feet
--2 Pump Stations at the Hillsboro Canal
(1 Existing & 1 Planned)
--16 Gate Structures (5 monitored weekly)



Cocomar WCD

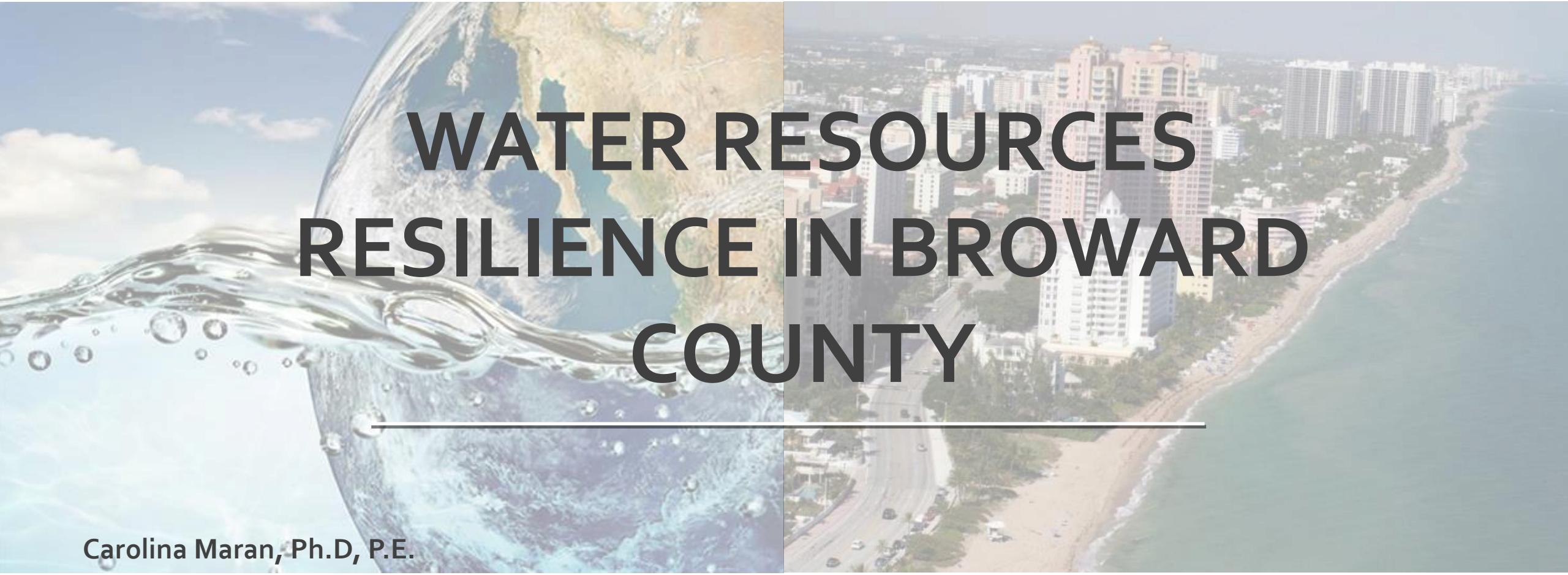
City of Margate Canal System

SFWMD C-14 Canal



Thank you

Margate Planning and Zoning Special Meeting



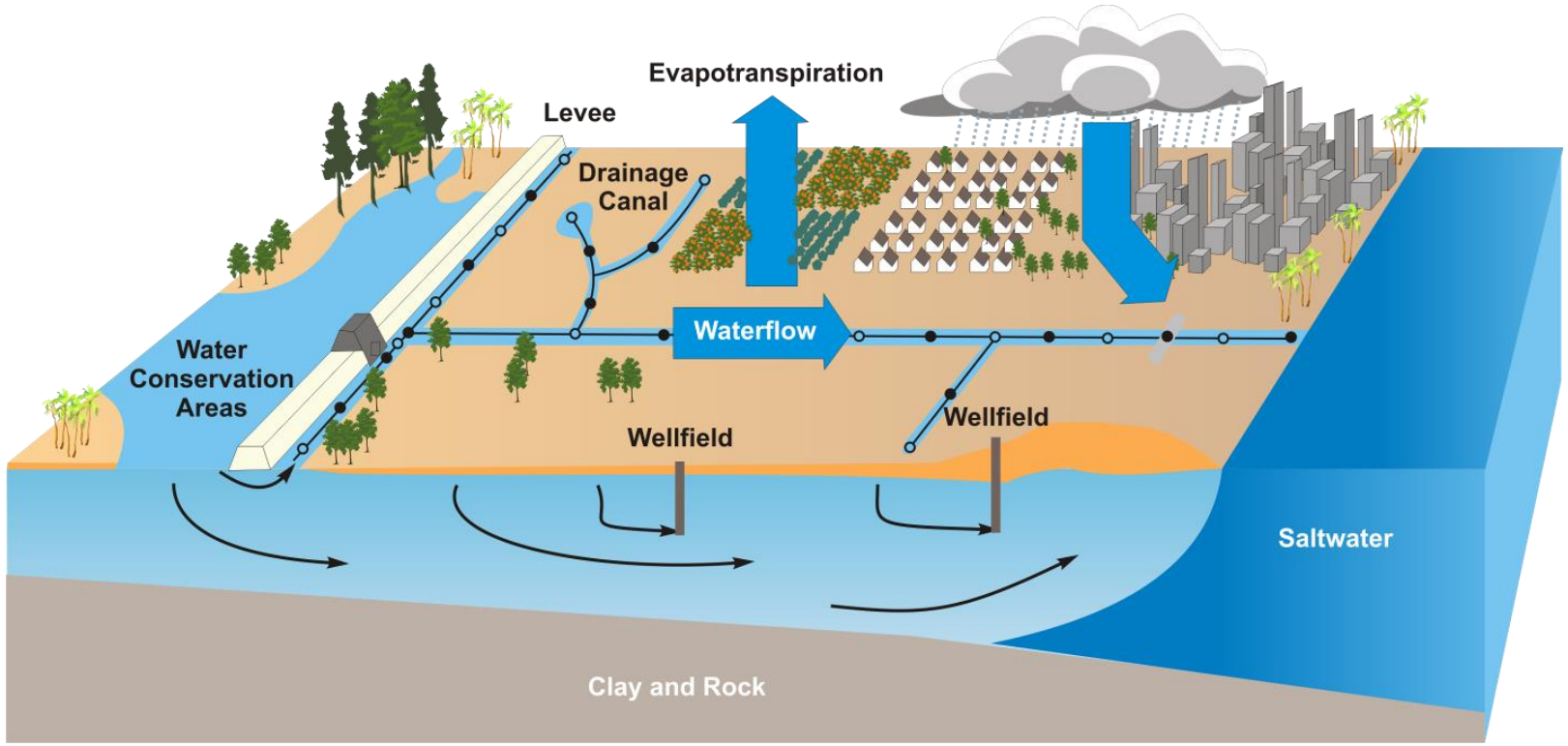
WATER RESOURCES RESILIENCE IN BROWARD COUNTY

Carolina Maran, Ph.D, P.E.

Water Resource Manager, Environmental
Planning and Community Resilience Division

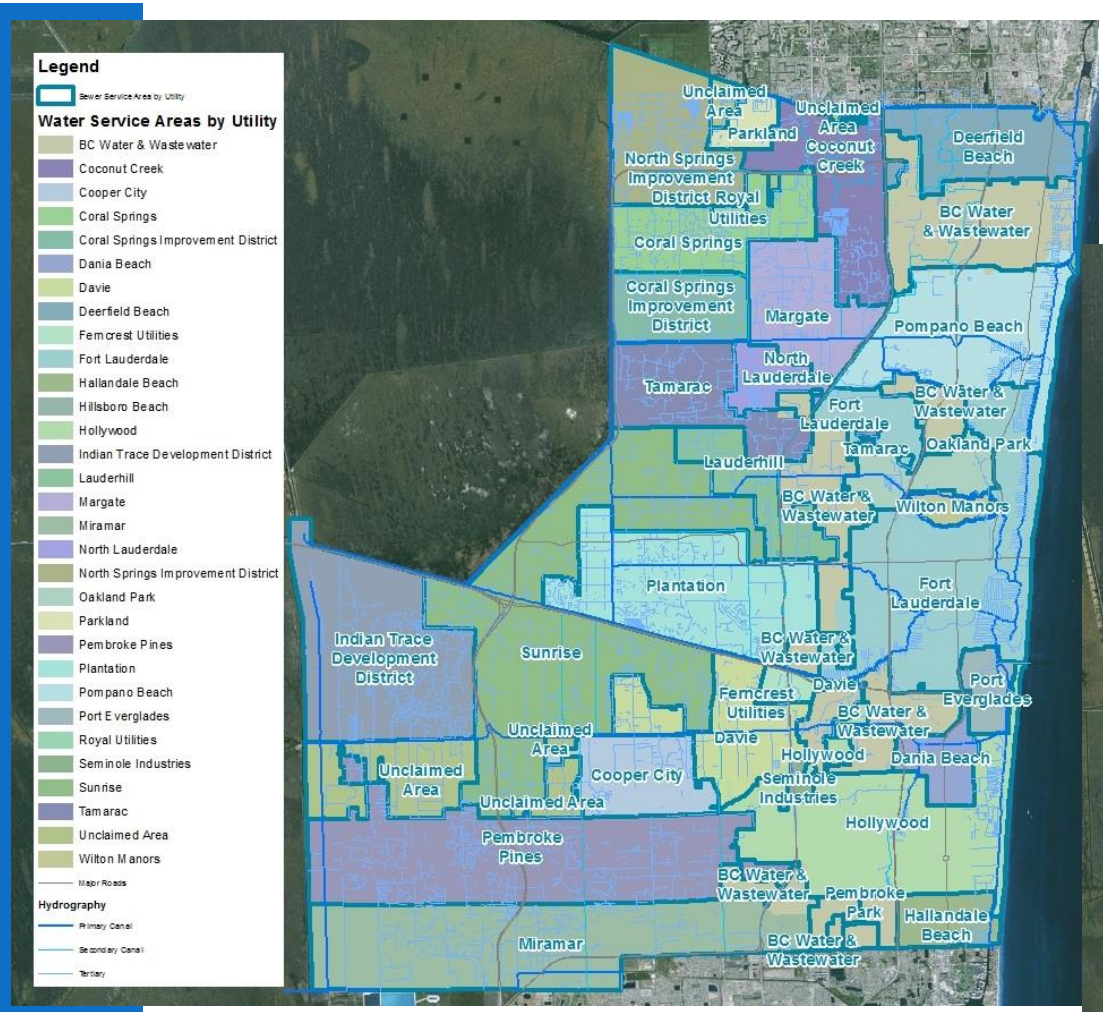
July 29, 2019

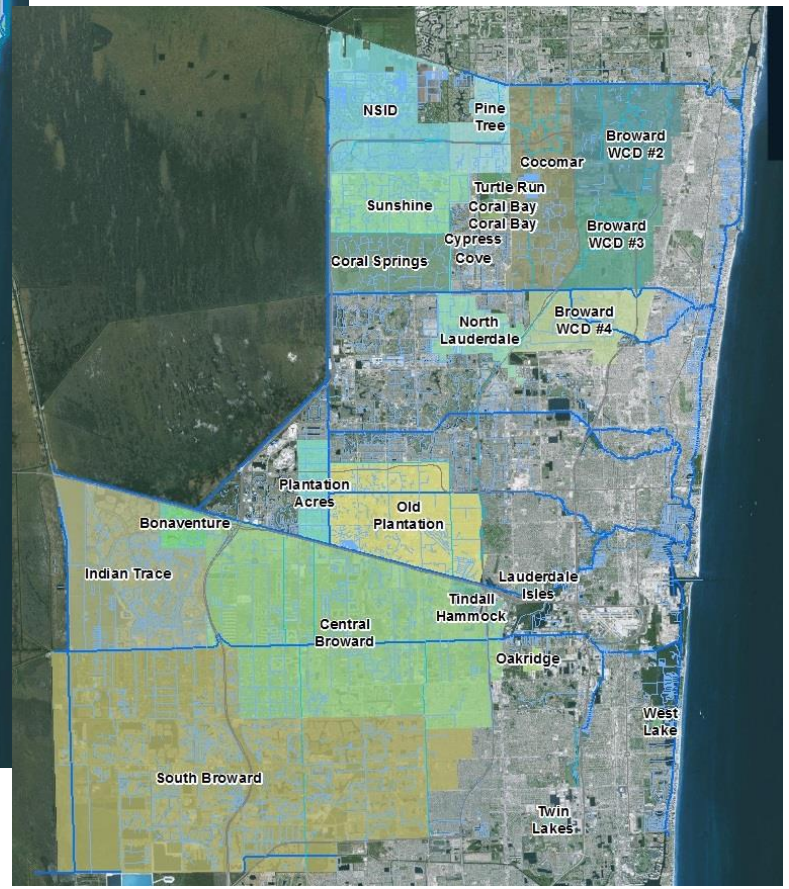
Water System Integration



Diverse Water Managers:

Utilities and Drainage/Water Control Districts





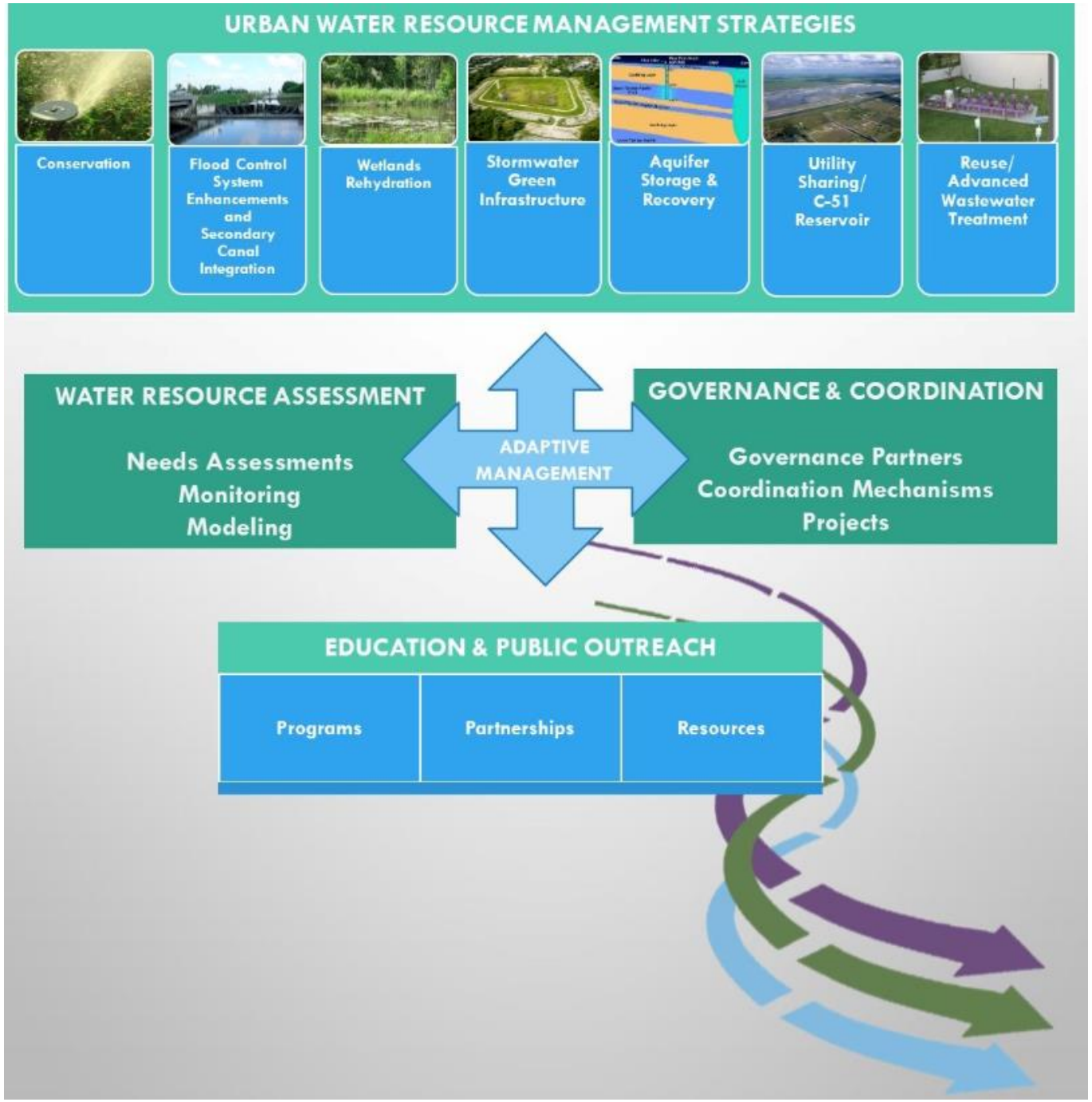
2019 Integrated Water Resource Plan Update : Building Resiliency in Water Management



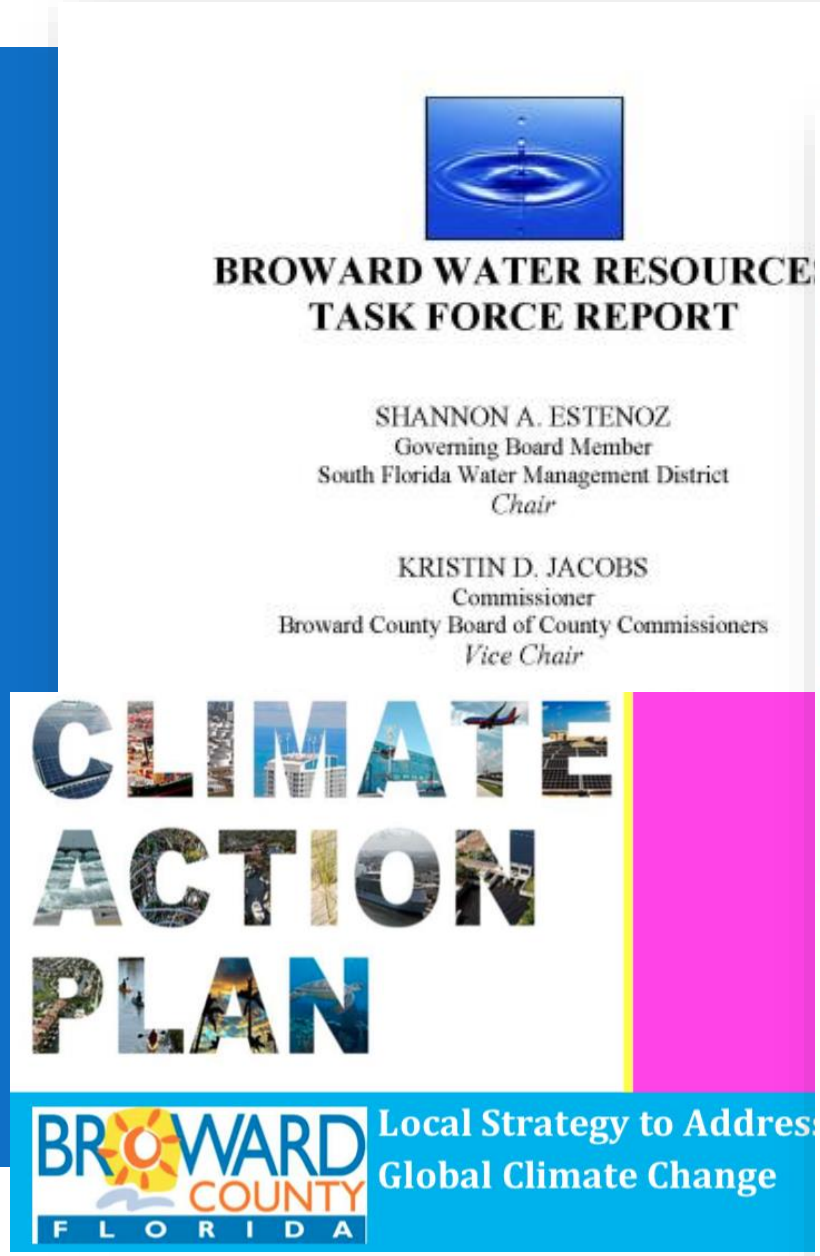


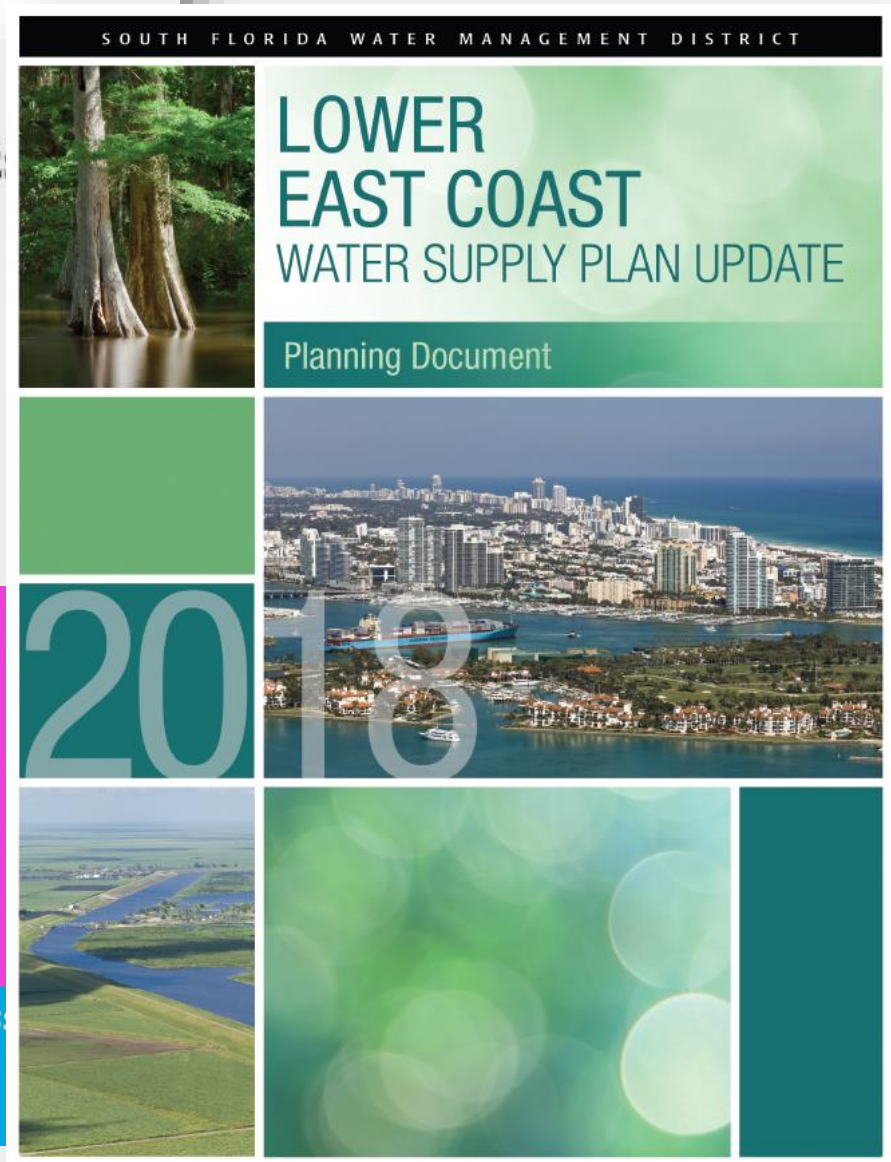

Broward Countywide Integrated Water Resource Plan

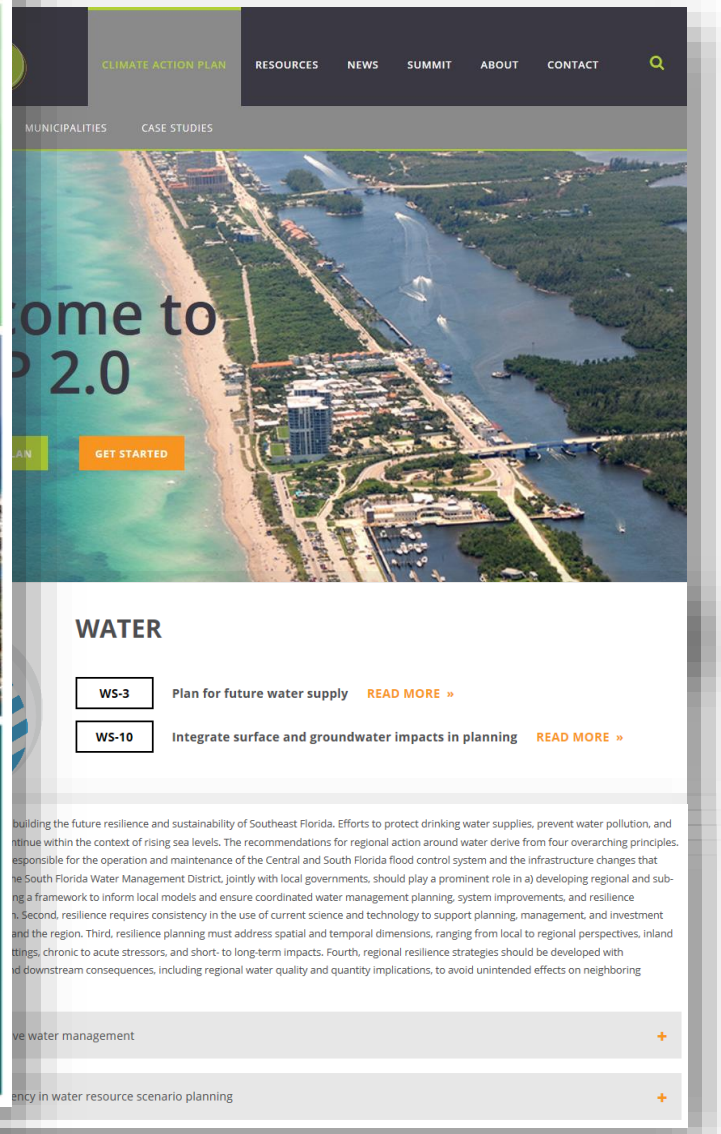
COMPONENTS



Planning for Tomorrow



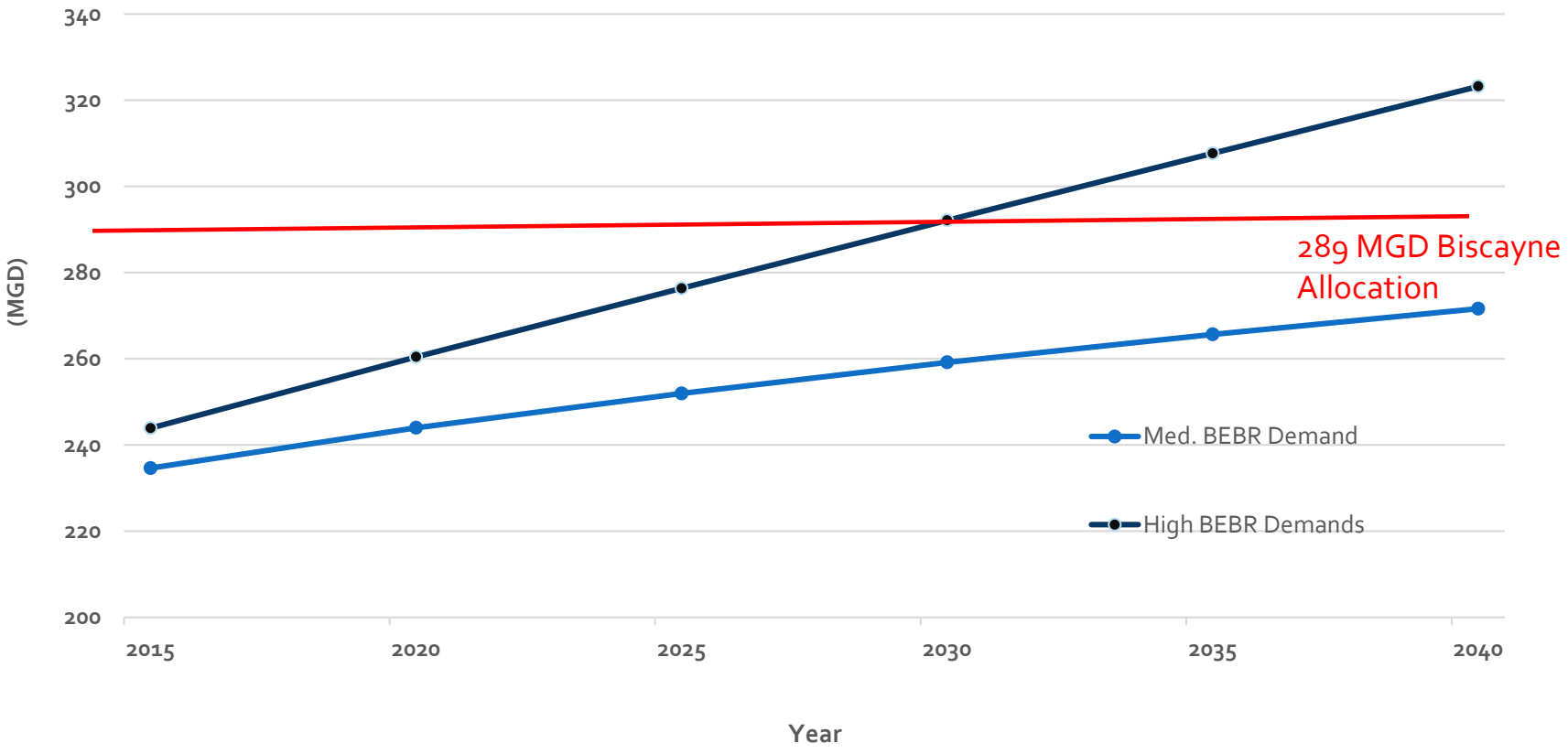




Traditional Uncertainties:

Long-term Growth Trends

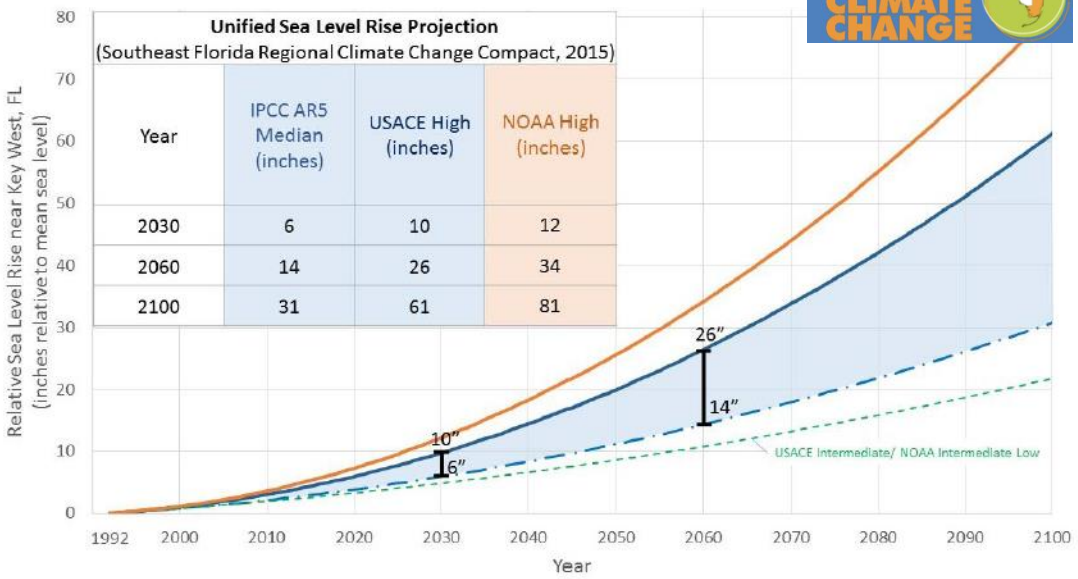
Water Demands for Med/High BEBR



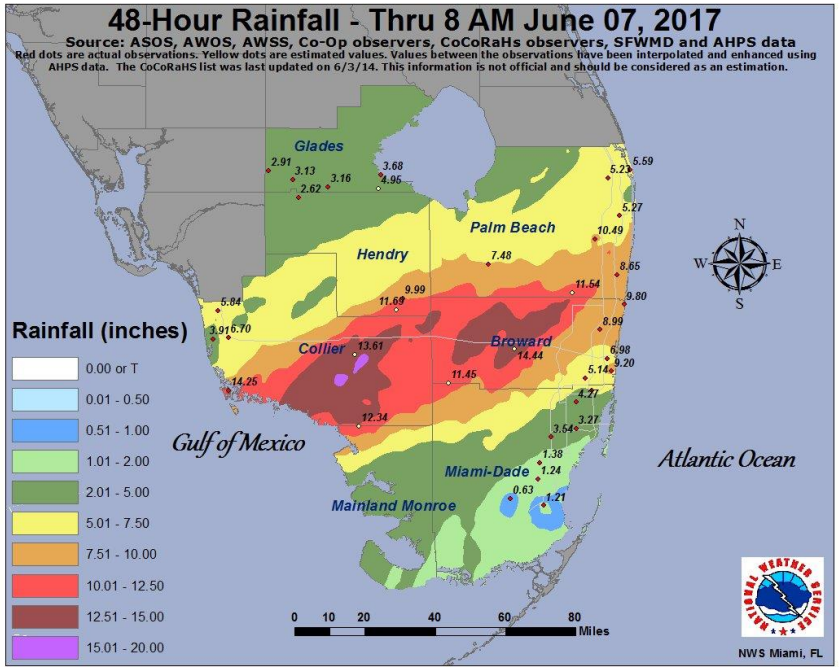
SEA LEVEL RISE

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

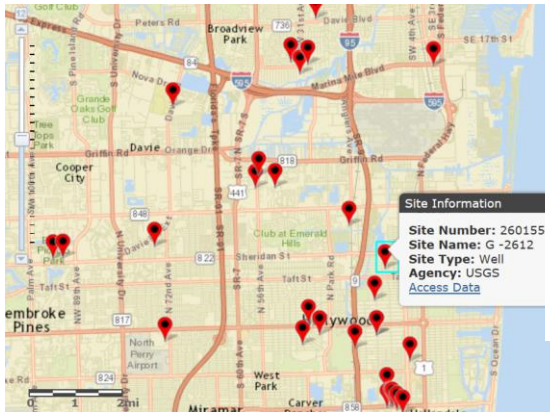
Year	IPCC AR5 Median (inches)	USACE High (inches)	NOAA High (inches)
2030	6	10	12
2060	14	26	34
2100	31	61	81

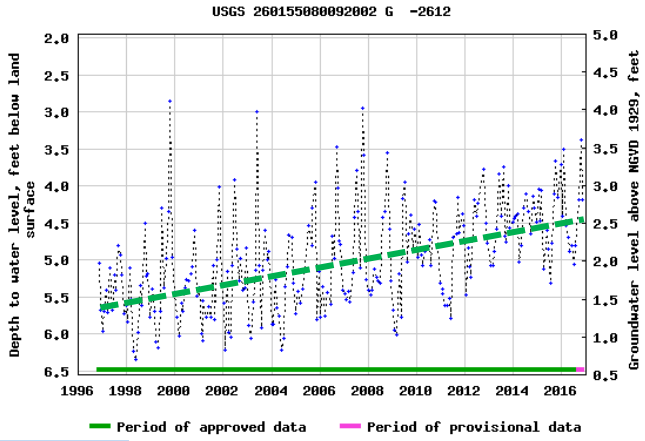


MORE EXTREME RAINFALL



+ High Tide Flooding



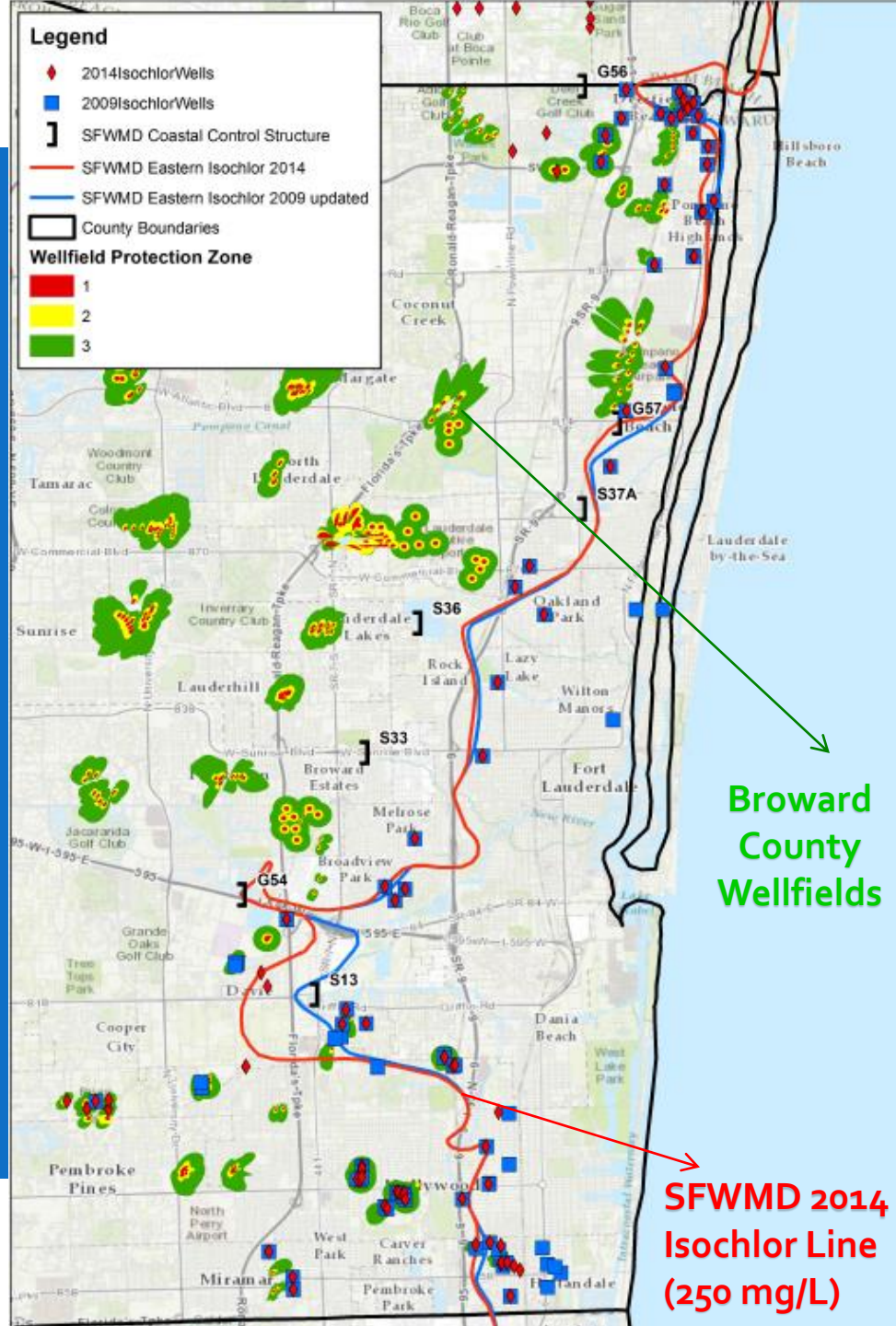


HIGHER GROUNDWATER

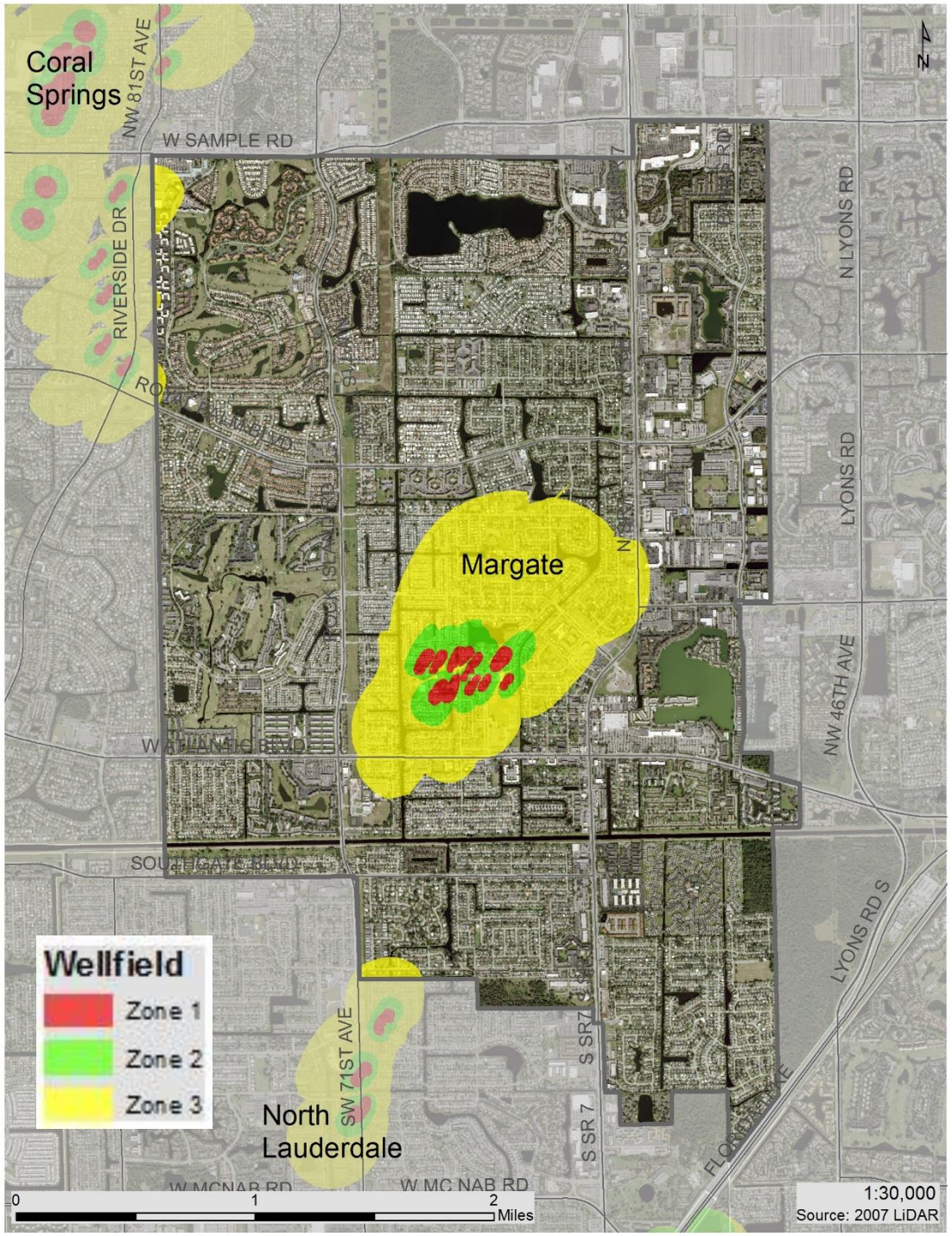
Biscayne Wellfields Impacted by Saltwater Intrusion

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 - 2 ft. SLR scenario (16% of total)



Margate Wellfields



LARGER AMOUNT OF RAINFALL

+

LOWER INFILTRATION STORAGE

INCREASING STORMWATER VOLUME

Additional Challenges:

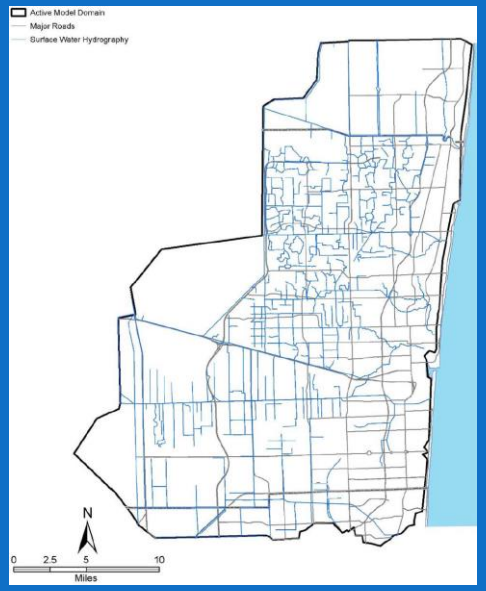
- Limited land availability
- Increasing pollution carried out by stormwater runoff into waterways
- Temperature and evapotranspiration new patterns
- Water Supply Needs

BEYOND PLANNING:

BROWARD MODELING APPROACH

- Highly complex system and uncertainties
- Integrated approach to water resource management and climate adaptation planning
  - Conduct Risk Assessments – wellfields and flood control infrastructure
  - Develop Integrated Water Management Plans - water supply, wastewater disposal, water conservation, alternative water supply, stormwater management and reuse
  - Provide Drainage and Flood Control – identify and pursue infrastructure improvements
  - Support Everglades Restoration

MODELING WATER SUPPLY AND FLOOD RISKS



2000-2002 (CDM & DHI): To analyze water management options for Broward Co. and the upper Biscayne Aquifer:

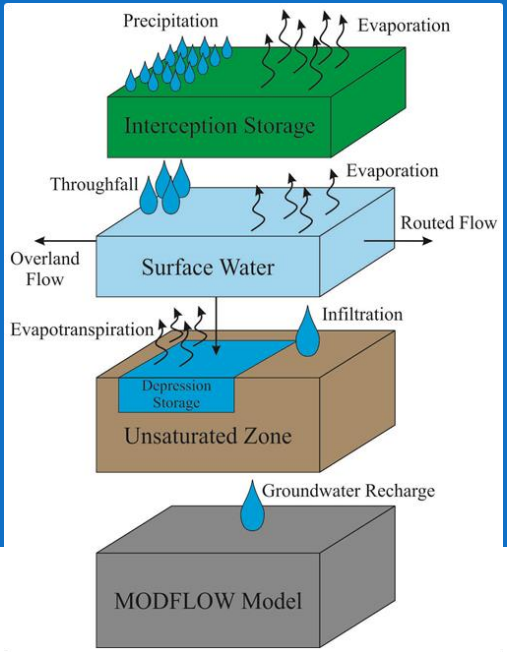
- Central Aquifer Drainage Assessment (CADA)
- South Aquifer Drainage Assessment (SADA) model
- North Aquifer Drainage Assessment (NADA) model

2003 – 2005 (CDM & DHI) : Evaluate predictive scenarios / alternative water supply options (AWS), determine capability to support projected increase in water demand

- C-51 reservoir
- Reuse projects
- Aquifer recharge

2014 (AECOM): FEMA Flood Zones – refinement of canals and control structures, stormwater focus

MODELING SALTWATER INTRUSION & INNUNDATION



- Develop a numerical representation of urban hydrology
- Evaluate response of surface water-groundwater system to future scenarios
- Identify, evaluate, and test adaptation strategies

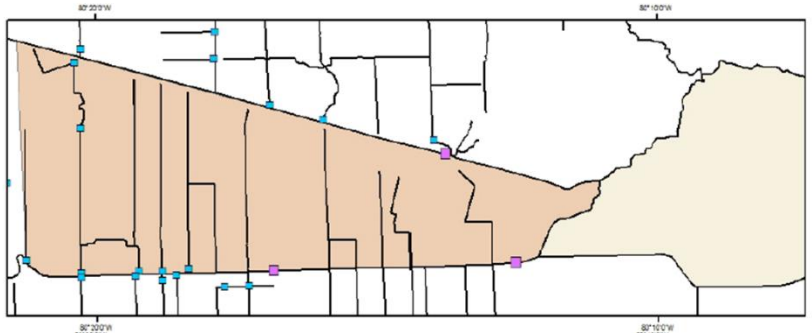
2010-2016: Variable Density - 3D dispersive Saltwater Intrusion Modeling:

* Northern Variable Density Model as Pilot
* Central and Southern Variable Density Model

2011-2019 and beyond: Inundation Modeling / integrated surface water/groundwater models

Phase 1: 2011-2015 (Pilot) Ft. Lauderdale/Davie

Phase 2: 2018-2021 - Full County Build Out



Critical Infrastructure Failures and Cascading Effects, 3D Visualization in support of the creation of a climate impacts database and related economic aspects

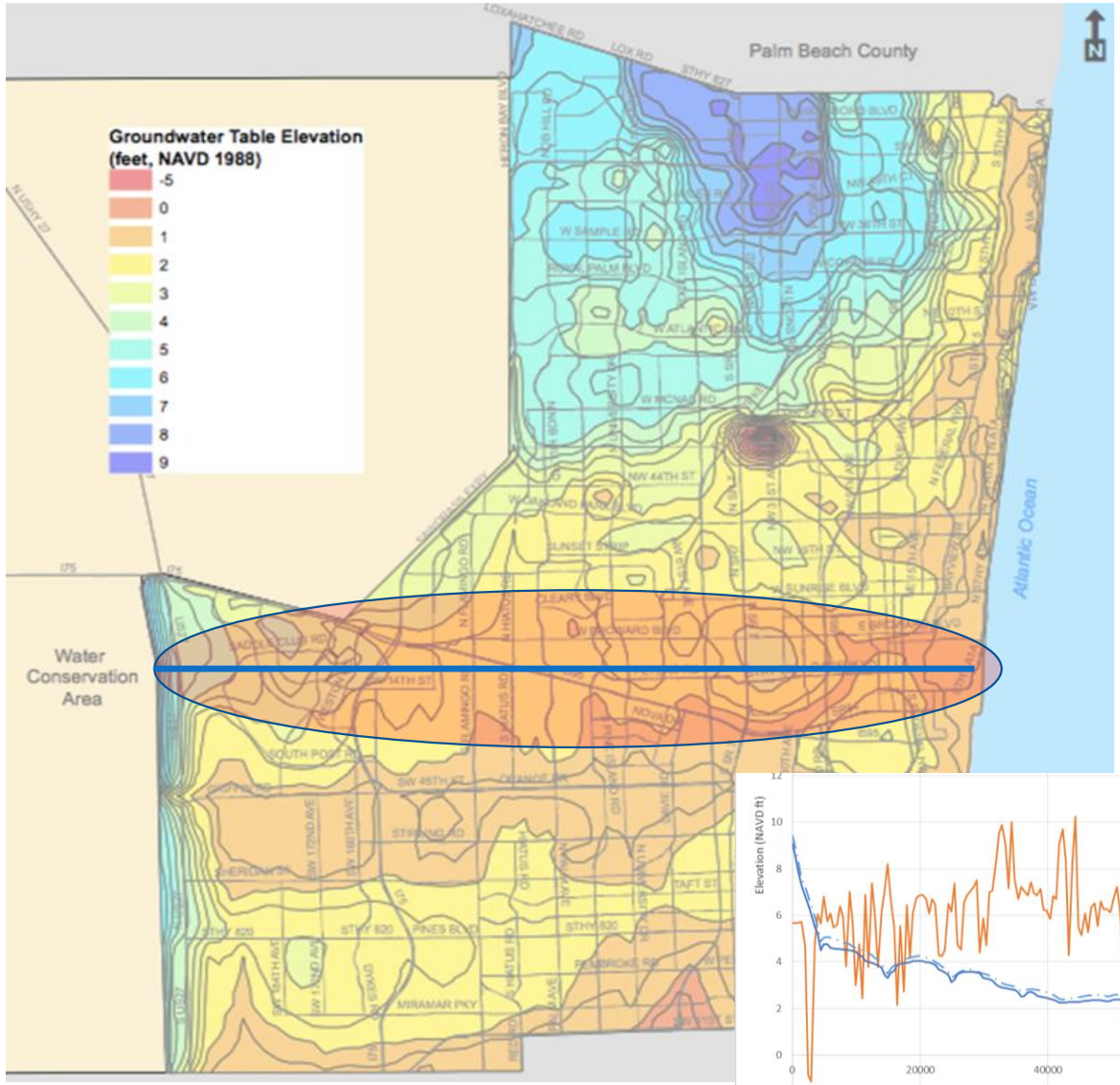
BEYOND PLANNING & MODELING: Future Conditions Map Series

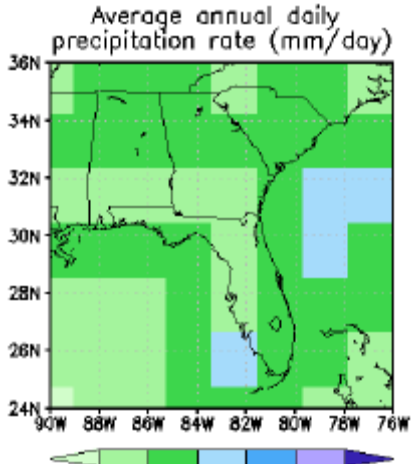
- February 7 2017 Broward County Commission Authorized Future Conditions Map Series
  - *"To ensure the resiliency of current and future infrastructure investments, it is necessary to modernize many aspects of regional planning and licensing requirements. With the influence of climate change, and the impacts of sea level rise in particular, no longer is it prudent to rely solely upon historic and current environmental conditions as the basis for infrastructure planning, design and permitting."*

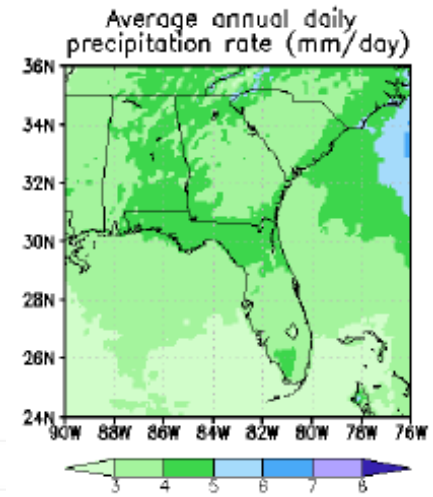
- First planned maps:
  - Future Conditions GW Elevations
  - Storm Surge Mapping: minimum sea wall elevations
  - Future Conditions 100-yr Flood Elevations

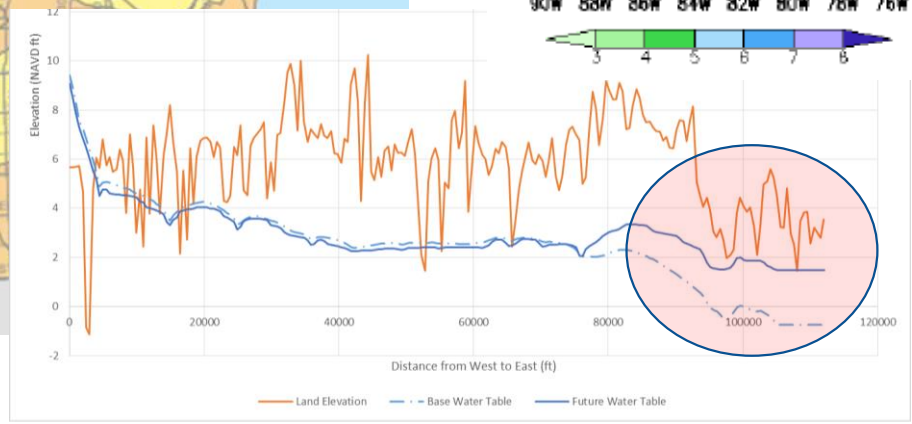
Future Conditions Groundwater Elevation Map:

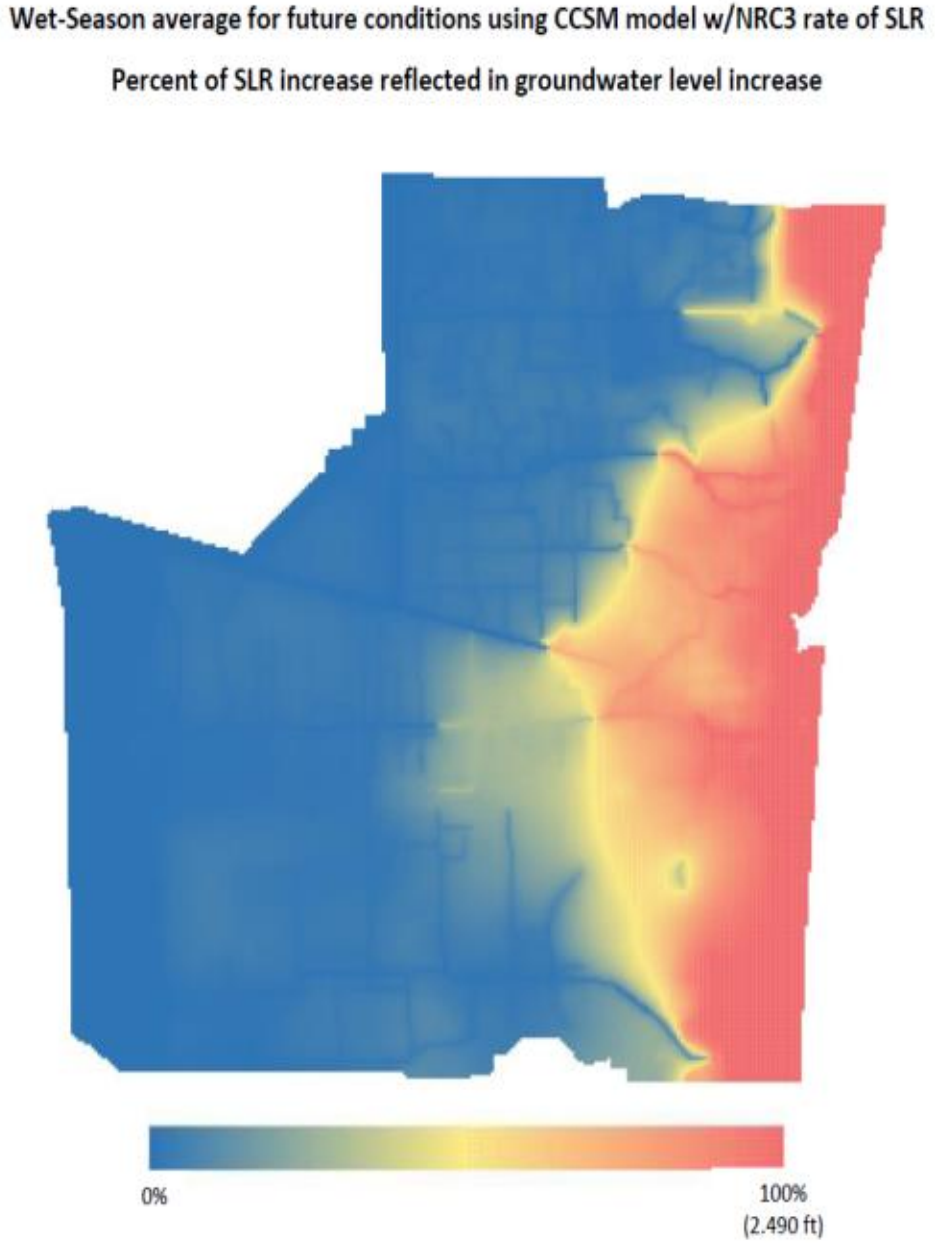
- 2060-2069 Wet Season Averages
- SEFRCCC NRC 3 sea level rise projection
- COAPS CCSM climate model – 9% average rainfall increase
- MODFLOW Inundation Model – 500ft grid cell

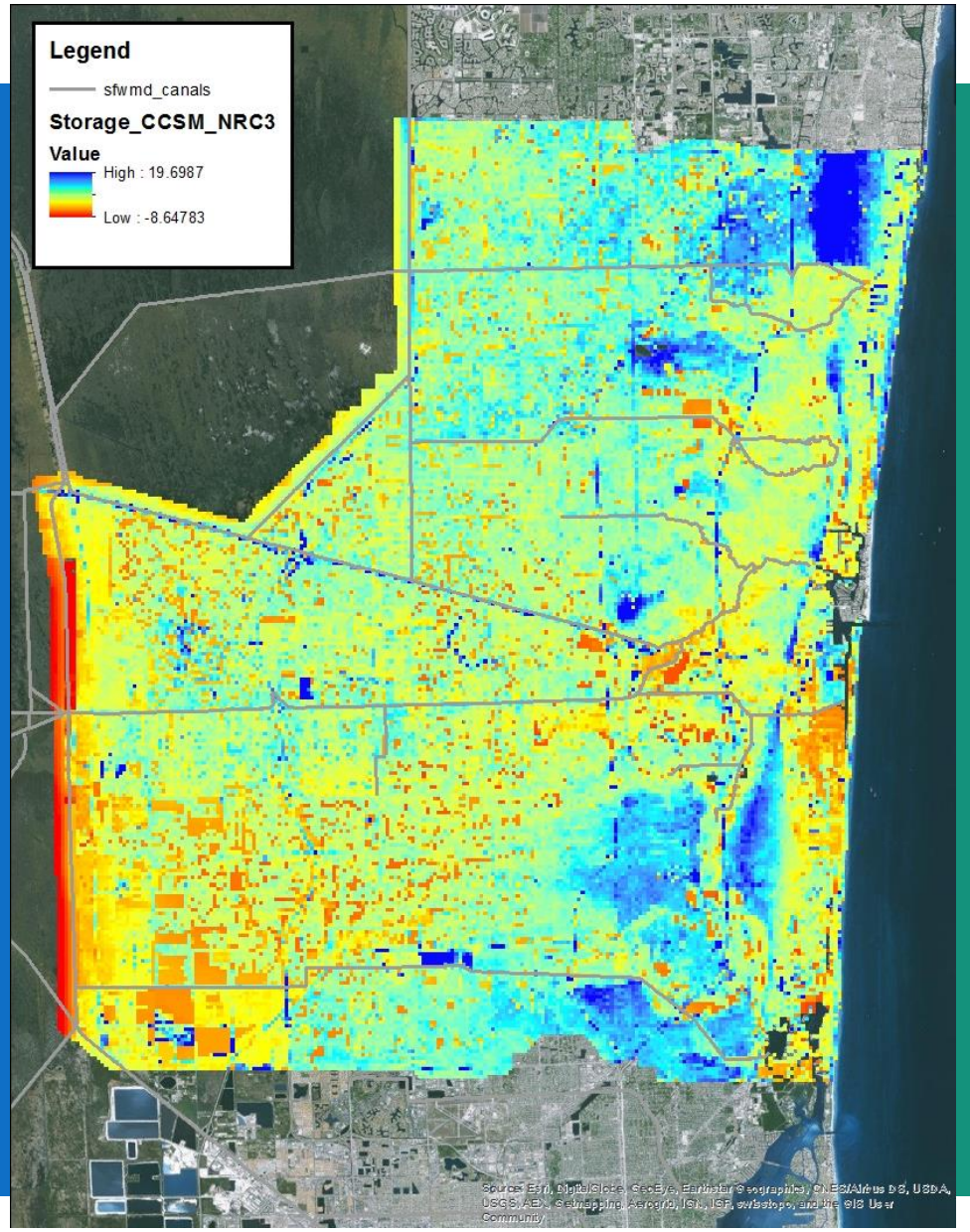










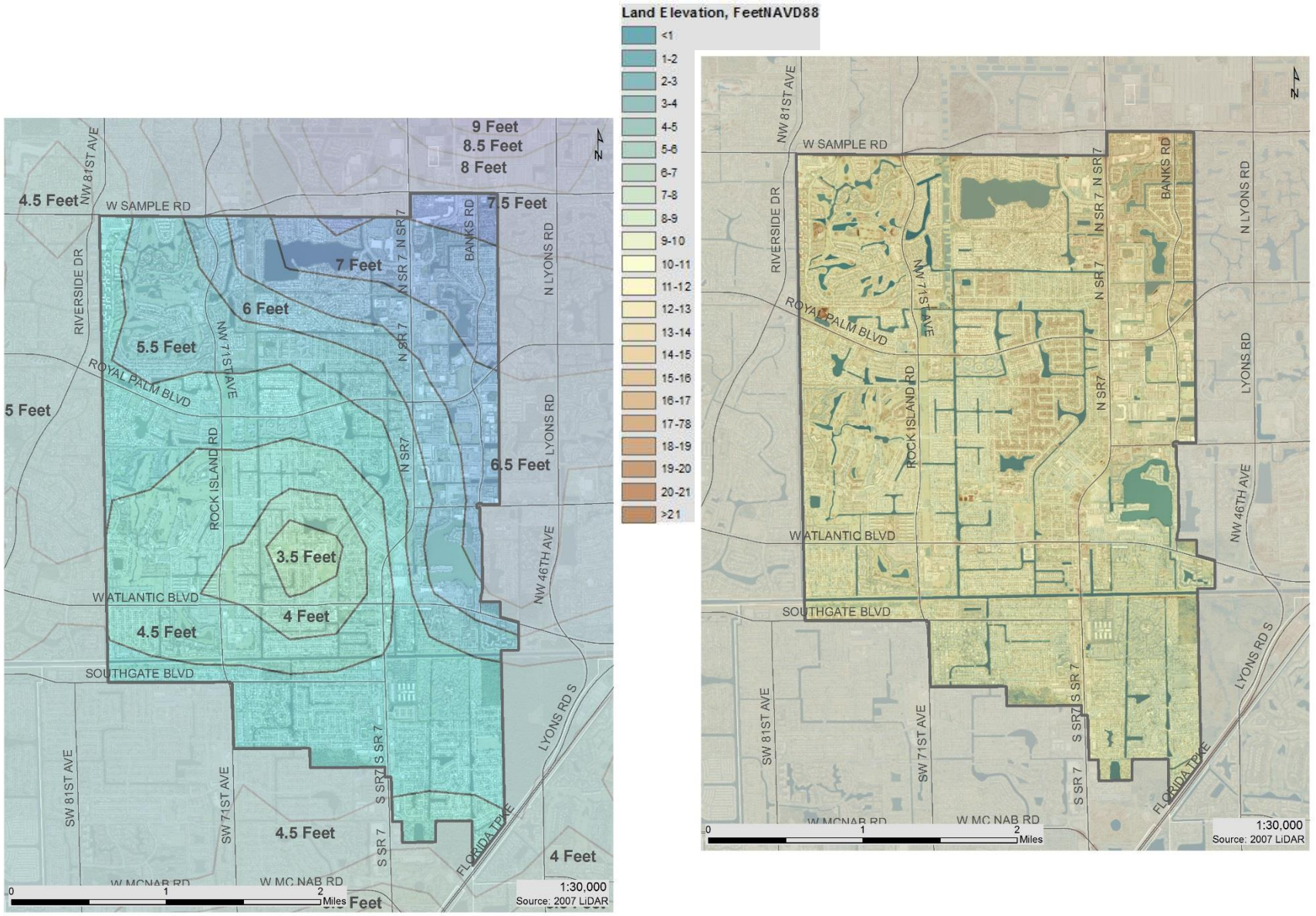


Soil Storage

Red shows water or no storage

Blue indicates most storage potential

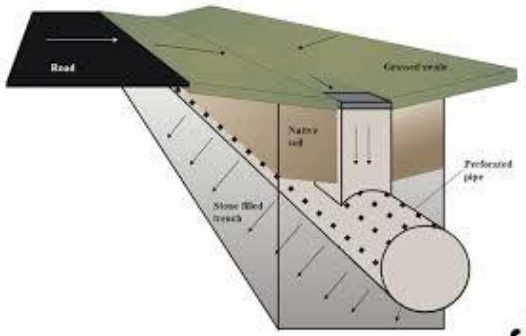
Margate Future Conditions Groundwater Elevations

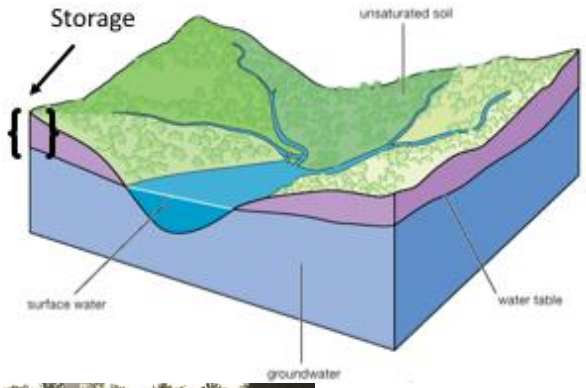


Application

Provides for proper design of stormwater management systems during permitting process

Impacts the need for correctly identifying wet or dry retention areas for proper functioning of system for on site storage

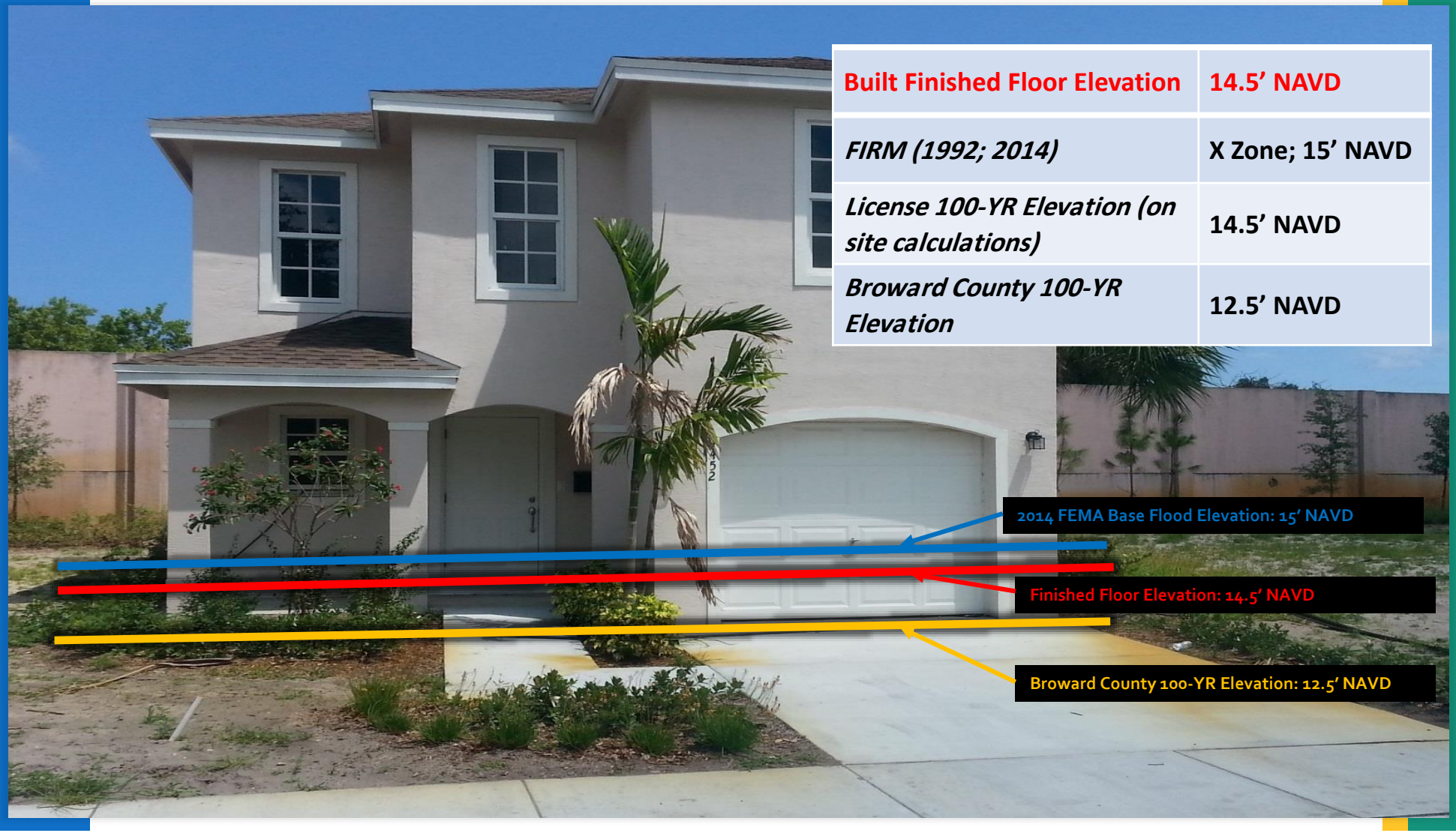




Future Conditions Flood Elevation Map

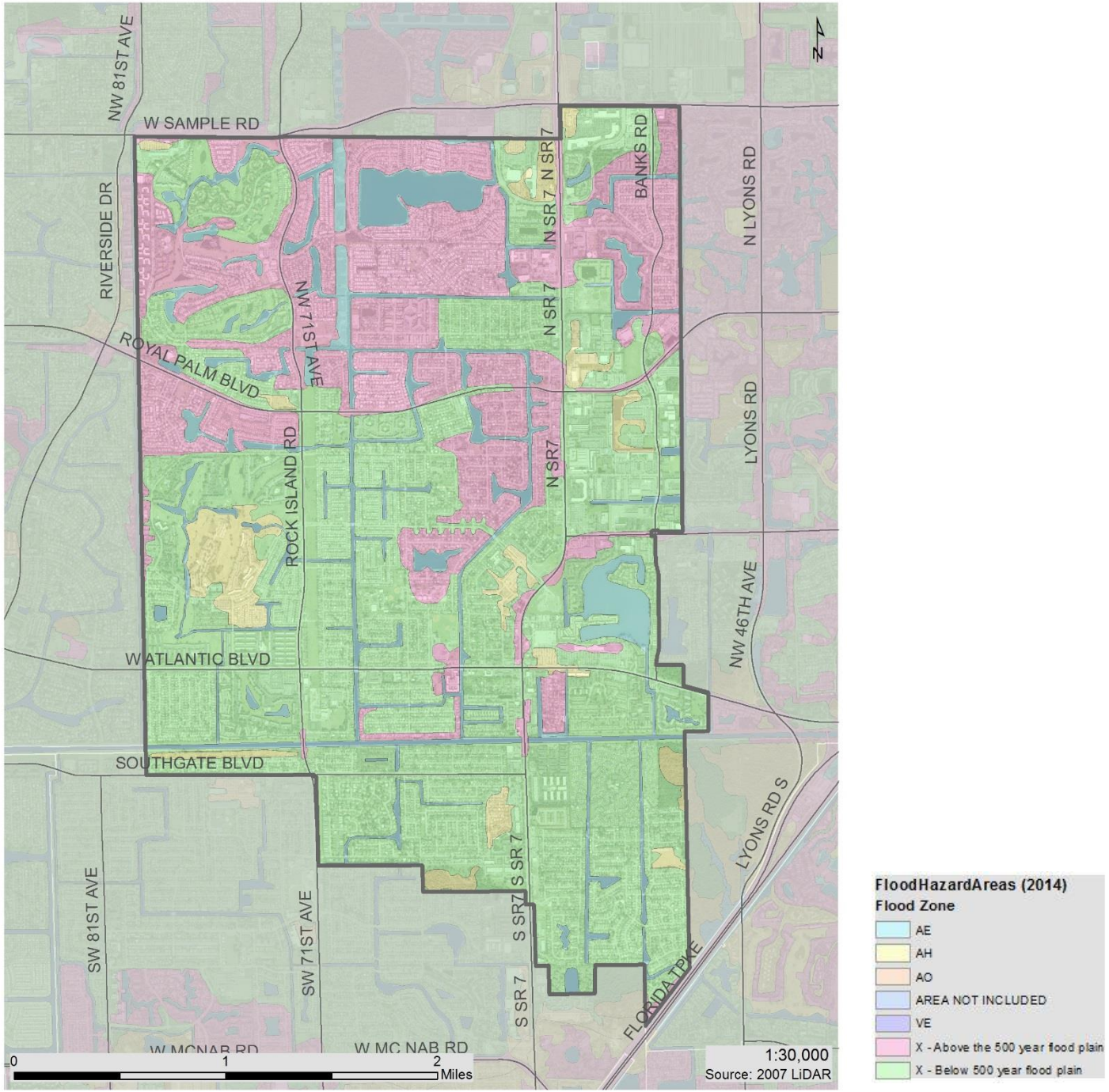
Geosyntec consultants

TAYLOR ENGINEERING, INC.



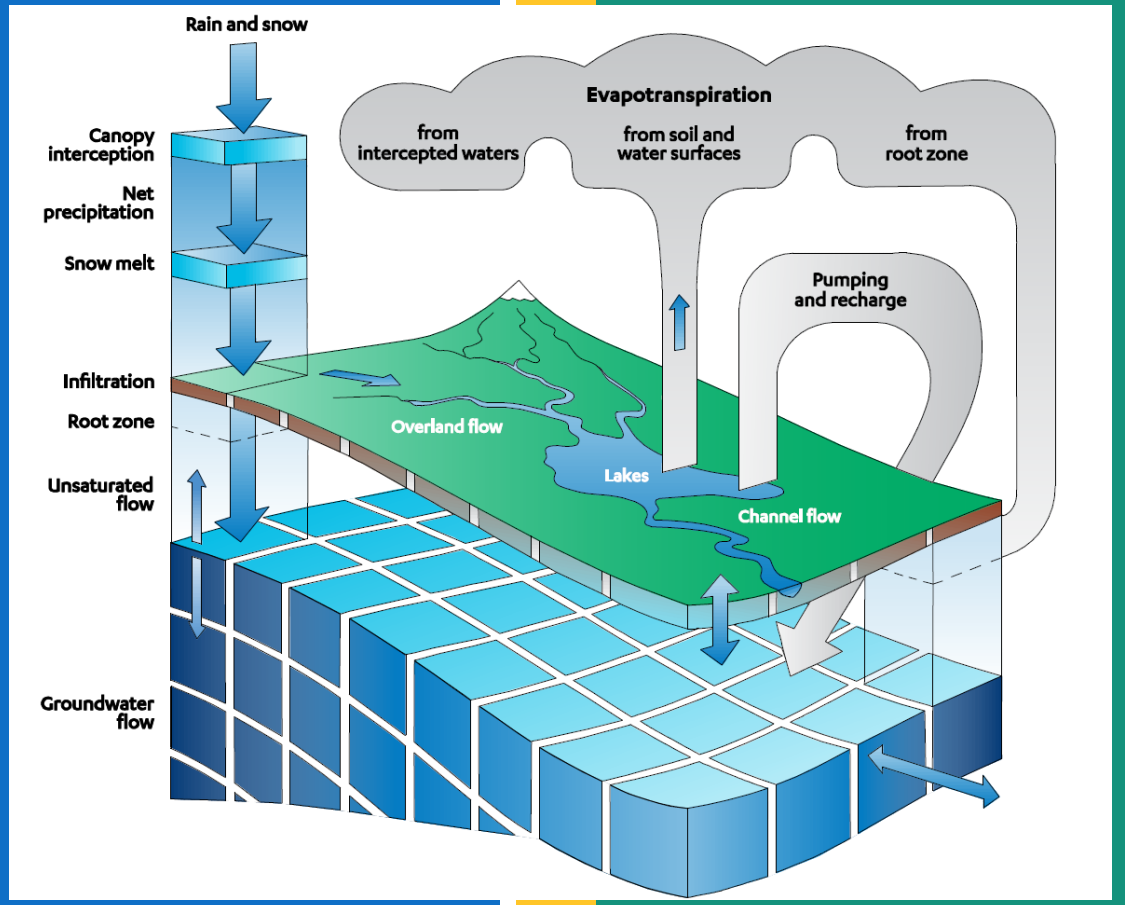
Margate

FEMA Flood Zones



Future Conditions Flood Elevation Map

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



Source: DHI, Inc.

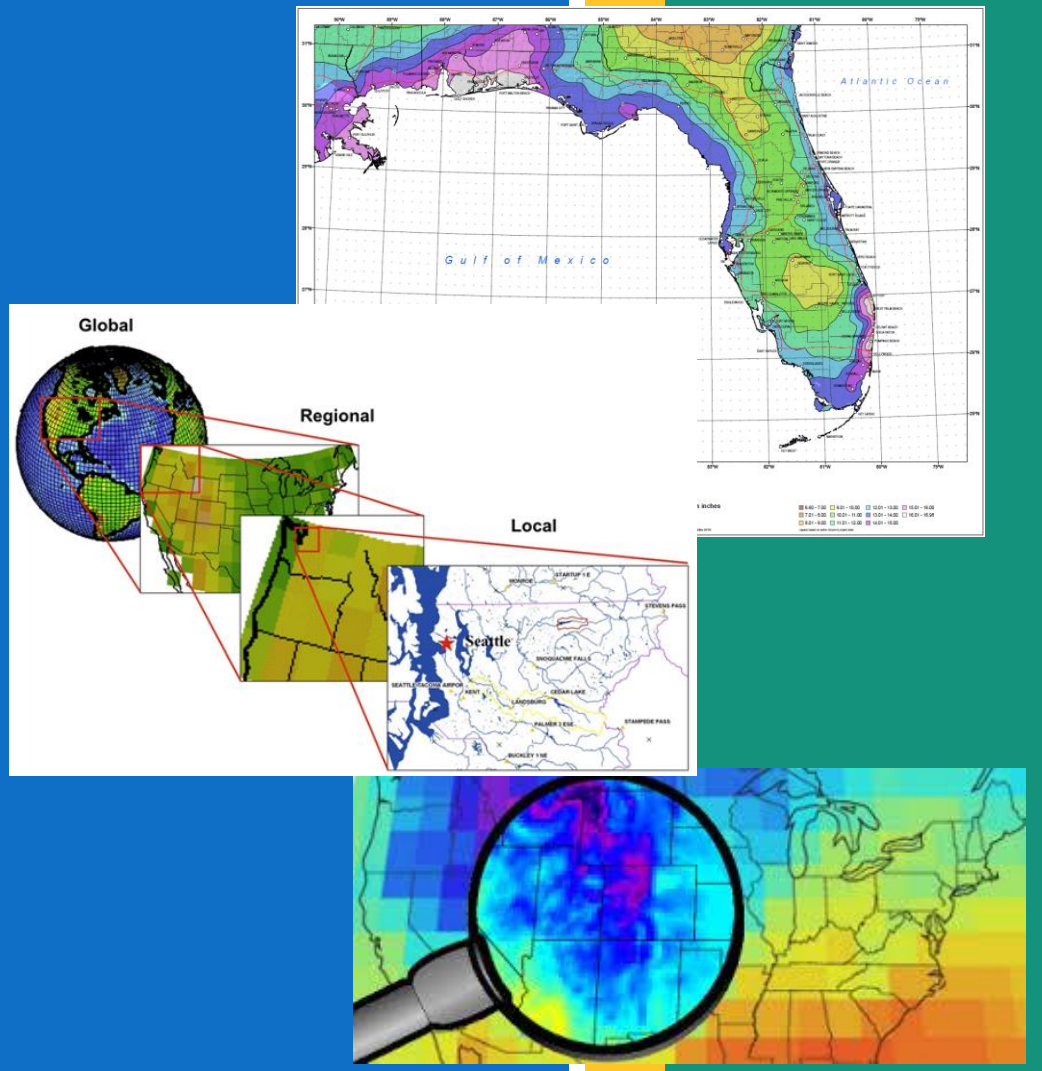
Future Rainfall Conditions

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

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

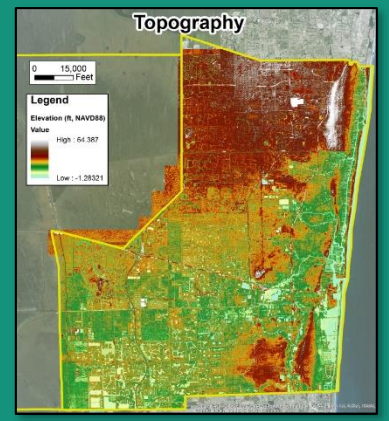


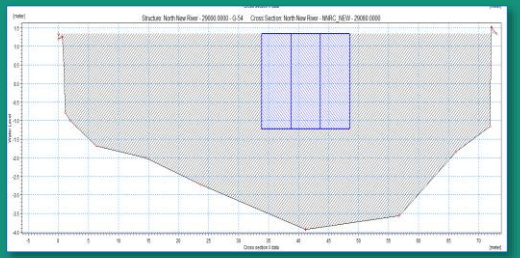
Major Tasks

- Data Collection and Review
- Stakeholder Outreach and Coordination
- Update Current Conditions Model
  - Incorporate Stakeholder Data
  - Refine Model Computational Grid
  - Update Land Use and Parameters
  - Incorporate New Survey Data
  - Model Validation
  - Current Conditions Design Storm Simulations
- Future Conditions Model Development & Execution
- Future 100-year Flood Contour Map Development
- CRS Evaluation and Recommendations

Data Collection

- LiDAR data
- Jurisdictional Data
- Soils / Hydrogeology / Aquifer Characteristics
- Current Land Use / Future Land Use
- FEMA Coastal Modeling
- Gauge and Tidal Data
- Rainfall and Calibration Storm
- Reference Climate Documentation
- Municipality Stormwater Plan and Model Acquisition
- Planned Major Infrastructure Projects
- SFWMD ERPs, As-built plans, etc.
- SFWMD Future Water Control Projects
- Field Reconnaissance
- Field Survey - Structures, Cross-sections, Sediments
- Sedimentation Data





Seawall Ordinance

Flood Risk Management Study for Tidally Influenced Coastal Areas

(United States Army Corp of Engineers/Broward County)

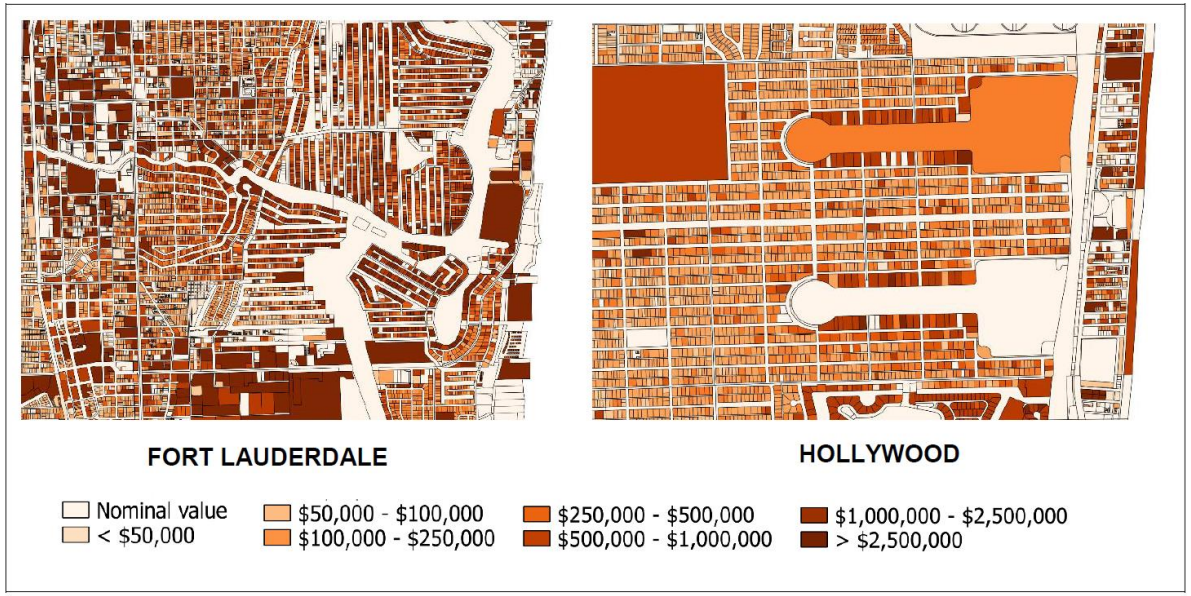
- Uniform Seawall Height
- Proposed Minimum Seawall Height Resilience Standard of 5 feet NAVD 1988
- (4 feet until 2015, 5 feet by 2050)
- Amendment to the Broward County Land Use Plan (2 years)
- Amendment to the Chapter XXV, County Code of Ordinances

Flood Risk Management Study for Tidally Influenced Coastal Areas

(United States Army Corp of Engineers/Broward County)

Seawall	Minimum Elevation (ft-NAVD)	
Alternative	Las Olas Boulevard	Hollywood Lakes
1	4	2.5
2	4	4
3	6	6

AREAS ASSUMED TO BE PROTECTED BY EXISTING (GREEN) AND UPGRADED (BLUE) SEAWALLS IN THE STUDY AREA



Seawall Ordinance

PROPOSED: ARTICLE XXV. - RESILIENCY STANDARDS FOR TIDAL FLOOD PROTECTION

- Uniform Seawall Height

- Proposed Minimum Seawall Height Resilience Standard of 5 feet NAVD 1988
- (4 feet until 2015, 5 feet by 2050)

- Amendment to the Broward County Land Use Plan (2 years)
- Amendment to the Chapter XXV, County Code of Ordinances

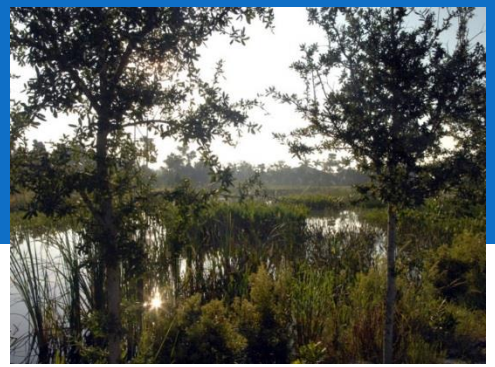
Water Resources Resilience

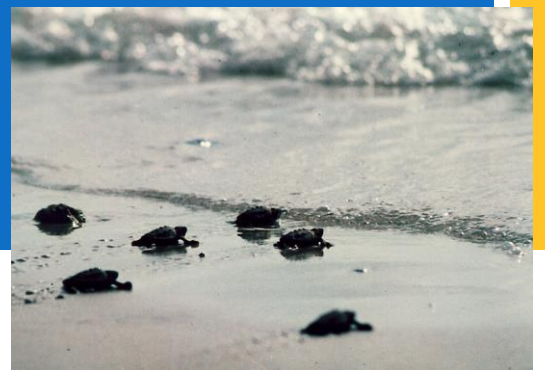
Coordinated efforts, multiple stakeholders, competing goals

Evolution of Policies, Planning, Modeling and Regulation under current and future conditions

2019 Broward Leaders Water and Climate Academy

Session 1 on September 27!





Thanks!

Questions?

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BROWARD COUNTY FLORIDA