GEER
Greater Everglades Ecosystem Restoration
April 21–24, 2025
Coral Springs, FL
www.conference.ifas.ufl.edu/geer

Building Resiliency: Integrating Flood Protection, Water Supply and Ecosystem Restoration for South Florida's Future

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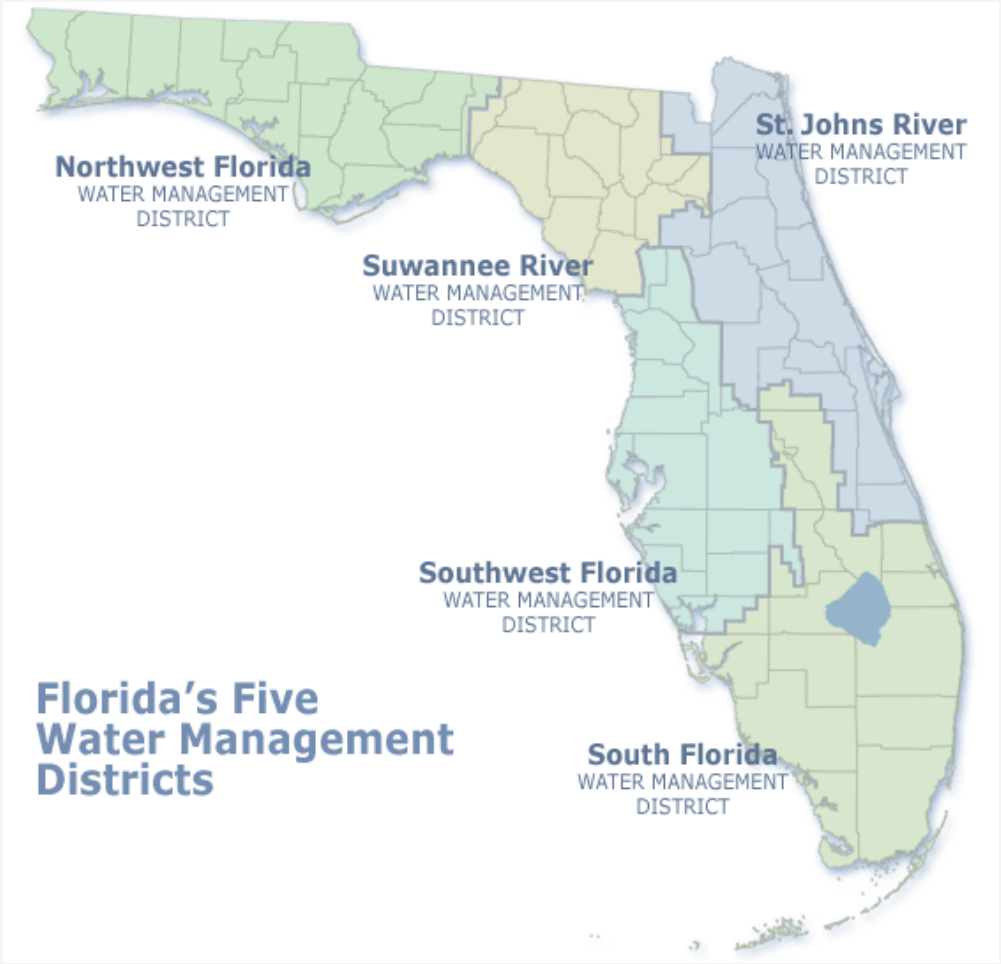
Chief of District Resiliency, SFWMD
April 22, 2025

sfwmd.gov

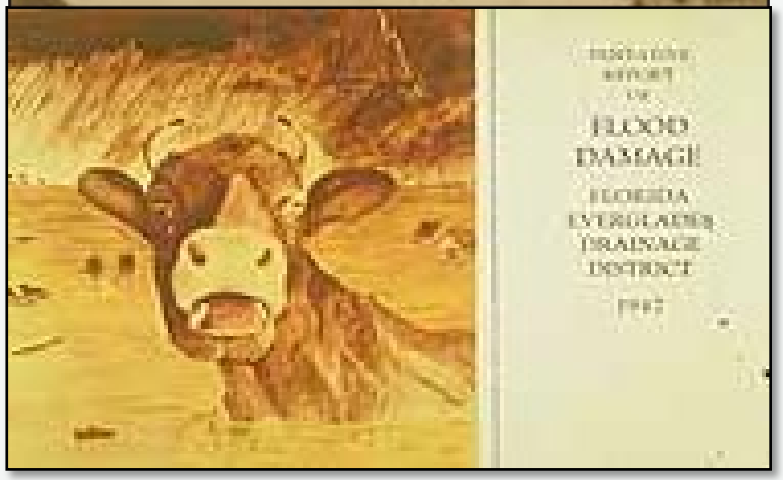
South Florida Water Management District

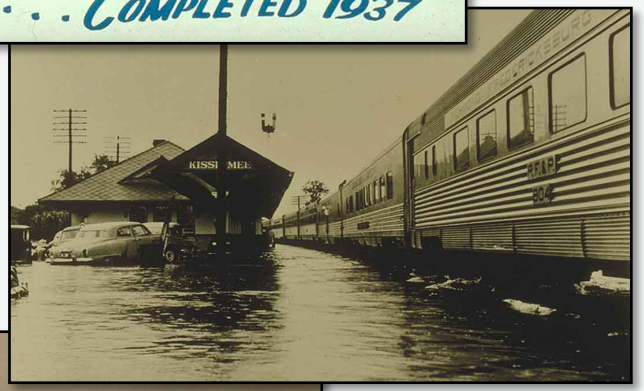
- Created in 1949, oldest and largest of the state's five water management districts
- 16 counties from Orlando to the Florida Keys
- Serves a population of ~9 million residents
- 2,200 miles of canals; 2,100 miles of levees/berms, 84 pump stations, 778 water control structures and weirs and 621 project culverts
- Regional network moves more than 20-million-acre feet during an average year

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.

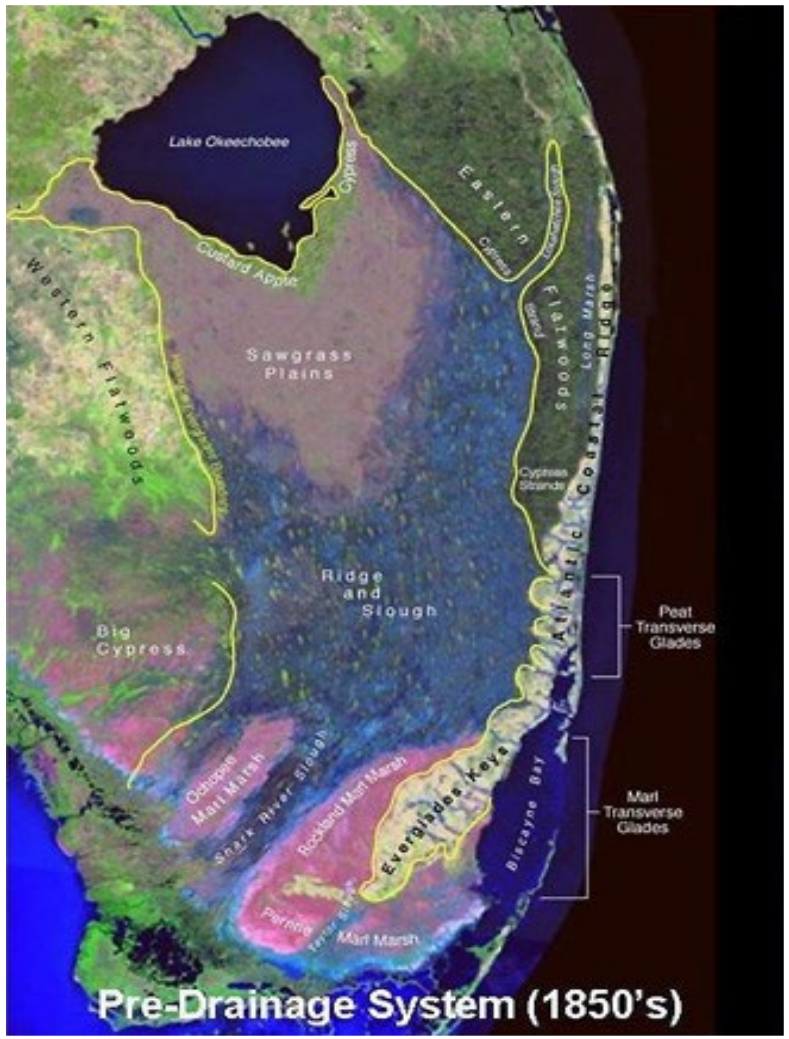


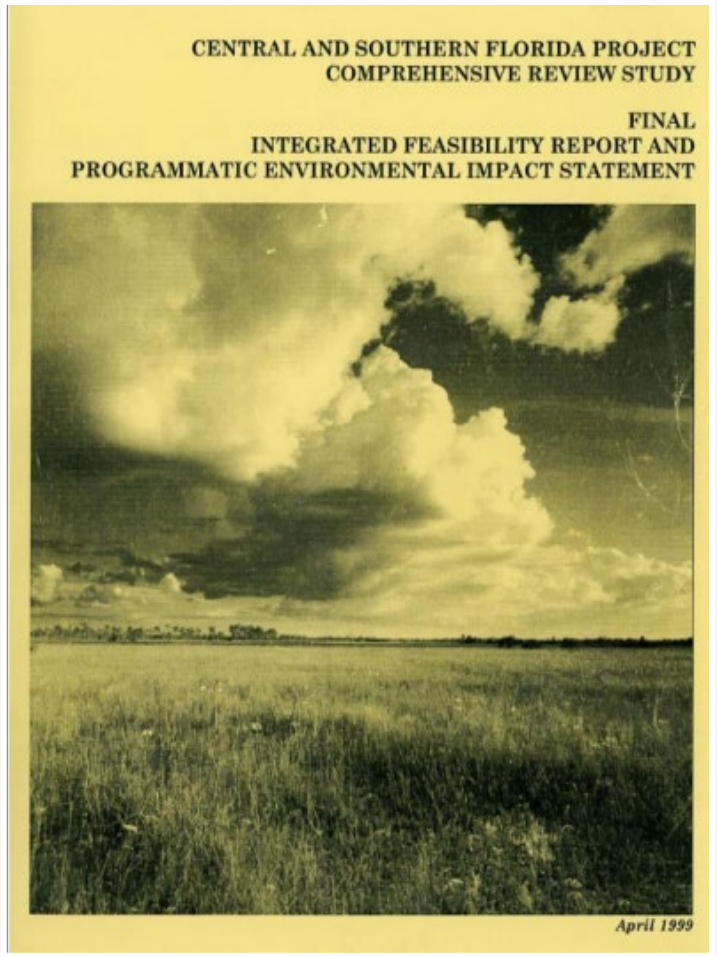
Central & Southern Florida Flood Control Project

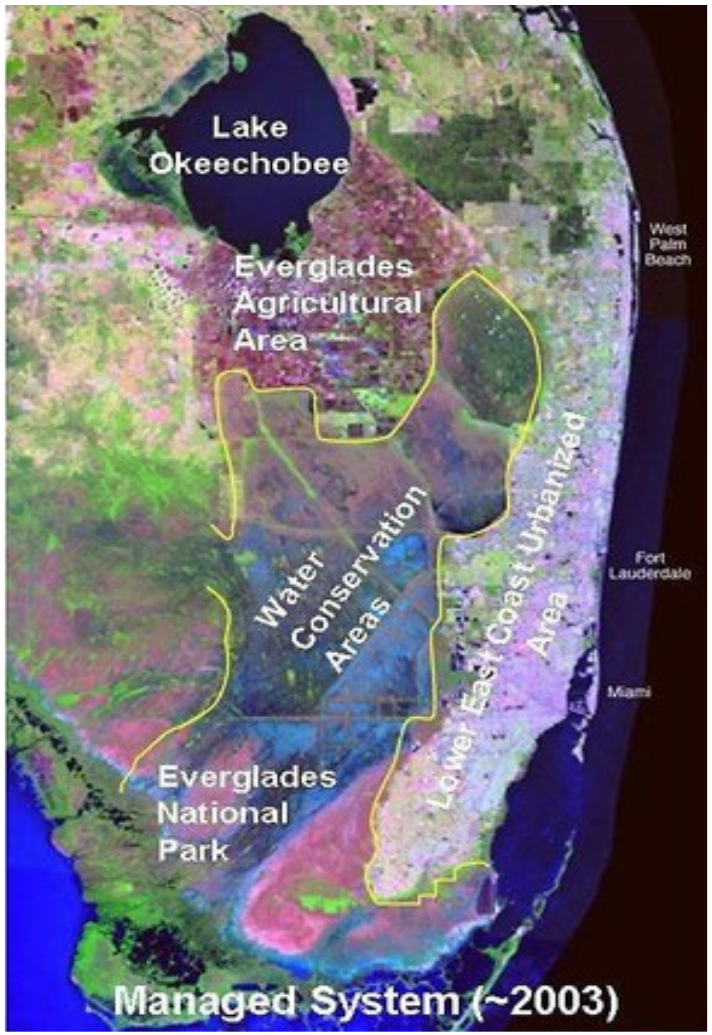




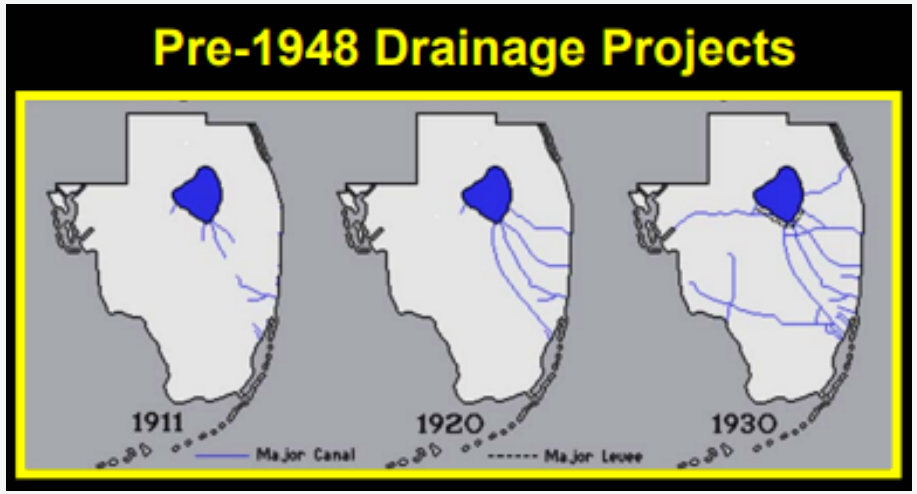
Comprehensive Everglades Restoration Plan

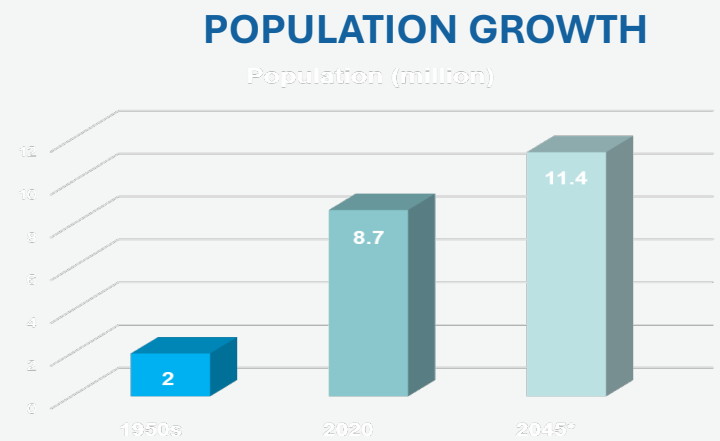




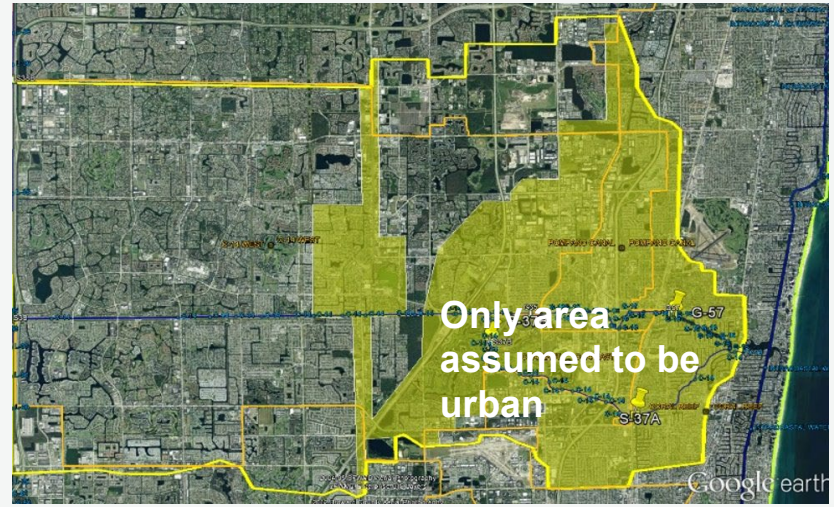


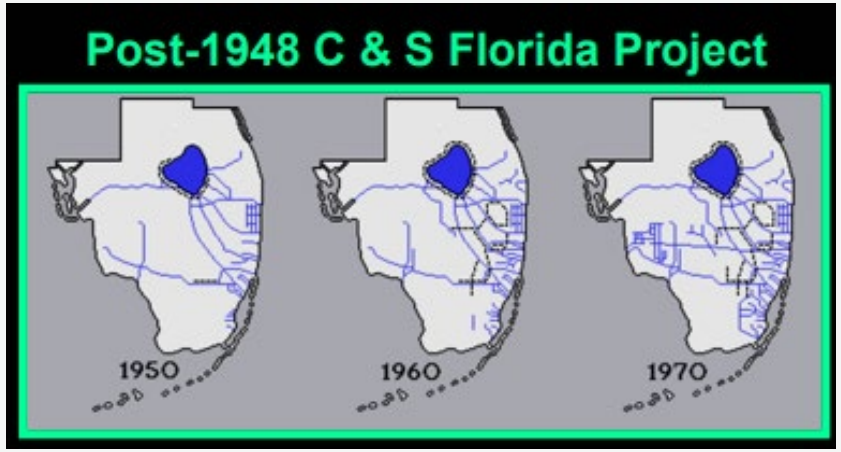
Recognizing Changed Conditions

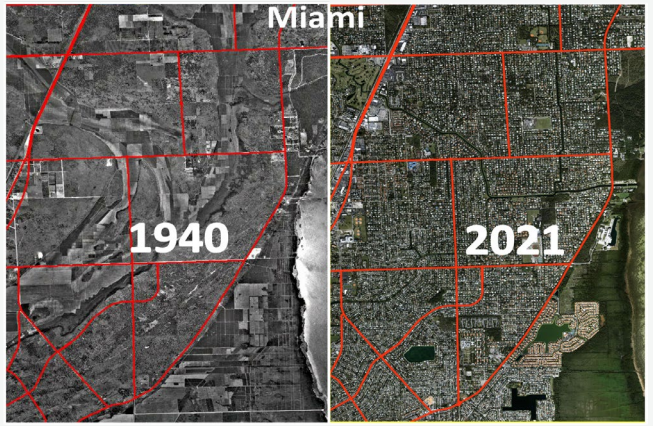




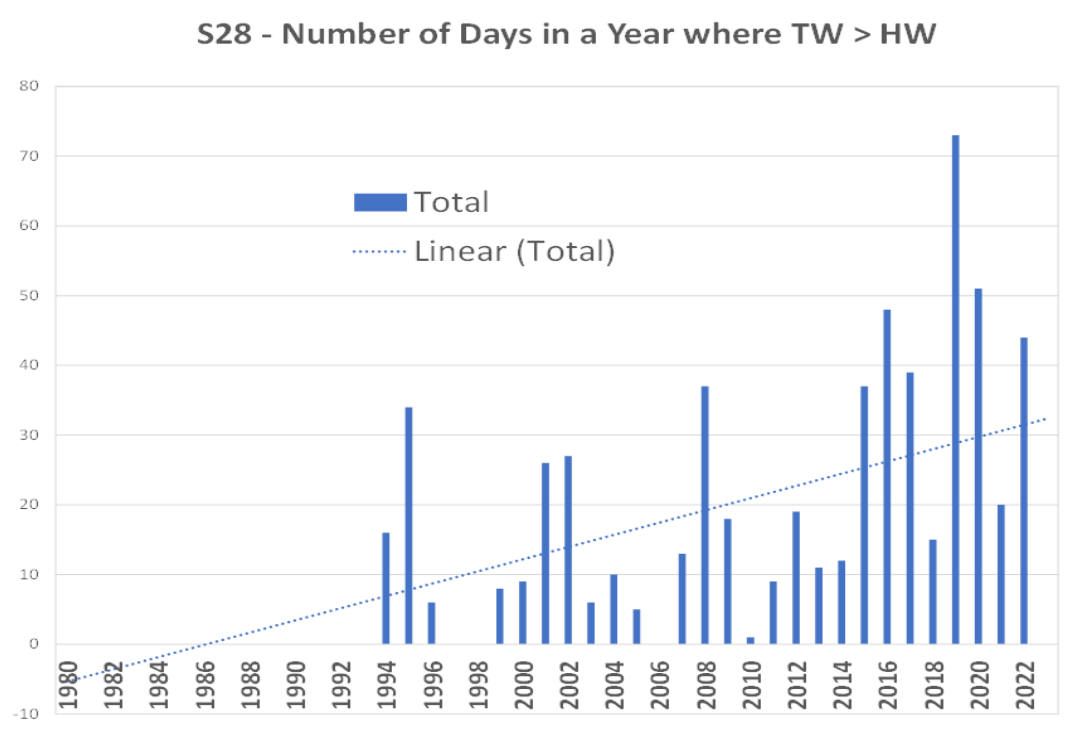
* Estimate taken from BEBR 2017 publication (Median, SFWMD boundaries)







Changed Conditions and Risks: Sea Level Rise



Current reduction on drainage capacity, especially during extreme rainfall events concomitant with higher tide events (compound flooding risks)

Coastal Structure Gate

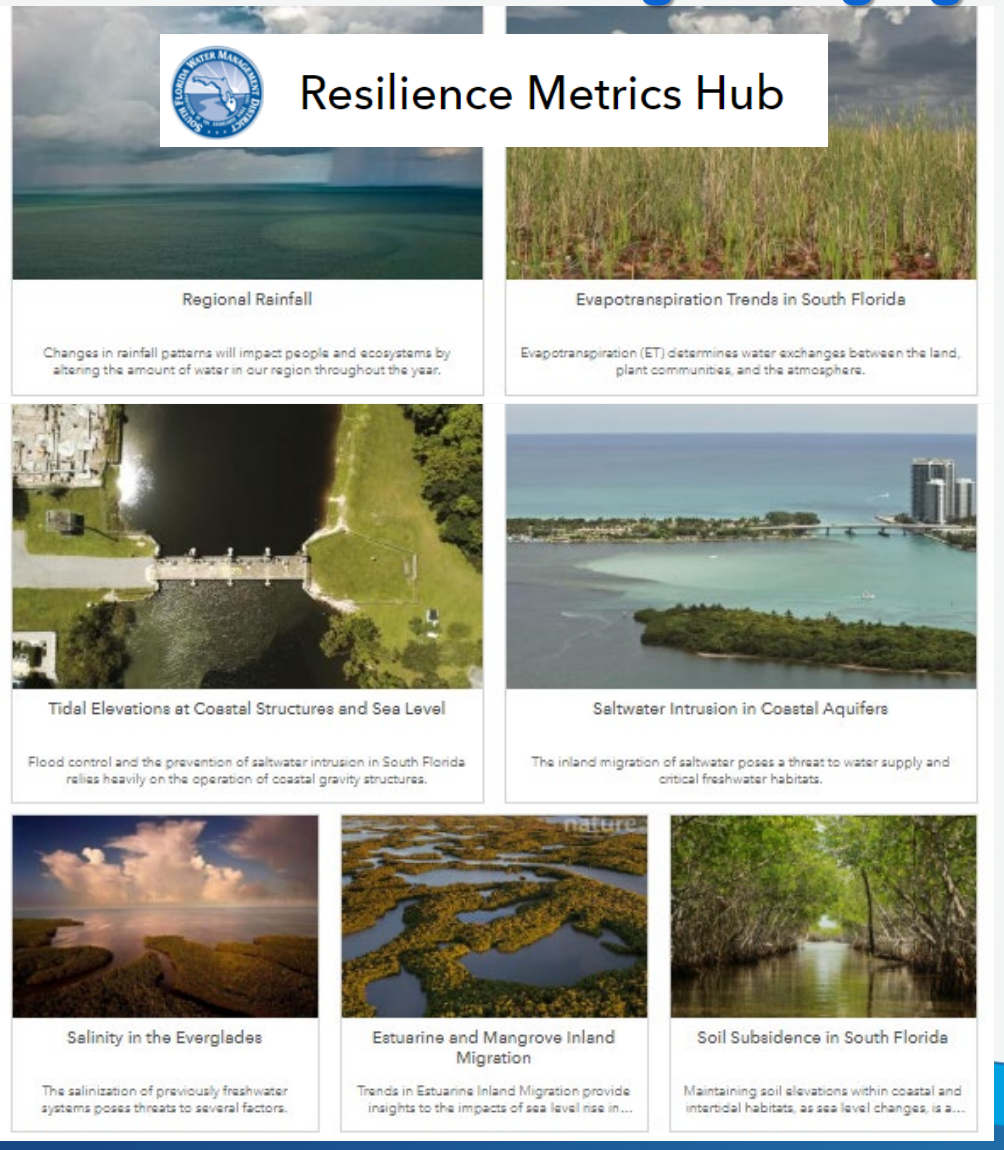
Saltwater moving inland, bypassing the top of the gate of the salinity coastal structure during a High Tide event in 2019.

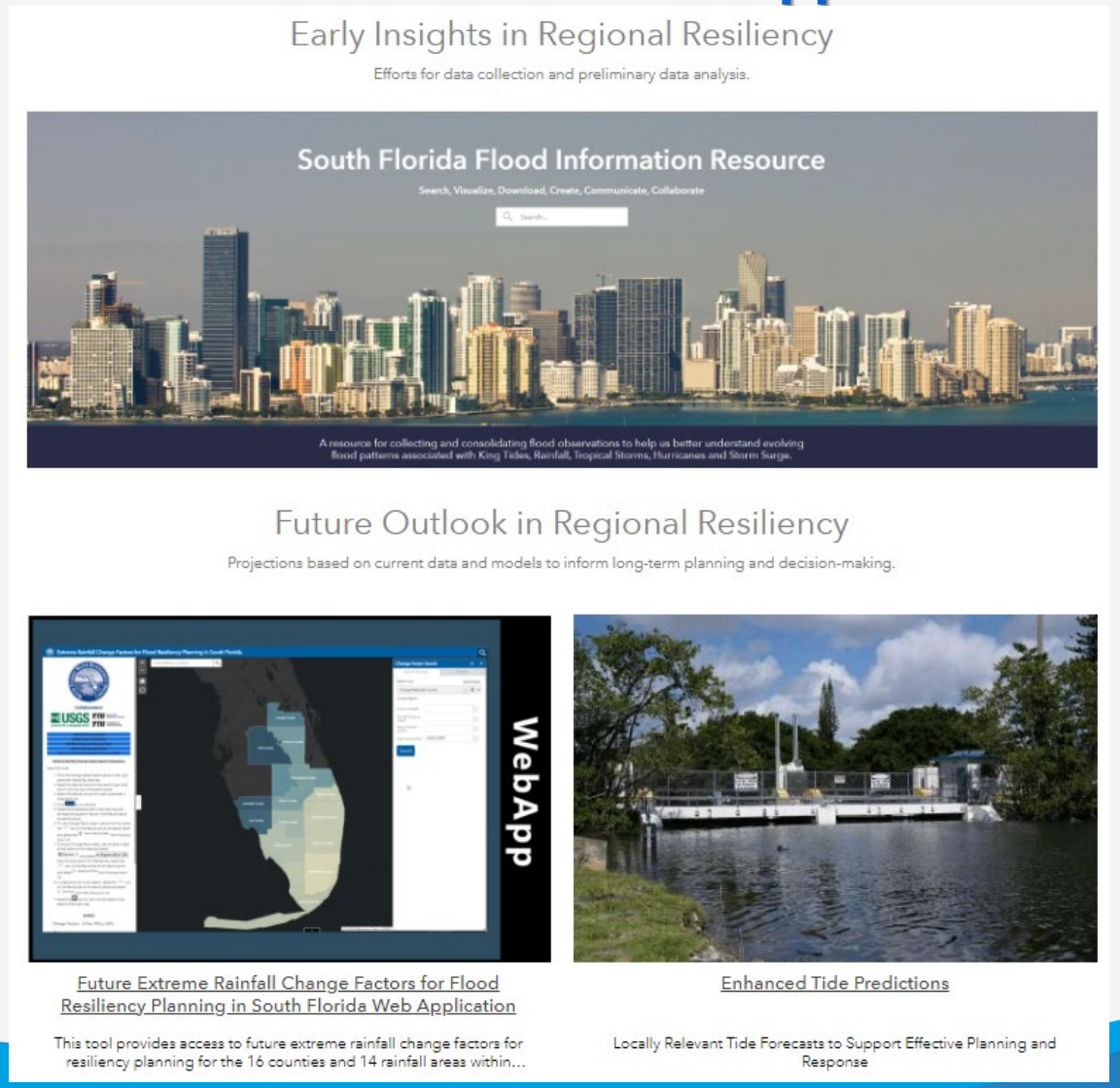
Resiliency among District Priority Actions

- EXPANDING MONITORING AND DATA ANALYSIS
- ADVANCING FUTURE CONDITIONS ASSESSMENTS
- HARDENING FLOOD PROTECTION INFRASTRUCTURE
- INVESTING IN ALTERNATIVE WATER SUPPLY SOURCES
- RESTORING NATURAL SYSTEMS
- PROMOTING STAKEHOLDER ENGAGEMENT AND JOINT ACTION

Water and Climate Resilience Metrics:

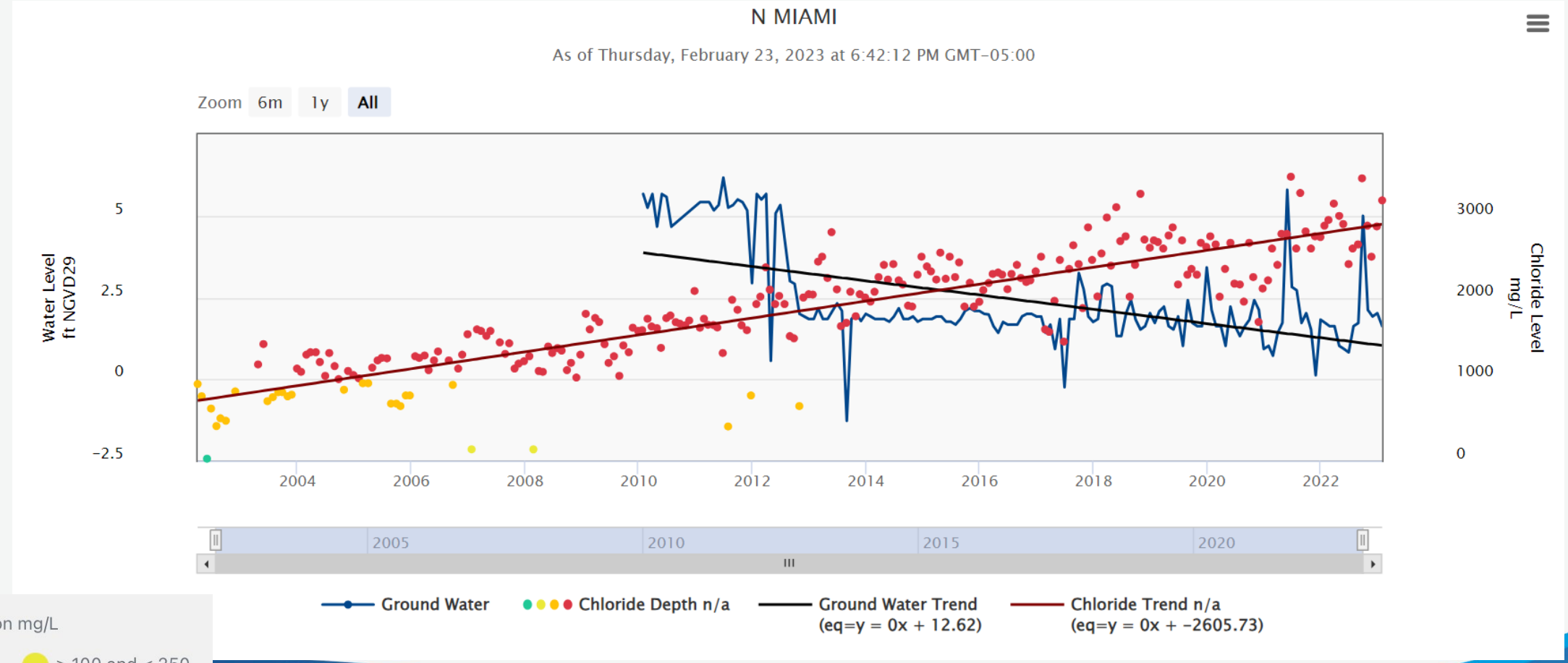
Monitoring Changing Conditions for a Risk-Informed Approach





https://sfwmd-district-resiliency-sfwmd.hub.arcgis.com/

Observations- Groundwater Stages and Chloride Concentrations (example)



Chloride Concentration mg/L

- < 100
- ≥ 100 and < 250
- ≥ 250 and < 1000
- ≥ 1000

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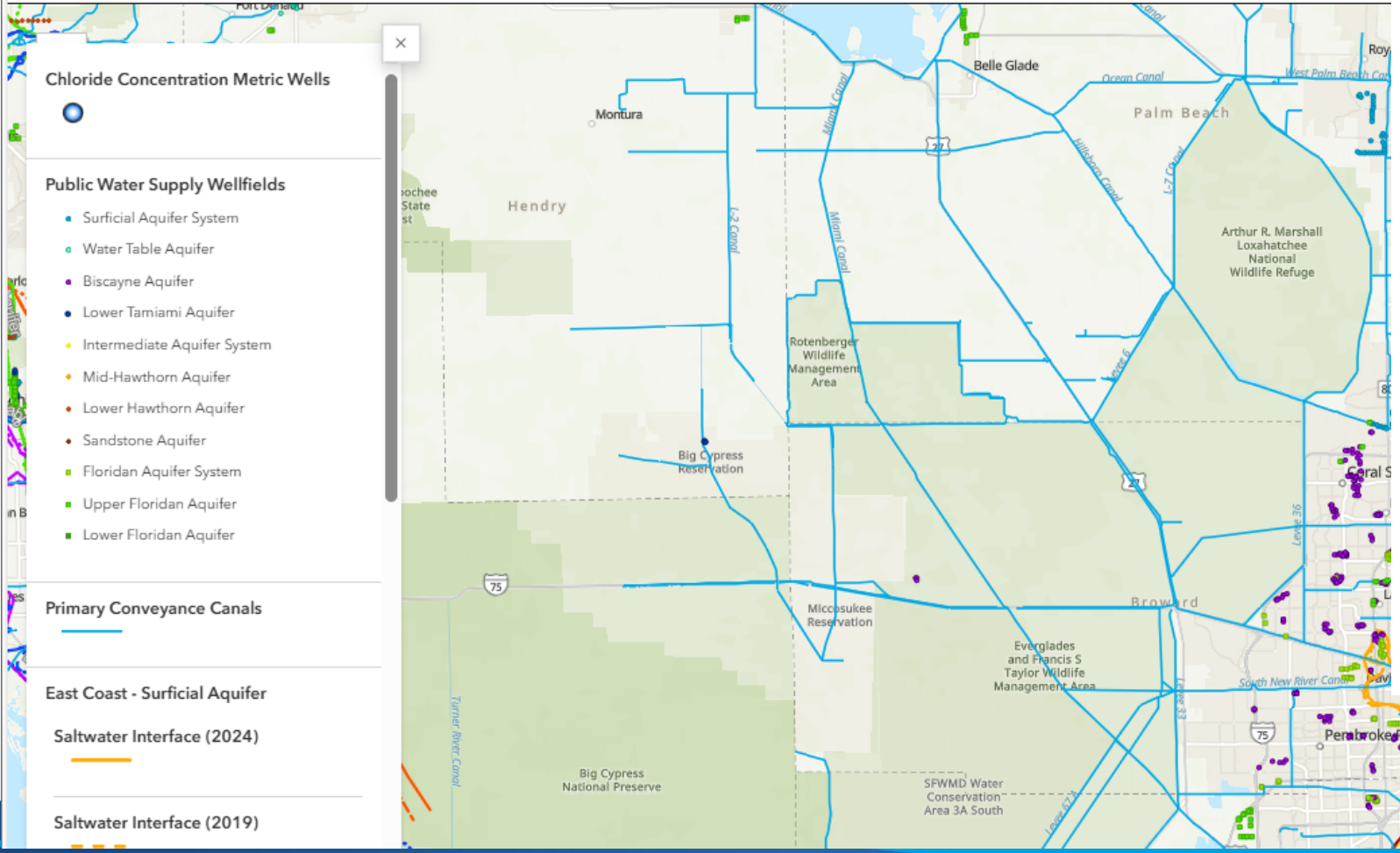
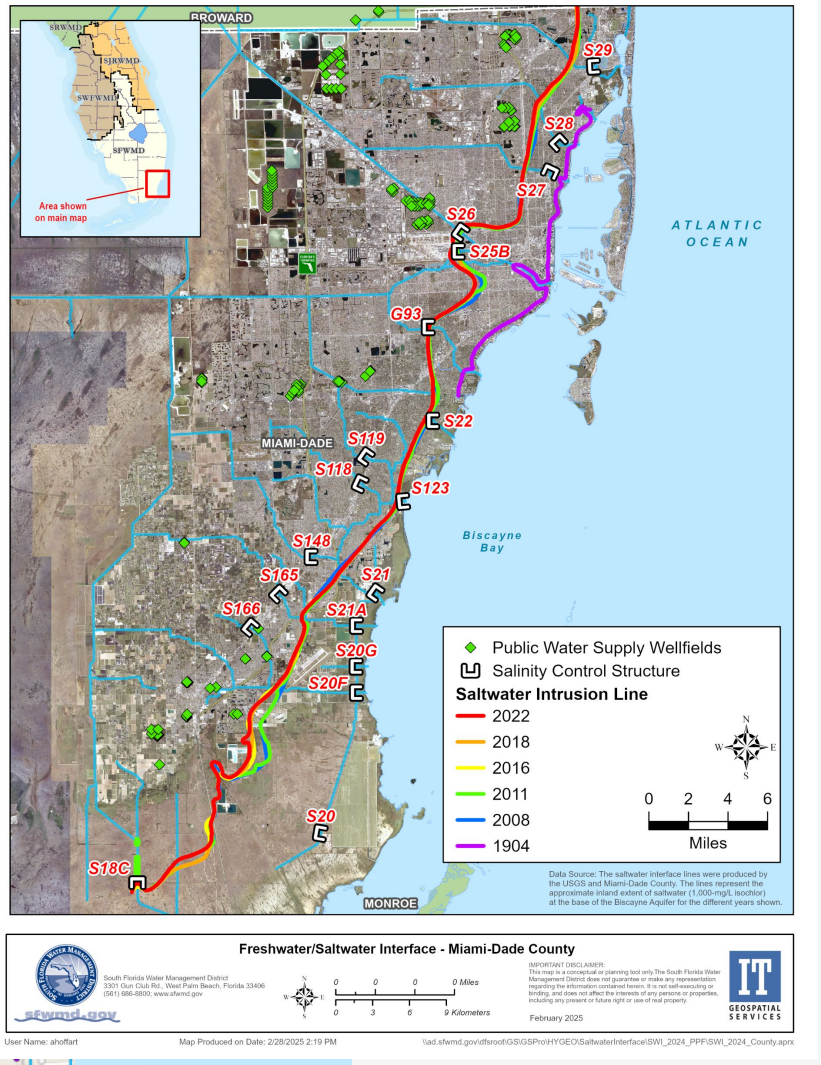
PWS Wells and Saltwater Interface

The District identifies public water supply utilities with water supply source interface that could be vulnerable to saltwater intrusion or reduced availab drought conditions.

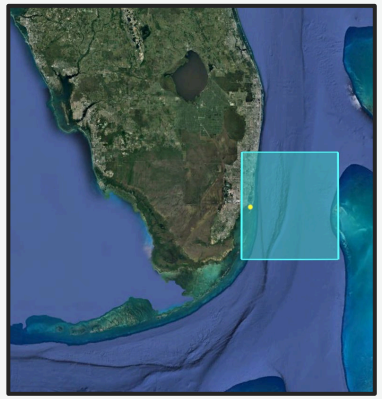


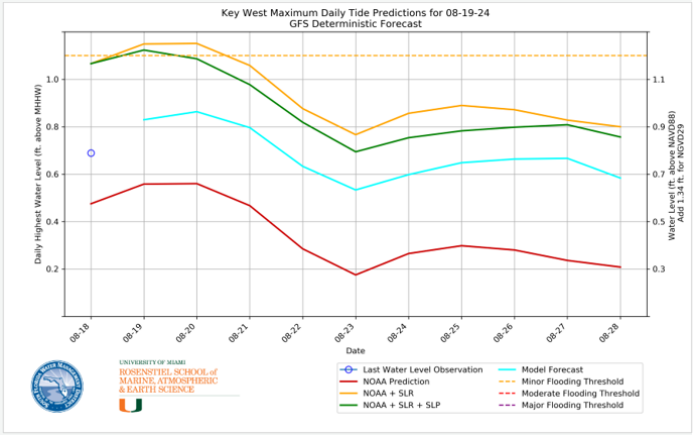


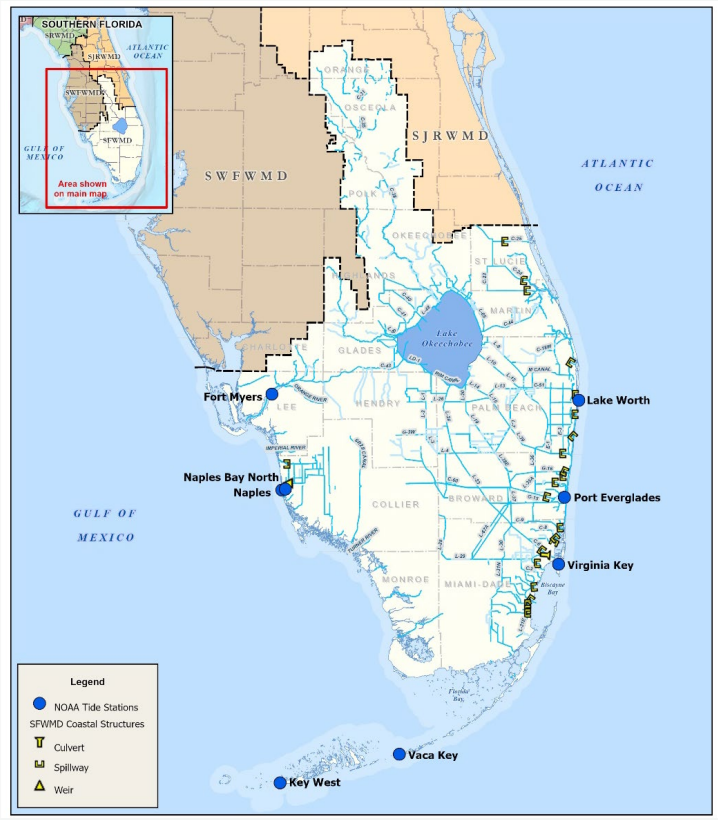
[Saltwater Intrusion in Coastal Aquifers | Resilience Metrics Hub]

Tidal Prediction Model

- University of Miami/SFWMD partnership began in 2023 to improve tidal predictions
- Major component is sea level rise adjustment
- Other predictors include:
  - Sea level pressure
  - Local wind direction/speed
  - Significant wave height of combined wind and swells
  - Sea surface temperature



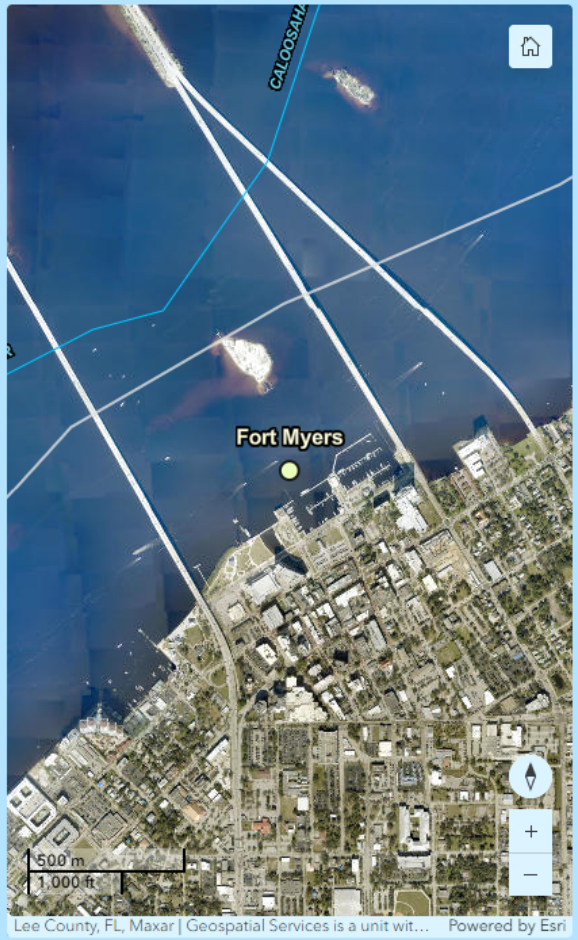




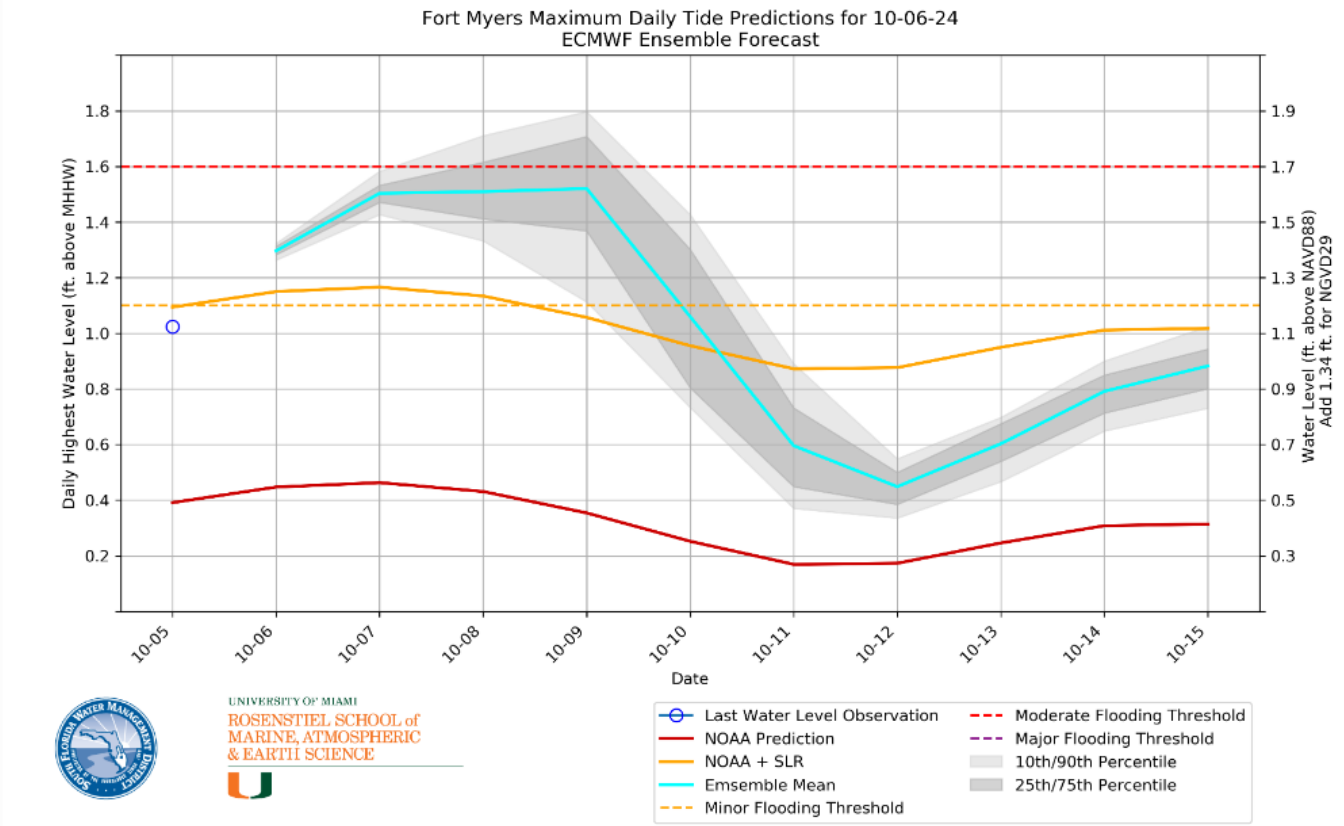
Enhanced Tide Predictions

UNIVERSITY OF MIAMI ROSENSTIEL SCHOOL of MARINE, ATMOSPHERIC & EARTH SCIENCE

Select a date: 10/6/2024 | Select a Tide Gauge: Fort Myers | Select a Model: All



1 of 3



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Daily Tide Prediction | 6 Minute Prediction

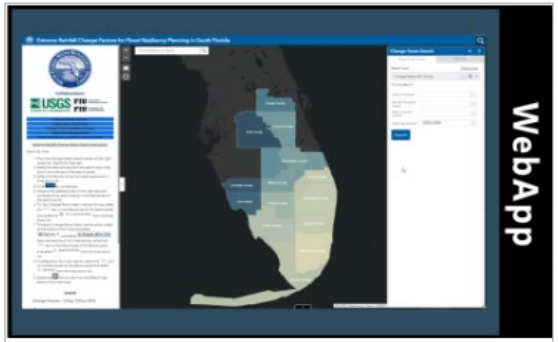
Run Date	Date	Days	Model	Tide Gauge	NOAA Prediction_FT ...	NOAA Prediction SLR...	Tide Forecast_FT (NA...	F10th Percentile_FT (...	F25th Percentile_FT (...	F75th Percentile_FT (...	F90th Percentile_FT (...	Flood Potential_NWS G...
10/6/2024, 12:00 AM	10/5/2024, 12:00 AM	0.00	ECMWF Ensemble	Fort Myers	0.66	1.37						None
10/6/2024, 12:00 AM	10/6/2024, 12:00 AM	1.00	ECMWF Ensemble	Fort Myers	0.72	1.42	1.57	1.54	1.56	1.59	1.6	Minor
10/6/2024, 12:00 AM	10/7/2024, 12:00 AM	2.00	ECMWF Ensemble	Fort Myers	0.74	1.44	1.78	1.7	1.74	1.81	1.86	Moderate

https://sfwmd-district-resiliency-sfwmd.hub.arcgis.com/apps/855a2167ab06428d96194f0fb76946a1

King Tide Season Weekly Outlook

Resilience Metrics Hub (arcgis.com)

Future Outlook in Regional Resiliency



Future Extreme Rainfall Change Factors for Flood Resiliency Planning in South Florida Web Application

This tool provides access to future extreme rainfall change factors for resiliency planning for the 16 counties and 14 rainfall areas within…

Enhanced Tide Predictions

Locally Relevant Tide Forecasts to Support Effective Planning and Response

2024 King Tides Forecast

With approximately 700 miles of shoreline and 40+ gravity coastal structures upstream of tidally influenced canals, the South Florida Water Management District (SFWMD)'s water management mission is influenced by sea levels. Along with rainfall and surge, high tide events also contribute to flood risks in South Florida. The variation in strength and direction of the gravitational pull of the moon, especially during the new and full moon phases in the Fall, contributes to King Tide occurrences.

As the 2024 King Tide Season approaches, SFWMD is continuing efforts for the monitoring, operational response and documentation of these events.

Extreme high tides are predicted by the **National Oceanographic and Atmospheric Administration to peak above 2.5-3.0 feet Mean Lower Low Water** along the South Florida Coast during the following days (peak varies by location):

- August 19-23 (Full Moon)
- September 18-21 (Full Moon)
- October 1-5 (New Moon)
- October 16-20 (Full Moon)
- October 30 - November 4 (New Moon)
- November 13-18 (Full Moon)
- November 29-30 (New Moon)

WEEKLY TIDAL OUTLOOK FORECAST

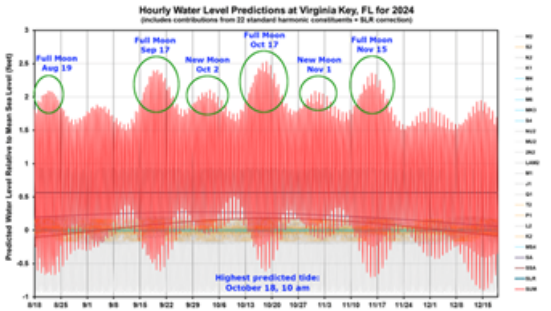
With the onset of the 2024 King Tide season, SFWMD will be publishing the weekly Tidal Outlook Forecast, every Monday, beginning today, August 12, to report conditions – such as wind strength and direction, ocean currents – that can cause tides to occur higher or lower than predicted at certain locations. These weekly updates are intended to be informational for interested stakeholders and the public. **To subscribe to receive these weekly updates, please visit our email signup page, enter your email address and check the "King Tide Forecast" option.**

Weekly King Tide Forecast

The South Florida Water Management District's Tidal Outlook for the forecast period of August 19, 2024 through August 26, 2024, is now available. Tidal water levels along the southeast coast of Florida are expected to stay below the National Weather Service's "Minor Flooding" threshold. Tidal water levels on the west coast and in the Florida Keys are predicted to be slightly above the "Minor Flooding" threshold.

View the daily forecast HERE.

SFWMD is continuing efforts for the monitoring, operational response and documentation of these events. These weekly updates are intended to be informational for interested stakeholders and the public. If conditions warrant, additional updates may be issued throughout the forecast period.



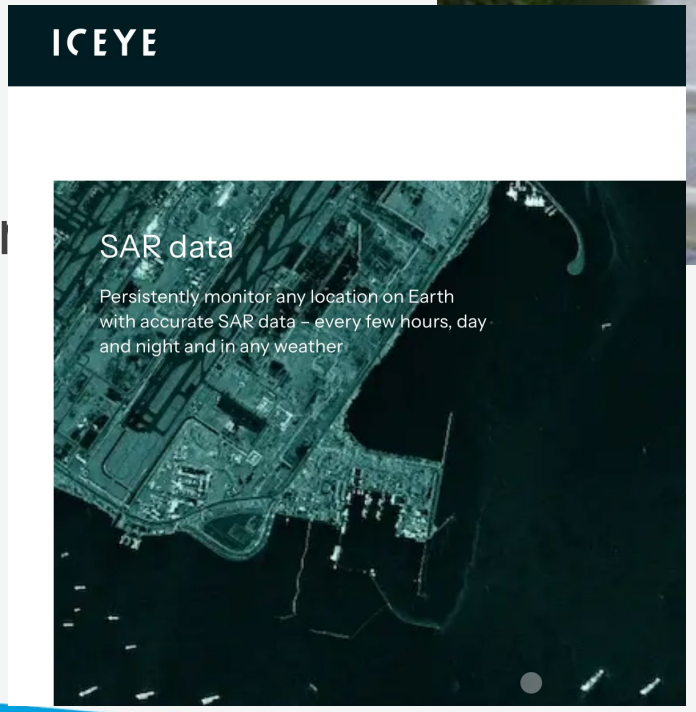
Source: University of Miami

Wet Season Tools & Innovations

Engagement with Local Partners for Data Crowdsourcing, Flood Sensors Installation and Radar Data Collection

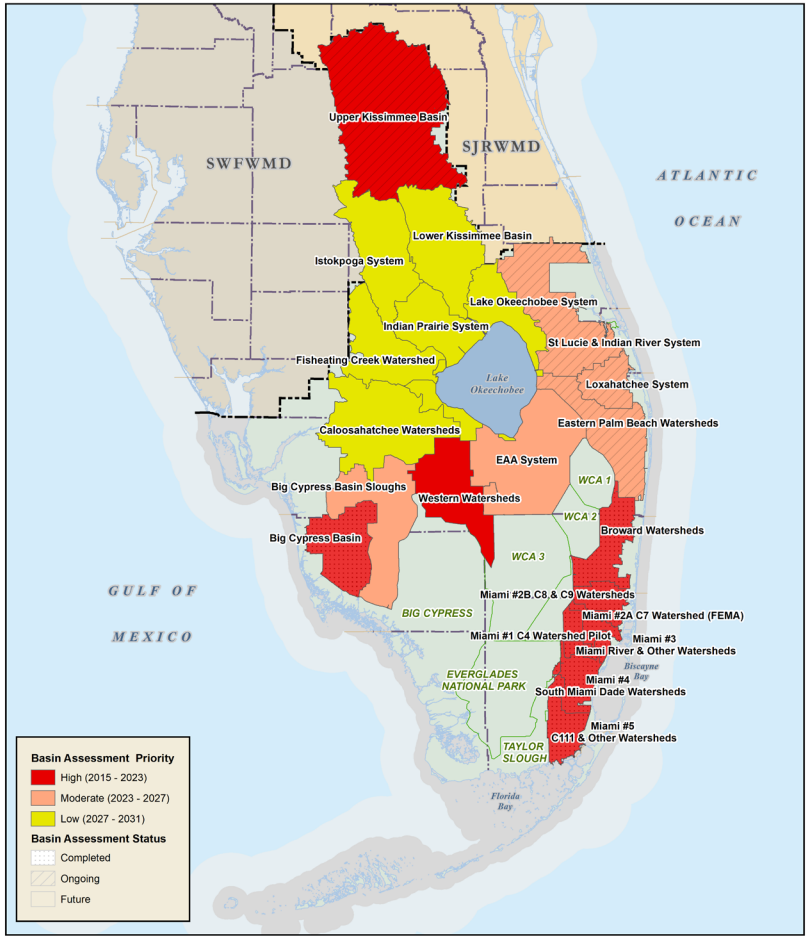
South Florida Flood Information Resour
www.sfwmd.gov/FloodResource

Document the Flood Survey
sfwmd.gov/FloodingApp



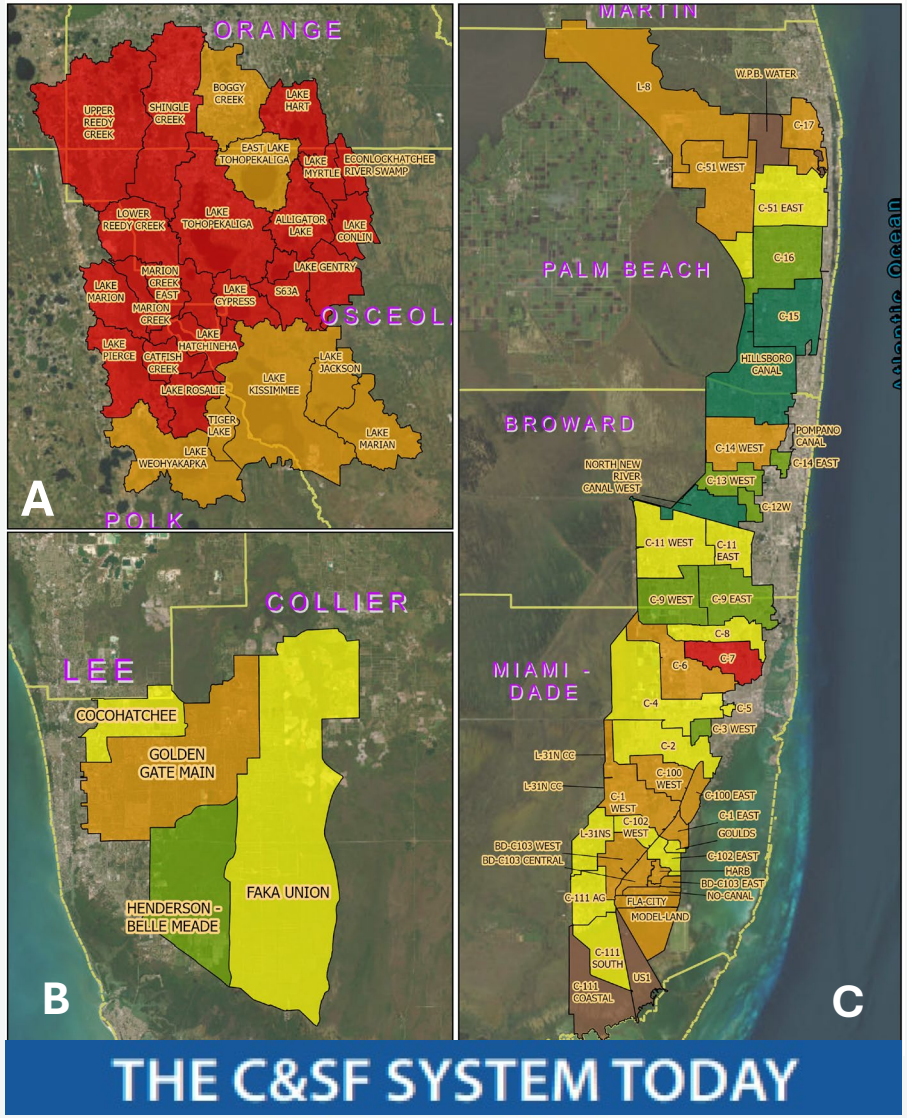
Flood Protection Level of Service Program:
Flood Vulnerability Assessments and Adaptation Planning

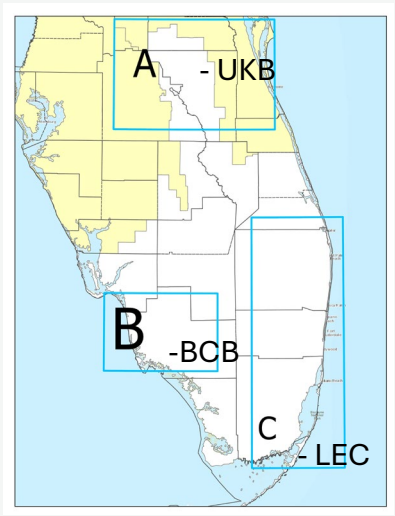
- SFWMD's strategy for assessing the impacts of land development, sea level rise, extreme rainfall and other changing conditions on flood control infrastructure
- Evaluate current and future flood risks to communities in South Florida
  - Performance metrics: canal stages, discharge capacity, overland flood inundation and duration
  - Considers rainfall, groundwater levels, tides, storm surge and sea level: compound flooding analysis
  - Regional Basin-wide integrated H&H modeling
- Support decision making on prioritizing flood control infrastructure investments
- Safeguarding tomorrow, today!

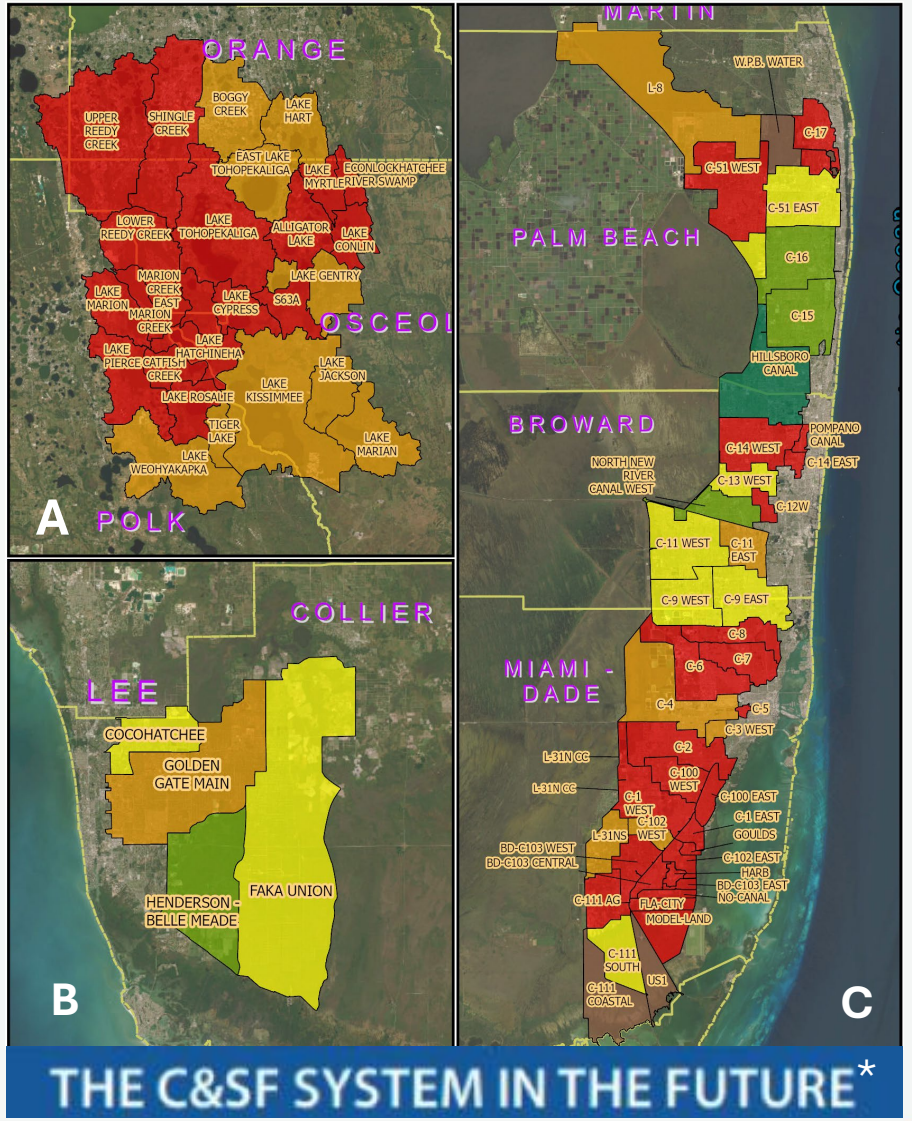


https://www.sfwmd.gov/our-work/flood-protection-level-service

Overview of Available FPLOS Results







* Flood Protection Level of Service under future conditions of Sea Level Rise (2ft, for LEC and BCB), rainfall intensification (for UKB) and land use development.

C&SF Flood Resilience: Integrated Path Forward

Planning Reach A - Broward County Basins

- Section 203 Feasibility Study – Target WRDA 26
- Funding support from FDEP and Broward County

Planning Reach B - C-7, C-8, C-9 Basins

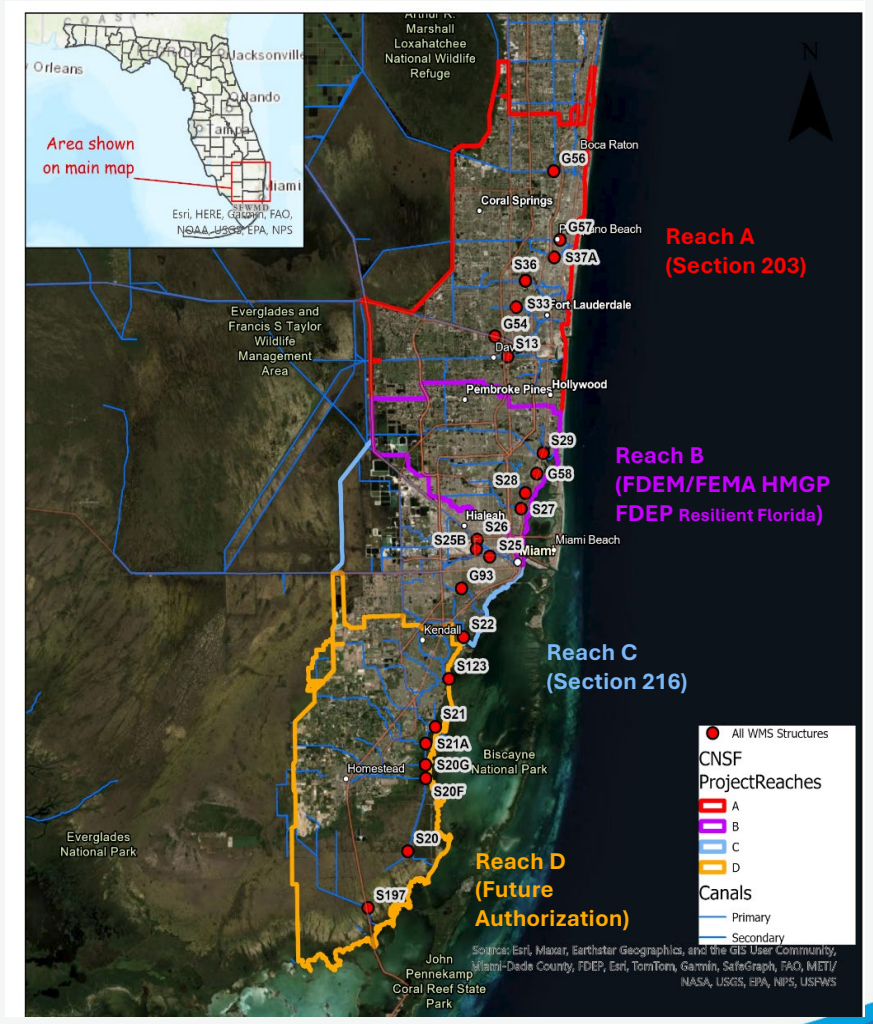
- FDEM / FEMA Hazard Mitigation
- Resilient Florida Grant
- Support from Miami Dade County

Planning Reach C – Miami River Basins

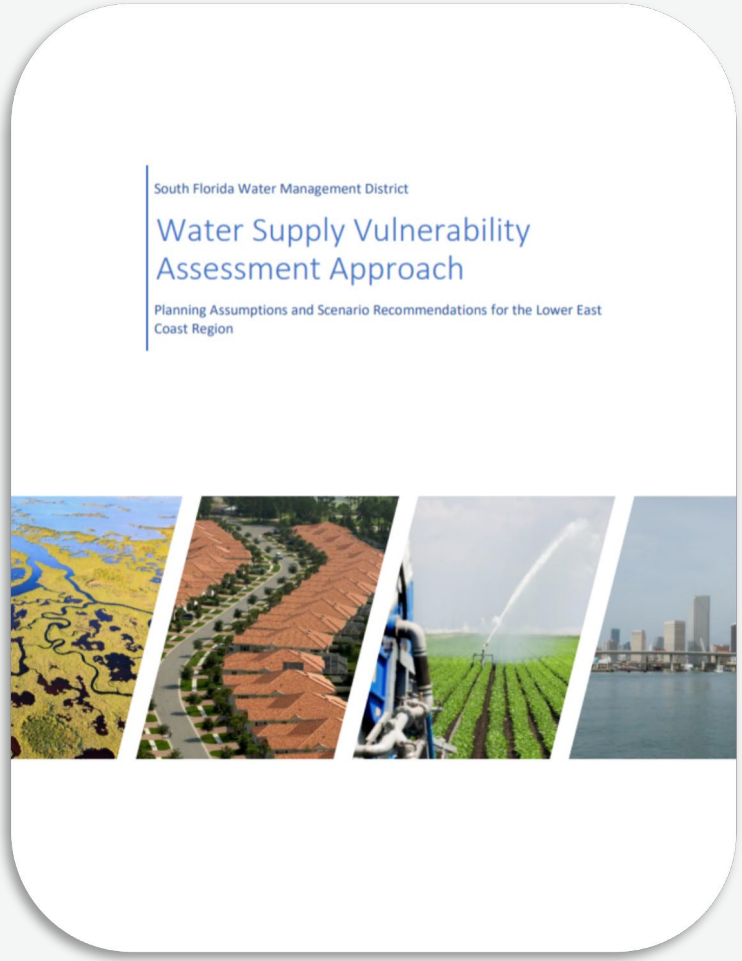
- C&SF Flood Resiliency Study – Section 216 Authorization – Seeking Budget
- Feasibility Study - Target WRDA 28

Planning Reach D - South Dade Basins

- CS&F Comprehensive Study or future planning studies



Water Supply Vulnerability Assessment



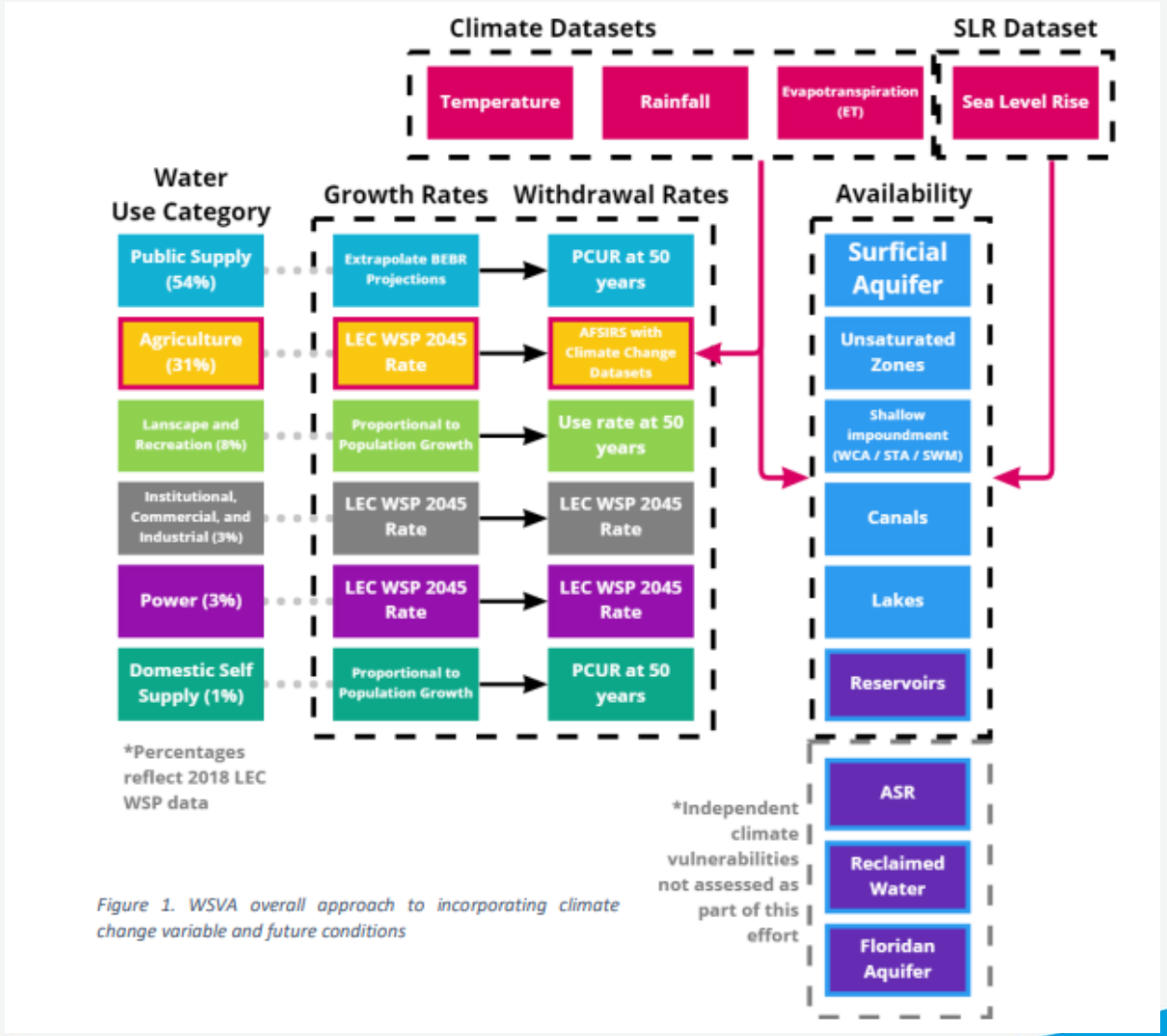
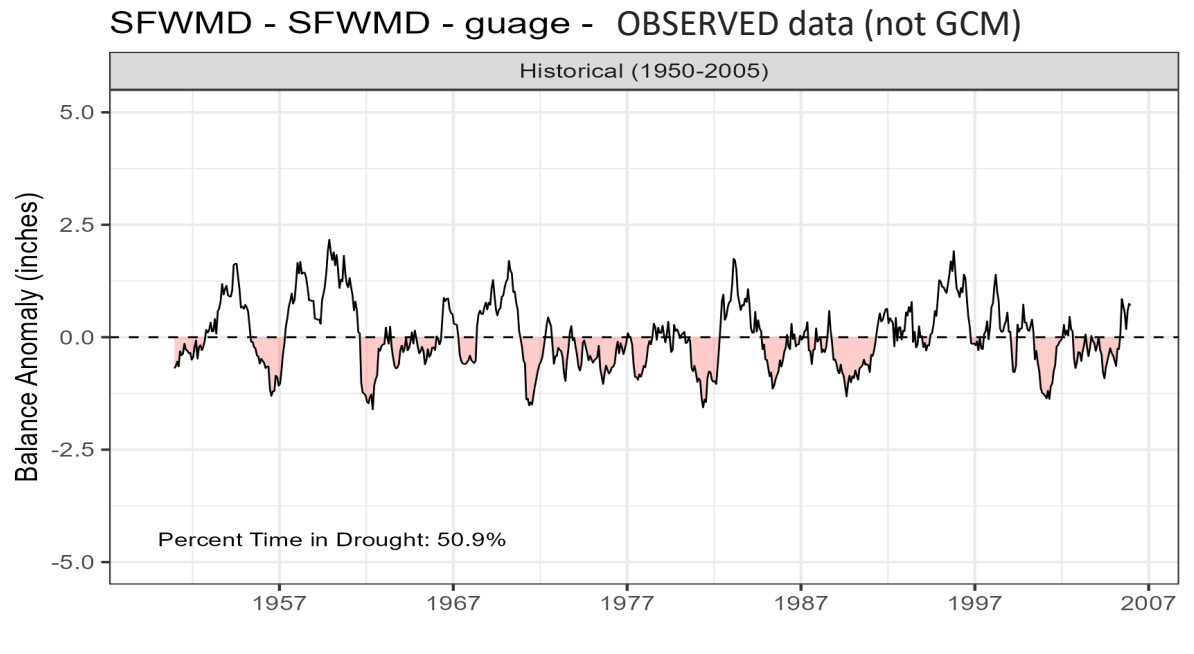


Figure 1. WSVA overall approach to incorporating climate change variable and future conditions

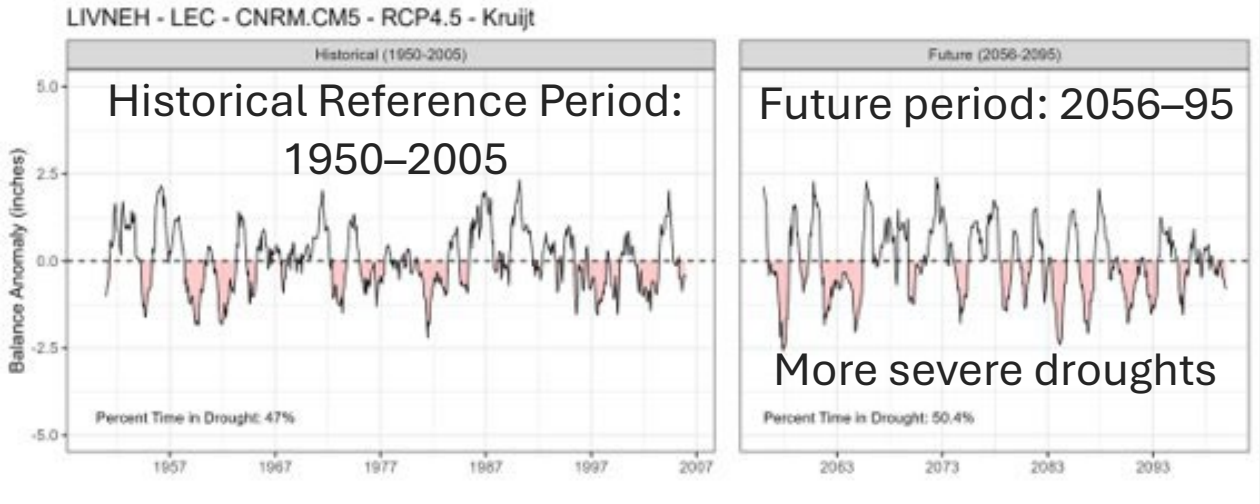
USGS FIU SFWMD Drought Analysis

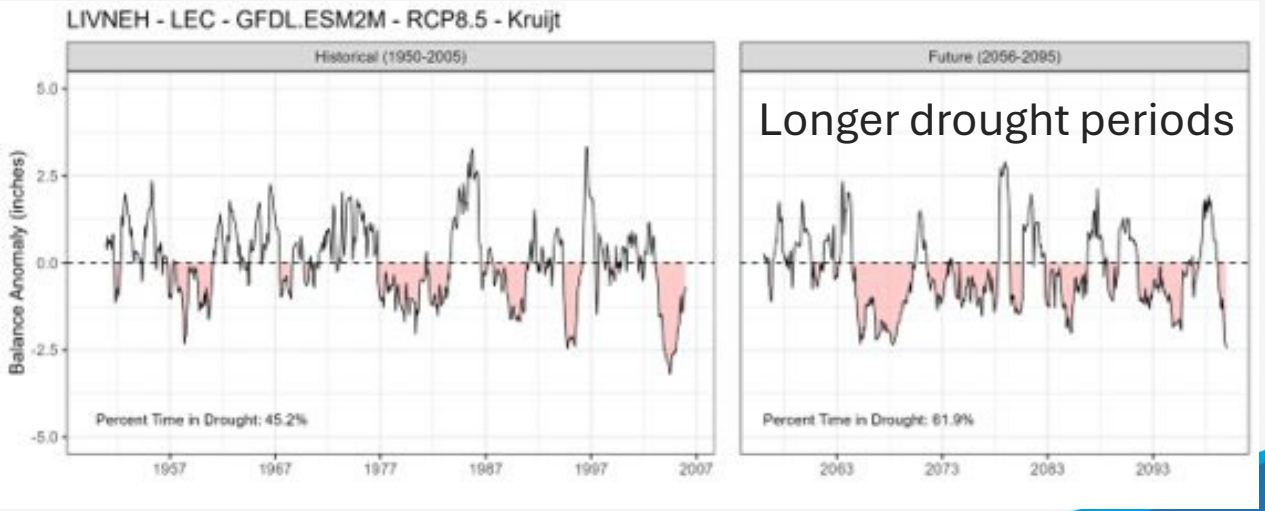
Water Balance Anomaly Timeseries

- Monthly Balance = P - RET
- Subtract mean historical *balance* for month of the year to get *Balance Anomalies*



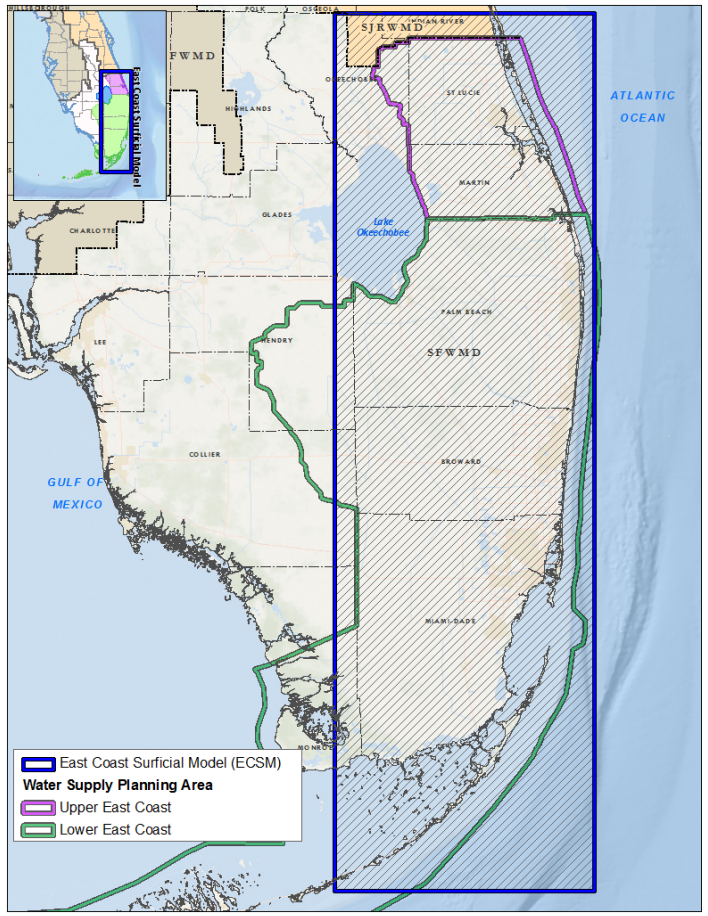
Candidate GCM Timeseries – Kruijt curve





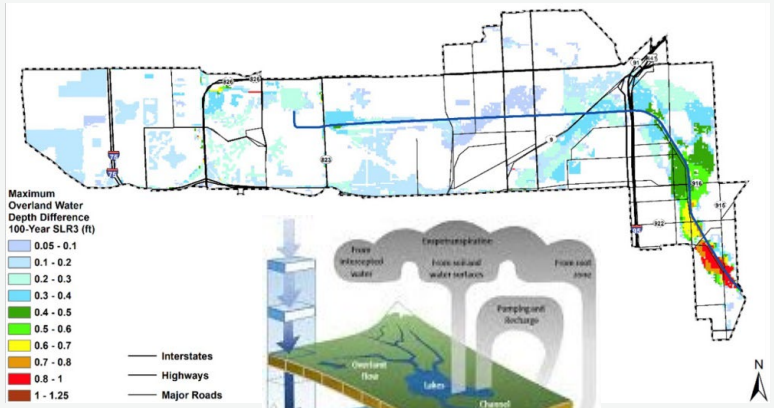
'Drought' = 3+ months when ET > Precip

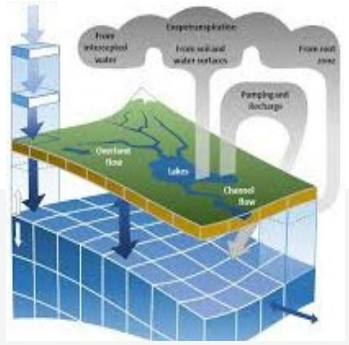
East Coast Surficial Model

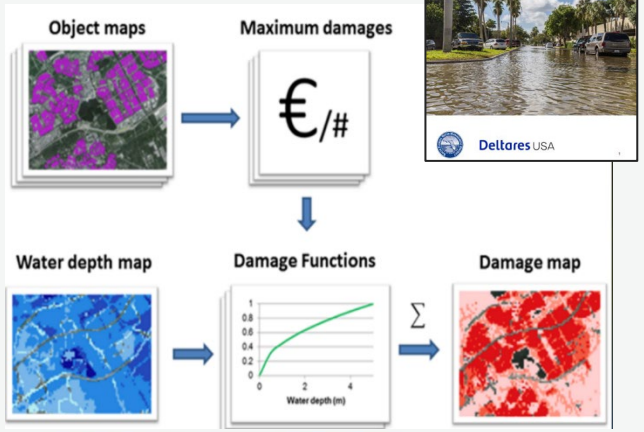


- SEAWAT (USGS Computer Code modified by SFWMD)
- Calibration Period of Record: 1985 – 2012, Verification Period of Record: 2013 – 2016
- Cell size: 1,000 ft x 1,000 ft
- 5 model layers that represent the Surficial Aquifer System, including the Biscayne Aquifer
- Calibrated to water levels (daily) and water quality (Total Dissolved Solids [TDS]) mg/L (monthly)
- Current Status: finalizing model calibration

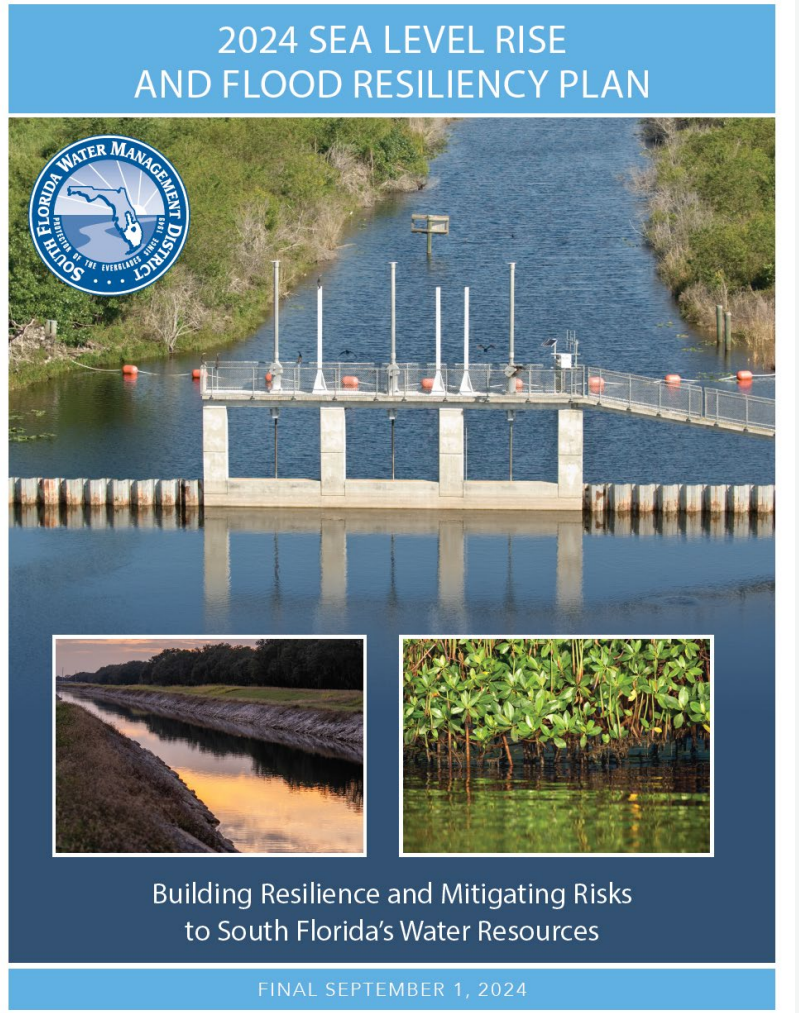
District Resiliency Planning







Reducing the risks of flooding, sea level rise and other changing conditions on water resources (water management infrastructure) and increasing community (economy) and ecosystem resiliency in South Florida



"…hard to recognize, but there used to be a canal somewhere in the foreground." – Merritt Canal Plugged

Ecosystem Restoration supports mitigation against sea level rise and other impacts from a changing climate.

CERP goals are aligned with the adaptation strategies needed to build Resiliency in South Florida.

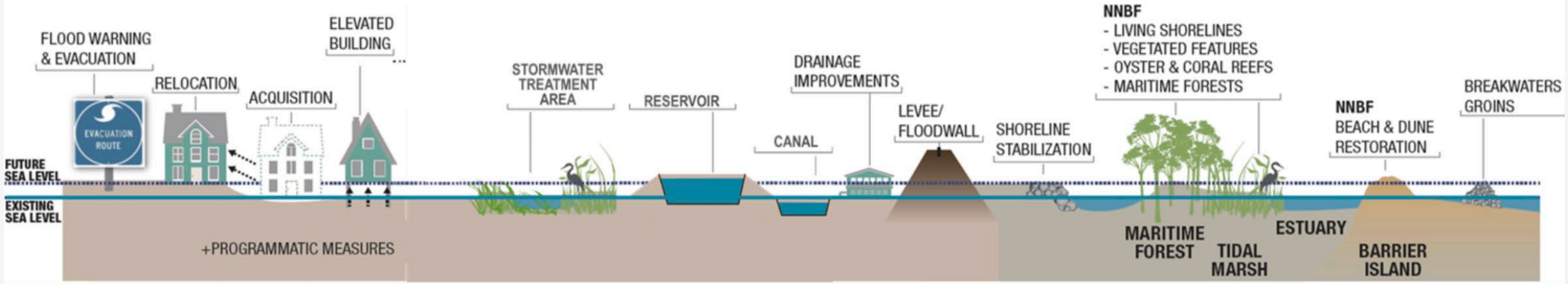
Resiliency Initiatives Coordination

Integrating Inland and Coastal Flood Mitigation Strategies

Counties Studies/ Projects	Water Control Districts and Municipalities Projects	USACE Studies/ Projects	Regional Climate Compacts	Other Partners

POTENTIAL MEASURES TO IMPROVE RESILIENCE AND SUSTAINABILITY

Graphic modified from https://ewn.el.erdc.dren.mil/nnbf/other/5_ERDC-NNBF_Brochure.pdf



2025 Resiliency Coordination Forum Schedule

JANUARY

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DECEMBER

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Resiliency Coordination Forum

Resiliency Coordination Forum

The Resiliency Coordination Forum is a fact-finding forum to promote regional collaboration between the South Florida Water Management District and local, state, federal and tribal partners on water management initiatives related to resiliency, and engage partners on assessing the impacts of changing climate conditions and water management.

Invited Partners

- Resiliency Leads from 16 Counties and Local Governments
- Local Mitigation Strategy (LMS) Workgroups from 16 Counties
- 298 Districts
- Planning Councils
- Tribes
- State Agencies
- Federal Agencies

2025 Meeting Dates

- Resiliency Plan Workshops
- Wednesday, May 28
- Wednesday, September 3
- Wednesday, December 3

All of these forums will be held at the South Florida Water Management District's Headquarters Complex at 3301 Gun Club Road, West Palm Beach, FL 33406.

Visit SFWMD.gov/Resiliency for more information.

Resiliency Coordination Forum

2025 Sea Level Rise and Flood Resiliency Plan Update Workshops:

- Workshop #1 – Lower East Coast – February 21, 2025
- Workshop #2 – Upper East Coast – February 25, 2025
- Workshop #3 – Southwest Coast – February 27, 2025
- Workshop #4 – Kissimmee River Basin – March 7, 2025

Upcoming Quarterly Meetings:

- Wednesday, May 28, 2025: **Wet Season / Resiliency Plan**
- Wednesday, September 3, 2025
- Wednesday, December 3, 2025

How can you be involved?

- Sign-up for our updates by visiting https://www.sfwmd.gov/news-events and following these steps:
  - 1 - Click on the “Subscribe for Email” icon
  - 2 - Enter your email address
  - 3 - Select “District Resiliency” under Subscription Topics / News

- Contribute on our initiatives and send us an email to resiliency@sfwmd.gov

- Visit www.sfwmd.gov/resiliency to get updated information

- Visit www.sfwmd.gov/meetings to attend and participate at District events

We Do The Coolest Work on the Planet - Join Us!

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SFWMD.gov/Careers

Thank You

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Chief of District Resiliency

South Florida Water Management District
www.sfwmd.gov/resiliency

Photos by Nicole Cortez
@ JW Corbett Wildlife Management Area