Coordinated Water Supply and Climate Adaptation Planning in Broward County

Water Utilities and Climate Change Workshop

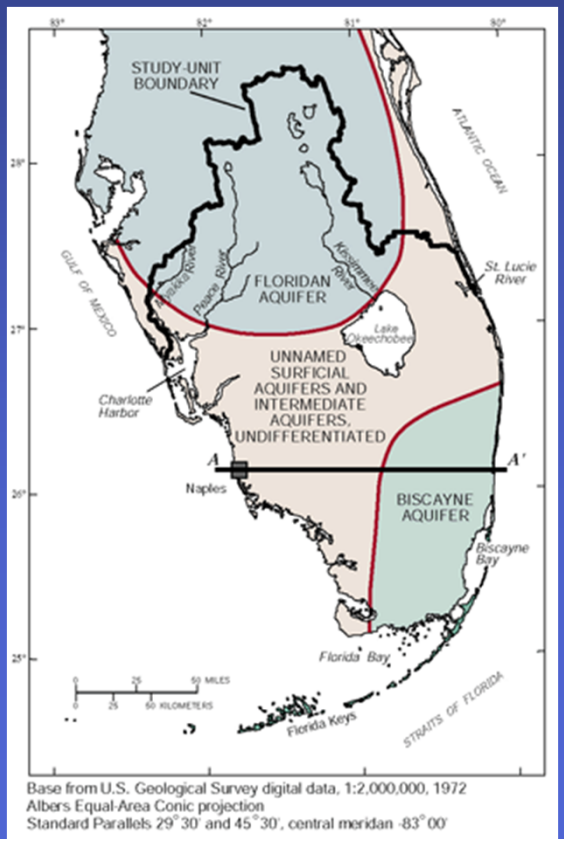
June 10, 2011

BROWARD COUNTY FLORIDA

The Biscayne Aquifer

Characteristics

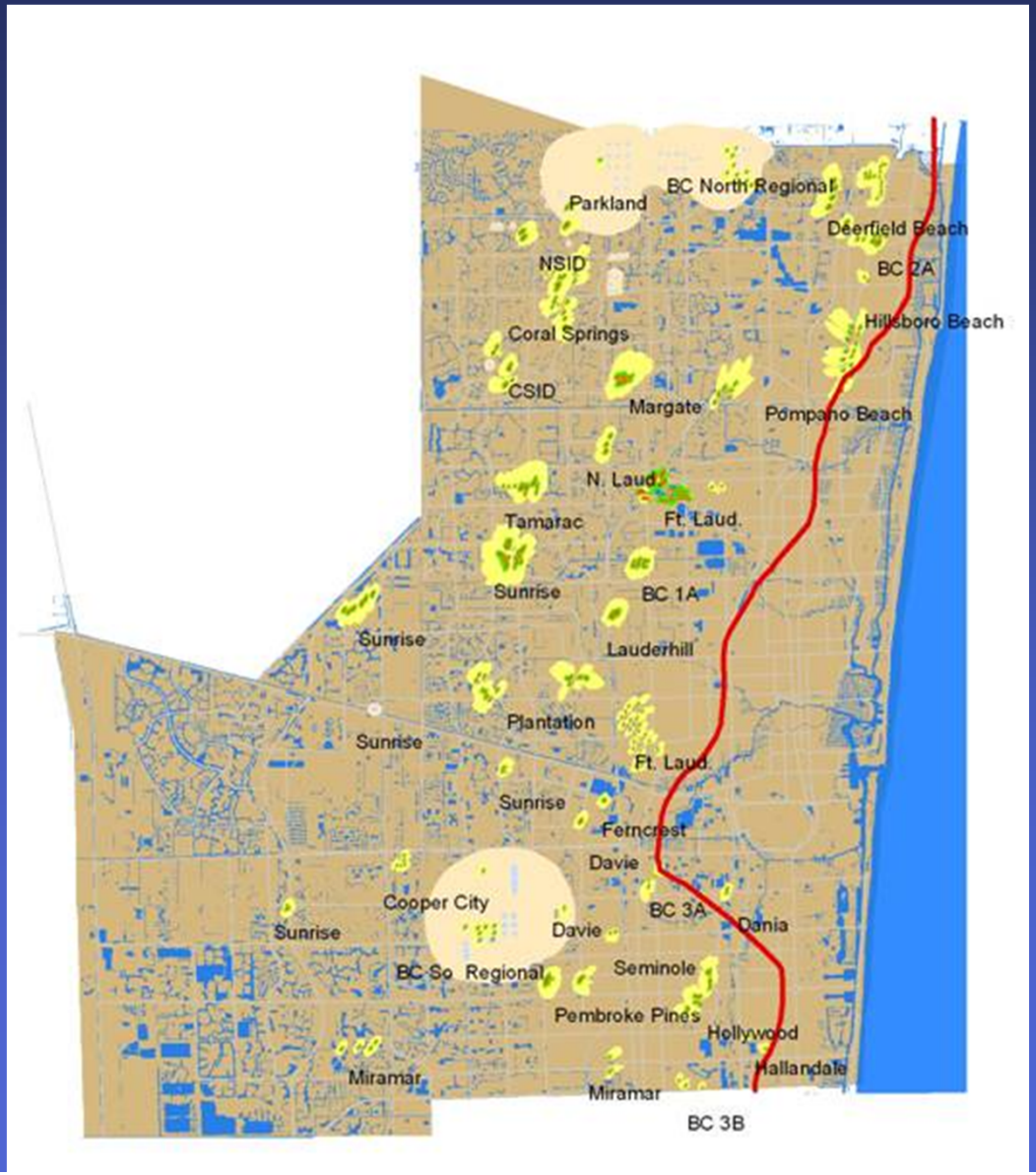
- Coastal Aquifer
- Highly porous and transmissive
  - Freshwater recharge
  - Saltwater intrusion
- Anthropogenic Stresses:
  - Everglades drainage
  - Well field pumping
  - Canal water level management
  - Agricultural/Urban development
- Natural Stresses:
  - Sea level rise
  - Rainfall variations



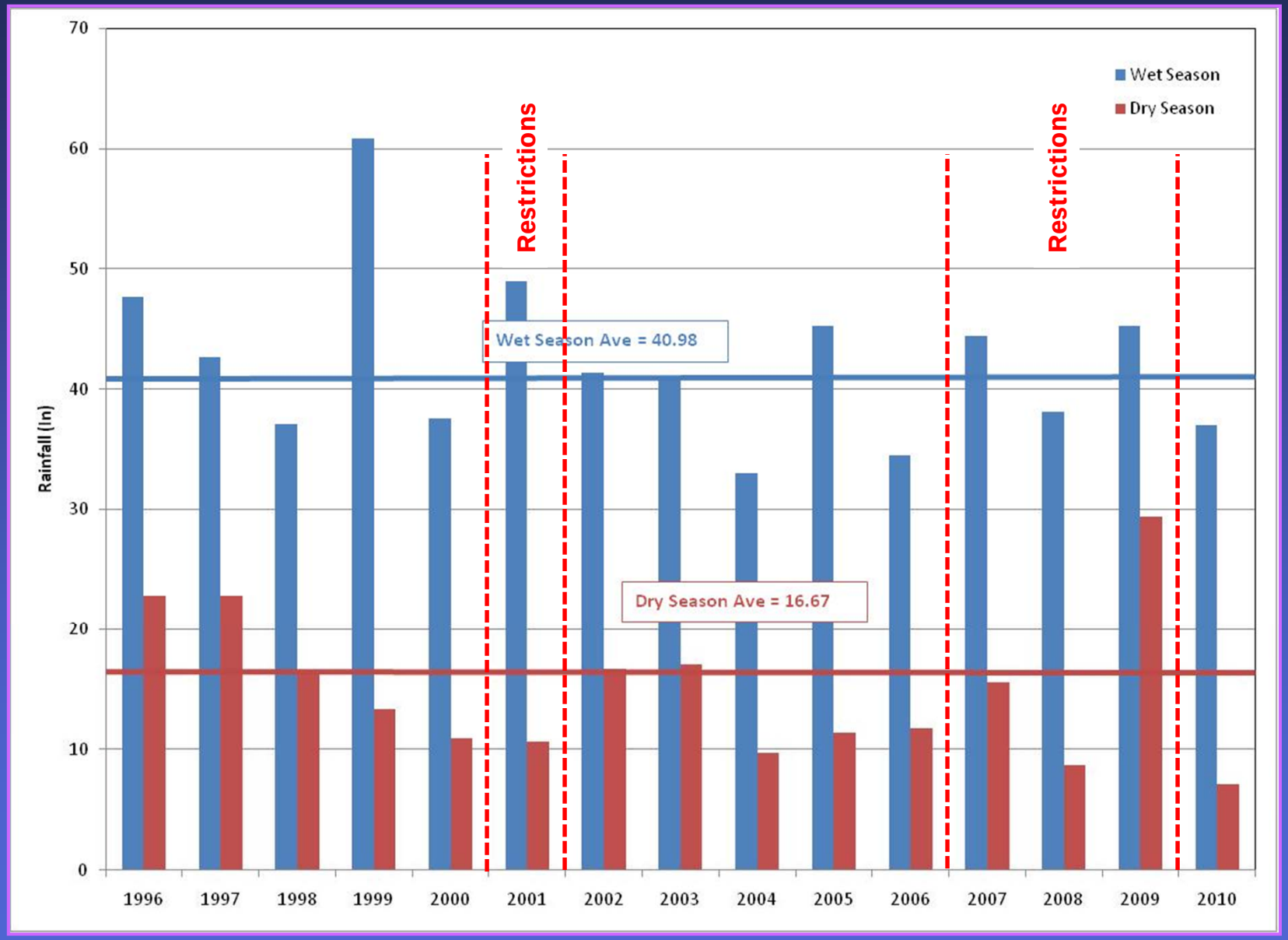
Climate Change Implications for Water

- **Increased potential for:**
  - **Contamination of drinking water supplies due to saltwater intrusion**
  - **Water shortages due to increased frequency and severity of drought**
  - **Coastal flooding due to rising sea level, low land elevations and flat topography**
  - **Inland flooding due to constraints on drainage and flood control infrastructure**

Historic and Continued Saltwater Intrusion



Seasonal Rainfall and Water Restrictions

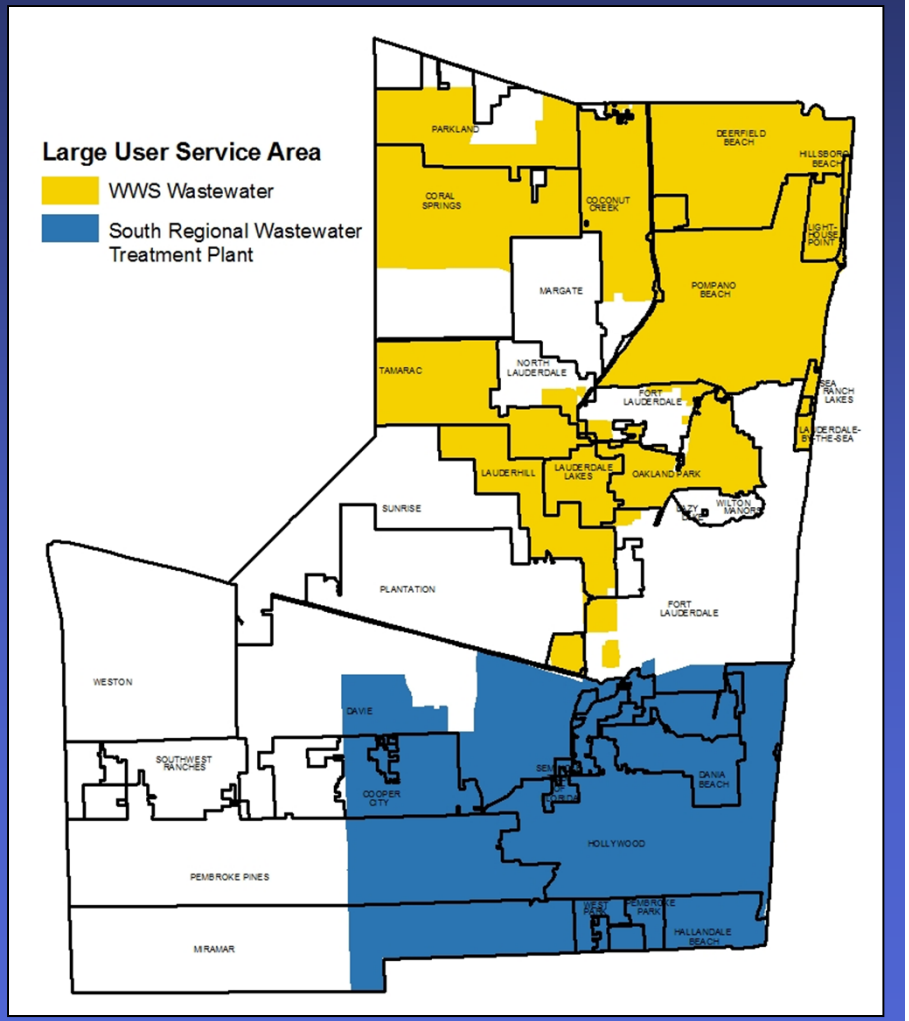


Increased Tidal Flooding

Inland Flooding and Extreme Rain Events

Compounding these Issues...

- **Delicate balance between recharge and flood control systems and connection between surface and groundwater**
- **Influence of infiltration and inflow on wastewater collection systems and water quality**
- **Need to comply with Regional Water Availability Rule**
- **Obligations of 2008 Ocean Outfall Legislation**



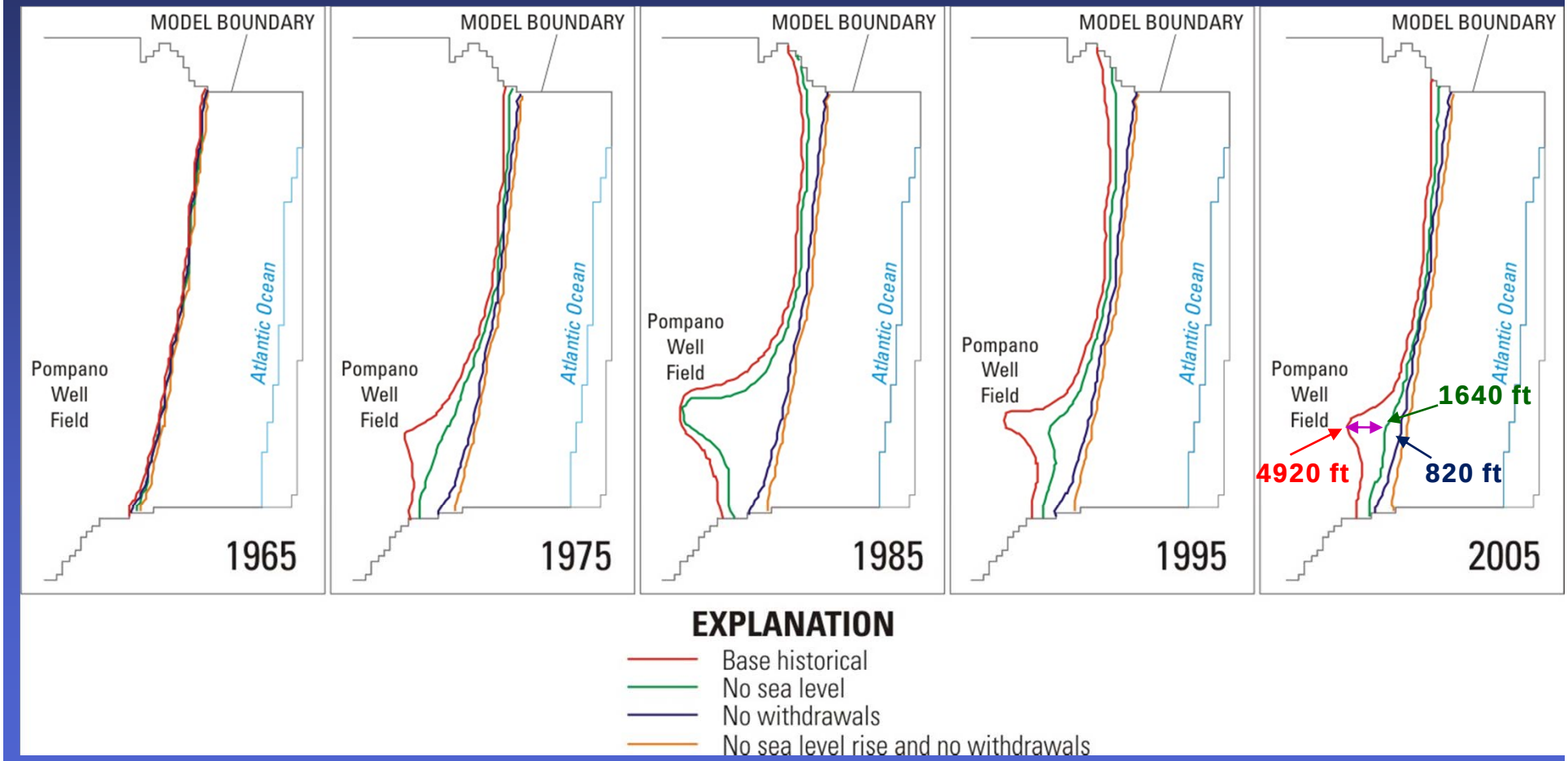
Water Supply Planning Strategy

- **An integrated approach that considers combined needs and influences relating to:**
  - **Potable Water**
  - **Wastewater**
  - **Stormwater**
- **Priorities:**
  - **Succeed in Water Conservation Initiatives**
  - **Preserve Existing System Capacity**
  - **Diversify Water Supplies**
  - **Gain Efficiencies through Regional Coordination**

Climate Change and Water Conservation

- **The value of conservation will increase as it serves to:**
  - **Lessen water shortages that may accompany drought**
  - **Maintain aquifer levels needed to abate saltwater intrusion**
  - **Reduce the demand for energy-intensive alternative water supplies**
- **Current efforts include:**
  - **launching of a county-wide water conservation and incentives program in collaboration with 16 water utility and municipal partners**
  - **local amendments to building codes relating to cooling towers, condensate recovery, and indoor plumbing fixtures**

Variable Density Modeling of Saltwater Migration

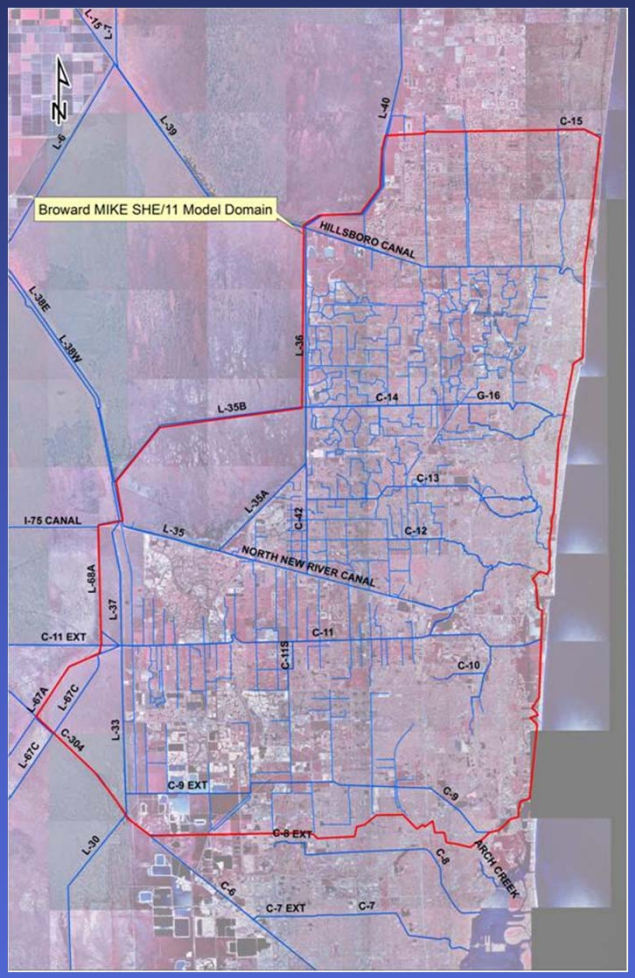


Stormwater/Climate Vulnerability Model

- **Project with the USGS to develop adaptation planning model to address drainage and flood control**
  - **Downscale global climate models**
  - **Integrate with regional surface water/groundwater models and variable density models**
  - **Identify areas vulnerable to climate influences**
  - **Propose and test adaptation measures to maintain existing levels of service**

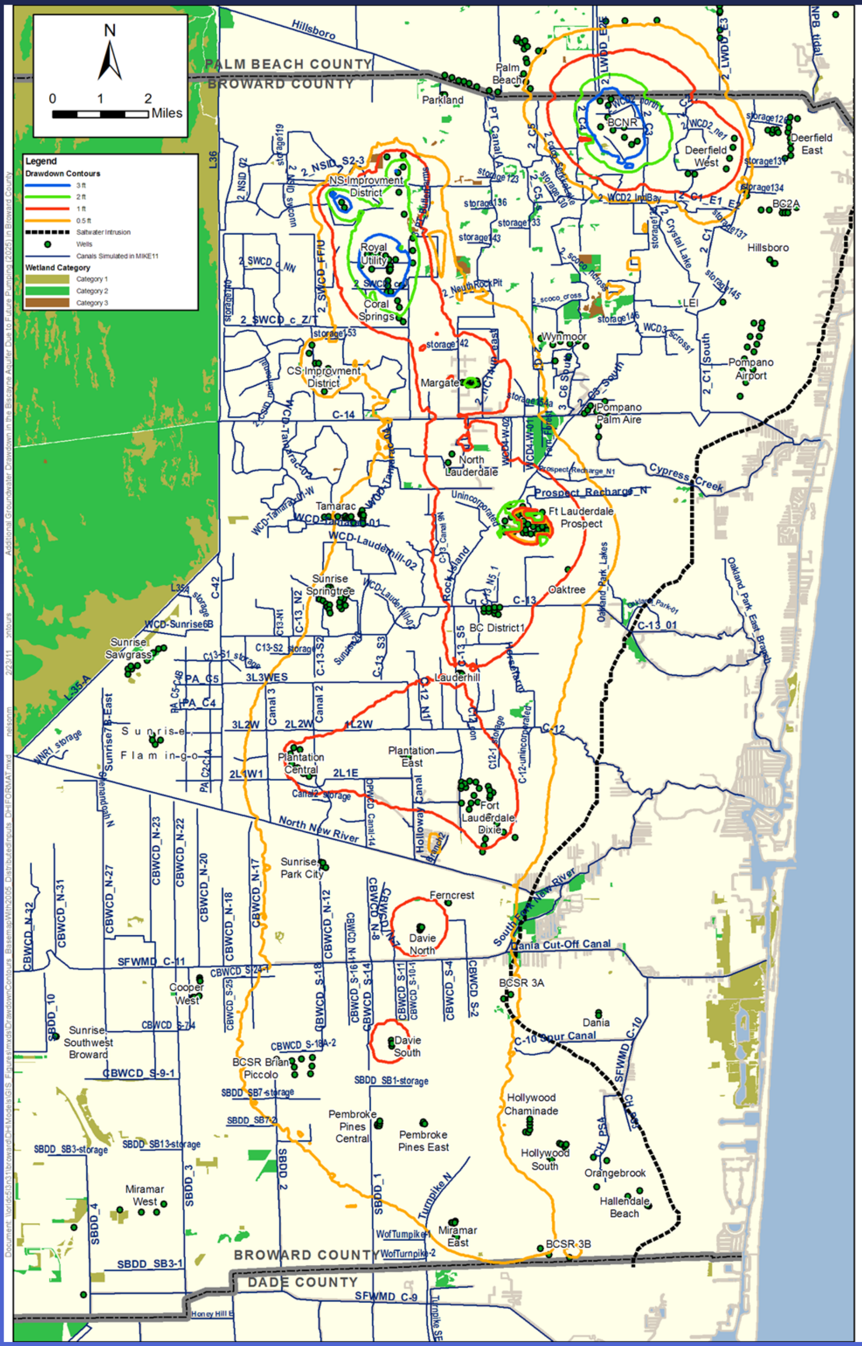
Recent Biscayne Modeling

- **Evaluate various AWS plans**
  - **Increased reuse w/ irrigation & injection**
  - **Utilization of storm water via C-51 reservoir**
  - **Relocation of coastal wells**



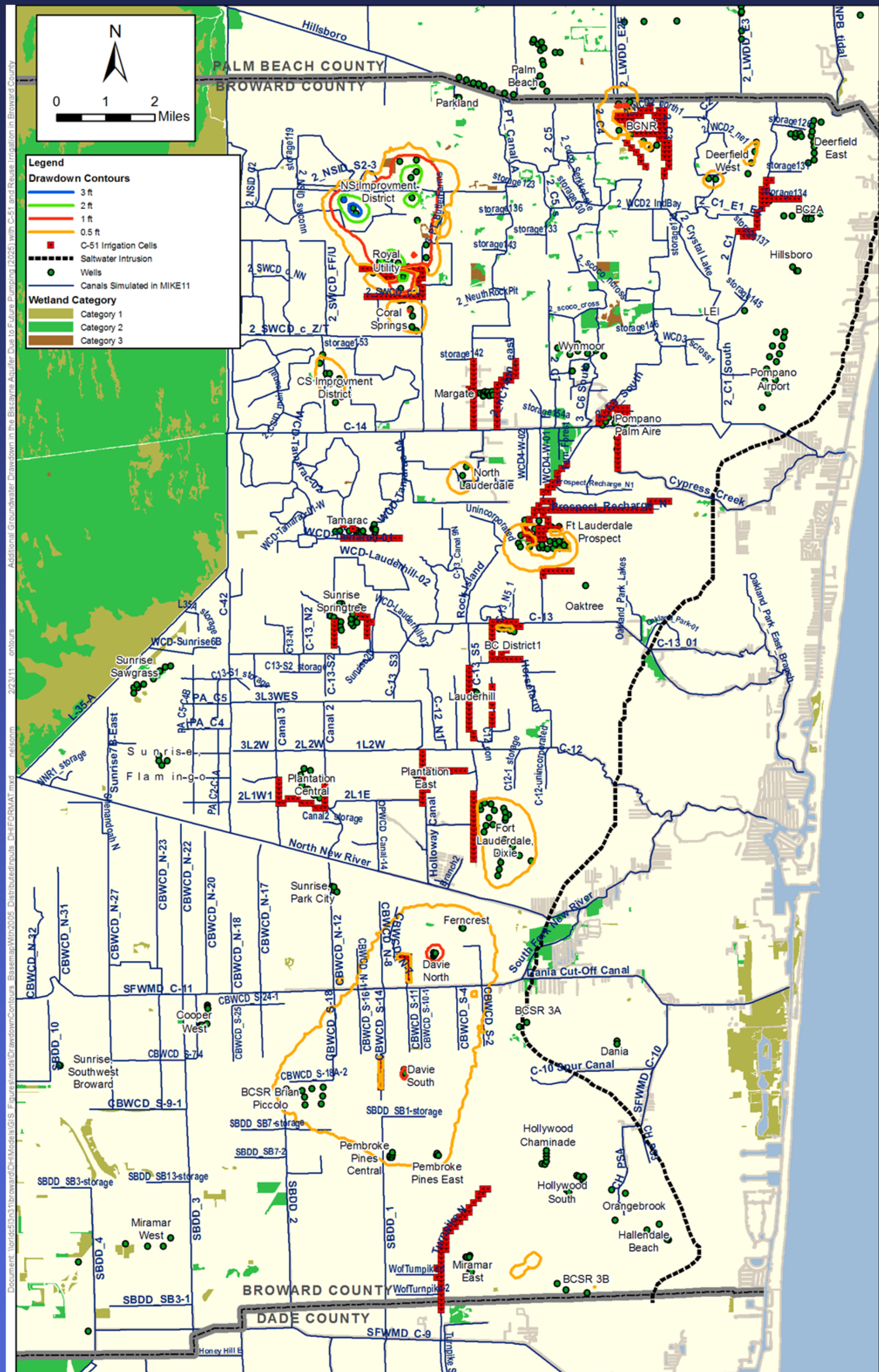
Simulation Results for 2025 - No AWS

- **Groundwater withdrawals ~ 330 mgd**
- **Compared to 2005 groundwater level**
  - **1 ft drawdown in central & southern BC**
  - **2-3 ft drawdown in northern BC**



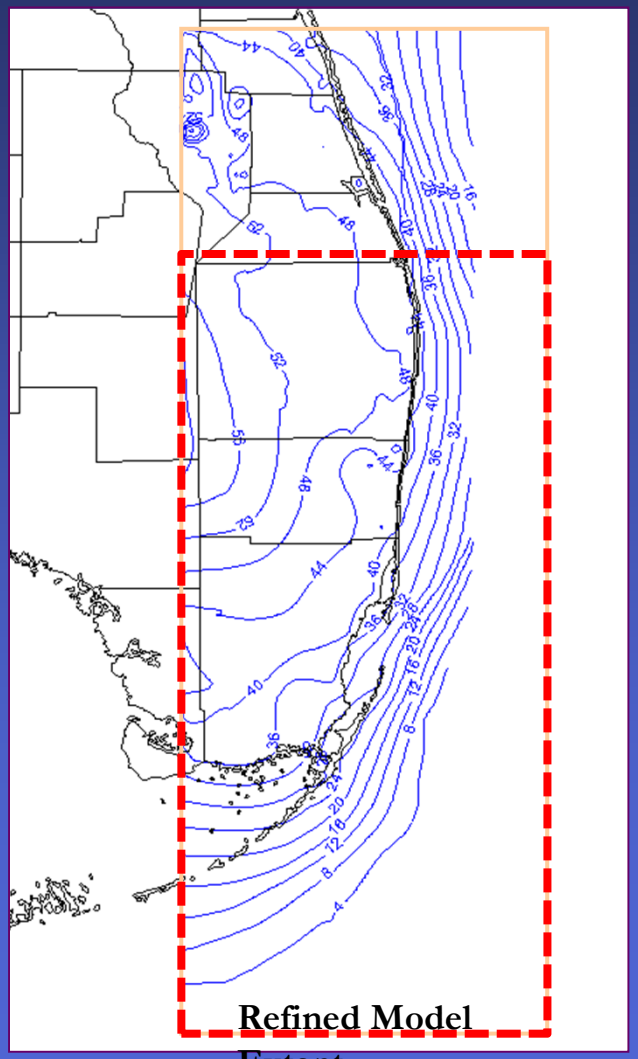
2025 Simulation Reuse & C-51

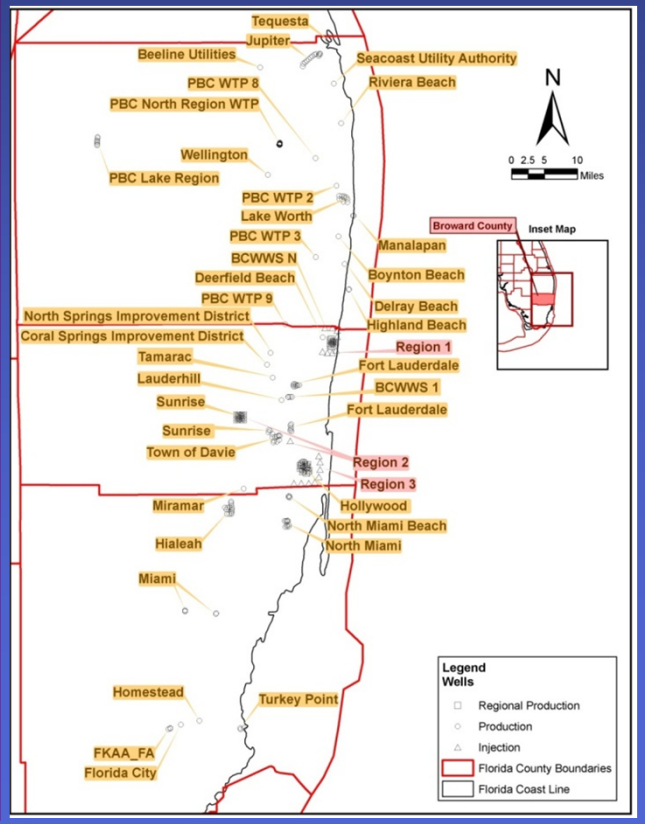
- 18 mgd reuse irrigation
- 60 mgd (net 45 mgd) C-51 recharge
- Provides significant drawdown recovery
  - 1 ft drawdowns eliminated or confined to immediate vicinity of wells



Floridan Model

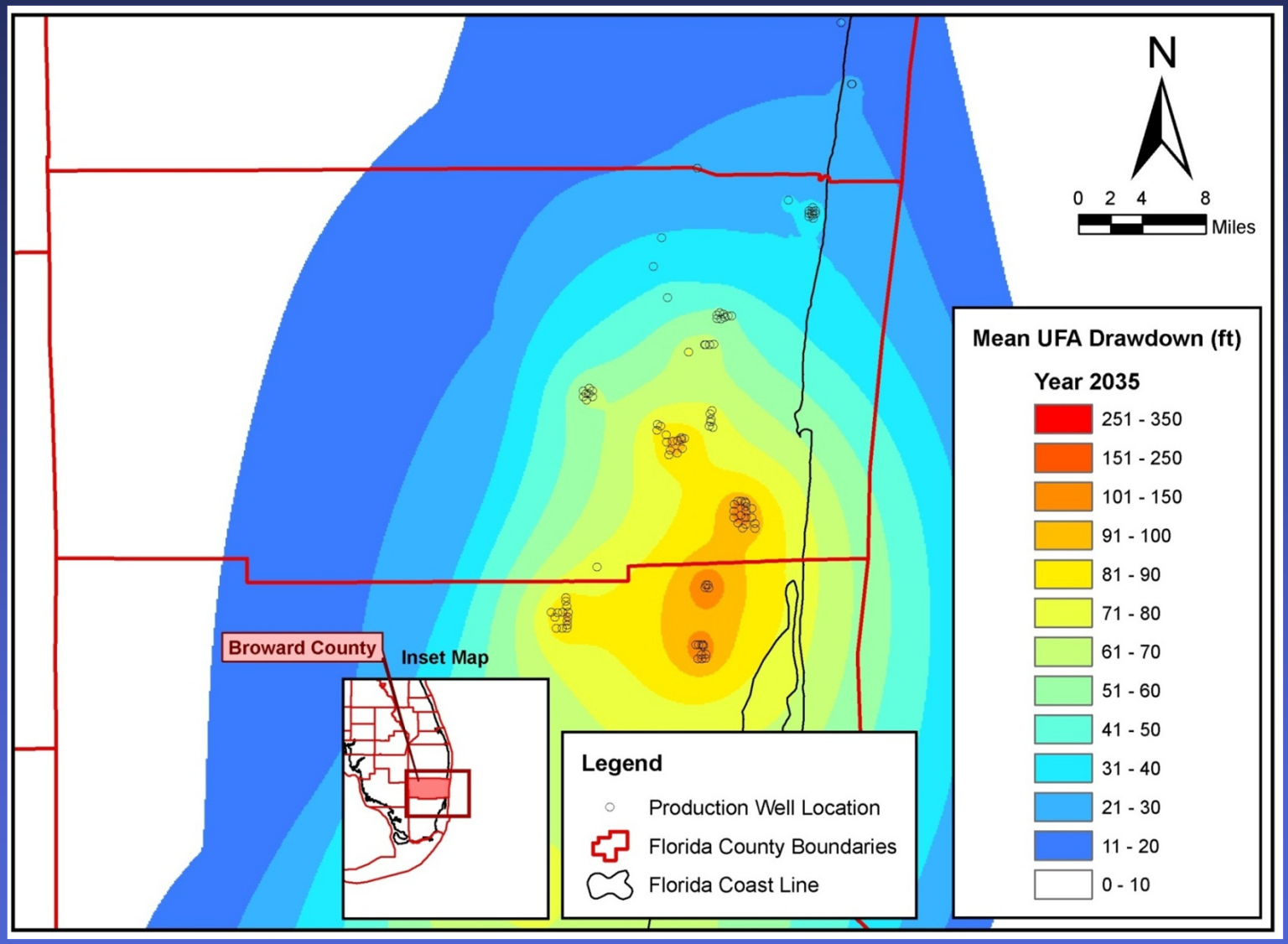
Refined SFWMD Phase II Model





- Refined Grid for BC
- Additional layer added to UFA
- Includes 196 wells and analyses through 2035
  - 56 Broward wells
  - 18 Regional wells
  - 17 Injection wells
  - 103 mgd Broward withdrawal
  - 53 mgd recharge

Predictive Simulation Results



Simulated 2035 Drawdown Without Injection

Regional Coordination

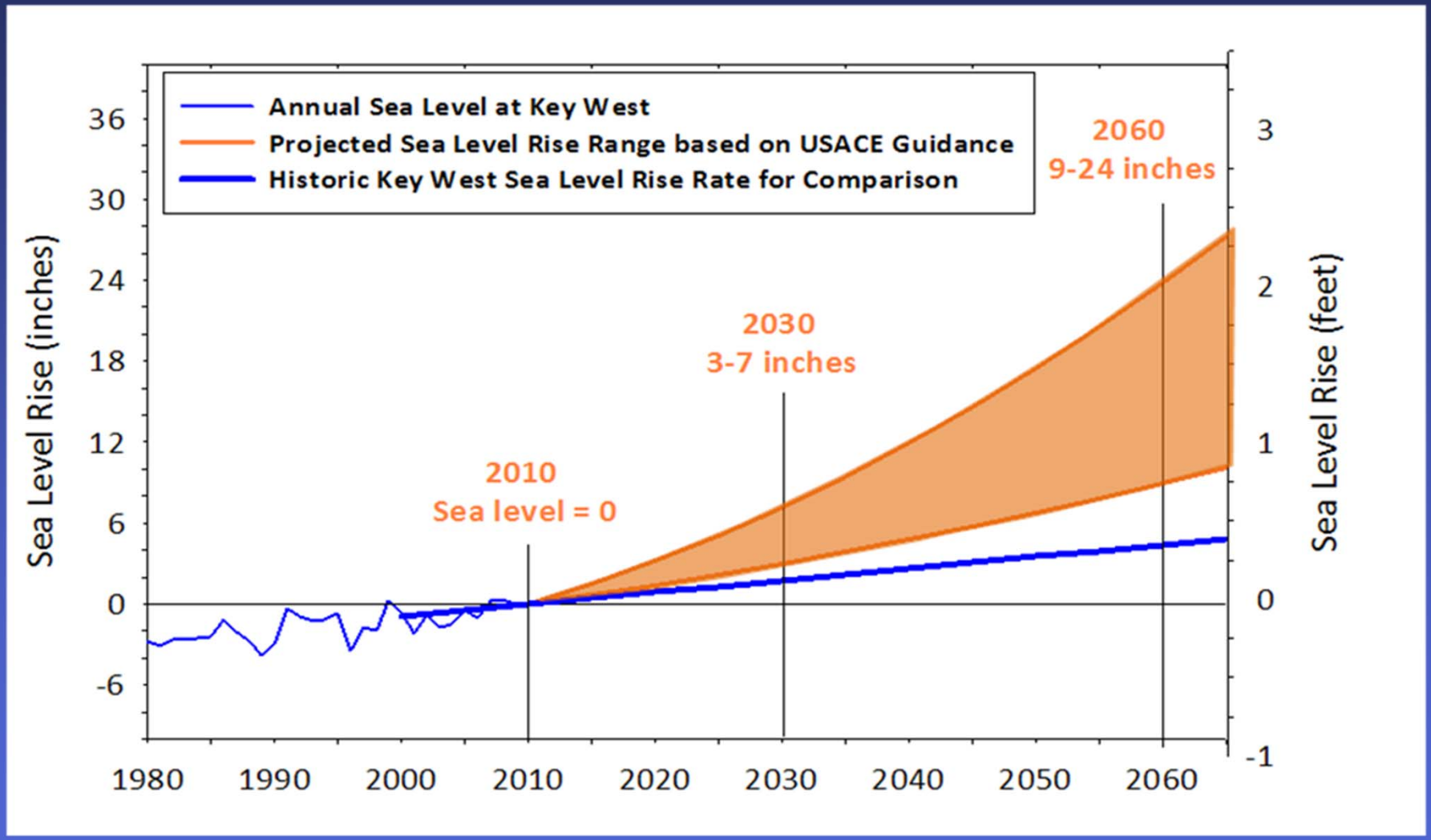
- **Broward Water Resources Task Force**
- **Broward Climate Change Task Force**
- **Southeast Florida Regional Climate Change Compact**

Regional Reuse Master Plan

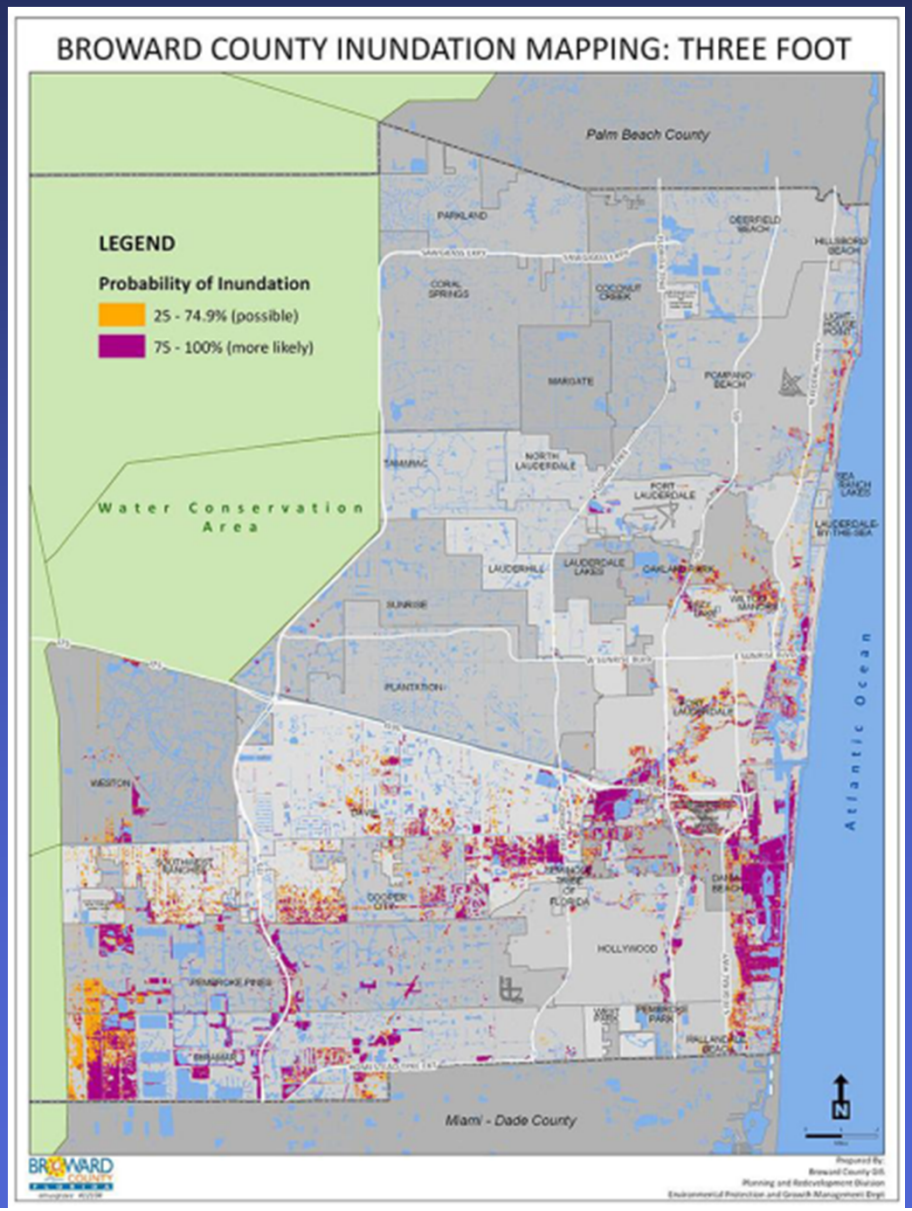
- **Coordinate with water utility, wastewater utility, municipal and transportation agencies**
- **Provide county-wide assessment of reuse infrastructure, plans, and opportunities**
- **Identify beneficial projects, including those that cross jurisdictional boundaries**
- **Evaluate corridors for installing conveyance infrastructure**
- **Present regional strategy, phased implementation plan, and cost-benefit analysis**

Regional Climate Compact

Sea Level Rise Work Group



Preliminary Vulnerability Assessment



Regional Compact Work Groups

- **Convene Built Environment, Transportation, and Land and Natural Systems Workgroups**
- **Focus on areas where efficiency and effectiveness to be gained through regional strategy and coordination**
- **Built Environment Work Group**
  - **Water resources**
  - **Adaptation action areas**
  - **Land use and building codes**
  - **Energy use and production**
  - **Outreach**

Conclusions

- Climate Change poses diverse and immediate influences on local water resources and supplies
- Effective response will require an integrated and coordinated approach
- Current planning efforts include both individual and regional projects and strategies
- Efforts to protect existing water sources will be as critical as developing new supplies

Questions?

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