South Florida Water Management District

RESILIENCY COORDINATION FORUM
AGENDA

May 29, 2024
9:00 AM
District Headquarters - B-1 Auditorium
3301 Gun Club Road
West Palm Beach, FL 33406

FINAL

1. Opening Remarks - Drew Bartlett, Executive Director, SFWMD

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. Draft 2024 Sea Level Rise and Flood Resiliency Plan - David J. Colangelo, District Resiliency Plan Coordinator, SFWMD

5. Flood Vulnerability Assessments in South Florida: The Importance of Hydrology and Hydraulics - Akin Owosina, Chief Information Officer, SFWMD

6. Break

7. Wet Season Readiness: Latest Updates on South Florida Flood Information Resources and Flood Critical Elevations Coordination Efforts - Carolina Maran, Ph.D., P.E., Chief of District Resiliency, SFWMD

8. Central & Southern Florida Flood Resiliency Study Updates - Tim Gysan, P.E., Resilience Senior Project Manager, USACE; Eva Velez, P.E., Chief, Ecosystem Branch, USACE

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

Final presentations: (Staff contact, Yvette Bonilla)

Agenda Item Background:

3. District Resiliency Updates
4. Draft 2024 Sea Level Rise and Flood Resiliency Plan
5. Flood Vulnerability Assessments in South Florida
8. Central & Southern Florida Flood Resiliency Study
7. Wet Season Readiness

M E M O R A N D U M

TO: Governing Board Members

FROM: Yvette Bonilla, Executive Office

DATE: May 29, 2024

SUBJECT: Final presentations:

Agenda Item Background:

Staff Contact and/or Presenter:

ATTACHMENTS:

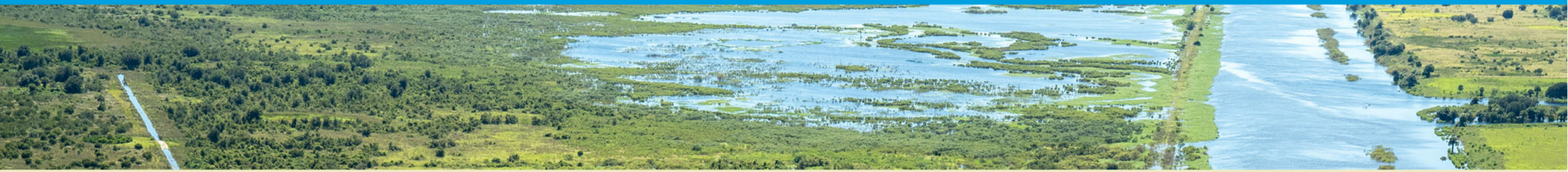
3. District Resiliency Updates

4. Draft 2024 Sea Level Rise and Flood Resiliency Plan

5. Flood Vulnerability Assessments in South Florida

8. Central & Southern Florida Flood Resiliency Study

7. Wet Season Readiness



District Resiliency Updates

Resiliency Coordination Forum – May 29, 2024

Carolina Maran

Chief of District Resiliency

South Florida Water Management District

Florida Statewide Office of Resilience
Resilient Florida C&SF Regional Tour

- USACE, SFWMD, USDOI OERI, Miami Dade, Broward County, City of Fort Lauderdale, City of Dania Beach, City of Miami

Office of District Resiliency - Team Updates

This month we welcomed a new team member!

Tarana Solaiman, Ph.D., P.E. – Resiliency Project Manager, will lead resiliency implementation efforts, in coordination with the Engineering and Construction and Permitting and Real Estate teams, to ensure recently awarded grants projects and other priority resiliency construction projects are successfully implemented in a timely manner.

Water and Resilience Climate Metrics Updates

- **South Florida Environmental Report (SFER)** Chapters were published on March 1st and Open House Poster Exhibition was hosted April 10-11
  - sfwmd.gov/SFER (Chapters 2A and 2B)
  - 2024 Open House Posters

- **Sub-daily Rainfall Trends and Drought Projections** under development, in collaboration with USGS/FIU to support upcoming Water Supply Vulnerability Assessment and other ongoing Flood Vulnerability Assessments
- Year 2 **Enhanced NOAA Tide Predictions**, in collaboration with UM Rosenstiel School (new global climate model, one potential new west coast site)
- Ongoing Collaboration with the **Florida Flood Hub** on **Statewide Rainfall Projections**

FPLOS Program Updates – Ongoing Studies

- St. Lucie/Martin County FPLOS Flood Vulnerability & Adaptation Planning Study
  - *Task 2 – Model Development is underway*
- Palm Beach County FPLOS Phase I Study
  - *Future Conditions model runs are wrapping up*
- Upper Kissimmee Basin FPLOS Phase I Study
  - *Future Conditions model results are under review*
- C-7 Basin FPLOS Phase II Study
  - *Future with Project Alternatives model runs are underway*
- *High Level Cost Estimates*
  - *Completed: Miami Dade and Broward FPLOS Phase I Studies*
  - *Added to FPLOS Studies in Palm Beach and Upper Kissimmee*

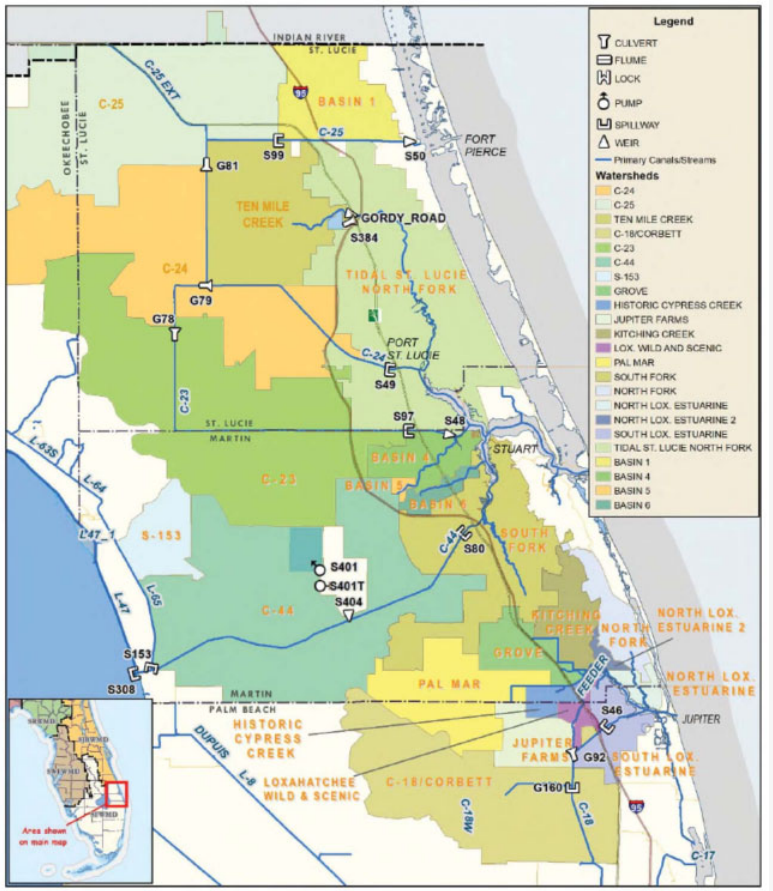
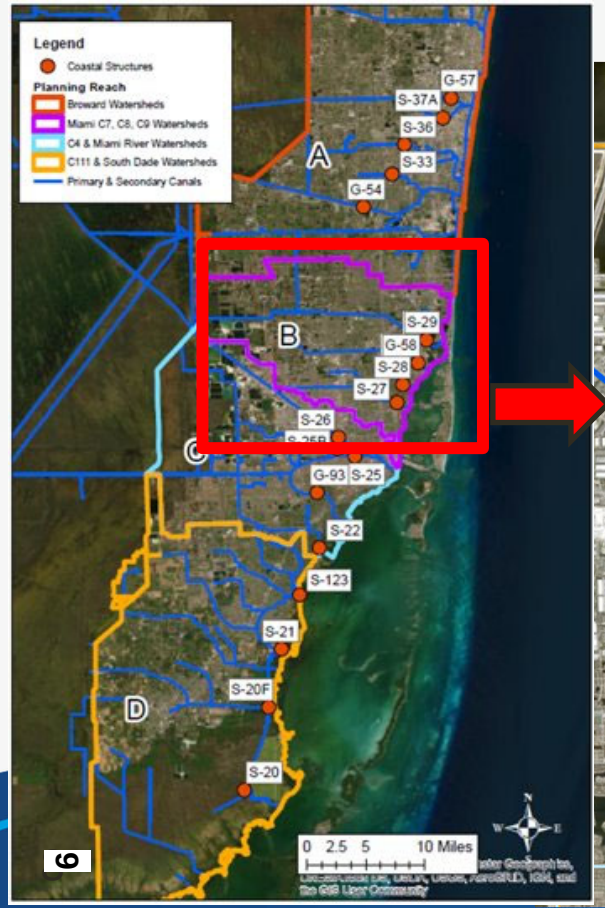


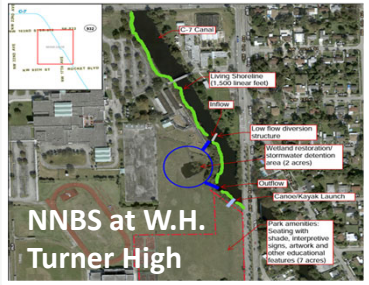
Figure 1: St Lucie/Indian River and Loxahatchee System FPLOS Study Areas

C&SF Flood Resiliency Study & FPLOS Studies

C&SF Resilience Study

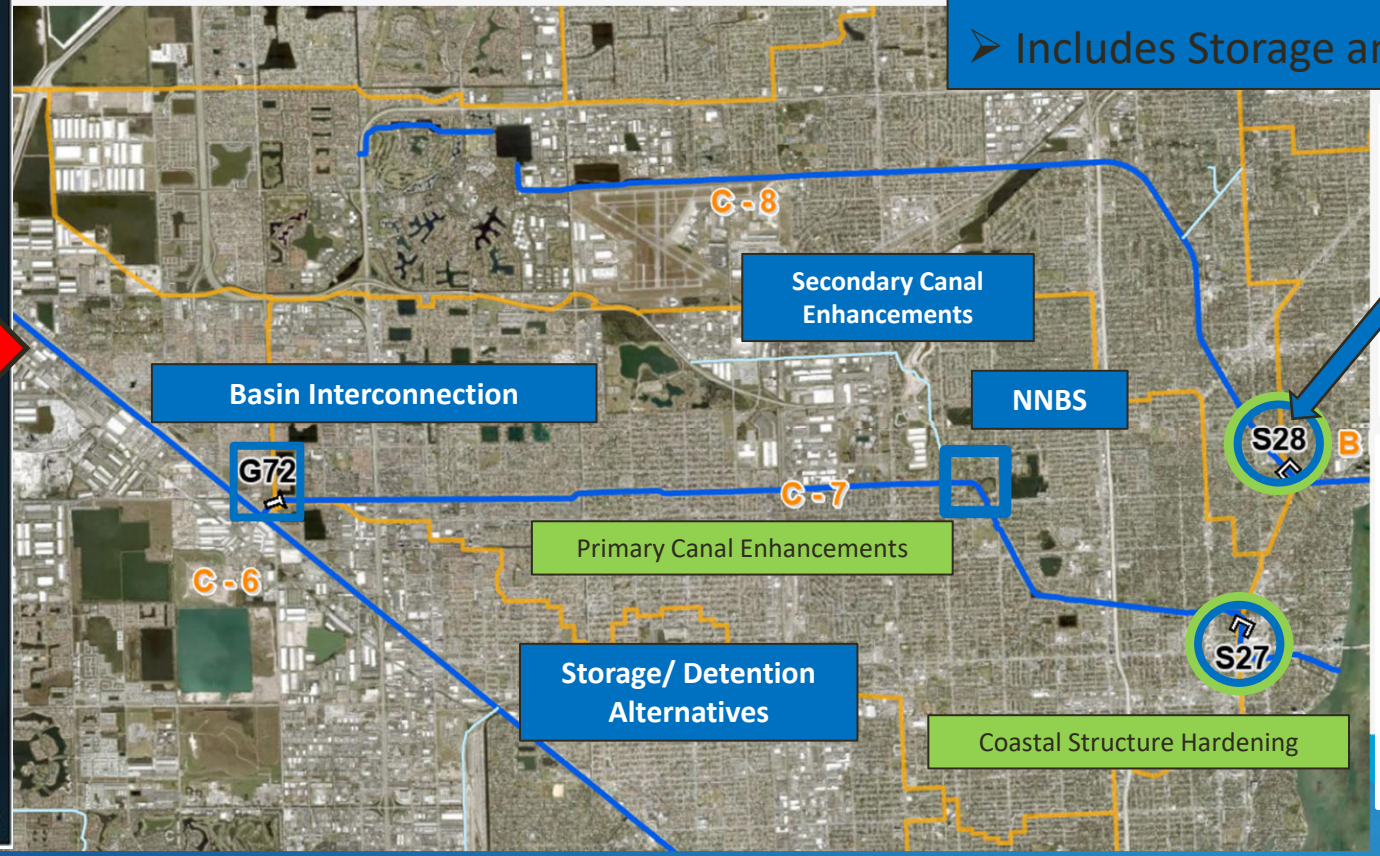
- Primary Canals
- Primary Structures

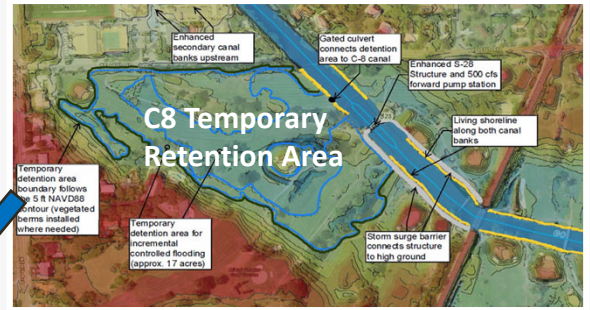




FPLOS Adaptation and Mitigation Studies

- Develop comprehensive basin-wide strategies
- Includes projects from regional and local level
- Includes GI / Natural/Nature Based Solutions
- Includes Storage and Conveyance





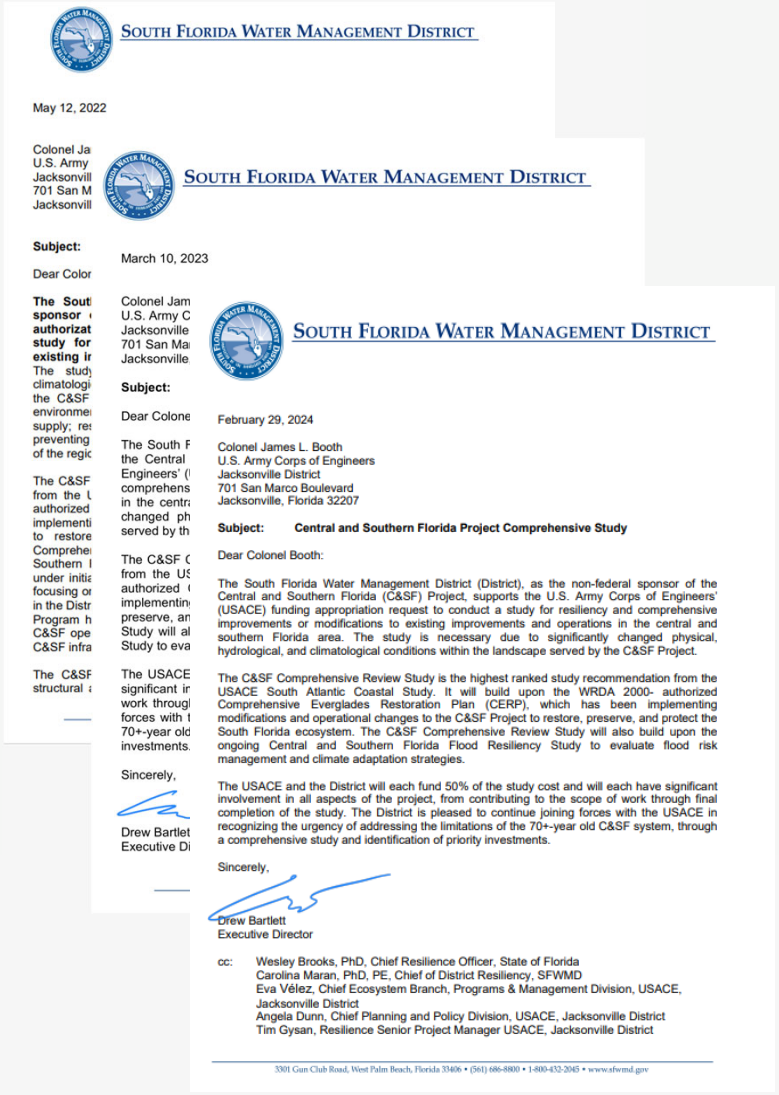
USACE-SFWMD Resiliency Coordination Efforts

- **C&SF Flood Resiliency Study:**
  - Coordinating scope and budget update to VTAM
  - July Workshop on Total Benefits
  - FWOP Total Benefits Evaluation
  - Ongoing coordination with Counties

- **C&SF Comprehensive Study**
  - Implementation Guidance underway
  - Review of draft Feasibility Study Cost-Share Agreement underway
  - Compound flood proposal being reviewed by ERDC

US Army Corps of Engineers®
Jacksonville District

www.sfwmd.gov/C&SF



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

May 12, 2022

Colonel Ja
U.S. Army
Jacksonvill
701 San M
Jacksonvill

Subject:

Dear Color

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT

March 10, 2023

Colonel Jam
U.S. Army C
Jacksonville
701 San Ma
Jacksonville

Subject:

Dear Colone

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The C&SF (from the US authorized (implementin preserve, an Study will al Study to eva

The USACE significant in work through forces with t 70+-year old investments.

Sincerely,

Drew Bartlet
Executive Di

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

February 29, 2024

Colonel James L. Booth
U.S. Army Corps of Engineers
Jacksonville District
701 San Marco Boulevard
Jacksonville, Florida 32207

Subject: Central and Southern Florida Project Comprehensive Study

Dear Colonel Booth:

The South Florida Water Management District (District), as the non-federal sponsor of the Central and Southern Florida (C&SF) Project, supports the U.S. Army Corps of Engineers' (USACE) funding appropriation request to conduct a study for resiliency and comprehensive improvements or modifications to existing improvements and operations in the central and southern Florida area. The study is necessary due to significantly changed physical, hydrological, and climatological conditions within the landscape served by the C&SF Project.

The C&SF Comprehensive Review Study is the highest ranked study recommendation from the USACE South Atlantic Coastal Study. It will build upon the WRDA 2000- authorized Comprehensive Everglades Restoration Plan (CERP), which has been implementing modifications and operational changes to the C&SF Project to restore, preserve, and protect the South Florida ecosystem. The C&SF Comprehensive Review Study will also build upon the ongoing Central and Southern Florida Flood Resiliency Study to evaluate flood risk management and climate adaptation strategies.

The USACE and the District will each fund 50% of the study cost and will each have significant involvement in all aspects of the project, from contributing to the scope of work through final completion of the study. The District is pleased to continue joining forces with the USACE in recognizing the urgency of addressing the limitations of the 70+-year old C&SF system, through a comprehensive study and identification of priority investments.

Sincerely,

Drew Bartlett
Executive Director

cc: Wesley Brooks, PhD, Chief Resilience Officer, State of Florida
Carolina Maran, PhD, PE, Chief of District Resiliency, SFWMD
Eva Vélez, Chief Ecosystem Branch, Programs & Management Division, USACE, Jacksonville District
Angela Dunn, Chief Planning and Policy Division, USACE, Jacksonville District
Tim Gysan, Resilience Senior Project Manager USACE, Jacksonville District

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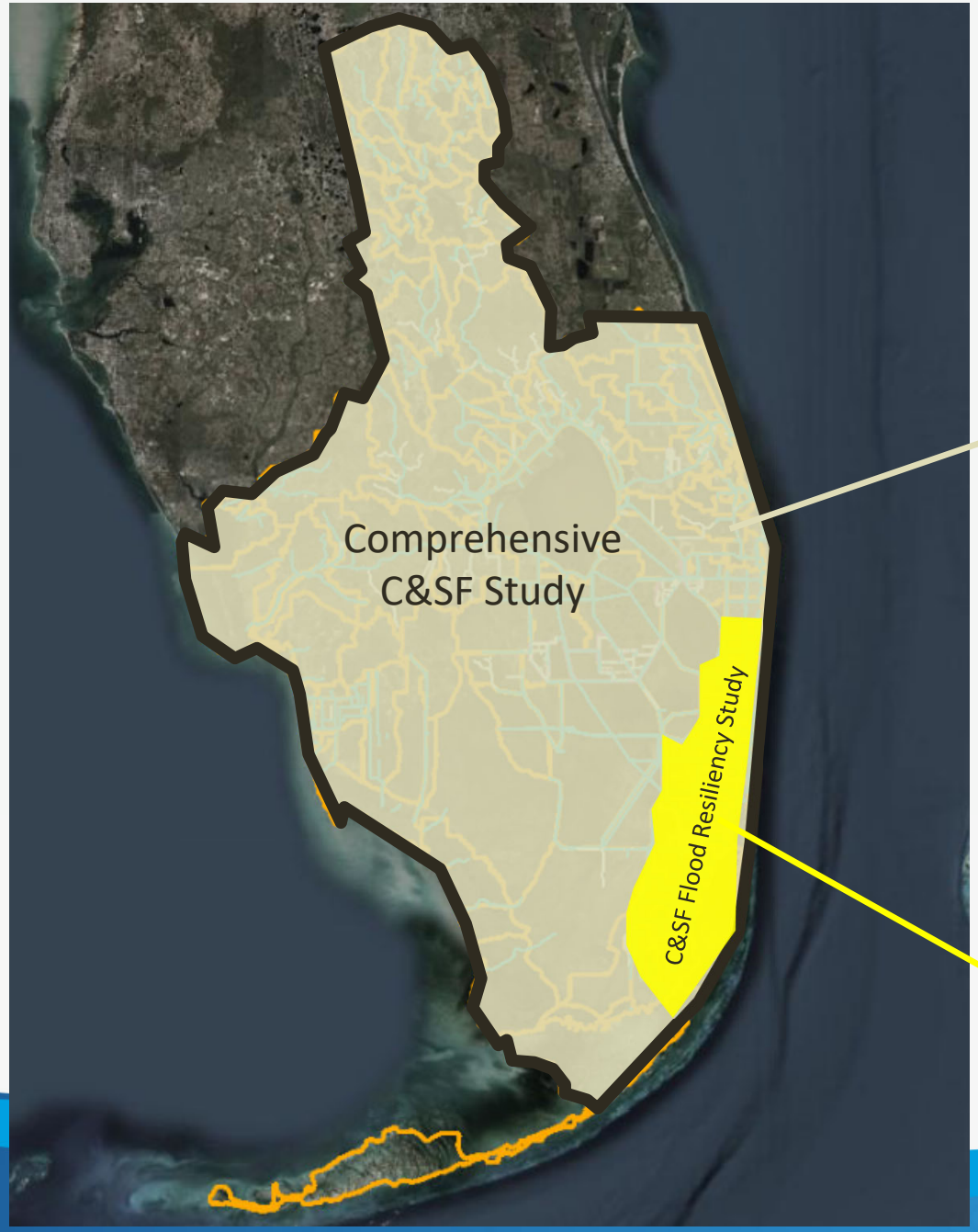


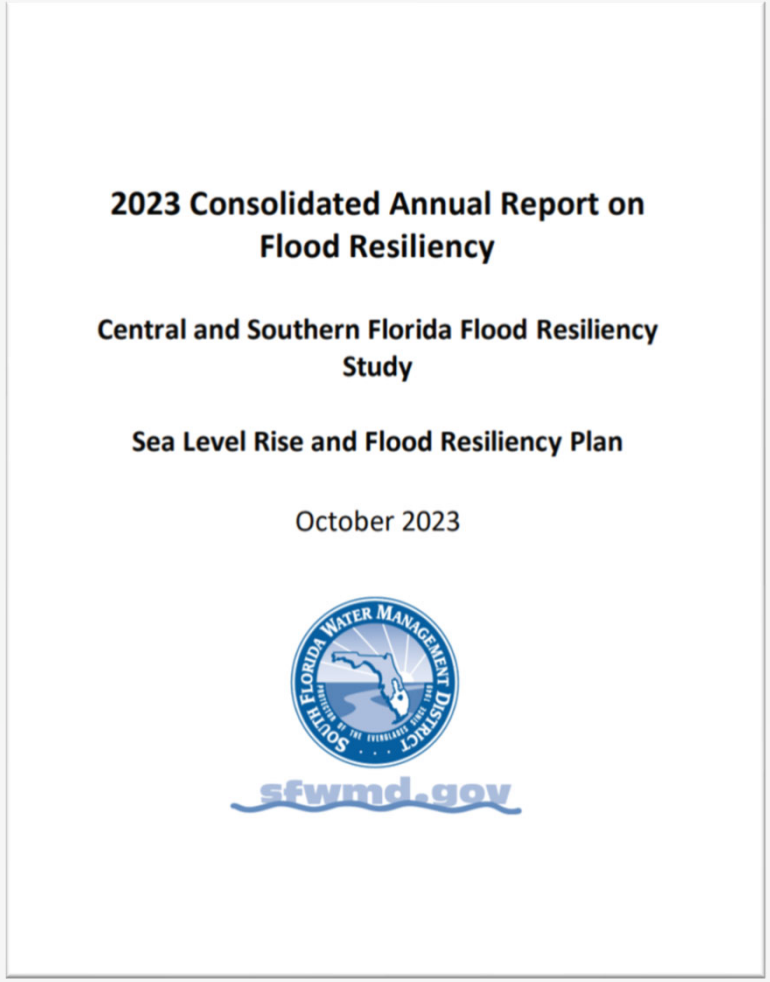
Comprehensive C&SF Study

- Multipurpose Project, under Flood Risk Management Mission
- 18 Counties
- ~9 Million Population
- ~18,000 Square Miles
- Federal Cost = $9.9B (as of April 2022)
- Multiple Federal Projects including CERP

C&SF Flood Resiliency Study (Section 216)

- Single Purpose: focus on Flood Risk Management
- Focus on coastal salinity and other highly vulnerable regional C&SF structures to build flood resilience and other comprehensive benefits
- 4 Planning Reaches
- 3 Counties
- > 5 Million Population
- > 1,100 Square Miles

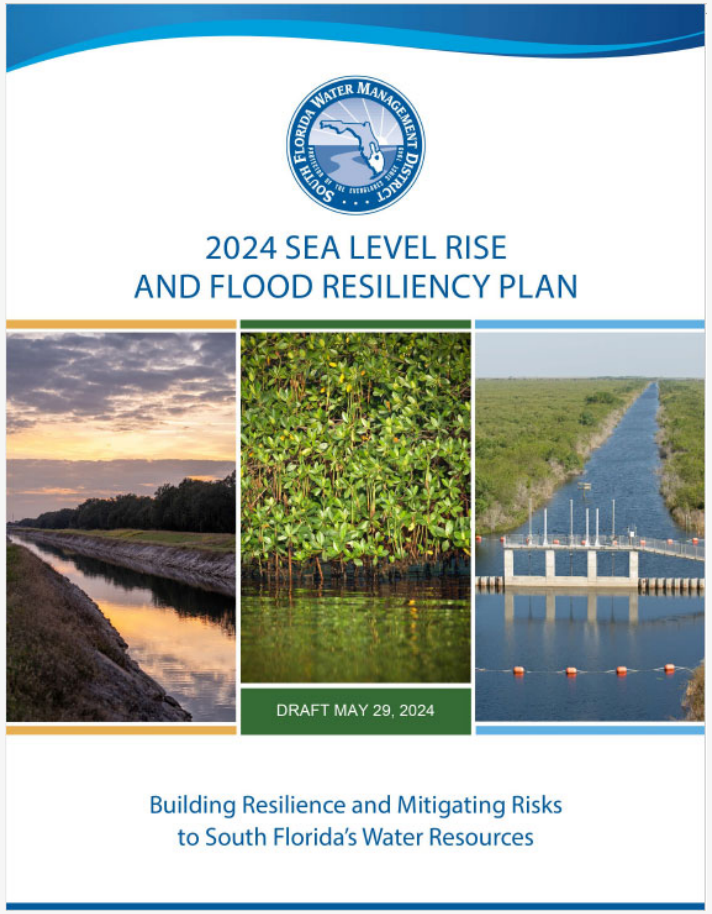
Resiliency Planning: 2024 Updates



Reducing the risks of flooding, sea level rise and other climate impacts on water resources and increasing community and ecosystem resiliency in South Florida

Draft Version to be shared TODAY

Consolidated Report Next



Grant Proposals

- Continuing to explore potential project partnership opportunities in 2024
- Initial coordination meetings with Broward, Miami and Lee Counties
- Resilient Florida, FEMA BRIC and other HGMP (DR), Florida Commerce, NOAA, others.

Projects for Review and Award Consideration

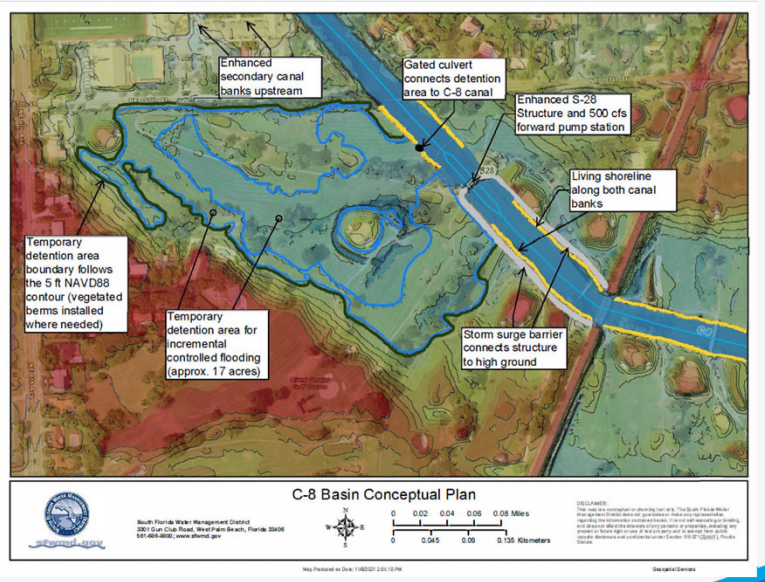
- FDEM Hurricane Ian HGMP DR4673 – Ongoing RFIs
  - S-61 Structure Enhancement & S-61 Navigation Lock Erosion Control
  - C-29, C-29a, C-29b and C-29c Canal Conveyance Improvement
  - S-59 Structure Enhancement and C-31 Canal Conveyance Improvements
  - S-58 Structure Enhancement
  - Big Cypress Basin Microwave Tower
  - L-8/Corbett Water Control Structures

- FDEP 2024 Resilient Florida
  - C-8 Basin Resiliency
  - Homestead Field Station Buildings Resiliency
  - S169W Structure Replacement and Trash Rake/Manatee Barrier

Projects/Grant Implementation

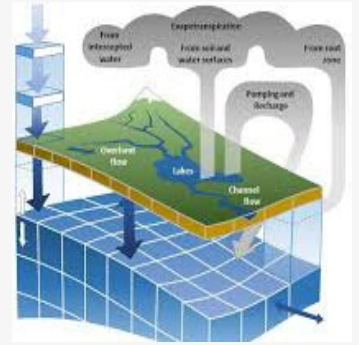
Ongoing Coordination with:

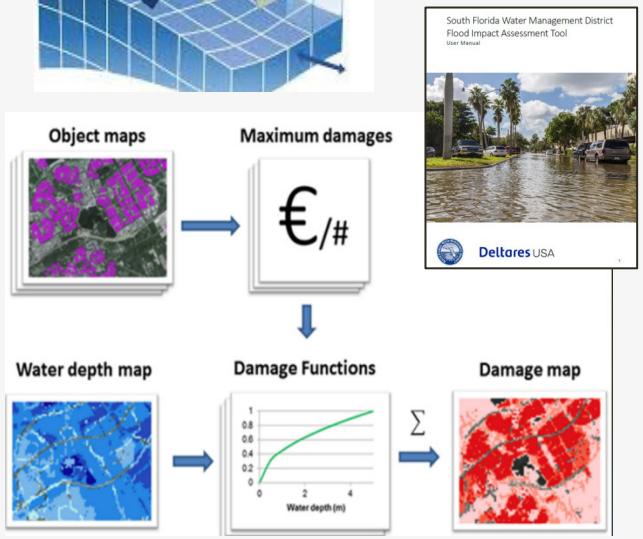
- FDEP on Resilient Florida Implementation Grants – 3 Agreements Executed; Ongoing site visits and quarterly reports; Finalizing Agreement with Palm Beach County
- FEMA/FDEM to advance FEMA BRIC implementation – 3 projects awarded to FDEM by FEMA; sub-awardee packages to SFWMD under development
- FDEP on Resilient Florida Planning Grant - Flood Adaptation Planning Study initiated for Martin/St. Lucie Counties
- FDEP Innovative Tech Grant – Submitted draft workplan in collaboration with Miami-Dade County



Other Relevant Recent Updates

- Flood Risk Modeling (Silver Jackets: USACE, FDEM, WMDs, Florida Flood Hub and FL Statewide Office of Resilience) – upcoming in person workshop on June 7
- Flood Vulnerability Assessments and the need for advanced H&H tools in South Florida (agenda item #5)
- Resilient Florida Updates during Around the Table Updates (agenda item 9)





Upcoming Events

- Environmental Permitting Summer School, July 16-19 – Marco Island, FL
  https://floridaenet.com/
- AWRA Florida Annual Meeting, August 1-2, 2024 – Key West, FL
  https://awraflorida.org/event-5445995
- Florida Resilience Conference, September 11-13, 2024 – Bonita Springs, FL
  https://floridaresilienceconference.org/
- Symposium on Flooding Adaptation, October 28-31, 2024 – Kissimmee, FL
  https://conference.ifas.ufl.edu/flooding/index.php
- Southeast Florida Climate Leadership Summit, Dec. 16-18, 2024 – Key West, FL
  https://southeastfloridaclimatecompact.org/summits/
- Please share other relevant events during the Around the Table

Thanks!

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

Photo by Paul Krashefski

SFWMD
Sea Level Rise and Flood Resiliency Plan: 2024 Update Overview

David Colangelo, District Resiliency Plan Coordinator

Today's Outline

- SFWMD Resiliency Plan 2024 Chapters Overview
- Highlights on new content
- Seeking Public Input on 2024 Plan Update and New Content

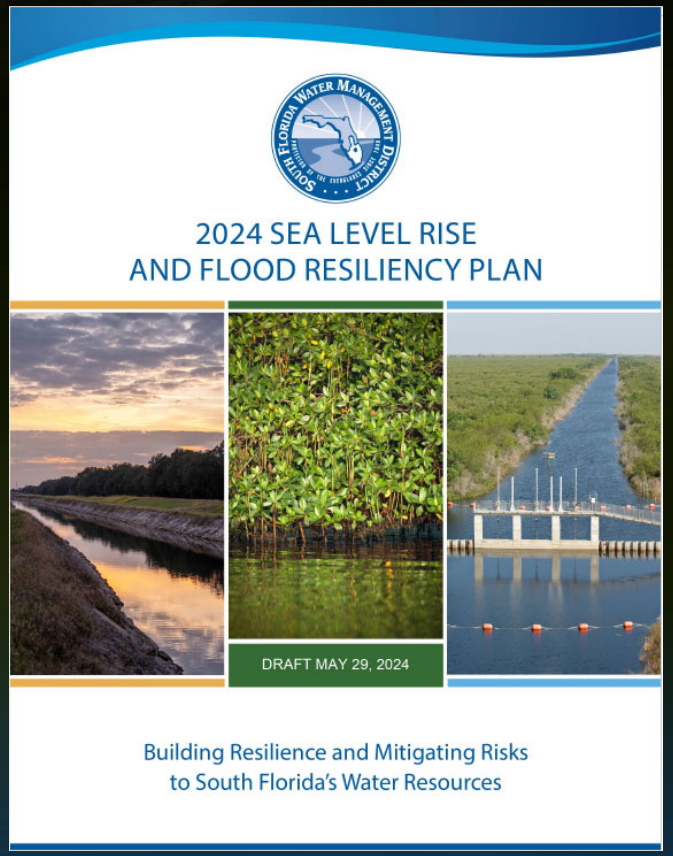
Project Team

Project Team

Carolina Maran	District Resiliency	Ryan Brown	Vegetation Management
David Colangelo	District Resiliency	LeRoy Rodgers	Vegetation Management
Francisco Pena	District Resiliency	Fred Sklar	Applied Sciences
Nicole Cortez	District Resiliency	Cassondra Armstrong	Applied Sciences
Pramod Pandey	District Resiliency	Phyllis Klarmann	Applied Sciences
Nafeeza Hooseinny	District Resiliency	Matthew Biondolillo	Ecosystem Restoration
Tarana Solaiman	District Resiliency	Maryam Mashayekhi	GeoSpatial Services
Candida Heater	Budget and Finance	Christine Carlson	GeoSpatial Services
Julie Maytok	Budget	Alexandra Hoffart	GeoSpatial Services
Lissette Sori	Budget	Mark Elsner	Water Supply
Jackea Gray	Budget	Peter Kwiatkowski	Water Supply
Lucine Dadrian	Eng. & Construction	Jim Harmon	Water Supply
Vijay Mishra	Eng. & Construction	Tom Colios	Water Supply
Sandy Smith	Eng. & Construction	Bradley Jackson	Big Cypress Basin
Akintunde Owosina	Information Technology	Robin Bain	Big Cypress Basin
Hongying Zhao	Hydrology & Hydraulics	Marcy Zehnder	Real Estate
Matahel Ansar	Hydrology & Hydraulics	Robert Schaeffer	Real Estate
Tibebe Dessalegne	Hydrology & Hydraulics	Guianeya Herrera Osorio	Counsel
Jun Han	Hydrology & Hydraulics		

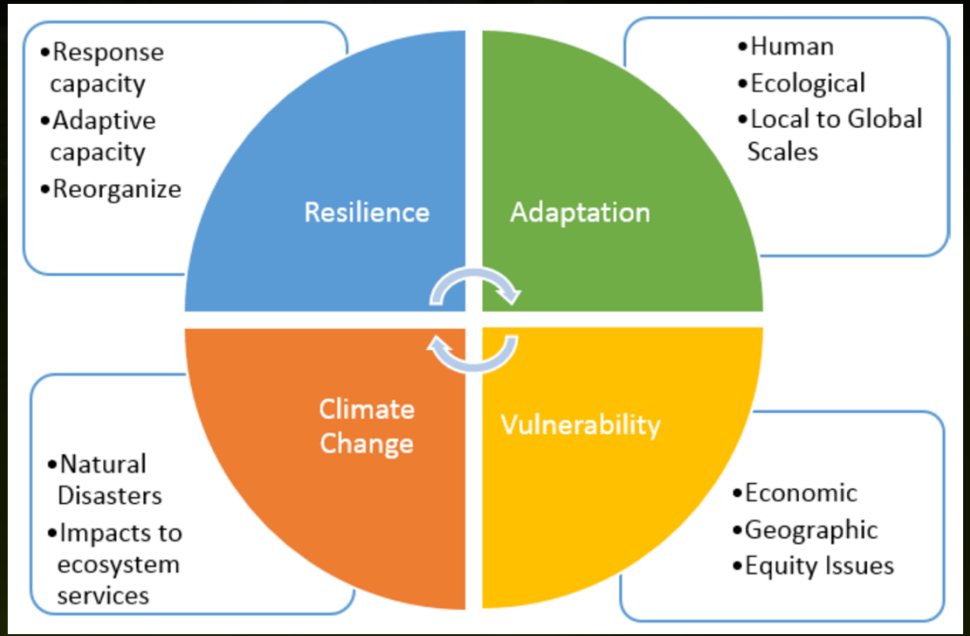
2024 Resiliency Plan Chapters

- Chapter 1. Our Resiliency Vision
- Chapter 2. Central and Southern Florida System
- Chapter 3. Flood Protection Level of Service Program
- Chapter 4. Nature-Based Solutions
- Chapter 5. Ecosystem Restoration Resiliency & Carbon Storage
- Chapter 6. Water Supply Resiliency
- Chapter 7. Energy Efficiency and Renewable Energy
- Chapter 8. Characterizing and Ranking Resiliency Projects
- Chapter 9. Priority Implementation Projects
- Chapter 10. Priority Planning Studies
- Appendix A. Project Descriptions/Cost Estimates



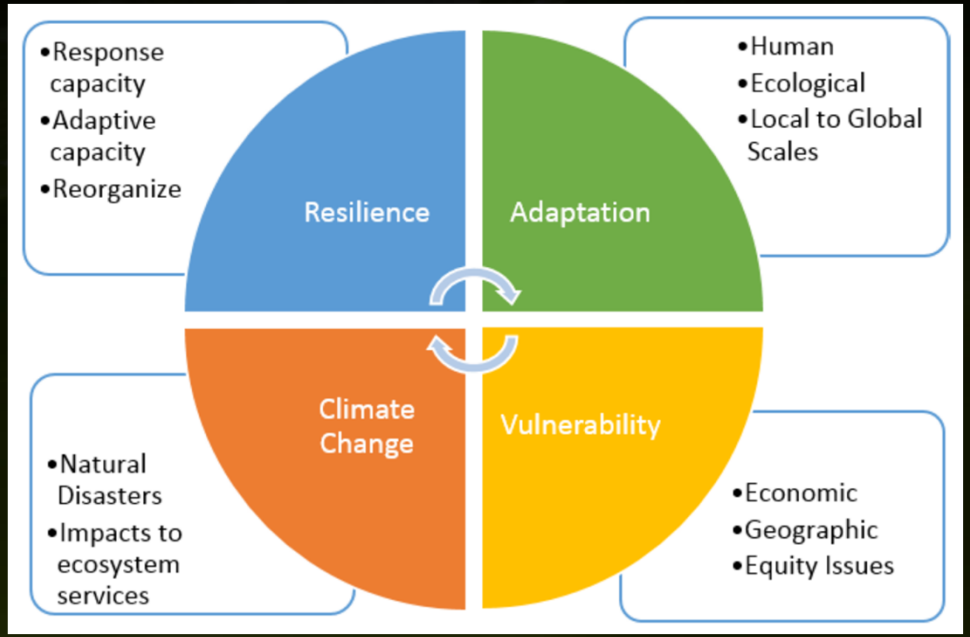
Chapter 1 – Our Resiliency Vision

- Risk Reduction
  - Reduce risk while maximizing effectiveness
- Implementation Resources
  - Project planning and management
  - Consideration of technical, and financial challenges
- Future Conditions
  - Population and land development
  - Climate and sea level rise considerations



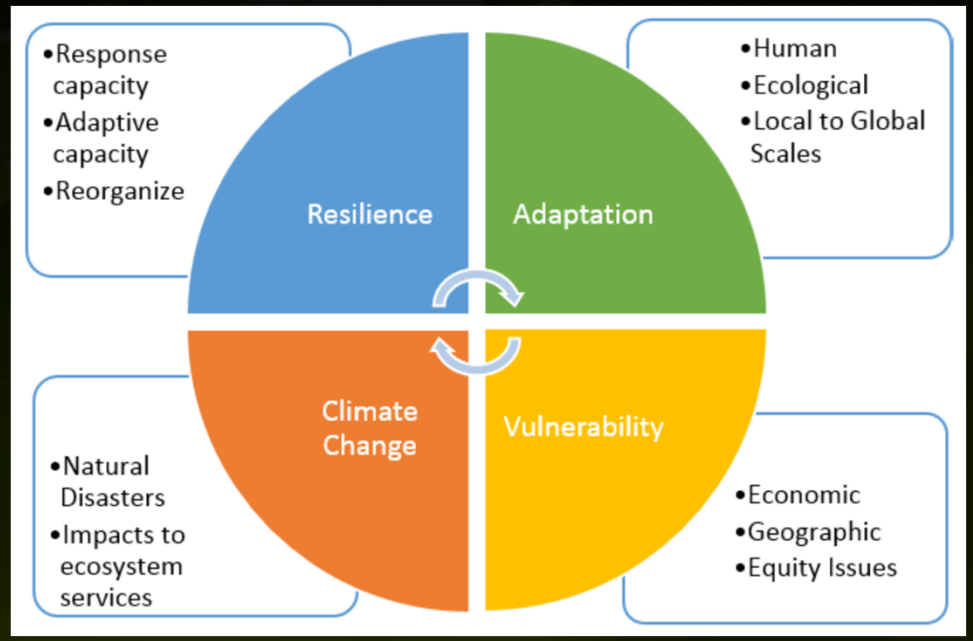
Chapter 1 – Our Resiliency Vision

- Disadvantaged Communities and Critical Infrastructure
  - Ensure community-wide benefits
  - Protection of community lifelines
- Leveraging Partnerships and Public Engagement
  - Resiliency Forum
  - Outreach activities
- Ecosystem Restoration
  - Restoring and preserving ecosystems



Chapter 1 – Our Resiliency Vision

- Nature-Based Solutions
  - Incorporate NBS into Gray Infrastructure projects
- Energy Efficiency/Renewable Energy
  - Follow latest building codes
  - Energy efficient designs
  - Offset new energy demands with renewable energy solutions



Chapter 2 – C&SF and BCB Systems

- Current Challenges and Limitations
  - Population growth
  - Land development
  - Extreme rainfall events
  - Sea level rise
- Capital Improvement Plan
  - Building resiliency into projects
  - Mitigating flooding risks
  - CIP feeds into FPLOS


FY20 SIP S28

Structure Inspection Program

S28
SPILLWAY
MIAMI Field Station
South C&SF
C-8
# of Gates: 2
Lifting/Pumping Mechanism: Cable Drum, Description: Roller


Inspection Summary/Issue Identification

FY20 Update to FY15019 – *(Updated 1-31-20)*

S-20F Major Half-Life Refurbishment		Date: 1-31-2020
Structure Type: Spillway	Field Station / Contact: Homestead / Sean Smith	Priority Score: 17.02 Priority Level: 2

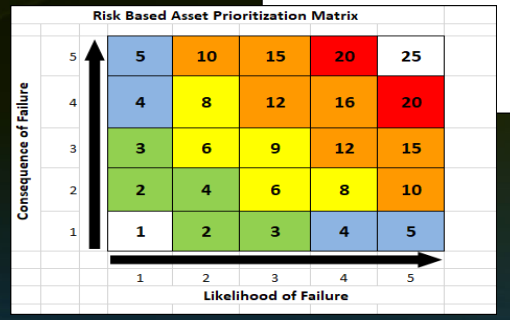
Inspector Information

Lead Inspector: Tim Kunard	Inspection Date: 1-6-20	Phone: 561-882-6305
Previous Inspection Date: 2-12-15	Previous Inspector: Gary Dunmyer	
F/S Superintendent: Sean Smith Signature:	F/S Bureau Chief: Jesus Carrasco Signature:	

Structure Details

Description: Spillway	# Gates 3	# Pumps 0	# Barrels 0	Lifting Mechanism: Hydraulic

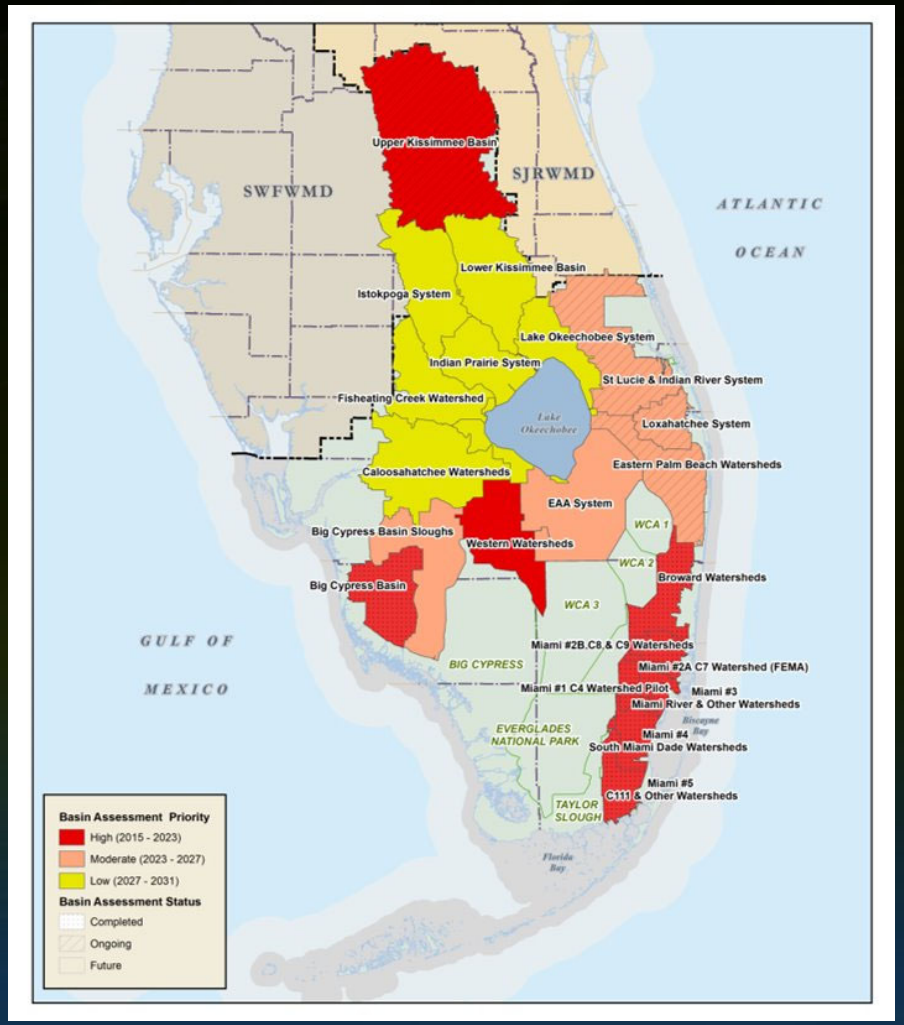
Figure 1 – Aerial image of the S20F Structure site



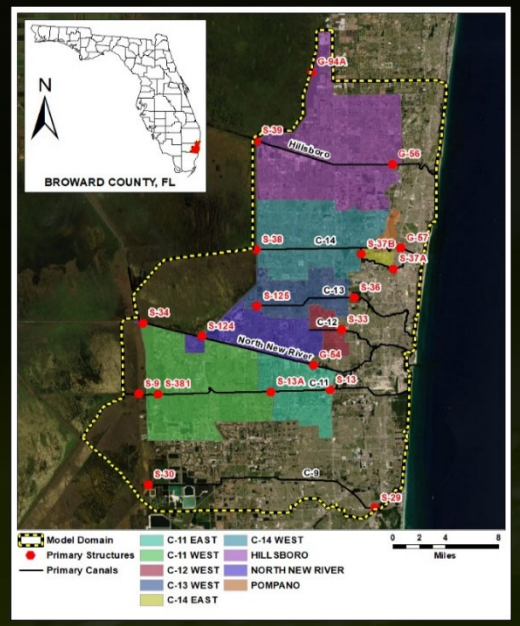
Chapter 3 – Flood Protection Level of Service & C&SF Flood Resiliency Study

2024 Plan Reflects Latest Studies and Results

- Phase I – Flood Vulnerability Assessments
  - Identify basin-wide flood vulnerabilities
- Phase II – Adaptation and Mitigation Planning
  - Identify solutions to vulnerabilities
- Phase III – Implementation (through this Plan)
  - Design, permitting, real estate, construction
- Flood Impact Assessment Tool (SFWMD-FIAT)
  - Calculate flood damage costs



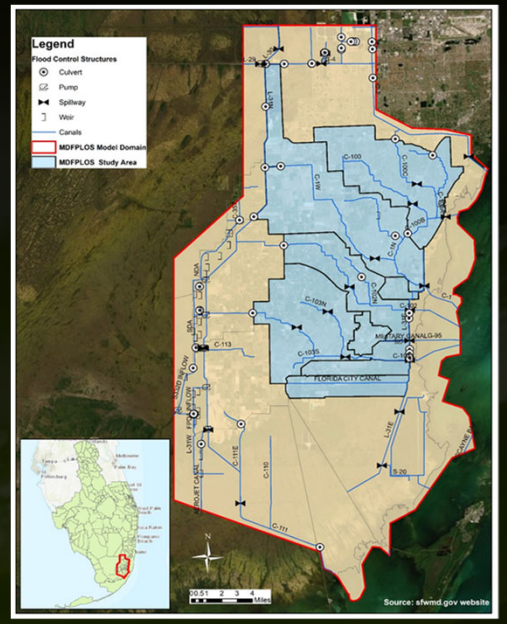
Chapter 3 - Completed FPLOS Studies



Lead PM: H. Zhao

FPLOS for Nine Basins in Broward County

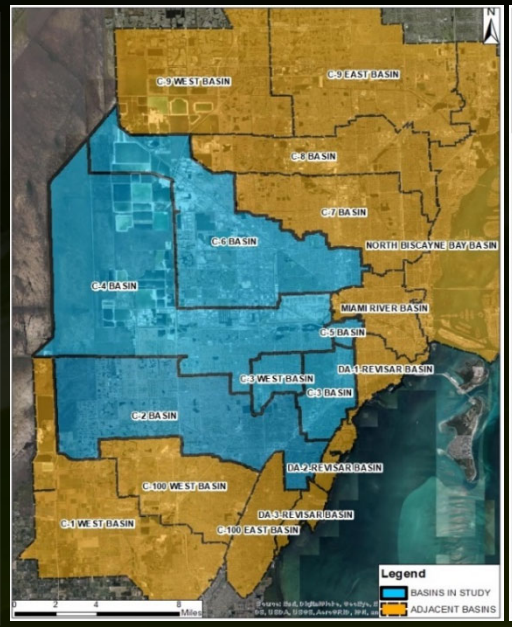
Completed: September 2021



Lead PM : L. Brion

FPLOS for C-1, C-100, C102, and C-103 Basins

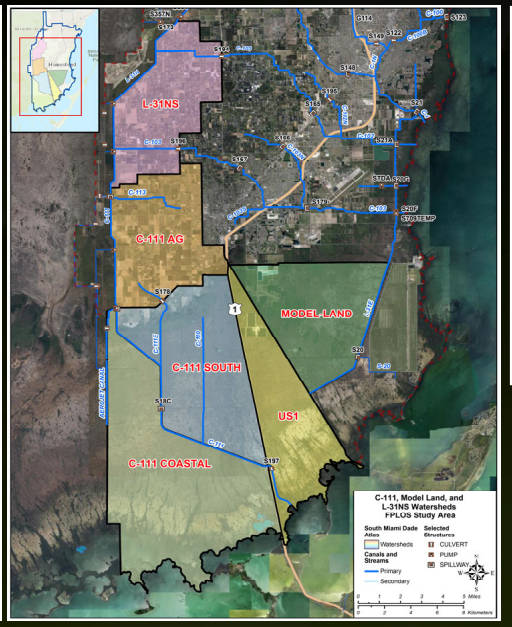
Completed: September 2021



Lead PM : R. Arteaga

C2, C3W, C4, C5 and C6 Watersheds

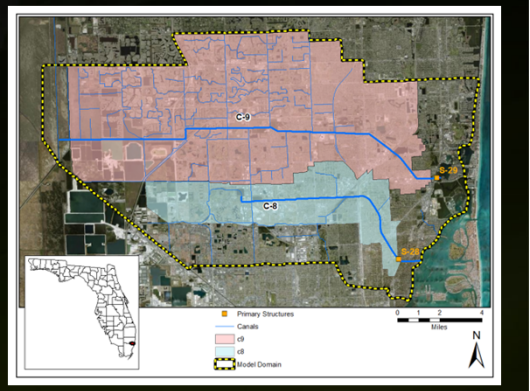
Completed: September 2022



Lead PM : C. Ballard

C-111, Model Land, and L-31NS Watersheds

Completed: December 2023



Lead PM: H. Zhao

C8/C9 Basins FPLOS Phase I

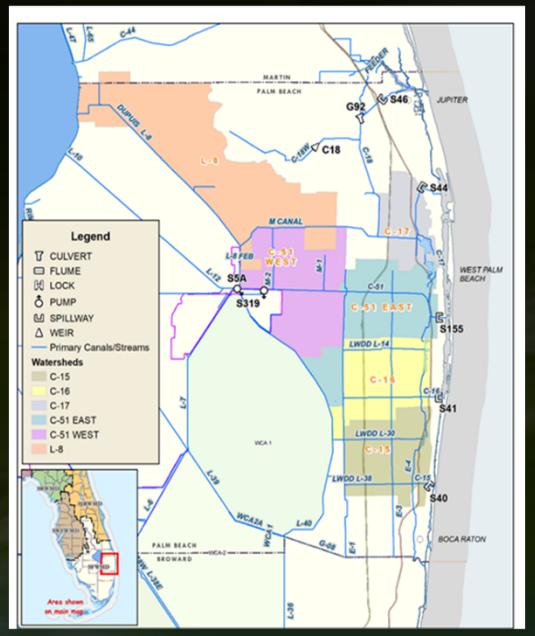
Completed: January 2021

C8/C9 Adaptation & Mitigation (Phase II)

Completed: July 2023

Chapter 3 – Flood Protection Level of Service & C&SF Flood Resiliency Study

Ongoing and Recently Complete Studies



Leading PM: H. Seyed
Eastern Palm Beach County

Completion date: July 2024

Leading PM: S. Nair
Upper Kissimmee Basins

Completion date: August 2024

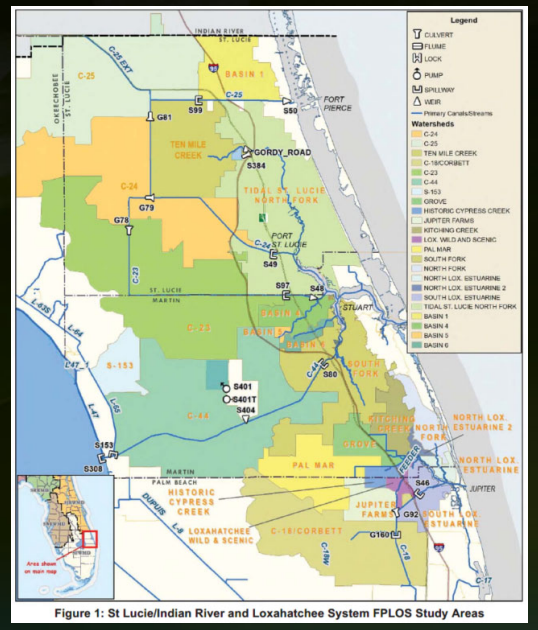
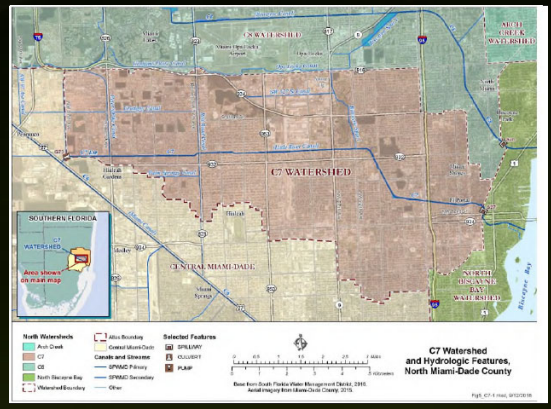


Figure 1: St Lucie/Indian River and Loxahatchee System FPLOS Study Areas

Leading PM: H. Seyed
St Lucie/Indian River and Loxahatchee System

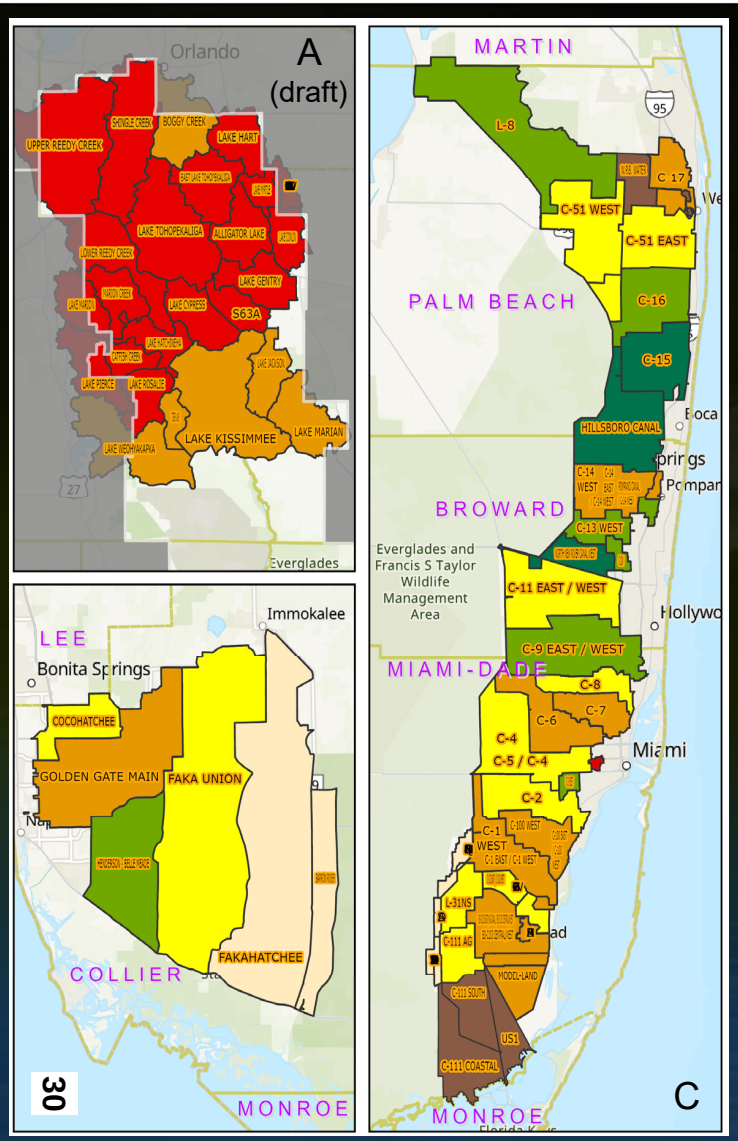
Completion date: Sep. 2025

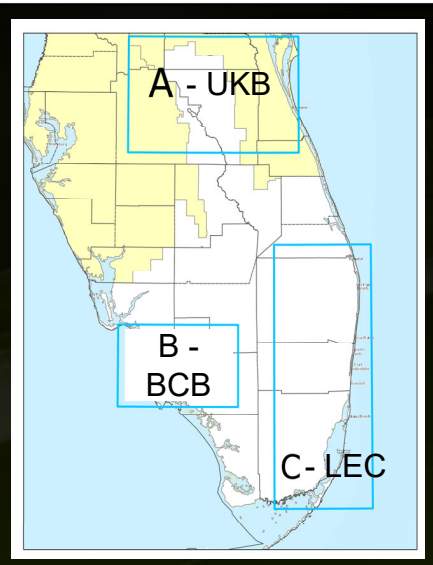


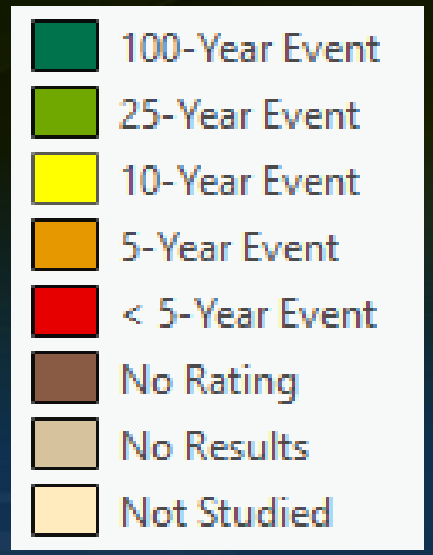
Leading PM: A. Springston
C7 Adaptation and Mitigation Study

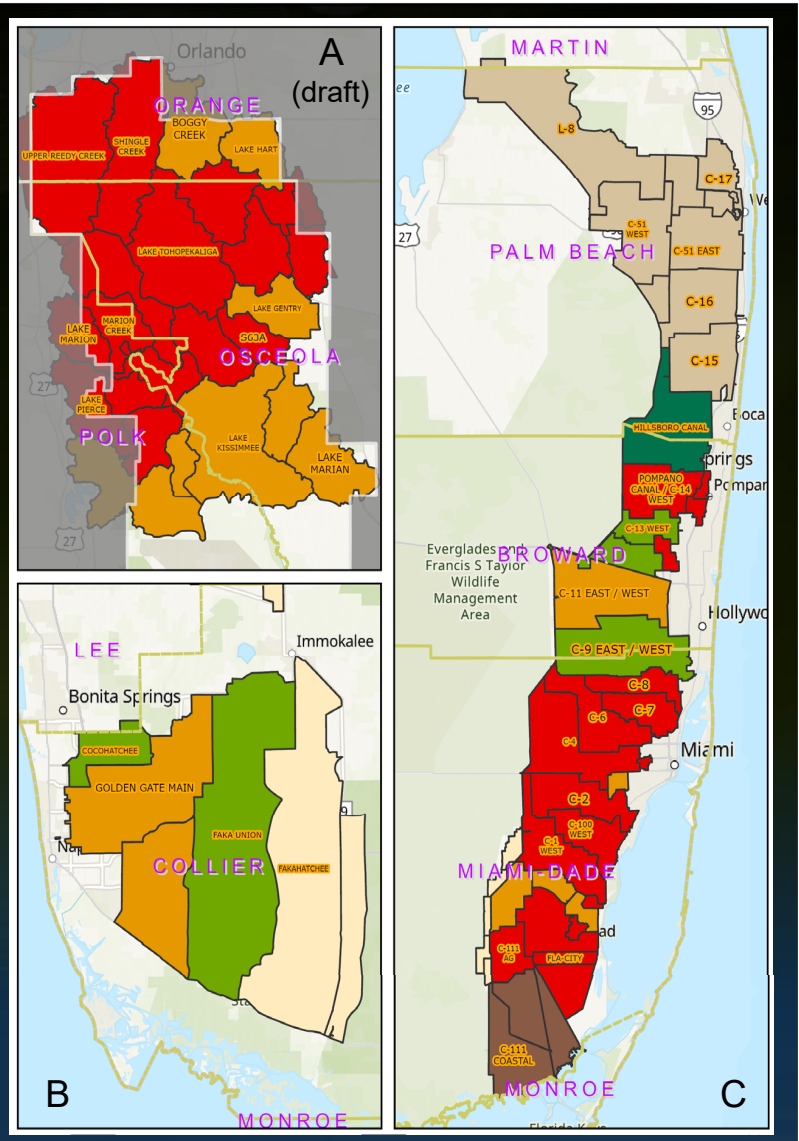
Completion date: Sep. 2025

Chapter 3 – Flood Protection Level of Service – Map of Latest Results







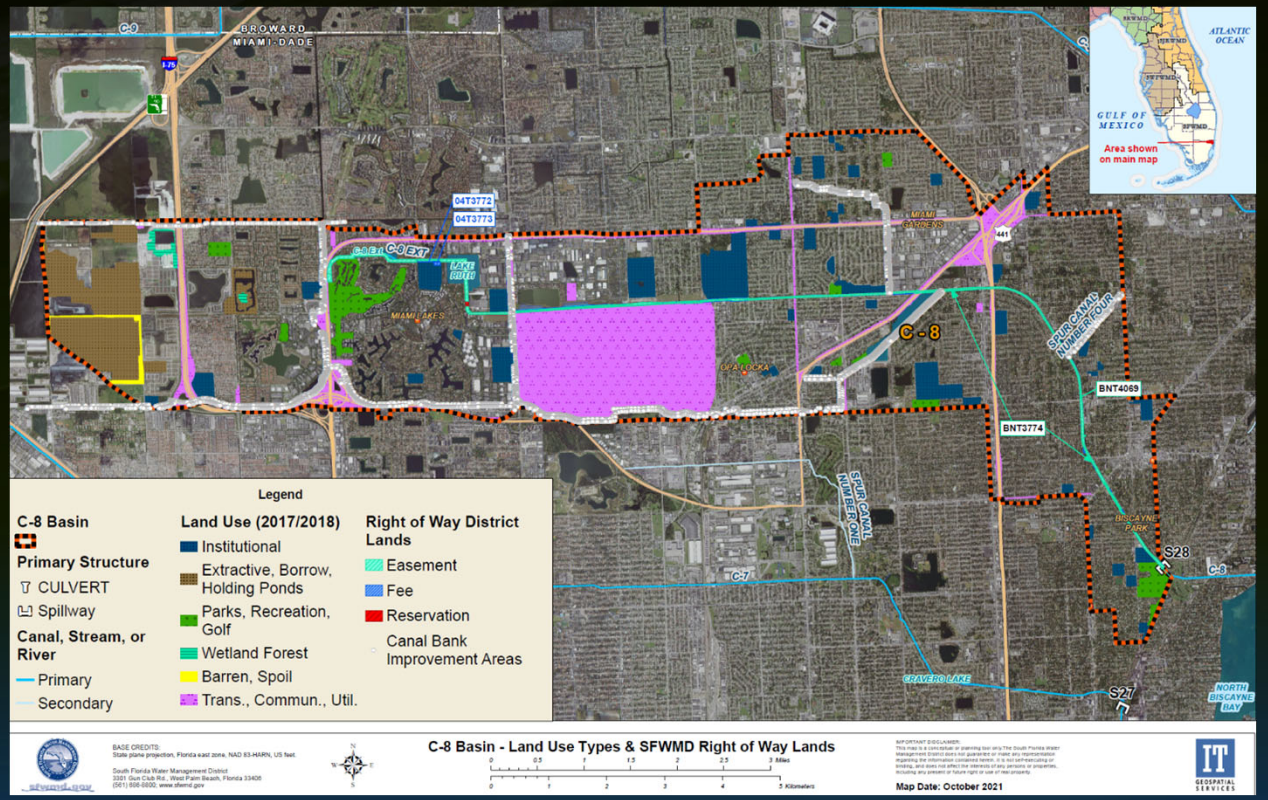


Chapter 4 – Nature Based Solutions

- Nature-Based Solutions – Reduce Flood Risk
  - Reconnecting Floodplains
  - Wetland Restoration
  - Living Shorelines
  - Bioswales
- Integrate into Gray Infrastructure
- Collect, Store and Slow the Flow

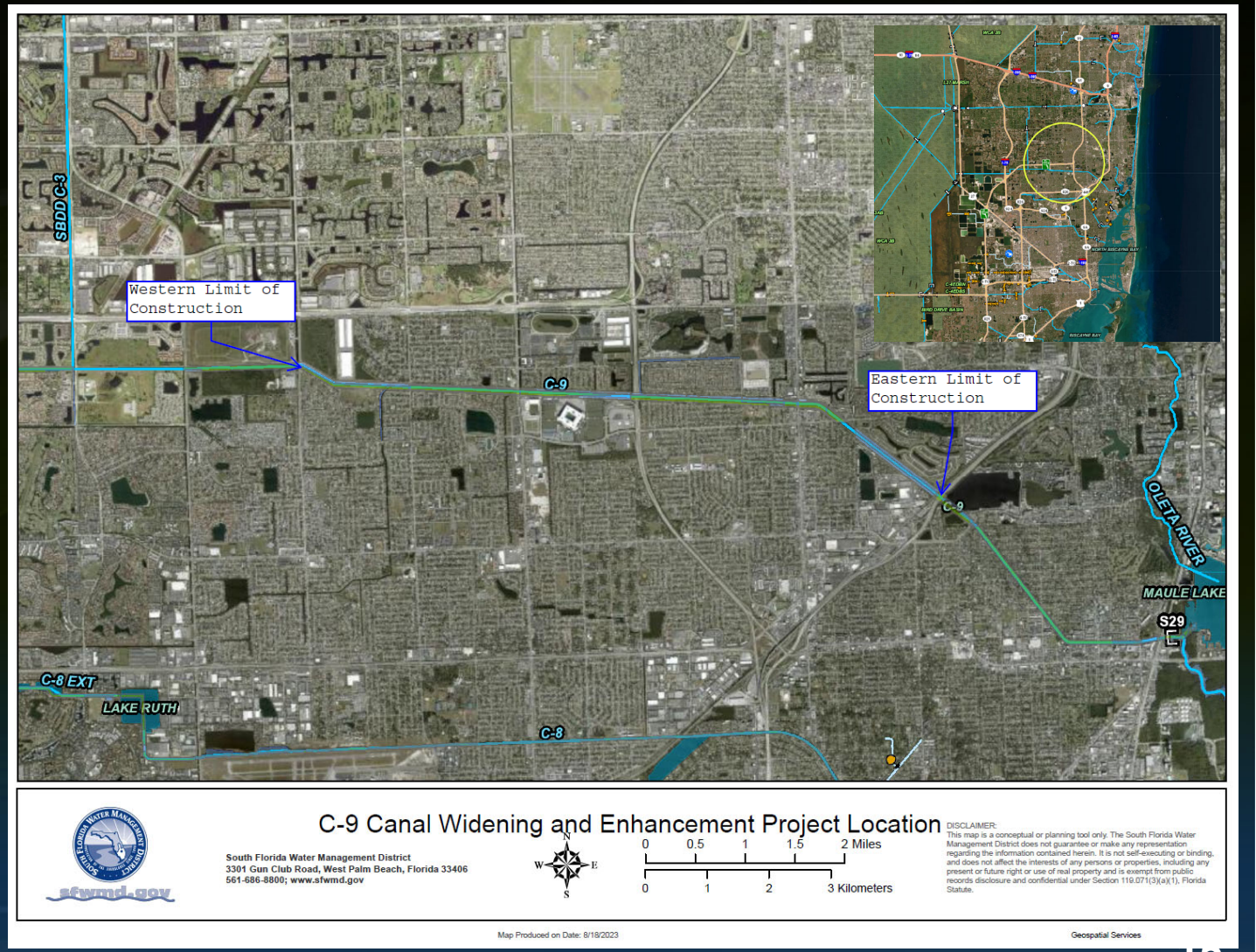
Chapter 4 – Nature Based Solutions

- Process for Assessing and Implementing NBS
  1. Identify Opportunities (available land)
  2. Select and assess NBS and related actions
  3. Design NBS implementation processes
  4. Engage stakeholders, communicate co-benefits and establish partnerships
  5. Implement NBS, upon funding strategy
  6. Monitor and evaluate co-benefits
  7. Transfer and upscale NBS
- Process for Evaluating NBS - Estimating Direct and Indirect Benefits
- Performance Metrics for NBS



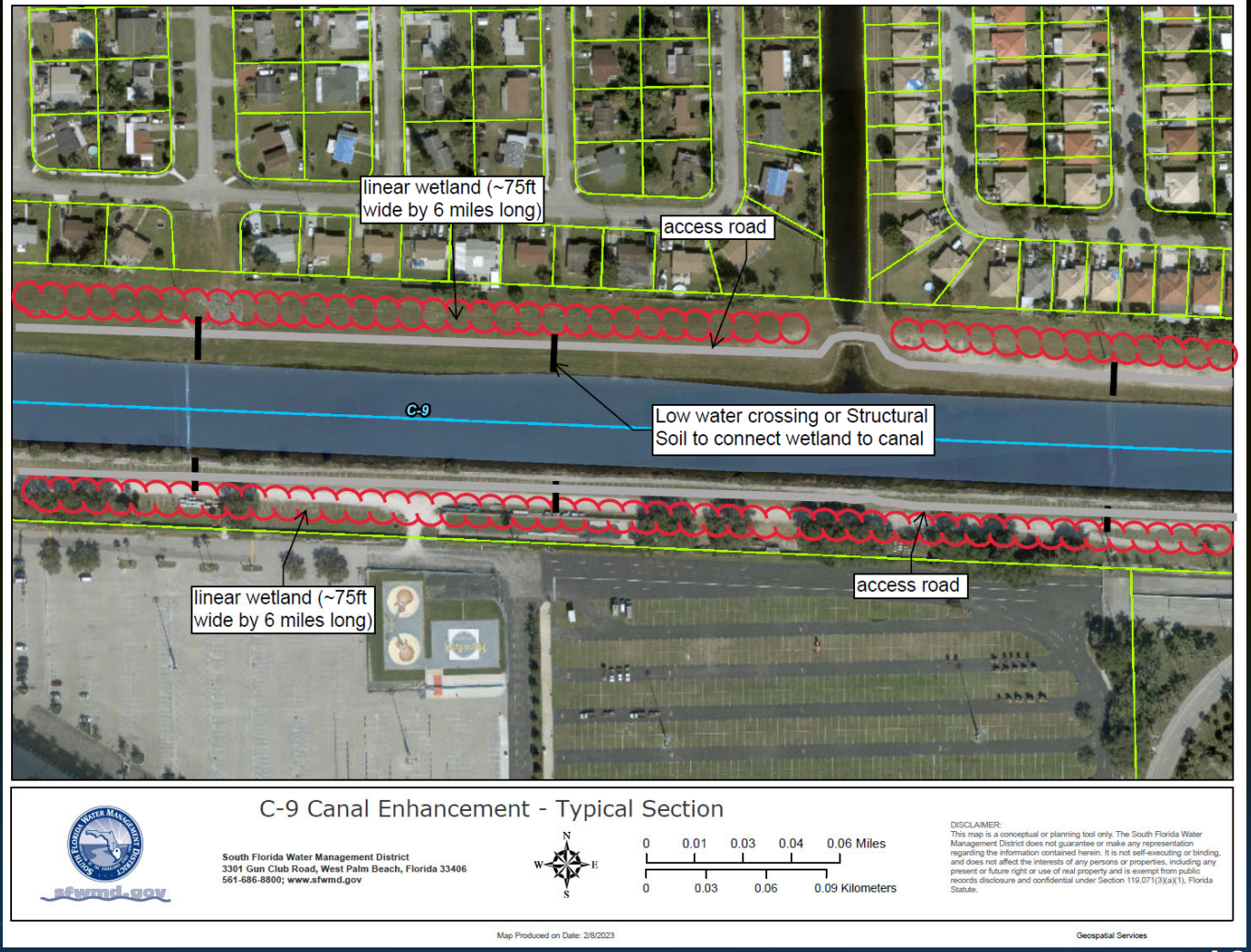
C-9 Canal Enhancement Project – FEMA BRIC Grant Application

- FPLOS study results show a need for enhanced conveyance and storage capacity in the basin
- Forward pumps alone are not enough to achieve desired level of service
- Project footprint along six-mile section of C-9 Canal
- Chosen based upon available District owned ROW



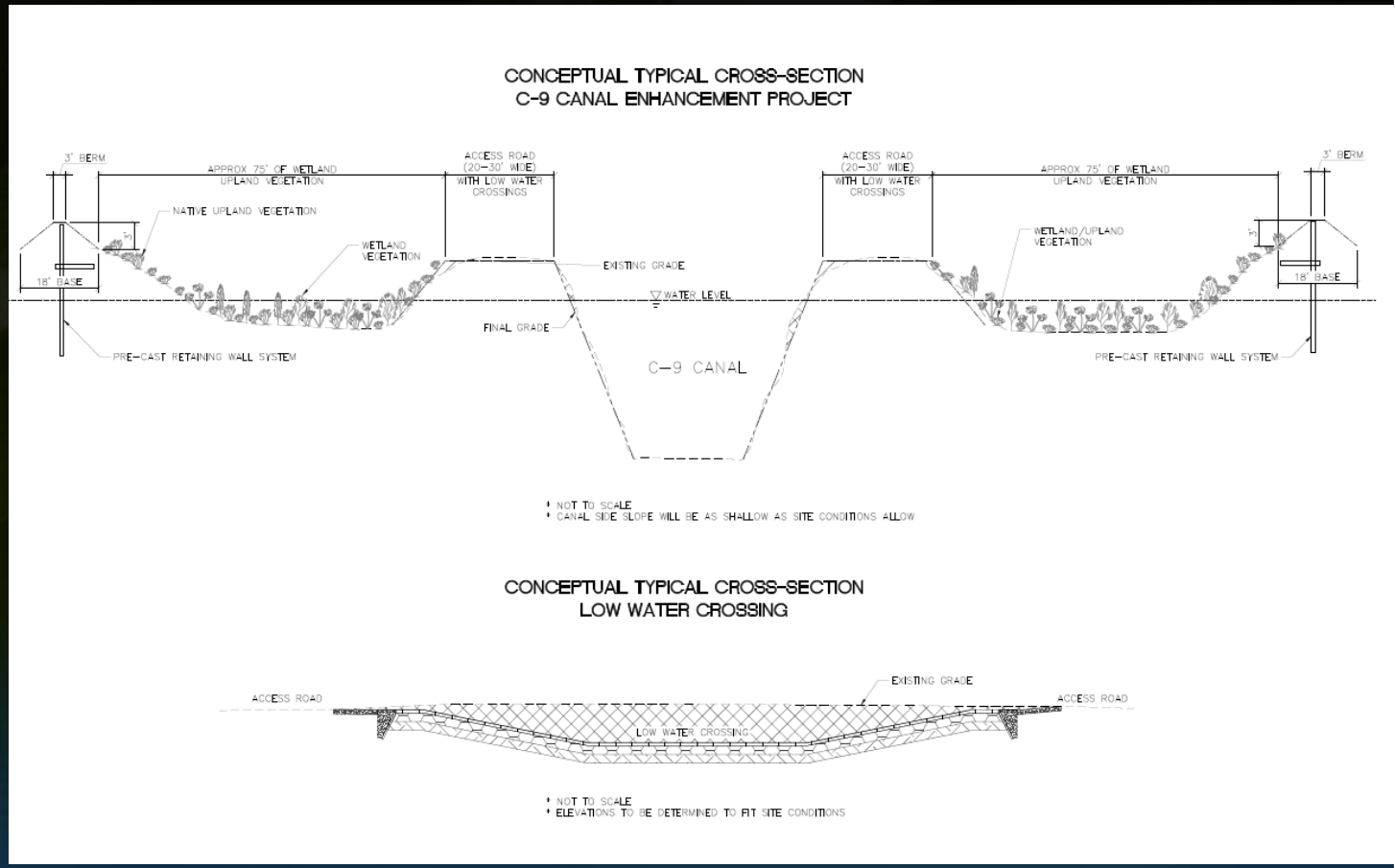
Proposed Canal Enhancement Features and Benefits

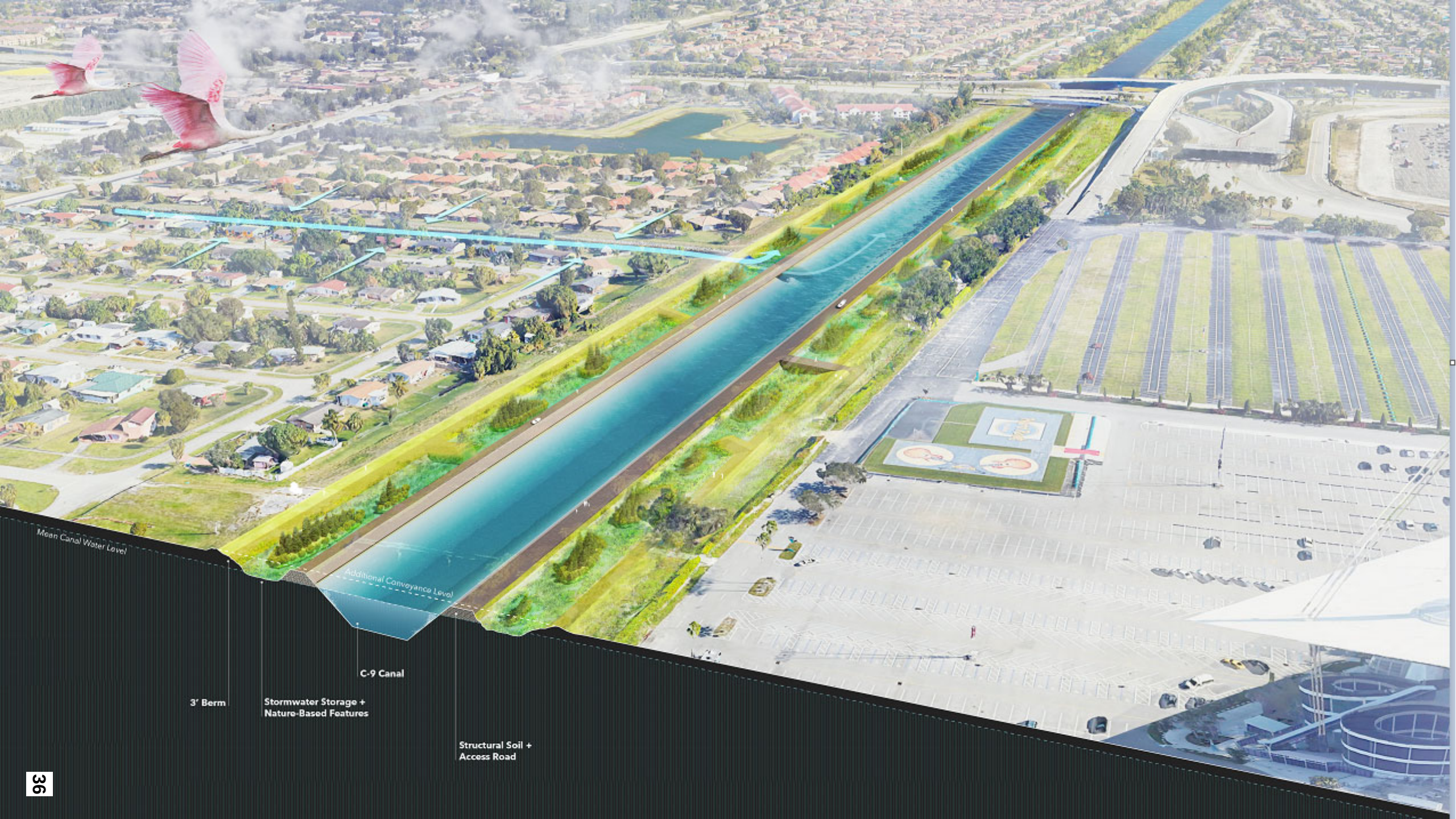
- Berms for Stormwater Storage on ROW floodplain
  - Enhance conveyance and storage
  - Improve flood protection level of service
- Construct wetland adjacent to canal
  - Create additional stormwater storage
  - Restore floodplain connectivity
  - Increased evapotranspiration in wetland can contribute to reduction in peak stage and flood duration
  - Enhance water quality
  - Improve fish and wildlife habitat



Proposed Canal Enhancement Features and Benefits

- Construct berms and access roads along canal banks
  - Improve access for operation and maintenance
  - Potential for increased public access for recreation
- Construct low water crossings along access road to connect wetland with canal
- Construct structural and/or nature-based features at secondary canals outfalls to improve water quality

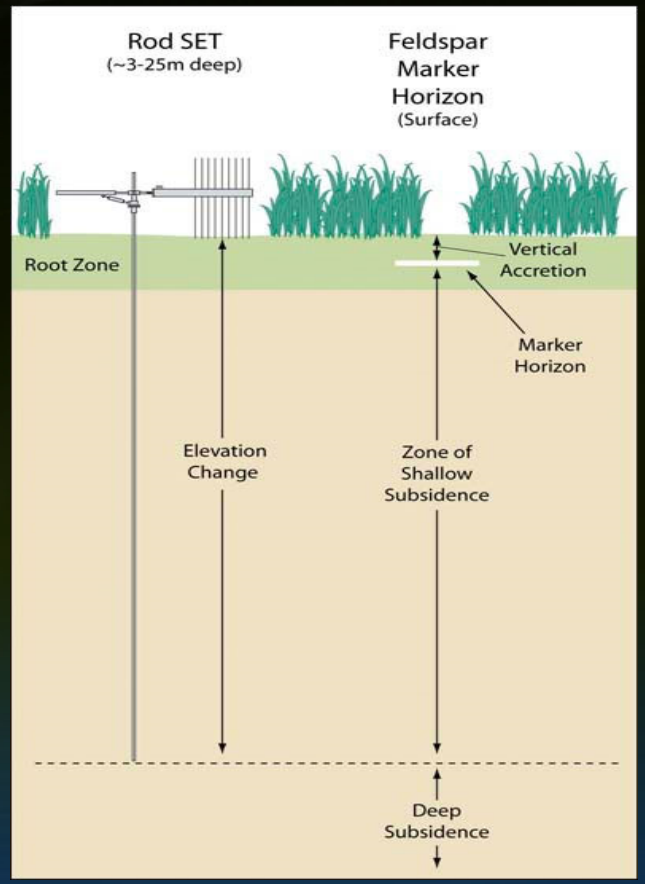



Mean Canal Water Level
Additional Conveyance Level
C-9 Canal
3' Berm
Stormwater Storage +
Nature-Based Features
Structural Soil +
Access Road

Chapter 5 – Ecosystem Restoration

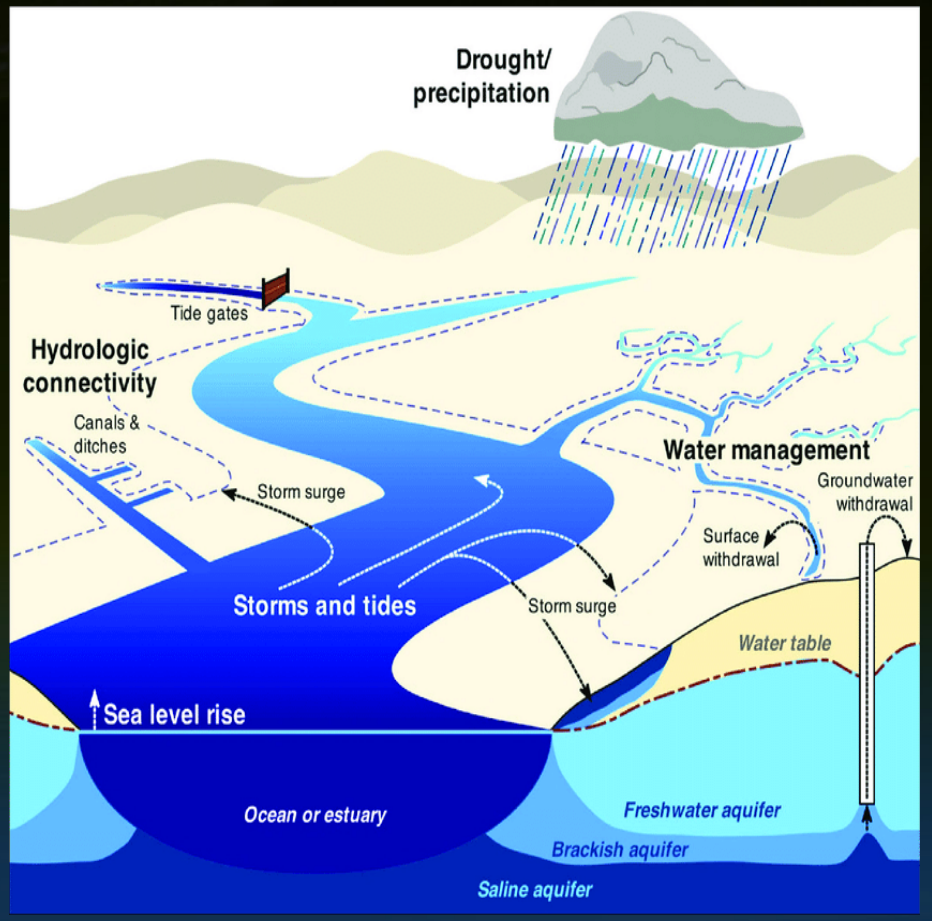
- Ongoing Ecosystem Restoration projects Increase Resiliency
  - by reducing flood impacts
  - by protecting the regional water supply and storing water that can be available to attend dry season needs
  - by providing enhanced hydrology for environmental restoration efforts

- Ongoing CERP projects restore preserve, and protect water related needs of the region
  - Stormwater Storage
  - Wetland restoration
  - Water quality treatment



Chapter 6 – Water Supply Resiliency

- Understand and assess water supply vulnerabilities to future conditions
  - Water Supply Vulnerability Assessment
    (approach report completed March 2023)
    - Datasets under development for fall 2024:
      - 2075 Land Use, distribution of new population and water demand
      - Develop drought rain and ET datasets
- Protect existing water supply sources
  - MFLs, monitoring, salinity control structures
- Develop alternative water sources
  - Conservation, reuse, brackish water
- Storage of excess water
  - Reservoirs, aquifer storage, WCAs, WMAs, SWM



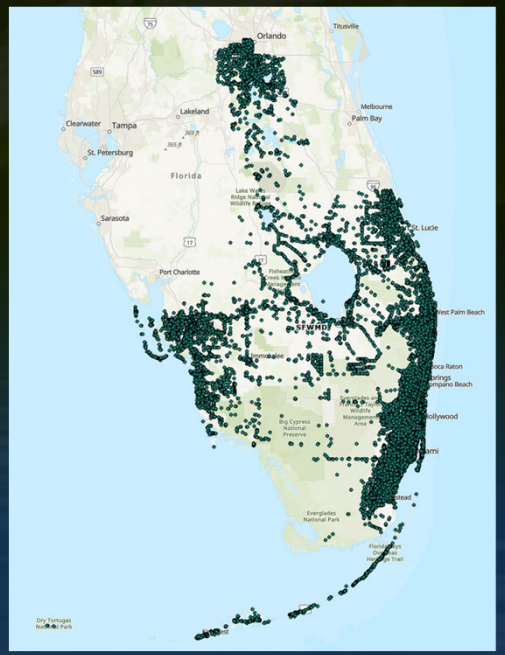
Chapter 7 – Energy Efficiency and Renewable Energy

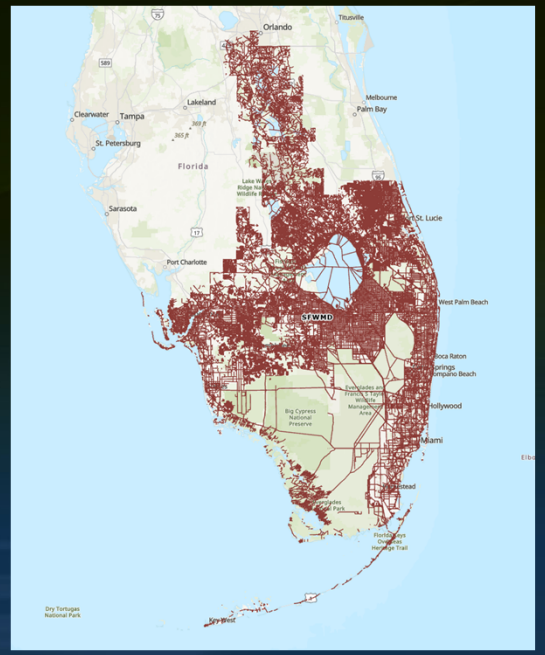
- Seeking to increase energy efficiency and offset existing and new energy demands
- Florida building code energy efficiency requirements
- Solar energy initial project recommendations
  - Solar array at C-44 reservoir adjacent lands
  - Solar canopy in HQ parking lot
  - Floating solar panels pilot project at Lake Freddy

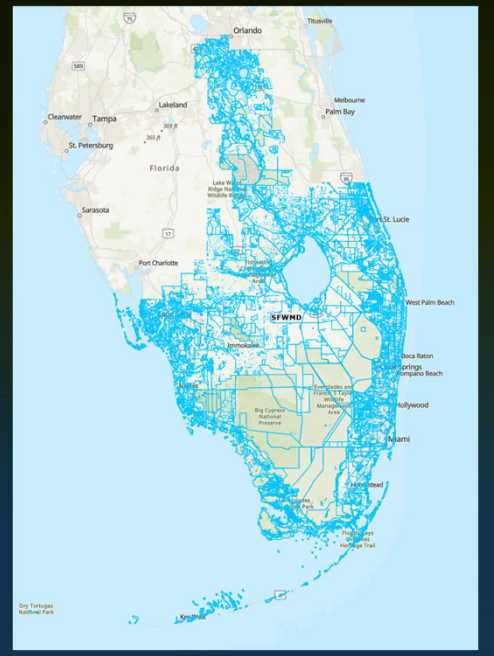
Chapter 8 – Characterizing and Ranking Resiliency Projects

Ranking Criteria

- No changes on any of the weights or ranking criteria
- New Critical assets - FDEP Statewide database
- Automated GIS process



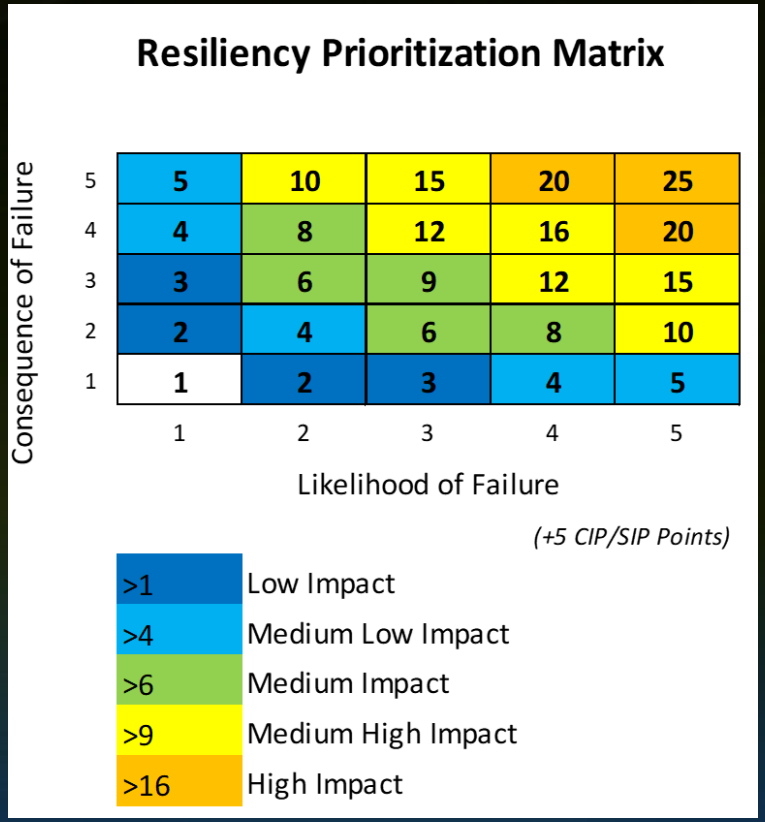




Chapter 8 – Characterizing and Ranking Resiliency Projects

Ranking Criteria

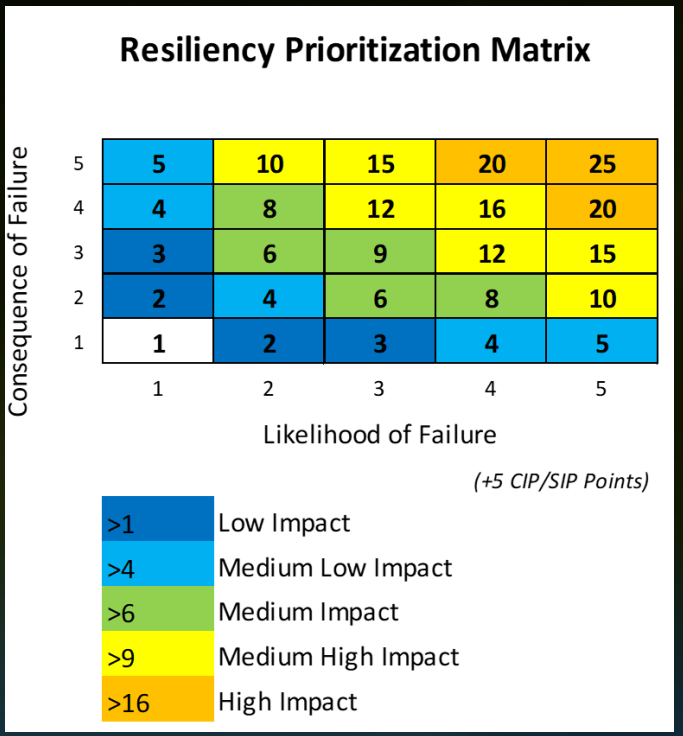
- Consequence of System Failure Scoring (30%)
  - 15% - Critical Assets / Lifelines F.S. (RF) 20% Tier1
  - 5% - Social Vulnerability F.S. (RF) 5% Tier4
  - 3.5% - Environmental Protected Areas
  - 1% - Total Population
  - 5% - Public Water Supply Wellfields
  - 1% - County Adaptation Action Areas



Chapter 8 – Characterizing and Ranking Resiliency Projects

Ranking Criteria

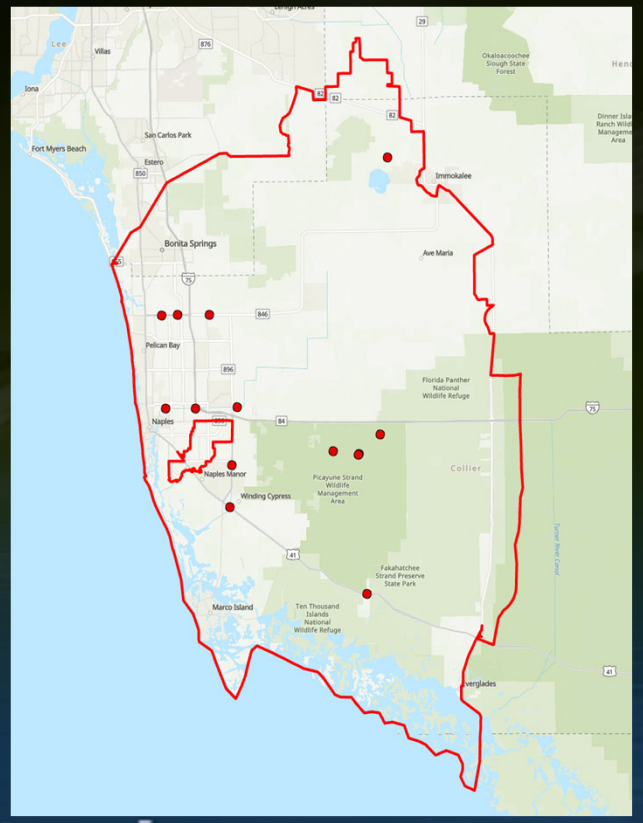
- Project Benefits System Enhancement (20%)
  - 5%- Nature-based Solutions F.S. (RF) 12.5% Tiers 1 and 2
    - Ecosystem Restoration / Regional Benefit F.S. (RF) 7.5% Tier
  - 2.5%- Cost Benefit F.S. (RF) 7.5% Tier2
  - 2.5%- Previous State Commitment F.S. (RF) 5% Tier3
  - 2.5%- Available Matching F.S. (RF) 5% Tier3
  - 2.5%- Florida Building Code – Exceed Criteria F.S. (RF) 10% Tier3
  - 5%- Innovative Technology F.S. (RF) 5% Tier4
- SIP Overall Rating and CIP Status (10%)



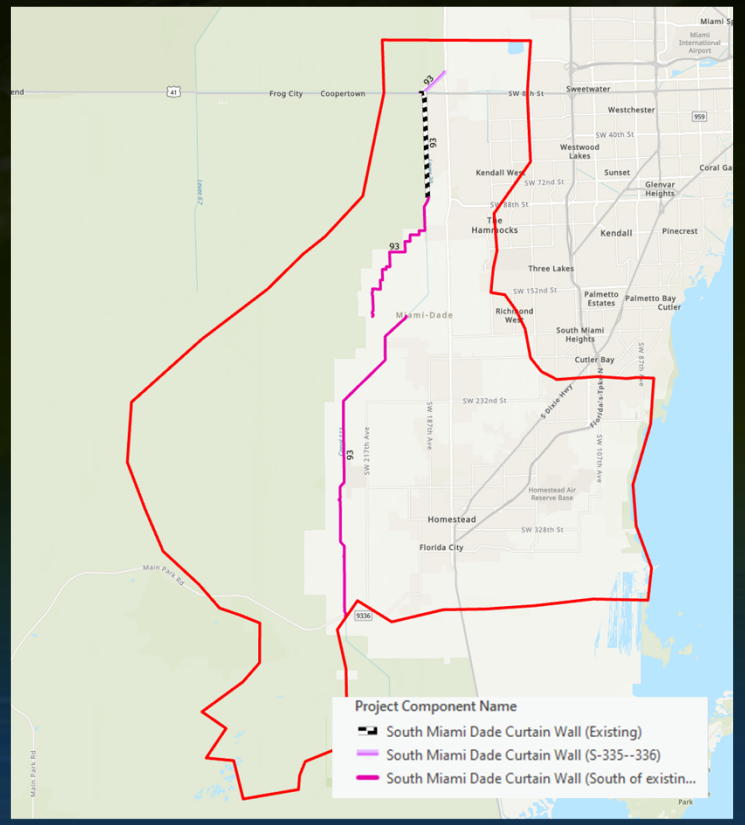
Chapter 8 – Characterizing and Ranking Resiliency Projects

Projects Associated Area of Influence

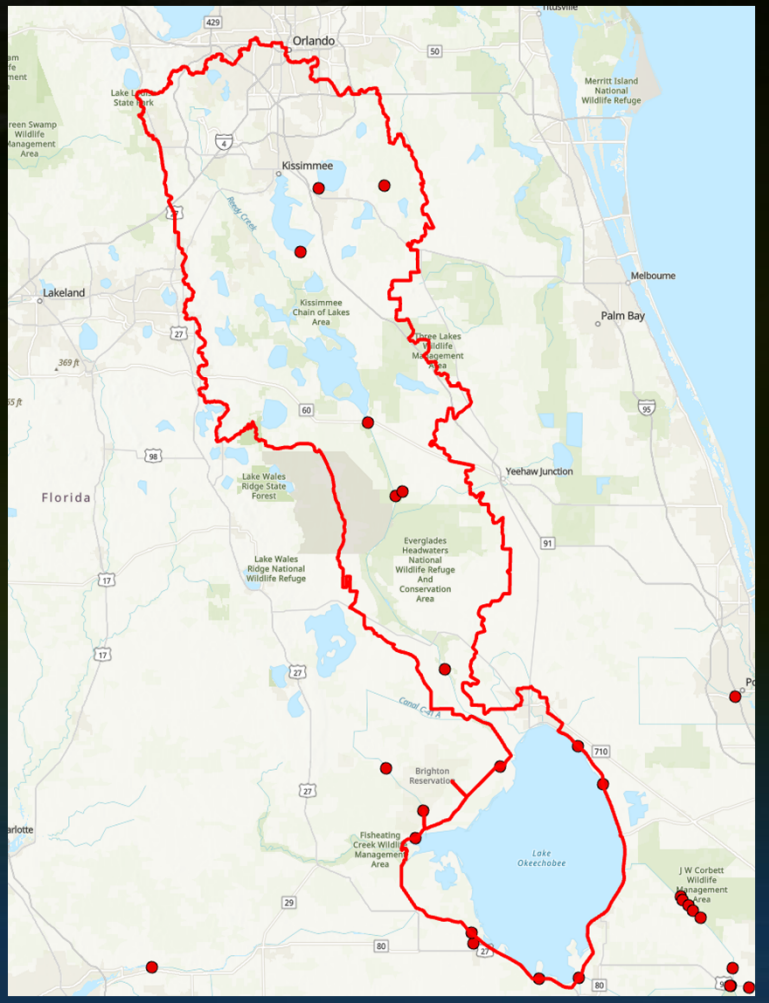
Big Cypress Basin Microwave Tower



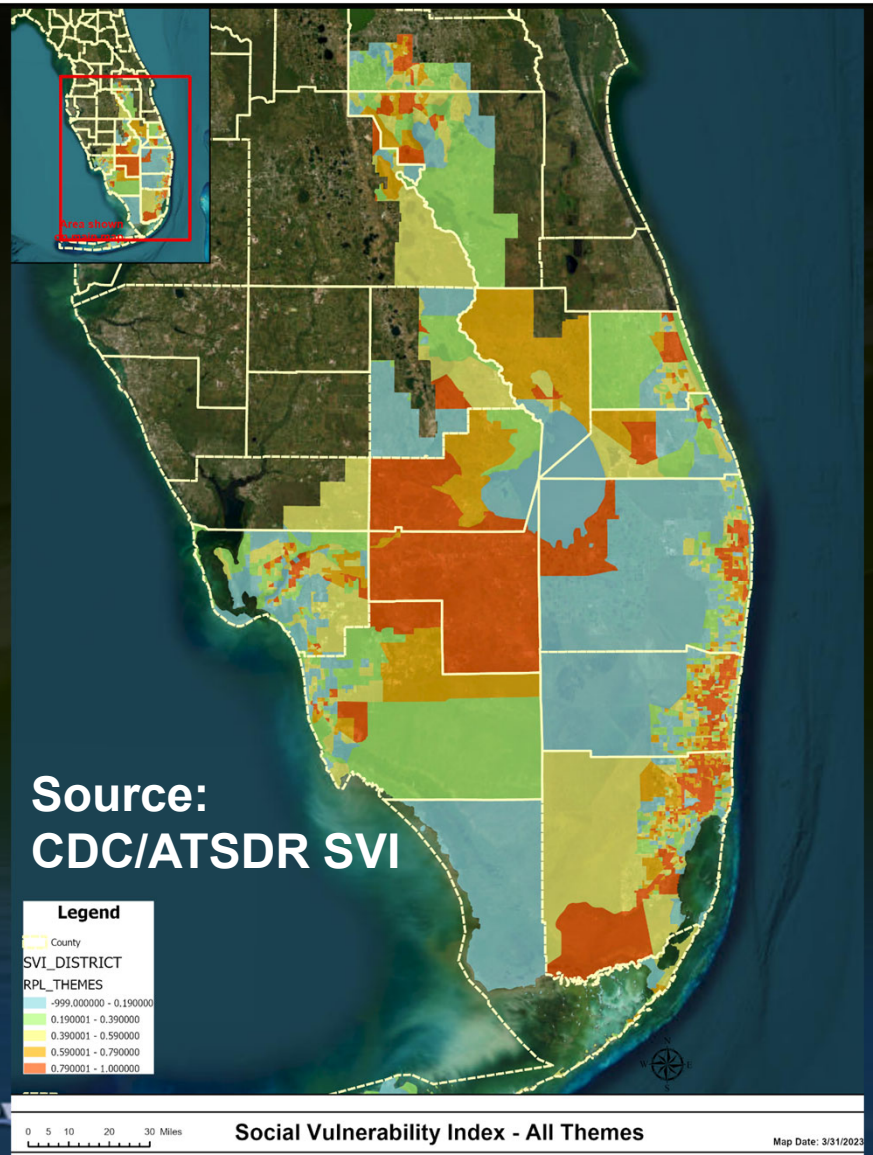
South Miami-Dade Curtain Wall

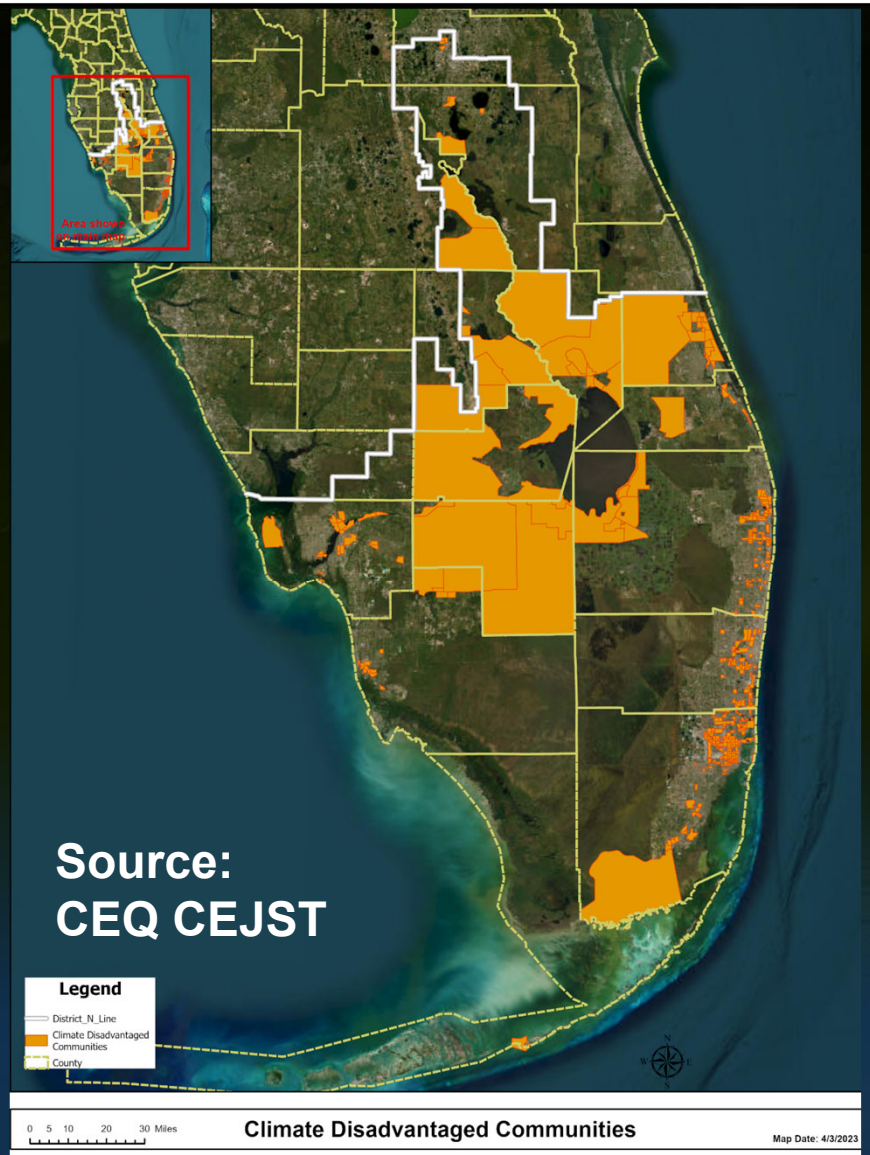


Upper Kissimmee Projects



Chapter 8 – Characterizing and Ranking Resiliency Projects – Disadvantaged Communities





Chapter 8 – Characterizing and Ranking Resiliency Projects

Projects	Likelihood of System Deficiency	Consequence of System Deficiency	Benefits from System Enhancement	Project Status	Total Points
C-9 Basin Resiliency and S-29 Coastal Structure	33.50	20.70	18.50	5.00	**77.70**
C-14 Basin Resiliency	39.50	19.30	16.50	1.00	**76.30**
C-12 West Basin Resiliency	39.50	18.90	16.50	1.00	**75.90**
C-7 Basin Resiliency and S-27 Coastal Structure	35.30	16.30	18.50	5.00	**75.10**
C-6 Basin Resiliency	38.30	15.30	20.00	1.00	**74.60**
C-8 Basin Resiliency and S-28 Coastal Structure	35.30	16.10	18.50	4.00	**73.90**
C-11 Basin Resiliency	36.50	19.30	16.50	1.00	**73.30**
MODEL-LAND Basin Resiliency	37.10	13.50	16.50	6.00	**73.10**
C-2 Basin Resiliency	39.50	15.30	16.50	1.00	**72.30**
Pompano Canal and C-14 West Basin Resiliency	35.50	19.30	16.50	1.00	**72.30**
C-100 Basin Resiliency	38.50	15.10	16.50	1.00	**71.10**
C-111 AG Basin Resiliency	34.90	13.50	16.50	6.00	**70.90**
HARB Basin Resiliency	39.50	13.50	16.50	1.00	**70.50**
North New River Canal West Basin Resiliency	33.50	19.10	16.50	1.00	**70.10**
Henderson-Belle Meade Basin Resiliency	33.50	18.90	16.50	1.00	**69.90**
C-102 and C-102N Basin Resiliency	35.50	13.50	16.50	4.00	**69.50**
C-5 Basin Resiliency	38.30	13.50	16.50	1.00	**69.30**
C-103 and C-103N Basin Resiliency	34.60	13.90	16.50	4.00	**69.00**
C-1 Basin Resiliency	35.80	14.10	16.50	1.00	**67.40**
GOULDS Basin Resiliency	35.90	13.50	16.50	1.00	**66.90**
C-4 Basin Resiliency	31.60	15.10	18.50	1.00	**66.20**
C-3 and C-3 West Basin Resiliency	33.50	15.10	16.50	1.00	**66.10**
C-13 West Basin Resiliency	31.10	17.10	16.50	1.00	**65.70**
L-31NS Basin Resiliency	31.90	13.50	16.50	1.00	**62.90**
Hillsboro Canal Basin Resiliency	24.50	20.50	16.50	1.00	**62.50**
North Biscayne Bay Basin Resiliency	23.30	14.50	16.50	1.00	**55.30**
C-111 SOUTH Basin Resiliency	20.90	12.90	16.50	1.00	**51.30**
US1 Basin Resiliency	20.90	12.90	16.50	1.00	**51.30**

Projects	Likelihood of System Deficiency	Consequence of System Deficiency	Benefits from System Enhancement	Project Status	Total Points
Hardening of S-2, S-3, S-4, S-7, S-8 Engine Control Panels	35.50	24.50	17.50	6.00	**83.50**
Coastal Structures Enhancement and Self Preservation Mode	39.50	21.70	18.50	1.00	**80.70**
Big Cypress Basin Microwave Tower	38.50	23.30	17.50	1.00	**80.30**
C-29, C-29A, C-29B, and C-29C Canal Conveyance Improvement	38.50	19.50	16.50	5.00	**79.50**
S-58 Structure Enhancement and Temporary Pump	39.50	19.50	16.50	2.00	**77.50**
L8 FEB / G539 PS - Resiliency Upgrades	34.30	18.50	17.50	7.00	**77.30**
S-61 Spillway Enhancement and Erosion Control	35.50	23.50	16.50	1.00	**76.50**
S-59 Structure Enhancement and C-31 Canal Conveyance Improvements	38.50	19.50	16.50	1.00	**75.50**
South Miami-Dade Curtain Wall	37.00	15.30	18.50	1.00	**71.80**
L-31E Levee Improvements	38.50	15.10	16.50	1.00	**71.10**
Corbett Levee Water Control Structures	19.90	19.70	17.50	1.00	**58.10**
JW Corbett Wildlife Management Area Hydrologic Restoration and Levee Resiliency	20.90	17.30	18.50	1.00	**57.70**
Everglades Mangrove Migration Assessment (EMMA)	22.90	12.90	19.00	1.00	**55.80**

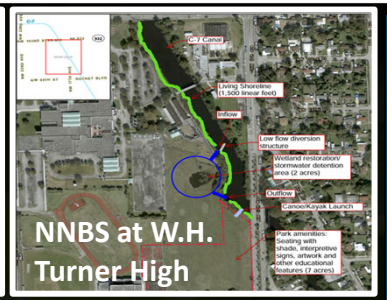
Legend

Priority Levels

- Lower
- Medium
- Medium High
- High

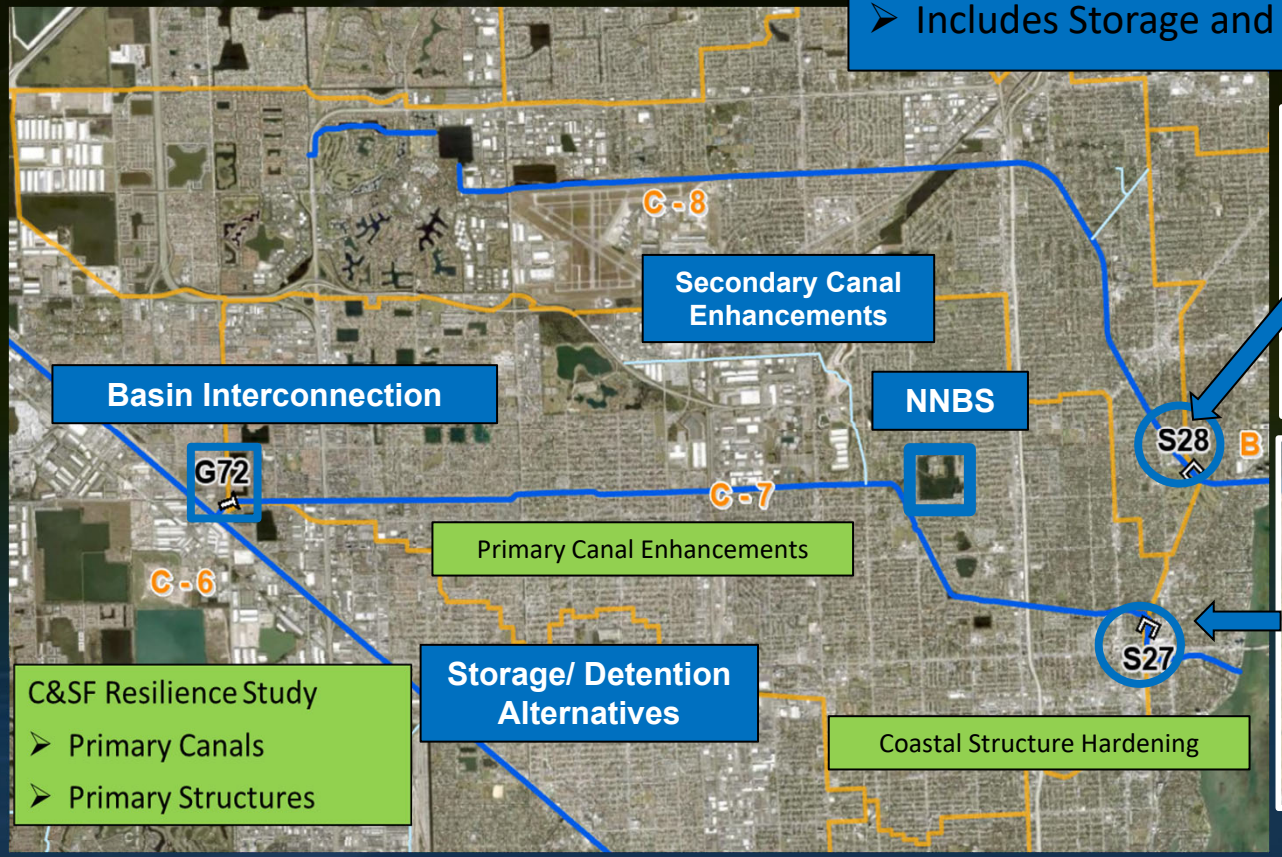
Chapter 9 – Priority Projects

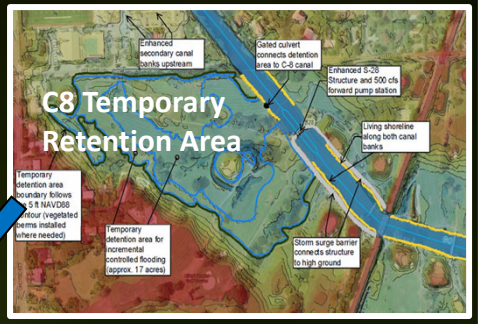
- Updated List of All Resiliency Projects and Project Descriptions with 2024 Cost Estimates
- Projects reorganized
  - Basin-wide main project with project components identified in each basin
  - Helps to understand links between projects and components
  - Helps facilitate coordination
- Project Descriptions and Cost Estimates moved to Appendix A



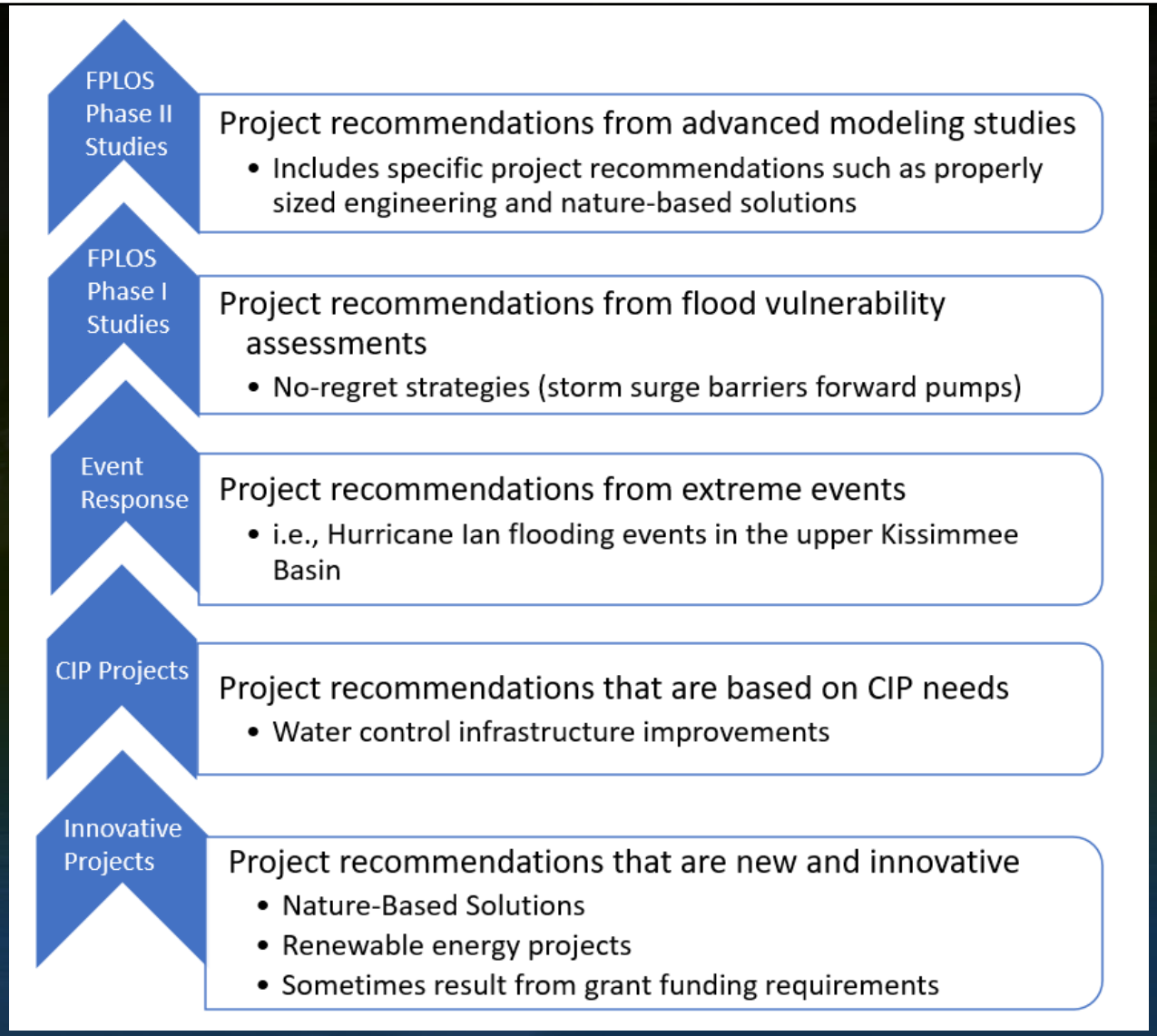
C7 Adaptation and Mitigation Study (2023 –2025)

- Develop comprehensive basin-wide strategies
- Includes projects from regional and local level
- Includes GI / Natural/Nature Based Solutions
- Includes Storage and Conveyance



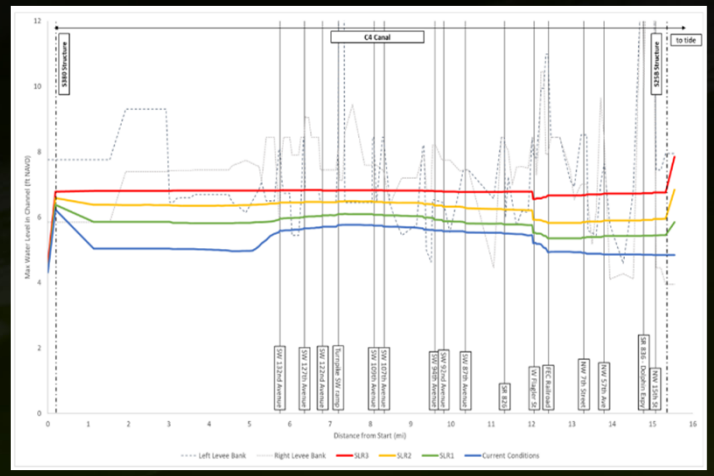


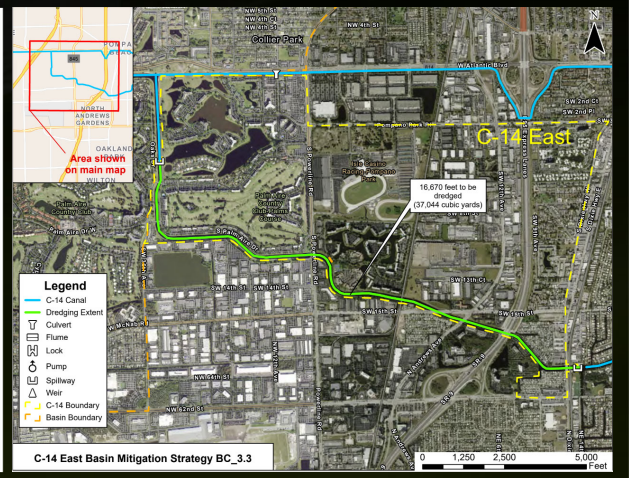
Chapter 9 – Priority Projects
Sources of Projects

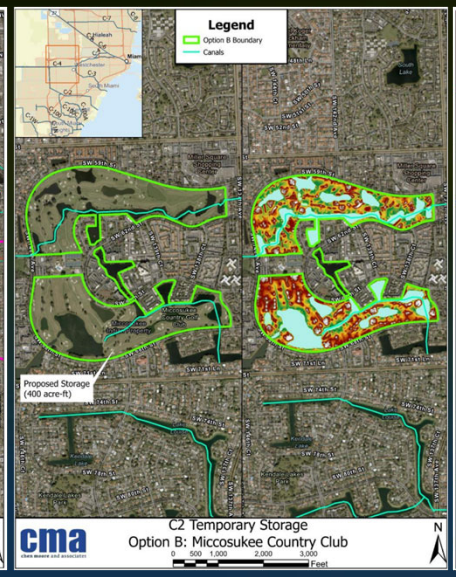


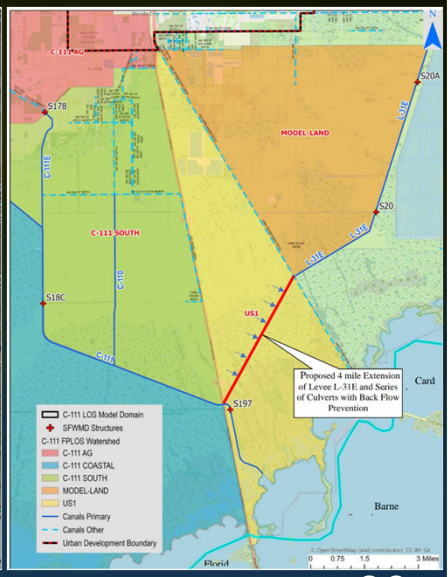
Chapter 9 – Priority Projects

- Added project component descriptions and high-level cost estimates from FPLOS Phase I Studies
- Costs estimate assumptions for 8 types of project components (canal widening, canal bank enhancement, spillway, culvert, forward pump, dredging, distributed storage and storage areas).
- Total main projects – 43
- Total components – 88





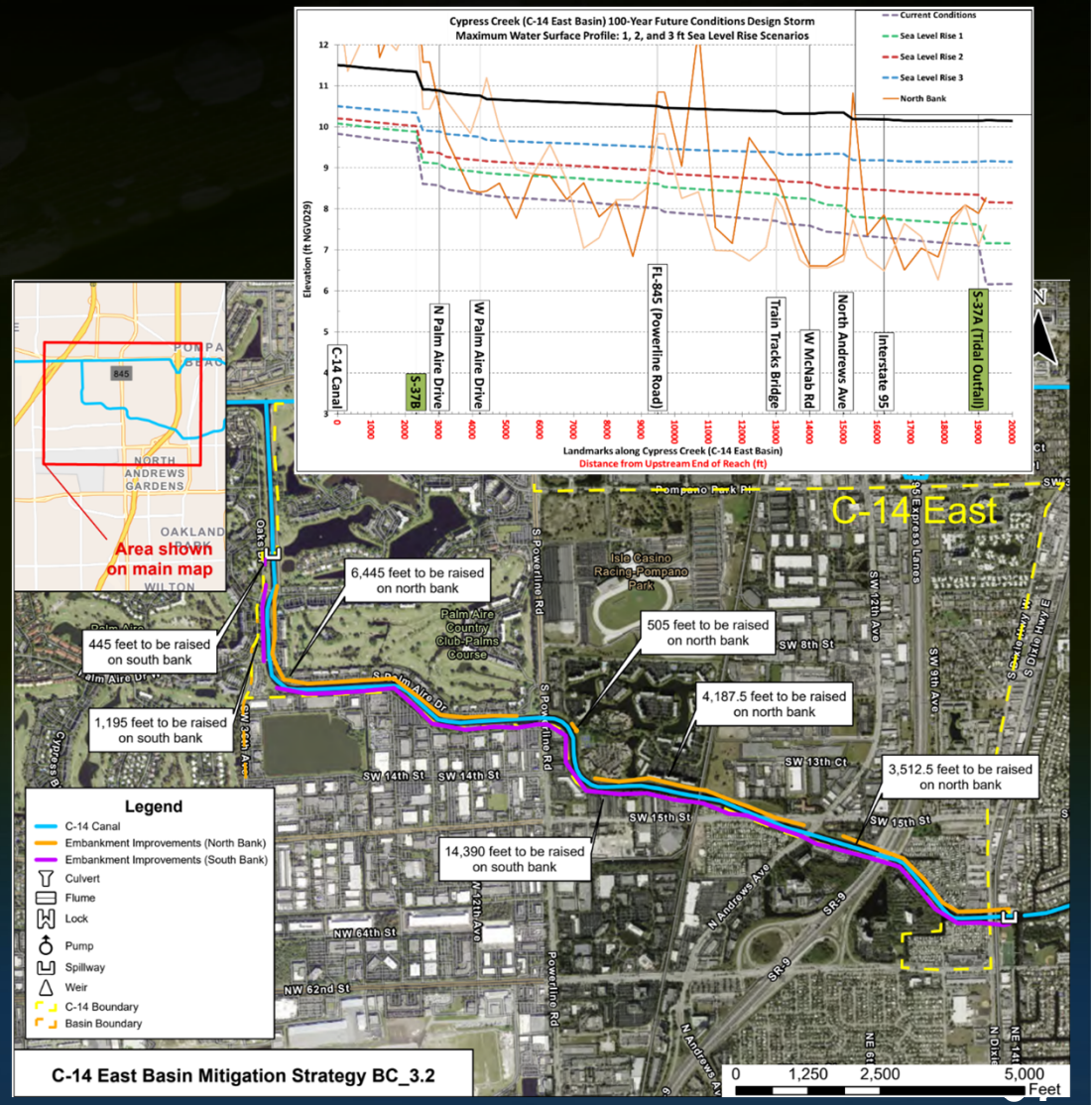




Chapter 9 – Priority Projects
C-14 East Basin (Appendix A)

Canal Embankment

- Goal: Build resiliency and decrease overbank flooding due to extreme rainfall events, sea level rise, climate change and land use changes in the basin.
- The recommended improvements include:
  - Length – 30,680 ft
    - Left bank – 14,650 ft (average of 3 ft height)
    - Right bank – 16,030 ft (average of 2.5 ft height)

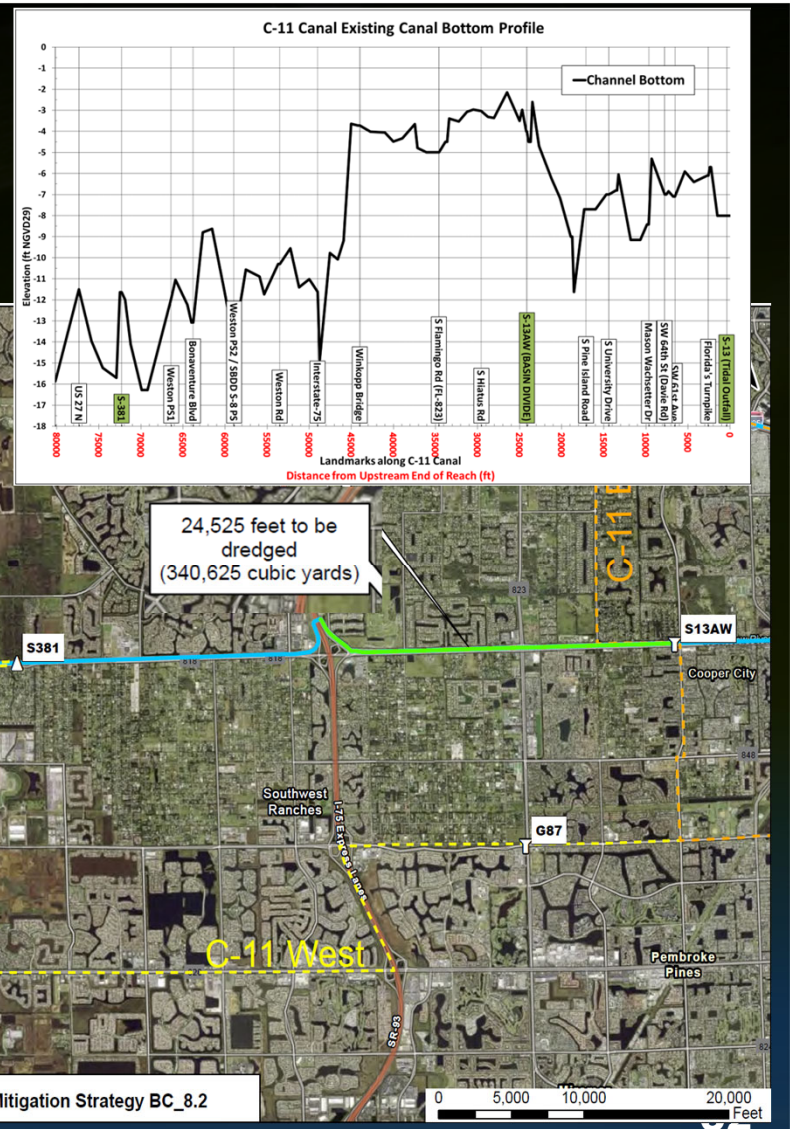


Cost Estimate	
North Bank Raising	$4,478,647
South Bank Raising	$3,573,354
Adjusted 2024 Cost Total	**$8,052,001**

Chapter 9 – Priority Projects
C-11 West Basin (Appendix A)

Canal Dredging

- Goal: Build resiliency and decrease overbank flooding due to extreme rainfall events, sea level rise, climate change and land use changes in the basin
- Could increase the conveyance capacity enough to ensure the S-9/S-9A can discharge at full capacity
- The recommended improvements include:
  - Length – 24,525 ft
    - Dredging volume – 340,625 cubic yards



Cost Estimate

C-11 Dredging	$43,736,250
Adjusted 2024 Cost Total	**$43,736,250**

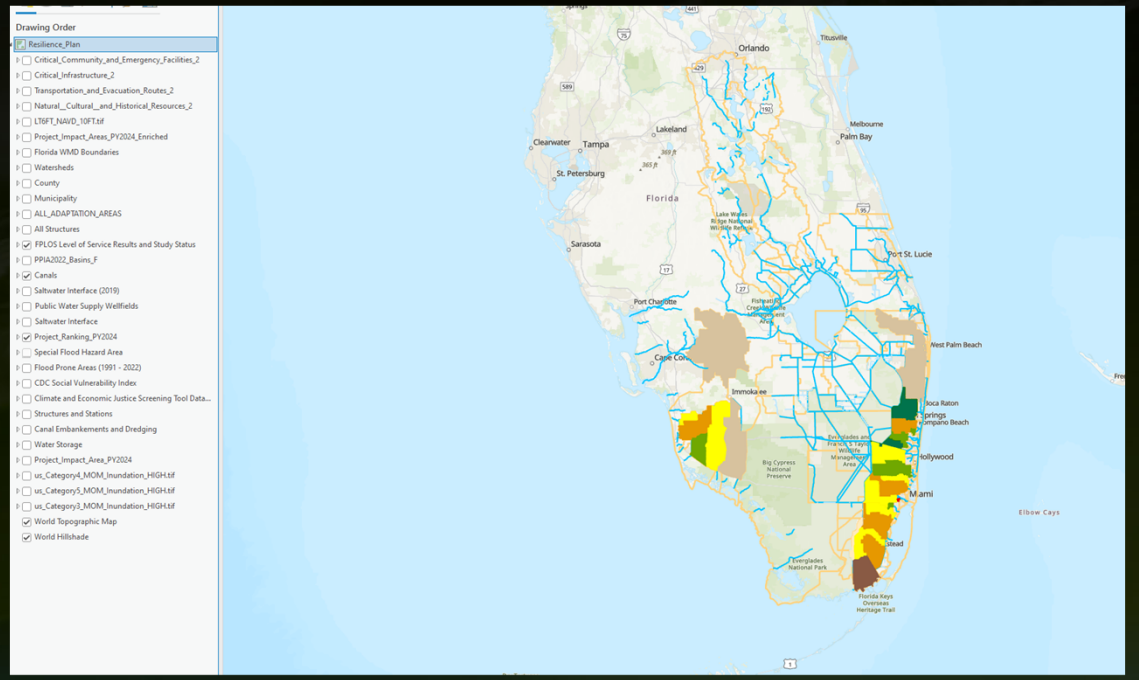
Chapter 9 – Priority Projects – New Content – Real Estate Coordination

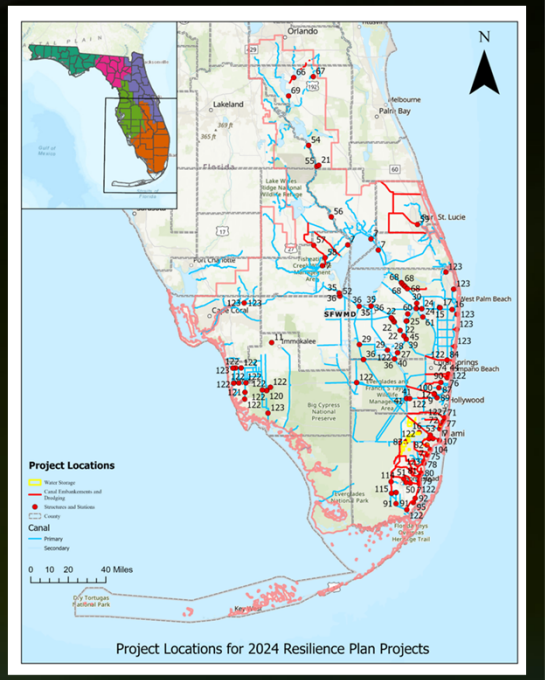
- Early coordination to evaluate land interests needed for a project
- Reduce risk of delay due to acquisition requirements
- Reduce risk of cost overruns
- Identify potential challenges early
- Optimize resource allocation
- Facilitate communication and collaboration among project team members

Project Name	Location	Real Estate Status	Ownership
C-7 Basin Resiliency (S-27)	Miami-Dade	Real Estate Negotiations initiated	Private
C-8 Basin Resiliency (S-28)	Miami-Dade	Title research in progress	Public
C-9 Basin Resiliency (S-29)	Miami-Dade	Real Estate Negotiations initiated (Draft MOU)	Public
C-6 Basin Resiliency (S-25B)	Miami-Dade	Title research in progress	TBD
C-6 Basin Resiliency (S-26)	Miami-Dade	Title research in progress	TBD
C-14 Basin Resiliency (G-57)	Broward	Title research in progress	TBD
C-2 Basin Resiliency (S-22)	Miami-Dade	Title research in progress	TBD
C-12 Basin Resiliency (S-33)	Broward	Title research in progress	TBD

Chapter 9 – Priority Projects Open GIS

- New Open GIS Project – all GIS layers utilized for the plan formulation and projects ranking are made public
- Open GIS project include locations of main basin projects, major subcomponents, and respective project impact areas





- Incorporation of Critical Assets GIS Layer recently released by FDEP – Resilient Florida Team, including representation of SFWMD's own structures and protected lands as Regional Significant Assets.

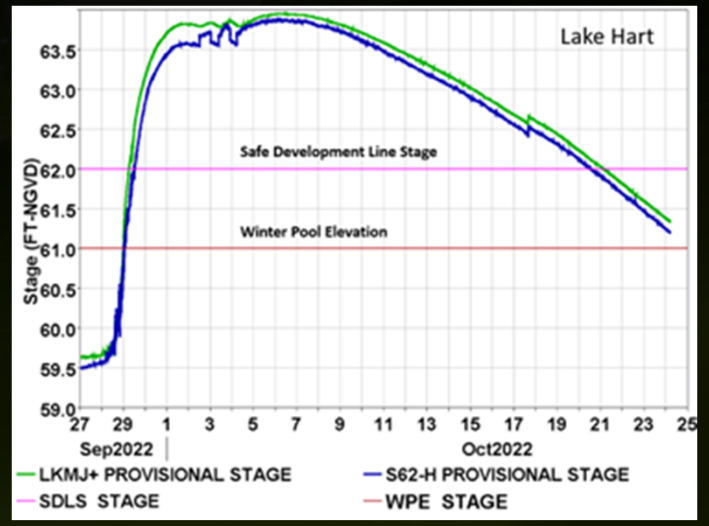
Projects under Review for Award

Resilient Florida Recommendation for awards:

- C-8 Basin Resiliency
- Homestead Field Station buildings replacement
- S169W Structure Replacement and Trash Rake/Manatee Barrier

Hurricane Ian DR-4673 HMGP:

- 4 Upper Kissimmee, 1 BCB and 1 Palm Beach County projects – Responding to numerous RFIs



Next Steps

- May 29th – Plan is released for public comments

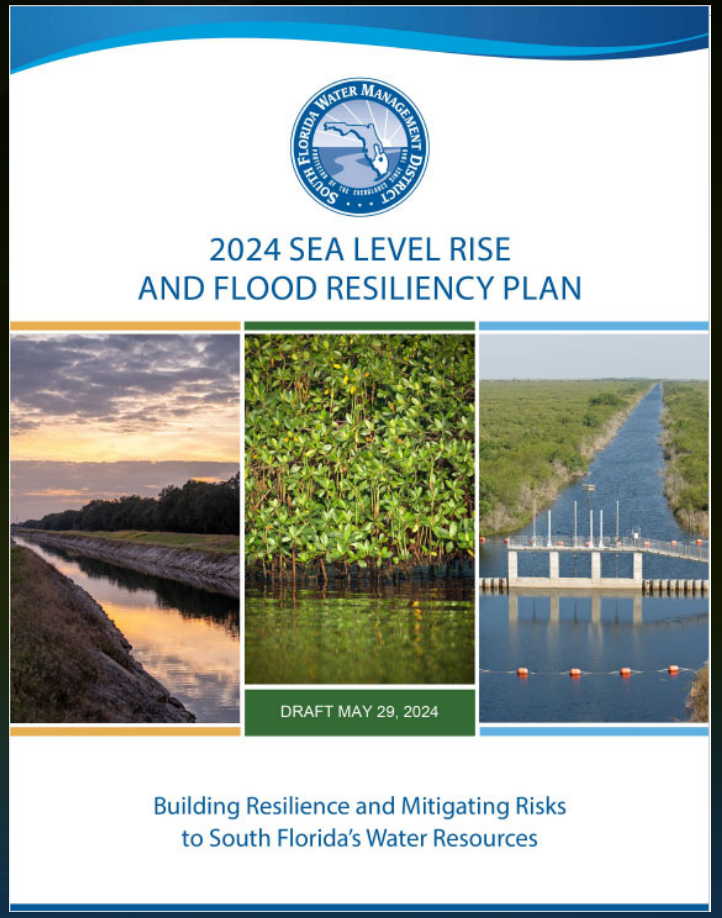
  Draft Plan Document and GIS project/layers are available at:

  https://www.sfwmd.gov/our-work/sea-level-rise-and-flood-resiliency-plan

- June 23rd – Deadline for Public Comments

  Submit comments to: resiliency@sfwmd.gov

- September 1st – List of Priority Projects Due to FDEP
- October 1st – HB513 Report Due to the Governor's Office and Legislature



Thanks!

Questions?

Comments?

www.sfwmd.gov/resiliency

Photo by Miami DDA

Flood Vulnerability Assessment in South Florida: The importance of Hydrology and Hydraulics

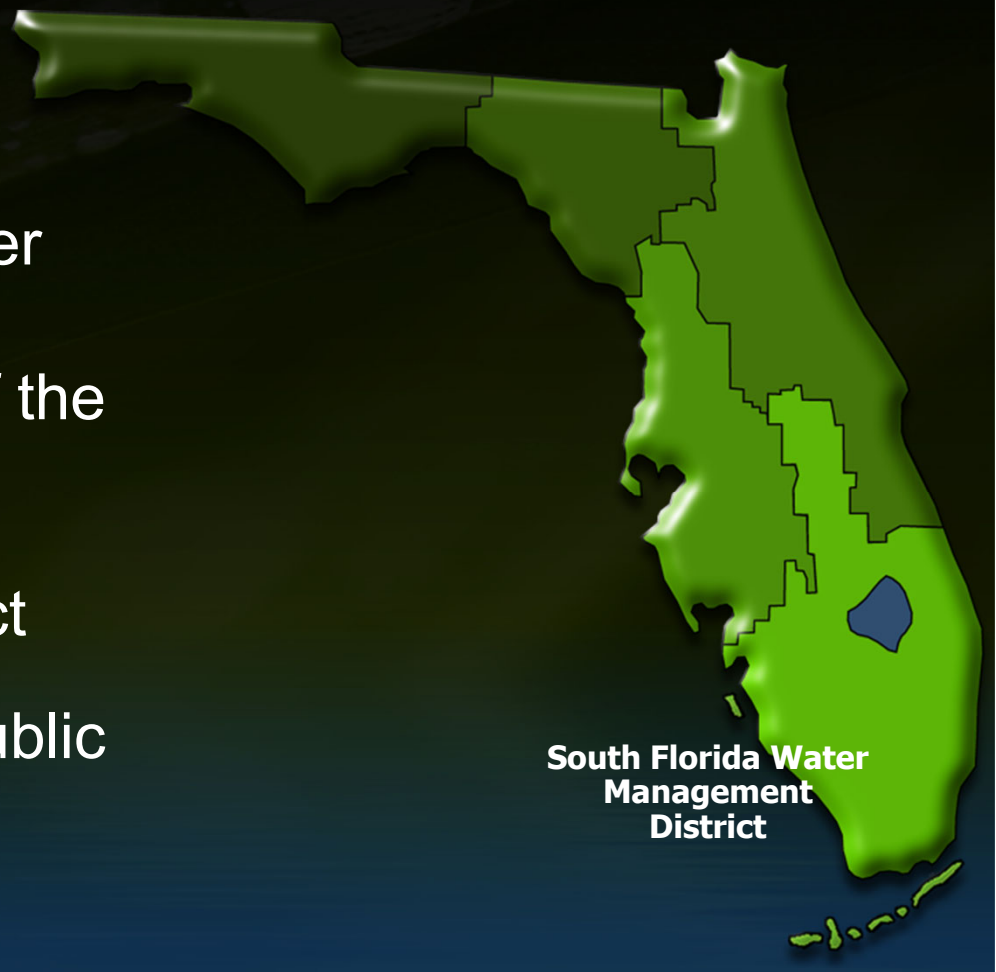
May 29, 2024

Akintunde Owosina, P.E., *Chief Information Officer*

SFWMD - Who We are and What we do

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

- Oldest and largest of the state's five regional water management districts
- Protecting water resources in the southern half of the state since 1949
- Our mission: To safeguard and restore South Florida's water resources and ecosystems, protect our communities from **flooding**, and meet the region's water needs while connecting with the public and stakeholders



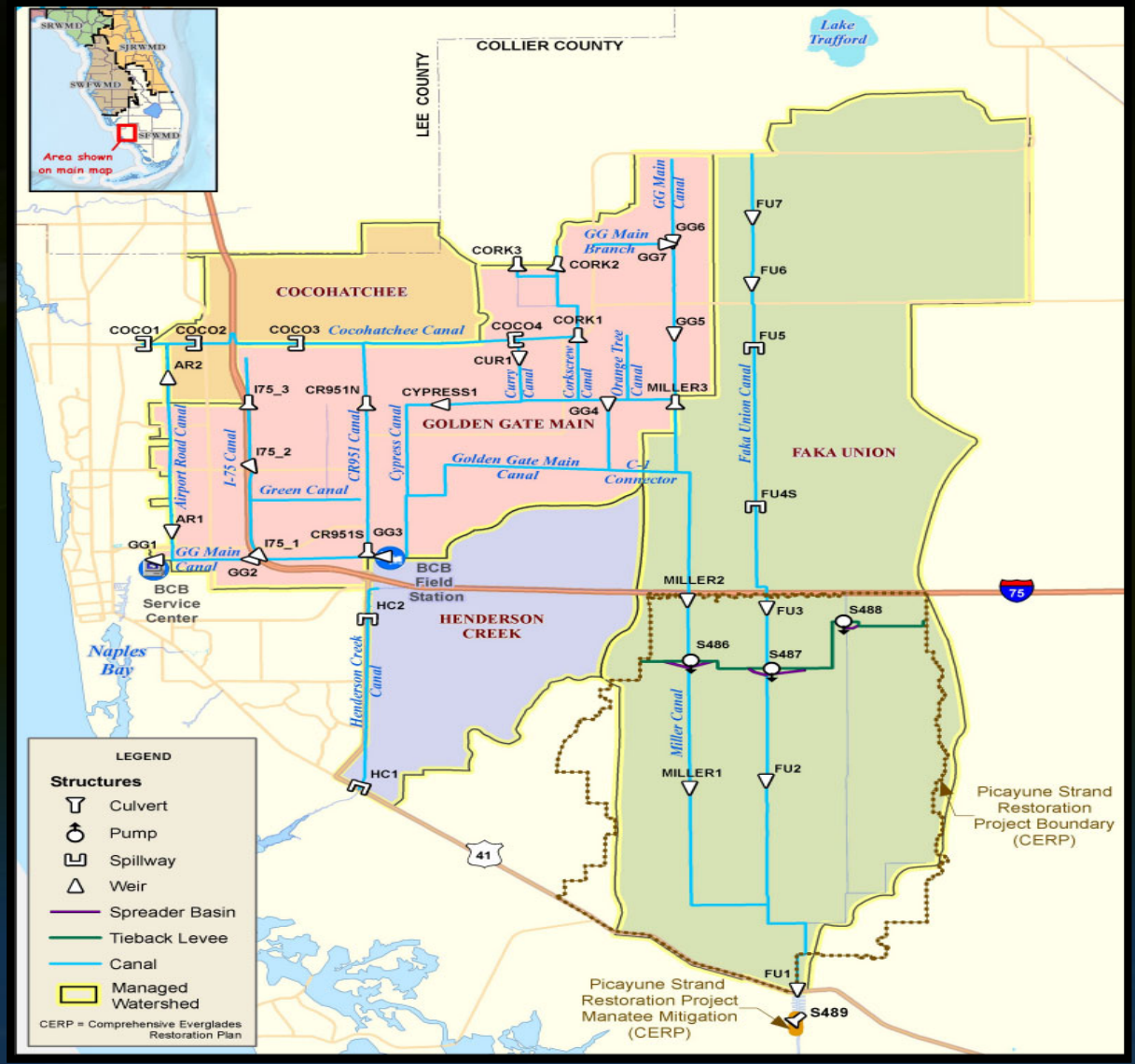
Central and Southern Florida (C&SF) Project

- 2,200+ miles of canals
- 2,100+ miles of levees and Berms
- 160 major drainage basins
- 1,380+ water control structures / project culverts
- 89 pumping stations
- 60,000 acres of regional wetland Stormwater Treatment Areas
- Lake Okeechobee
  - 450,000 acres surface area
- Water Conservation Areas
  - 959,000 acres for water conservation

Big Cypress Basin System

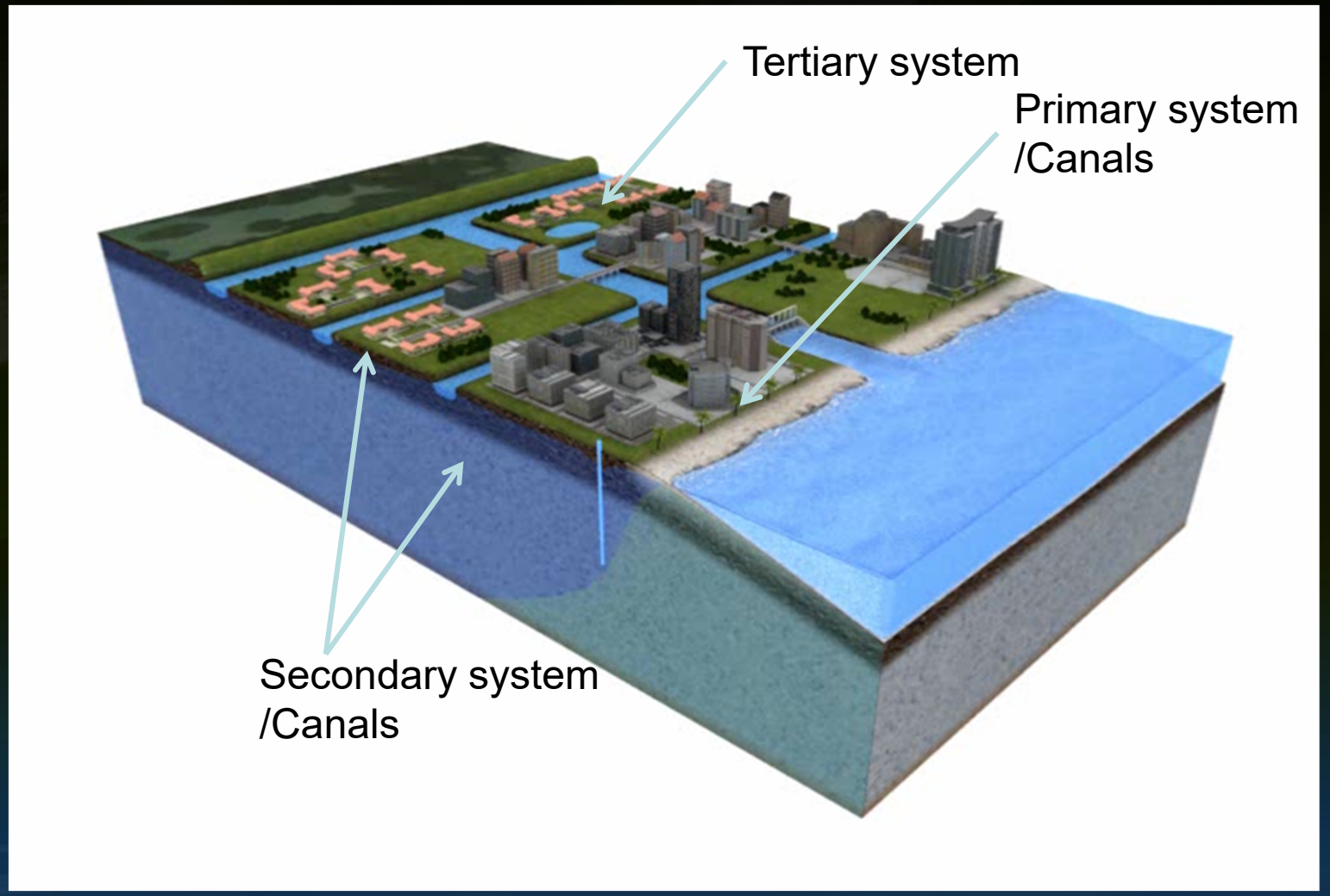
Operation and maintenance of:

- 139 Miles of Canals
- 35 Water Control Structures
  - 16 Remotely Operable
- 3 Major Pump Stations
- Moving 825,000 Acre-Feet of Water Annually
- Providing flood protection for over 390,000 people
- Managing water resourcing of a 2,380 square mile watershed



Three-Tiered Water Management System

- Primary System
  - USACE
  - SFWMD
    - C&SF Project, BCB System
- Secondary System
  - Local Governments
  - 298 Drainage Districts
- Tertiary System
  - Homeowner Associations
  - Private landowners



Why *when doing vulnerability assessments is* Hydrology and Hydraulics Important?

Because

… when you support a population of over 9 million people

… and the operators of the secondary and tertiary system rely on the primary system to work

… and the consequence could be life safety, property protection, environmental preservation and more

you need to get it right

Image created by AI – Microsoft Copilot

Factors that affect the Flooding

- Volume of water and how it arrives
  - Rainfall, Storm surge, River or canal flow, Elevated water table and more
- How rapidly it arrives and how sustained or persistent it is
- What the conditions where before it arrived – antecedent conditions
- Elevation of the land - topography
- Protective features and flood defenses such as berms and levees
  - Natural and man made
- Flood risk reduction assets and Operations – pumps, structures, storage
- Location of floodable (including critical) assets
  - and more

Parsimonious Approach to Flood Studies

- Parsimonious approach is great, you must however balance simplicity with appropriate level of accuracy
  - … but be careful what you assume away for simplicity

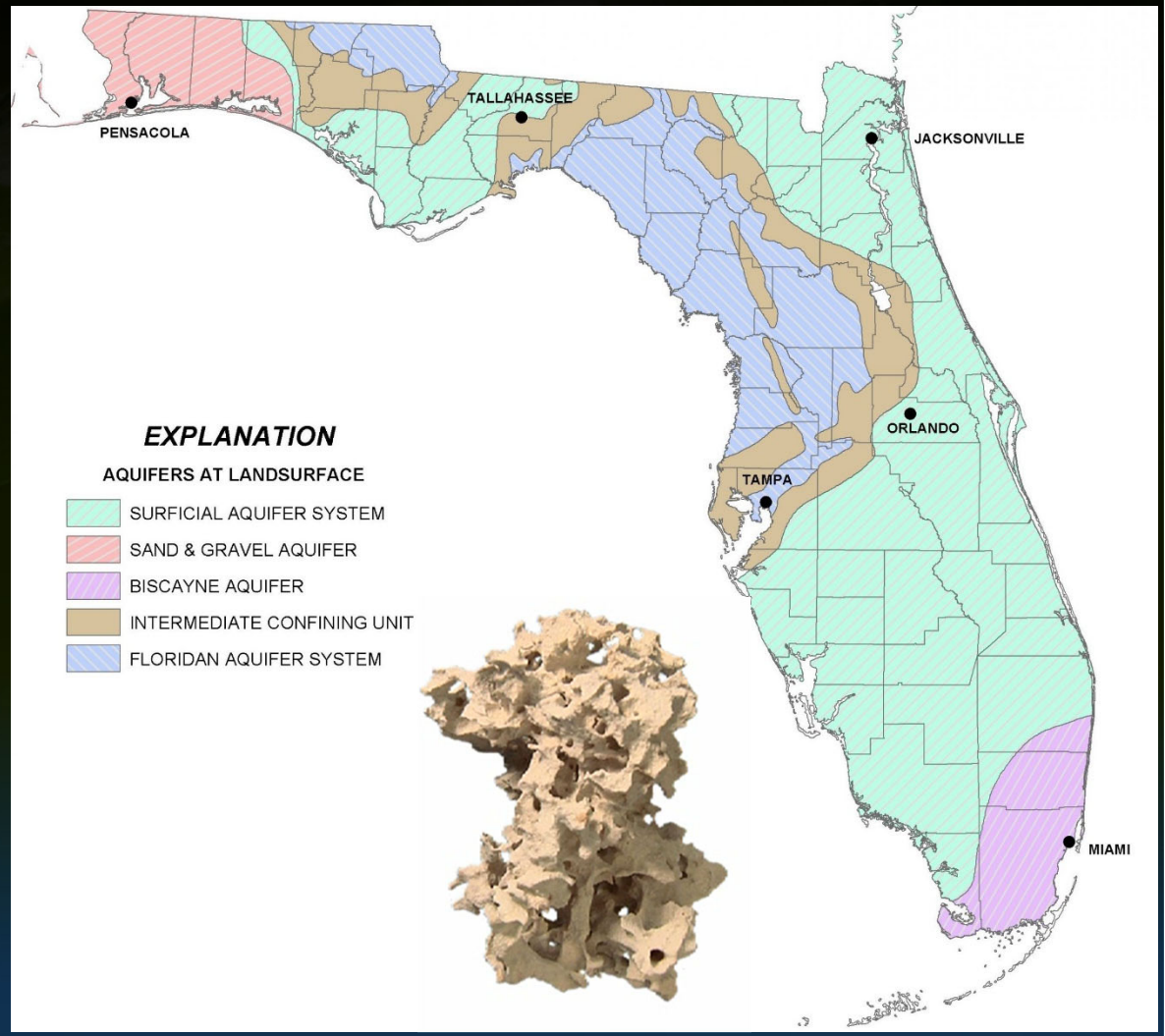
Now for some South Florida Examples

Groundwater	Surface water
Coastal flooding/processes	Inland flooding/processes
Slope	Roughness
Flood defenses	Water Management Operations
Land use changes	Future condition changes

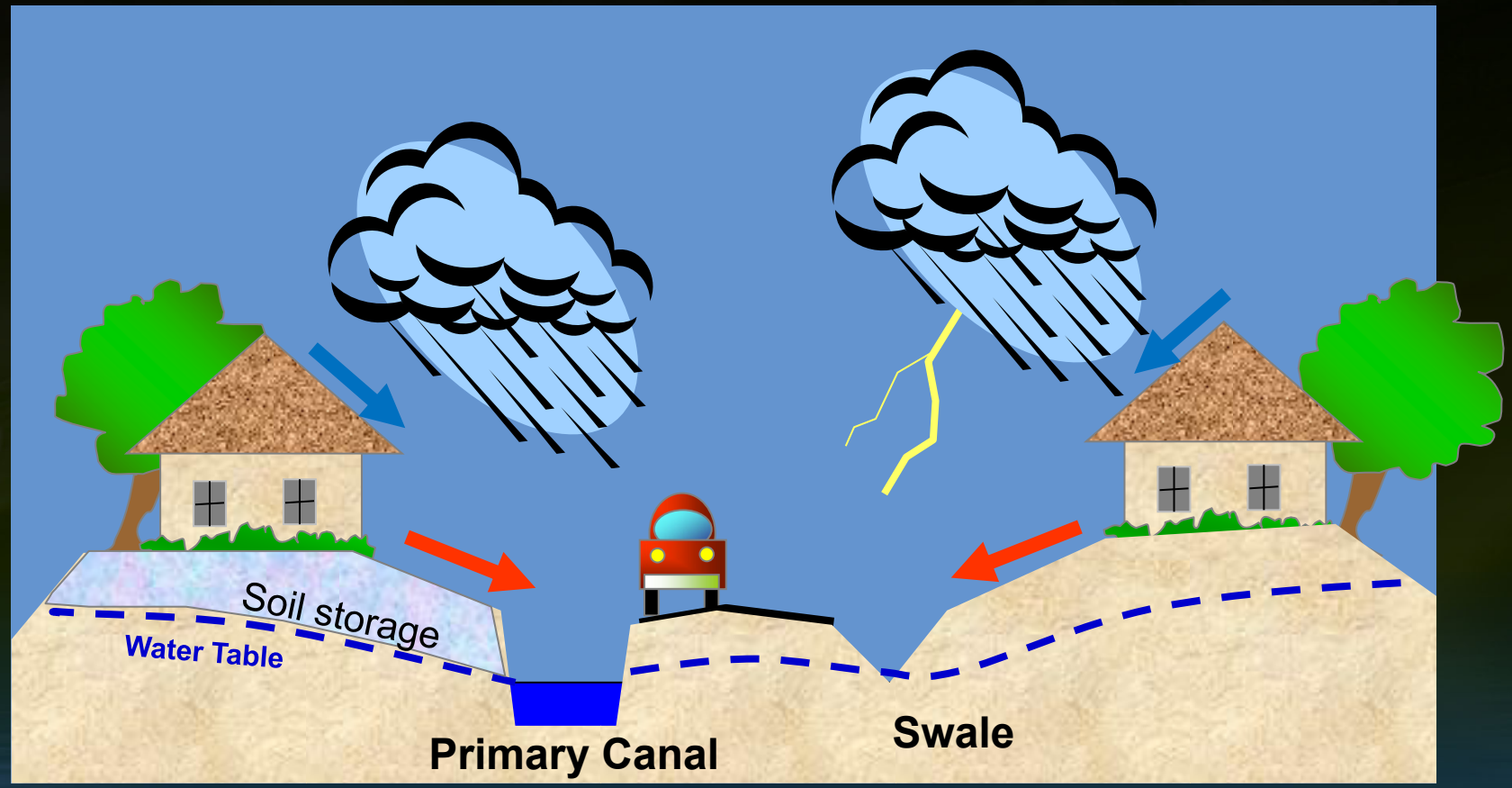
Image created by AI – Microsoft Copilot

Aquifer and Groundwater Example

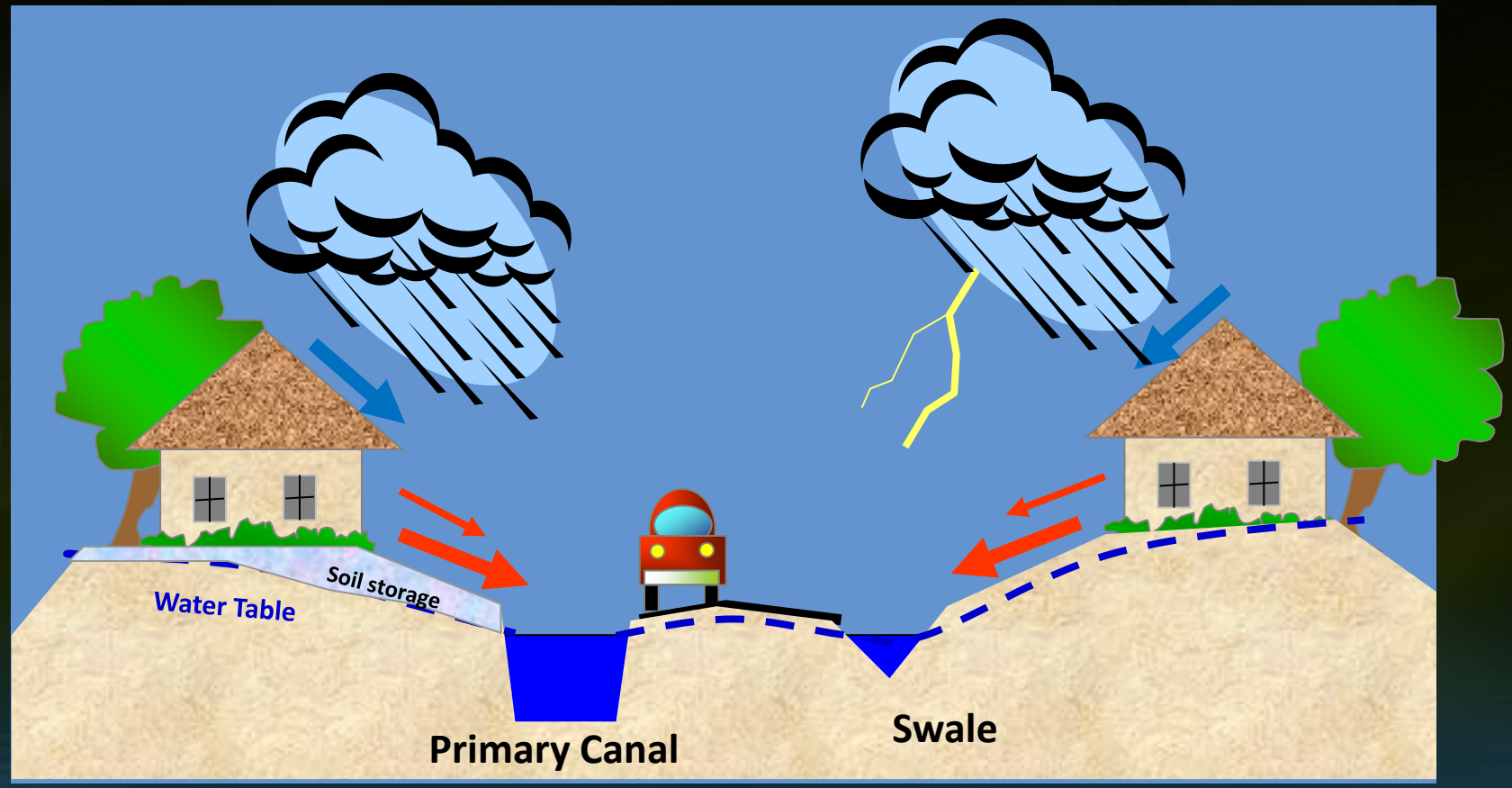
- Aquifer characteristics could influence the depth and duration of flooding and should be considered in vulnerability assessments
  - Soil storage could mitigate flood risk
    - Infiltration when the depth to water table is large could reduce runoff depending on the rainfall intensity
  - The permeability of the aquifer matters
    - Highly transmissive aquifers like the Biscayne aquifer can bypass defenses like levees or closed structure gates



South Florida: Flooding depends on the location of water table

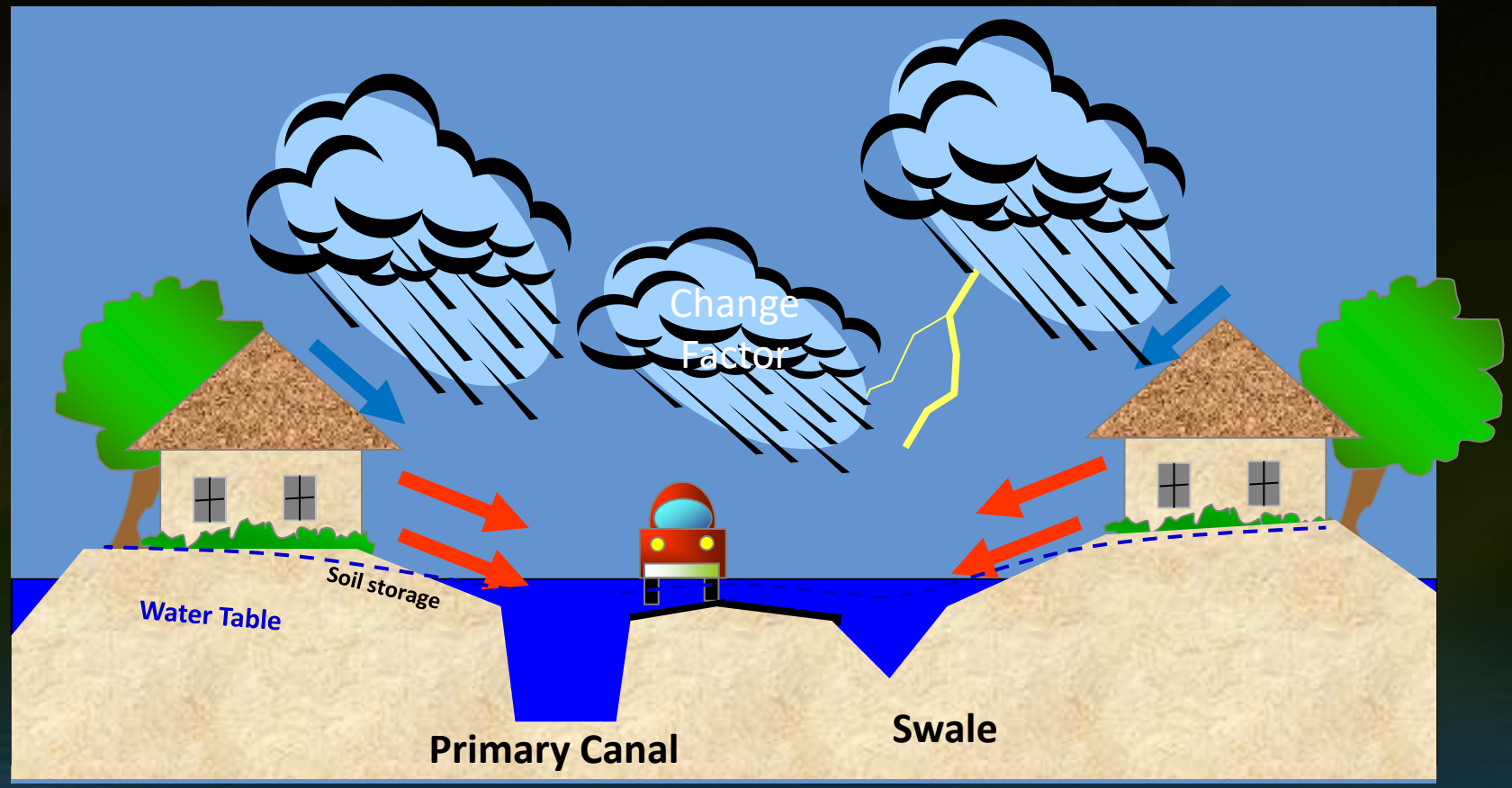


With Higher Water Table



* A rise in water table will reduce soil storage and result in more runoff during storms

.. Then With Increase in Future Extreme Rainfall



*A rise in water table will reduce soil storage and rapid runoff during storms

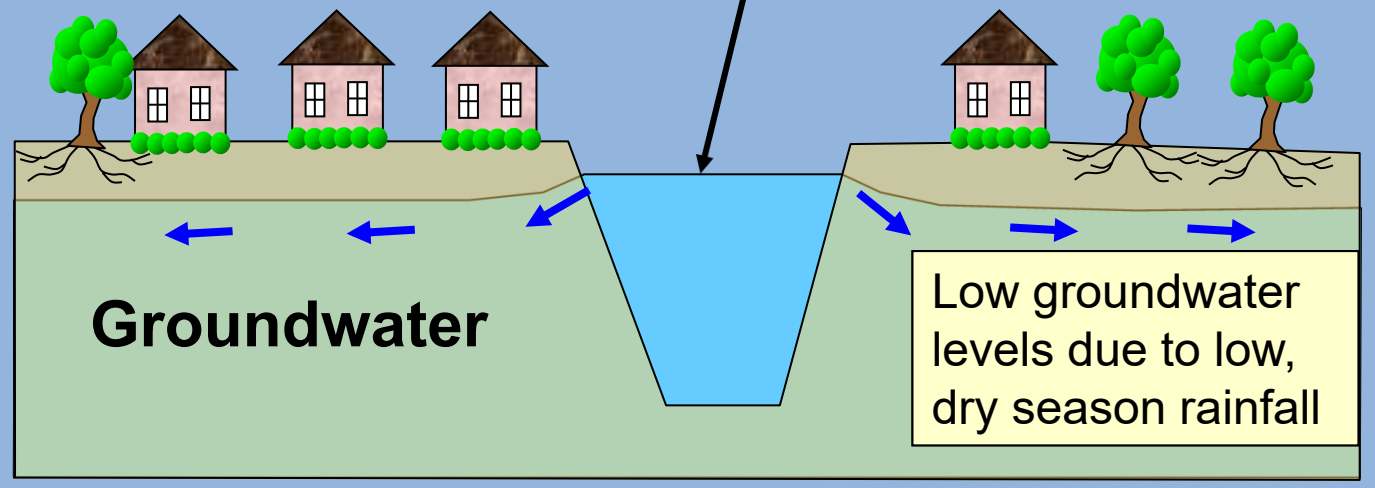
Canal / Groundwater Interaction

Normal Dry Season Operations

Canals serve two primary purposes….

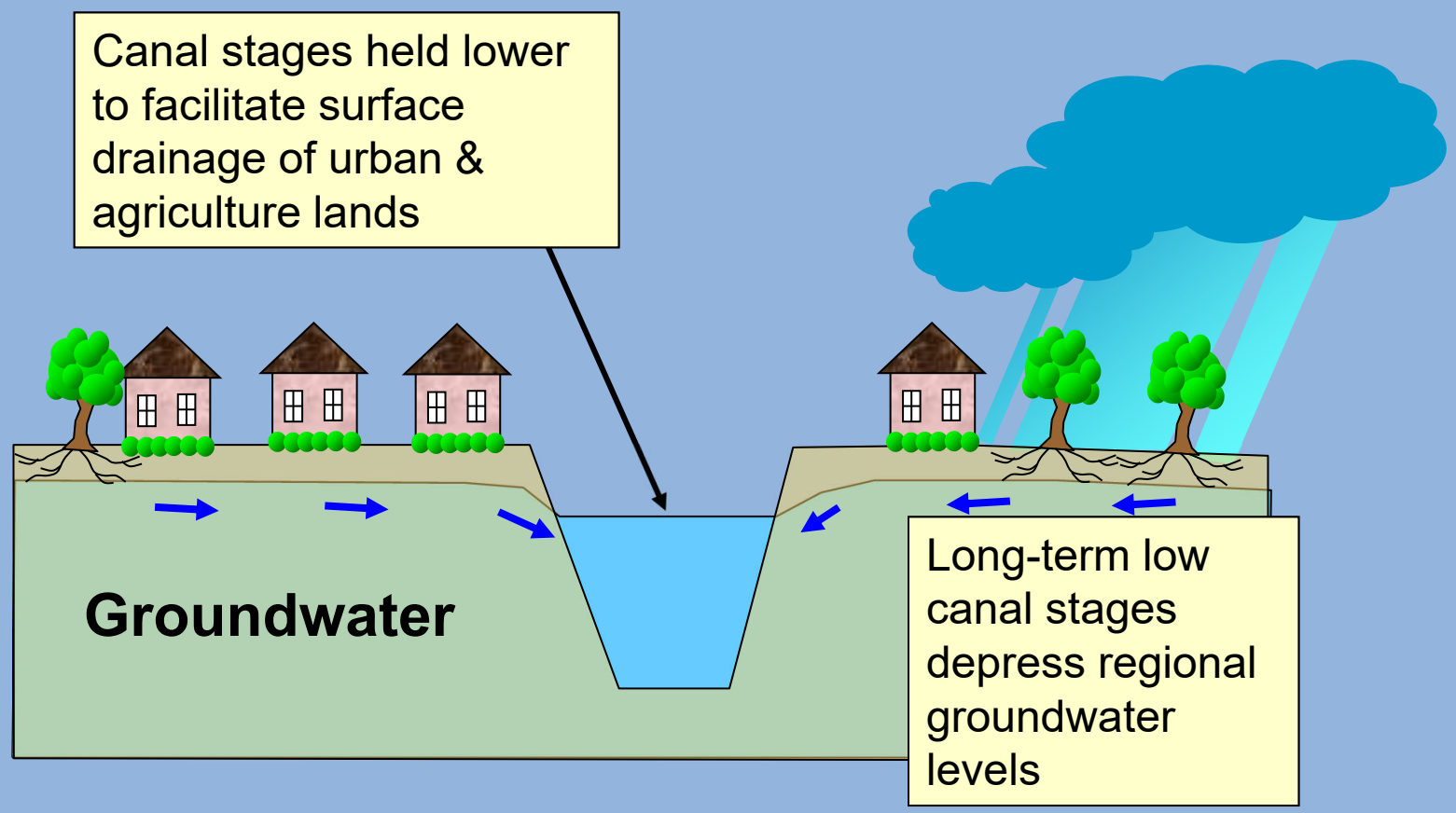
1. **Flood Control**
2. **Water Supply**

Canal stages held high to facilitate groundwater recharge and assist supplemental irrigation



Canal / Groundwater Interaction

Normal Wet Season Operations

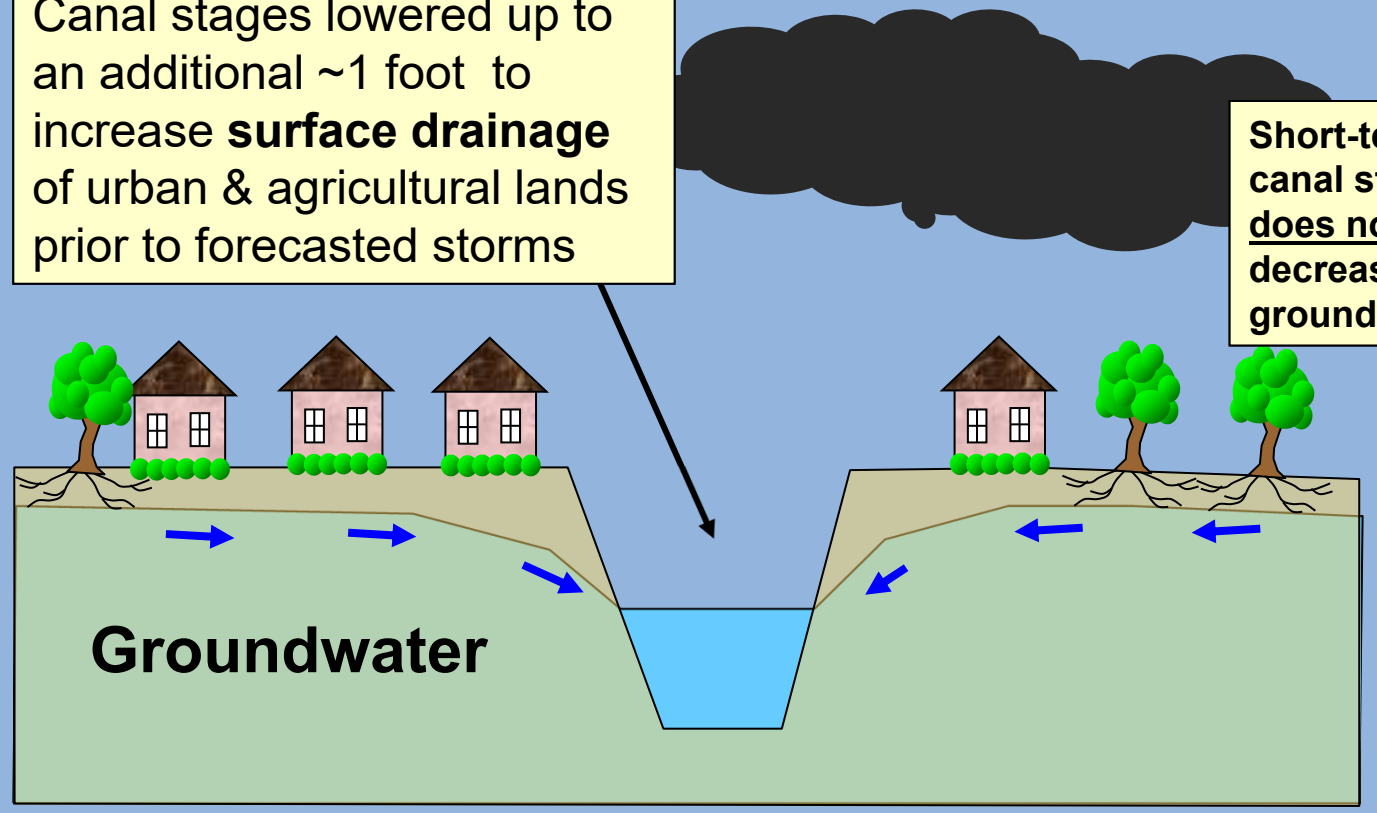


Canal / Groundwater Interaction

Wet Season Pre-Storm Drawdown Operations

Canal stages lowered up to an additional ~1 foot to increase **surface drainage** of urban & agricultural lands prior to forecasted storms

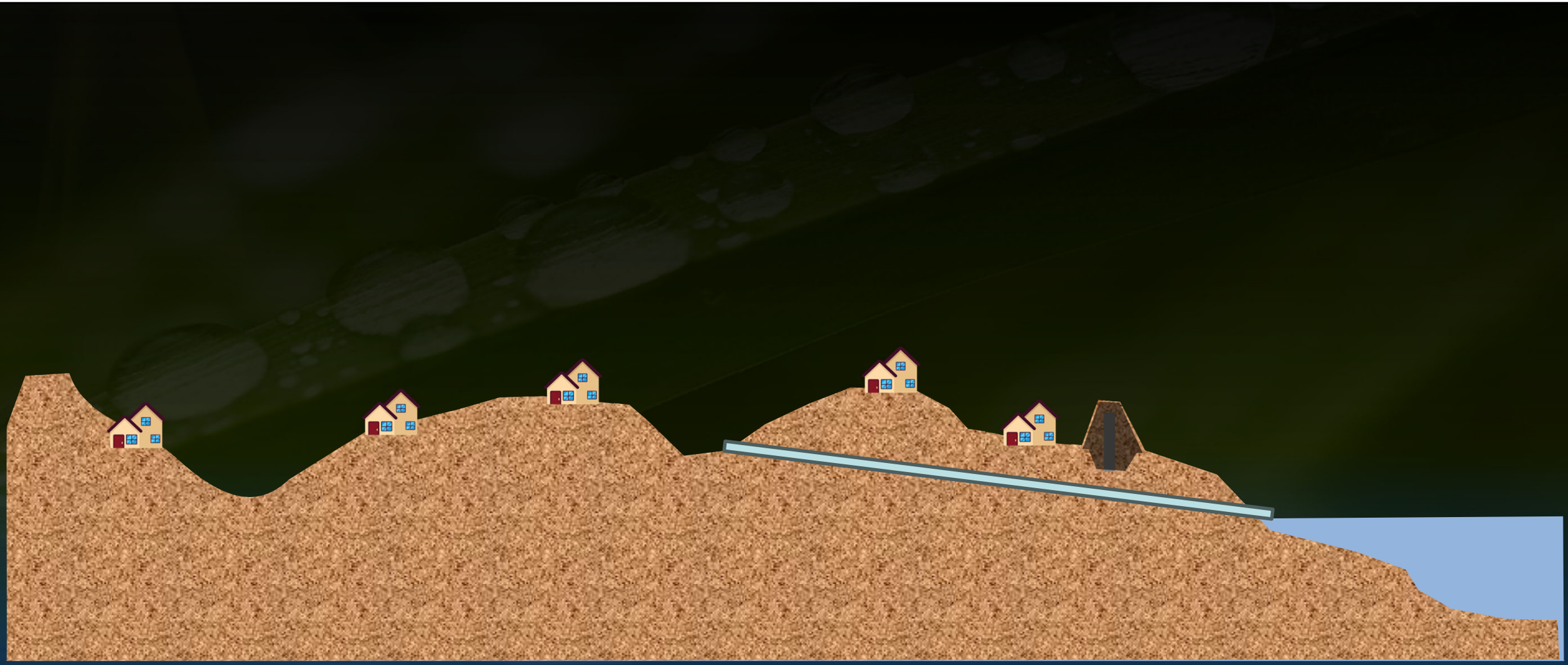
Short-term lowering of canal stages <u>generally does not</u> significantly decrease regional groundwater levels.**



Simple or Enhanced Bathtub Model

What if you recognized levees

What if there was a discharge pipe or drain



Flood Risk Based on Topography

Hypothetical Coastline Experiencing Surge or Tide

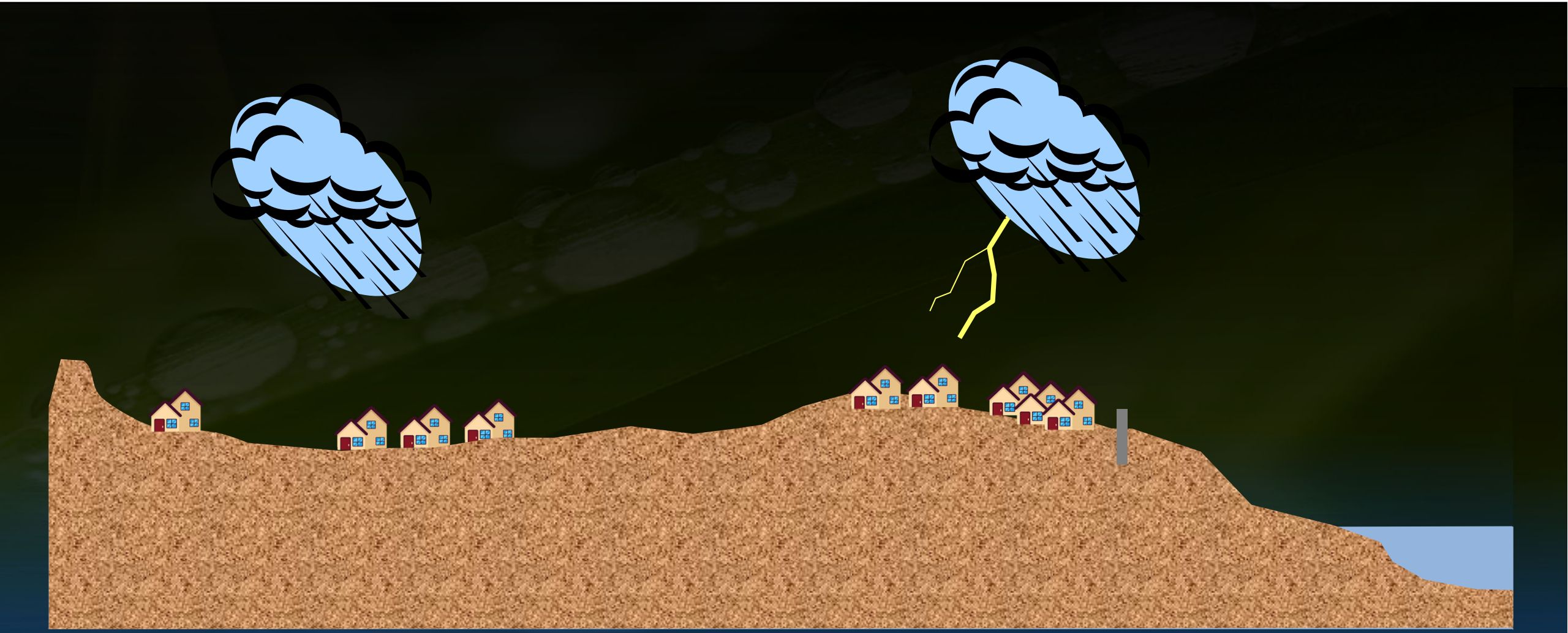
Bathtub Models

- Commonly used for rapidly assessing coastal inundation
- Typically intersect sea level with elevation in the study area to determine flood depth
- Enhanced bathtub models may incorporate hydraulic connectivity, beach slope
- Neither are comprehensive or substitutes of hydrologic and hydraulics models

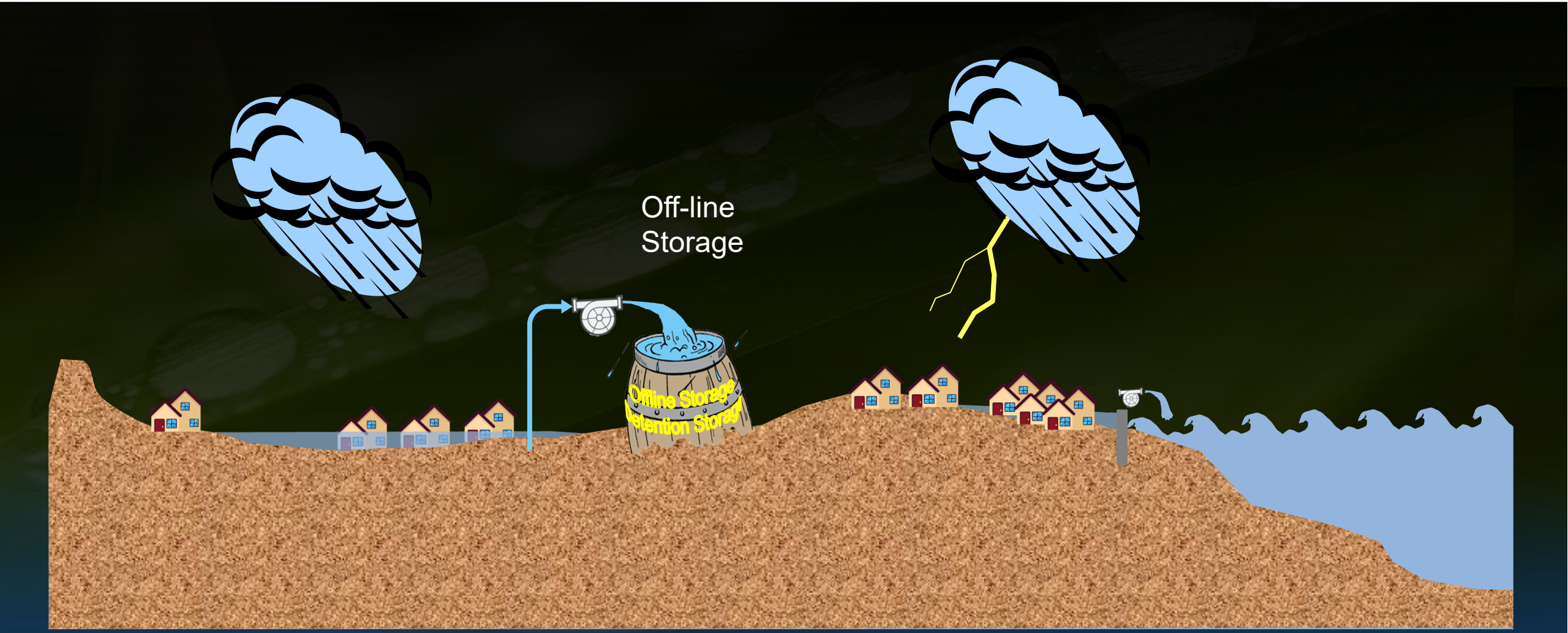
What if you Assumed no Surge, or Wave

And you were wrong…

What if you Assumed Surge, or Wave but no Rain

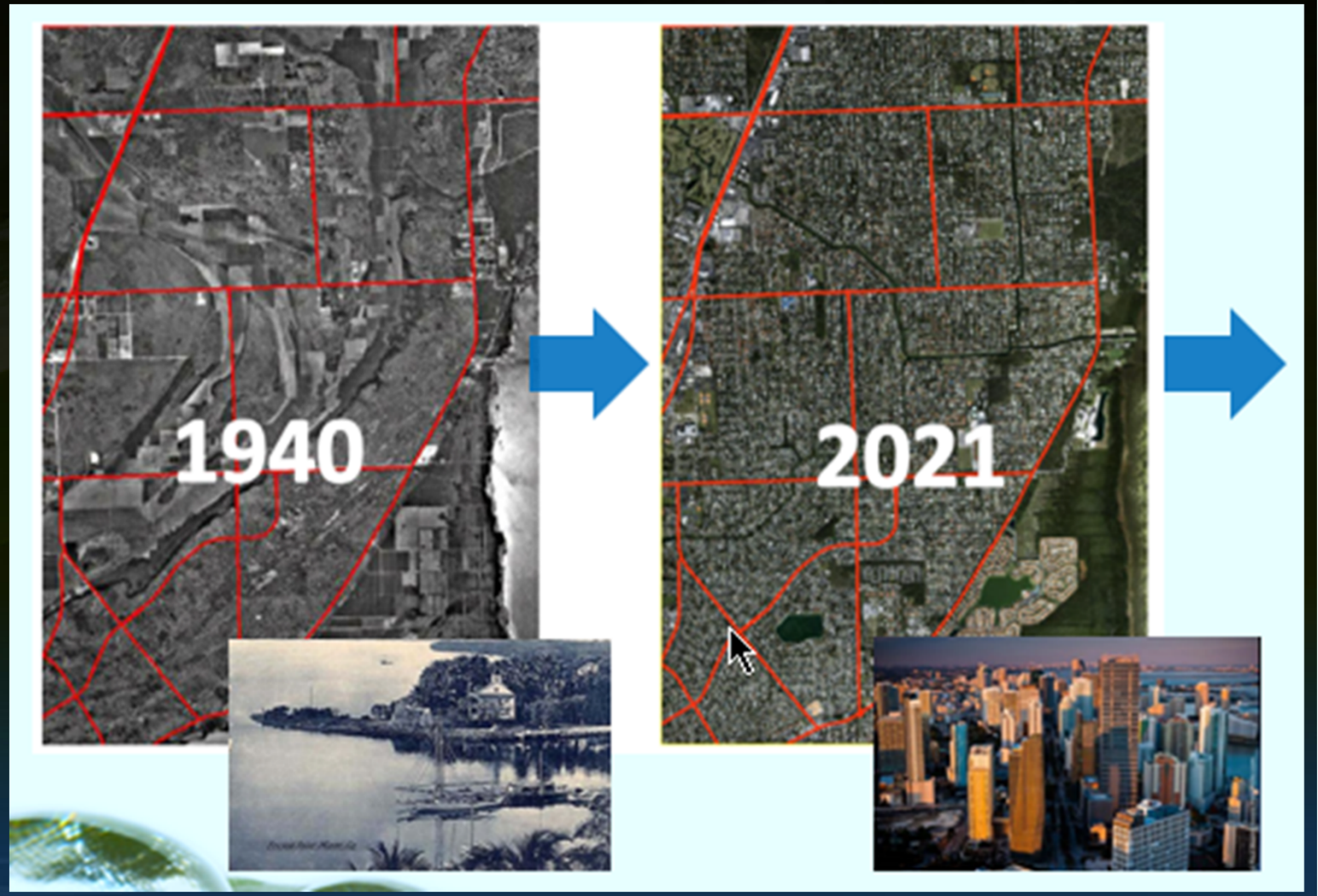


What if you had Pumps



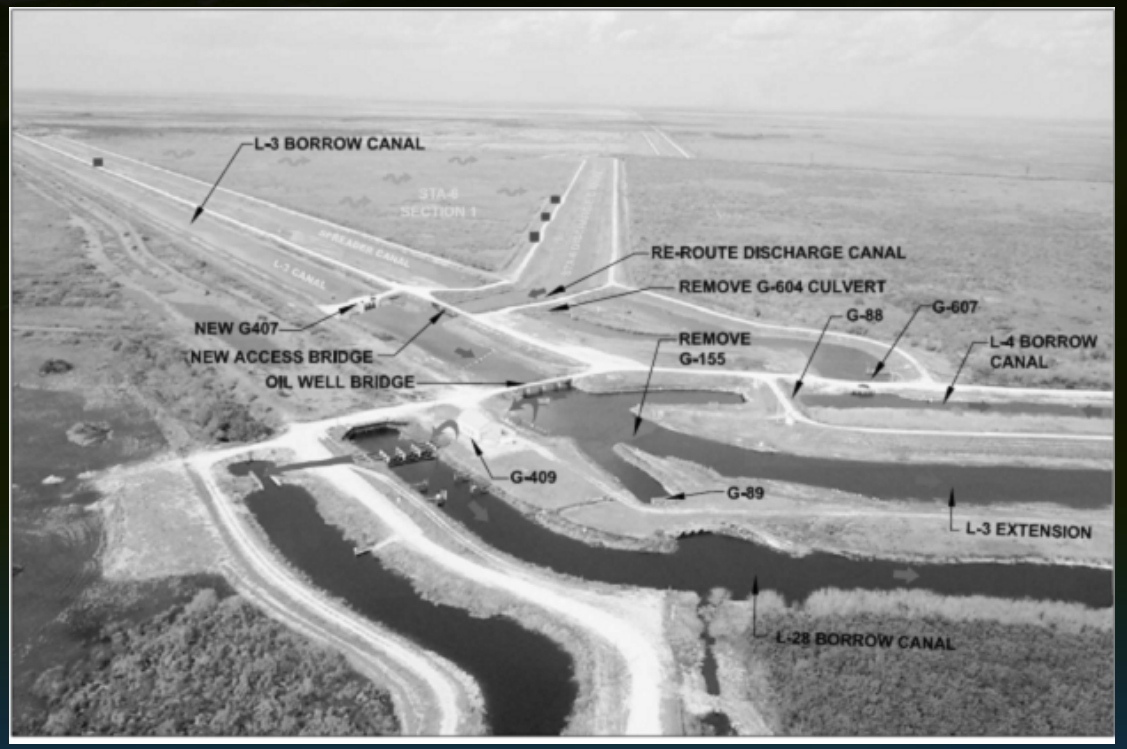
Land Use Change

- Change in runoff or peak discharge
- Reduced infiltration and aquifer recharge
- Change in hydrology – ET
- Different acceptable risk



Pick a model Tool 'Fit for Purpose'

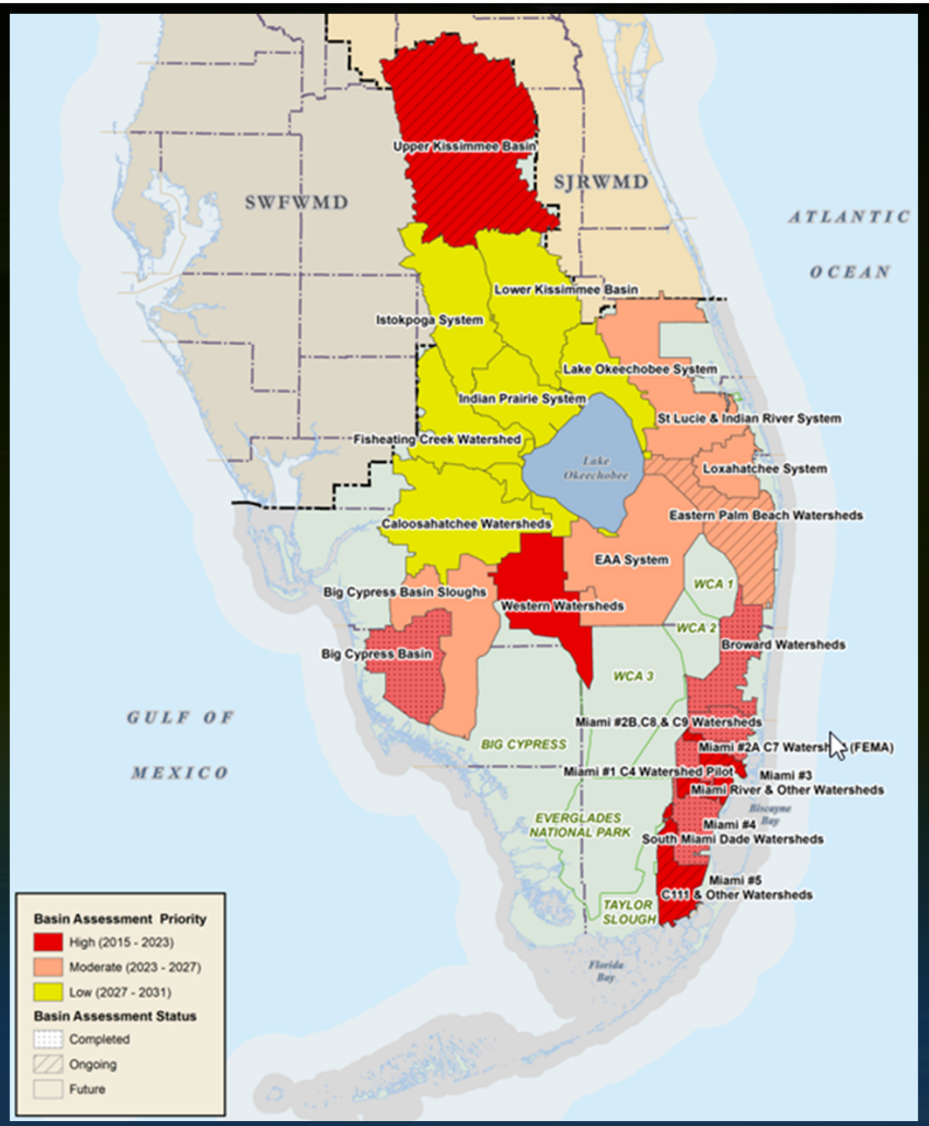
- Use the simplest tool that can achieve the vulnerability assessment
  - Know which processes are important to flood risk in the study area
  - Know the time frame and potential changes that must be represented
  - Clearly identify your assumptions and make sure that critical information to be simulated are not assumed away
  - Caveat the tool and be clear about the limitations of the assessment to avoid misuse



Configuration of STA-5/6 canals and structures - Confusion Corner

The Approach We Adopted

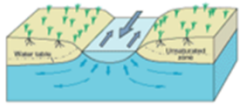
- The FPLOS program serves a highly complex water management system, we must ensure that the tool is capable of:
  - Represent structure operation and water management actions
  - Simulating the interaction between groundwater and surface water
  - Represent the important flood drivers including rainfall and surge
  - Address anticipated changes within the study timeframe including land use changes, future rainfall, and future sea level rise
- A long-term sustainable tool that can be used for adaptation and mitigation planning and can be continuously build upon and improved



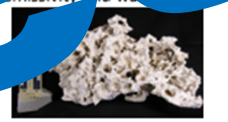
Enhancing Flood Vulnerability Assessment and Flood Risk Management Strategies in South Florida through Advanced Hydrologic, Hydraulic, and Hydrodynamic Modeling Approaches (Draft for discussion)

Central and South Florida's hydrological landscape presents unique challenges for flood risk management due to its low-lying flat topography, large surface-subsurface water interactions resulting from highly transmissive aquifers and high-water tables, predominant gravity-based-canal drainage system highly influenced by tide levels, and very importantly, an intensively managed complex flood control system. Simplified regional assessments, especially "bathtub"-derived ones, have significant limitations in properly characterizing flood risks. It is of critical importance to properly characterize hydrology, hydraulic, and hydrodynamic/coastal (H&HC) processes for accurately quantifying flood risk and vulnerability, particularly in the context of the unique environmental conditions present in South Florida.

Hydrological Dynamics of Highly Connected Surface Subsurface Water Systems



South Florida's hydrological dynamics are shap tricate interactions between surface ground resulting from highly one a high/near-surface w oles. S er-groundwater intera s play l role i flood p necessitating sophisticated modelin es to missivity and wa s comprehensi The exac fall e ding nt gro condition resu me floodi ced hyd odeling enabl n an of th ctions, providing insights contri the l ystem and flood risk man



Cunningham, Kevin J. and Florea, Lee J. (2009). The Biscayne Aquifer of Southeastern Florida. Caves and Karst of America, 2009, 186-199.

Co l Syste tions

The C n Florida Flood Control Project (C&SF Project) is a very comprehensive em with 2175 miles of canals, 2130 miles of levees and berms, 915 water tructures, 620 project culverts, and 90 pump stations. The efficient and coordinated operation of water control structures is integral to flood management in the region. Simplified flood vulnerability assessments that overlook structure operations and water management decisions lead to incomplete evaluation of flood risk. Advanced H&HC modeling tools allow for the incorporation of detailed operational rules and protocols into simulations, resulting in a more accurate representation of flood dynamics and more effective adaptatio n strategies.

Low Lying Flat Topography & Coastal Gravity-Based Drai

The predominantly low-lying flat topograph unique challenges for flood risk management. In addition, the existi avity-b age syst nced by tidal elevati h-scale differen and a nificantly infl ulner -level r utes to increasing ood risks, especi avity-ba ge sy higher t result in reduced di capacit astal low- scape water movement and depths can b fluenc scape feat land us eir contribution to hydrodynamics. Fo the a road versus vegetated areas in this type of landscape – alo eir infi mic processes – can significantly determine the flood exte luration. &HC mode niques, including high-resoluti aphic data coupled with histic d computational algorithms, ble the accurate capture of these subtle elevation differences and their impacts on flood risk management.

Critical Need of Advanced Characterization of H&H processes in South Florida

The utilization of advanced hydrology, hydraulic, and hydrodynamic modeling approaches is essential for understanding flood risk and vulnerability in South Florida. By integrating surface-groundwater interactions and comprehensive water control structures operations into flood vulnerability assessment and adaptation planning, we can develop more robust flood management strategies tailored to the region's unique hydrological conditions. Despite providing overall insights and relative characterization of flood risks, simplified analysis, such as bathtub topography-derived approaches – might be very limited in correctly characterizing flood vulnerabilities and identifying the best courses of action for adapting to and mitigating flood risks. It is important that simplified approaches be properly caveated where used and that their application be discouraged where factors such as water control operations and surface-subsurface water interaction will make them unreliable. Ultimately, advanced modeling approaches provide a robust, unbiased, and accurate technical path for identifying and mitigating flood risks effectively and safeguarding communities against adverse impacts.

Questions

SFWMD RESILIENCY COORDINATION FORUM:

USACE RESILIENCY PROJECTS UPDATE

29 May 2024

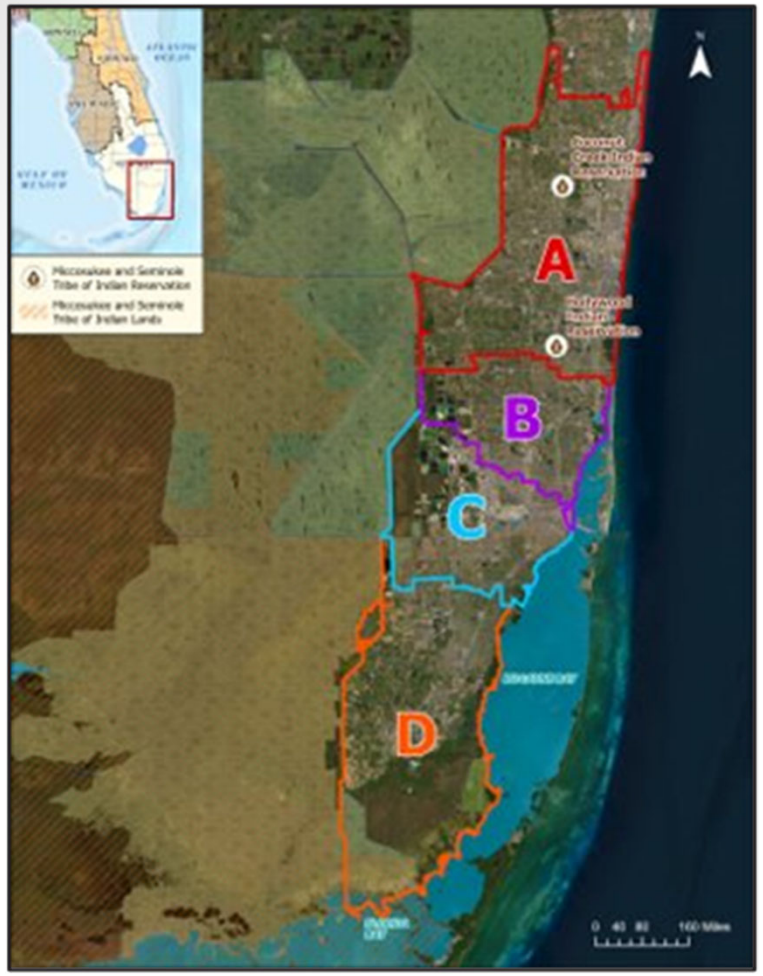
E. Timothy Gysan, P.E.,PMP
Resilience Sr Project Manager
Jacksonville District
U.S. Army Corps of Engineers

U.S. ARMY

US Army Corps of Engineers

C&SF FLOOD RESILIENCY (SECTION 216) STUDY

Overview



Sponsor and USACE Business Line –

- South Florida Water Management District
- Flood Risk Management (FRM) business line

Website:
www.saj.usace.army.mil/CSFFRS

Scope –

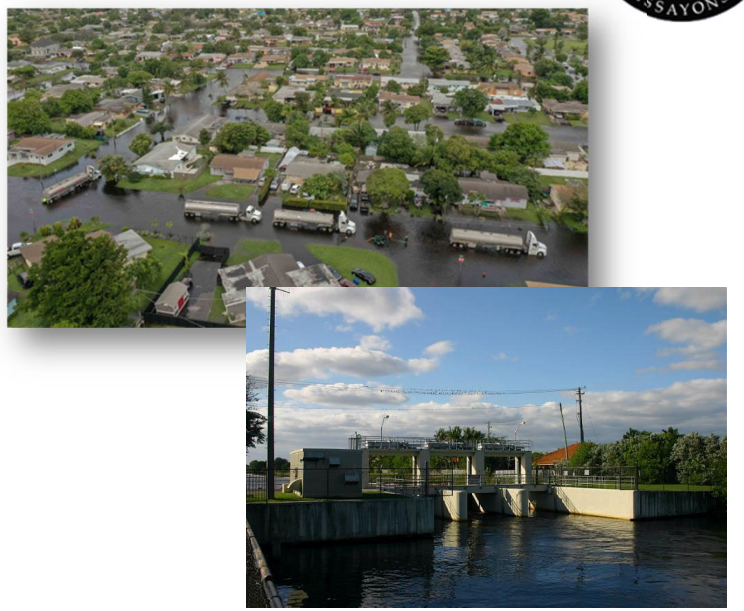
- Address C&SF system resiliency in the high risk areas in Lower East Coast focused on most immediate needs at coastal structures

Current Efforts –

- PDT meeting scheduled 7-8 March 2024 to review draft evaluation metrics;
- SFWMD/SAJ Team completed FWOP H&H modeling; PDT workshop held 12 April 2024 to present overview of available data
- SAJ/SFWMD teams working on evaluation of FWOP data
  - SAJ Economics team is producing FDA model data to support NED evaluation
  - SFWMD contractor (HDR) producing GIS based evaluation to support RED, EQ, and OSE account evaluations

Upcoming Efforts –

- Evaluation discussions with PDT July 2024
- Location Prioritization discussions August 2024

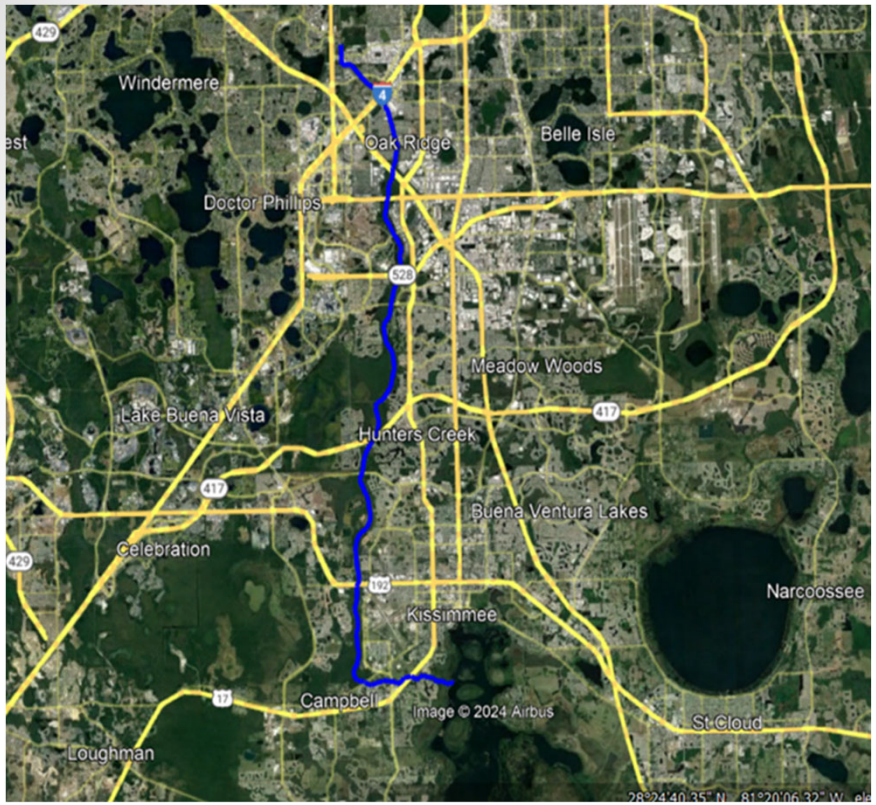


G-54 Structure (Sewell Lock) and flooding in Ft Lauderdale 2020.

C&SF C-7 canal Miami

SHINGLE CREEK AND KISSIMMEE RIVER STUDY

Overview



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

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

Current Status –

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

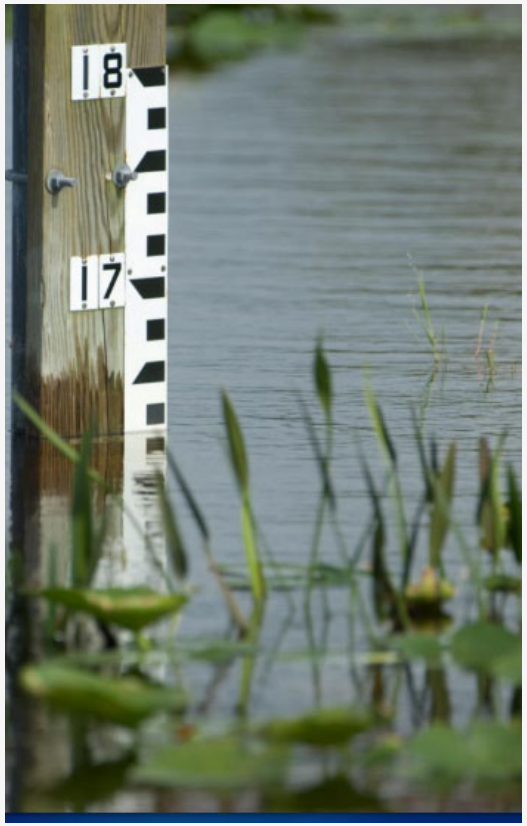
Wet Season Readiness: Latest Updates on South Florida Flood Information Resources and Flood Critical Elevations Coordination Efforts

Resiliency Coordination Forum – May 2024

Carolina Maran
Chief of District Resiliency
South Florida Water Management District

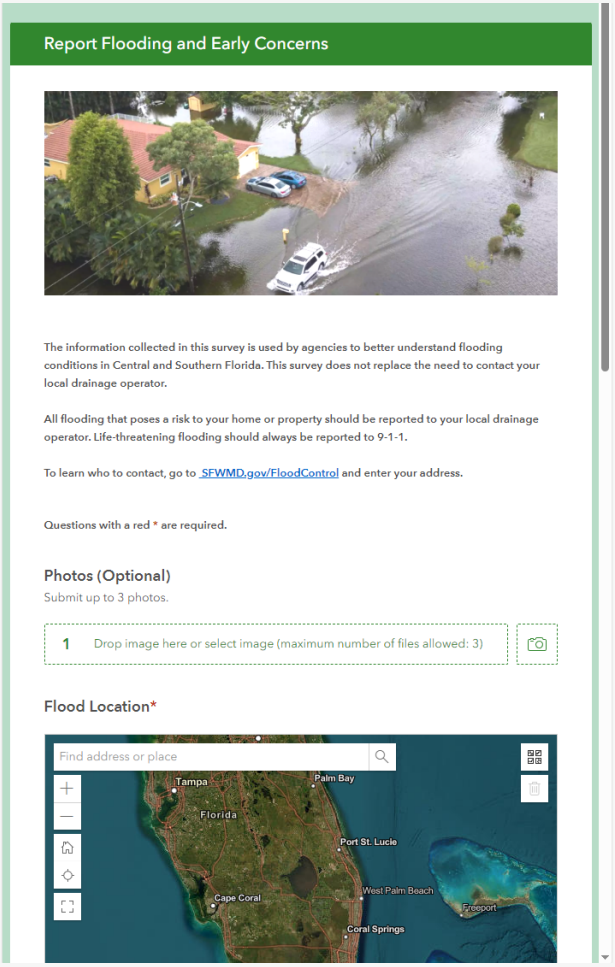
Flood Observations and High-Water Mark Trainings

- SFWMD hosted 9 training sessions at various locations across the region throughout the month of April.
- Trainings were open to local government staff in addition to SFWMD field staff.
  - Total of 121 participants from across the region:
    - 50 from SFMWD field stations
    - 33 from 9 counties
    - 21 from 9 municipalities
    - 16 from 3 Water Control/Drainage Districts
- We welcome your feedback and any suggestions on how we can further support your local staff. Email us at resiliency@sfwmd.gov or reach out directly.



Flood Observations and High-Water Mark Trainings (continued)

- These sessions enhance our flood response preparedness for the upcoming wet season.
- These trainings support identifying flood extents from rainfall, storm surge, high tides, and compounding factors.
- The data collected and reported provides real-time insights for water managers, supports monitoring of flood conditions, and informs resiliency planning.



Flood Observations and High-Water Mark Trainings (continued)

Recognition/Special Thanks

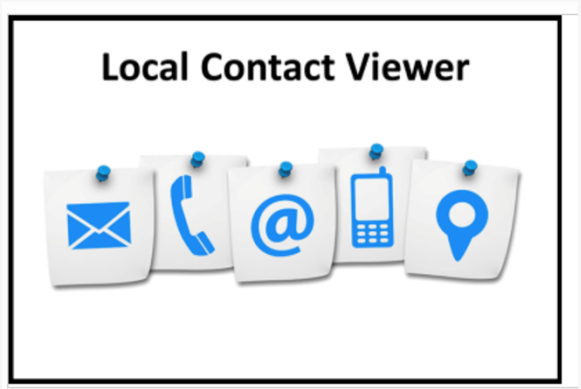
- Madelyn Rinka, Geospatial Mapping
- Diana Alvarez, Geospatial Mapping
- Brian McEachern, Survey & Mapping
- Kealan Weldon, Survey & Mapping

Flood Observations & South Florida Flood Information Resource

- Resiliency partners can now:
  - Submit flood observations at sfwmd.gov/FloodingApp
  - View flood event data at sfwmd.gov/FloodResource*
  - Find who to contact via the Local Contact Viewer

Flood Observation Survey

(No sign in required)



*Note: Users will be asked to create their own accounts and accept terms and conditions.

*Dashboard functionalities will be added mid-June

Critical Elevations Data Request

From the November 29th Forum Discussions

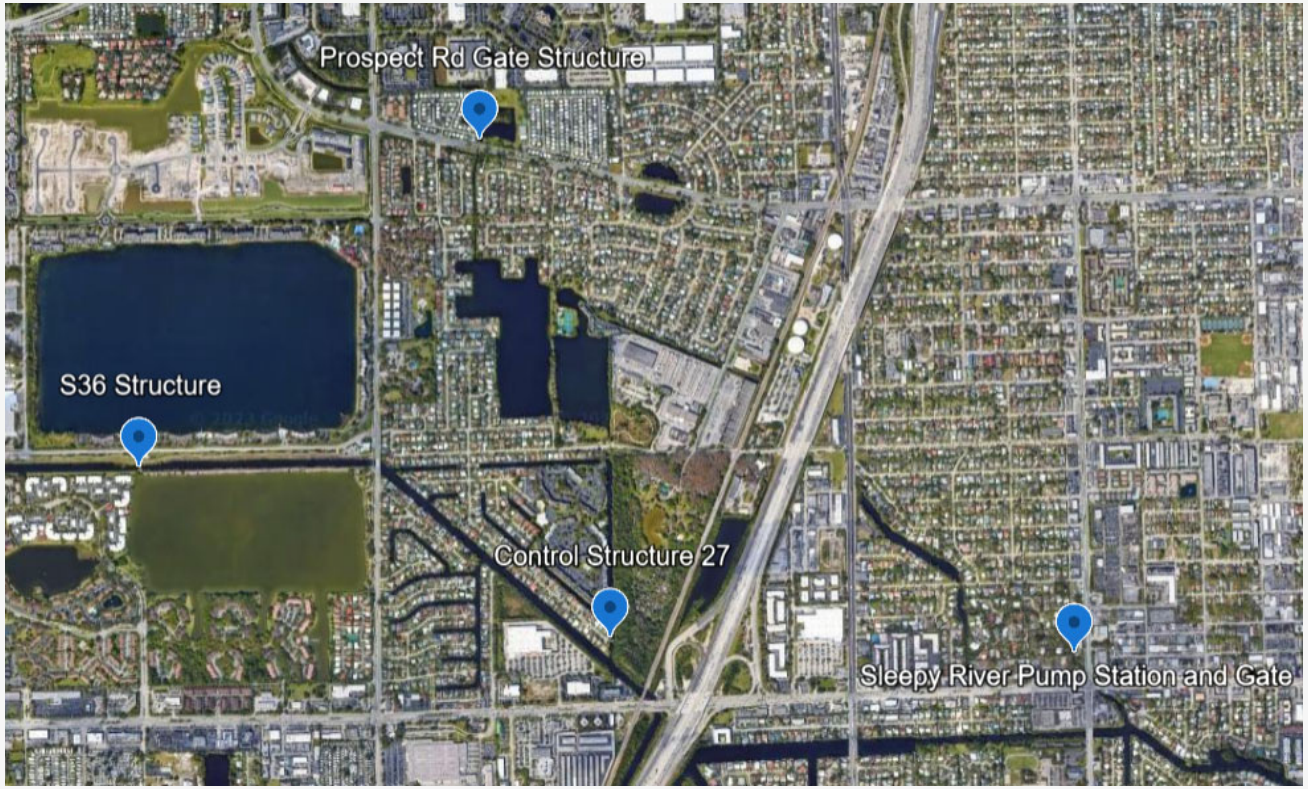


Image Courtesy of City of Oakland Park

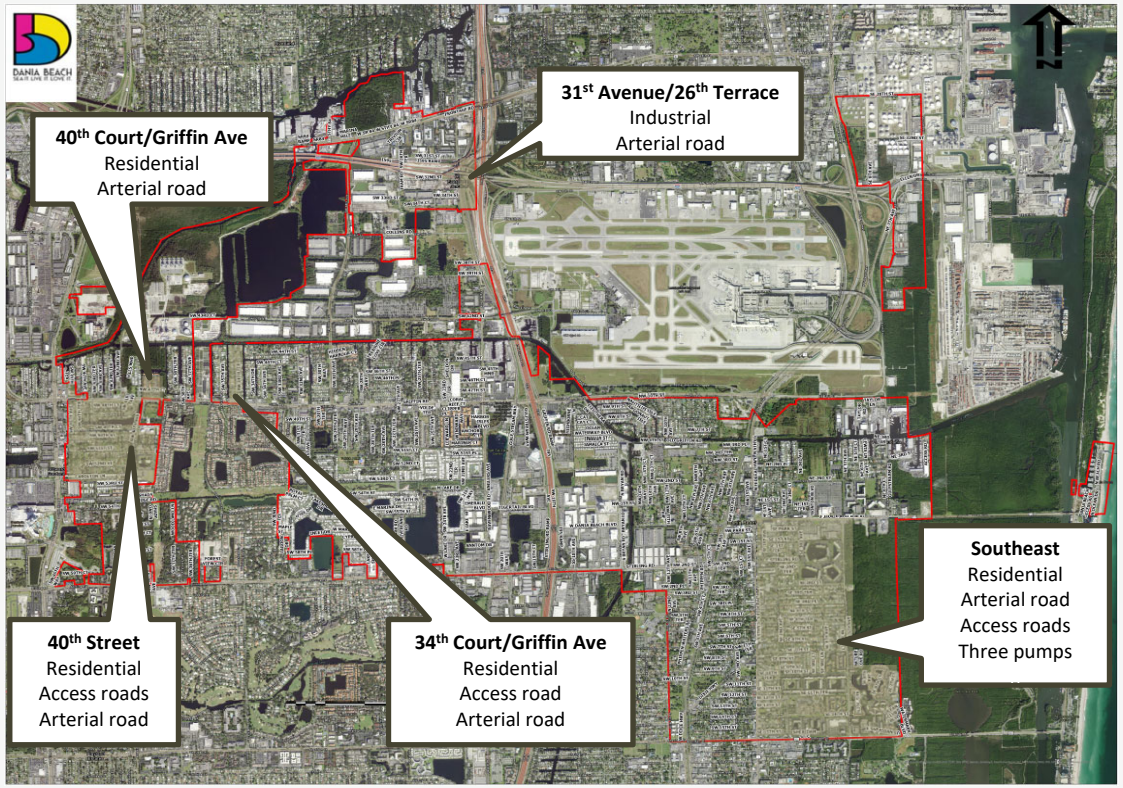


Image Courtesy of City of Dania Beach

Critical Elevations Data Request

Common concerns during heavy rainfall events:

(from previous forum discussions)

- Compound flooding
  - Simultaneous heavy rainfall and high tide
- Antecedent conditions
- Reduced stormwater discharge capacities
- Limited water storage capacity
- Exceedance of wastewater infiltration/pumping capabilities
- Head loss and choke points
- Water quality concerns

Takeaway:

Integrated interagency operational response and collaborative resiliency planning are needed.

Critical Elevations Data Request

From the November 29th Forum Discussions

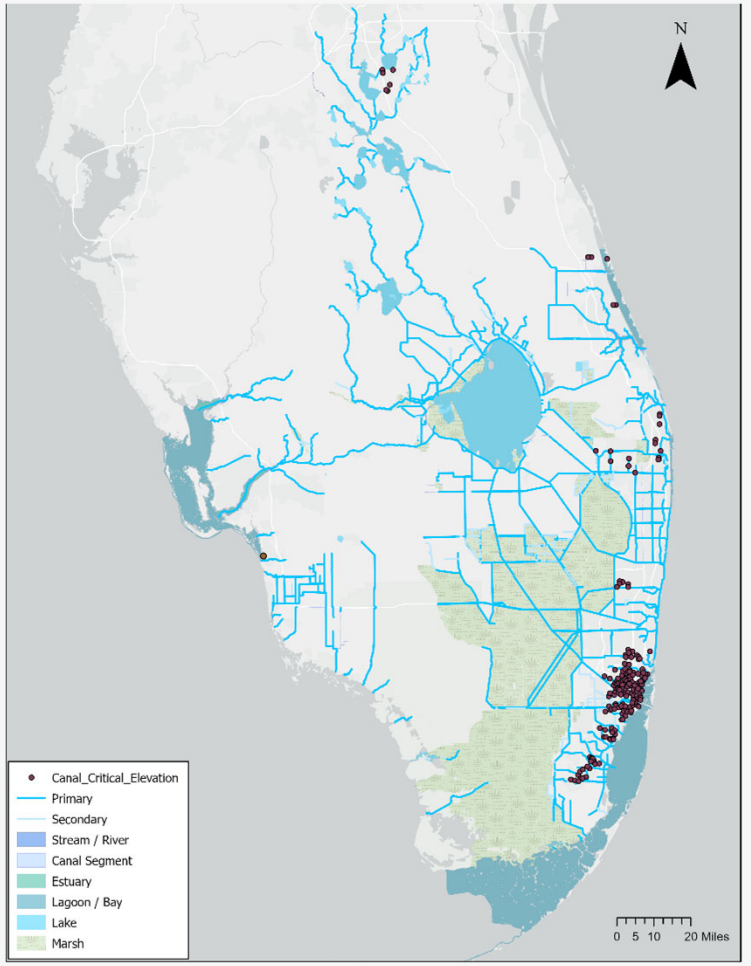
- **Defining Critical Elevations:** We define critical elevations as those at primary and secondary canals that could exacerbate flood risks within drainage basins. These risks extend beyond street flooding, impacting finish floor elevations, and causing limited road access, particularly for emergency vehicles.

- **Request Details:** Please provide all relevant critical elevations and associated durations, along the primary canals (applicable both upstream and downstream of coastal structures) and secondary canals. In addition, please detail vulnerable areas/locations within the respective drainage basin that would be affected if the critical elevation is exceeded and add a brief description of local operational issues/limitations.

Critical Elevations Data Request

- **Received responses or data from :**
  - 1 Tribe
  - 5 Counties*
  - 8 Municipalities
  - 4 Drainage Districts

** **Note:** Miami-Dade County provided critical elevations for most of the canals in 30+ municipalities within the county*



Critical Elevations Data Request

Common impacts:

(from data received so far)

- Localized flooding
  - Increased flood risks to roadways, as well as residential and commercial structures (along with identified areas of impact)
- Reduced road access and usage
  - Limited emergency response capability
- Reduced stormwater discharge capacities from secondary system structures
- Submerged/Inoperable structures
- Necessity for stormwater pumping operations

Critical Elevations Data Request

Interagency Canal Critical Elevations Data Tracking Sheet

Directions: Please provide information by 2/16/24 to resiliency@sfwmd.gov

County	Agency/ District Name	Canal Name	Primary / Secondary System	Canal Operator	Gauge Name (if existing)	Location of Elevation Measurement Lat/Long (Decimal Degrees)	Critical Elevation (Note if NAVD/NGVD)	Duration	Areas/Loca+K7tions Impacted if Critical Elevation is (Name Neighborhood/Community or Lat/Lon
Osceola	City of St. Cloud	C-31 Canal	2nd Street Ditch	SFWMD		28.259; -81.315	57.2 NGVD	Multiple days/weeks during last hurricane	Blackberry Creek; Commerce Center Drive
Osceola	City of St. Cloud	Ohio Lateral Ditch	C-31	FDOT		28.246; -81.312	65 NGVD	Strucutral flooding during Hurricane Ian	Cypress Court
Osceola	City of St. Cloud	Gator Bay Slough	Lake Toho	Osceola County		28.201; -81.282	73.7 NGVD	approx.1 day	Bayview Lane
Osceola	City of St. Cloud	Gator Bay Slough	Lake Toho	Osceola County		28.177; -81.292	69.3 NGVD	approx.1-2 days	Moon Dancer
Osceola	City of St. Cloud	Gator Bay Slough	Lake Toho	Osceola County		28.180; -81.298	68.1 NGVD	approx.1 day	Pixie Lane

- **An initial dataset of critical elevation has been compiled.**
  - SFWMD Water Managers are reviewing data received; some follow up may be needed. We will reach out to agency POCs as needed.
  - This is an ongoing effort; new data and locations are welcome.

USGS Flood Sensors: Initial Proposed Locations

RDG Sites in UKB Recommended by SFWMD and agreed with USGS Orlando

1. Lake Ajay
2. Nova Rd Culvert D
3. Econlockhatchee Bridge
4. S-69 H
5. S-69 T

Level TROLL® 700H Data Logger

RDG Sites in LEC Recommended by SFWMD and agreed with USGS Davie

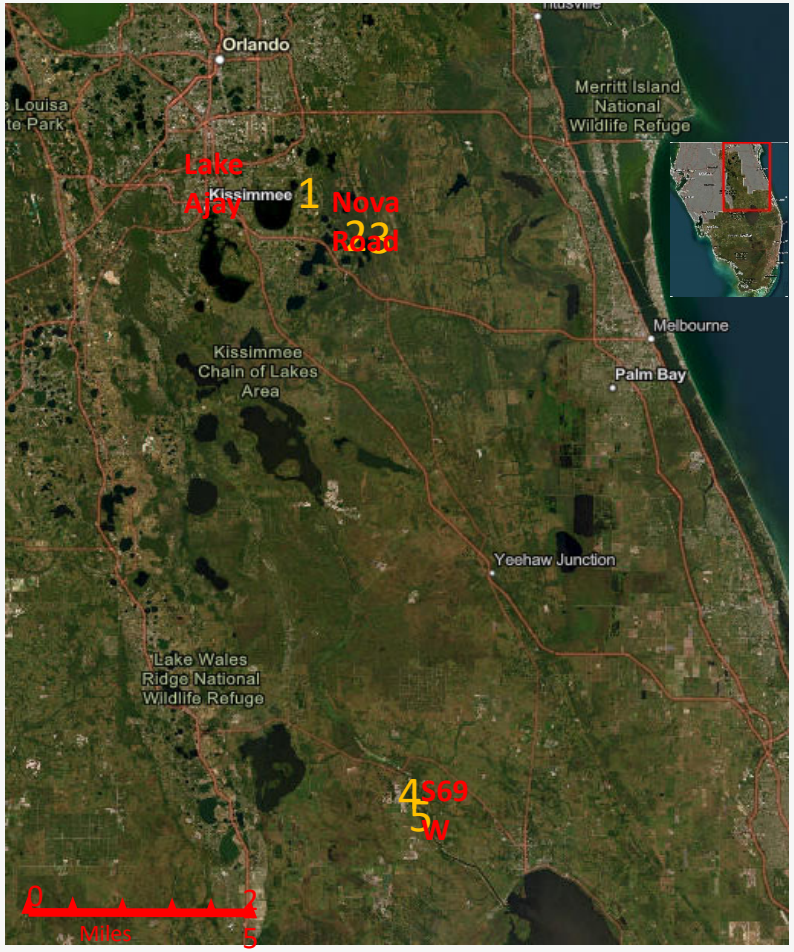
1. S27 H
2. Downstream of S25B / NW 37th Ave Bridge
3. C4 canal between C4 Coral & S25B headwater / Blue Lagoon (Antonio Maceo Park)
4. Between MRMS1 & MRMS4 (no agreed upon location)

Prepared by J Goodson and J Gonzalez May 24, 2024

Source: USGS

RDGs will be paired with smaller flood sensors in selected locations

USGS Flood Sensors – Upper Kissimmee Basin



Proposed RDG locations in UKB

1 - Lake Ajay (Near community boat ramp)

2 - Nova Rd Culvert D (~1 Mi E of C32 near S58)

3 - Econlockhatchee Bridge (~3 Mi E of C32)

4 - S69 H (~300’ U/S from Weir)

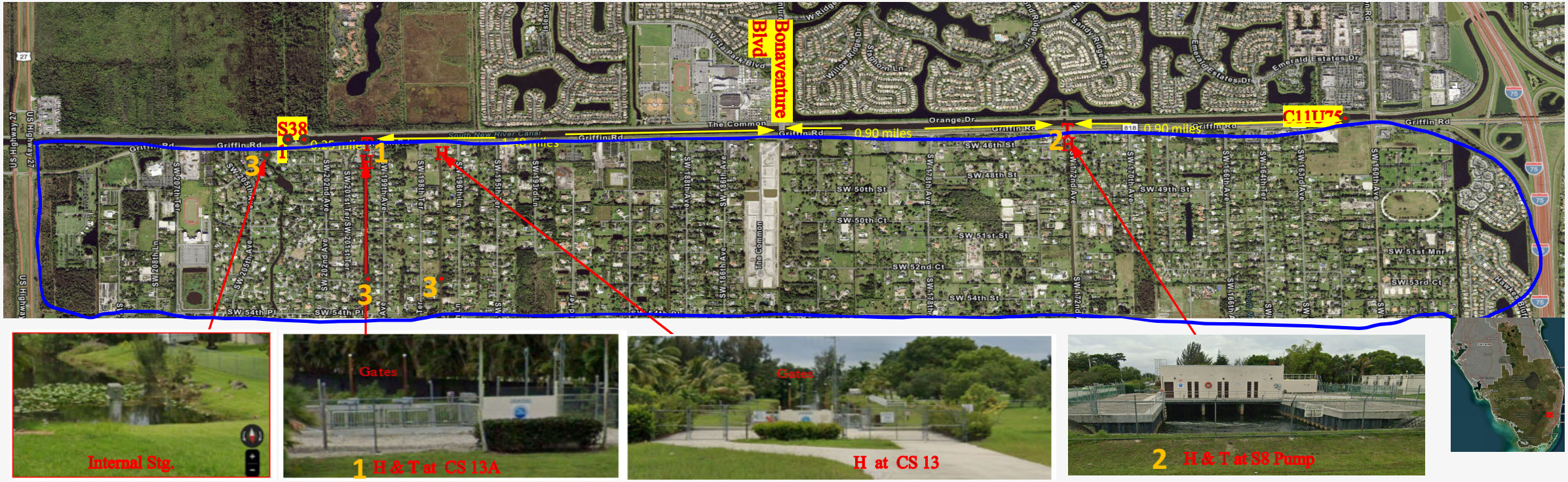
5 - S69 T (on Dolphin of CSX RR Bridge)

Prepared by J Goodson and J Gonzalez, May 24, 2024

USGS Flood Sensors – Lower East Coast

Prepared by J Goodson and J Gonzalez May 24, 2024

USGS Flood Sensors – Lower East Coast



Existing stage monitoring in C-11 Canal available from South Broward Drainage District (SBDD)

1 - Gated Culvert CS 13A; 2- Pump Station S8 (0.9 Mi E of Bonaventure Rd.) has H & T; 3 - Additional stage sites are available inside the Southwest Ranches Community (blue line)

District stage monitoring in C-11 is available at S381 & C11U75

2024 Wet Season Tools

South Florida Flood Information Resource

www.sfwmd.gov/FloodResource

Document the Flood Survey

sfwmd.gov/FloodingApp

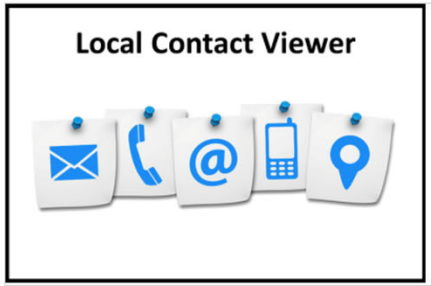
Who to Contact

https://apps.sfwmd.gov/WAB/LocalContactViewer/index.html

South Florida Flood Information Hub

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: Please select the "Local Contact Viewer" text on the right side of the panel below to launch the contact viewer application. Once the application launches, use the panel on the right side of the application to enter an address or location to be returned contact information.



Local Contact Viewer

Web application to access contact information for drainage districts, municipalities, counties and other organizations responsible for…

Share this card

Photos and Flood Observations:

The Document the Floods survey is for stakeholders to capture or upload photos and information about flooding at a location.

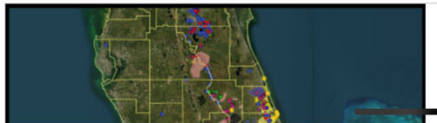
To provide information and photos for past events, please contact Resiliency@sfwmd.gov.

Document the Floods

Public survey to document flood events. Also available at sfwmd.gov\FloodingApp.

Submit / Capture Photo

Flood Documentation: Please select the "South Florida Flood Information Viewer" text on the right side of the panel below to launch the viewer application.



South Florida Flood Information Viewer

Web Application to provide access to the first version of flood documentation compiled as part of the SFWMD Water and Climate…

Public Engagement and Support Needed

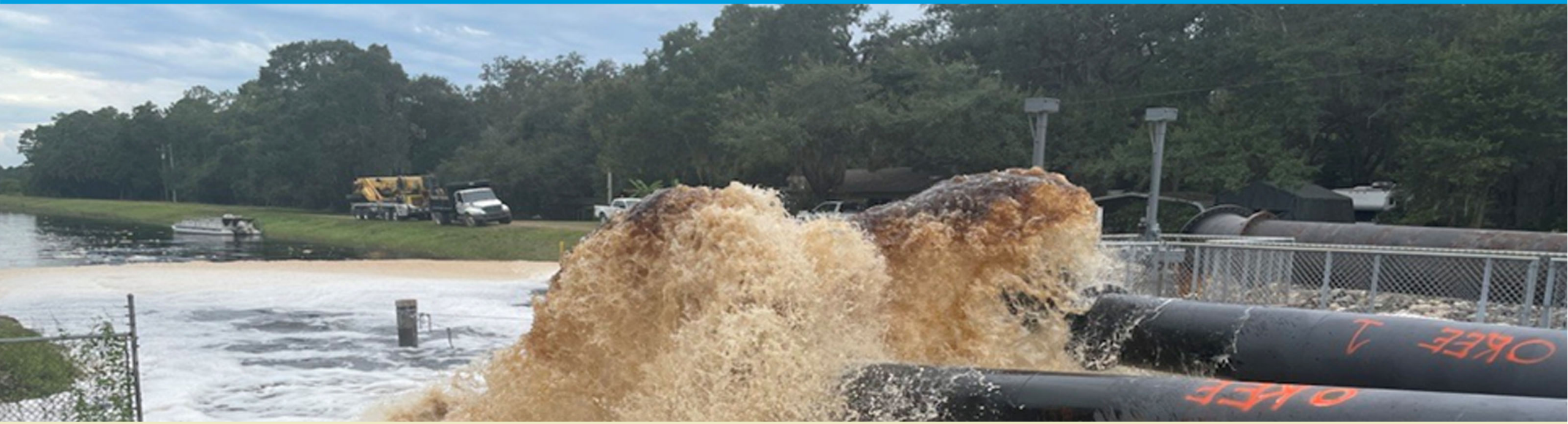
- **All Hands On Deck:** Advancing our collective flood response preparedness and mitigation and adaptation planning capabilities requires collaboration from everyone, including regional and local governments.

  Local operators have eyes on the ground:

  (1) can quickly identify, and report flooding incidents

  (2) understand specific community needs

- **Active Participation:** We invite you, our local partners, to engage your community and promote collection of flood observations locally.



Thank You

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