



# The Role of MFLs in Conserving and Protecting Water Resources in Southeast Florida

**Karin A. Smith, P.G.**

**Resiliency Project Manager – Water Supply**

**February 21, 2024**

**District Resiliency**  
**[www.sfwmd.gov/Resiliency](http://www.sfwmd.gov/Resiliency)**

# MINIMUM FLOWS AND MINIMUM WATER LEVELS RESILIENCY METRIC

## Water and Climate Resilience Metrics

As part of our ongoing resilience initiatives, the District has developed a set of Water and Climate Resilience Metrics to document trends and track shifts in District managed water and climate observed data. These efforts support the assessment of current and future climate conditions, modeling scenario formulation and adaptation planning, operational decisions, and the determination of District resiliency priorities.

### Learn More

The District's commitment to resilience includes informing stakeholders, the public, and partner agencies to support local resiliency strategies.

Visit the [Resilience Metrics Hub](https://www.sfwmd.gov/our-work/water-and-climate-resilience-metrics) to learn more about the data driving the District's resiliency efforts.



<https://www.sfwmd.gov/our-work/water-and-climate-resilience-metrics>

# MINIMUM FLOWS AND MINIMUM WATER LEVELS

Miami-Dade Northwest Wellfield wellhouse



To protect water resources from significant harm resulting from permitted water withdrawals

- **MFLs** identify the point at which *further water supply withdrawals* cause **significant harm** to the water resources
- **Significant harm:** Temporary loss of water resource functions that takes more than 2 years to recover
- May be adopted for surface waters or aquifers
- Established using “*best available information*”
- Peer-reviewed science



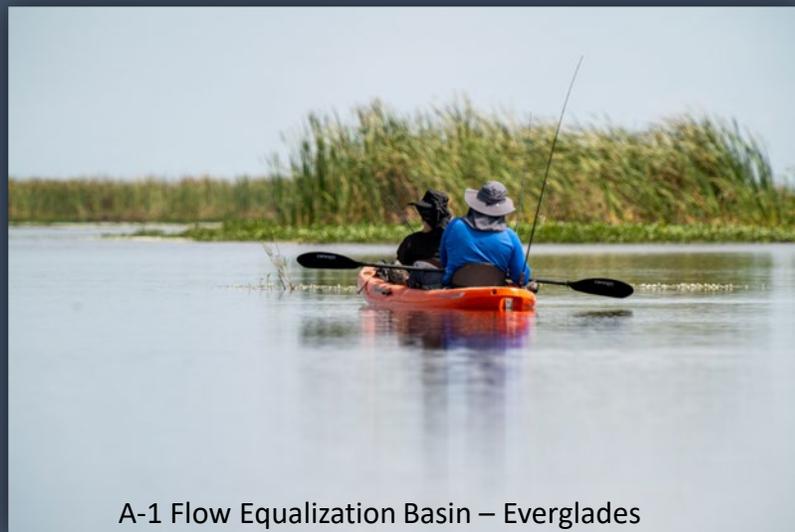
Defined in Chapter 40E-8, F.A.C

# MINIMUM FLOWS & MINIMUM WATER LEVELS (MFLs)

Protect non-consumptive uses of water



fish and wildlife habitat



A-1 Flow Equalization Basin – Everglades

navigation and recreation



Lake Okeechobee during drought

MFLs consider the ability of wetlands and aquatic communities to adjust to changes in hydrologic conditions. MFLs allow for an acceptable level of change to occur.



Loxahatchee Slough

Sea level rise and climate change were not considered when establishing MFLs

# MINIMUM FLOWS WATER BODIES

Caloosahatchee River



457 cfs at S-79 structure

To maintain salinity gradient for mobile & immobile indicator species

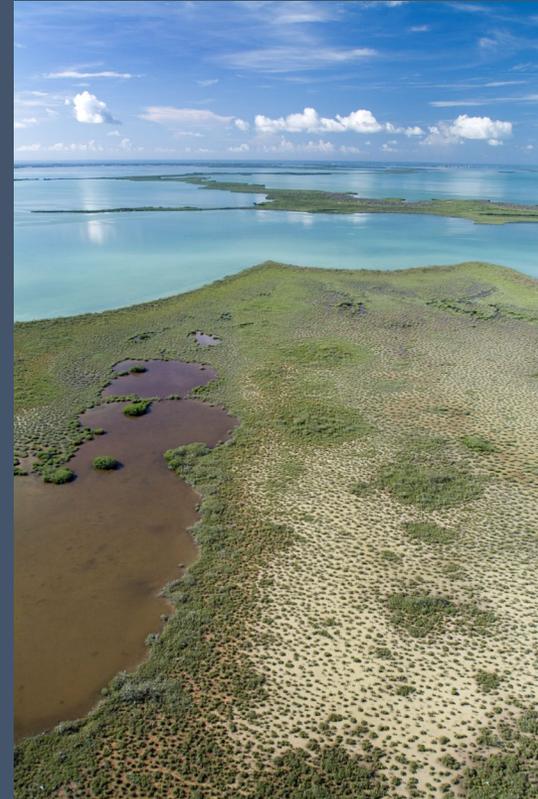
NW Fork of the Loxahatchee River



35 cfs at Lainhart Dam

Avg daily salinity < 2 ppt at River Mile 9.2  
To create freshwater regime at RM 9.2 like at RM 10.2

Florida Bay



St. Lucie Estuary



# MINIMUM WATER LEVEL WATER BODIES

Everglades

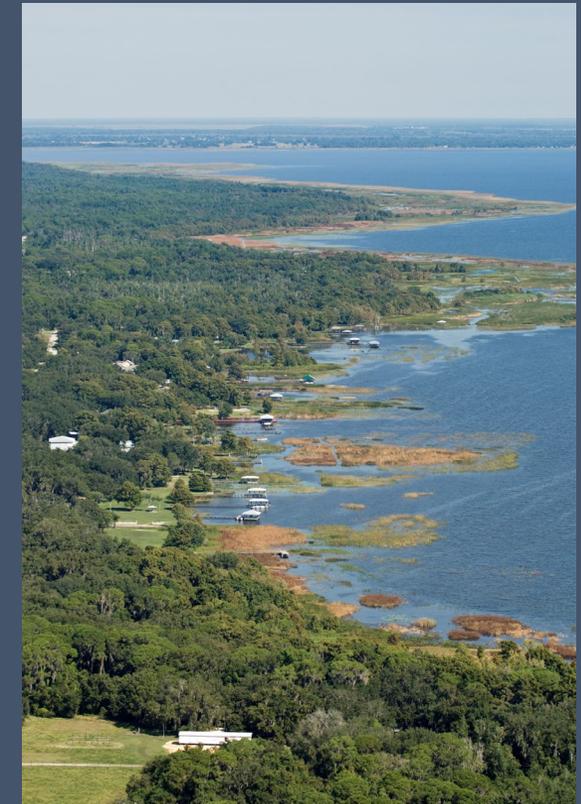
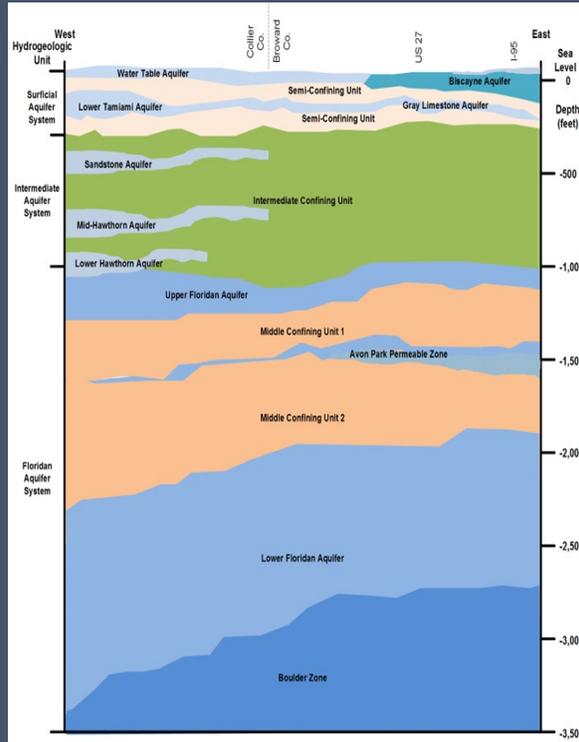
Lower West Coast Aquifers  
Biscayne Aquifer

Lake Okeechobee

Lake Istokpoga



Everglades National Park

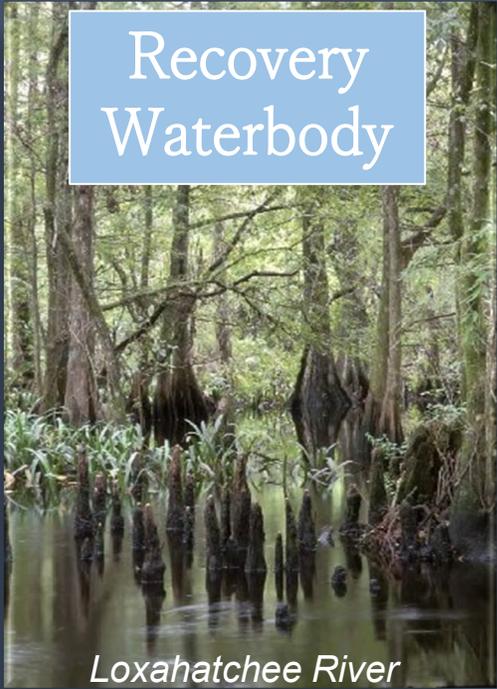


Depth/duration limits below land surface at 20 specific peat & marl-forming wetland sites  
To maintain minimum hydro-pattern return frequencies

LWC - Structural tops of aquifers  
Biscayne – level that prevents landward movement of saltwater  
To maintain ability to serve as a water supply source

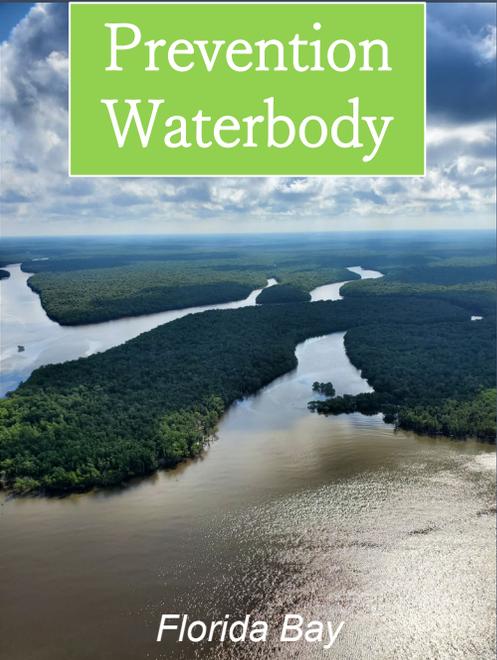
Lake level - 11 feet NGVD  
To provide littoral zone habitat, recreation, navigation, water for ENP and saltwater intrusion prevention

Lake level - 36.5 feet NGVD  
To maintain littoral zone habitats, recreation, navigation, runoff to Lake O.



Recovery  
Waterbody

*Loxahatchee River*



Prevention  
Waterbody

*Florida Bay*

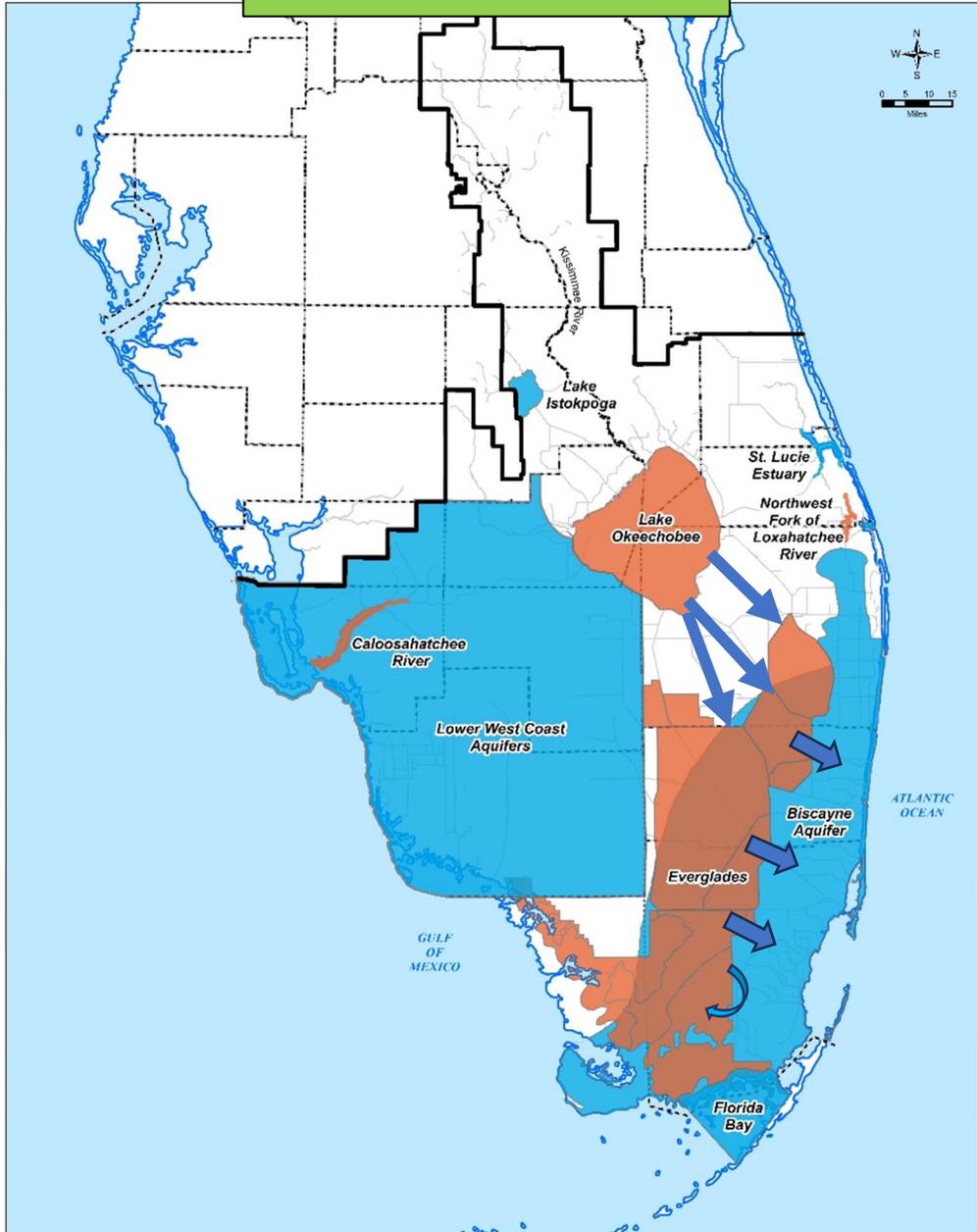
# MFL PREVENTION & RECOVERY STRATEGIES

## Structural and non-structural actions

Required to develop a strategy when a water body currently does not or will not meet an established MFL

- **Prevention Strategy** for those that are meeting the MFL but not expected to meet it in 20 years
  - Prevent the existing flow or level from falling below the established MFL
- **Recovery Strategy** for those not meeting the MFL at the time of adoption
  - Achieve recovery to the established MFL as soon as practicable
- Adopted simultaneously with MFL rule adoption in the SFWMD
- Strategies are included in the water supply planning process

Protects ~6.6 M Acres



# MFL WATERBODIES IN SFWMD

## MFL Prevention Waterbodies

-  ■ Biscayne aquifer (2001)
-  ■ Lower West Coast aquifers (2001)
-  ■ St Lucie Estuary (2002)
-  ■ Lake Istokpoga (2006)
-  ■ Florida Bay (2006)

## MFL Recovery Waterbodies

-  ■ Lake Okeechobee (2001), revised (2007)
-  ■ Everglades (2001)
-  ■ Caloosahatchee River (2001)
-  ■ Loxahatchee River (2003)



Affected by sea level rise and climate change



Affected by climate change

# MINIMUM WATER LEVEL CRITERION

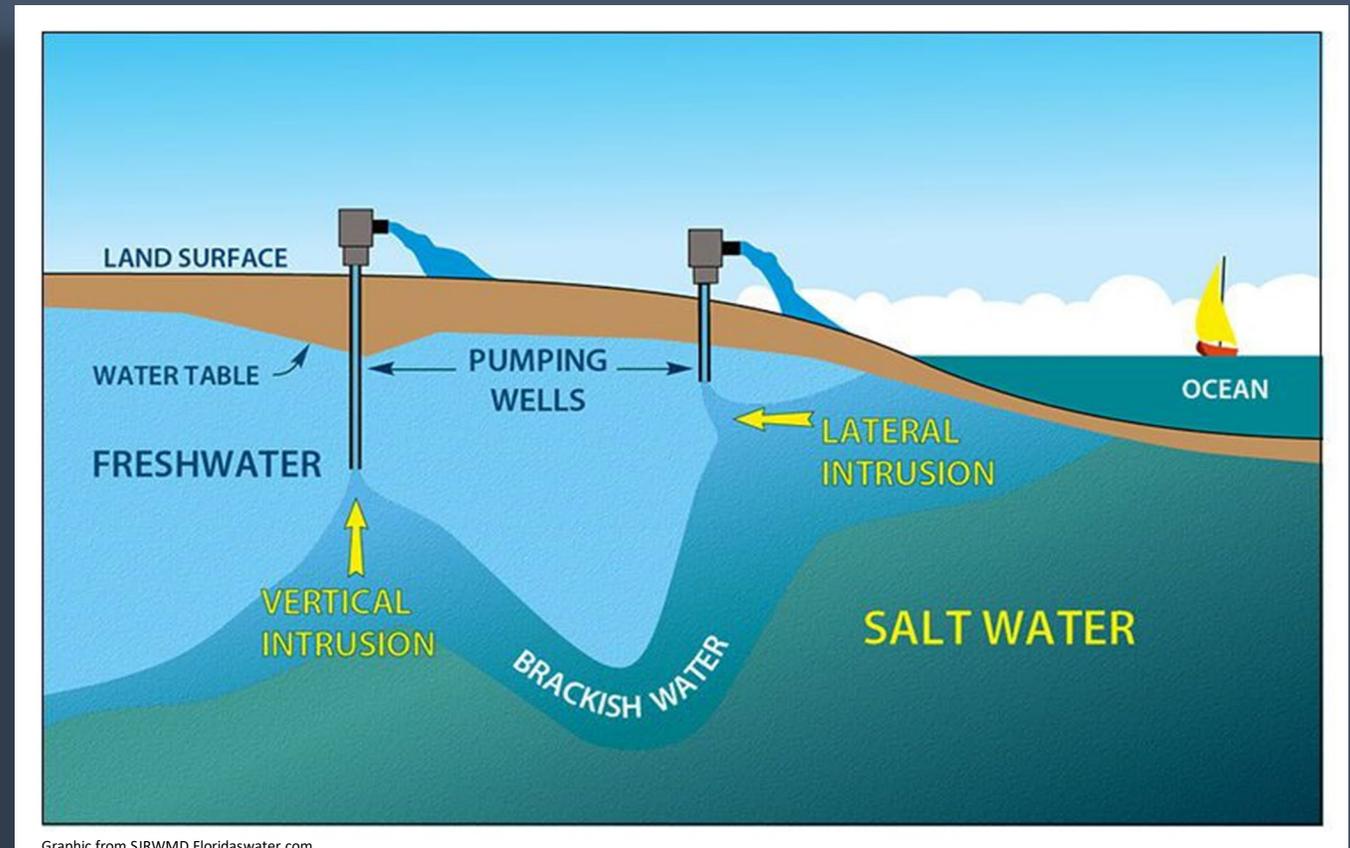
## Biscayne Aquifer MFL

Level that results in **movement** of the saltwater interface **landward** to the extent that groundwater **quality** at an established withdrawal point is **insufficient** to serve as a **water supply source**”

Section 40E-8.231, F.A.C.

## MFL violation

When water level in the aquifer produces this degree of saltwater movement at any point in time



# BISCAYNE AQUIFER MFL

MFL established in November 2001

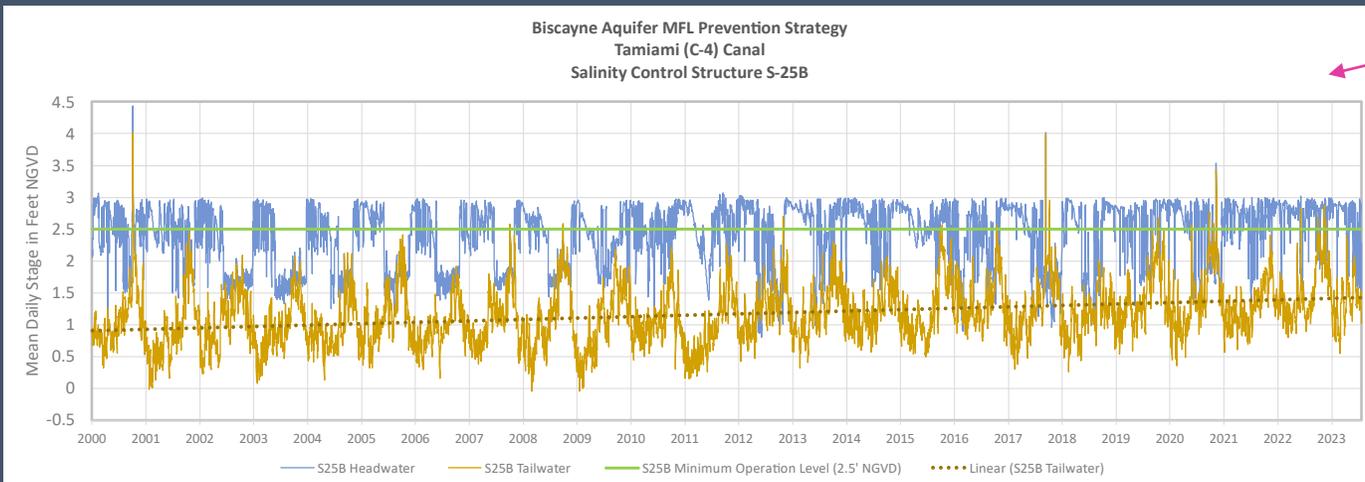
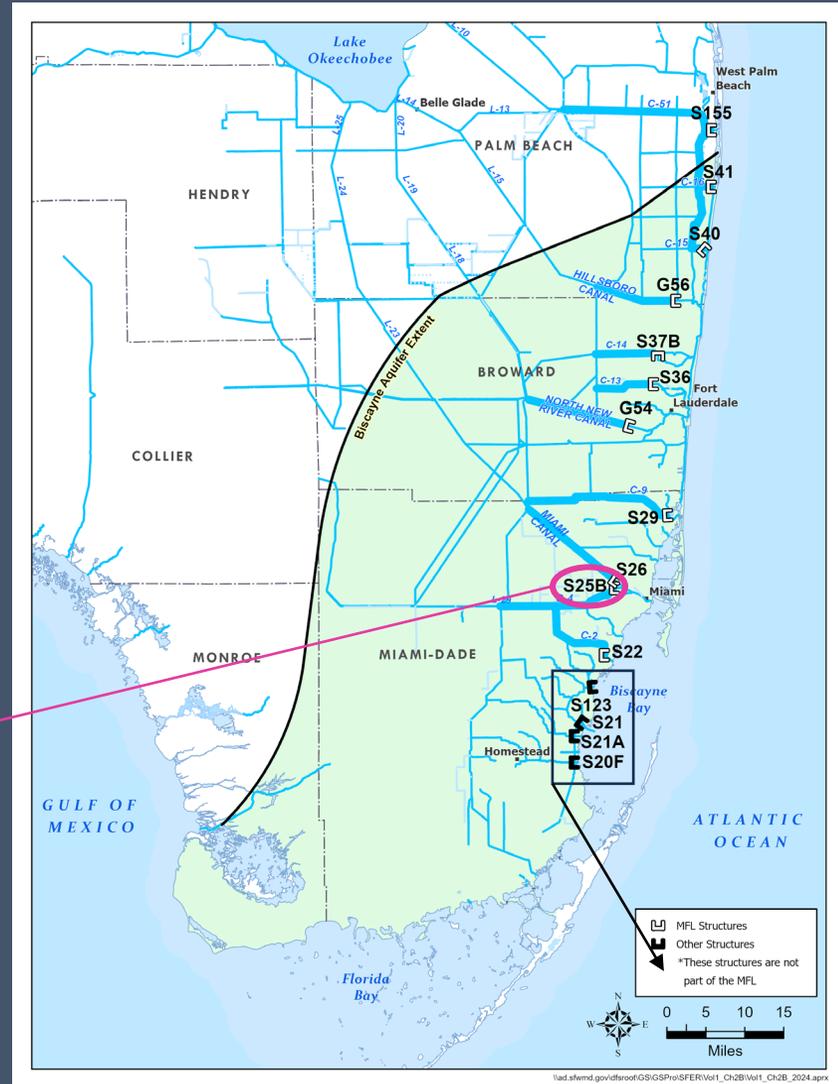
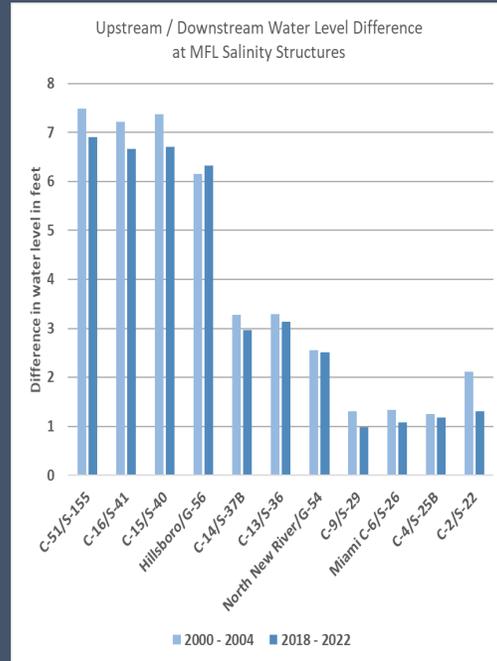
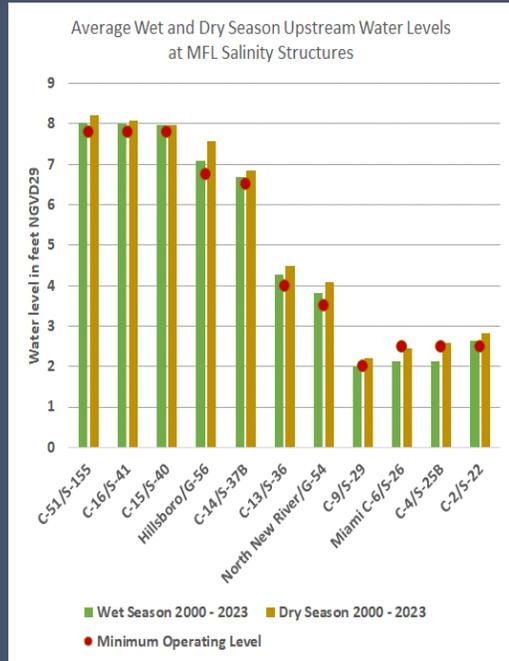
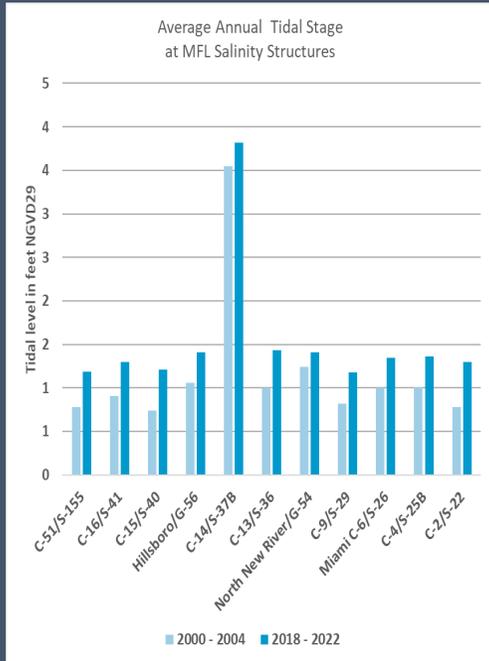
## Prevention strategy

structural & non-structural actions to maintain minimum groundwater levels.



- Maintain coastal canal minimum **operating levels** upstream at 11 salinity control structures (map) for at least 180 days a year
- Issue water use **permits** with conditions to prevent harmful movement of saltwater
- Maintain a groundwater **monitoring** network to inform water shortage actions
- Construct and operate water resource and water supply development **projects**
- Conduct **research** in high-risk areas to locate saltwater front

# BISCAYNE AQUIFER MFL – OPERATING LEVELS



# BISCAYNE AQUIFER MFL – WATER USE PERMITS

## Harmful saline intrusion

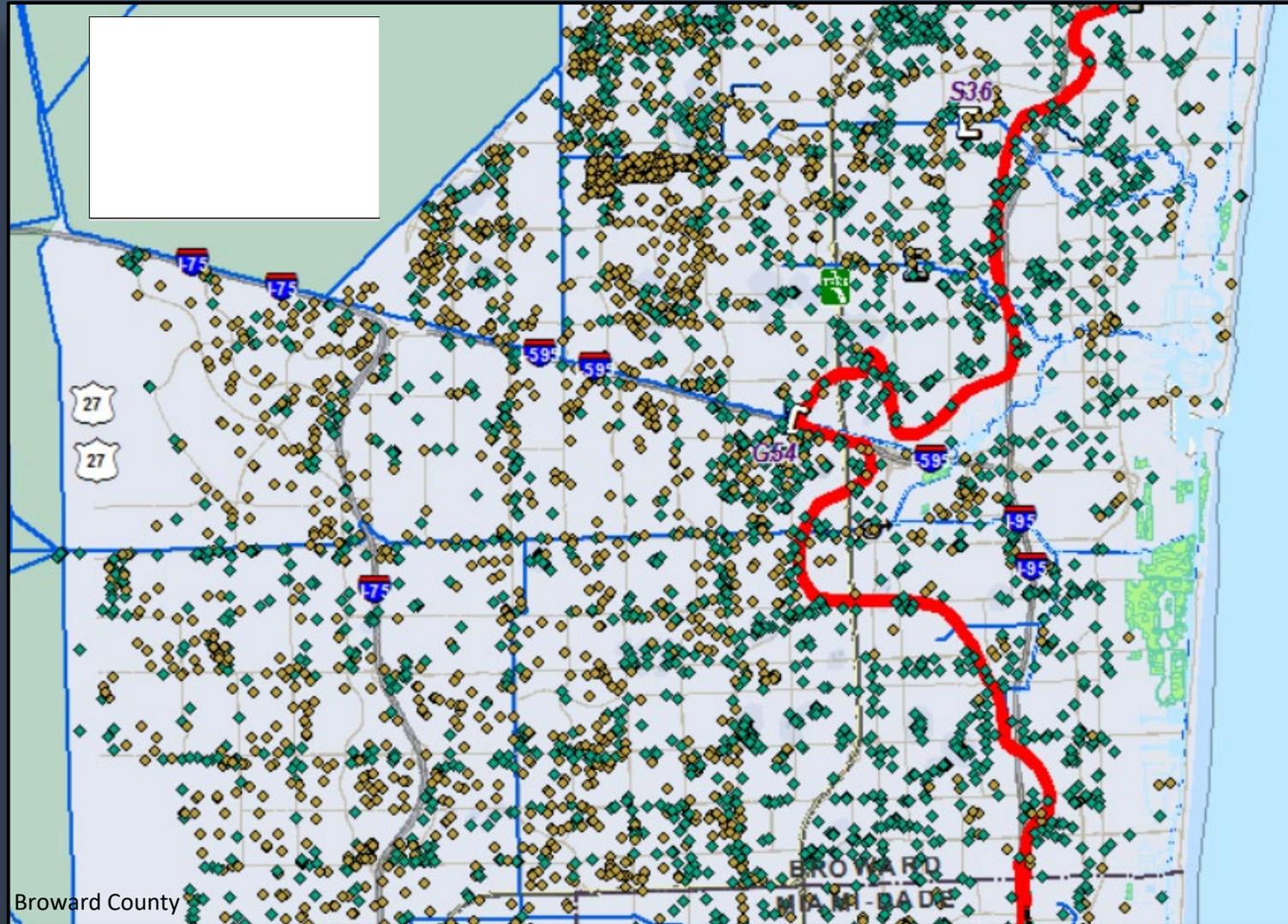
Groundwater withdrawals that result in further movement of a saline water interface

to a greater distance inland toward a freshwater source,

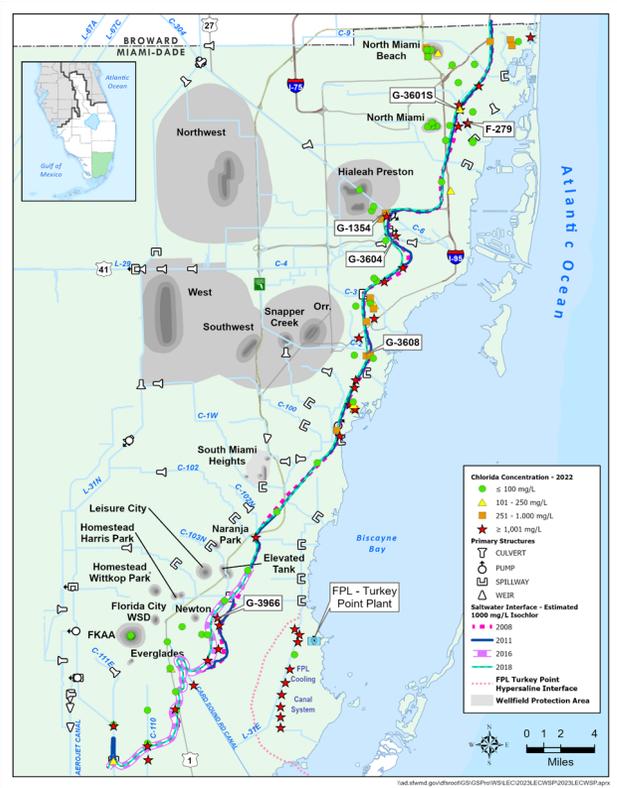
except as a consequence of

- seasonal fluctuations;
- climatic conditions, such as drought;
- operation of the Central and Southern Flood Control Project, secondary canal systems, or stormwater systems.

*(Section 3.4 of Applicant's Handbook for Water Use Permit Applications)*



# BISCAYNE AQUIFER MFL – MONITORING



**Saltwater Interface Mapping**

- SFWMD – published every 5 years for seven coastal counties
  - [www.sfwmd.gov/document/s-by-tag/saltwaterinterface](http://www.sfwmd.gov/document/s-by-tag/saltwaterinterface)
- *Miami-Dade maps – published by USGS*

**Salinity Control structure headwater/tailwater**

- SFWMD telemetry
- Data available in SFWMD DBHYDRO  
<https://www.sfwmd.gov/science-data/dbhydro>

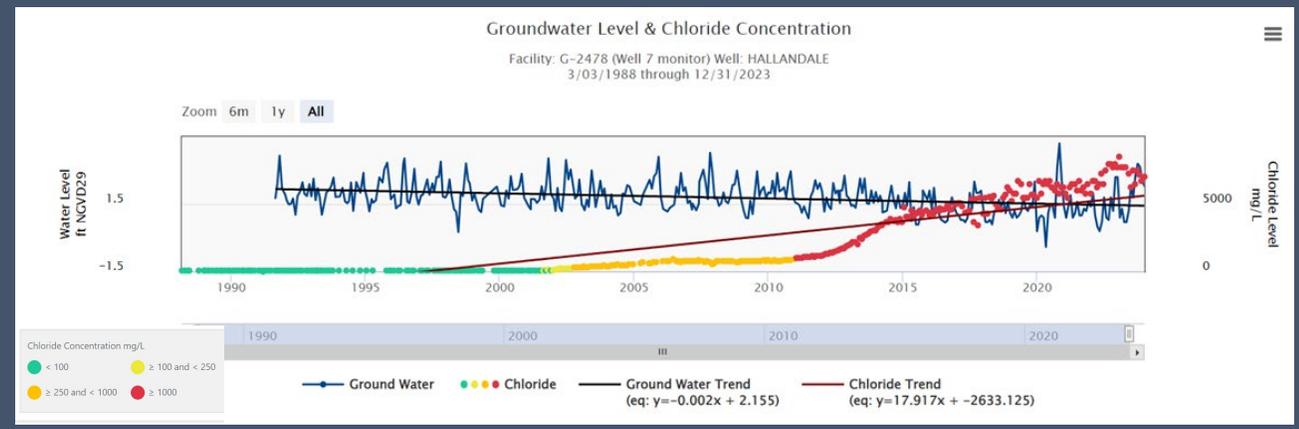
**NOAA tidal stations**

**Regulation Permittee monitoring**

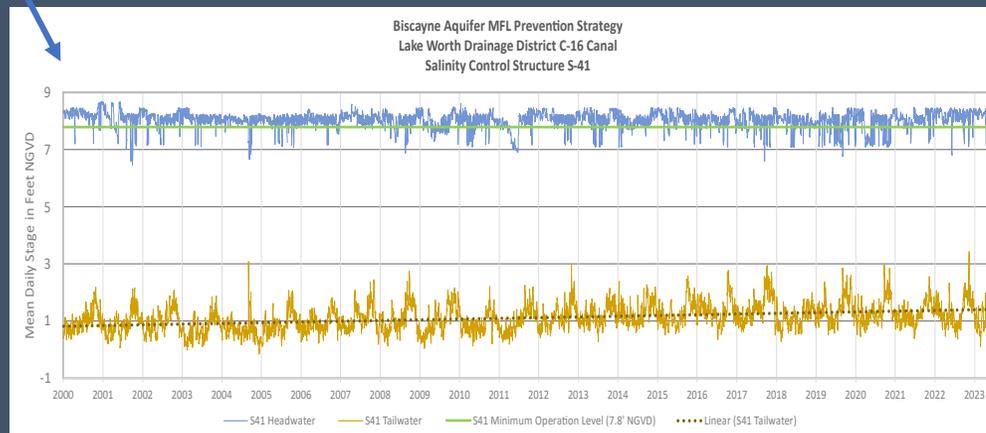
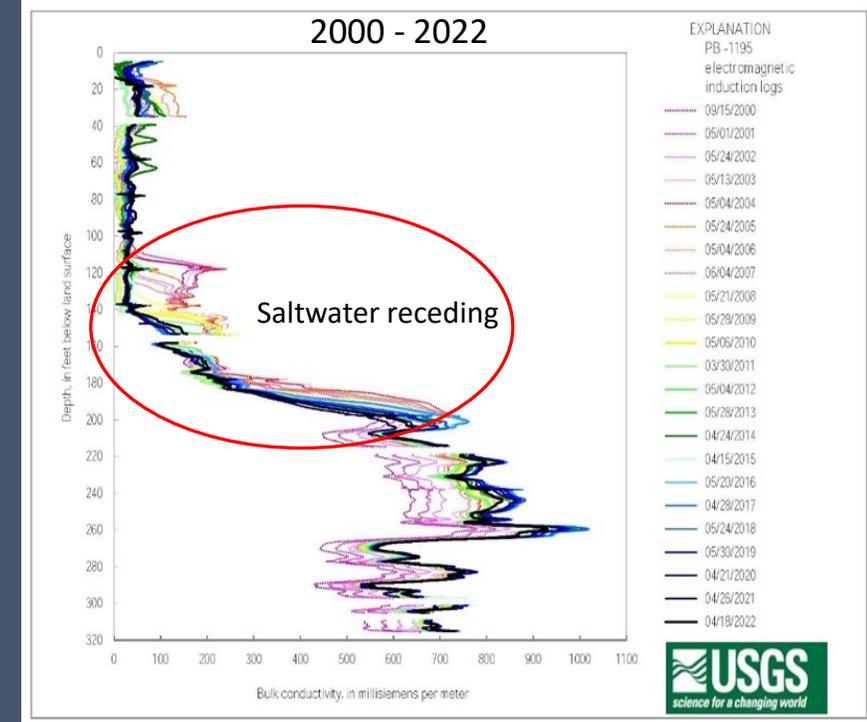
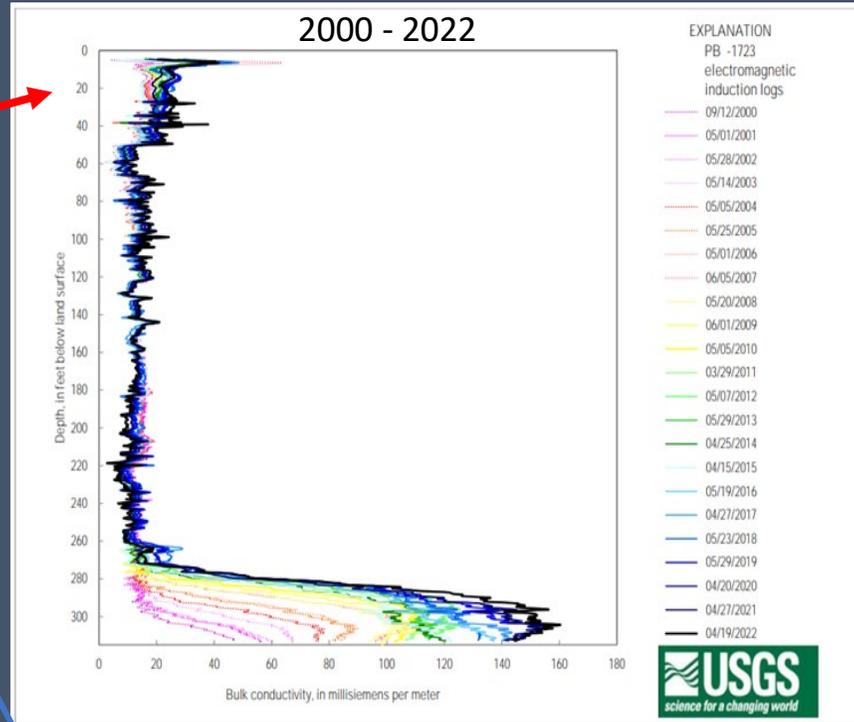
- Utility, recreation, landscape, agriculture  
[DBHYDRO Insights \(sfwmd.gov\)](https://www.sfwmd.gov/dbhydro-insights)

## USGS Cooperative Program

- Monitoring by USGS in coordination with SFWMD, Counties, utilities
- Data available in Water Level and Salinity Analysis Mapper  
<https://fl.water.usgs.gov/mapper/>



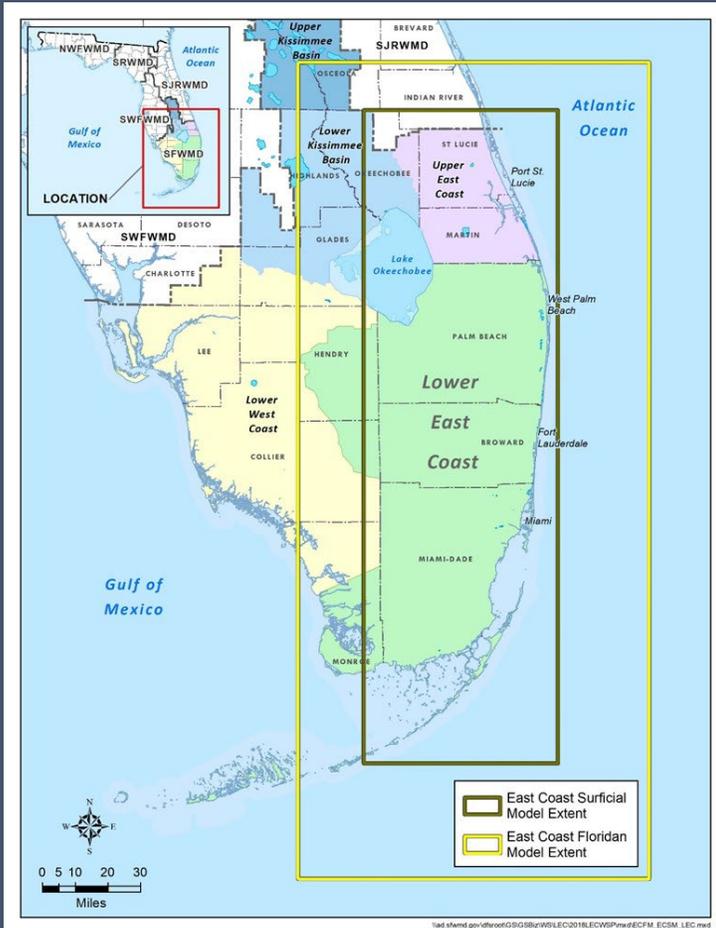
# BISCAYNE AQUIFER MFL – MONITORING



# BISCAYNE AQUIFER MFL – RESEARCH & PROJECTS

Research:

- East Coast Surficial Model (ECSM)  
Density-dependent MODFLOW/SEAWAT



## Water Supply Vulnerability Analysis

2075 ECSM runs with drier/hotter climate and sea level rise

Comprehensive Everglades Restoration Projects:

- C-11 Spreader Canal
- C-9 and C-11 impoundments
- C-9, C-12, and C-13 basins excess water to coastal canal systems



# SEA LEVEL RISE & CLIMATE CHANGE

- MFLs provide tools & baseline data
- Prevention/Recovery strategies have helped abate effects and built some resilience for waterbodies
- Evolving climate conditions will affect ability to meet MFLs
- Future MFL strategy changes require:
  - Conducting research
  - Computer modeling
  - Developing adaptation strategies
  - Coordinating with others to share information & ensure common approach





# Thank You

**Karin Smith, P.G., SFWMD, Resiliency Project Manager**

[karismit@sfwmd.gov](mailto:karismit@sfwmd.gov)

[www.sfwmd.gov/resiliency](http://www.sfwmd.gov/resiliency)