WATER AND CLIMATE RESILIENCE METRICS

Public Workshop

December 17, 2021

South Florida Water Management District

Welcome

Moderator: Yvette Bonilla

Q&A Session

If you're participating in person – please fill out a question card and give to a meeting attendant

If you're participating via Zoom – use the chat function to submit a written question

Public Comments

If you're participating in person – please fill out a comment card and give to a meeting attendant

If you're participating via Zoom – use the Raise Hand feature

If you're participating via Phone –
*9 Raises Hand
*6 Mutes/Unmutes

Moderator: Yvette Bonilla

Opening Remarks

Drew Bartlett

Executive Director
South Florida Water Management District

Opening Remarks

Adam Blalock

Deputy Secretary for Ecosystems Restoration
Florida Department of Environmental Protection

Opening Remarks

Dr. Wesley Brooks

Chief Resilience Officer for the State of Florida

Introduction and Background

Carolina Maran , Ph.D., P.E.
District Resiliency Officer
South Florida Water Management District

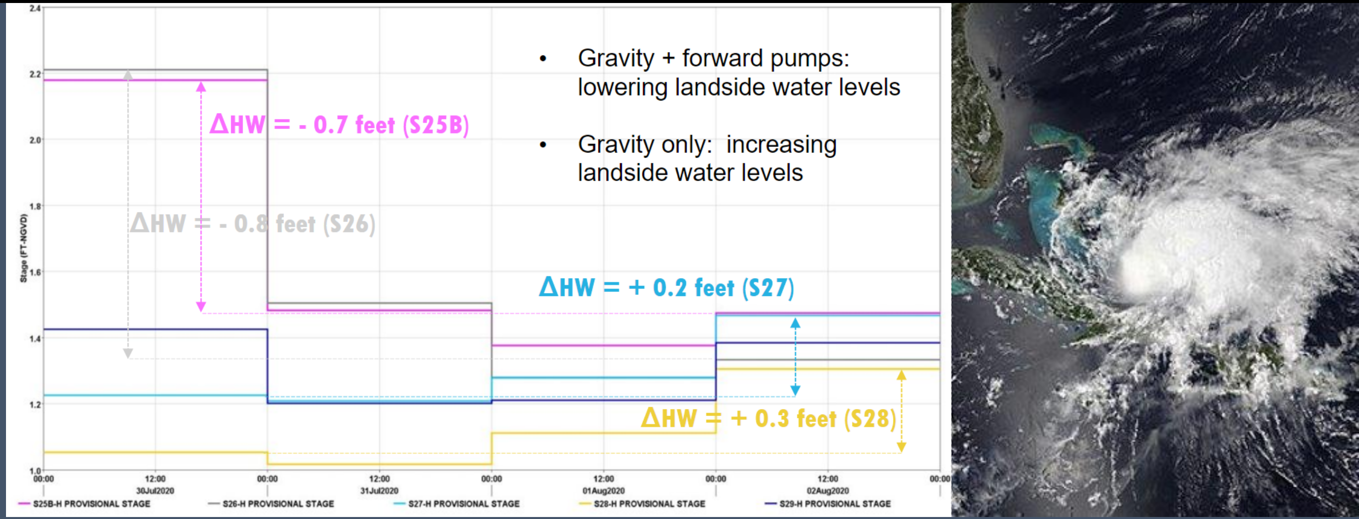
2021 Extreme Events in South Florida

- Less Intense King Tide Season, with no significant tropical cyclones contributing to swells along the Atlantic Ocean, near Florida
- 2021 Atlantic Hurricane Season – third most active (exhausted the names, two consecutive years)
- Impacts from Extreme Rainfall Flood, i.e. Downtown Miami (in November) and King Tide Flood, i.e. Palm Beach (in October)

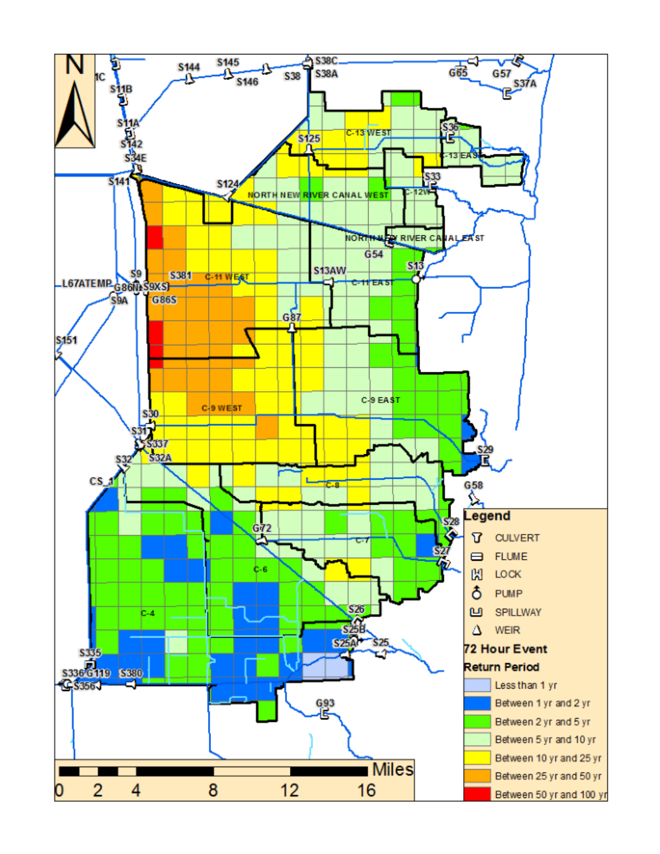
Source: The Palm Beach Post, King Tide Flooding (November 2021)

Presenter: Carolina Maran

2020 Extreme Events

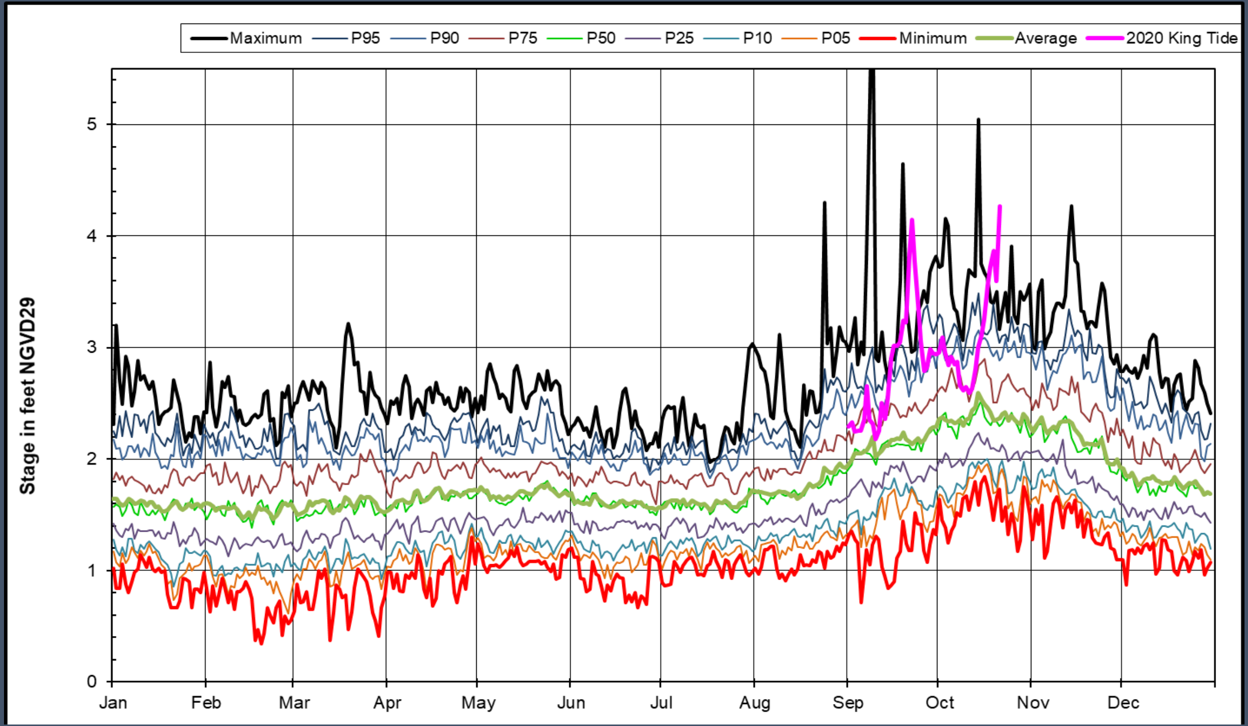


Hurricane Isaias

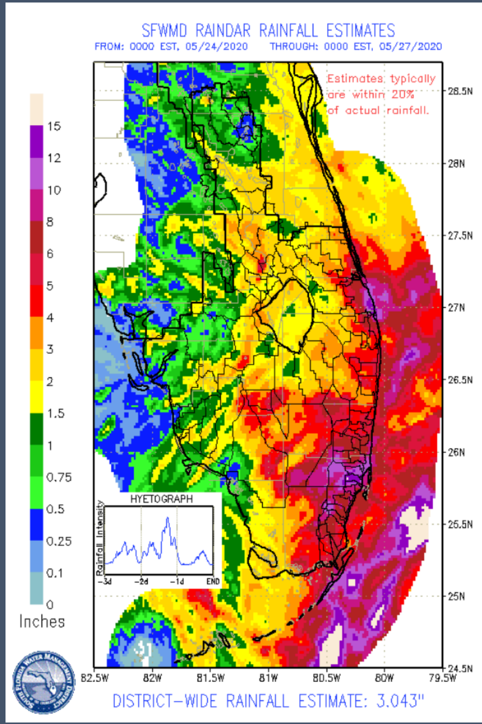


Tropical Storm Eta

2020 King Tide Season



Memorial Day Rainfall



Presenter: Carolina Maran

How significant was 2020, 2021 compared to the record?

What impacts are we observing in South Florida?

How can we associate these impacts with Climate Change?

Are these recent events part of a long-term trend?

Presenter: Carolina Maran

Water and Climate Resilience Metrics

OBJECTIVES

1. Track and document long term trends and shifts in observed data owned/managed by SFWMD

2. Advance the understanding of the climate change impacts over the District's mission

3. Report and Communicate the water and climate resilience aspects, and the associated science

4. Support the assessment of future conditions, and propose uniform guidelines.

Presenter: Carolina Maran

Water and Climate Resilience Metrics

BENEFITS

- Stronger SFWMD planning capacity by documenting and publishing observed trends districtwide, based on best available data analysis and science-based approaches
- Better substantiated modeling assumptions and risk informed operational decisions
- Smarter infrastructure investment decisions, supported by robust assessment of current and anticipated future climate conditions
- More educated and engaged stakeholders and partner agencies in water resilience aspects
- Enhanced resilience of District's projects, regarding observed or expected changes in climate

Presenter: Carolina Maran

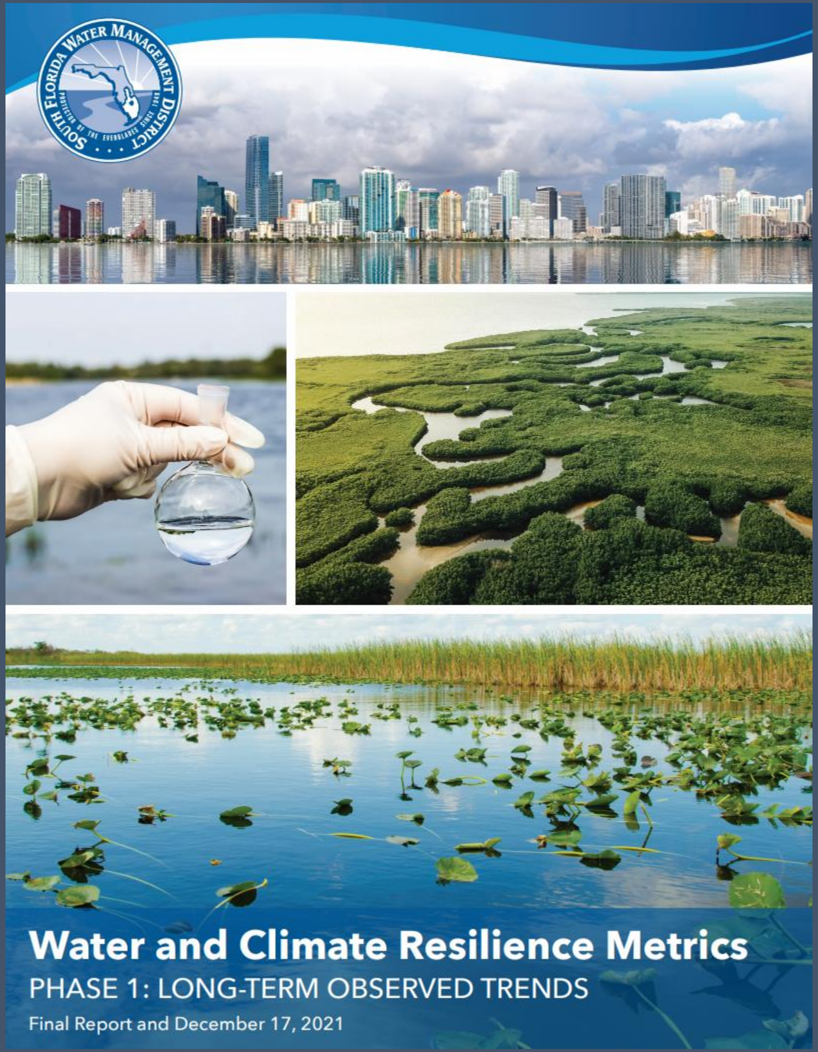
Main Drivers

Climate Metrics — Primary drivers of change

Resilience Metrics — Consequences of change, cascading drivers

Presenter: Carolina Maran

Internal Workgroup Final Report

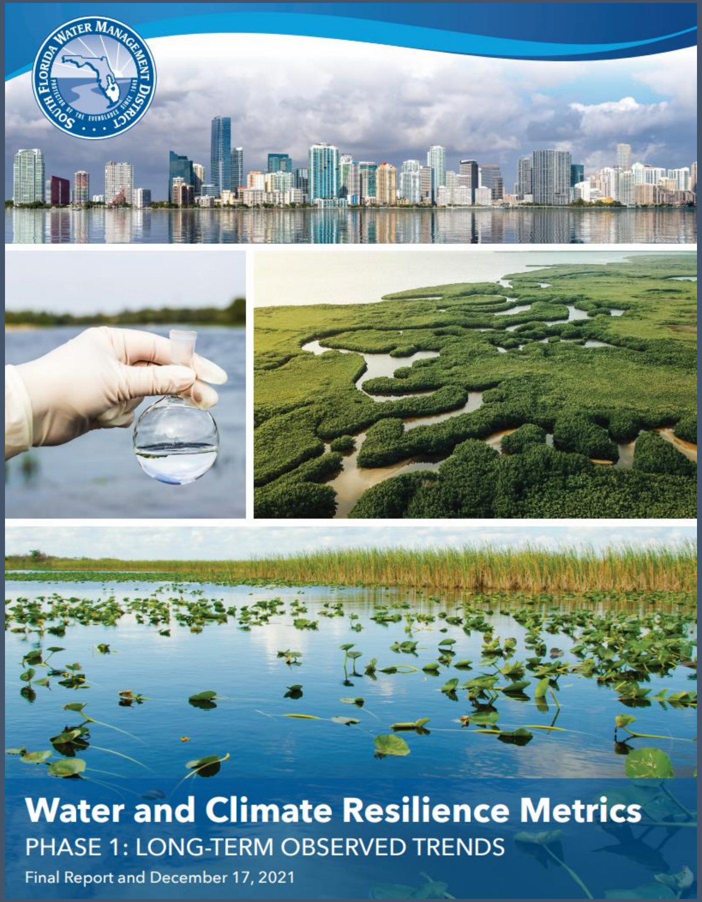


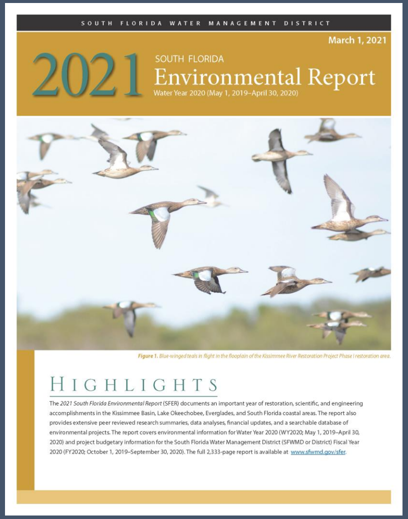
Stakeholder Comment (USGS): "the *report represents a comprehensive and insightful review of available data that will help guide the South Florida Water Management District in their many critical directives in water-resources management over the long term. Pulling all of this information together and providing the data analysis will make this document invaluable not just for the SFWMD, but also many of the stakeholders and other resource-managers within the district boundaries. It may also serve as a template for the other WMDs in* ***pointing to data and analysis needed for long-term planning under changing conditions****.*"

Presenter: Carolina Maran

Bringing Water and Climate Resilience Metrics to the South Florida Environmental Report (SFER), and the District Resilience Metrics Hub

Nicole A. Cortez
District Resiliency Coordinator
South Florida Water Management District





South Florida Environmental Report (SFER)

Resilience Metrics Hub

Presenter: Nicole Cortez

SFER ANNUAL REPORTING

- Home for scientific discussions
  - Provides the public with the science and data used to drive decisions at the SFWMD.
  - Documents restoration, water quality, scientific and engineering accomplishments in South Florida each Water Year (May 1 – April 30).

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

March 1, 2021

2021 SOUTH FLORIDA Environmental Report

Water Year 2020 (May 1, 2019–April 30, 2020)

Figure 1. Blue-winged teals in flight in the floodplain of the Kissimmee River Restoration Project Phase I restoration area.

HIGHLIGHTS

The *2021 South Florida Environmental Report* (SFER) documents an important year of restoration, scientific, and engineering accomplishments in the Kissimmee Basin, Lake Okeechobee, Everglades, and South Florida coastal areas. The report also provides extensive peer reviewed research summaries, data analyses, financial updates, and a searchable database of environmental projects. The report covers environmental information for Water Year 2020 (WY2020; May 1, 2019–April 30, 2020) and project budgetary information for the South Florida Water Management District (SFWMD or District) Fiscal Year 2020 (FY2020; October 1, 2019–September 30, 2020). The full 2,333-page report is available at www.sfwmd.gov/sfer.

SFER ANNUAL REPORTING - 2022

- Resilience Metrics Content:
  - Chapter 2A
    - Same content previously featured in Chapter 2
    - With the addition extreme hydrological event summaries
  - Chapter 2B – Water and Climate Resilience Metrics
    - Rainfall
    - Evapotranspiration
    - Tidal Elevations at Coastal Structures
    - Water Quality
- Important dates:
  - Monday January 17 – Draft opens for public review
  - Tuesday March 1 – Final 2022 SFER Published

Chapter 2B: Water and Climate Resilience Metrics

Nicole A. Cortez, Dr. Carolina Maran, Kevin Zhu, Nenad Iricanin, Dr. Alaa Ali, Dr. Tibebe Dessalegne

Contributors: Akintunde Owosina and Jenifer Barnes.

BACKGROUND

This chapter introduces the Water and Climate Resilience Metrics, being established by SFWMD Resiliency Team, in collaboration with technical leads from Hydrology and Hydraulics, Water Supply, Water Quality, Applied Science, Hydrology and Hydraulics, and geospatial information technology services, and with contributions from the overall District teams.

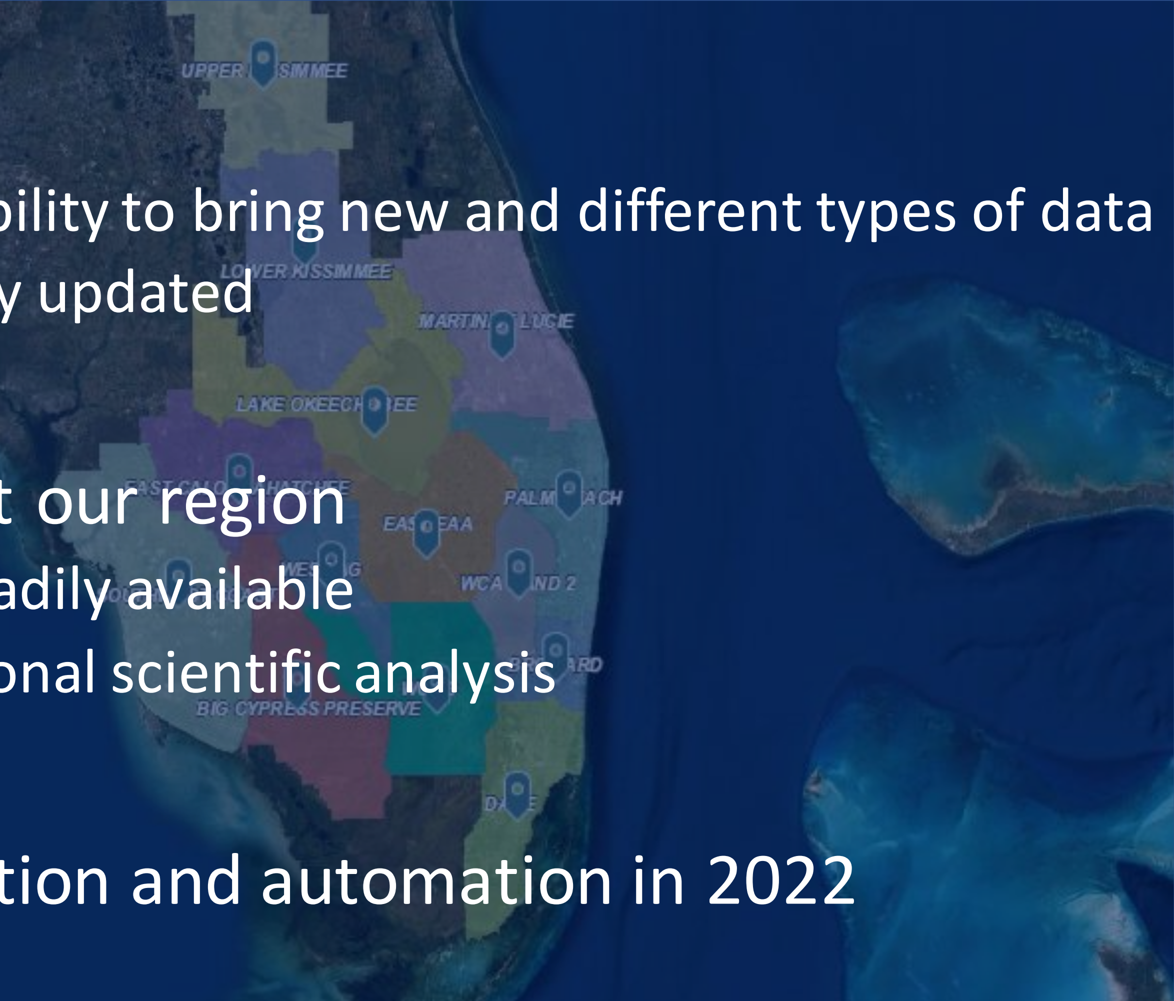
The Water and Climate Resilience Metrics effort was initiated in June 2020 with the goal of tracking and documenting trends and shifts in water and climate data monitored by SFWMD. This effort supports SFWMD's resiliency goals of ensuring ecosystem restoration, flood protection, and water supply mission elements accounting for current and future climate conditions, in collaboration with local, state, and federal agencies in South Florida.

Although many aspects of climate change are still uncertain, SFWMD is assessing its current and predicted impacts on South Florida's ecosystems and water resources. The combination of changes to climate variables such as rainfall, temperature, evapotranspiration, and their consequential impacts such as sea level rise, saltwater intrusion, and groundwater elevation, has the potential of substantially altering water management system operations and infrastructure needs.

As part of its role of coordinating scientific data and research to ensure SFWMD's resilience planning and projects are founded on the best-available science, SFWMD Resiliency team, under the leadership of the Executive Team, has prioritized the analysis of its monitored water and climate data. The continuous observation of trends and shifts in this data serves as the foundation for more robust infrastructure planning and operational decisions, with consideration of how sea level rise and extreme events, including flood and drought events, happen under current and future climate conditions, and how they affect water resources management. As a result of still relative uncertainty, the assessment of climate change impacts on South Florida's water resources and ecosystems are based on the best-available science, along with the collective experience and best professional judgment of District technical staff.

As part of SFWMD's communication and public engagement priorities, the advancement of Water and Climate Resilience Metrics provides continued information to stakeholders, the general public, and partner agencies, while supporting local resilience strategies. The ultimate purpose of these efforts is to ensure water resources and ecosystems resilience for the present and in the future.

RESILIENCE METRICS HUB: [SFWMD Resiliency (arcgis.com)]



- Living data hub
  - Offers the flexibility to bring new and different types of data
  - Will be regularly updated
- A tool to support our region
  - Making data readily available
  - Advance additional scientific analysis
- Full implementation and automation in 2022

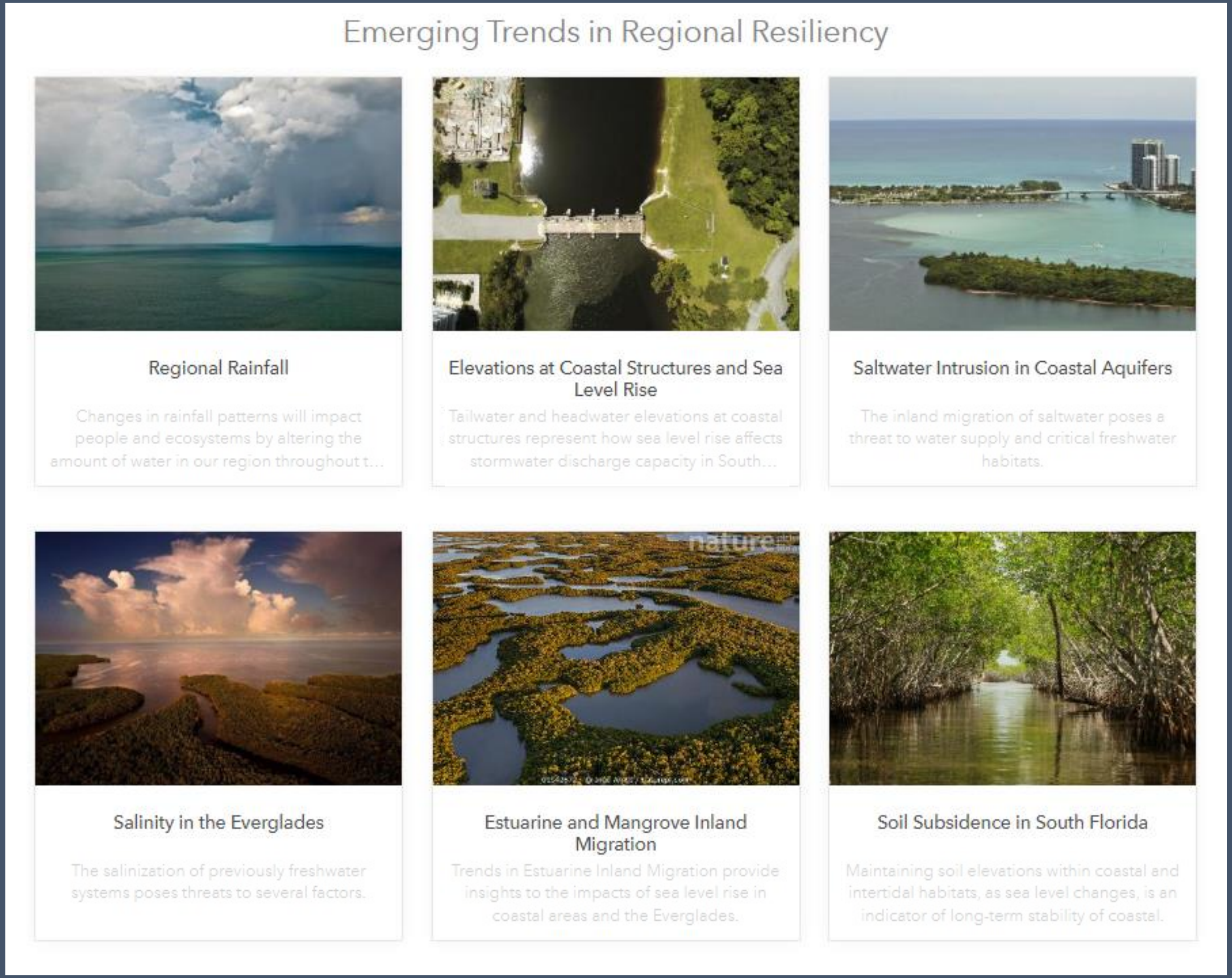
RESILIENCE METRICS HUB: SFWMD Resiliency (arcgis.com)

- Story Maps for:
  - Estuarine Inland Migration in the Everglades
  - Salinity in the Everglades
  - Soil Subsidence
  - Saltwater Interface

- Under development:
  - *Rainfall*
  - *Tidal Elevations*

    at Coastal Structures and SLR

- Future plans

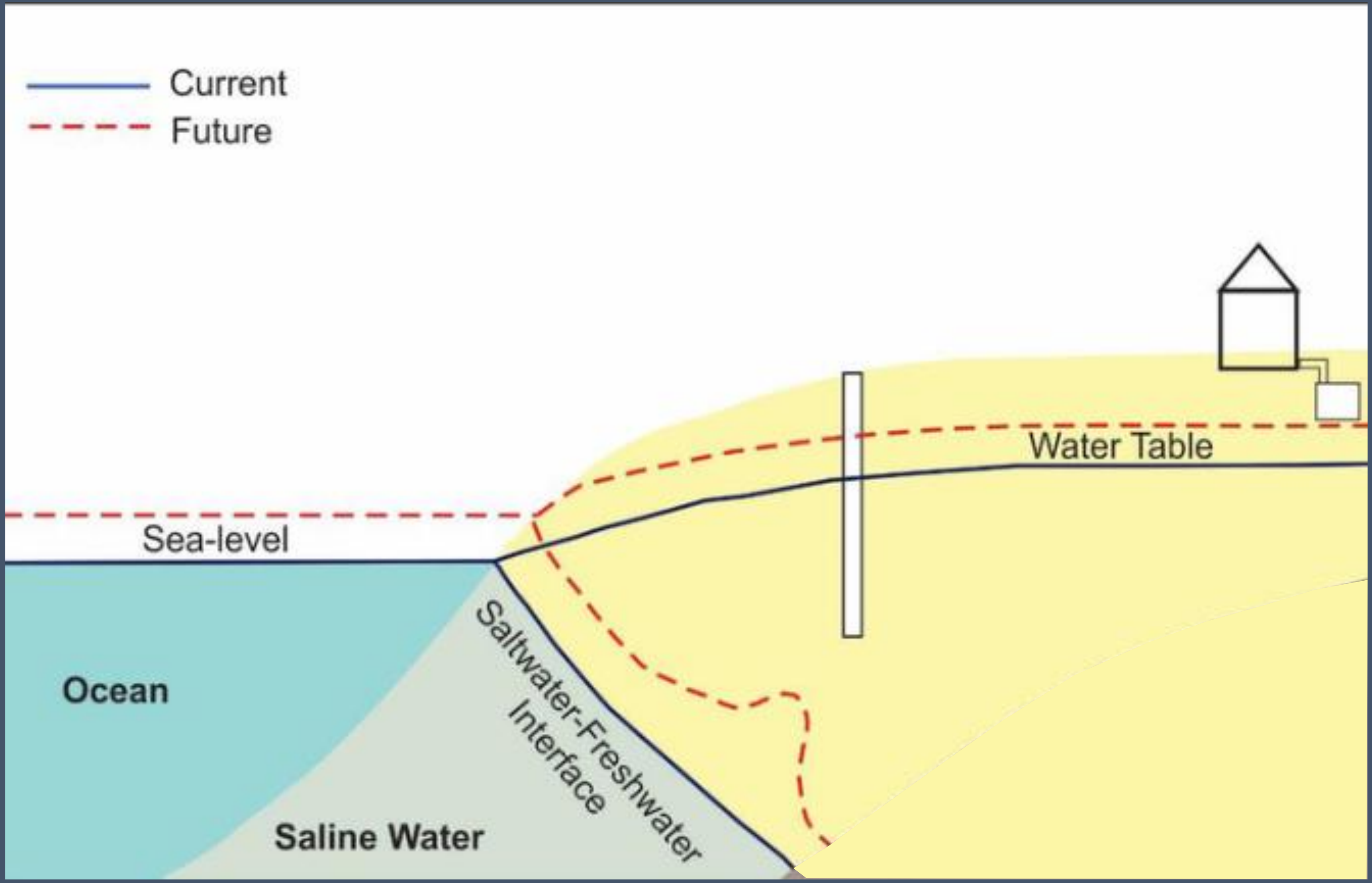


Observed Trends in Groundwater: Groundwater Stages and Saltwater Intrusion

Karin Smith, P.G.
Principal Scientist
Water Supply Bureau

Technical Lead: Karin Smith

Groundwater Stages and Saltwater Intrusion



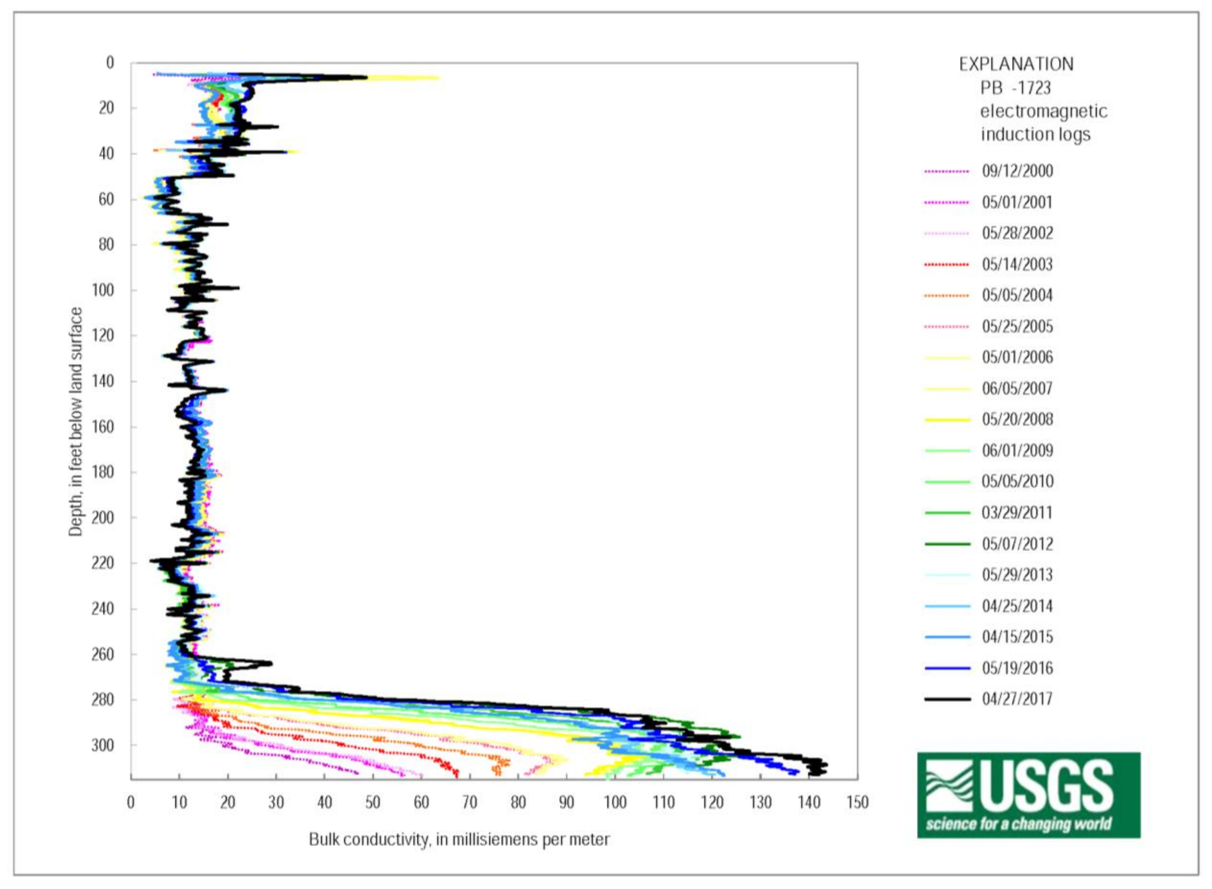
Sea level rise causes denser saltwater further inland and freshwater floating atop it to rise.

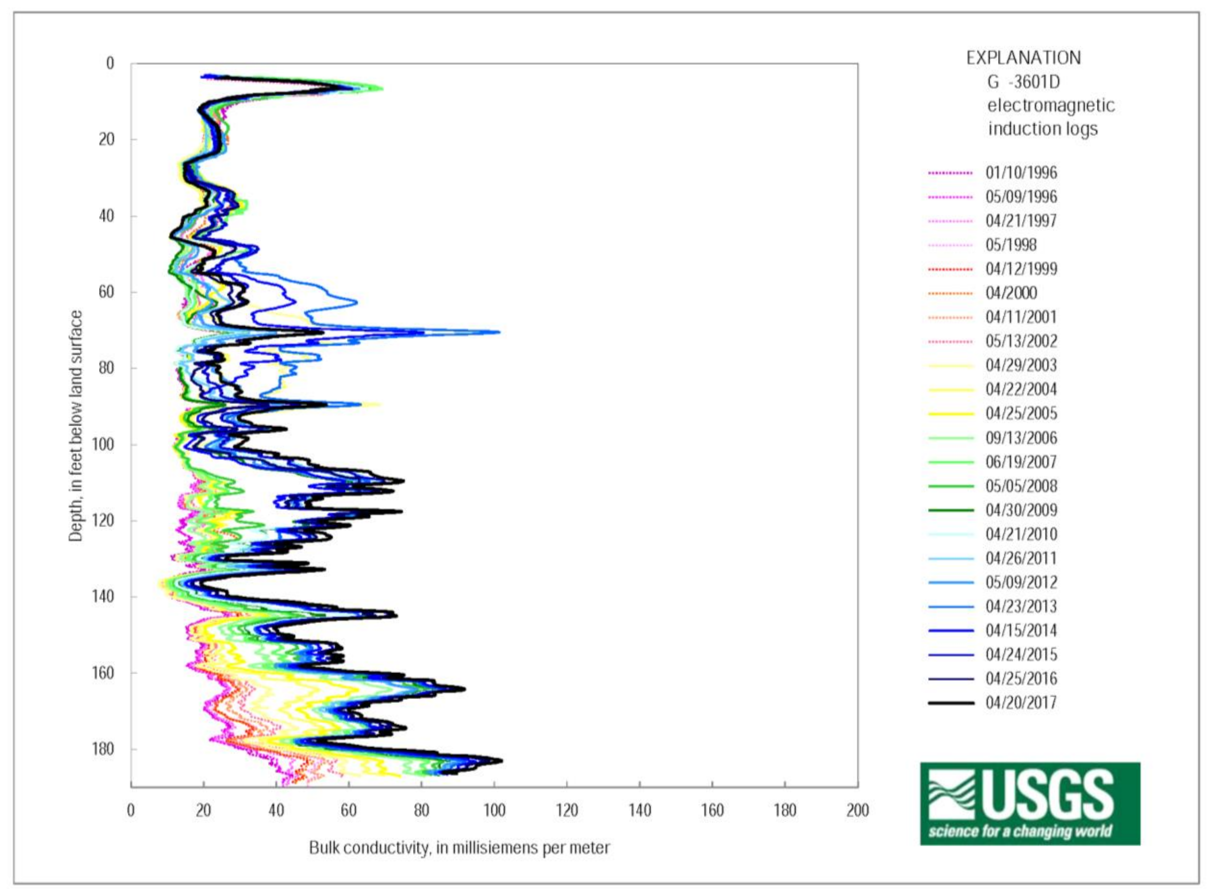
Impacts

- Saline water further inland, reduced freshwater gradient
- Inland flooding from higher groundwater, reduced storm water storage capacity

Technical Lead: Karin Smith

Saltwater Intrusion Monitoring – Induction Logs

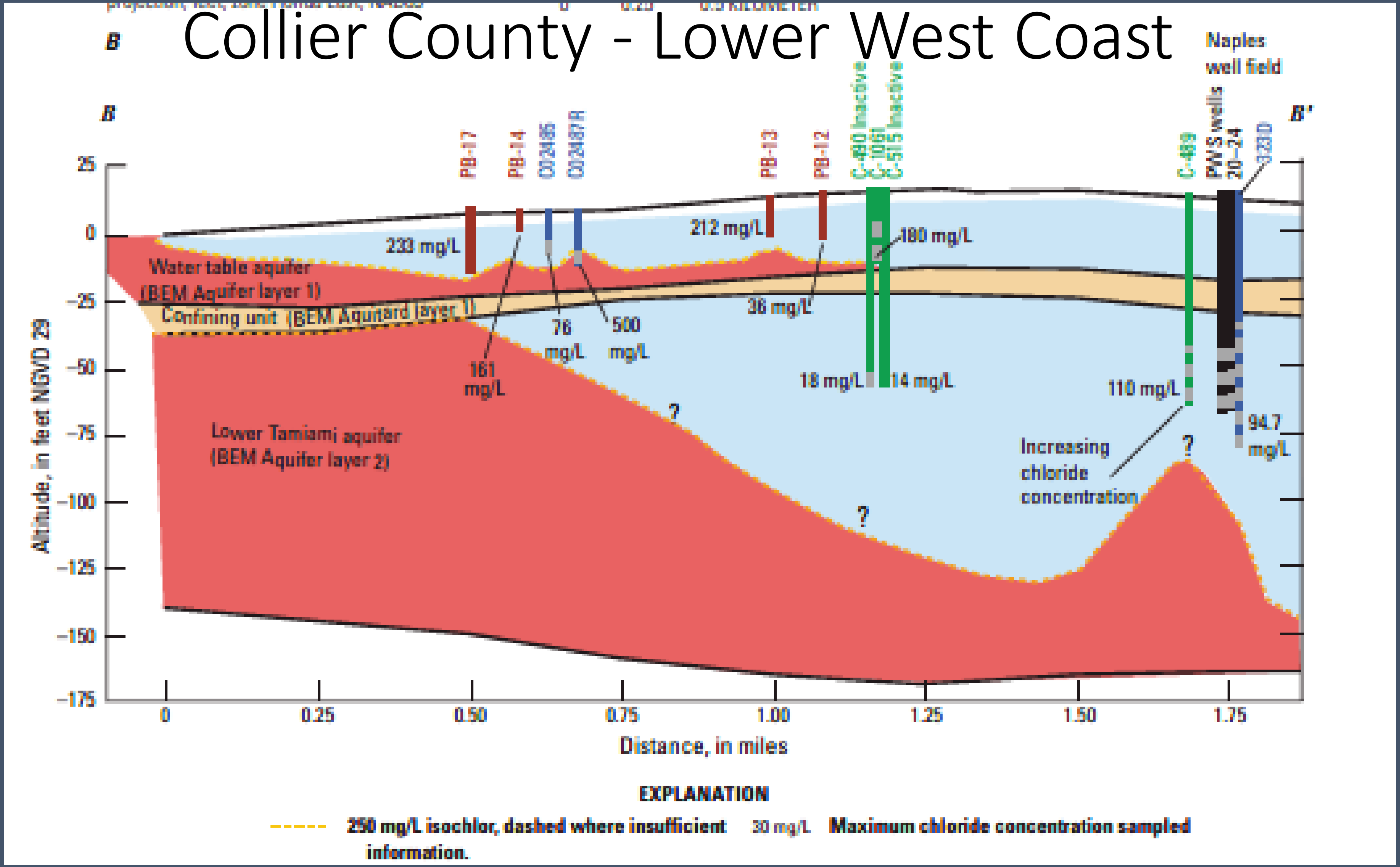




Technical Lead: Karin Smith

Saltwater intrusion monitoring of multiple aquifers

Collier County - Lower West Coast



U.S. Geological Survey Open-File Report 2013–1088, 58

Technical Lead: Karin Smith

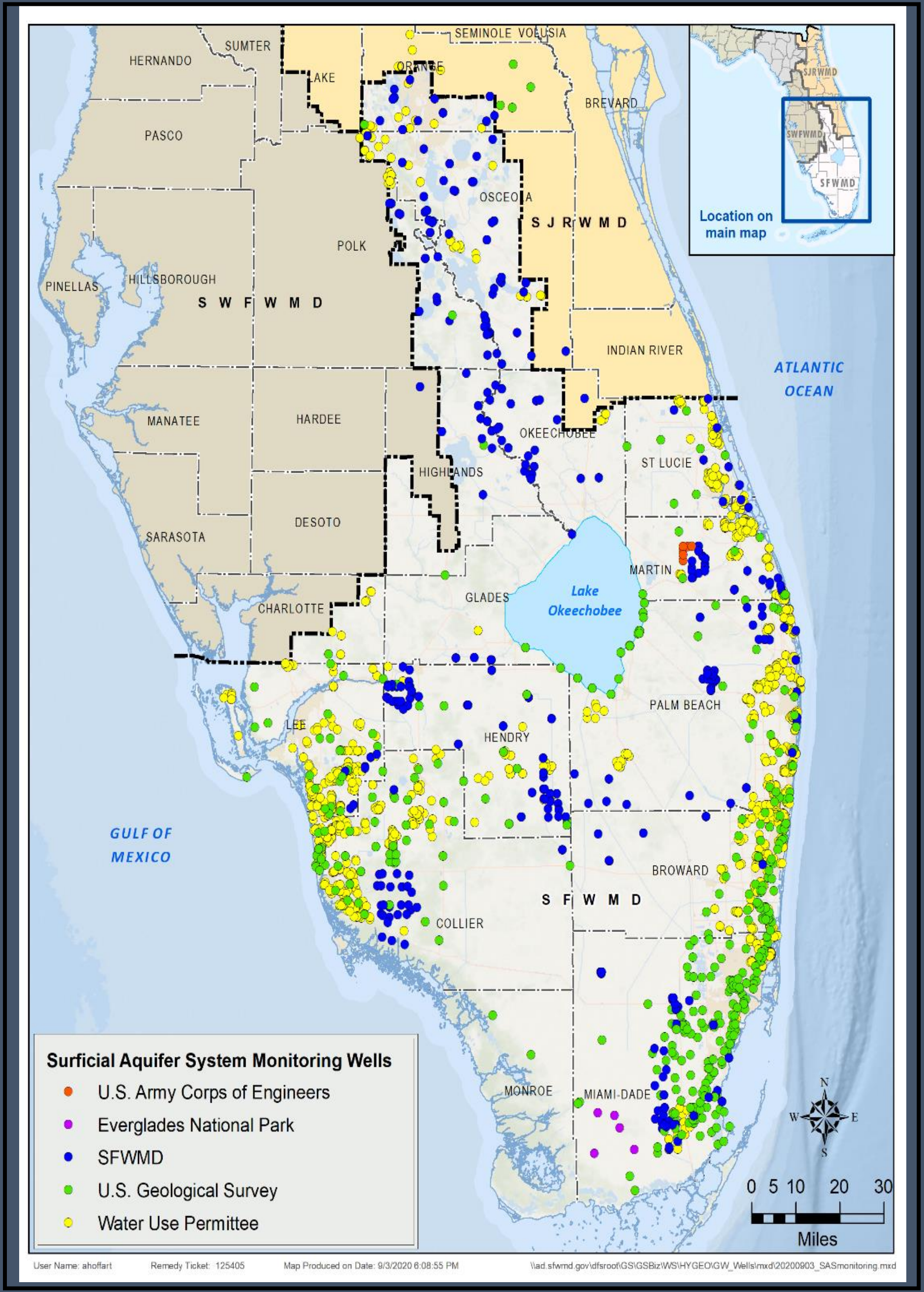
Saltwater Intrusion

BACKWARD LOOKING: Utility Wellfield	# of wells abandoned
Deerfield Beach PWS	2
Dania Beach PWS	1
Broward County 3A/3B Wellfields	9
Broward County 2a Wellfield	3
Hollywood – North & Plant wellfields	10
Lake Worth Utilities – East Wells	7
Manalapan PWS	3

FORWARD LOOKING	Utilities Identified in Most Recent Water Supply Plan		
Water Supply Planning Region	Total Utilities	More Vulnerable (no alternative)	Vulnerable (but has alternative)
Lower East Coast	52	6	8
Lower West Coast	22	0	4
Upper East Coast	17	0	4

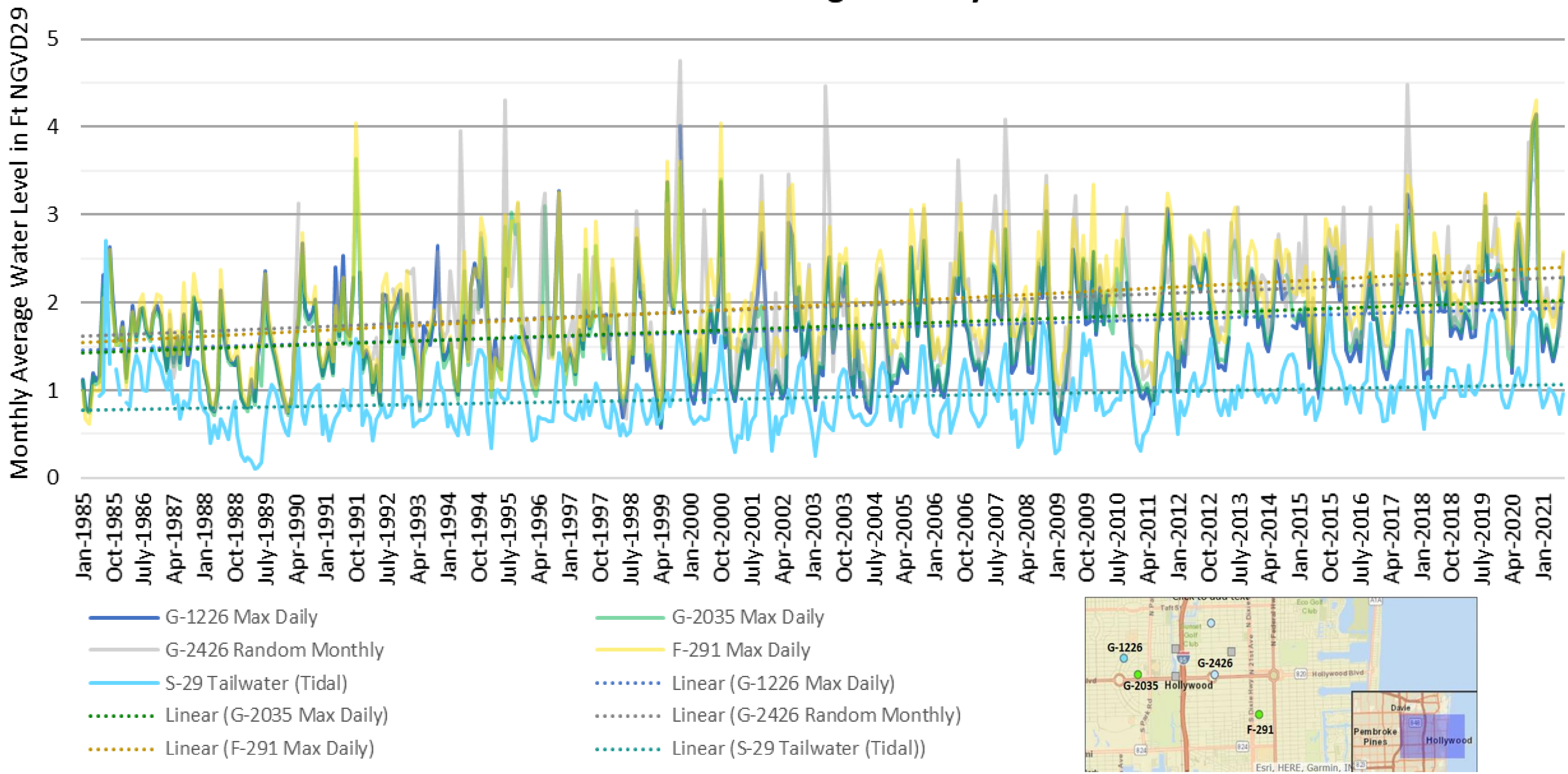
Technical Lead: Karin Smith

Groundwater Stages



Technical Lead: Karin Smith

Groundwater and Tidal Stages - Hollywood Area

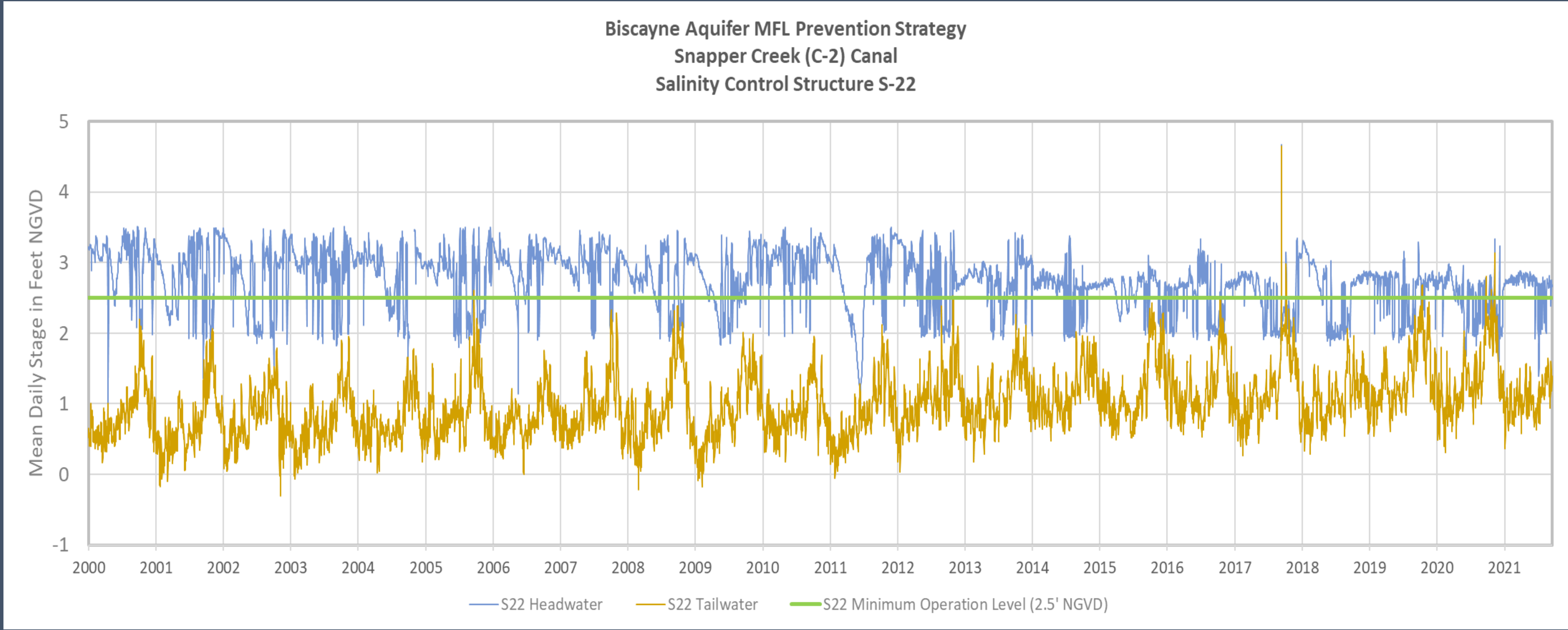


Technical Lead: Karin Smith

Biscayne Aquifer MFL

Technical Lead: Karin Smith

Biscayne Aquifer Minimum Flow and Minimum Water Level Prevention Strategy



Technical Lead: Karin Smith

Saltwater Intrusion in Coastal Aquifers

The inland migration of saltwater poses a threat to water supply and critical freshwater habitats.

Karin Smith, Principal Scientist, Water Supply Bureau, SFWMD

December 16, 2021

Salinity Control Structure S-155 (West Palm Beach (C-...
The canal minimum operation level is more than five feet higher than downstream tidal stages. This enhances significant seawar...

Salinity Control Structure S-41 (Lake Worth Drainage ...
The canal minimum operation level is more than five feet higher than downstream tidal stages. This enhances significant seawar...

Salinity Control Structure S-40 (Lake Worth Drainage ...
The canal minimum operation level is more than five feet higher than downstream tidal stages. This enhances significant seawar...

Salinity Control Structure G-56 (Hillsboro Canal)
On average, upstream canal stages are at least four feet higher than downstream tidal stages. This provides significant seawar...

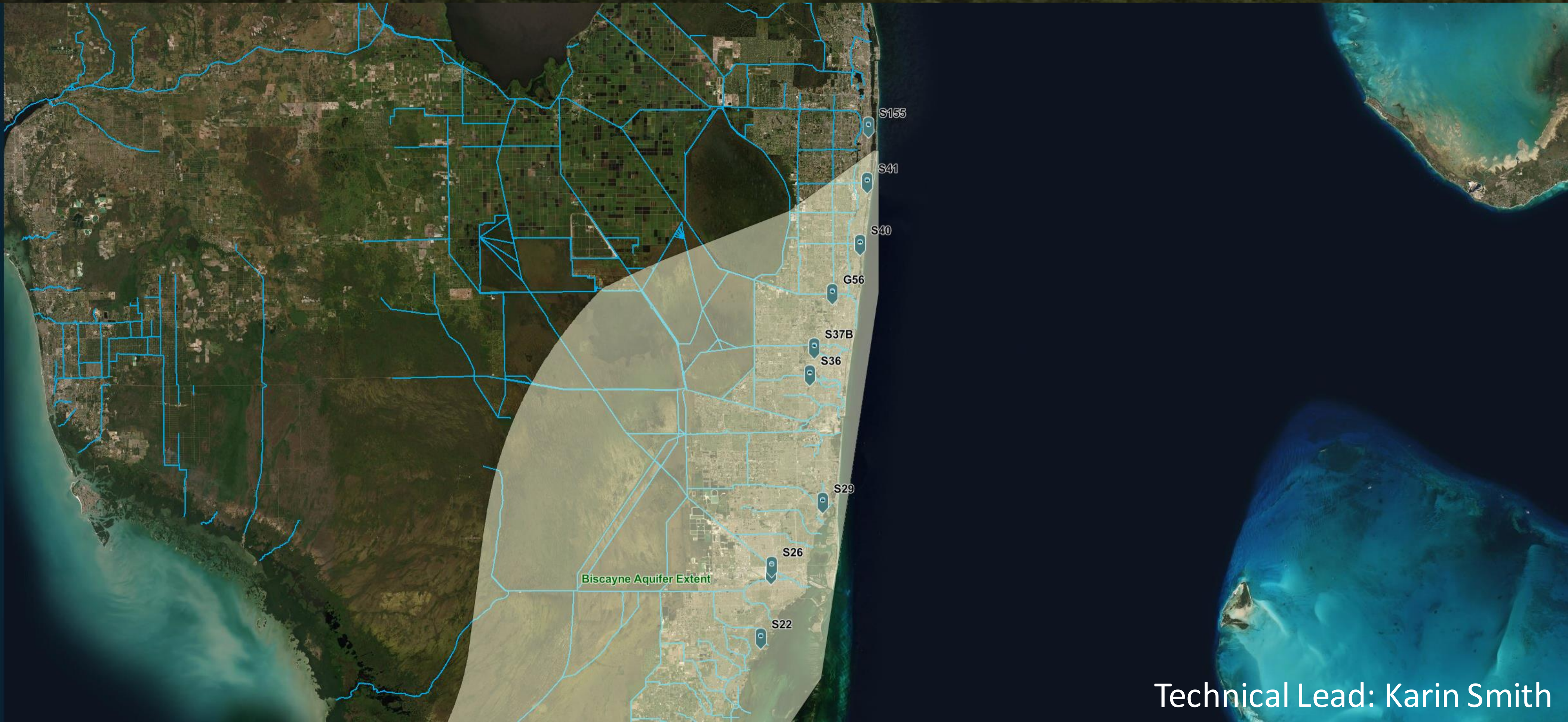
Salinity Control Structure S-37B (Cypress Creek (C-14) ...
The canal minimum operating level averages two feet higher than downstream tidal stages. This supports seaward moveme...

Salinity Control Structure S-36 (Middle River (C-13) Ca...
The canal minimum operating level averages two feet higher than downstream tidal stages. This supports seaward moveme...

Salinity Control Structure C-29 (Royal Glades (C-9) Canal)
The canal minimum operating level at times is less than one foot higher than downstream tidal stages. When there is less than t...

Salinity Control Structure S-26 (Miami (C-6) Canal)
The canal minimum operating level at times is less than one foot higher than downstream tidal stages. When there is less than t...

Salinity Control Structure S-25B (Tamiami (C-4) Canal)
The canal minimum operating level at times is less than one foot higher than downstream tidal stages. When there is less than t...

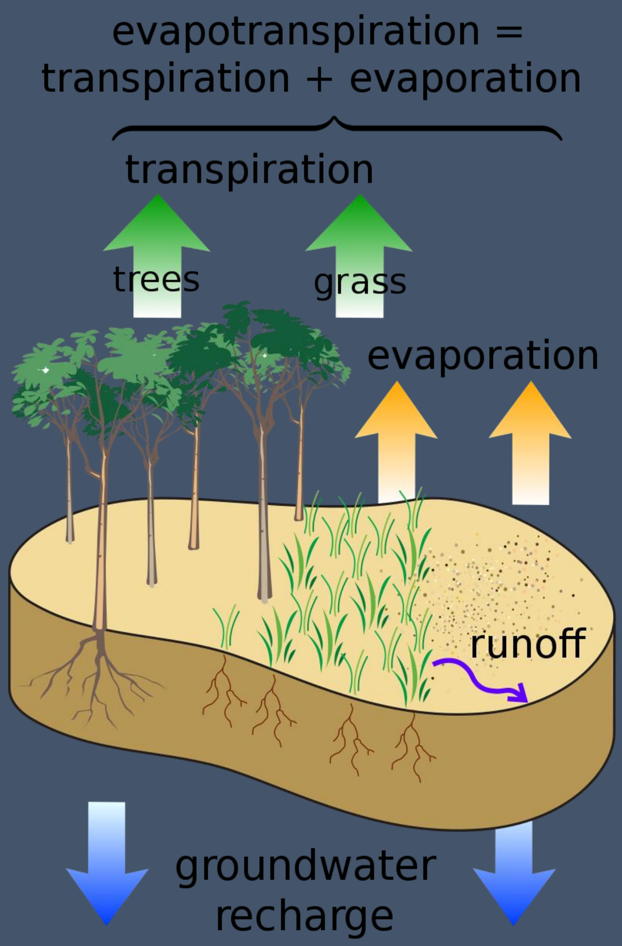


Technical Lead: Karin Smith

Observed Trends in Evapotranspiration

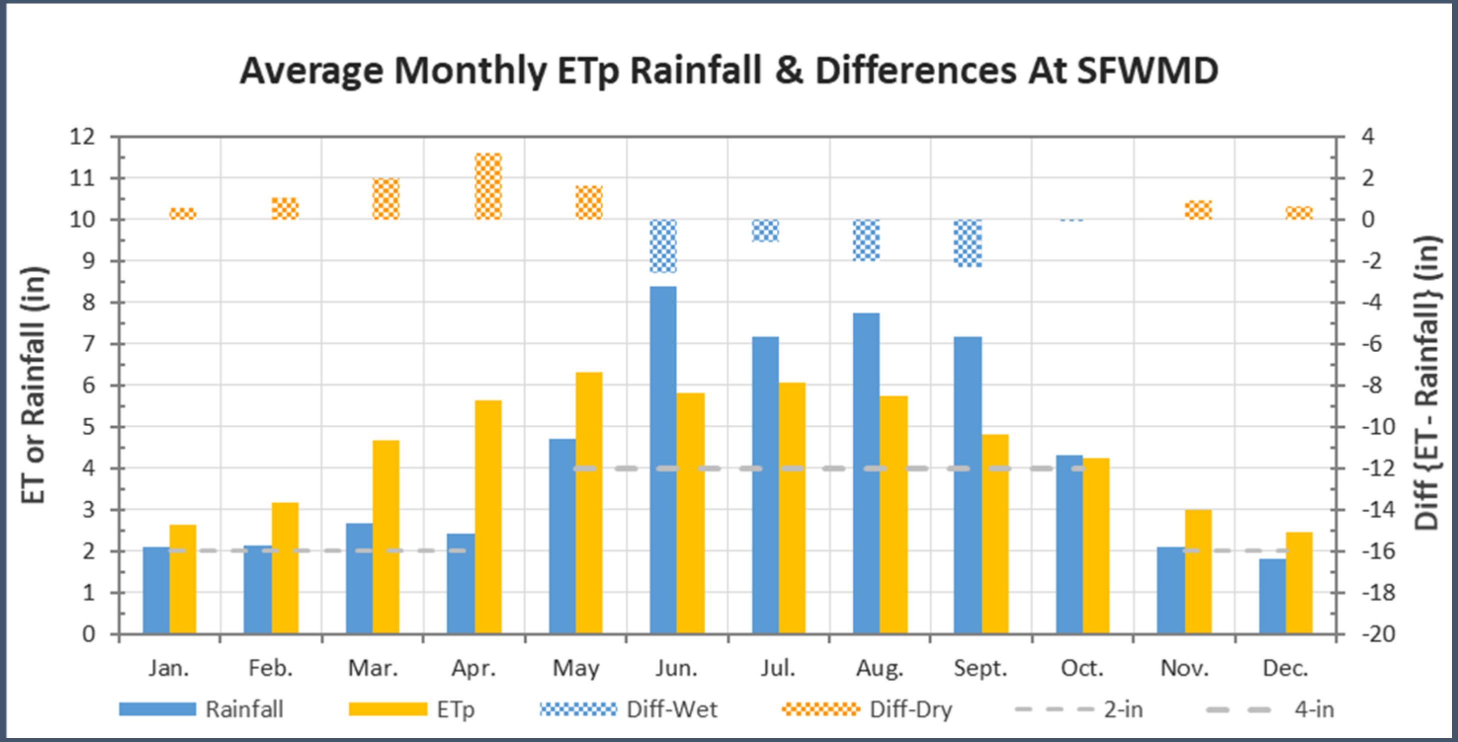
Kevin Zhu, PE
Staff Engineer
Hydrology & Hydraulics Bureau

Evapotranspiration (ET)



Pan Evaporation:
(popular most)

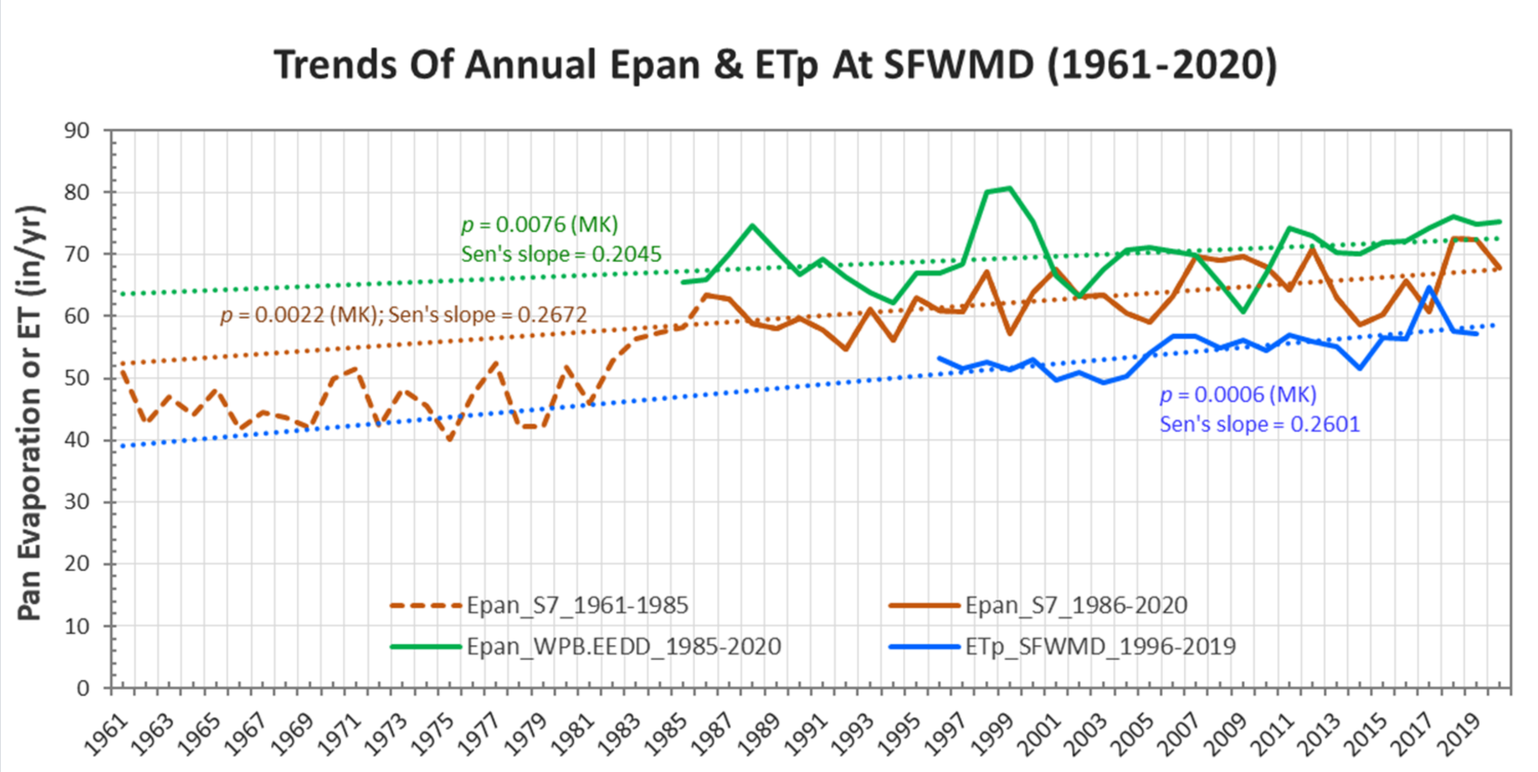
Lysimeter:
(direct measure of ETp)

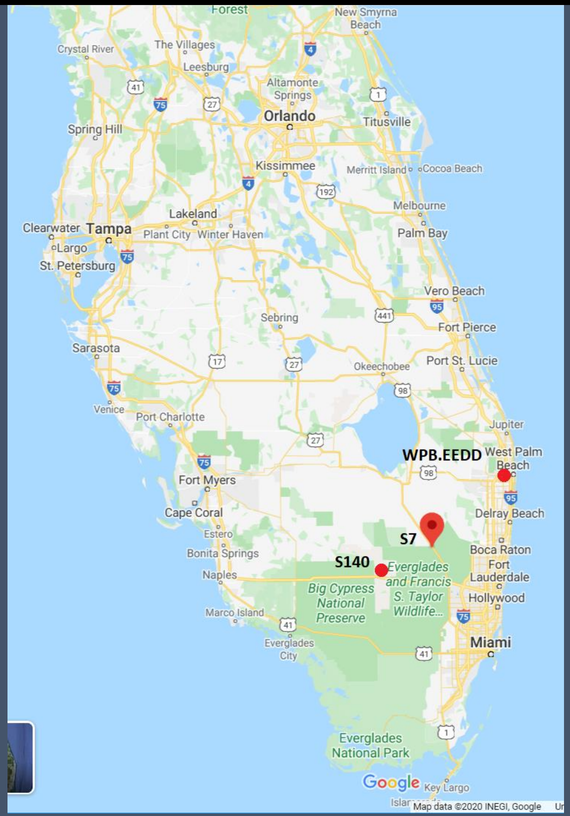


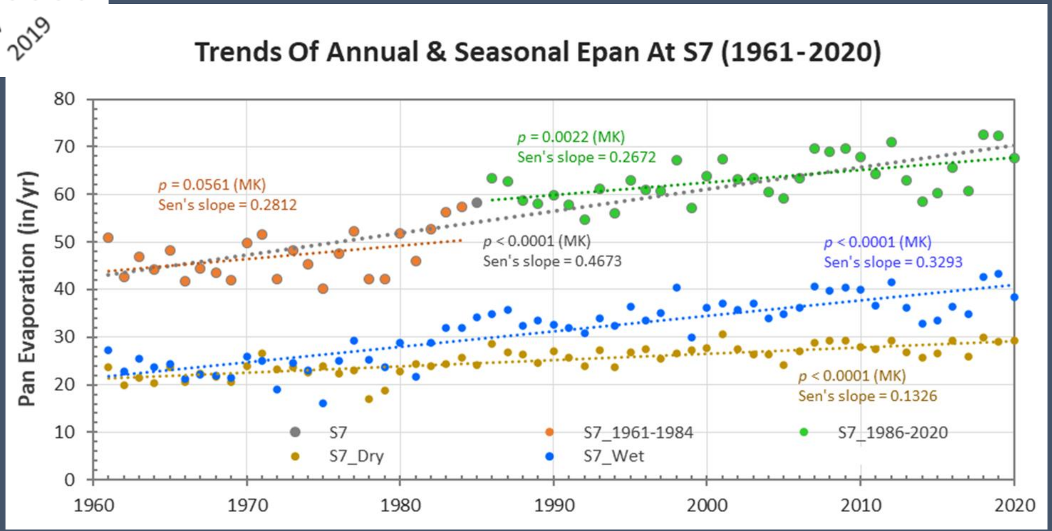
(Data of Rainfall & ET: District-wide Average over the Past 25 Years.)

Technical Lead: Kevin Zhu

Evapotranspiration (ET)







Selection Criteria:

1. Period of Records >= 25 Years;
2. Still in Operation (for future trend watch).

Technical Lead: Kevin Zhu

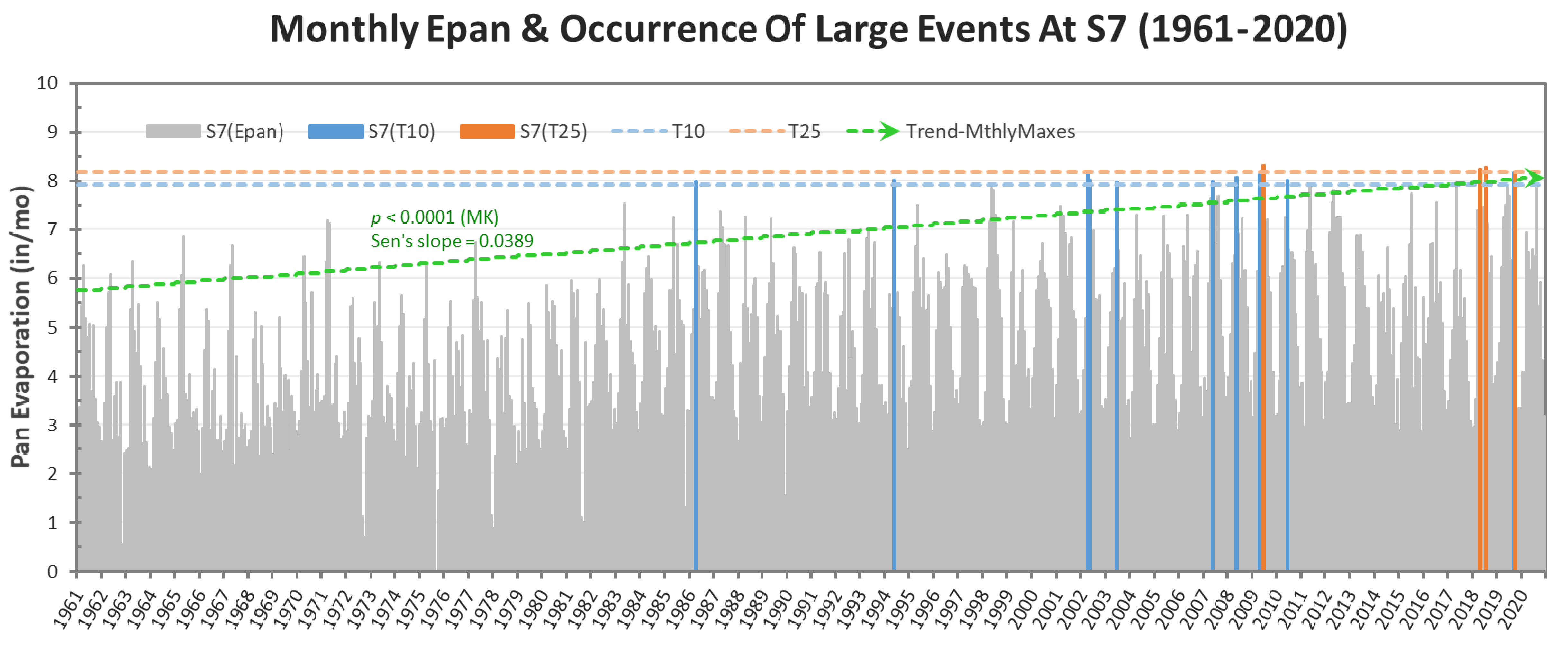
Three Selected Stations/Sets:

EVAP (2): **S7** (SFWMD), **WPB.EEDD** (City of WPB)

ET (1): **District** (USGS or Univ. of Alabama)

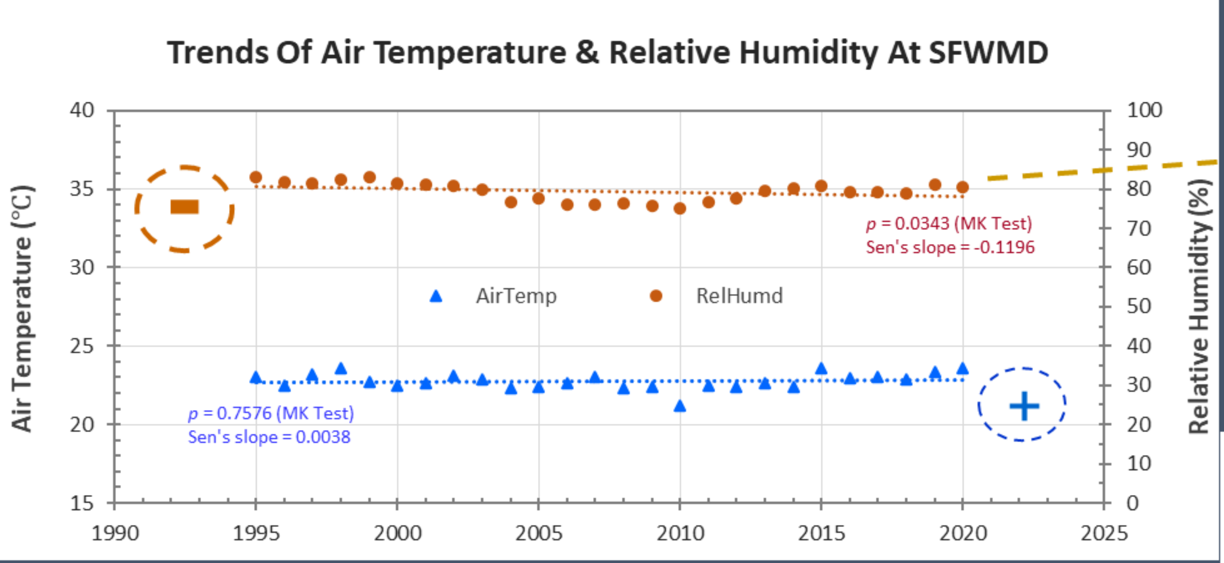
Evapotranspiration (ET)

Technical Lead: Kevin Zhu



Evapotranspiration (ET)

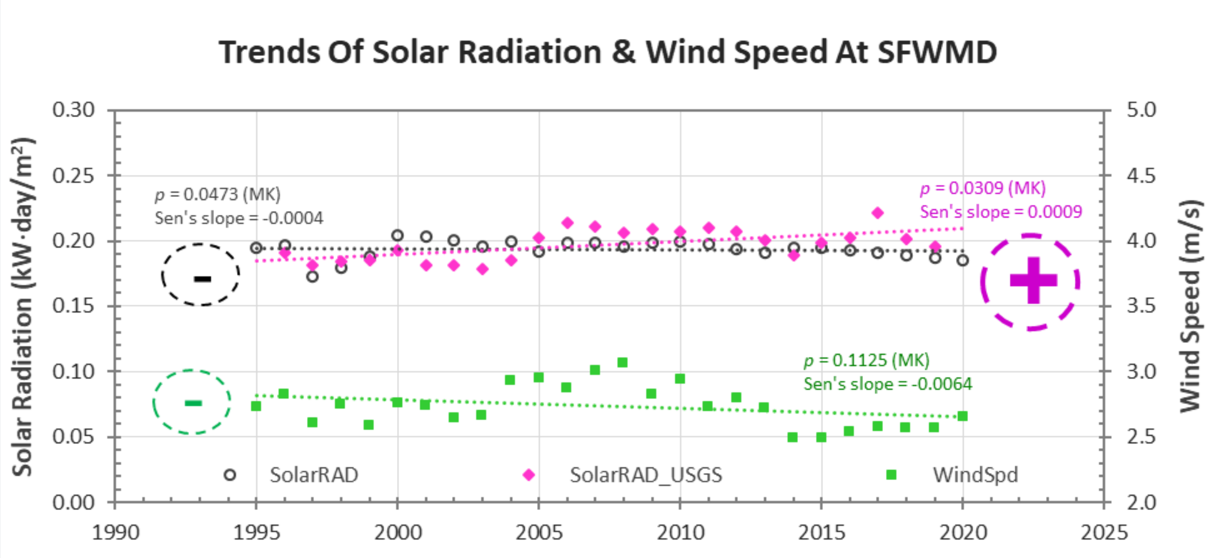
Technical Lead: Kevin Zhu



Relative Humidity ↓ = Vapor Pressure Deficit ↑

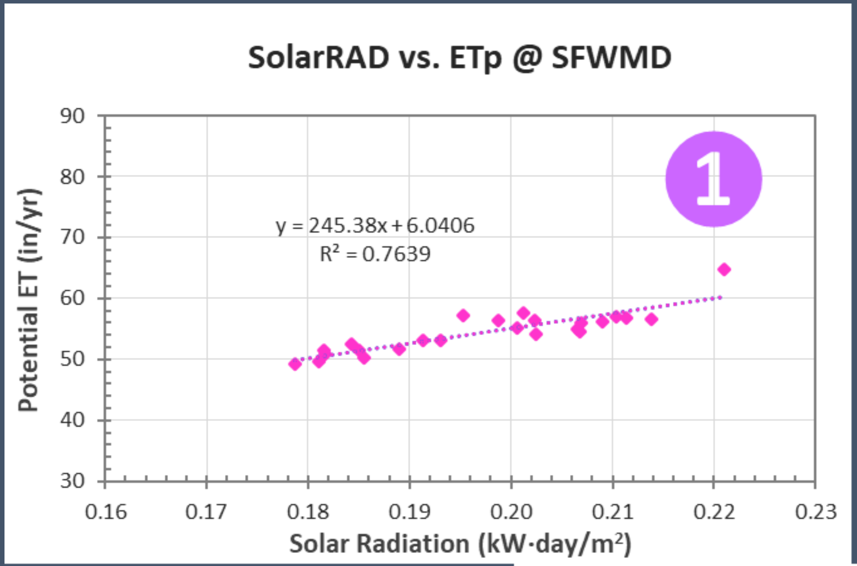
Driving Factors:

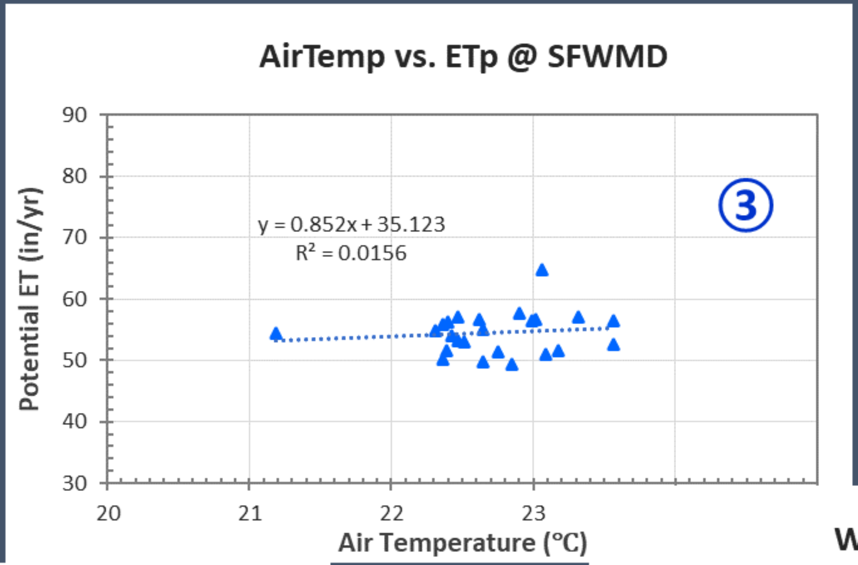
1. Solar Radiation
2. Relative Humidity (or Vapor Pressure Deficit)
3. Air Temperature
4. Wind Speed



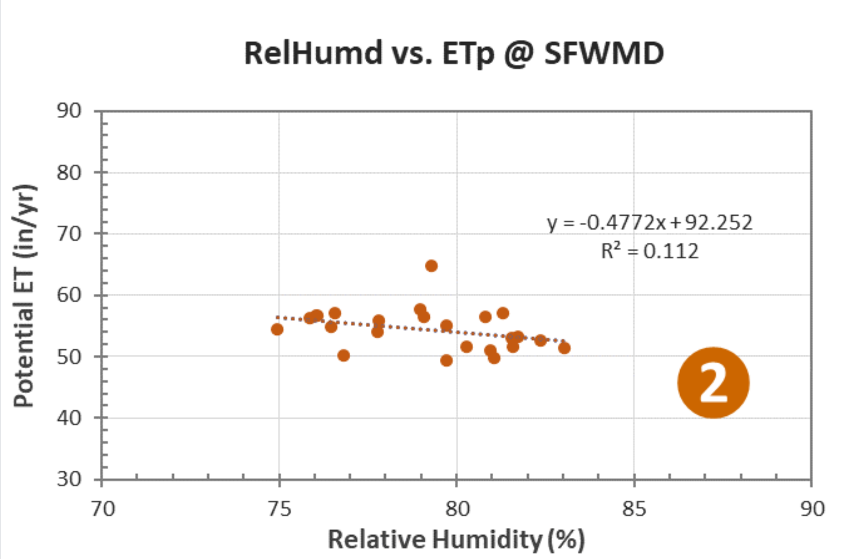
Evapotranspiration (ET)

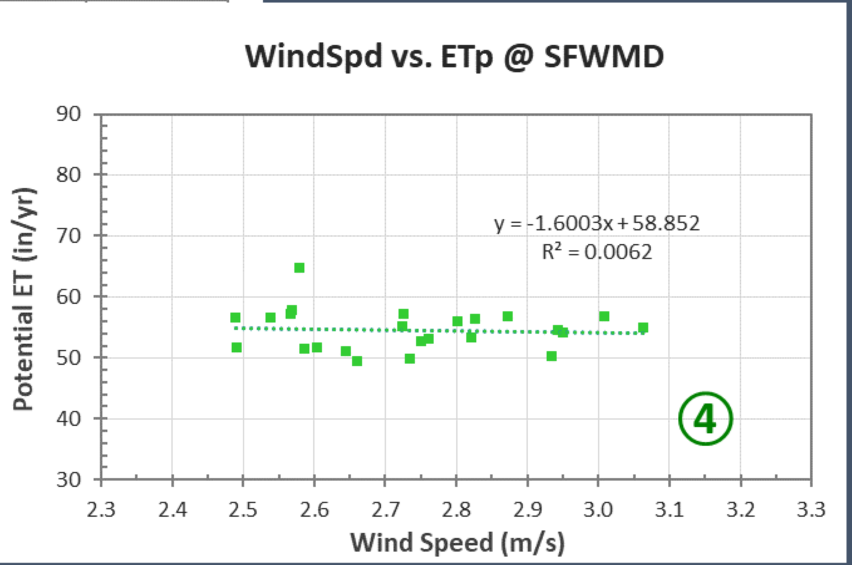
Technical Lead: Kevin Zhu





Period of Records:
1995 - 2020





Evapotranspiration (ET)

Summary

Upward Trend starting back to 60 years ago (↑ET);

The averaged Change Rate: +0.25 in/yr (+6.35 mm/yr);

Major Driving Variables: Solar Radiation (↑), Relative Humidity (↓).

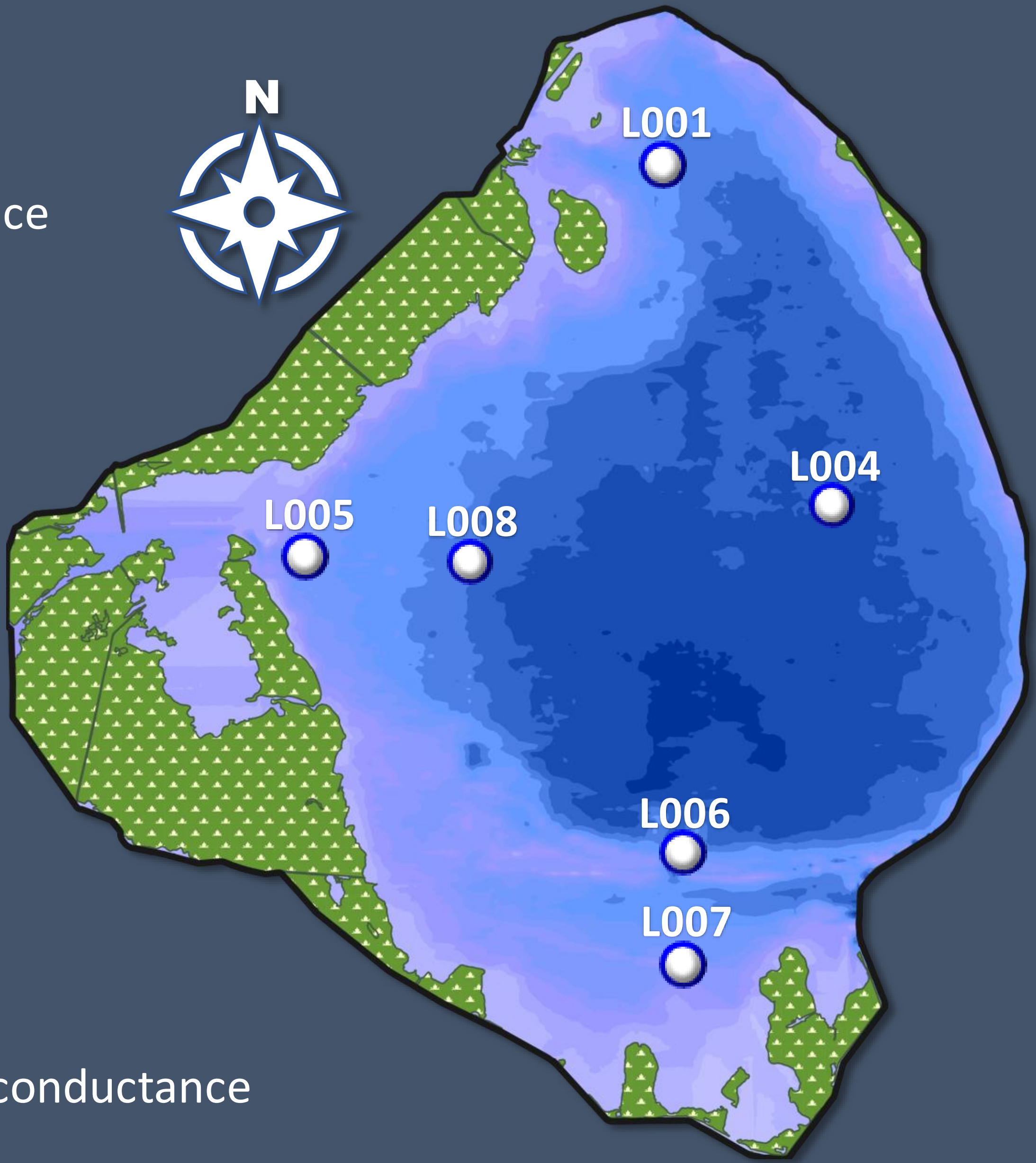
Technical Lead: Kevin Zhu

Water Quality

Nenad Iricanin, Ph.D.
Principal Scientist
Water Quality Bureau

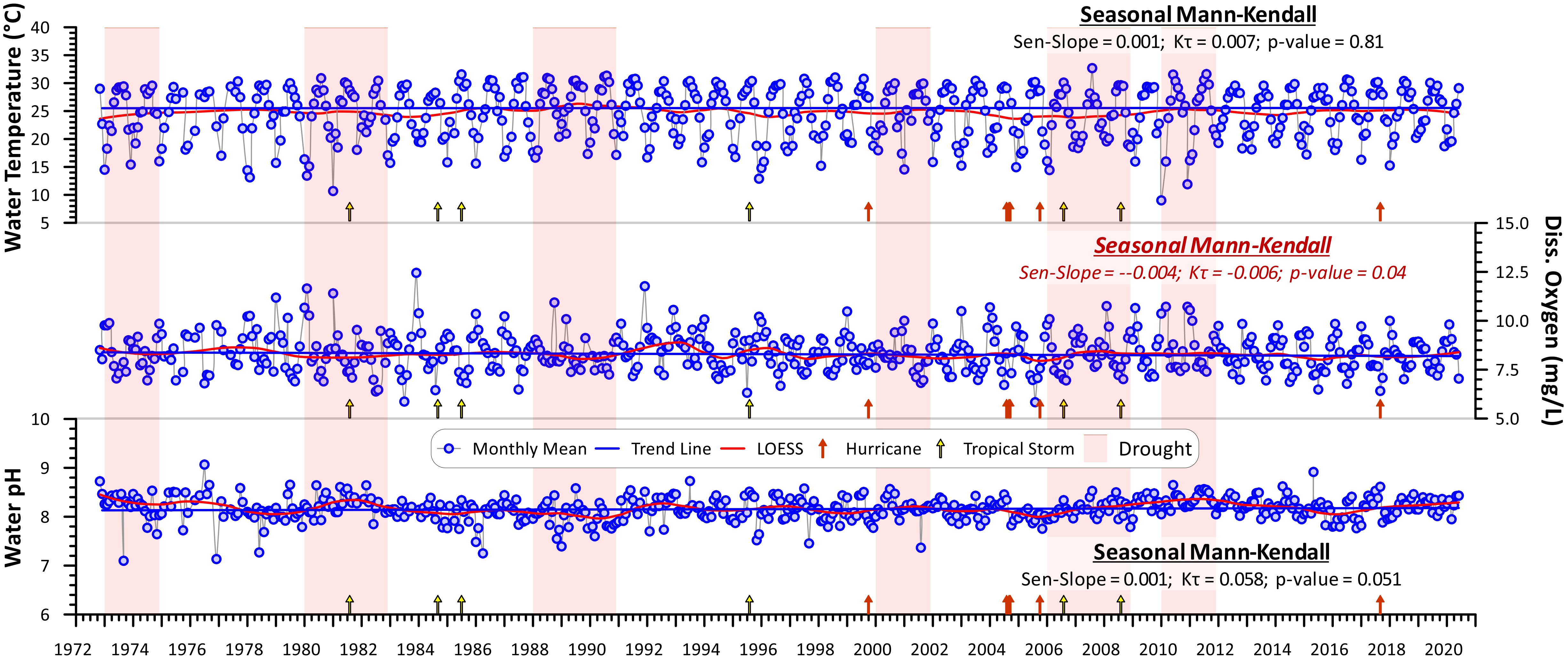
Water Quality

- **List of water quality parameters**
  - Temperature, dissolved oxygen, pH, specific conductance
- **Water quality data used for six in-lake stations**
  - L001, L004, L005, L006, L007, and L008
  - Stations have longest data records
- **48-year period of record retrieved**
  - November 1972 – June 2020
  - Data retrieved from District corporate database, DBHYDRO
  - Data aggregated as monthly means
  - Identified climatic events (droughts, tropical storms)
- **Analyses performed**
  - Seasonal Mann-Kendall trend analyses
  - Potential interpretation of observed trend for specific conductance



Technical Lead: Nenad Iricanin

Temperature, Diss. Oxygen, pH – Trend Analysis

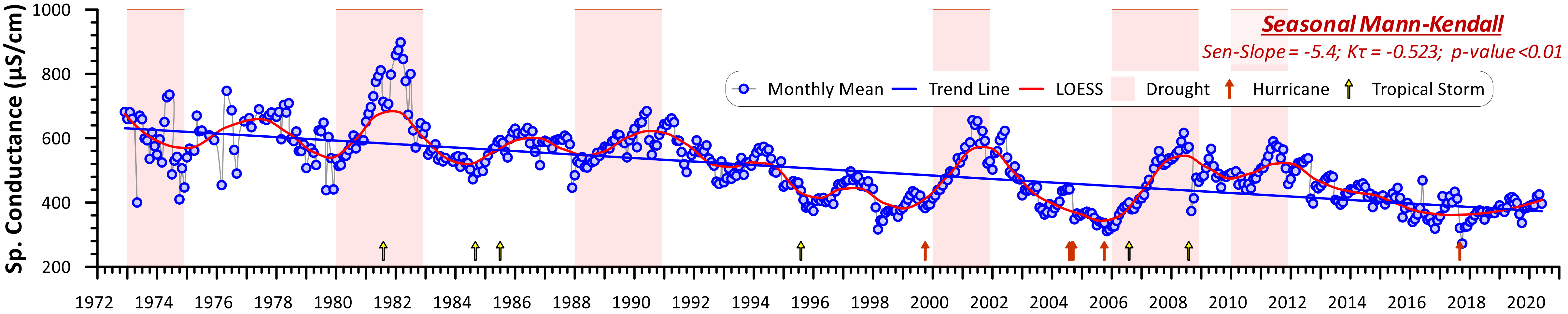


Water temperature and water pH data do not show statistically significant trends (p-value ≥0.05). Diss. oxygen data exhibited a statistically significant decreasing trend. The annual rates of change for all three parameters (Sen-slopes) are not measurable over the period of record

Technical Lead: Nenad Iricanin

Statistical Significance at p-value <0.05

Specific Conductance – Trend Analysis



- A measurable and significant decrease was observed for specific conductance
- Over 48-year period, specific conductance decreased significantly by 40% (~660 µS/cm in 1973 to ~400 µS/cm in 2020)
- Seasonal variations in specific conductance are caused by evaporation (increase in specific conductance during droughts and dry season months) and precipitation (decrease in specific conductance during tropical events and wet season months)
- Typical specific conductance for Florida lakes is 385 µS/cm (Hand 2004)

Hand, J (2004). Typical Water Quality Values for Florida's Lakes, Streams, and Estuaries. Watershed Assessment Section, Florida Department of Environmental Protection. Tallahassee, Florida.

Technical Lead: Nenad Iricanin

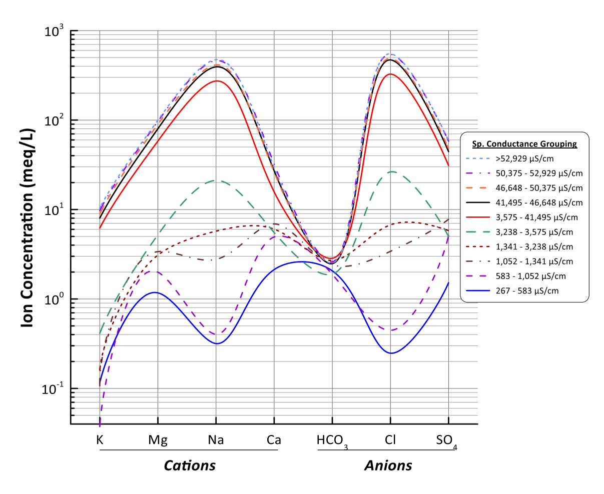
Statistical Significance at p-value <0.05

Major Ions in Lake Okeechobee

- Period of record major ions were retrieved from DBHYDRO for the in-lake stations (Na^+, K^+, Ca^{2+}, Mg^{2+}, Cl^-, HCO_3^{2-}, SO_4^{2-})
- Ions were summarized by decade and graphically presented using Schoeller plots and Stiff diagrams

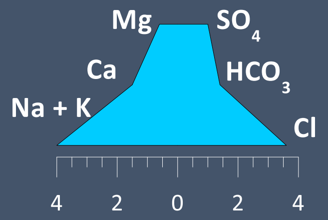
Schoeller Plots

- Plots are used to present major ion concentration groups (cations and anions) and demonstrate different hydro-chemical water types
- Plots can also be used to show changes in ionic composition by identifying dominant ion pairs (cations and anions)

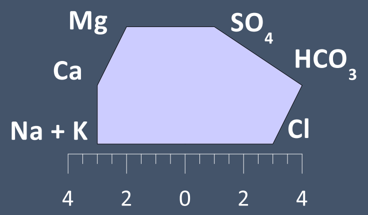


Stiff Diagrams

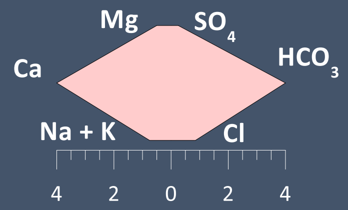
- Resulting polygon shape extends from either side of the zero axis with cations presented on the left side and anions presented on the right side. All ions are plotted in units of meq/L.
- Stiff patterns are a useful method for making rapid visual comparisons between waters from different sources/types.



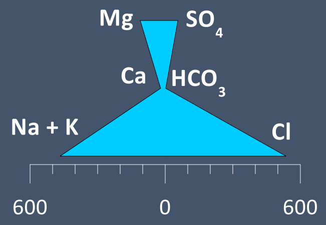
Na-Cl dominated



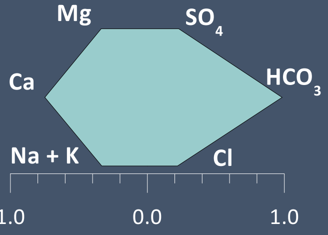
Ca-HCO_3 and Na-Cl co-dominated



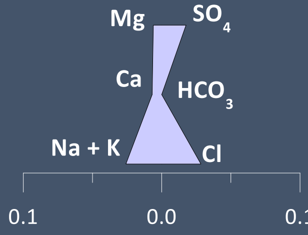
Ca-HCO_3 dominated



Mean Seawater



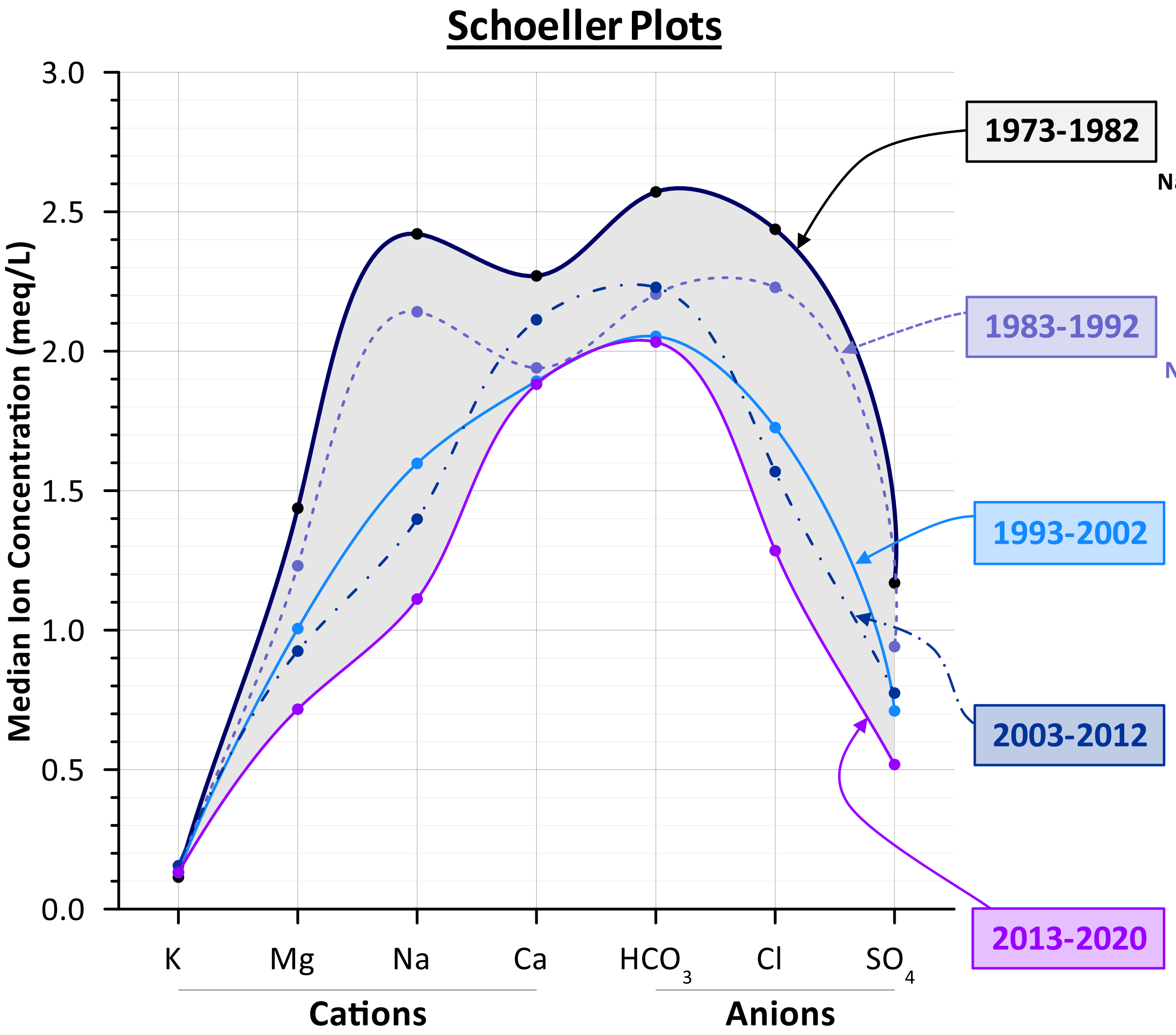
Mean River Water

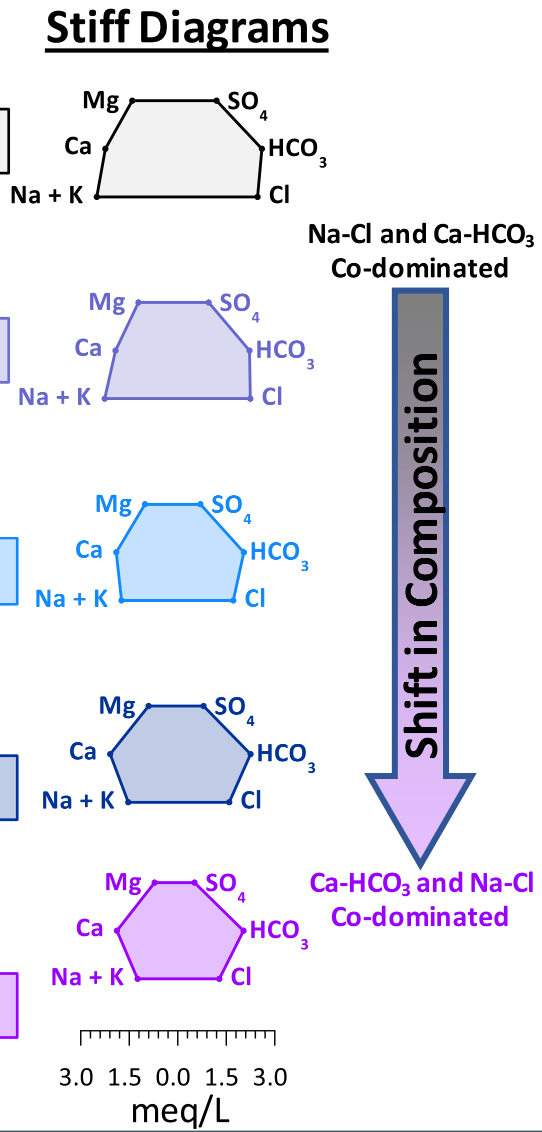


Mean South FL Rainfall

Technical Lead: Nenad Iricanin

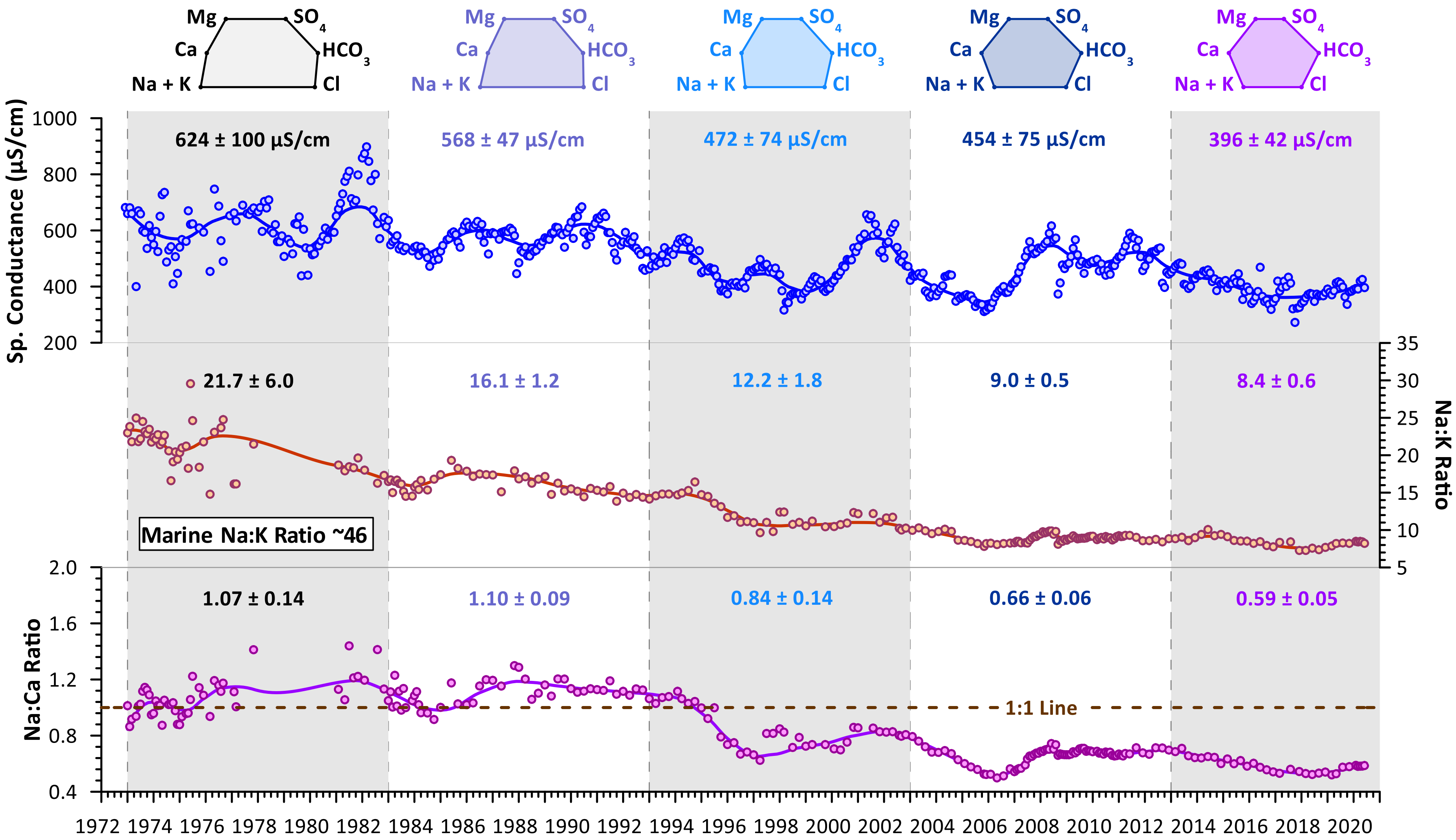
Changes in Lake Okeechobee Ionic Composition





- Decadal median concentrations were calculated for each ion
- These median values were used to generate Schoeller plots and Stiff diagrams
- Results show a decadal change in the ionic composition of lake water
  - 1973–1992: More Na-Cl dominated during higher specific conductance
  - 2003-2020: More Ca-HCO_3 dominated with lower specific conductance
- Shift in ionic composition appears to mirror the observed change/decrease in specific conductance as shown on the next slide

Changes in Lake Okeechobee Ionic Composition



- Decadal shift in ion composition follows the changes to specific conductance
- Na:K and Na:Ca ratios were analyzed to explore potential sources
- 1973 – 1982 period Na:K ratios were higher and approached a mean seawater ratio of 46 suggesting a potentially more marine-like source (e.g., connate seawater)
- 1973-1993 period Na:Ca ratios were greater than 1 supporting the finding that this period was more Na-Cl dominated
- After 1994, both Na:K and Na:Ca ratios decreased
- Na:K ratios more representative of freshwater and Na:Ca ratios suggesting a more Ca-HCO_3 dominant source

Technical Lead: Nenad Iricanin

Ratios and Stiff diagrams based on ion concentrations in meq/L
Decadal values presented as averages ± st. deviations

Water Quality Trend Analysis Summary

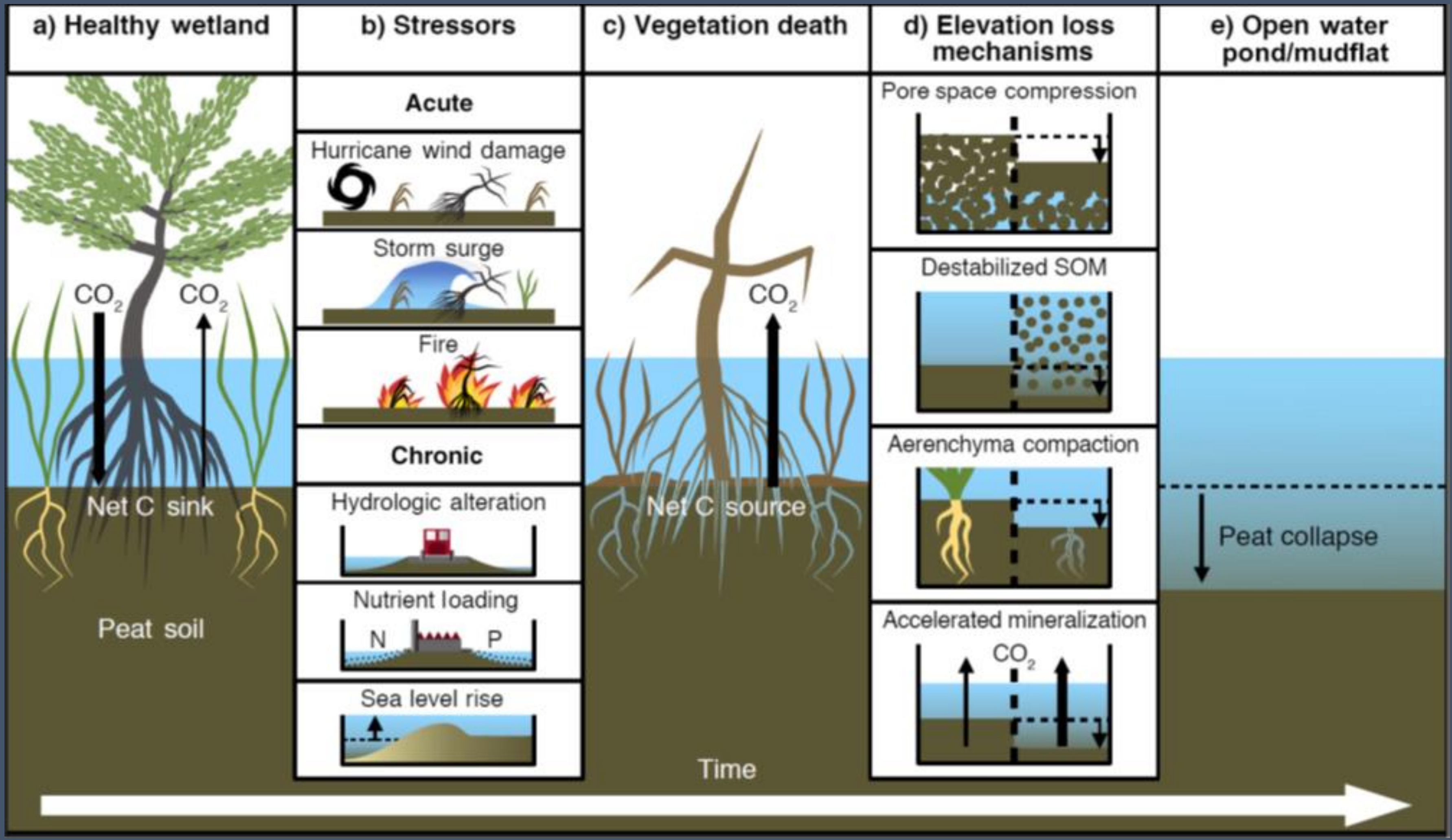
- Results from trend analyses performed for 48-year period:
  - Water temperature and pH had increasing trend; trends were not statistically significant
  - Dissolved oxygen had a statistically significant decreasing trend; the observed change not measurable over the period
  - Specific conductance had a measurable significant decreasing trend over the period
- Lake's ionic composition over the period of record exhibited a shift from a more Na-Cl source to more a Ca-HCO_3 source
- Na:K ratios suggest that the higher specific conductance levels observed may have been affected by a more marine-like source, possibly upwelling of connate seawater
- The observed change in ionic composition appears to have occurred after 1994 (based on Na:K and Na:Ca) and coincides with observed decrease in specific conductance
- This evaluation shows that changes in water quality are affected multiple factors that can exert a more complex influence on water quality that hinder the ability to detect potential influence of climate change factors

Technical Lead: Nenad Iricanin

Observed Trends in Ecosystem: Soil Subsidence and Estuarine Migration

Carlos Coronado, Ph.D.
Lead Scientist
Applied Sciences Bureau

Peat Collapse Concepts and Mechanisms of Soil Surface Elevation Loss



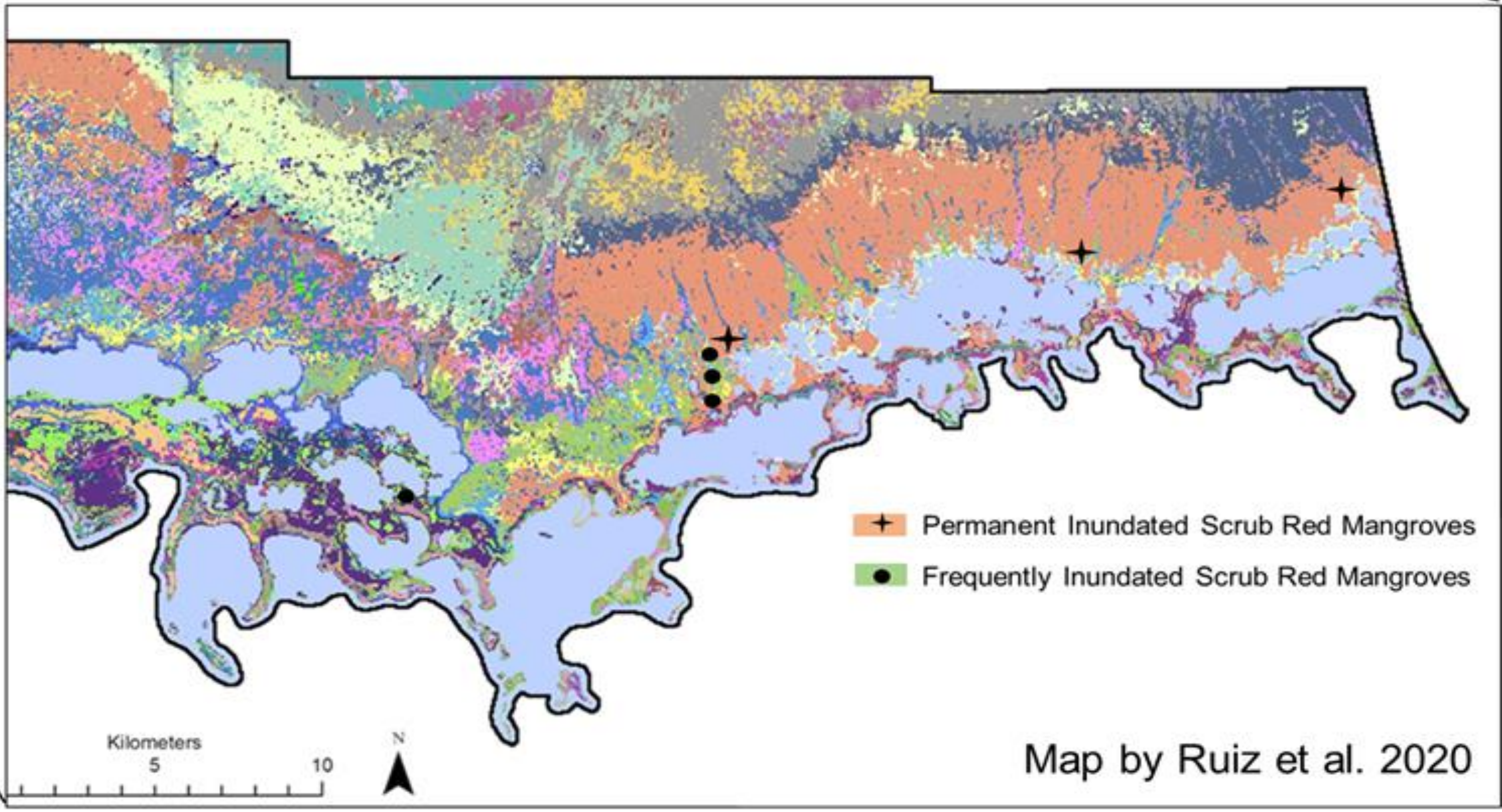
Technical Lead:
Carlos Coronado

Conceptual framework detailing the potential pathways that a healthy wetland (panel a) that is exposed to various acute or chronic environmental stressors (panel b) can result in vegetation death (panel c), leading to four potential (non-exclusive) mechanisms of soil surface elevation loss (panel d) and ultimately conversion to an open water pond or mudflat (panel e). Figure by Chambers et al. 2019

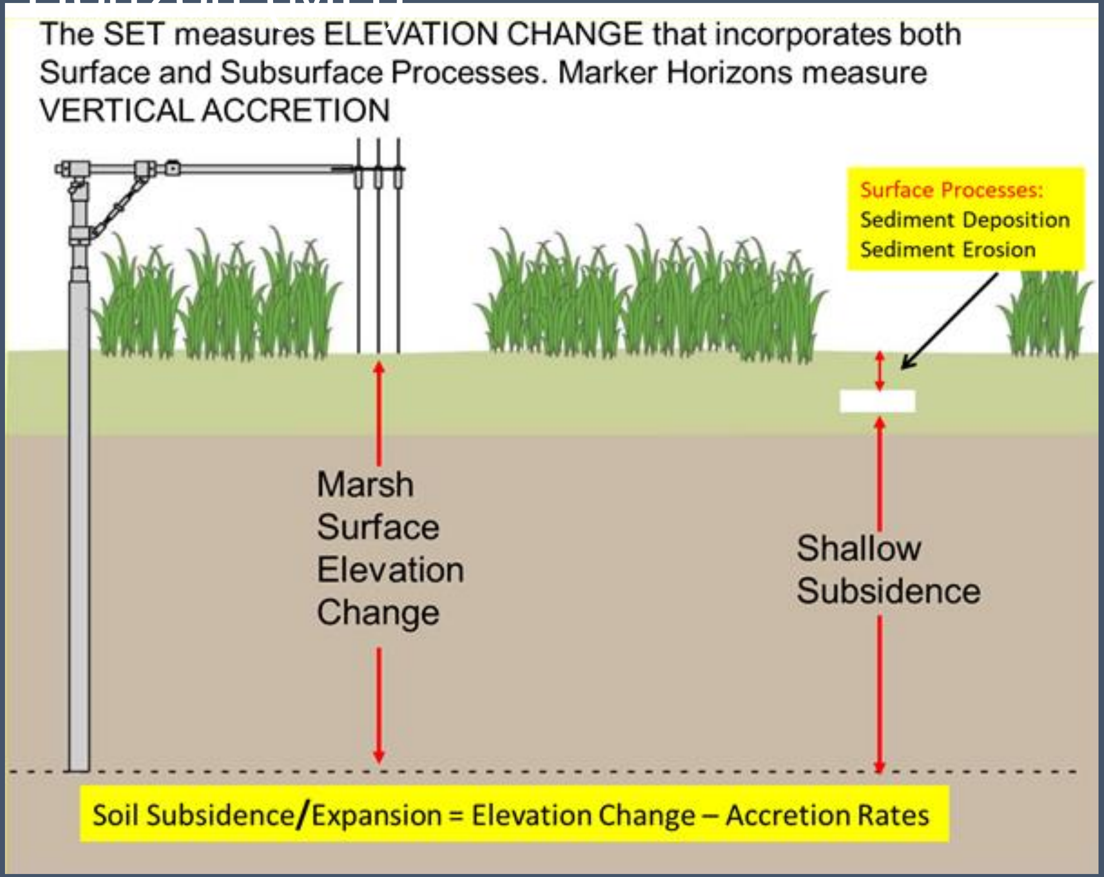
Monitoring Sites Northeastern Florida Bay

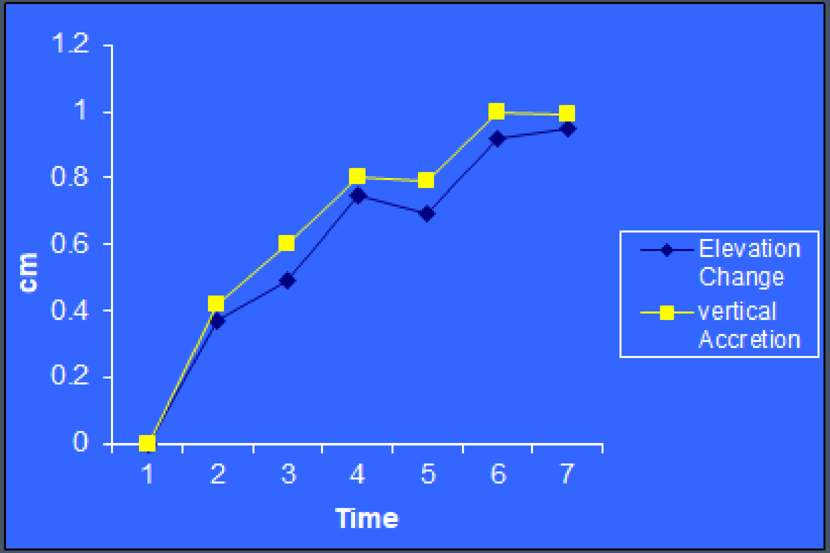
Permanent Inundated Scrub Red Mangrove

Frequently Inundated Scrub Red Mangrove

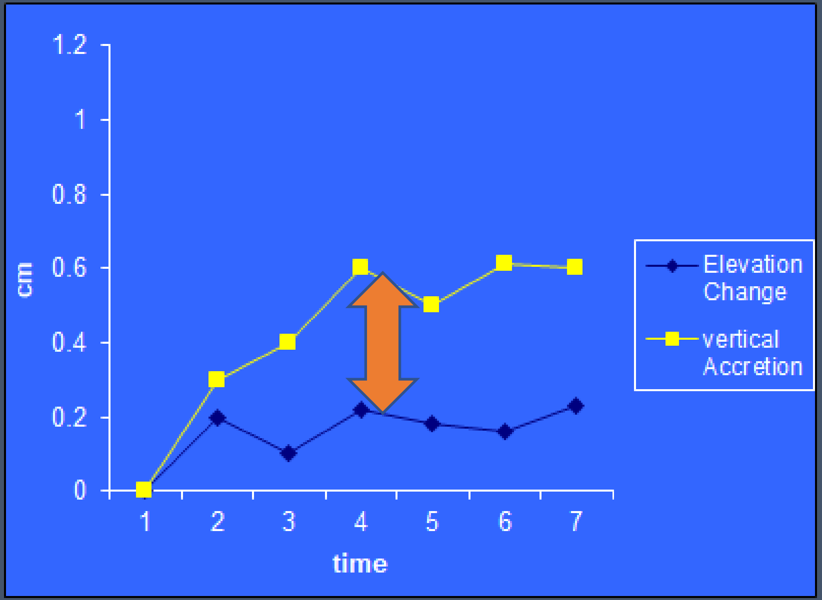


Field Method: Sediment Elevation Table (SET) and Marker Horizon (MH)





Low
Peat Collapse

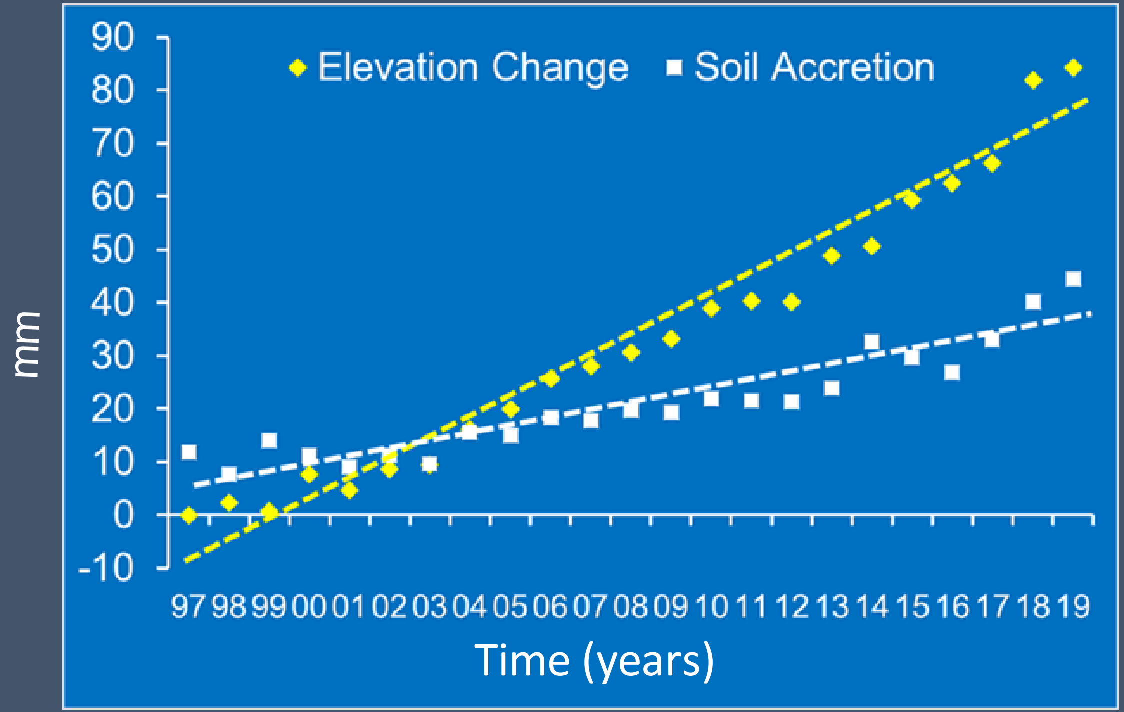


High
Peat Collapse

Definition: Peat Collapse, a specific type of soil subsidence, is process in which **highly organic soils** experience loss of soil strength and structural integrity that contributes to a decline in vertical elevation below the lower limit for plant growth and natural recovery.

Technical Lead: Carlos Coronado

High Energy & Frequently Flooded Sites n=5

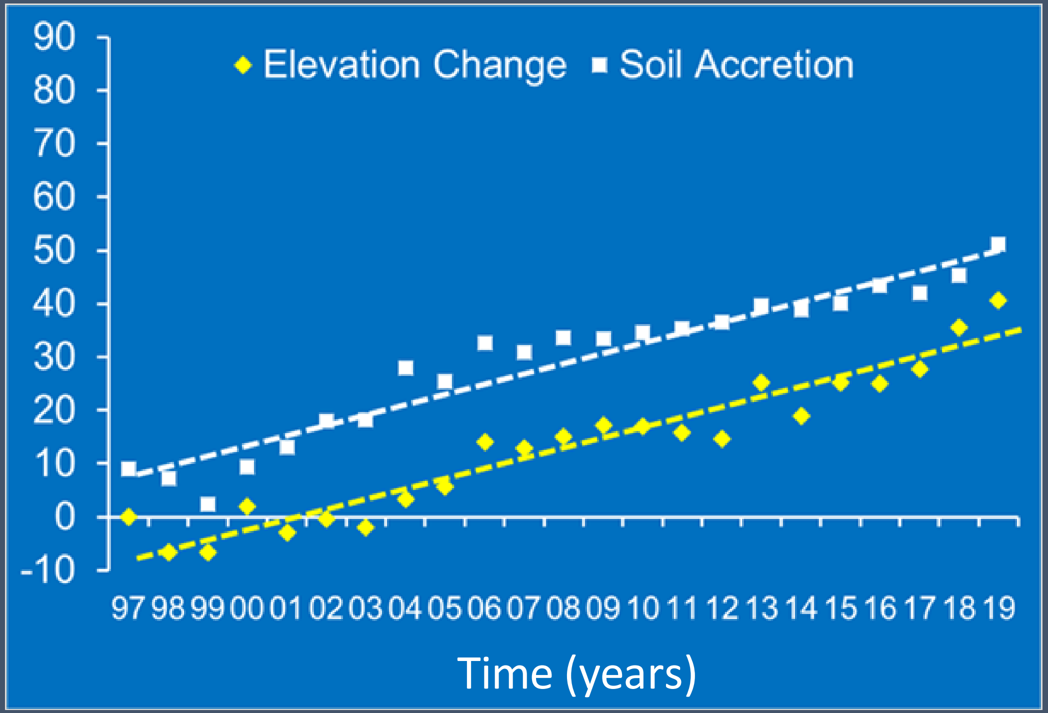


Elevation Change 3.9 mm yr^{-1}

Vertical Accretion 2.1 mm yr^{-1}

Soil Expansion 1.8 mm yr^{-1}

Low Energy & Permanent Flooded Sites n=7



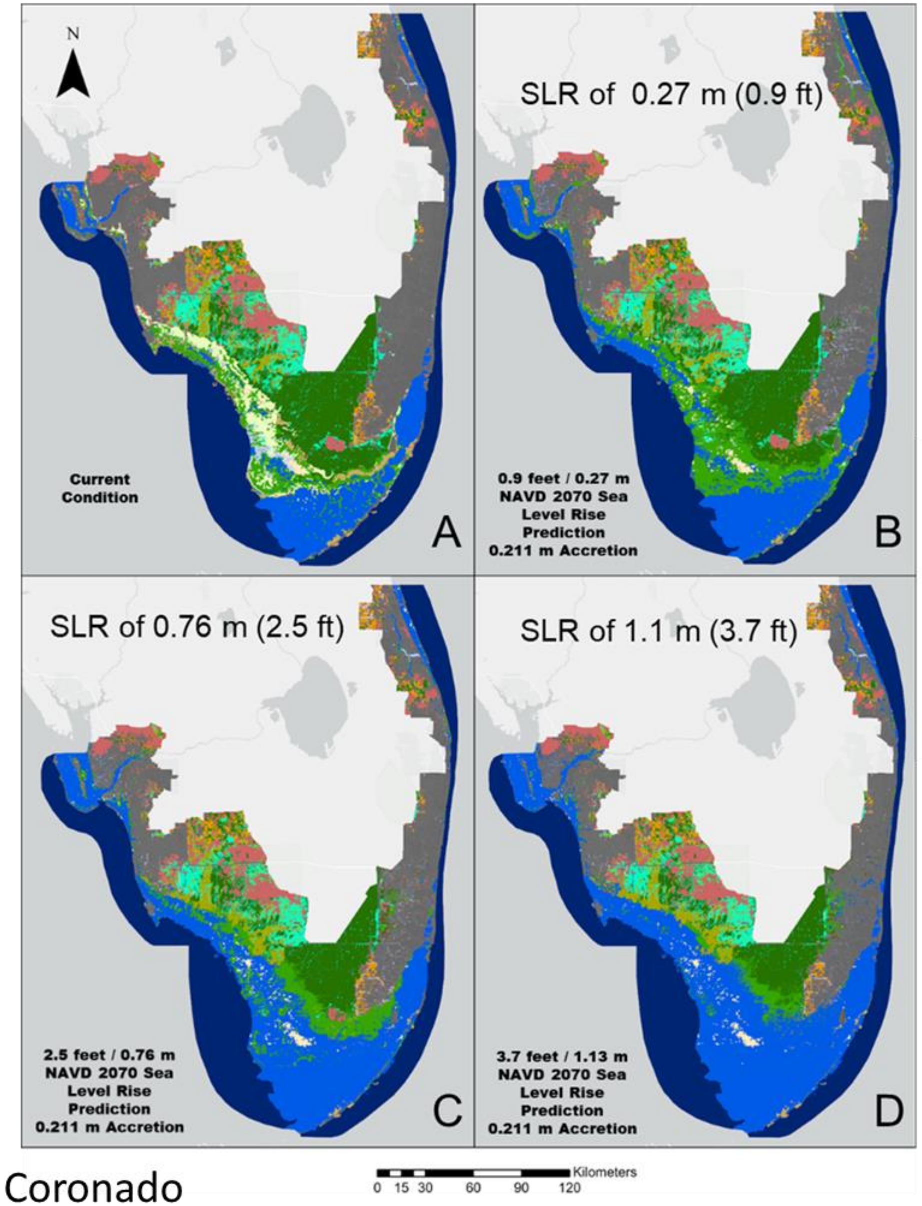
Elevation Change 1.7 mm yr^{-1}

Vertical Accretion 1.9 mm yr^{-1}

Soil Subsidence -0.2 mm yr^{-1}

Technical Lead: Carlos Coronado

Sklar, FH, C. Carlson, C, Coronado-Molina and A.C. Maran. 2021. Coastal ecosystem vulnerability and sea level rise (SLR) in South Florida: A mangrove transition projection. Front. Ecol. Evol. 9:646083. doi: 10.3389/fevo.2021.646083



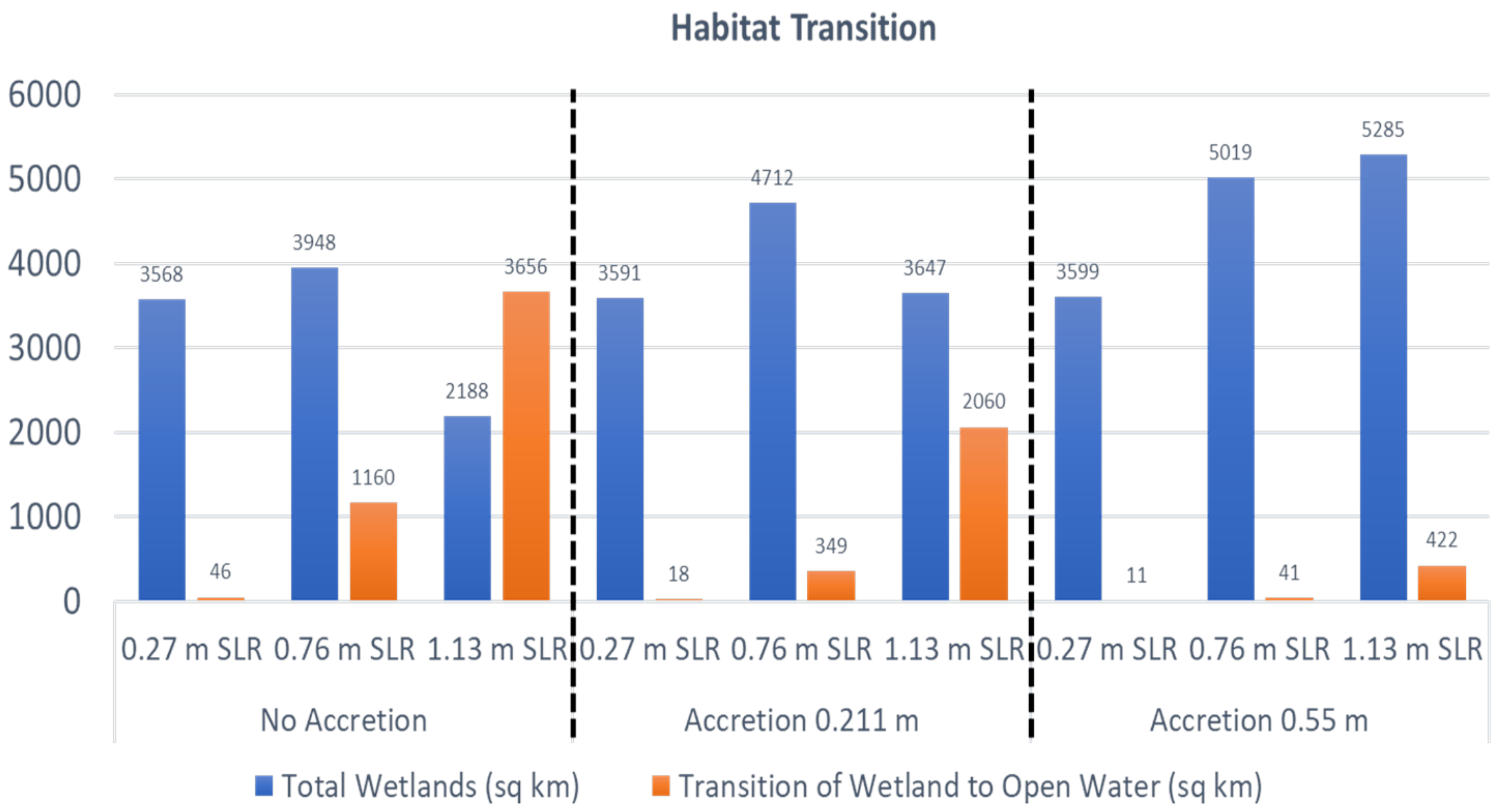
Habitat Transition with an Accretion Rate of 4.2 mm yr-1 (0.211 m by 2070).*

Agriculture	Palustrine Marsh
Barren Land	Palustrine Swamp
Estuarine Water	Saltwater Marshes
Mangrove Swamp	Saltwater Ponds
Marine	Terrestrial
Open Water	Tidal Flats
Palustrine Cypress	Urban

*Accretion Rate in Biscayne Mangroves

Technical Lead: Carlos Coronado

Importance of Soil Accretion to keep up with SLR

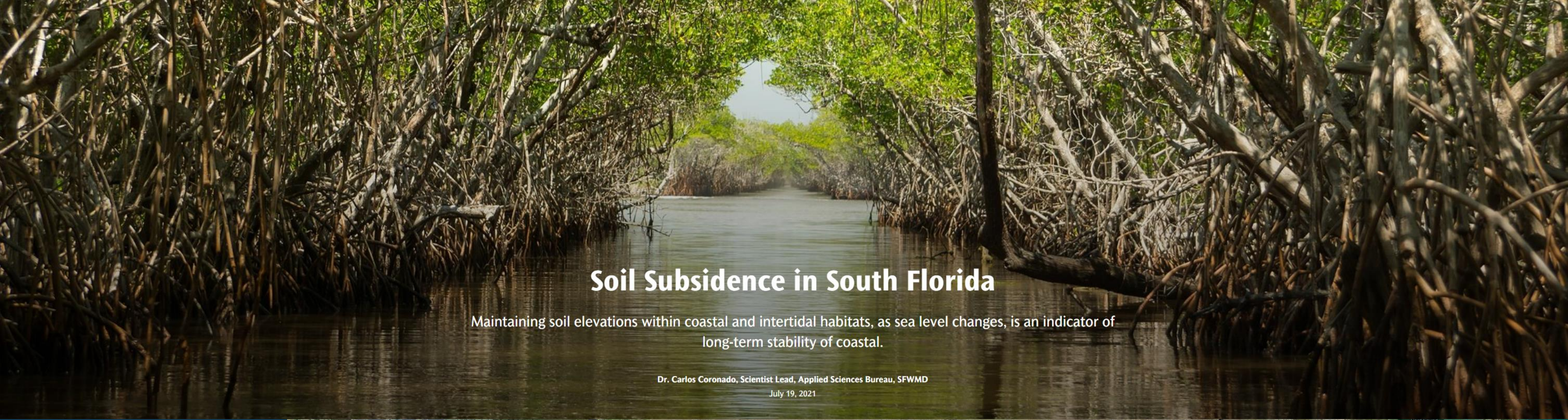


Technical Lead: Carlos Coronado

Summary

- Increases in SLR rate and saltwater intrusion have induced release of CO_2 from marshes. The collapse of marsh peat soils, W/O sufficient freshwater input, will hinder landward migration of mangroves by reducing seedling establishment and belowground production, a key process for organic matter accumulation.
- The current and future response of mangroves to SLR projection scenarios depends on the ability of mangroves to keep pace with rising sea level. Southern Everglades mangroves can keep pace with current SLR, but they will not be sustainable with SLR rates greater than 4-6 mm/yr.
- Modeling indicates a transition to open water by 2070 if accretion rates are not enhanced.

Technical Lead: Carlos Coronado

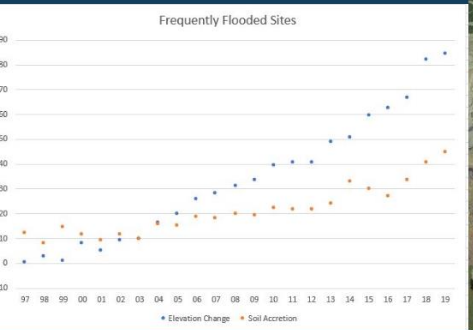


Soil Subsidence in South Florida

Maintaining soil elevations within coastal and intertidal habitats, as sea level changes, is an indicator of long-term stability of coastal.

Dr. Carlos Coronado, Scientist Lead, Applied Sciences Bureau, SFWMD

July 19, 2021



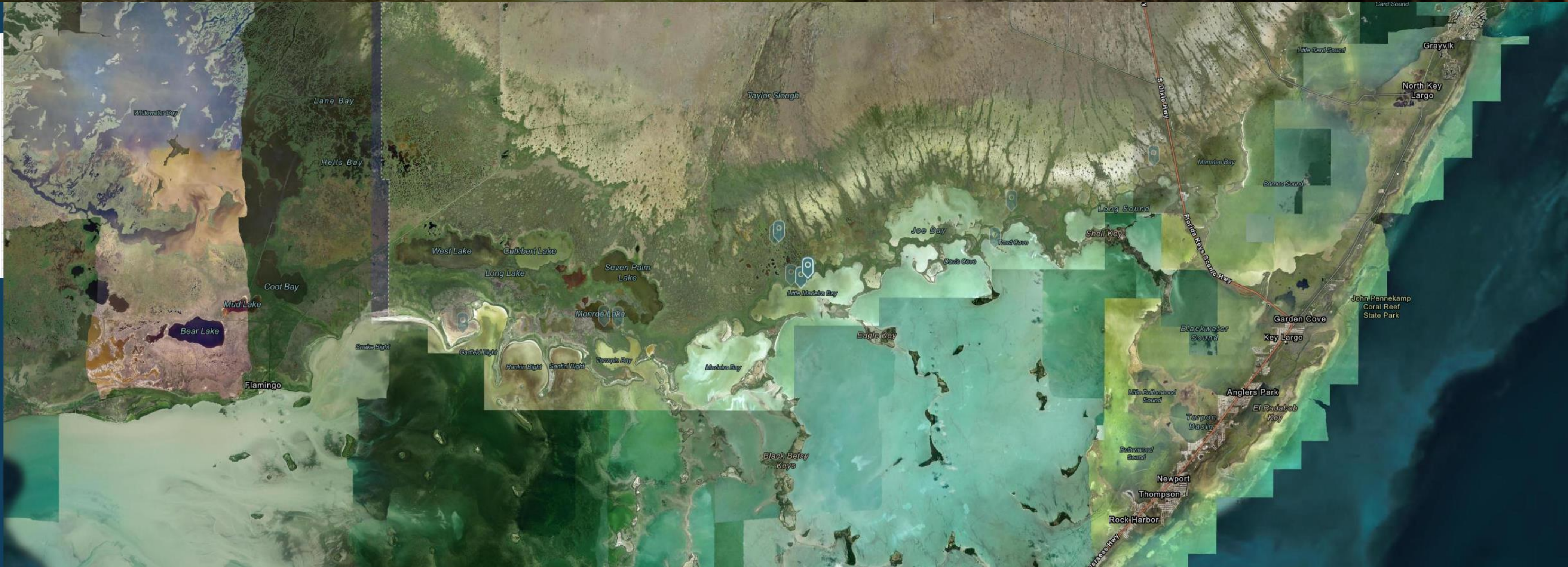
Frequently Flooded - TS-8

Elev. Change 3.7 mm/yr

Accretion 1.4 mm/yr

Expansion 2.4 mm/yr

Average of Frequently Flooded Sites: TS-3, TS-4, TS-8, TS-10 and TS-14



Water and Climate Resilience Next Steps

- Bring full content respective to all the metrics to the Resilience Metrics Hub
- Complete Automation: real time access for datasets available in DBHYDRO
- Continue to publish technical analyses and scientific resources in SFER
- Review data monitoring needs
  - quality/spatial distribution/frequency to appropriately evaluate trends
- Incorporate New Metrics
- Phase II: Future projections

Presenter: Carolina Maran

From Observations to Projections

The Rainfall Case

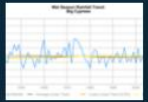
Presenter: Carolina Maran

Regional Rainfall

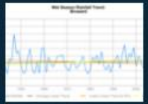
Changes in rainfall patterns will impact people and ecosystems by altering the amount of water in our region throughout the year.

Alaa Ali, Hydrological and Environmental System Modeling, SFWMD

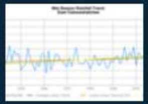
October 26, 2021



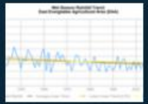
Big Cypress Rainfall Trends
Trend analyses of average rainfall during the wet season in the Big Cypress rainfall basin does not show a statistically significa...



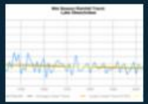
Broward Rainfall Trends
Trend analyses of average rainfall during the wet season in the Broward rainfall basin does not show a statistically significant...



East Caloosahatchee Rainfall Trends
Trend analyses of average rainfall during the wet season in the East Caloosahatchee rainfall basin shows a statistically significa...

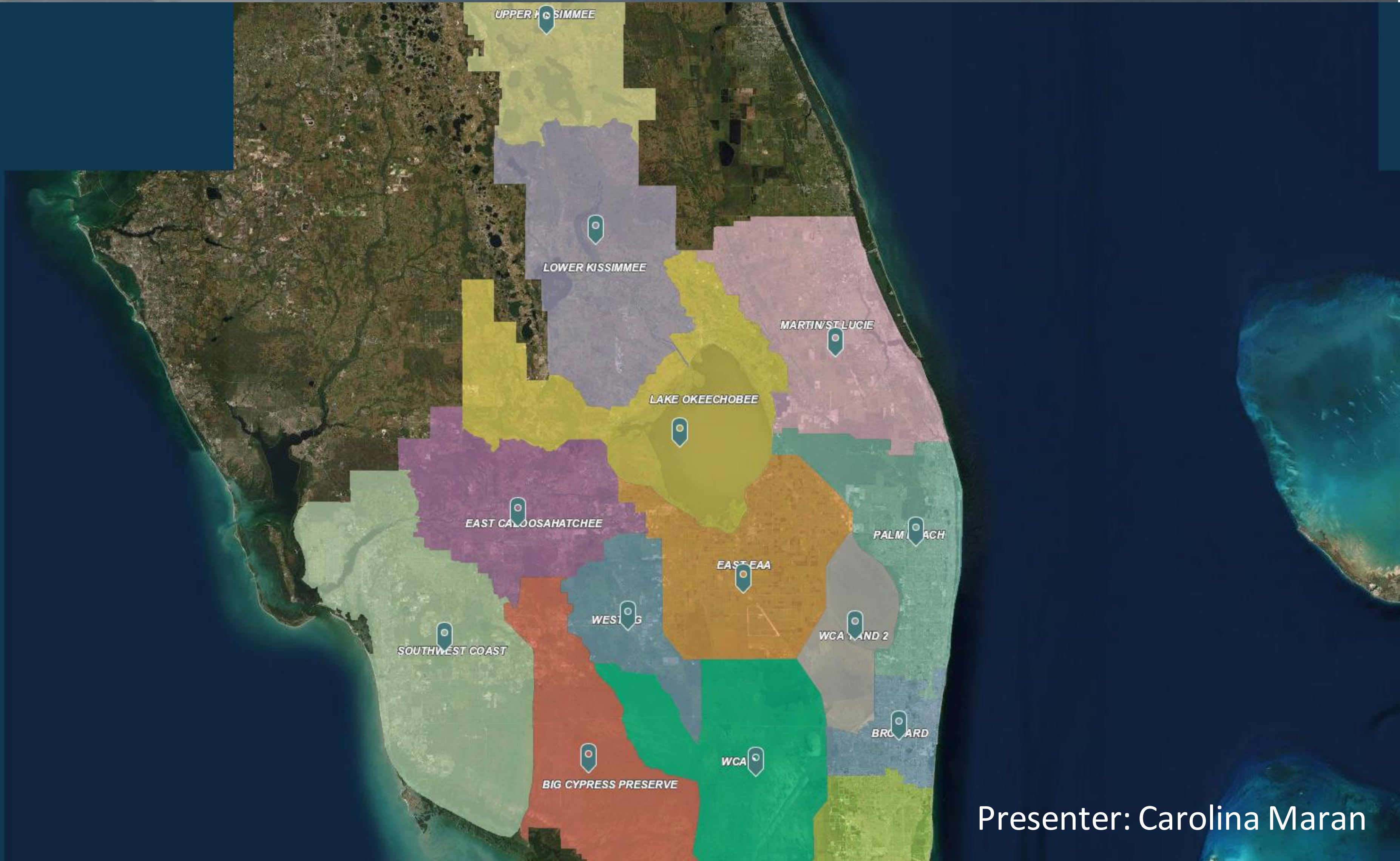


East Everglades Agricultural Area (EAA) Rainfall Trend
Trend analyses of average rainfall during the wet season in the East Everglades Agricultural Area (EAA) rainfall basin shows a...



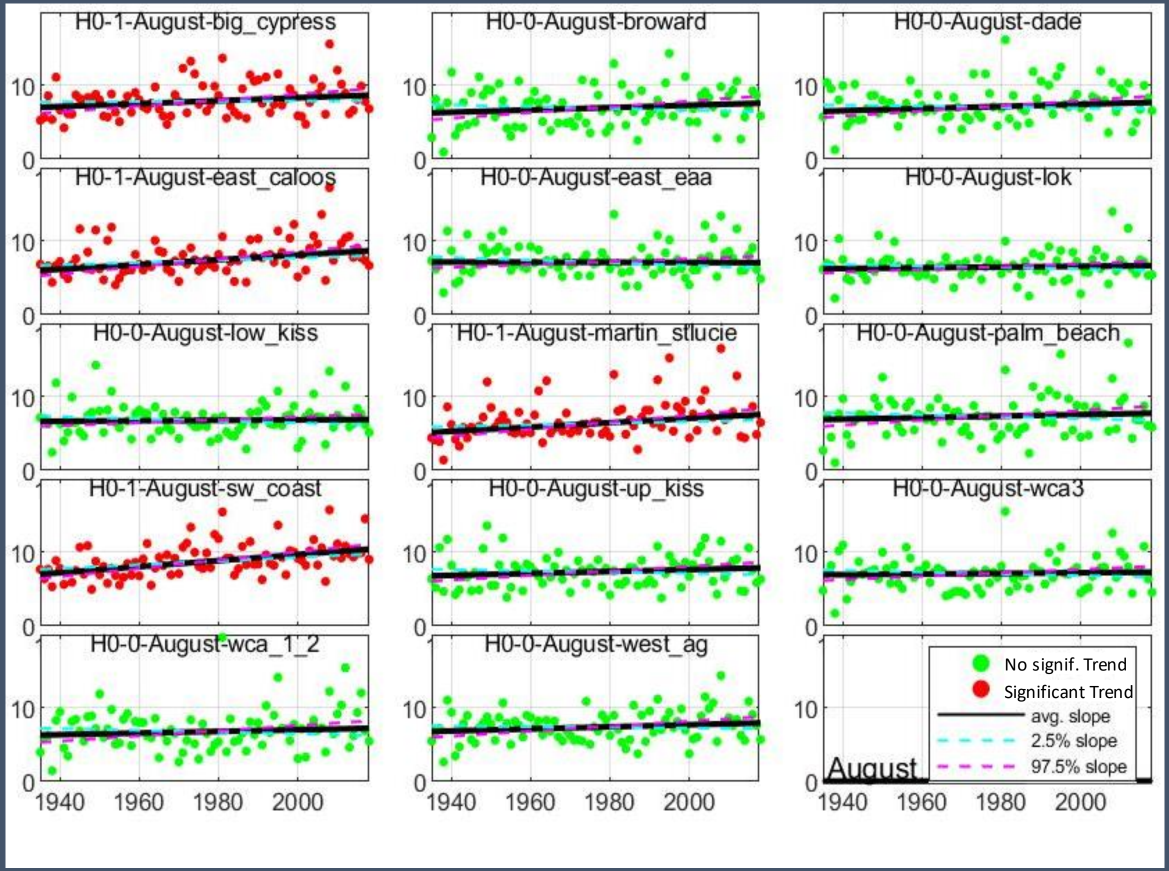
Lake Okeechobee Rainfall Trends
Trend analyses of average rainfall during the wet season in the Lake Okeechobee rainfall basin does not show a statistically...

Lower Kissimmee Rainfall Trends
Trend analyses of average rainfall during the wet season in Lower

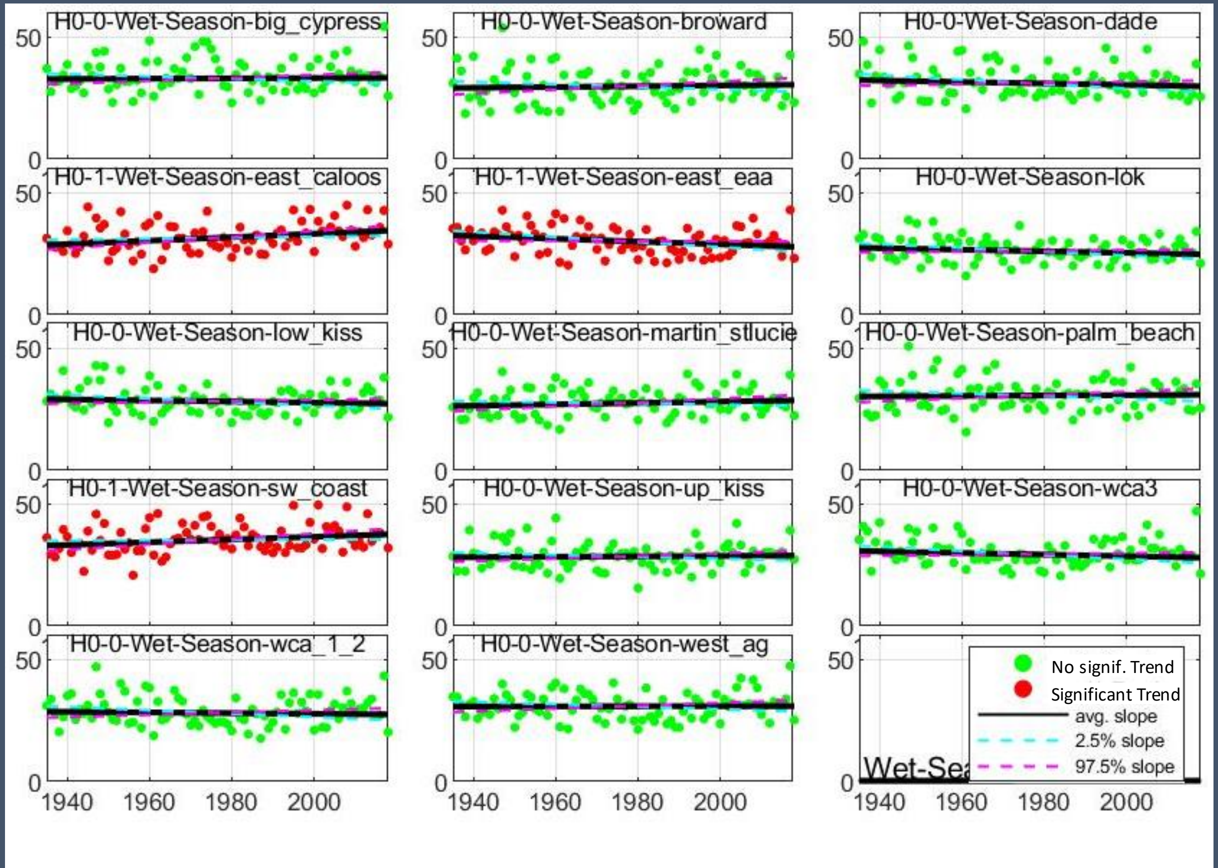


Presenter: Carolina Maran

Regional Rainfall Trend Analysis - Observations



Monthly Rainfall Trend Analysis Results, illustrated by the month of August



Wet Season Rainfall Trend Analysis Results

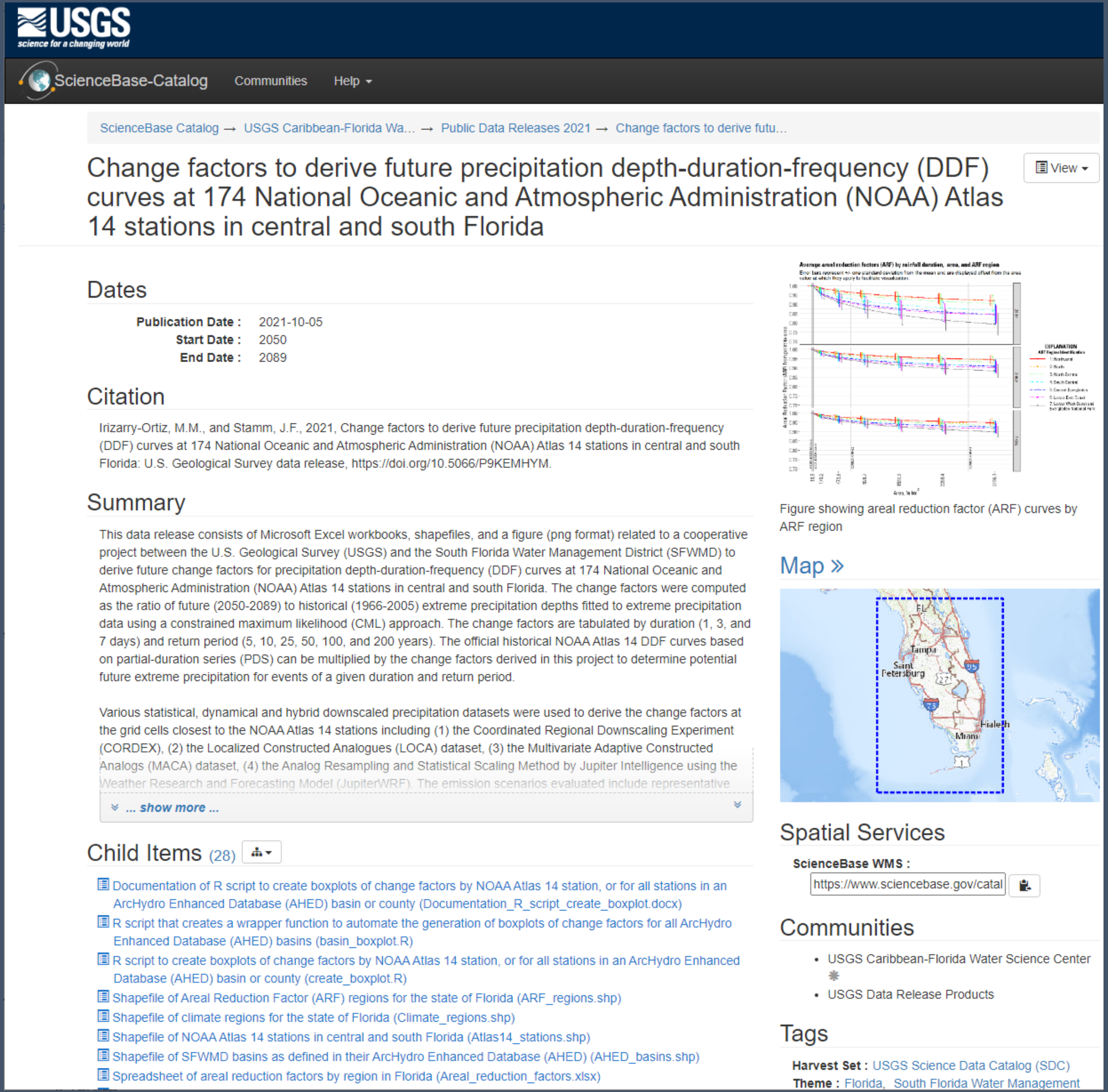
Technical Lead: Alaa Ali

Presenter: Carolina Maran

Future Rainfall Data Release

https://doi.org/10.5066/P9KEMHYM

- Internal review of the data by SFWMD teams
- Initial recommendations for planning purposes
- Partner / Stakeholder Review & Feedback Next


USGS science for a changing world

ScienceBase-Catalog Communities Help

ScienceBase Catalog → USGS Caribbean-Florida Wa... → Public Data Releases 2021 → Change factors to derive futu...

Change factors to derive future precipitation depth-duration-frequency (DDF) curves at 174 National Oceanic and Atmospheric Administration (NOAA) Atlas 14 stations in central and south Florida

View

Dates

Publication Date : 2021-10-05
Start Date : 2050
End Date : 2089

Citation

Irizarry-Ortiz, M.M., and Stamm, J.F., 2021, Change factors to derive future precipitation depth-duration-frequency (DDF) curves at 174 National Oceanic and Atmospheric Administration (NOAA) Atlas 14 stations in central and south Florida: U.S. Geological Survey data release, https://doi.org/10.5066/P9KEMHYM.

Summary

This data release consists of Microsoft Excel workbooks, shapefiles, and a figure (png format) related to a cooperative project between the U.S. Geological Survey (USGS) and the South Florida Water Management District (SFWMD) to derive future change factors for precipitation depth-duration-frequency (DDF) curves at 174 National Oceanic and Atmospheric Administration (NOAA) Atlas 14 stations in central and south Florida. The change factors were computed as the ratio of future (2050-2089) to historical (1966-2005) extreme precipitation depths fitted to extreme precipitation data using a constrained maximum likelihood (CML) approach. The change factors are tabulated by duration (1, 3, and 7 days) and return period (5, 10, 25, 50, 100, and 200 years). The official historical NOAA Atlas 14 DDF curves based on partial-duration series (PDS) can be multiplied by the change factors derived in this project to determine potential future extreme precipitation for events of a given duration and return period.

Various statistical, dynamical and hybrid downscaled precipitation datasets were used to derive the change factors at the grid cells closest to the NOAA Atlas 14 stations including (1) the Coordinated Regional Downscaling Experiment (CORDEX), (2) the Localized Constructed Analogues (LOCA) dataset, (3) the Multivariate Adaptive Constructed Analogs (MACA) dataset, (4) the Analog Resampling and Statistical Scaling Method by Jupiter Intelligence using the Weather Research and Forecasting Model (JupiterWRF). The emission scenarios evaluated include representative

... show more ...

Child Items (28)

- Documentation of R script to create boxplots of change factors by NOAA Atlas 14 station, or for all stations in an ArcHydro Enhanced Database (AHED) basin or county (Documentation_R_script_create_boxplot.docx)
- R script that creates a wrapper function to automate the generation of boxplots of change factors for all ArcHydro Enhanced Database (AHED) basins (basin_boxplot.R)
- R script to create boxplots of change factors by NOAA Atlas 14 station, or for all stations in an ArcHydro Enhanced Database (AHED) basin or county (create_boxplot.R)
- Shapefile of Areal Reduction Factor (ARF) regions for the state of Florida (ARF_regions.shp)
- Shapefile of climate regions for the state of Florida (Climate_regions.shp)
- Shapefile of NOAA Atlas 14 stations in central and south Florida (Atlas14_stations.shp)
- Shapefile of SFWMD basins as defined in their ArcHydro Enhanced Database (AHED) (AHED_basins.shp)
- Spreadsheet of areal reduction factors by region in Florida (Areal_reduction_factors.xlsx)

Figure showing areal reduction factor (ARF) curves by ARF region

Map »

Spatial Services

ScienceBase WMS : https://www.sciencebase.gov/catal

Communities

- USGS Caribbean-Florida Water Science Center
- USGS Data Release Products

Tags

Harvest Set : USGS Science Data Catalog (SDC)
Theme : Florida, South Florida Water Management

Presenter: Carolina Maran

Join us at the 2022 UF Water Institute Symposium

Sustainable Water Resources
Complex Challenges, Integrated Solutions

OVERVIEW

The UF Water Institute and Duke Energy invite you to participate in the 8th biennial UF Water Institute Symposium. The Symposium will bring together individuals from a broad range of disciplines and organizations to explore water issues from multiple perspectives.

WHERE

J. Wayne Reitz Union
University of Florida
Gainesville, FL

WHEN

Tuesday to Wednesday
February 22-23, 2022

Registration Information | UF Water Institute Symposium (ufl.edu)

Q&A Session

If you're participating in person – please fill out a question card and give to a meeting attendant

If you're participating via Zoom – use the chat function to submit a written question

Moderator: Yvette Bonilla

Public Comments

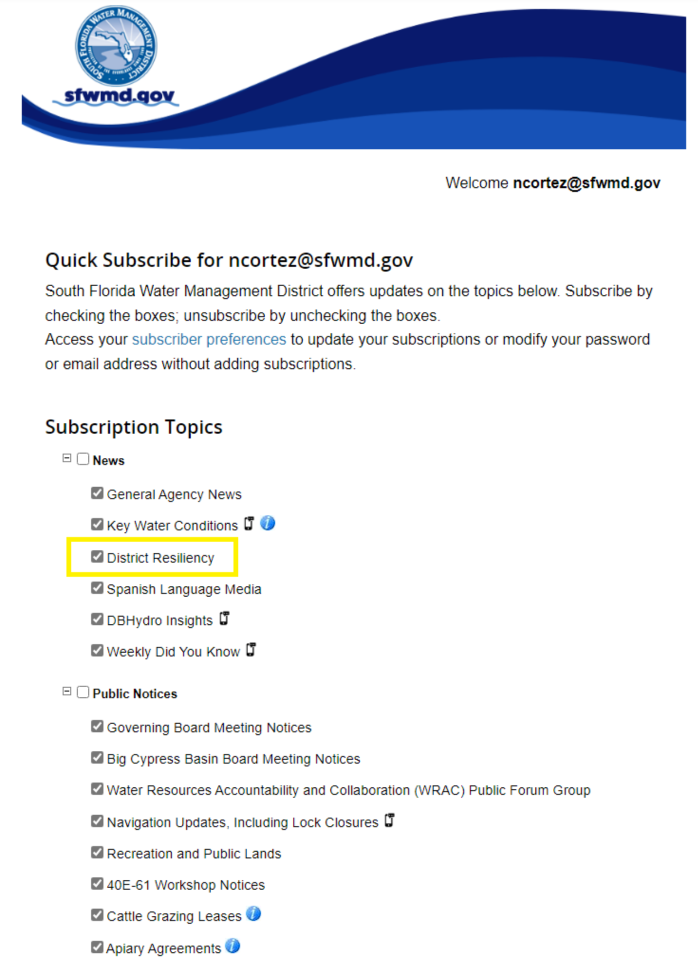
If you're participating in person – please fill out a comment card and give to a meeting attendant

If you're participating via Zoom – use the Raise Hand feature

If you're participating via Phone –
*9 Raises Hand
*6 Mutes/Unmutes

Moderator: Yvette Bonilla

Subscribing for District Resiliency Updates



South Florida Water Management District (govdelivery.com)

- You may also update your current preferences if you're already signed-up

Thanks for Participating