

South Florida Water Management District

RESILIENCY COORDINATION FORUM AGENDA

December 4, 2024 9:00 AM District Headquarters, B-1 Auditorium 3301 Gun Club Road West Palm Beach, FL 33406

FINAL

- 1. Opening Remarks Wes Brooks, Ph.D., Chief Resilience Officer, State of Florida
- 2. Statewide Office of Resilience Wes Brooks, Ph.D., Chief Resilience Officer, State of Florida
- 3. District Resiliency Updates Carolina Maran, Ph.D., P.E., Chief of District Resiliency, SFWMD
- 4. Saltwater Intrusion Monitoring Update, Peter Kwiatkowski, P.G., Water Resources Evaluation Section Administrator, SFWMD
- 5. Resilient Jacksonville: An Interdisciplinary Strategy for a Resilient Future Anne Coglianese, Chief Resilience Officer, City of Jacksonville
- 6. Break
- Central and Southern Florida Flood Resiliency Study and Integration Studies Updates

 Tim Gysan, P.E., Resilience Senior Project Manager, USACE; Eva Velez, P.E., Chief, Ecosystem Branch, USACE; Jennifer Smith, Project Manager, USACE; Matthew Morrison, Chief Policy Advisor, SFWMD; and Carolina Maran, Ph.D., P.E., Chief of District Resiliency, SFWMD
- 8. Florida Flood Hub for Applied Research and Innovation, Workgroup Updates Gary T. Mitchum, Ph.D., Professor and Associate Dean, University of South Florida
- 9. Around the Table Updates from Local, State, and Tribal Partners

- 10. Public Comment
- 11. Closing Remarks Carolina Maran, Ph.D., P.E., Chief of District Resiliency, SFWMD
- 12. Adjourn

Presentations for agenda items 3, 4, 5, 7 and 8. (Staff contact, Yvette Bonilla)

Agenda Item Background:

- 03. District Resiliency Updates
- 04. Saltwater Intrusion
- 05. Resilient Jacksonville
- 07. USACE C&SF & SFWMD Integration Studies
- 08. Florida Flood Hub

Presentations:

MEMORANDUM

- TO: Governing Board Members
- FROM: Yvette Bonilla, Executive Office
- DATE: December 4, 2024
- **SUBJECT:** Presentations for agenda items 3, 4, 5, 7 and 8.

Agenda Item Background:

Staff Contact and/or Presenter:

ATTACHMENTS:

- 03. District Resiliency Updates
- 04. Saltwater Intrusion
- 05. Resilient Jacksonville
- 07. USACE C&SF & SFWMD Integration Studies
- 08. Florida Flood Hub

District Resiliency Updates Resiliency Coordination Forum – December 4, 2024

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



Office of District Resiliency - Team Updates

We welcome a new team member!

Robert Caraccio Resiliency Project Manager (C&SF/FRM Studies)





Office of District Resiliency - Team Updates



Carolina Maran

Chief of District Resiliency

• Lead the SFWMD's resiliency planning and infrastructure adaptation investments to continue to protect communities from flooding, meet the region's water needs, and advance ecosystem restoration, now and into the future, in collaboration with local, state, and federal agencies.

• Develop and coordinate the implementation of comprehensive Districtwide resiliency goals and projects to mitigate and adapt District's infrastructure and core functions.

District Resiliency sfwmd.gov/resiliency

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• Consistently assess the regional risks and associated impacts of sea level rise, extreme rainfall, changing temperatures, land development and other evolving conditions. Advance scientific data and research needs to ensure the District's resilience planning and adaptation is founded on the best available science and robust technical analyses.

gov/resiliency		
Nicole Cortez	Tarana Solaiman	Yvette Bonilla
Resiliency Coordinator / Resiliency Planning Projects Supervisor	Principal Project Manager / Resiliency Implementation Projects Supervisor	(Office of the Clerk)
versee execution of planning projects and provide guidance and support to planning project managers. ngage with internal teams and external stakeholders to ensure overall projects coordination and regional insistency (Metrics, FPLOS Phase II, SLR&FRP, C&SF, and others).	 Oversee execution of implementation (real estate/design/construction) projects and provide guidance and support to implementation project managers. Coordinate with grant funding agencies and respective project managers to ensure are provide a provide a function of the provide and the provide	Resiliency Coordination Forum Lead
bordinate with External Affairs and FEMA/LMS teams to incorporate and support ranking of priority projects	compliance with project/grant requirements, objectives, and grant reporting.	 Schedule and confirm dates for

- ite with External Affairs and FEMA/LMS teams to incorp into LMS Plans (including pre and post disaster).
- Engage with Communications for facilitating public message delivery and ensuring resiliency webpages are up-to-date.
- · Support overall resiliency projects controls and budget in coordination with the Budget,

Distribute related notifications

and announcements to the

public forums.

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- Finance, Procurement, Construction, Real Estate and Legal teams.
- Complete Strategic Plan / Executive team recurring monitoring and reporting.

Stephanya Salazar Resiliency Project Manager (Metrics)	Karin Smith Resiliency Project Manager (Water Supply)	Francisco Peña Resiliency Project Manager (Flood Protection)	Aaron Duecaster Resiliency GIS Specialist	David Colangelo Resiliency Plan Coordinator	David Griffin Resiliency Project Manager (Grants Implementation)	First Last Resiliency Intern (Summer 2025)	Robert Caraccio Resiliency Project Manager C&SF FRM Studies • Ensure a reflect a and det • Prepare scripts. Liaise w present	 Ensure all relevant calendars reflect accurate meeting dates and details. Prepare meeting agendas and scripts. Liaise with speakers and presenters to confirm participation and content. Moderate meetings, manage meeting flow and adherence to agenda
 water and climate Resilience Metrics (Metrics Hub / new metrics) development) South Florida Environmental Report – Chapters 2A and 2B 	 water Supply Vulnerability Analysis Water Supply Plan CC/SLR Chapter review/support Water Supply – Technical Assessments (C&SF Flood Resiliency, BBSEER SLR, etc. Metrics support (groundwater) 	 FPLOS Program Coordination, Deliverables review; crosswalk analyses Plan updates and Grant Applications (technical support) Flood Damage Cost Estimate Tool (updates, runs) C&SF Flood Resiliency Studies (Compound Flooding; H&H Sub- team) 	(resiliency spatial database structure and content updates, data visualization and analysis; support to resiliency plan, grant applications, resiliency metrics including flood observations, and others)	Flood Resiliency Plan (annual updates, project list, costs, descriptions, tracking) Grant applications (FEMA BRIC, FDEP, FDEO, others) Stakeholder Comments and Partnerships	 Overall PM Support to Reporting Overall PM Support to Resiliency Implementation Projects Technical review of water quality/nature base features studies Presents analysis, recommendations and status information to the District and collaborating agencies as needed 	• To be confirmed	 implementation of Flood Resiliency/Risk Management Studies with USACE and project partners/ stakeholders Manage all C&SF FRM studies related contracts and interlocal agreements and execute project delivery process. Presents analysis, recommendations and project status information to the District and collaborating agencies 	



Hurricane Helene / Milton

• EOC Activation and Immediate Actions to Reduce Water Levels (strategic down-down of water levels prior to tropical storm conditions and recovery operations; temporary pumps in Upper Kissimmee Chain of Lakes; high water marks and flood observations)







2024 Wet / King Tide Season Tools

South Florida Flood Information Resource <u>www.sfwmd.gov/FloodResource</u>

Document the Flood Survey <u>sfwmd.gov/FloodingApp</u>

Enhanced Tidal Forecast

Thank you for the support!

South Florida Flood Information Resource

A resource for collecting and consolidating flood observations to help us better understand evolving flood patterns associated with King Tides, Rainfall, Tropical Storms, Hurricanes and Storm Surge.



Who to Contract about Flooding in your area:

Use this application to enter an address or location and be returned contact information for local governments and 298 / Special Districts responsible for addressing flooding at this location.

Photos and Flood Observations:

Click or scan this QR code to upload photos or submit information about flooding and/or flooding concerns in your area.

To provide information and photos for past events, please contact <u>Resiliency@sfwmd.gov</u>.



Flood Information and Current Event Viewers: Simple viewer applications designed for exploration of publicly shared Flood Information Repository content.



Flood Information Viewer







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Water and Climate Resilience Metrics Update

2025 South Florida Environmental Report (SFER)

Chapter 2A

• Water Year 2024 Hydrology, Water Management, Event Summaries

Chapter 2B

• Updated Evapotranspiration correlations, Florida Bay Seasonal Salinity Trends

Important Dates

- Open now Public Comment period: <u>sfwmd.gov/SFER</u>
- March 1, 2025 Publication date

DUTH FLORIDA WATER MANAGEMENT DISTRICT

DRAFT

2025 South Florida Environmental Report

VOLUME I

THE SOUTH FLORIDA ENVIRONMENT

Acronyms, Abbreviations, and Units of Measurement | Glossary | Conversion of Units of Measuremen

Chapter 2A: South Florida Hydrology and Water Management

Appendix 2A-1: Area Maps and Major Hydrologic Components Appendix 2A-2: Monthly Totals for Water Year 2024 Rainfall and Potential Evapotranspiration, and Historical Average Rainfall

- Appendix 2A-3: Monthly Flows for Water Year 2024, Water Year 2023, and Historical Averages
- Appendix 2A-4: Water Year 2024 Groundwater Levels Appendix 2A-5: Daily and Monthly Average Stages for Water Year 2024, Water Year 2023, and Historical Averages

Chapter 2B: Water and Climate Resilience Metrics

Chapter 3: Water Quality in the Everglades Protection Area

- Appendix 3-1: Water Year 2024 Water Quality Monitoring Results
- Appendix 3-2: Water Years 2020–2024 Water Quality Monitoring Results at Individual Stations Appendix 3-3: Water Year 2024 Attainment of the Everglades Dissolved Oxygen Site-Specific Alternative Criteria at
- Appendix 3-3: Water Year 2024 Total Phosphorus and Total Nitrogen Concentrations at Individual Stations
 Appendix 3-4: Water Year 2024 Total Phosphorus and Total Nitrogen Concentrations at Individual Stations
- Appendix 3-4. Water Year 2024 and Five-Year (Water Years 2020–2024) Annual Flows and Total Phosphorus Loads and Concentrations by Structure and Area
- Appendix 3-6: Water Years 2020–2024 Annual Total Phosphorus Criteria Compliance Assessment

Chapter 4: Nutrient Source Control Programs in the Southern Everglades

- Appendix 4-1: Supplemental Information for the Everglades Agricultural Area Basin
- Appendix 4-2: Supplemental Information for the C-139 Basin
- Appendix 4-3: Supplemental Information for Other Tributary Basins

Chapter 5A: Restoration Strategies – Design and Construction Status of Water Quality Improvement Projects

Chapter 5B: Performance and Operation of the Everglades Stormwater Treatment Areas

- Appendix 5B-1: Stormwater Treatment Areas and Everglades Agricultural Area A-1 Flow Equalization Basin Schematic Maps
- Appendix 5B-2: Implementation of the Long-Term Plan for Achieving Water Quality Goals for the Everglades Protection Area Tributary Basins
- Appendix 5B-3: Summary of Stormwater Treatment Area Black-necked Stilts and Other Protected Birds during the 2023 Nesting Season
- Appendix 5B-4: Submerged Aquatic Vegetation Coverage in the Stormwater Treatment Areas Appendix 5B-5: Dryout in the Everglades Stormwater Treatment Areas



Water and Climate Resilience Metrics Update

Phase II

- Planning activities kicked off in August
- Focuses on refined and expanded the assessment of changing conditions in water and climate data, including:
 - **New Data Analysis:** Identification of additional work relevant to initially prioritized and additional metrics.
 - Enhanced Monitoring/Analysis: Integration of new datasets and monitoring stations to improve data collection in advance of further analysis.
 - **Updates:** Ongoing monitoring of trends to track changes and identify emerging patterns, primarily for the initially prioritized metrics.

Florida Flood Hub

 Ongoing collaboration on Ocean-Atmospheric Statewide Regional Model

	Metric	New Data Analysis	Enhanced Analysis	Updates
New Metrics/Parameter	Drought	Task 1		
	Saltwater Intrusion (Freshwater Lens)	Task 2		
	Stormwater Volume and Flow	Task 3		
	Algal Blooms	Task 4		
	Atlantic Multidecadal Variability	Task 5		
	Statewide Regional Climate Projections	Task 6		
	SFWMD Future Climate Projections Workgroup	Task 7		
Implemented Metrics	Estuarine / Mangrove Inland Migration		Task 8	Task 15
	Flooding Events		Task 9	Task 15
	Groundwater Levels / Saltwater Intrusion (Cl- Levels)		Task 10	Task 15
	Tidal Stages / High Tide Events		Task 11	Task 15
	Evapotranspiration		Task 12	Task 15
	Rainfall		Task 13	Task 15
	Water Quality		Task 14	Task 15
	Minimum Flows and Minimum Water Levels (MFLs)			Task 15
	Soil Subsidence			Task 15
	Salinity			Task 15



Lower East Coast Water Supply Plan Update

Climate Change and Sea Level Rise Discussion

- Rainfall, temperature, ET, sea level data
- Use historical observations to identify evolving conditions
- Characterize SLR impacts on water supply sources

Modeling Effort to support LEC Plan Update

- Utilize the East Coast Surficial Model (ECSM)
- 20-year look ahead (2045) + SLR scenarios

ECSM Model Development Status

- Model development is ongoing
- First LEC WSP model runs anticipated in Spring 2025



Approved September 2024



Water Supply Vulnerability Assessment Update

Modeling Effort

- Utilize the East Coast Surficial Model (ECSM) Lower East Coast Plan
- 50-year look ahead (2075)
- Sea Level Rise Intermediate Curves and Future Climate Scenarios
- Characterize future potential impacts on water supply sources
- Inform strategies and projects to build resiliency

Current Status

- Model data inputs under development:
 - Drought rainfall, ET & temperature data
 - Future land use
 - **Future population distribution per utility service area**
 - Public supply and irrigation well withdrawals
- First model runs anticipated in early summer 2025

South Florida Water Management District Water Supply Vulnerability Assessment Approach Planning Assumptions and Scenario Recommendations for the Lower East Coast Region





FPLOS Program Updates – Ongoing Studies

- St. Lucie/Martin Counties FPLOS Phase I & II Study
 - Model Development report is under review
- Palm Beach County FPLOS Phase I Study
 - Mitigation Strategies report & One Pagers are under review
- Upper Kissimmee Basin FPLOS Phase I Study
 - Mitigation Strategies report & One Pagers (pending) are under review
- C-7 Basin (Miami-Dade County) FPLOS Phase II Study
 - Future with Project Alternatives model runs are underway (04/2025)
- Western Basins (Hendry & Collier Counties) FPLOS Phase I Study
 - Model Development report is underway



Phase I: Flood Vulnerability Assessment Phase II Adaptation and Mitigation Planning



SLR & Flood Resiliency Plan

- 2024 SLR & Flood Resiliency Plan Submitted on September 1st, Consolidated Report on October 1st
- 2025 SLR & Flood Resiliency Plan activities kicking off
 - 5-year update and new proposed update schedule
 - Align planning effort with Statewide Sea Level Rise and Flood Resiliency Plan
 - Engagements Workshops ahead of publishing draft in May 2025
 - **o** East Coast, West Coast, and Upper Kissimmee Basin
 - February 2025 exact dates TBC









Building Resilience and Mitigating Risks to South Florida's Water Resources

FINAL SEPTEMBER 1, 2024



15

Consolidated Report

- 2024 Consolidated Annual Report on the status of implementation of the C&SF Studies and SFWMD Flood Resiliency Plan
- Submitted to Governor, Legislators, FDEP and published on October 1st

2024 Consolidated Annual Report on Flood Resiliency

Central and Southern Florida Flood Resiliency Study

Sea Level Rise and Flood Resiliency Plan

October 2024





LMS Coordination Post 2024 Plan Update

- SFWMD sent out the latest list of prioritized projects and updated cost estimates in each county for inclusion in the respective LMS plans
- Lining up projects for new post disaster funding (Milton, Helene)

Please let us know of additional information needed to include/update in your LMS list and confirm deadlines (ranking updates)





Projects for Review and Award Consideration

- FDEM Hurricane Ian HGMP DR4673 Tier I Recommendation
 - Big Cypress Basin Microwave Tower
- FDEM Hurricane Ian HGMP DR4673 Ongoing RFIs
 - S-61 Structure Enhancement & S-61 Navigation Lock Erosion Control
 - C-29, C-29a, C-29b and C-29c Canal Conveyance Improvement
 - S-59 Structure Enhancement and C-31 Canal Conveyance Improvements
 - S-58 Structure Enhancement
 - L-8/Corbett Water Control Structures
- FDEP 2024 Resilient Florida ~\$40M
 - C-8 Basin Resilience (Miami-Dade County)
 - Homestead Field Station Improvements
 - S169W Structure Improvements (Glades and Hendry Counties)







Grant Proposals

Resiliency Florida

- 12 grant proposals submitted by SFWMD
 - 3 planning projects; 9 implementation projects
- 2 feasibility study proposals submitted by SFRPC and MDC

FEMA BRIC

• 3 Notices of Intent (NOIs) submitted by SFWMD

Partners

 Broward, Miami-Dade, St. Lucie, Lee, Osceola, Orange, Polk, Palm Beach Counties and the South Broward Drainage District (SBDD)

Next Steps

- Ongoing coordination with grant partners
- Continue exploring project(s) partnership opportunities
- Waiting on FEMA NOFO







Grant Proposals

FEMA BRIC (Ongoing Testing)

- C-6
 - Inter-basin connectivity (between C-6, C-7, C-8, C-9)
 - Associated storage options under consideration
- C-9
 - Canal Enhancement (storage, conveyance, NBS options)
 - Temporary Storage Area ≈ 40 acres Potential partnership with Miami-Dade County
- C-12
 - Distributed stormwater storage options
 - Canal Enhancement (storage, conveyance, NBS options)
 - Culverts and Flap Gates
 - Local Pumps

Inter-Basin Connectivity (C-6)



Distributed Stormwater Storage (C-12)





Inter-Basin Connectivity

C-6 Grant Proposal

Project components

1. Inter-Basin Connectivity (Ongoing Testing)

- C-6 to C-8 and C-9 (and vice-versa)
 - Interbasin connectivity through the planned extension of the Golden Glades secondary canal system
- C-6 to C-7 (and vice-versa)
 - Existing structure G-72 is removed and replaced with two (2) pre-cast concrete box culverts with remote-controlled sluice gates that will allow for regulation of the upstream (C-6 canal) and downstream (C-7 canal) water elevations.

Benefits: Reduction in canal peak stages



Temporary Storage



Potential Storage Areas

C-6 Grant Proposal

Project components

- 2. Storage Locations (Ongoing Testing)
 - Penssuco
 - Bird Drive
 - Kendall
 - Existing C-4 Emergency Detention Basin

Benefits: Reduction in canal peak stages and flood risk across watersheds.

3. Temporary Storage Areas ≈ 13.40 acres (Ongoing Testing – New Locations TBC)

- Sewell Park (≈ 11.22 acres)
- Jose Marti Park (≈ 2.18 acres)

Benefits: Reduction in flood risk with nature-based features with the potential to attenuate localized flooding by slowing runoff and storing floodwater.





C-9 Grant Proposal

Project components

1. Temporary Storage Area ≈ 40 acres (Ongoing Testing) - Potential partnership with Miami-Dade County

Benefits: Reduction in flood risk with nature-based features with the potential to attenuate localized flooding by slowing runoff and storing floodwater.

Temporary Storage





C-12 Grant Proposal

Project components

- 1. Distributed stormwater storage
 - Northern Bank- 0.39 miles
 - Southern Bank- 1.09 miles
 - Total Area: 11.90 acres

Benefits: Reduction in flood risk with the potential to attenuate localized flooding by slowing runoff and storing floodwater.

- 2. Temporary Storage (≈ 6.10 acres)
 - Passive Park -The Circles (≈ 2.63 acres)
 - 46th Avenue South of 21st Street (≈ 1.47 acres)
 - St. George Park (≈ 2 acres)

Benefits: Reduction in flood risk with nature-based features with the potential to attenuate localized flooding by slowing runoff and storing floodwater.

Distributed Stormwater Storage



Temporary Storage



C-12 Grant Proposal

Project components

3. Culverts and Flap Gates

- Scenario 3A (Only Flap Gates)
 - Outfall East of the Turnpike and West NW 47th Court
 - Outfall downstream Structure S-33
- Scenario 3B (One Culvert and Flap Gates)
- Scenario 3C (Two Culverts and Flap Gates)

Benefits: Reduction in flood risk, improvements in the secondary system

Culverts and Flap Gates



Local Pump



4. Local Pump (Ongoing Testing)

- East N State Road 7

Benefits: Increase local drainage and alleviate flood depths during extreme storms

Projects/Grant Implementation

Ongoing Coordination with:

- FDEP Resilient Florida Grants Implementation:
 - 3 Grant Agreements Amended + 3 under review; Site visits and quarterly reports; Interagency agreement executed with Palm Beach County
 - Flood Adaptation Planning Study initiated for Martin/St. Lucie Counties and Broward Basins
- FDEM/FEMA BRIC Grants Implementation:
 - 3 grant agreements executed
 - 3 interagency agreements undergoing final review
 - 2 draft MOAs with key stakeholders ongoing
- FDEP Innovative Tech Grant Implementation:
 - Draft grant work plan currently under final FDEP review, in collaboration with Miami-Dade County







Projects/Grant Implementation (continued)

- Coordination with project partners and key stakeholders ongoing:
- Interagency Workshop on C-8 Basin Project -August 27, 2024
- Interagency Workshop on C-7 & C-9 Basin Projects - September 10, 2024
- Projects coordination, site visit with Miami-Dade County, City of North Miami Beach
- Design and real estate coordination with Miami Shores Village and Miami-Dade County (Parks, DERM, Office of Resilience), South Broward Drainage District, Miami-Dade County Schools and City of North Miami Beach
- Public Outreach in early 2025





USACE-SFWMD Resiliency Coordination Efforts

C&SF Flood Resiliency Study – Section 203

- Initiated in Broward County (Reach A)
- Leveraging 216 Study milestones
- Initial Public Planning Meeting was hosted on October 24, 2024
- NEPA Scoping Meetings: December 10, 2024 at 2:00 p.m. and 6 p.m.
- More on Agenda Item #7





Visit <u>www.sfwmd.gov/C&SF</u> for more information.



USACE-SFWMD Resiliency Coordination Efforts

C&SF Flood Resiliency Study – Section 216:

- Coordinating scope and budget update to VTAM
- FWOP Total Benefits Evaluation Underway
- Agency Technical Review Memo (in support of Section 203)
- More on Agenda #7

Visit <u>www.sfwmd.gov/C&SF</u> for more information.





Other Relevant Recent Updates

- Flood Risk Modeling (Silver Jackets: USACE, FDEM, WMDs, Florida Flood Hub and FL Statewide Office of Resilience)
 - Statewide user interface (web map) being tested
 - Models submitted (500+ from SFWMD)
 - Flood Vulnerability Assessments and the need for advanced H&H tools in South Florida
- Statewide Regional Climate Model/ Projections:
 - Assisting Florida Flood Hub on contract execution
 - Project to be funded by 3 WMDs, FDOT and FDEP
 - Working with University of Miami and Florida State University on contract execution





Deltares USA

South Florida Water Management District Flood Impact Assessment Tool



Resiliency Coordination Forum

- Take our survey to provide feedback and share suggestions
 - https://forms.office.com/g/MkZuHNhCPZ
- Save the date for our 2025 meetings
 - Wednesday, February 26, 2025
 - Wednesday, May 28, 2025
 - Wednesday, September 3, 2025
 - Wednesday, December 3, 2025





Upcoming Events

- WateReuse Florida Resilience Panel, Dec. 5, 2024, Orlando, FL: <u>https://watereuse.org/sections/watereuse-</u> <u>florida/meetings-events/</u>
- Southeast Florida Climate Leadership Summit, Dec. 16-18, 2024 – Key West, FL: <u>https://southeastfloridaclimatecompact.org/summits/</u>

Please share other relevant events during *Around the Table Updates* (Agenda #9)



12.5.2024

8:00 A.M. -12:00 P.M. | ROSEN SHINGLE CREEK, ORLANDO WEKIWA 5

Resilience Panel, A New Integrated Water Resource Project, Orange County Utilities, Special Speaker: Mr. Wilton Simpson, Commissioner of Florida Department of Agriculture & Consumer Services

Fl WateReuse Board of Trustees December Board Meeting & Elections





Thanks!

Carolina Maran, Ph.D., P.E. Chief of District Resiliency, SFWMD <u>cmaran@sfwmd.gov</u> <u>www.sfwmd.gov/resiliency</u>



2024 SFWMD Saltwater Interface Mapping Update

Resiliency Forum December 4, 2024



Pete Kwiatkowski, P.G. Resource Evaluation Section Administrator Water Supply Bureau, Water Resources Division

Pete Kwiatkowski, P.G.



SFWMD Staff Acknowledgements

- Justin Zumbro, P.G., Lead Hydrogeologist
- Stacey Coonts, P.G., Senior Hydrogeologist
- Brian Moore, Senior Data Analyst
- Alexandra Hoffart, Geospatial Specialist
- Harshit (Sunny) Saini, P.G., Hydrogeologist 4
- Greg Cook, Hydrogeologist 2



Agenda

- Overview of saltwater intrusion and aquifers
- Importance to wellfields and infrastructure
- Project approach
- Results Water Table, Lower Tamiami, Sandstone, Mid-Hawthorn, Biscayne aquifers (2009, 2014, 2019, and 2024)
- Conclusions
- Next steps

Pete Kwiatkowski, P.G.
Common Sources of Saltwater Intrusion

- Lateral intrusion from the coast
- Vertical intrusion (upconing) from saltwater below
- Surface Infiltration -- estuaries, boat basins, saltwater marshes, saltwater canals, etc.
- Ancient (relict) seawater trapped in low permeability portions of aquifers



Generalized Hydrogeology of South Florida



Why is this Important?

- Wellfields are a major water supply source protect investment
- Once saltwater enters wells, very difficult if not impossible -- to reverse
- Very expensive to relocate wellfields and associated infrastructure (pipelines, treatment plants and processes, etc.)
- Other sources of water more expensive to treat (e.g., Floridan aquifer – reverse osmosis)



SFWMD Saltwater Interface Mapping Project

- <u>Strategy</u> -- Compare interface positions (i.e., 2009, 2014, 2019, 2024), note areas of concern, adjust monitoring, and adapt as necessary
- Update maps every 5 years
- Use all available data (USGS, SFWMD, Counties, Water Use Permittees)
- Furthest inland extent dry season
- 250 milligrams per liter (mg/L) chlorides (isochlor)
- Coastal aquifers: Water Table, Lower Tamiami, Sandstone, Mid-Hawthorn, Biscayne

Mapping Challenges

- Representing a threedimensional feature on a twodimensional map
- Representing a dynamic interface with fixed-time snapshots
- Representing a diffuse front with a single line

vmd.gov



- Mapping from data that may represent one of several saltwater intrusion pathways
- Some wells used in 2009 and 2014 and 2019 not available in 2024 (e.g., wells abandoned, destroyed, no longer required to be monitored, etc.)

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Data Compilation

Map ID	SFWMD Facility ID	Project Name	Well or Station Name	Facility Type	XCOORD	YCOORD	Cased Depth (feet bls)	Total Depth (feet bls)	2019 Chloride (mg/L)	2024 Chloride (mg/L)
1	115935	DEERFIELD BEACH PUBLIC WATER SUPPLY	D1-A (G2718) ID 115935	WELL	944746	725422	100	150	182	46
2	149498	DEERFIELD BEACH PUBLIC WATER SUPPLY	D11 (G2729) ID 149498	WELL	949765	725218	20	180	186	52
3	115984	DEERFIELD BEACH PUBLIC WATER SUPPLY	CWI ID 115984	WELL	950221	724407	150	160	50	68
4	115976	DEERFIELD BEACH PUBLIC WATER SUPPLY	D12 (G2730) ID 115976	WELL	951147	724120	20	180	4,759	3,030
5	115985	DEERFIELD BEACH PUBLIC WATER SUPPLY	CWD ID 115985	WELL	950198	724065	190	200	2,250	2,750
6	115978	DEERFIELD BEACH PUBLIC WATER SUPPLY	D13 (G2731) ID 115978	WELL	950594	723439	20	170	682	315
7	149548	DEERFIELD BEACH PUBLIC WATER SUPPLY	D10 (2728) ID 149548	WELL	948052	722957	20	180	237	40
8	115943	DEERFIELD BEACH PUBLIC WATER SUPPLY	D7 (G2725) ID 115943	WELL	949933	722800	60	170	181	42
9	115979	DEERFIELD BEACH PUBLIC WATER SUPPLY	D14-A (G2733) ID 115979	WELL	951596	722753	100	150	181	46
10	115936	DEERFIELD BEACH PUBLIC WATER SUPPLY	D2-A (G2719) ID 115936	WELL	944329	722439	100	150	128	21
11	115982	DEERFIELD BEACH PUBLIC WATER SUPPLY	D17 (G2737) ID 115982	WELL	949053	722435	100	150	225	61
12	115980	DEERFIELD BEACH PUBLIC WATER SUPPLY	D15-A (G2/35) ID 115980	WELL	951110	720940	100	150	234	52
15	115985	DEERFIELD BEACH PUBLIC WATER SUPPLY	DR-1 (G2/38) ID 115983	WELL	942847	710540	1/0	1/0	245	48
14	6428	NORTH SPRINGS IMPROVEMENT DISTRICT	4 ID 6428	WELL	952549	719049	10	130	240	74
16	115042	DEEPEIEID BEACH DUBLIC WATER SUPPLY	4 10 0428 D6 (G2724) ID 115942	WELL	900807	717676	60	190	207	/4
17	6/31	NORTH SPRINGS IMPROVEMENT DISTRICT	010 6431	WELL	002/03	717446	80	130	60	76
10	6431	NORTH SPRINGS IMPROVEMENT DISTRICT	5 ID 6431	WELL	902493	716929	80	130	53	69
19	115973	DEEREIEID BEACH PUBLIC WATER SUPPLY	D9 (G2727) ID 115973	WELL	948468	715524	80	180	181	41
20	6425	NORTH SPRINGS IMPROVEMENT DISTRICT	7 ID 6425	WELL	906186	714820	80	130	55	74
21	136498	BROWARD COUNTY 24/NORTH REGIONAL PW 5	G-2893 ID 136498	WELL	953145	713873	167	177	1 130	2 240
22	6423	NORTH SPRINGS IMPROVEMENT DISTRICT	24 ID 6423	WELL	900319	713297	80	130	54	70
23	136493	BROWARD COUNTY 2A/NORTH REGIONAL P W S	G-2694 ID 136493	WELL	952025	712690	85	125	21	23
24	136492	BROWARD COUNTY 2A/NORTH REGIONAL P W S	G-2693 ID 136492	WELL	952000	712686	200	229	40	35
25*	261643080055901	USGS	G-2752	WELL	951331	708018	250	255	21	22
26	136873	TOWN OF HILLSBORO BEACH	HBBSW1(39th Street) ID 136873	WELL	951253	707989		257	58	62
27	136872	TOWN OF HILLSBORO BEACH	HBBMP1 (plant 110) ID 136872	WELL	947573	707104	110	110	52	57
28	136306	CITY OF POMPANO BEACH	SWI4-D ID 136306	WELL	949589	700570		200	361	221
29	136307	CITY OF POMPANO BEACH	SWI4-S ID 136307	WELL	949589	700570		120	374	222
30	136193	CITY OF POMPANO BEACH	SWI1-D ID 136193	WELL	947553	698253		200	371	158
31	136299	CITY OF POMPANO BEACH	SWI1-5 ID 136299	WELL	947553	698253		120	371	156
32	261446080062801	USGS	G-2445	WELL	948655	696461	117	132	191	189
33	136326	CITY OF POMPANO BEACH	SWI6-D ID 136326	WELL	947869	695023		200	397	231
34	136327	CITY OF POMPANO BEACH	SWI6-S ID 136327	WELL	947869	695023		120	108	124
35	136308	CITY OF POMPANO BEACH	SWI5-D ID 136308	WELL	946184	694742		200	154	62
36	136325	CITY OF POMPANO BEACH	SWI5-S ID 136325	WELL	946184	694742		120	125	53
37	136304	CITY OF POMPANO BEACH	SWI3-D ID 136304	WELL	950151	694391		180	8,820	8,328
38	136305	CITY OF POMPANO BEACH	SWI3-S ID 136305	WELL	950151	694391		120	1,650	878
39	136302	CITY OF POMPANO BEACH	SWI2-D ID 136302	WELL	946184	693443		180	168	105
40	136303	CITY OF POMPANO BEACH	SWI2-5 ID 136303	WELL	946184	693443		120	152	99
41	261403080070801	USGS	G-2149	WELL	945005	691852	135	137	38	32
42	136319	CITY OF POMPANO BEACH	PRW1 (Palm-Alire w wf) ID 136319	WELL	928857	690769		178		86
43		SFWMD	BS-3	WELL	922104	619918	280	310		19
44	136301	CITY OF POMPANO BEACH	SWI10-S ID 136301	WELL	950207	688843		130	174	181
45	136332	CITY OF POMPANO BEACH	SWI9-D ID 136332	WELL	949904	688166		140	391	197
46	136555	CITY OF POMPANO BEACH	SWI9-S ID 136333	WELL	949913	688160		130	381	202
47	261304080072501	USGS	G-2896	WELL	943527	685989	91	137	3,100	3,009
48	282737	FORT LAUDERDALE PUBLIC WATER SUPPLY	MW2A ID 282737	WELL	931727	680983	5	200	125	133
49	212914	HORT LAUDERDALE PUBLIC WATER SUPPLY	MW91D 212914	WELL	938540	6/6652	202	200	4,9/0	4,400
50*	261122080083401	0365	6-1252	WELL	935985	0/549/	205	205	50	34
51	212899	FORT LAUDERDALE PUBLIC WATER SUPPLY	MW1 ID 212899	WELL	928026	675330	5	200	119	108
52-	201100030140401		G-1212	WELL	954051	0/329/	221	225	00	00
55	126060		CRCCMW11D 136866	WELL	946594	671037	5	05	1,010	2,550
24	100009	LICOS	0.2007	WELL	940082	670440	126	126	40	2,000
56	201030080083301		6-2697 MW/-98 ID 296403	WELL	93/399	663547	120	270	5,400	1,002
574	260020020002204	USOS	C.2909	WELL	0330732	663300	110	160	2,200	1,010
58	260920080092201	1505	C.7999	WELL	931660	655579	115	165	1,020	1,910
50	200804080092/01	FORT LAUDERDALE DUBLIC WATER SURRUY	MW3A ID 282733	WELL	931000	650032	5	200	1,020	1,022
60	144160	FORT LAUDERDALE PUBLIC WATER SUPPLY	31-Divie ID 144160	WELL	915290	650002	90	120	1/4	27
61	144152	FORT LAUDERDALE PUBLIC WATER SUPPLY	27-Divis ID 144152	WELL	912952	647874	90	120		51
62	286505	FORT LAUDERDALE PUBLIC WATER SUPPLY	MW-10D ID 286505	WELL	915603	647064	5	280		2,660



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Legend



Mangrove and

Saltwater Marshes

Results: Water Table Aquifer

- Some inland saltwater movement in Naples
- New wells (red circles) better delineate interface (not necessarily interface movement)

Pete Kwiatkowski, P.G. sfwmd.gov



Map 2024

ID Chloride Chloride

2019



Results: Water Table Aquifer

- Some inland saltwater movement in SW Collier County
- New wells (red circles) better delineate interface (not necessarily interface movement)





Results: Lower Tamiami Aquifer

- Interface appears to have retreated towards coast in Naples area (reduced wellfield pumpage, aquifer recharge from reclaimed water use)
- Some inland movement in Bonita Springs area
- New wells (red circles) better delineate interface (not necessarily interface movement)
- Connate water area less than previously interpreted







SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Broward County Estimated Position of the Saltwater Interface

March/April/May 2024





14

Deerfield Beach Area



 Saltwater interface has retreated towards the coast, presumably due to reduced pumping from the City's East Well Field

Pompano Beach Area



 Saltwater interface has retreated towards the coast, presumably due to reduced pumping from the City's eastern wellfield, reduced pumping from domestic irrigation wells, and perhaps aquifer recharge from reclaimed water irrigation. Note new SFWMD Monitor Well BS-3.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Ft. Lauderdale Peele-Dixie Wellfield Area

- Saltwater interface at depth of 280 feet while production wells at depth of 120 feet
- Greater emphasis using data from deeper wells suggests interface is further inland than previously interpreted



Fort Lauderdale Area



5.Fwmd.gov

South Broward County Area

- Continued westward movement of the interface
- New SFWMD Monitor Well (BS-2) in Hollywood





Pete Kwiatkowski, P.G.

S .fwmd.gov

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Palm Beach County





20

Jupiter

 New wells (red circles) better delineate interface (not necessarily interface movement)





SOUTH FLORIDA WATER MANAGEMENT DISTRICT



Boynton Beach

- Interface relatively stable
- Interface position updated to correctly emphasize data from deeper zones where saltwater is present

per liter)

Chlorides (milligrams



Delray Beach

 Inland movement since 2019

 Sharp increase at Well PB-1707 and now stable



Martin and St. Lucie counties



Conclusions

- 2024 Status of the Saltwater Interface:
 - Noticeable inland movement (South Broward County [ongoing], Delray Beach [stabilized])
 - Some inland movement (Fort Lauderdale, Lantana, Naples, Southwest Collier County and Bonita Springs (LTA),
 - Retreated towards the coast (Naples [LTA], Deerfield Beach, Pompano Beach)
 - Been better delineated with new wells (Jupiter, Fort Lauderdale, and Boynton Beach)
- Saltwater interface has advanced or retreated depending on location, proximity to saltwater, wellfield pumpage, reclaimed water use, etc.
- Saltwater intrusion is occurring, emphasizing the importance of continued monitoring (laterally and vertically) and wellfield management
- Additional, localized monitoring may be required at select wellfields by permittees to protect water supplies
- Ongoing monitoring is important to evaluate the effects of future sea-level rise

Next Steps

- Work with local governments, permittees, and others to:
 - Identify other existing wells to increase mapping accuracy for future maps
 - Identify funding to facilitate well replacement as needed
 - Evaluate need and identify funding for new wells (critical data gaps or areas of concern)



Questions and Discussion

hank You

Pete Kwiatkowski, P.G. pkwiat@sfwmd.gov

2009, 2014, 2019 & 2024 maps available: https://www.sfwmd.gov/documents-by-tag/saltwaterinterface



JACKSONVILLE **COMPOUND FLOODING**

South Florida Water Management District

December 4, 2024











UNIVERSITY OF CENTRAL FLORIDA



Hurricane Irma is an important example of compound flooding in Jacksonville.



Downtown Jacksonville at the height of storm surge flooding [Hurricane Irma]. Image credit: Bob Self / Florida Times Union.



Image credit: City of Jacksonville.



COMPOUND FLOODING

When different types of flooding occur at the same time. An example is when heavy rain falls during a coastal storm. Many places along the St. Johns River and its tributaries are vulnerable to this kind of flooding, but this type of flooding is the most difficult to predict.



DATA GAPS: Compound flooding scenarios are not fully represented in the FEMA National Flood Hazard Layer and/or recent stormwater flood modeling developed for the City of Jacksonville.



STORMWATER (PLUVIAL) FLOODING

Flooding due to rainwater piling up in areas with poor drainage. This often happens during heavy rainfall events, when drains and pipes can't keep up with the rain.



DATA GAPS: Existing flood risk data for Jacksonville does not fully account for surface stormwater (pluvial) flooding that might occur away from the river and tributaries.



Quantify compound flood hazards

Develop probabilistic compound flood model to better understand flood risks.

Forecast flooding in real time

Design FloodID support dashboards to facilitate dynamic disaster preparedness and response.

Develop data and model catalog

Deploy Jacksonville EnDMC to support efficient and centralized data sharing.

Guide implementation of Resilient Jacksonville

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Estimate flood consequences and improve decision making, policy, and resilient infrastructure design.

cutting edge science and data

TO SUPPORT A MORE RESILIENT JACKSONVILLE





QUANTIFY COMPOUND FLOOD HAZARDS

Develop probabilistic compound flood model to better understand flood risks.



BENEFIT OF COMPOUND FLOOD MODEL AND DATA

Ability to model response to rain, winds, and storm surge concurrently

- Coastal Hydrodynamic and Wave models do not represent pluvial/fluvial effects.
- SWMM models focus on fluvial only with a static tidal boundary condition.

Response based approach to infrastructure design

- A 25-year rainfall event at Mayport does not necessarily produce a 25-year flood response at Springfield.
- The Annual Exceedance Probability Curves from the HEC-RAS 2D model can be used to identify
 - Flood depths for a desired design period
 - A set of events that can produce the flood depth that can be provided as inputs to the SWMM models or other models used for design



HEC-RAS 2D MODEL

- Model Domain Covers 4 HUC-8 Basins:
- Lower St. Johns River
 Upper St. Johns River
 Ocklawaha River
 Nassau River

Model domain extended well outside delineated boundary to capture any interflow and allow flow out of the model.



HEC-RAS 2D MODEL

Routing Area:

- 5000'x5000' Mesh
- Used to route flow to the City of Jacksonville
- Mesh size kept large to optimize model run time

Detail Area:

- 300'x300' Mesh
- Results require high level of accuracy
- Allows for accurate tidal wave propagation
- Additional regions of refinement (150') of frequently flooded areas



We have developed new detailed models to better capture these complex flood dynamics.




Compound flood model captures localized flooding not included in existing flood data.



New modeling captures the complexity of Hurricane Irma.



MODEL PERFORMANCE: HURRICANE IRMA







VISUALIZING RESULTS







FORECAST FLOODING IN REAL TIME

Design FloodID support dashboards to facilitate dynamic disaster preparedness and response.



REAL TIME FORECASTING - FloodID

- Real time forecasting and emergency decision support system
 - Forecasts for storm surge, waves, and compound flooding
 - Provides emergency support dashboards
- Operational for:
 - City of Jacksonville
 - Louisiana GOHSEP
 - National Oceanographic Partnership Program (NOPP, NRL)
- Coordination with:
 - NOAA NWC
 - USACE



COMPOUND FLOOD SIMULATIONS: NHC+QPF PEAK WATER LEVEL (NHC ADVISORY 15)





COMPOUND FLOOD SIMULATIONS: NHC+QPF PEAK WATER DEPTH (NHC ADVISORY 15)





COMPOUND FLOOD SIMULATIONS: NHC+QPF STRUCTURE FLOODING (NHC ADVISORY 15)



COMPOUND FLOOD SIMULATIONS: NHC+QPF TOTAL PRECIPITATION

Advisory 14









COMPOUND FLOOD SIMULATIONS: NHC+QPF RIVER WATER LEVEL TIMING

• Peak water levels (approximately 4 ft NAVD88) predicted the in St. John River 10/10 @ 2100 UTC (5PM Local time)





GUIDE IMPLEMENTATION OF RESILIENT JACKSONVILLE

Estimate flood consequences and improve decision making, policy, and resilient infrastructure design.



New modeling estimates flood consequences to support resilient infrastructure decision making.

Hurricane Irma Damage and Exposure



24

LOCATION-SPECIFIC DAMAGE ESTIMATES

Hurricane Irma Flood Damage



Asset Damage by Location Location Downtown





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LOCATION-SPECIFIC DAMAGE ESTIMATES

Hurricane Irma Flood Damage

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PLANNING APPLICATION:

Guiding future growth in areas that are low risk and well-connected to infrastructure





ENGINEERING & DESIGN APPLICATION:

Supporting resilient infrastructure design





NEW MODELING WILL SUPPORT FUTURE INTEGRATED PLANNING IN JACKSONVILLE





THANK YOU!

For further information: mnarayanaswamy@thewaterinstitute.org







SFWMD RESILIENCY COORDINATION FORUM: USACE RESILIENCY PROJECTS UPDATE

4 December 2024

E. Timothy Gysan, P.E., PMP Resilience Sr Project Manager Jacksonville District U.S. Army Corps of Engineers









C&SF Project Reaches and Associated Coastal Structures

Planning Reach A - Broward County Basins

- Section 203 with associated USACE agreements for technical assistance
- Feasibility Study (Initiated Q4 FY24) Target WRDA 26
- Letter of intent from SFWMD to ASA(CW) submitted 17 JUL 2024; ASA(CW) acknowledgment letter sent 23 AUG 2024

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

• FEMA Building Resilient Infrastructure and Communities (BRIC) / Resilient Florida Grant Funding Available with associated Section 408 requests

Planning Reach C - Miami River Basins

- C&SF Flood Resiliency Study Section 216 Authorization Budget to be agreed with VTAM
- Feasibility Study Target WRDA 28

Planning Reach D – South Dade Basins

 Structures potentially to be integrated into the upcoming CS&F Comprehensive Study or future planning studies





C&SF RESILIENCE PROGRAMS

C&SF FLOOD RESILIENCE: INTEGRATED PATH FORWARD

C&SF FLOOD RESILIENCY (SECTION 216) STUDY

Study Process

- USACE Jacksonville District and SFWMD finalized an overall integrated strategy; Revised Section 216 will focus on Reach C
 - Five Structures in the reach to be evaluated
- USACE Jacksonville submitted revised Vertical Team Alignment Memorandum (VTAM) to the South Atlantic Division (SAD) on 14 August 2024 for the focused Reach C study; Endorsement by SAD Oct 2024 transmitted to Headquarters USACE
 - Nest Steps: Endorsement by HQ and transmittal to ASA

Technical Efforts

 Target to share existing conditions and FWOP results with the PDT - Meeting early 2025









December 4, 2024 Resiliency Coordination Forum

Central & Southern Florida System Flood Resiliency Study (Section 203) for Broward Basins

> Matthew J. Morrison Chief Policy Advisor South Florida Water Management District

C&SF Flood Resiliency Study for Broward Basins

Project Purpose: Identify the most effective and feasible plan to reduce flood risk in areas of Broward County that are most vulnerable to flood risk

- Study will utilize WRDA 1986 Section 203 process to complete an integrated Flood Resiliency Study and Environmental Impact Statement for Broward Basins
- Study focus on the primary canals and coastal water control structures in Broward County that are part of the C&SF project
- SFWMD Non-Federal Sponsor
 - Funding support/partnership with FDEP and Broward County
- Leverage C&SF Flood Resiliency Study (216 Study) Milestones Reach A
- Project management, modeling and evaluations will be completed by SFWMD
- Consulting Services will provide technical, policy, modeling and engineering support services
- Technical and Federal Assistant from the Jacksonville District
- Targeting authorization WRDA 2026





Section 203 C&SF Flood Resiliency Study for Broward Basins

Project Study Area

- Reach A in the C&SF Flood Resiliency Study (Section 216) is the Section 203 Project Study Area
- Approximately 420 square miles
- Relatively flat landscape, slightly above sea level



C&SF Flood Resiliency Study for Broward Basins

Project Study Area – Managed Basins

- Several managed watershed basins
- Primary canals/rivers
- Primary coastal water control structures
- Other non-managed watersheds downstream of coastal water control structures

MANAGED BASIN	PRIMARY CANAL	COASTAL WATER CONTROL STRUCTURE
Hillsboro Canal Basin	Hillsboro (G-08) Canal	G56 Gated Spillway
Pompano Canal Basin	Pompano (G-16) Canal	G57 Gated Spillway
C-14 West Basin	C-14 Canal	S37B Gated Spillway
C-14 East Basin	C-14 Canal	S37A Gated Spillway
C-13 West Basin	C-13 Canal	S36 Gated Spillway
C-12 West Basin	C-12 Canal	S33 Gated Spillway
North New River Canal West Basin	North New River (G-15) Canal	G54 Gated Spillway
C-11 West & East Basins	C-11 Canal	S13 Pump Station & Gated Spillway



C&SF Flood Resiliency Study for Broward Basins

Draft Problems (leveraging 216 work):

- Changing climatic conditions have demonstrated the immediate need for a holistic and integrated approach to addressing flood and coastal storm risk management
- The more than 70-year-old gravity driven C&SF water management infrastructure system was not designed to manage the current conditions of combined runoff, storm surge, and high tides, resulting in a reduction of the system efficiency
- System inefficiencies are further exacerbated by sea level rise and extreme rainfall events that further stress the system and reduce its ability to provide flood protection in the future
- The highly dense urban areas in Broward County Florida, served by the C&SF system, are experiencing significant flooding now, which is expected to worsen in the future
- Flooding events result in property damage (residences, businesses and critical infrastructure), health and life safety risks, saltwater intrusion and threatens economic activities that are of significance

C&SF Flood Resiliency Study for Broward Basins

Draft Opportunities (leveraging 216 work):

- Provide continued flood risk management to reduce the most immediate flooding risks of vulnerable areas within the C&SF Project
- Expeditiously modifying C&SF coastal infrastructure in highly vulnerable areas to reduce the risk of harmful and damaging flooding and impacts to communities and economies
- Manage life, health and safety caused by inland inundation

Draft Goals and Objectives (leveraging 216 work):

- Develop, evaluate and recommend flood risk management measures and adaptation strategies to build flood resiliency in Broward County communities served by the C&SF system, now and in the future, and contribute to national economic development
- Enhance existing C&SF infrastructure functionality and capacity to improve flood risk management and resiliency, which has been degraded by changed conditions within Broward County
- Complete a feasibility study with economic analysis that justifies expenses for modifications and improvements

Draft Constraints (Section 203):

- Study limited to modifications to the primary canals and coastal water structures in Broward County
- No diminishment or reduction of existing flood risk management

Project Schedule

ARDR

Targeting March 2026 - Deliver Final Feasibility Report and Environmental Impact Statement to ASA Civil Works







Next Steps

Public Scoping Meetings

Public Scoping Meeting 1

December 10, 2024 2:00pm – 4:00pm

Government Center East 115 S. Andrews Ave., Room 430 Fort Lauderdale, FL 33301 **Public Scoping Meeting 2**

December 10, 2024 6:00pm – 8:00pm

Government Center East 115 S. Andrews Ave., Room 302 Fort Lauderdale, FL 33301





Central & Southern Florida

Broward Basins Flood Resiliency Study

Discussion





C&SF RESILIENCE PROGRAMS SHINGLE CREEK & KISSIMMEE RIVER STUDY





Shingle Creek flow-way through Orlando to Kissimmee and outlet into Lake Tohopekaliga

Current Status -

- SAJ received FY24 Work Plan Funds
- Working to develop Feasibility Cost Share Agreement with Osceola County by January 2025

Authority –

Section 201 of the Water Resources Development Act of 2020, Division AA of Public Law 116-260 as amended, in Division H Section 8201 of the National Defense Authorization Act for Fiscal Year 2023.

Scope –

• The purpose of the project is to improve flood risk management, provide ecosystem restoration, and additional water storage conditions in Shingle Creek and Lake Toho within the Kissimmee Chain of Lakes by improving the storage and hydrologic connection throughout the system



• This may include taking actions to develop cost-effective structural, non-structural, and natural and nature based features to re-establish native riparian, upland, and riverine habitat and the hydrologic functions they historic performed

Key themes –

- Shingle Creek and the surrounding floodplain could convey the runoff from storm events and the S-61 outlet structure at Lake Toho could pass high flows into the lower lakes. Continued urbanization has constricted the flow area, filled natural storage, and increased the volume of runoff
- Opportunities exist for development of multipurpose features optimizing total benefits of the flood risk management, aquatic ecosystem restoration, and water storage solutions
- Project will support federal goals for benefits to Environmental Justice communities, habitat restoration, navigation, flood risk management, and recreation

Florida Flood Hub for Applied Research and Innovation, Workgroup Updates

SFWMD Resiliency Coordination Forum December 4, 2024



Gary T. Mitchum, Ph.D. Professor and Associate Dean USF College of Marine Science





Florida Flood Hub

THE STATE OF FLORIDA'S CENTER FOR FLOOD DATA

- Improves flood forecasting
- Informs science-based policy, planning, and management decisions
- Brings together experts from across the country to address flood-related issues
- Creates a one-stop-shop for high-quality flood data
- Helps communities prepare for the realities of rising sea levels, stronger storms, and more extreme rainfall events





Scientific and Technical Workgroups

WORKGROUPS ARE CENTRAL TO THE SUCCESS OF THE FLOOD HUB



Sea level rise



Rainfall



Comprehensive modeling



Presenter: Dr. Gary Mitchum

Methodology

- Uses the 1 degree by 1 degree data directly from the national report.
- Create a smoothed coastline extending from LA-TX border to SC-NC border and interpolate the gridded data to this coastline.




Finding: Remarkable uniformity

- SLR is nearly constant along Florida's coastline from Pensacola to Jacksonville.
- This conclusion holds for all five projections (low, intermediate-low, intermediate, intermediate-high, high) and all three time horizons (2040, 2050, 2070).
- This also holds for all of the contributions to the total sea level change.





5

Florida projections are very similar to global projections

- Florida results can be accounted for as a combination of the global average projection plus vertical land motion.
- But what about the regional ocean thermal and dynamical processes?





Finding: An average along the Florida coastline is appropriate

- An average works well for SLR projections along the Florida coastline in the sense that deviations from the average too small to trust.
- This holds true for all 15 combinations of projections and time horizons.





Presenter: Dr. Gary Mitchum



1. There are possible issues with the VLM contribution that we will examine.

- 2. Explore possible contributions by regional ocean processes.
- 3. Look at high tide flooding and weather events.
- 4. Do a careful quality control and analyses of the regional tide gauge time series.
- 5. Examine the utility of the empirical extrapolations in the Florida region.
- 6. Assess the impact of wave runup on flooding risks.





 Table 2: Exceedance probabilities for Florida projected to 2100 with emissions scenarios used in the Federal Task Force Report. Closest

 emissions scenario-based projections are defined by a combination of Shared Socioeconomic Pathways (SSP) and increases in radiative forcing

 (2.6–8.5 watts per square meter) that generated rises in global mean sea level closest to the five chosen scenarios.

Closest emissions scenario-based global mean sea level projection							
Global mean sea level rise scenario (rise 2000–2100)	Low (SSP1-2.6)	Low (SSP1-2.6) to Intermediate (SSP2-4.5)	Intermediate (SSP2-4.5) to High (SSP3-7.0)	High (SSP3-7.0)	Very high (SSP5-8.5)	Low (SSP1-2.6), Low Confidence processes	Very high (SSP5-8.5), Low Confidence processes
	Predicted increase in global mean surface air temperature (2081–2100)					Unknown likelihood, high impact— low emissions	Unknown likelihood, high impact—very high emissions
	1.5°C	2.0°C	3.0°C	4.0°C	5.0°C		
Low (0.3 m)	92%	98%	>99%	>99%	>99%	89%	>99%
Intermediate-Low (0.5 m)	37%	50%	82%	97%	>99%	49%	96%
Intermediate (1.0 m)	<1%	2%	5%	10%	23%	7%	49%
Intermediate-High (1.5 m)	<1%	<1%	<1%	1%	2%	1%	20%
High (2.0 m)	<1%	<1%	<1%	<1%	<1%	<1%	8%



Presenter: Dr. Gary Mitchum

9

High tide flooding projections for the Tampa Bay region





Presenter: Dr. Gary Mitchum¹⁰





Rainfall workgroup

DEVELOPING PROJECTED DEPTH-DURATION-FREQUENCY CURVES



Also, Liaison positions coming soon!

Thank you.

