South Florida Water Management District Water and Climate Resilience Metrics Training

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Division of Flood Control and Water Supply (FloWS)

July 29, 2026

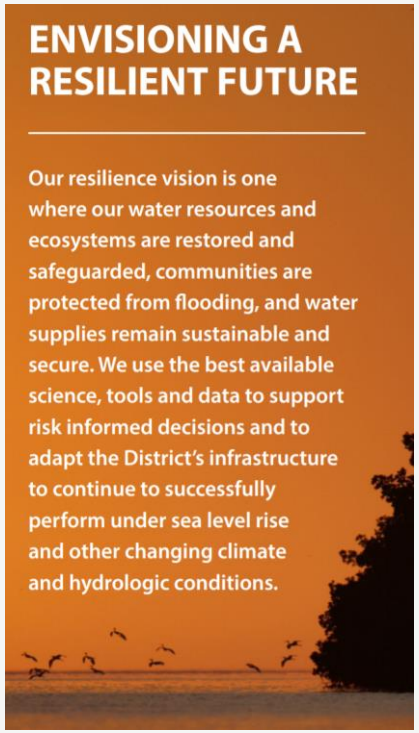
Agenda

1. Welcome and Introduction
2. Water and Climate Resilience Metrics
3. Resilience Metrics Hub
    a. Rainfall
    b. Tidal Elevations
    c. Groundwater Levels and Saltwater Intrusion
    d. Flood Occurrences
4. Q&A
5. Closing Remarks

Welcome and Introduction

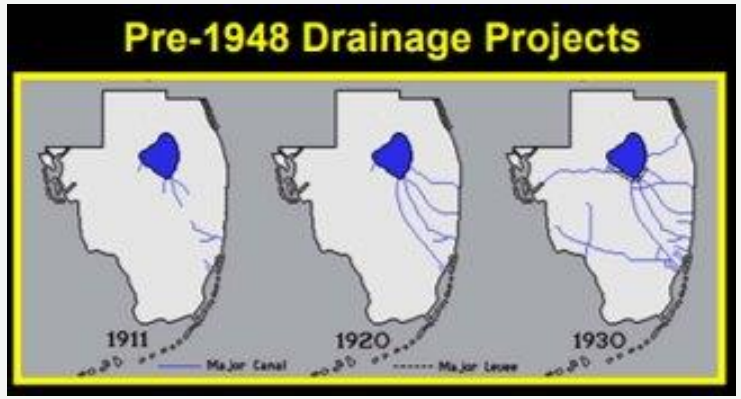
SFWMD mission: *To safeguard and restore South Florida's water resources and ecosystems, protect our communities from flooding, and meet the region's water needs while connecting with the public and stakeholders.*

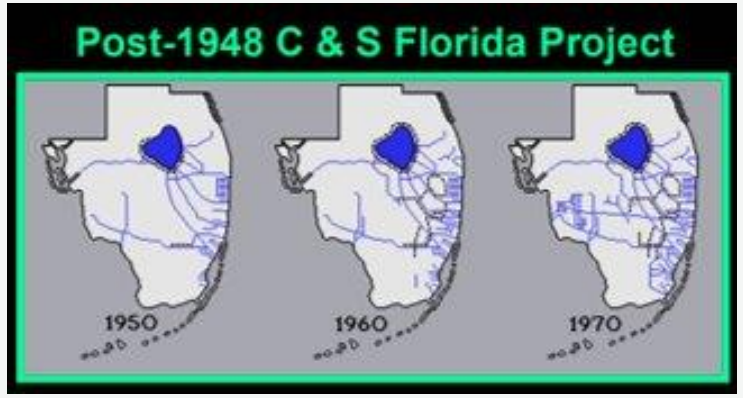
The Division of Flood Protection and Water Supply Planning advances planning and implementation efforts, working closely with internal teams and with local, state, tribal and federal partners. Our team advances water supply and flood control planning, integrating resiliency planning to support risk-informed decision making. We also coordinate implementation through funding applications and managing resiliency grants.

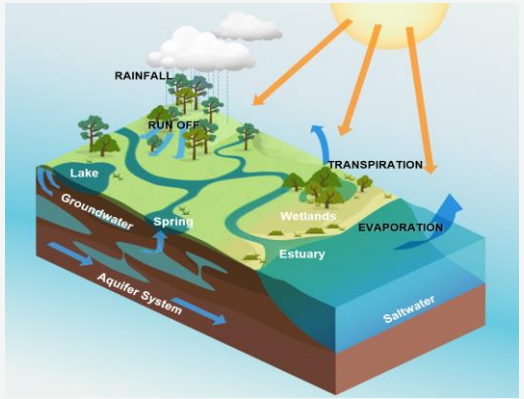


Welcome and Introduction

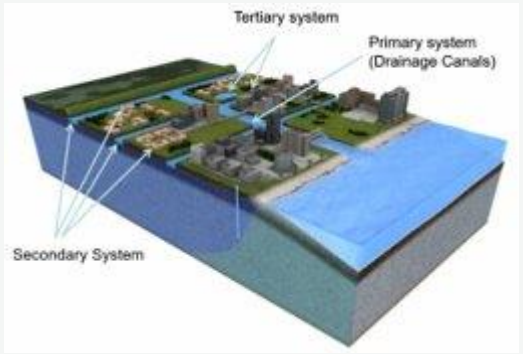
Recognizing changing conditions in a non-stationary climate.

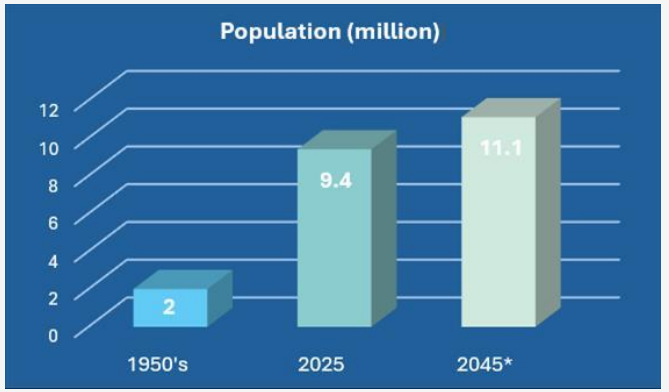






Source: Florida Center for Instructional Technology – University of South Florida





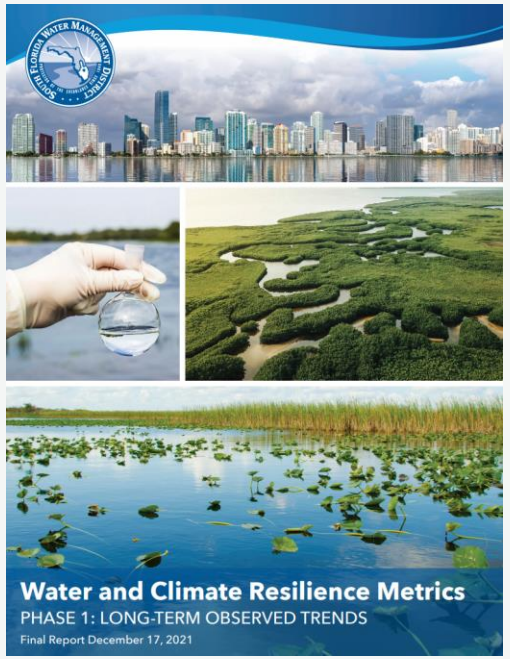
Presenter: Carolina Maran

Water and Climate Resilience Metrics

Water and Climate Resilience Metrics

Goals and Objectives:

- Track and document **trends and shifts in water and climate data** monitored by the District.
- Support long-term term planning by incorporating observed trends into **future scenario formulation**.
- Advance the District's resiliency goals by **informing infrastructure investments and operational decisions** of ensuring flood protection, water supply, and ecosystem restoration mission elements under current and future climate conditions.



Presenter: Carolina Maran

Water and Climate Resilience Metrics

Acknowledgement

The Water and Climate Resilience Metrics work is made possible by the guidance, support, and contributions of dedicated staff across divisions and bureaus at SFWMD.

- FloWS – Planning
- Water Resources Systems Modelling
- Operations – Hydrology & Hydraulics
- Office of Water Quality
- Everglades Systems
- Information Technology
- Geospatial Services

Water and Climate Resilience Metrics

➢ Climate Metrics

Indicators that reflect the primary drivers of observed changes in climate conditions and influence the hydrological cycle.

➢ Resilience Metrics

Indicators that represent the observed effects of changing climate conditions. These may be managed or mitigated through water management operations and/or by implementing adaptation strategies.

METRIC	TYPE OF METRIC	TREND ANALYSIS	AUTOMATION
Rainfall	Climate	✓	✗
Evapotranspiration (ET)	Climate	✓	✓
Tidal Elevations at Coastal Structures	Climate	✓	✓
High Tide Events	Climate	✓	✗
Groundwater Levels	Resilience	✓	✓
Saltwater Interface – Chloride Levels	Resilience	✓	✓
Minimum Flows and Minimum Water Levels (MFLs) – Exceedances	Resilience	✓	✗
Flooding Events	Resilience	✗	✗
Water Temperature	Resilience	✓	✓
Dissolved Oxygen (DO)	Resilience	✓	✓
pH	Resilience	✓	✓
Specific Conductance	Resilience	✓	✓
Estuarine Inland Migration in the Everglades	Resilience	✓	✗
Soil Subsidence in the Everglades	Resilience	✓	✗
Salinity in the Everglades and Biscayne Bay	Resilience	✓	✗
Drought	Climate	✓	✗
Freshwater Lens	Resilience	✗	✗
Stormwater Volume and Flow	Resilience	✗	✗
Algal Bloom	Resilience	✗	✗
Atlantic Multidecadal Variability (AMV)	Climate	✗	✗

Water and Climate Resilience Metrics

Leveraging Existing Data and Processes

- Hydrometeorological and water quality data – *not the focus today's training, we'll share links to publicly accessible, agency-wide tools*
  - DBHYDRO Insights
  - Site conditions
  - Weather
- Data Management (and quality assurance) – Life Cycle

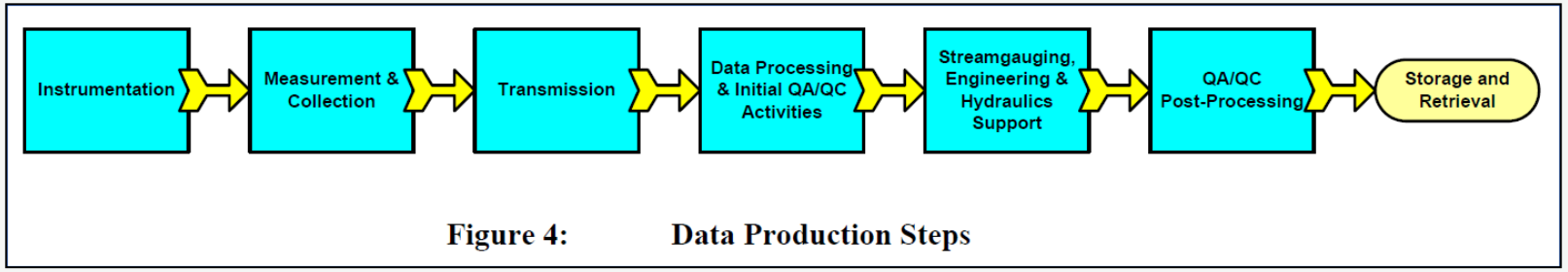


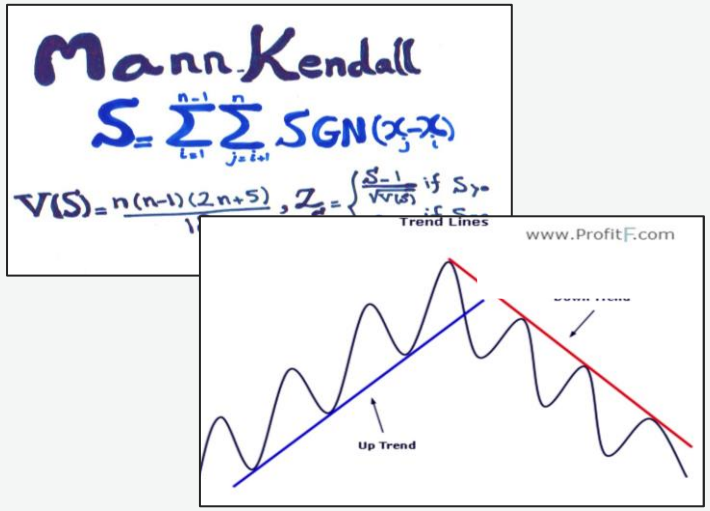
Figure 4: Data Production Steps

Source: *Data Management's Q200 Procedure - Quality Assurance/Quality Control (QA/QC) Section Policy*

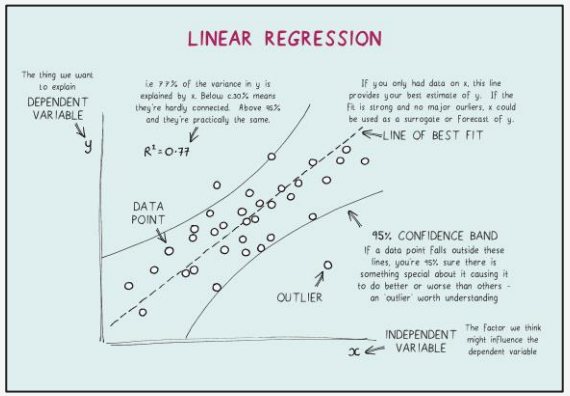
Water and Climate Resilience Metrics

Data analysis approaches recommended by workgroup support consistent interpretation, well established methods in hydrology and ecosystem science.

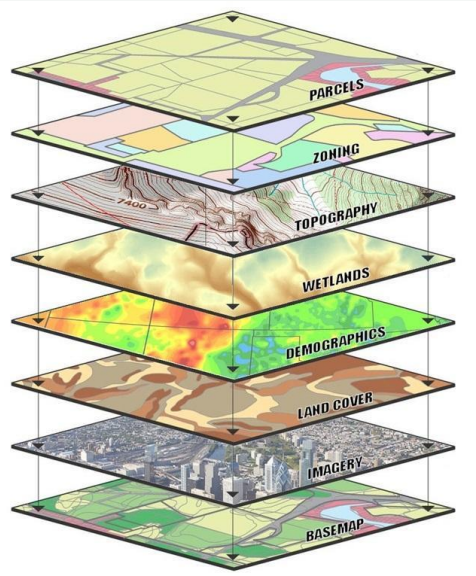
- **Mann Kendall** (Non-seasonal and seasonal) – To identify trends over time.



- **Linear Regression** (correlation, not prediction) – To define relationships between variables.

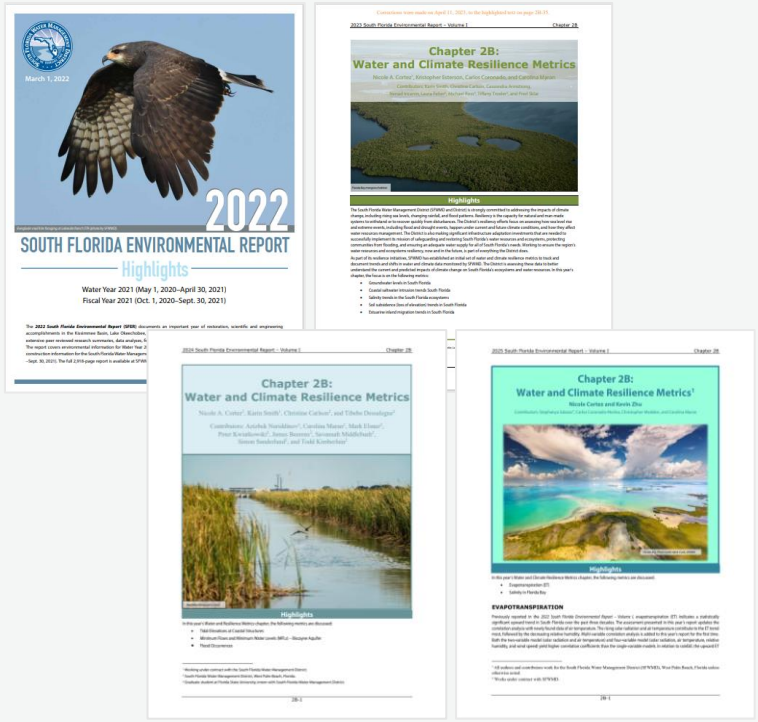


- **GIS** – To visualize spatial trends



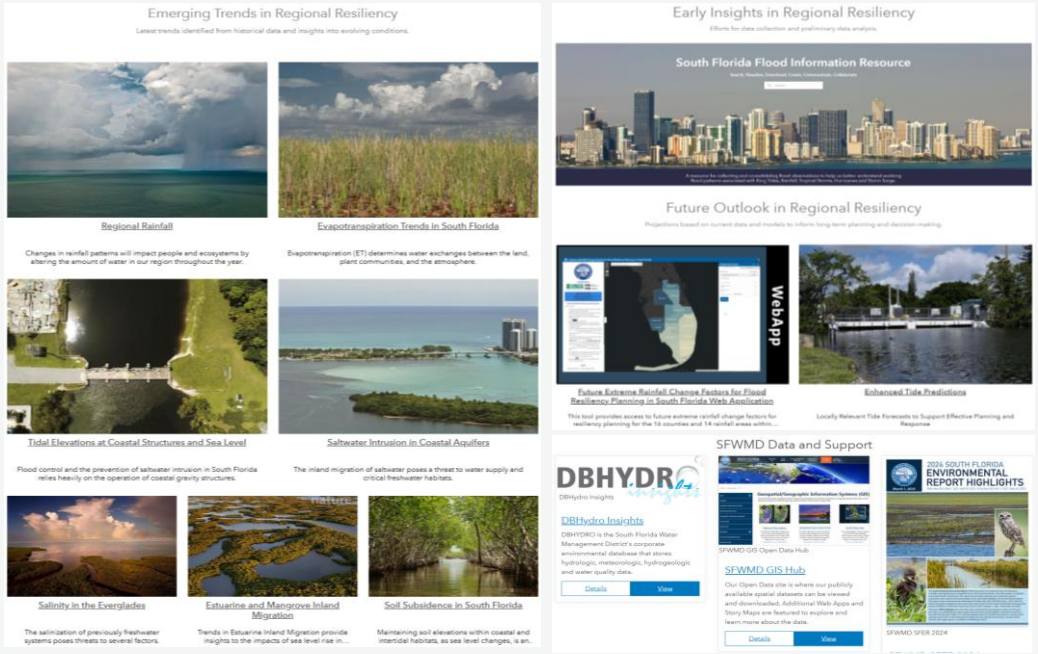
Water and Climate Resilience Metrics

Technical Reports



sfwmd.gov/SFER

Online Resources



sfwmd.gov/ResilienceMetricsHub

Presenter: Nicole Cortez

Water and Climate Resilience Metrics

This training focuses on the interpretation and access of Water and Climate Resilience Metrics data and tools in the **Resilience Metrics Hub**:

- **Emerging Trends in Regional Resiliency**
  Primary focus on latest trends identified from historical data and insights into evolving conditions.
- **Early Insights in Regional Resiliency**
  A brief look at ongoing data collection efforts shaping future trend analysis.
- **Future Outlook in Regional Resiliency**
  Projections based on current data and models to inform long-term planning and decision-making.
- **SFWMD Data and Support**
  Publicly available, agency-wide tools, though not the focus of today's session.
- **State and Local Data Sources**
  State and local agencies are using their resources to build resilient communities.

Presenter: Nicole Cortez

Rainfall

sfwmd.gov/ResilienceMetricsHub

Regional Rainfall

What We Track

- Rain gauges across the District
- Breakpoint & daily rainfall

Trends & Observations

- Significant upward/downward trends or no trends at SFWMD rainfall areas for:
  - Monthly, seasonal, and annual rainfall totals
  - 1-, 3-, and 5-day rainfall maxima
  - Cluster analysis
  - Sub-daily (to be reported in 2027 SFER)

Why It Matters

- Flood Protection & Water Supply Planning

Presenter: Stephanya Salazar

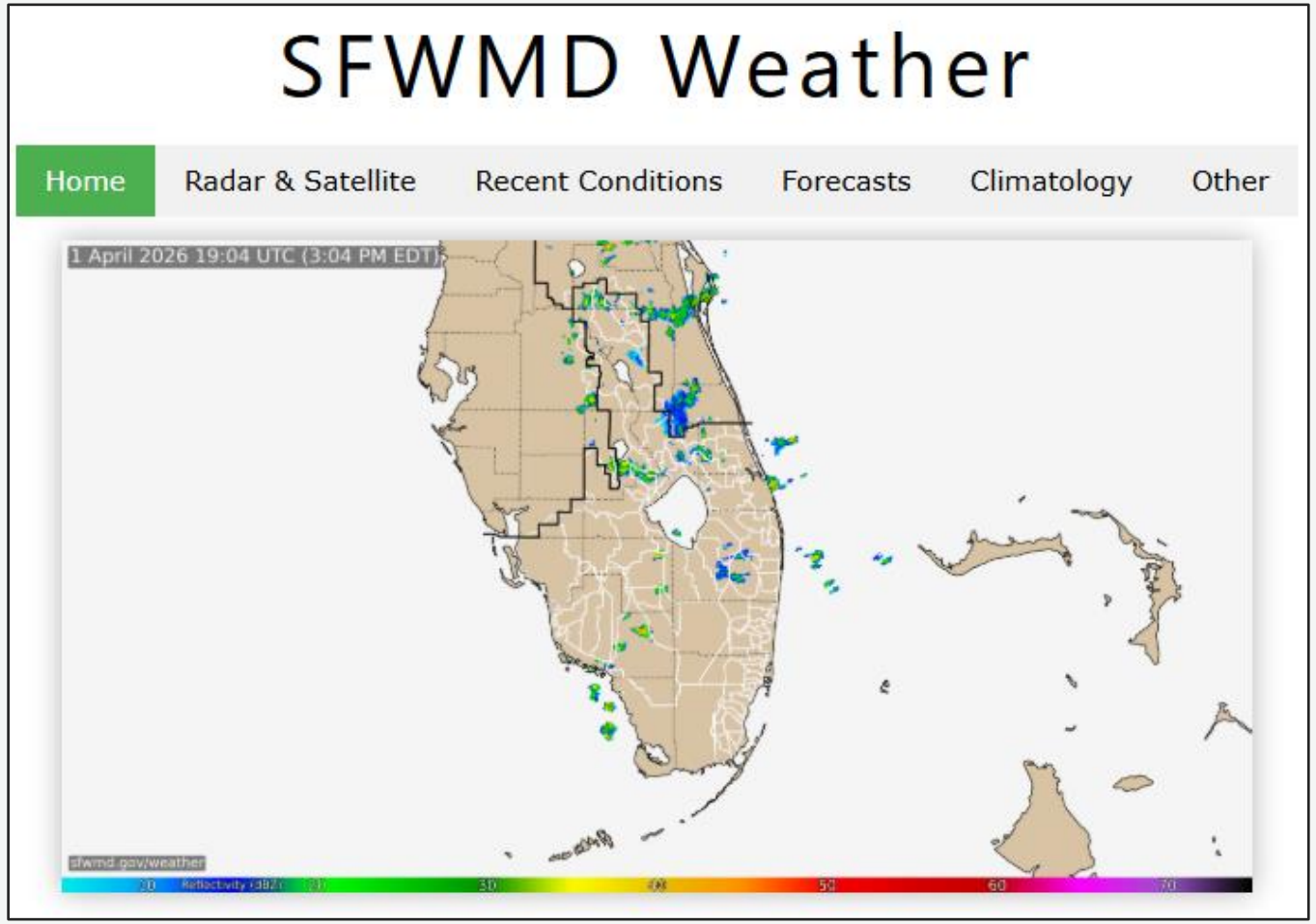
Rainfall

Agency-Wide Tool

SFWMD Weather

The SFWMD Weather site is a central hub for viewing current radar and satellite imagery, recent rainfall conditions, and precipitation trends across the region.

It also provides forecast products and rainfall climatology summaries, including monthly, annual, and seasonal totals.



For more information on this tool, please contact:
weather@sfwmd.gov

Rainfall

Trivia – *This slide was modified after the training session to share the answers.*

In Person Participants

Question:
What is the average annual rainfall for the District?

Answer: ~53 inches

Virtual Participants

Question: Based on the long-term analysis, identify a rainfall area and indicate whether its rainfall trend is neutral, increasing, or decreasing.

Answer: Big Cypress: neutral; Broward: neutral; East Caloosahatchee: increasing; East Everglades: decreasing; etc.

Tidal Elevations

sfwmd.gov/ResilienceMetricsHub

Tidal Elevations at Coastal Structures and Sea Level

Tidal Elevations at Coastal Structures and Sea Level

Flood control and the prevention of saltwater intrusion in South Florida relies heavily on the operation of coastal gravity structures.

What We Track

- Coastal elevations at structures
- Breakpoint & daily tidal levels

Trends & Observations

- Significant upward trends for annual tailwater levels at 32 coastal structures
- Wide range of vulnerability to High Tide Events (HTEs) at 35 coastal structures

Why It Matters

- Flood Protection & Water Supply Planning

Presenter: Stephanya Salazar

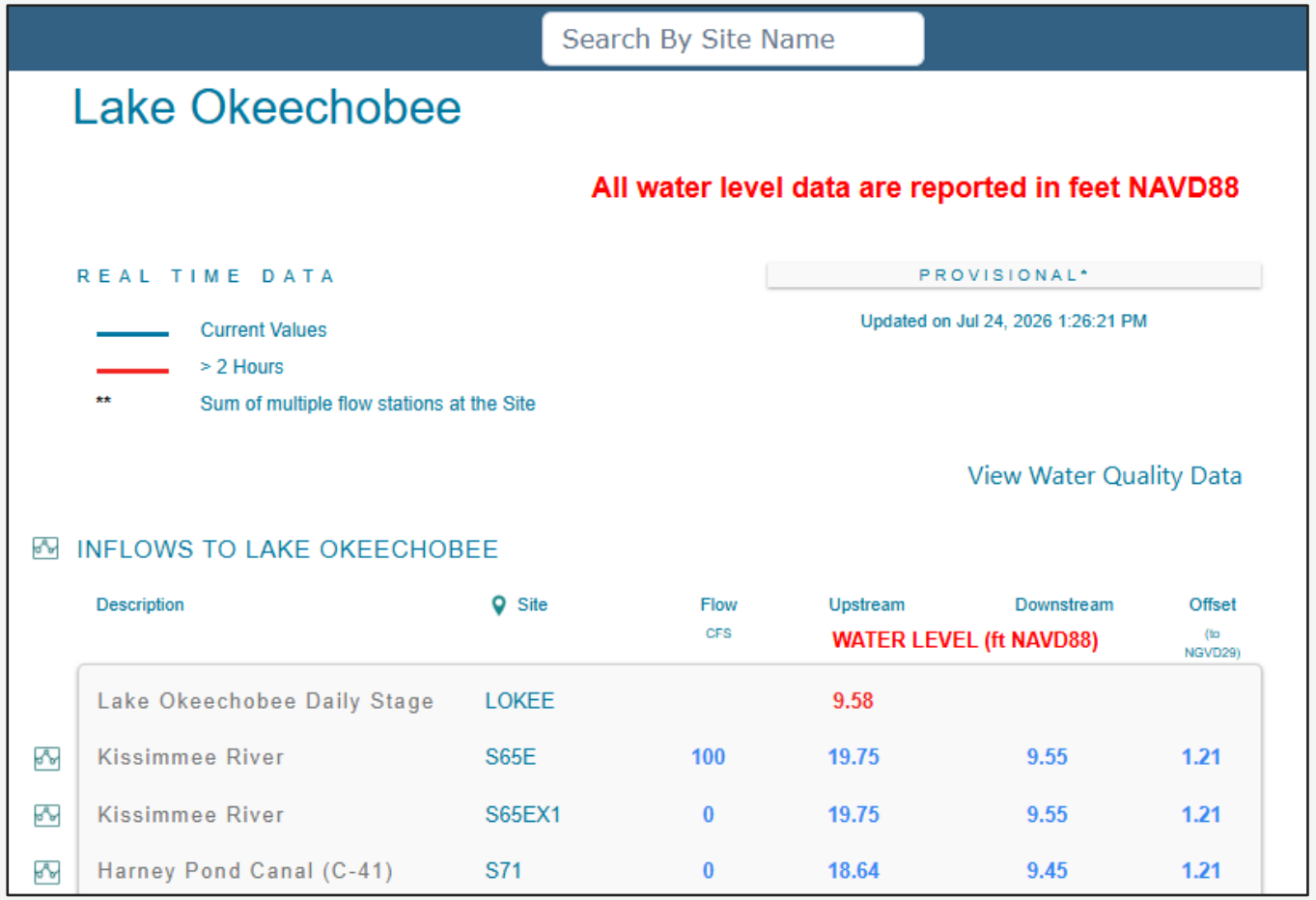
Tidal Elevations

Agency-Wide Tool

SFWMD Real-Time Water Levels

The SFWMD Site Status Report provides comprehensive up-to-the minute information for hundreds of water control structures throughout the SFWMD water management system, organized by regions for ease of navigation.

It shows the current volume of water being moved and the water level upstream and downstream at each location.



For more information on this tool, please contact:
DataRequests@sfwmd.gov

Tidal Elevations

Trivia – *This slide was modified after the training session to share the answers.*

In Person Participants

Question: At how many coastal structures have we analyzed tailwater level data?

Answer: 32 - 35

Virtual Participants

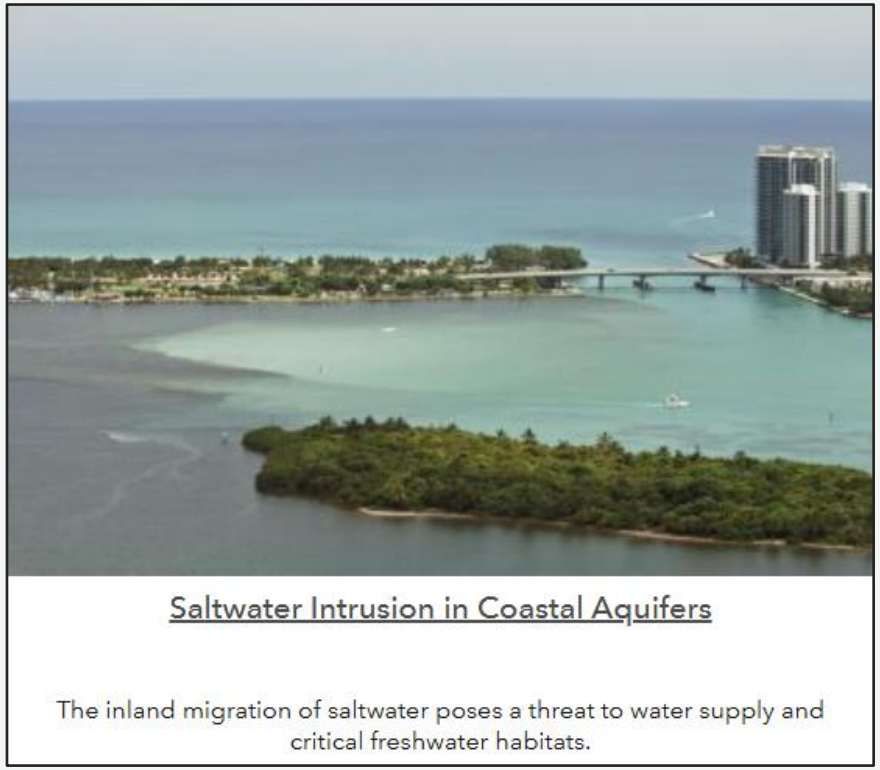
Question: Based on the long-term analysis, what trend has been observed at most coastal structures: neutral, increasing, or decreasing?

Answer: Increasing

Groundwater Levels and Saltwater Intrusion

sfwmd.gov/ResilienceMetricsHub

Saltwater Intrusion in Coastal Aquifers



What We Track

- Wells throughout the District
- Breakpoint & daily aquifer conditions (groundwater levels and Chloride concentrations)

Trends & Observations

- The 2024 saltwater interface mapping effort revealed mixed patterns of interface movement along the South Florida coast:
  - Retreat of the interface toward the coast
  - Inland movement
  - No appreciable change

Why It Matters

- Water Supply Planning

Presenter: Stephanya Salazar

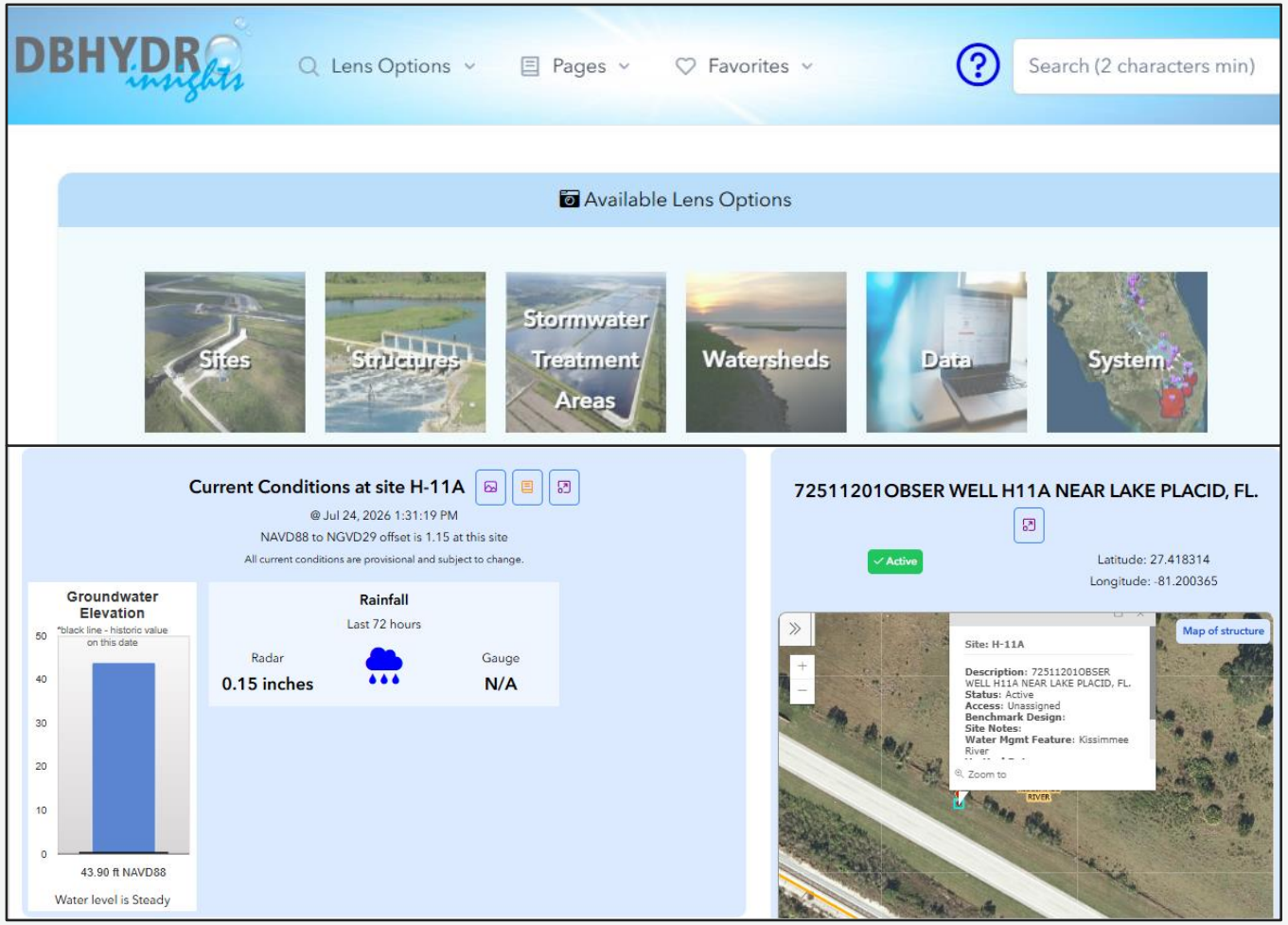
Groundwater Levels

Agency-Wide Tool

DBHYDRO Sites Current Conditions

Use the DBHydro Insights to:

- Locate specific sites (structures or wells).
- View their real-time data, including climatologic, water quality, and hydrologic parameters (water and groundwater elevations).



For more information on this tool, please contact:
DataRequests@sfwmd.gov

Groundwater Levels

Trivia – *This slide was modified after the training session to document the answer.*

In Person Participants

Question: What is the name of the process in which saltwater moves inland and potentially impacts freshwater aquifers?

Answer: Saltwater Intrusion

Virtual Participants

Question: Which two parameters are commonly used to assess saltwater intrusion in coastal aquifers?

Answer: Groundwater Levels and Cl- Concentrations

Flood Occurrences

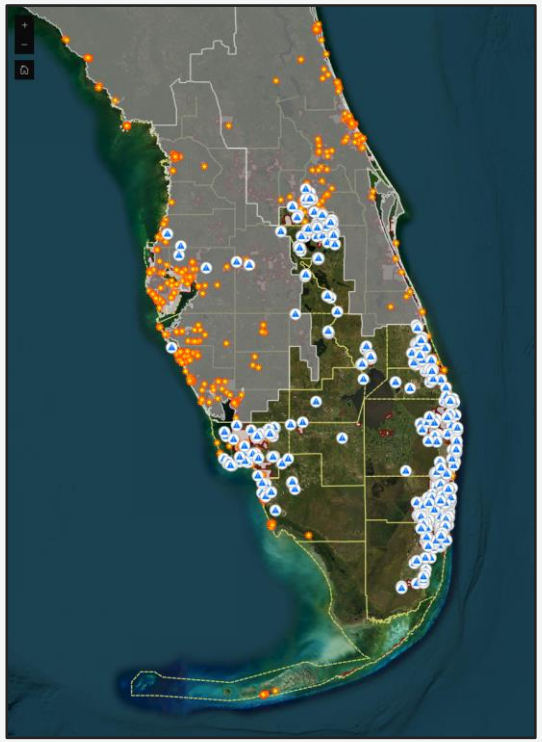
sfwmd.gov/ResilienceMetricsHub

What We Track
- Observed flood reports
- Frequency, depth, duration, and spatial extent

Trends & Observations
- Occurrence and recurrence
- Changes in flood prone areas
- Correlation with flood drivers (rainfall, tidal, & GW)

Why It Matters
- Flood Protection Planning
  - Model calibration and validation
  - Documenting flood damage impacts
  - Analyze long-term terms trends
  - Inform operational and emergency response

South Florida
Flood Information Resource

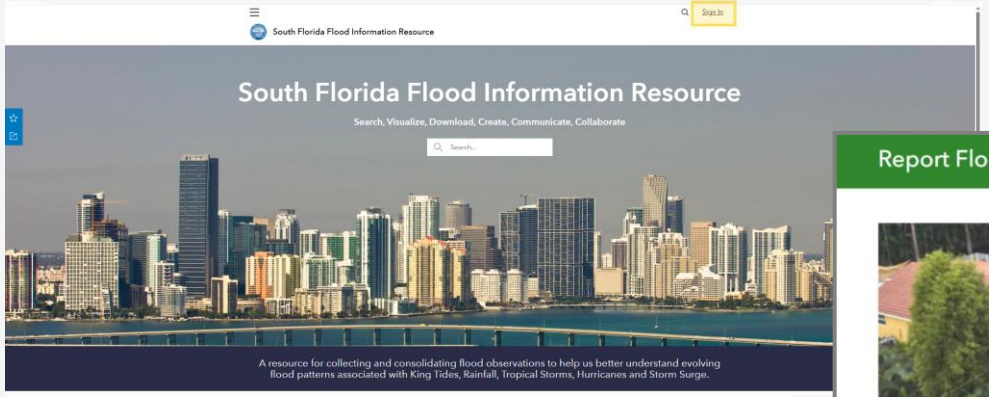


Flood Occurrences

South Florida Flood Information Resource

Presenter: Nicole Cortez

Flood Observations & South Florida Flood Information Resource



South Florida Flood Information Resource Public Viewer:

To access: Click on the image to the left. This application is designed for exploration of publicly shared Flood Information Repository content. Data for this application was compiled from a variety of sources.

South Florida Flood Information Resource Application (aka Stakeholder Dashboard):

Click on the image to the left. This application provides a variety of options to view, filter and download flood observations and high water mark records and photos.

Report Flooding and Early Concerns

Quick Link: sfwmd.gov/FloodingApp

QR Code:

Access: Survey123 application (recommended)
or web browser on a computer or mobile device

Availability: Public

Sign in Required: No

SFWMD HWM Survey

Quick Link: N/A

QR Code:

Access: Survey123 application (recommended)
or web browser on a computer or mobile device

Availability: Trained personnel only

Sign in Required: Yes

Presenter: Nicole Cortez

SFWMD.gov/FloodResource

Flood Occurrences

Trivia – *This slide was modified after the training session to share the answers.*

In Person Participants

Question: Flood Observations represent data collected from across the region. True or false: is this data is sufficient on its own to capture the full picture of flood extent and frequency across South Florida?

Answer: False – flood observations are an early insight, not yet a trend. We are still in active data collection mode and do not have the depth of record needed to draw directional conclusions.

Virtual Participants

Question: Why is flooding one of the hardest hydrologic events to capture with traditional monitoring networks?

Answer: Floods are spatially variable and short-lived – traditional hydrometeorologic monitoring networks may not record localized flooding. *Our monitoring reach as a regional agency has limits, making partnerships with local governments and the public essential to building a more complete picture.*

Questions & Answers

In Person

- We'll begin with questions from in-person participants, followed by virtual participants.
- Please raise your hand to be called upon.
- Use the nearest microphone and speak clearly into the microphone.
- State your name, affiliation, and the agenda item your question pertains to.
- As a courtesy to others, please keep questions concise.

Presenter: Nicole Cortez

Questions & Answers

MS Teams

- Use the Raise Your Hand feature.
- Unmute your microphone when called upon and speak clearly into your microphone.
- State your name, affiliation, and the agenda item your question pertains to.
- As a courtesy to others, please keep questions concise.

Closing Remarks

Water and Climate Resilience Metrics – Key Takeaways:

- SFWMD has established an initial set of metrics to aid climate-informed decision-making and resilience planning.
- SFWMD has documented emerging trends in water and climate metrics monitored by SFWMD to inform and support its mission activities.
- SFWMD is reporting metric's specific updates annually via the SFER and updates on the Resilience Metrics Hub.
- SFWMD is effectively monitoring evolving climate conditions and system responses.
- SFWMD is actively collaborating with local and regional institutions to both develop approaches for determining future scenario projections and create the projections.

Presenter: Nicole Cortez

Closing Remarks

2027 South Florida Environmental Report (SFER)

Chapter 2A: South Florida Hydrology and Water Management

- Water Year 2026 (May 1, 2025 – April 30, 2026)
  - Hydrology
  - Water Management
  - Event Summaries

Chapter 2B: Water and Climate Resilience Metrics

- Long-term Trends
  - Sub-daily Rainfall
  - Flooding Events
  - Water Quality
  - Algal Blooms

Key Dates

- **Public Review Period:** November 3 – 23, 2026
- **Publication Date:** March 1, 2027

Resilience Metrics Hub

- The hub is updated after SFER publication.

Access the Entire Report:
2026 South Florida Environmental Report

Poster Exhibitions: View the Posters

Water and Climate Resilience Metrics

We want to hear from you!

- This training was developed in response to direct feedback and interest from partner agency staff across the region.
- Our goal today was to go beyond sharing high-level updates and give you a deeper look at the data, tools, and findings behind the metrics work.
- Please complete the feedback survey.
  - Your input helps us understand what was useful and what could be improved.
  - Would an annual training session like this be valuable to you?

https://forms.cloud.microsoft/g/qD8hDhtpNp

Presenter: Nicole Cortez

Resiliency Coordination Forum

Join us!

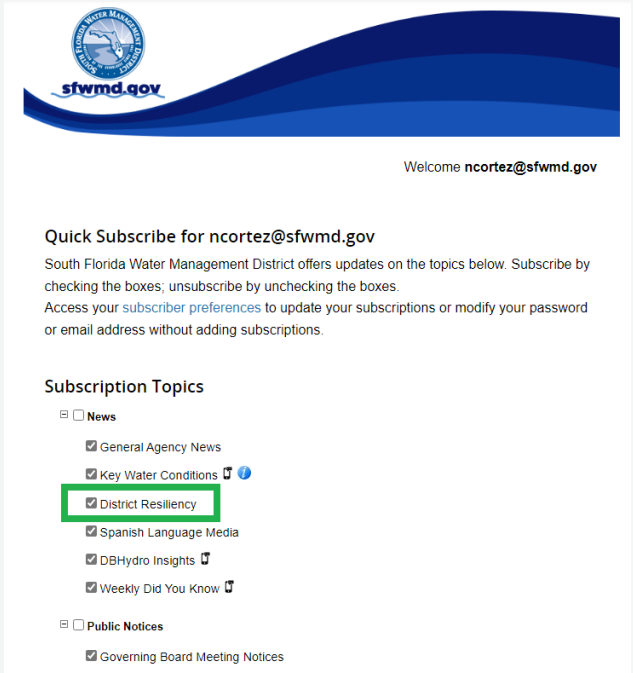
- The South Florida Resiliency Coordination Forum is a fact-finding forum to promote regional coordination and collaboration on water management and resiliency initiatives between local, state, federal and tribal partners.
- The forum hosts proactive discussions to engage project partners, leverage technical knowledge, exchange information, and foster a constructive environment to discuss tangible asset-level solutions and support decision-making.
- Next Meeting:
  - **Wednesday, October 21, 2026**

Presenter: Nicole Cortez

Subscribe Up for Updates

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



Thank you!

resiliency@sfwmd.gov