



Resiliency Coordination Forum

November 29, 2023

1. Opening Remarks



Jennifer Smith

Chief of Staff

South Florida Water Management District

2. Statewide Office of Resilience



Wes Brooks, Ph.D.

Chief Resilience Officer

Florida Statewide Office of Resilience

Housekeeping

Moderator: Yvette Bonilla



District Resiliency Updates

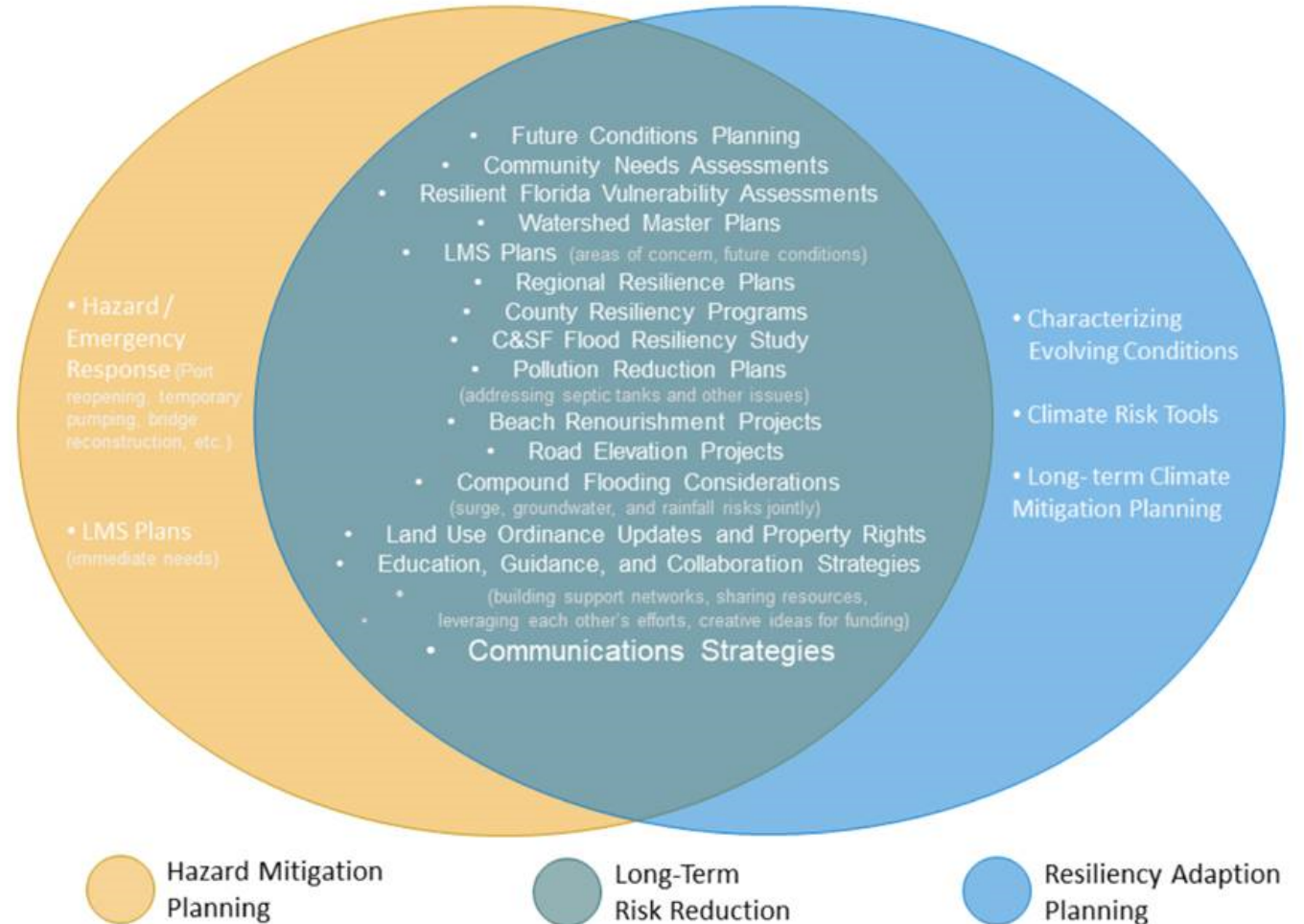
Resiliency Coordination Forum – November 2023

Carolina Maran
Chief of District Resiliency
South Florida Water Management District



From our last time together, August 30th Forum

HAZARD MITIGATION & RESILIENCY ADAPTATION PLANNING



Resiliency Planning: 2023 Updates

2023 Consolidated Annual Report on Flood Resiliency

Central and Southern Florida Flood Resiliency
Study

Sea Level Rise and Flood Resiliency Plan

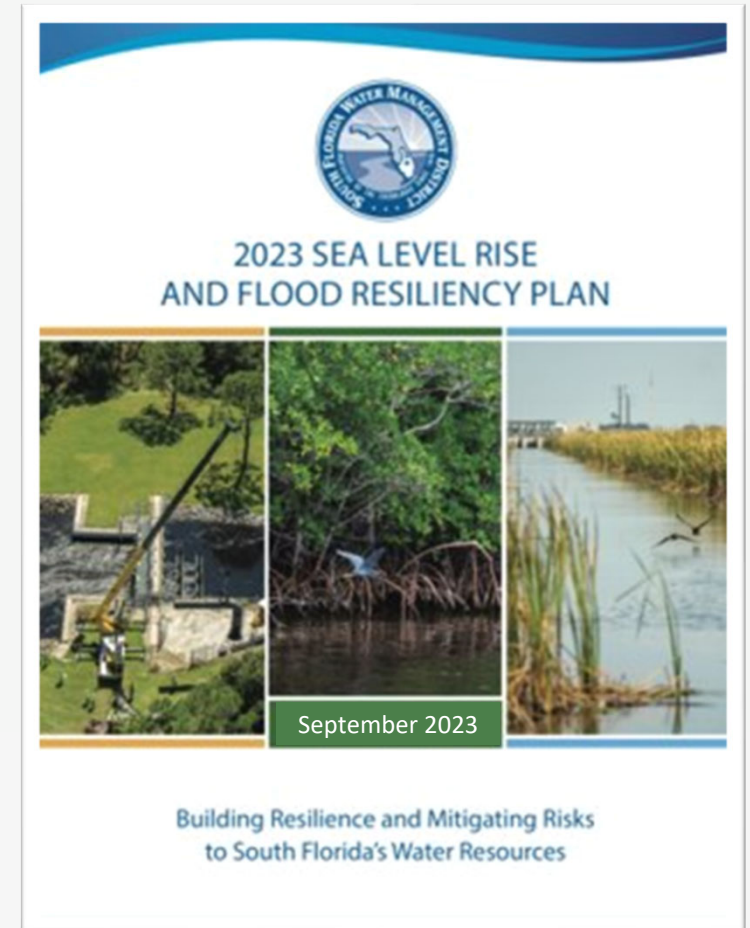
October 2023



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

Thanks for 24 Agency Comments Received

Published on September 1st along with the Oct 1st submission of the Consolidated Annual Report on Flood Resiliency to Governor's Office, Legislators, EDR and FDEP



Grant Proposals

- Resiliency Plan supported the formulation of 20+ priority project proposals for a series of grant programs, including Resilient Florida; NOAA; HGMP - DR 4673 and BRIC
- Looking for further exploring project partnerships in 2024



USACE-SFWMD Resiliency Coordination Efforts

- C&SF Flood Resiliency Study:
 - Hosted stakeholder workshop on Performance Measures
 - New Design Requirements
- Comprehensive Study: hosting initial meetings between SJRWMD/SFWMD/USACE
- Supporting the Southeast Florida Integration Meetings



**US Army Corps
of Engineers®**
Jacksonville District





Hurricane Season Ends This Week, but SFWMD's Work Continues Year-Round

The 2023 Atlantic hurricane season comes to an end on Thursday, November 30, but the South Florida Water Management District continues to proactively prepare for significant weather events all year long.

Did you know SFWMD water managers and field operations staff are prepared to move water to meet varying conditions 24 hours a day, 7 days a week, 365 days a year? The SFWMD operates the region's primary water control system and manages water supplies year-round. Our staff continue to meet this challenge even during South Florida's weather extremes.

Throughout the year, the District's Operations and Maintenance staff manages and oversees:

- 2,175+ miles of canals
- 2,130+ miles of levees/berms
- 915+ water control structures
- 620+ project culverts
- 89 pump stations

Around-the-clock weather monitoring helps our water managers determine where to move water through our system of pump stations, canals and water control structures to prevent flooding and protect our regional water supply.

The SFWMD's highly-skilled employees have the specialized expertise needed to keep this vast water management system ready for whatever nature sends our way.

[Learn more about flood control and the regional water management system.](#)



Wet / Hurricane / King Tide Seasons Closing

- Progress in advancing tools that support real time best information on flooding impacts (response) and data compilation/reporting/repository (prevention)
- King Tide Outlook Bulletins with Enhanced Projections and support from district staff on documentation (photos and HWMs)
- Coordination with and support from Resiliency Partners is essential to have the most robust assessment of system conditions and best responses



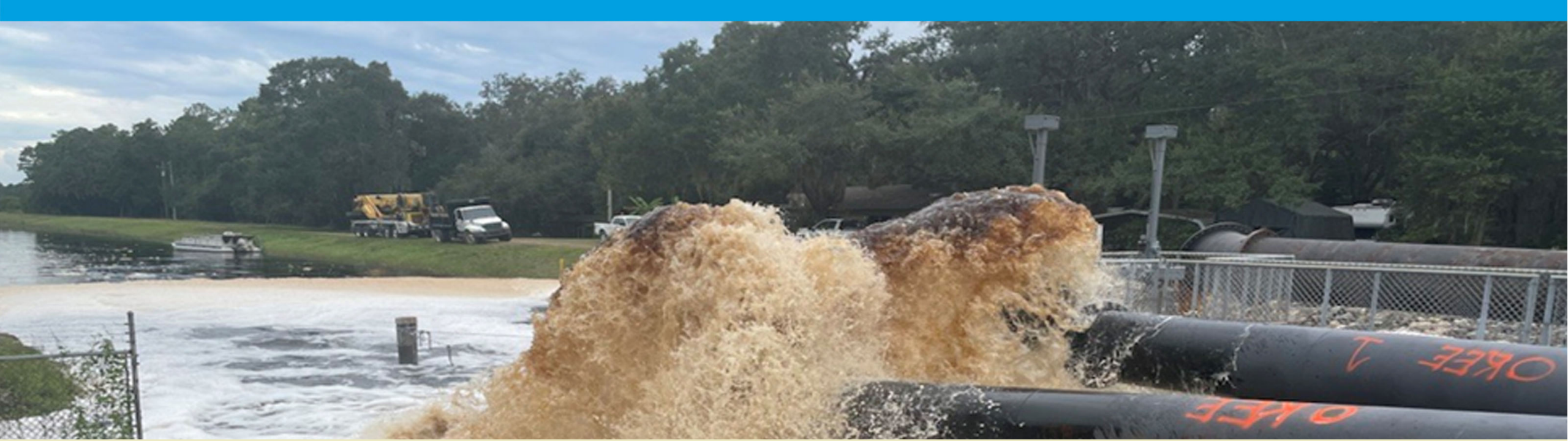
USGS Flood Gauges – Agreement Under Negotiation



Other Relevant Recent Updates

- Ongoing Coordination with FDEP on Resilient Florida Grants Implementation
- FPLOS Phase I Studies completed for basins in Miami Dade County and initiated for Martin/St. Lucie Counties
- Water and Climate Resilience Metrics Updates: full automation of additional metrics; hub portal redesign; scientific reporting (SFER)
- Drought Projections under development, in collaboration with USGS/FIU to support upcoming Water Supply Vulnerability Assessment
- Collaboration with the Florida Flood Hub on Statewide Rainfall Projections and Flood Risk Modeling (Silver Jackets / WMDs)





Thank You

Carolina Maran, P.E., Ph.D.

Chief of District Resiliency

cmaran@sfwmd.gov

www.sfwmd.gov/resiliency



4. Community Disaster Resilience Zones

Rachel Cychosz

Acting Director for Community Resilience Coordination,
FEMA

Community Disaster Resilience Zones

SFWMD Resiliency Coordination Forum

November 29, 2023



FEMA



Agenda

1. Community Disaster Resilience Zones Overview and Designations
2. What's Next?
3. Q&A

CDRZ Overview and Designations

Requirements of FEMA:

- 1 Maintain a natural hazard assessment program
- 2 Designate Community Disaster Resilience Zones at the Census tract level
- 3 Consider geographical balance, making designations in coastal, inland, urban, suburban, and rural areas. Designations must include census tracts on tribal lands



FEMA

Public Law 117–255
117th Congress

An Act

To require the President to develop and maintain products that show the risk of natural hazards across the United States, and for other purposes.

Dec. 20, 2022
[S. 3875]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the “Community Disaster Resilience Zones Act of 2022”.

SEC. 2. FINDINGS.

Section 101(b) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121(b)) is amended—

- (1) in paragraph (5), by striking “and” at the end;
- (2) in paragraph (6), by adding “; and” at the end; and
- (3) by adding at the end the following:
“(7) identifying and improving the climate and natural hazard resilience of vulnerable communities.”.

SEC. 3. NATURAL HAZARD RISK ASSESSMENT.

(a) IN GENERAL.—Title II of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5131 et seq.) is amended by adding at the end the following:

“SEC. 206. NATURAL HAZARD RISK ASSESSMENT.

42 USC 5136.

“(a) DEFINITIONS.—In this section:

“(1) COMMUNITY DISASTER RESILIENCE ZONE.—The term ‘community disaster resilience zone’ means a census tract designated by the President under subsection (d)(1).

“(2) ELIGIBLE ENTITY.—The term ‘eligible entity’ means—

- “(A) a State;
- “(B) an Indian tribal government; or
- “(C) a local government.

“(b) PRODUCTS.—The President shall continue to maintain a natural hazard assessment program that develops and maintains products that—

- “(1) are available to the public; and
- “(2) define natural hazard risk across the United States.

“(c) FEATURES.—The products maintained under subsection (b) shall, for lands within States and areas under the jurisdiction of Indian tribal governments—

- “(1) show the risk of natural hazards; and
- “(2) include ratings and data for—
 - “(A) loss exposure, including population equivalence, buildings, and agriculture;
 - “(B) social vulnerability;

The goal of the Community Disaster Resilience Zones Act is to build disaster resilience nationally by driving federal, public, and private resources to underserved communities especially vulnerable to natural hazards



Vision

Strong and thriving communities resilient to climate change and natural hazard impacts



Mission

Harness the power of collaboration to accelerate resiliency in the nation's most vulnerable areas



Aspiration

Groundbreaking Public-Private Resilience Innovation Ecosystem aligned for Collective Impact

Cross-cutting Principles:

- Protect the Nation's Most Vulnerable
- Community-Driven
- Cross-sector Partnerships
- Disruptive Innovation

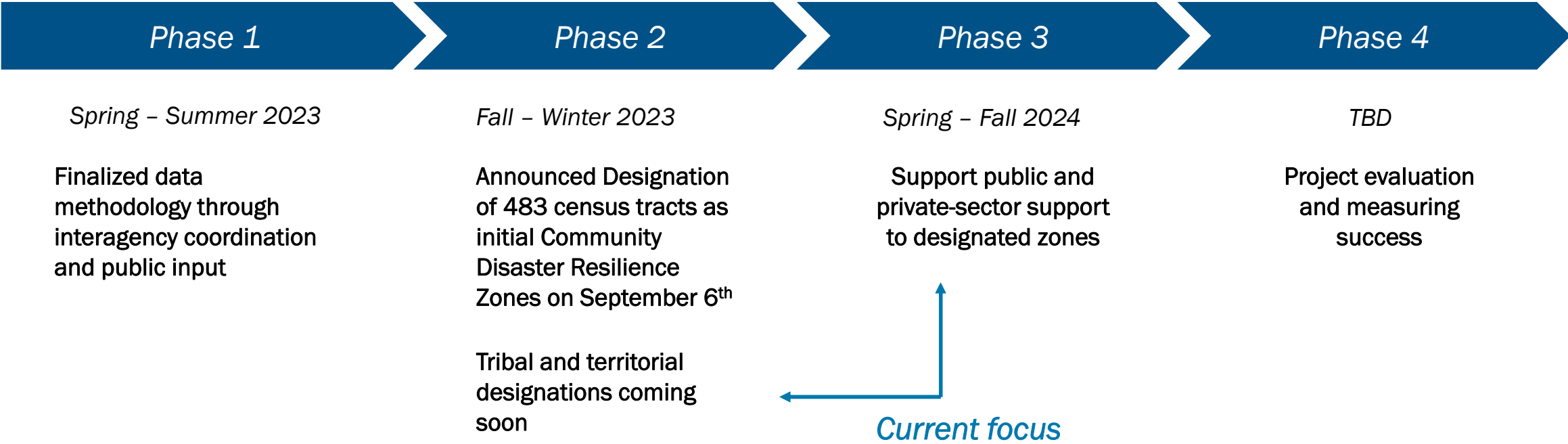
Strategic Outcomes:

- ✓ Fiscally and Socially Sound Investments
- ✓ System-wide Aligned Progress
- ✓ Enhanced Community Capacity
- ✓ Strengthened Assets



FEMA

Overview of Community Disaster Resilience Zones Initiative



FEMA made CDRZ designations based on widely known, transparent, and understood measures of natural hazard risk and vulnerability

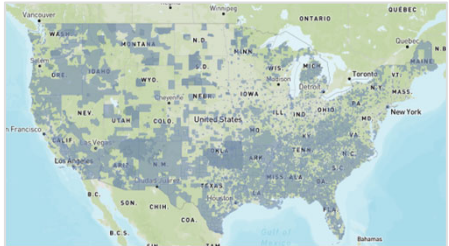
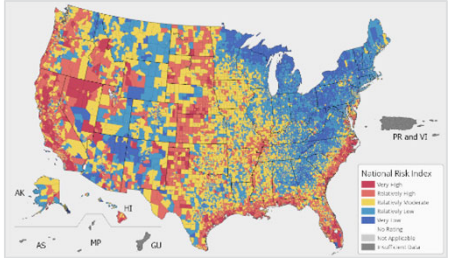
In September 2023, FEMA announced the first 483 Community Disaster Resilience Zones (CDRZ) across all 50 states and the District of Columbia.

More designations anticipated – including in territories and tribal nations – in December.



Census tracts were designated CDRZ based on the following criteria¹:

- ✓ **A composite National Risk Index (NRI):** Risk Index Scores that rank in the top 50 nationally or is in the top 1% within their state
- ✓ **A disadvantaged community** based on the **Climate & Economic Justice Screening Tool**



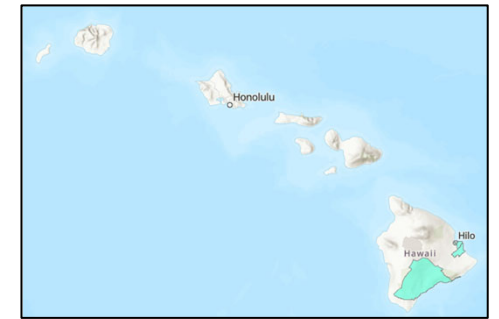
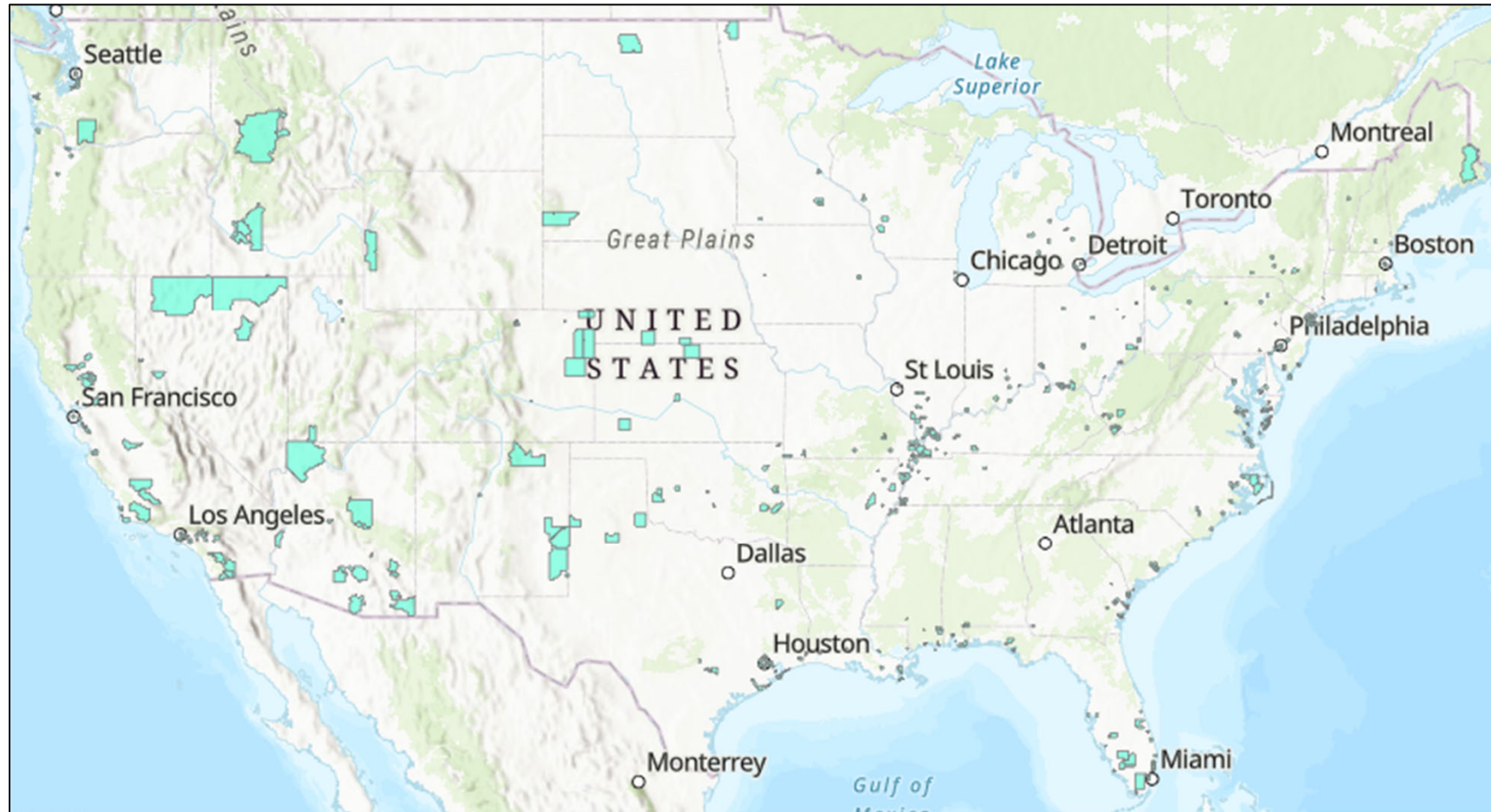
All designations underwent **peer review by subject matter experts in a Methodology Data Working Group** with support from the FEMA Mitigation Framework Leadership Group (MitFLG)



FEMA

1. [FEMA CDRZ Methodology](#), Aug 28, 2023

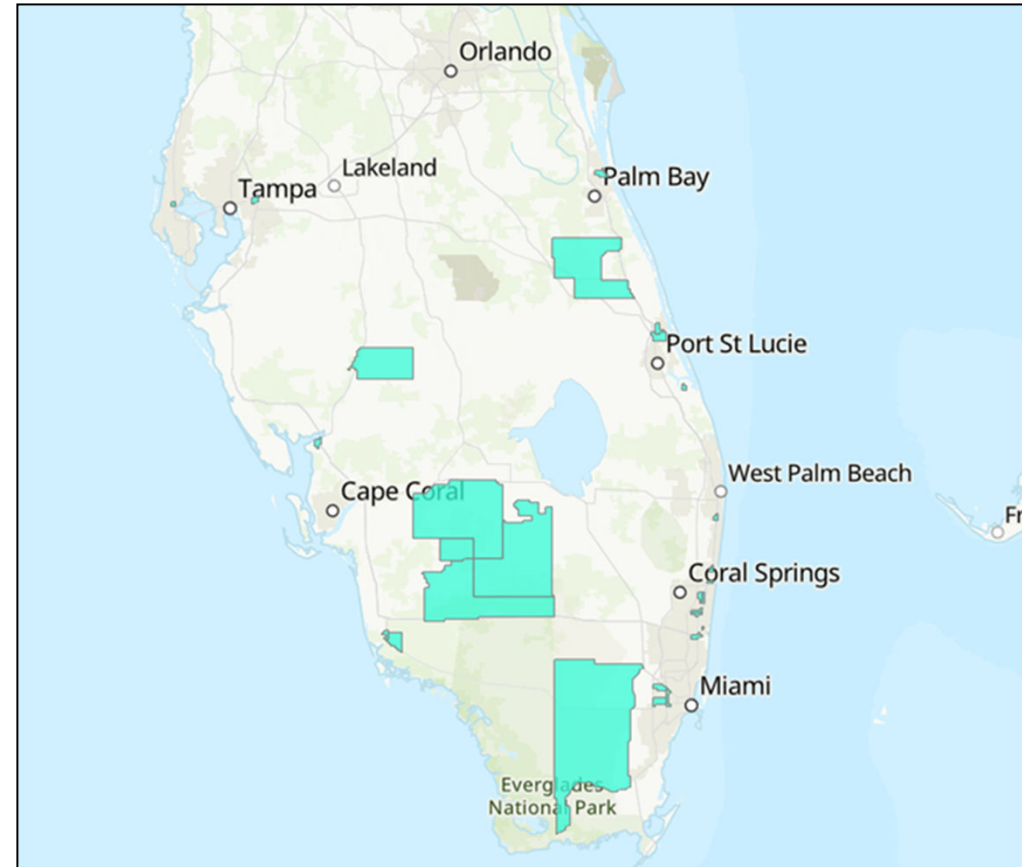
Census Tracts Identified as CDRZ



FEMA

Community Disaster Resilience Zones in South Florida

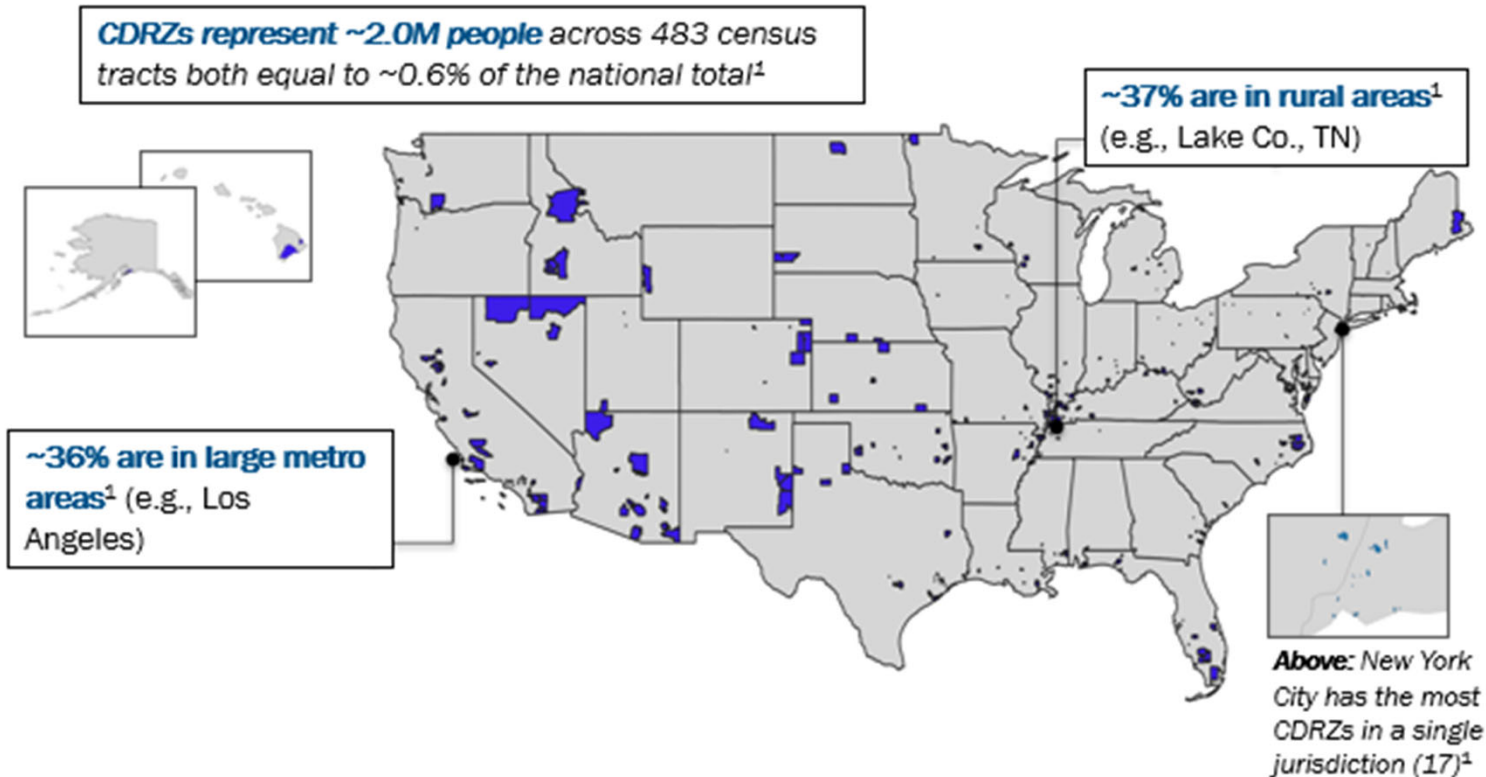
County	Number of CDRZs
Brevard	1
Broward	7
Charlotte	1
Collier	4
DeSoto	1
Hendry	2
Hillsborough	1
Indian River	1
Martin	1
Miami-Dade	4
Palm Beach	2
Pinellas	1
St. Lucie	2



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The first cohort of 483 Community Disaster Resilience Zones represents at risk and in-need communities in every state

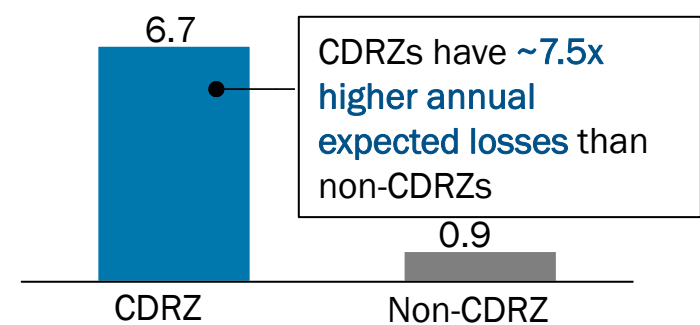
First cohort of designated CDRZ communities, Census tract coverage



 **76%** of CDRZ face three or more hazards rated relatively high or very high in the NRI^{2, 3}

 **84%** of CDRZ have high social vulnerability ratings^{2, 4}

Average expected annual loss²
Per census tract, \$M



FEMA

1. Source: First cohort of CDRZ designations, released 9/6/2023; 2020 Census
2. FEMA National Risk Index (NRI)
3. Hazard ratings are determined relative to the specific hazard in the NRI. See more at: FEMA NRI technical documentation
4. High defined as very high or relatively high SVI; relatively high social vulnerability corresponds to the 60th percentile nationally; very high refers to the 80th percentile nationally

What's Next for the Community Disaster Resilience Zones?

Vision: Community Driven Resilience with Whole of Community Support



FEMA

Federal Agencies

- Focus Resources
- Advance Climate & Natural Hazards Science
- Technical Assistance Integration
- Explore Streamlining of Multiple Agency Programs
- Enhanced Communications
- Build and Strengthen Public-Private Partnerships

Private Non-Profits

- Technical Assistance - Community Navigators
- Community-Building
- Centered in Equity – Community Driven

Philanthropy

- Stakeholder Convening
- Institution Building
- Foster Innovation
- Information Sharing

Private Sector (*Insurance, Finance, Community Development Financial Institutions*)

- Leverage Additional Capital
- Shape Resilience Incentives
- Promote Efficient Practices/Scale Effective Solutions
- Residential Catastrophe Mitigation – Housing as Infrastructure

Anticipated Benefits

Today, the primary benefit of a designation is access to additional funding and technical assistance for resilience and mitigation projects, but going forward the goal is to significantly increase access to resources from across sectors.

- Support from non-profit and philanthropic organizations and for-profit entities.
- Increased access to resilience stakeholder network for localities
- Increased awareness of local needs
- Increased access to both funding and technical assistance
- Leveraging partner knowledge
- Potential to unleash private capital
- Certification of projects benefiting designated zones



FEMA Benefits for Designated Zones

A primary benefit of a designation is access to additional funding and technical assistance for resilience and mitigation projects.

Building Resilient Infrastructure and Communities (BRIC)

- Increased Cost Share (to 90%)
- Direct Technical Assistance
- Additional Application Points
- Benefit Cost Analysis Technical Assistance

Flood Mitigation Assistance

- Additional Application Points
- Benefit Cost Analysis Technical Assistance



Commitments from Other Federal Agencies

FEMA has received a commitment from the following programs from other Federal agencies to support, prioritize, and/or incorporate Community Disaster Resilience Zones:

TECHNICAL ASSISTANCE

- **National Oceanic and Atmospheric Administration (NOAA)** Climate-Smart Communities Initiative Program
- **Environmental Protection Agency (EPA)** Environmental Justice Thriving Communities Technical Assistance Centers (EJ TCTACs)
- **Environmental Protection Agency (EPA)** Environmental Justice Thriving Communities Grantmaking Program (EJ TCGM)
- **Economic Development Administration** Economic Recovery Corps
- **Small Business Administration (SBA)** Small Business Development Center (SBDC), Women’s Business Centers (WBC), Veteran’s Business Outreach Centers (VBOC) and Native American Business Centers (NABC)
- **Department of Agriculture (USDA)** Rural Partners Network

GRANT FUNDING

- **Environmental Protection Agency (EPA)** Environmental and Climate Justice Community Change Grants Program (Community Change Grants)
- **Housing and Urban Development (HUD)**. Green and Resilient Retrofits Program (GRRP)
- **Department of Transportation (USDOT)** Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Program



FEMA

Questions & Answers Session

Thank you!

For additional questions, please email FEMA-CDRZ-RFI@fema.dhs.gov

5. Statewide Hazard Mitigation Plan

➤ <https://flshmp-floridadisaster.hub.arcgis.com/>

Kristin Lentz,
Mitigation Planning Manager,
Florida Division of Emergency Management

6. National Association of Counties Disaster Management Roundtable



Megan Houston,
Chief Resiliency Officer,
Palm Beach County

NACo Disaster Management Roundtable

National Association of Counties (NACo) Roundtable Discussion on Disaster Resilience was held February 10, 2023 in Washington, D.C.

- [NACo report offers blueprint on disaster mitigation | National Association of Counties](#)
- NACo Roundtable Report Major Findings
 - Disparities in local capacity a top challenge in achieving disaster resilience.
 - We must define local capacity to improve it. Elements of local capacity are:
 - Funding: For mitigation planning and project implementation
 - Staffing: Dedicated personnel, and in some instances, dedicated resilience agencies
 - Authority: To enact policy and practice that support mitigation efforts
 - Partnerships: To maximize shared expertise, responsibility and resources
 - Data & Data Analytics: To monitor and assess indicators of resilience for decision making
 - Education: To ensure a reasonable perception of risk, among policymakers and residents





BREAK

8. November's Rain Event and Local Stormwater Operation

Albert Carbon,
Public Works Director,
City of Oakland Park

November's Rain Event and Local Stormwater Operation

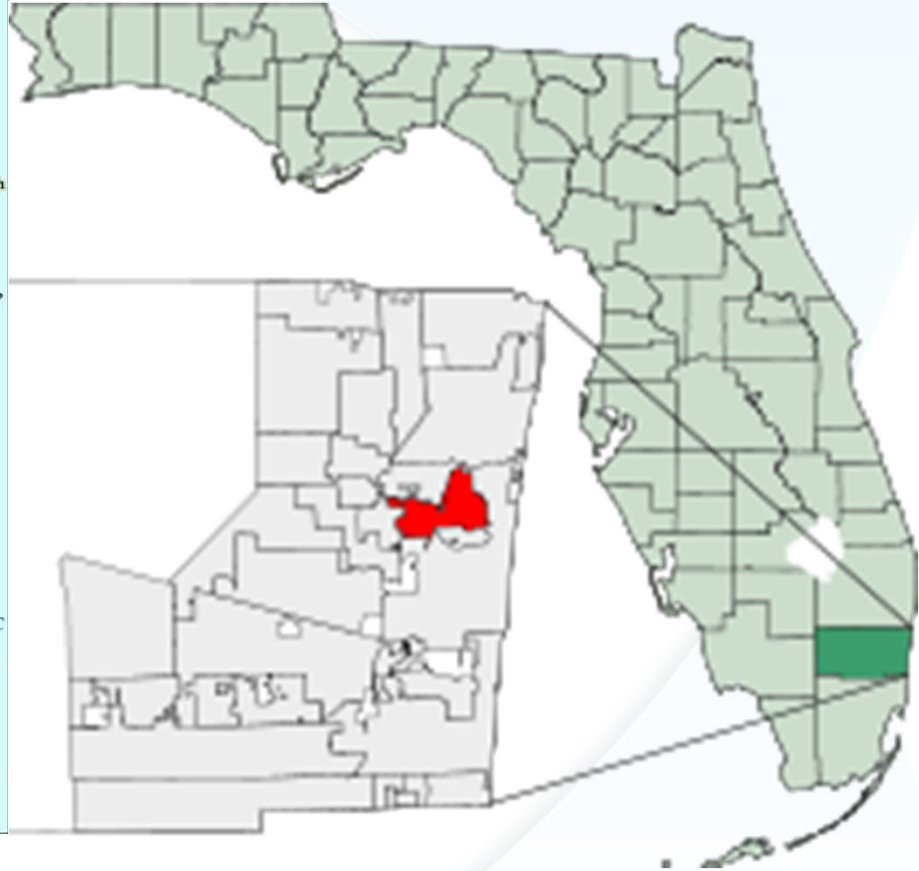
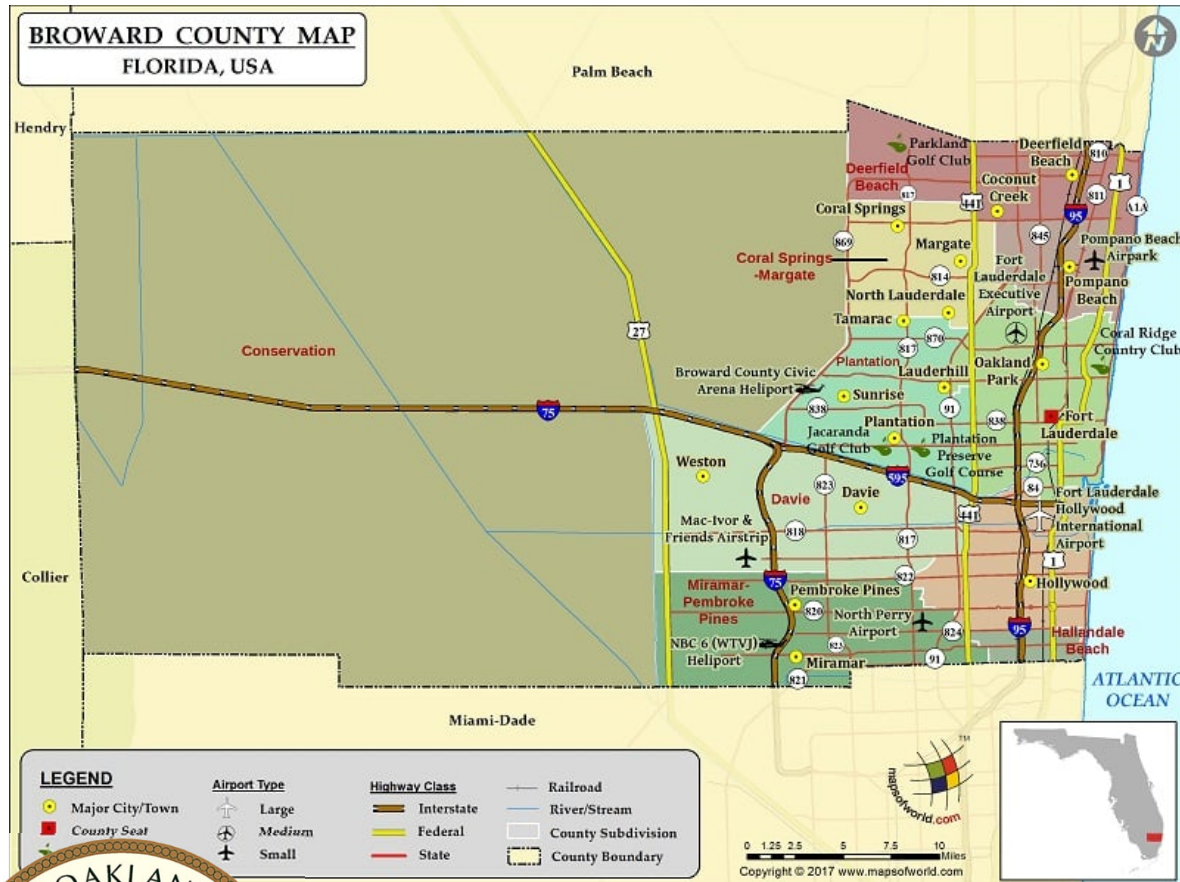
Resiliency Coordination Forum

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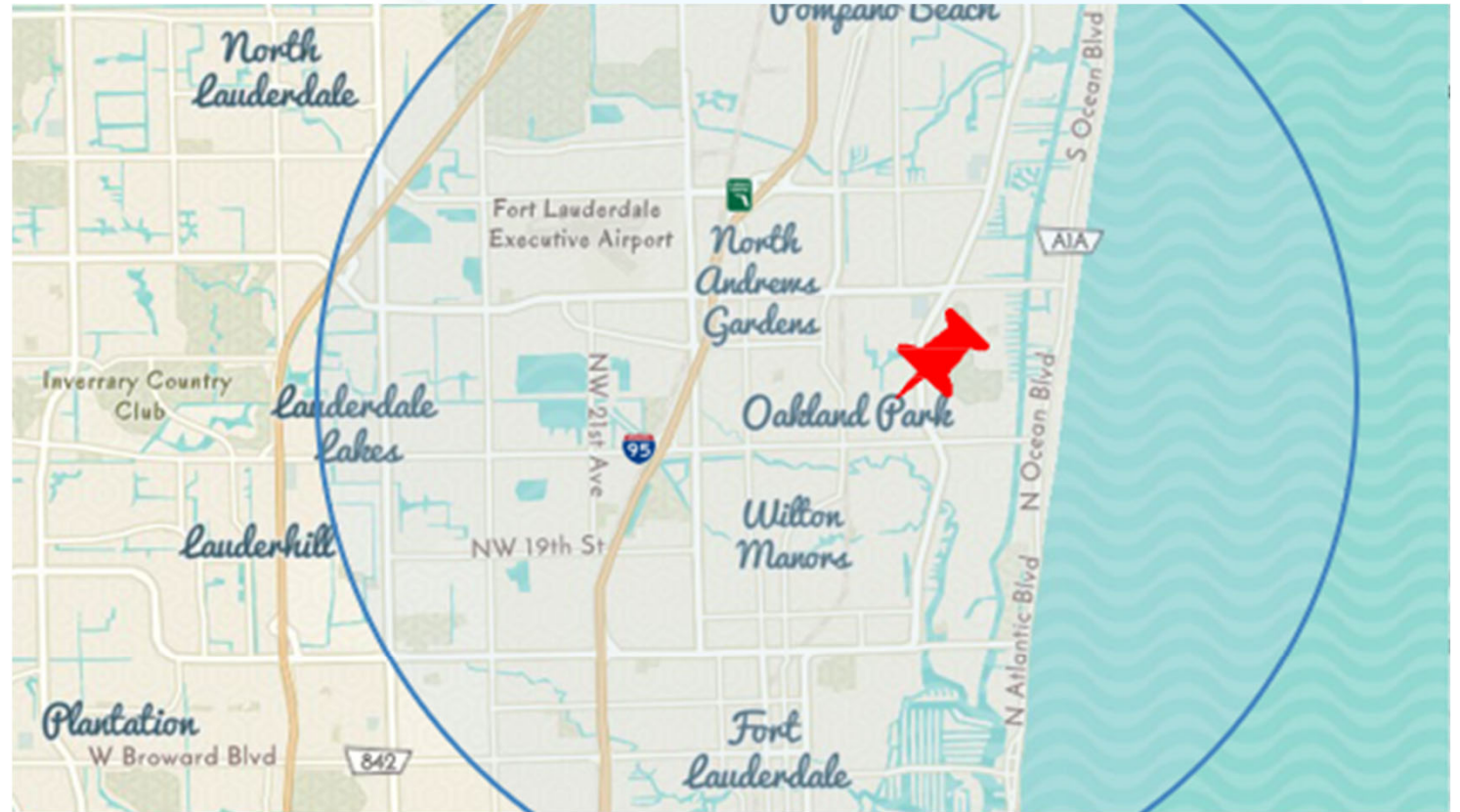
Albert J Carbon III, P. E.
Public Works Director
City of Oakland Park
albertc@oaklandparkfl.gov
954.630.4458

Oakland Park, FL



Oakland Park, FL

- Population: 45,000
- 8.5 square miles



FLL Intl. Airport
8 miles

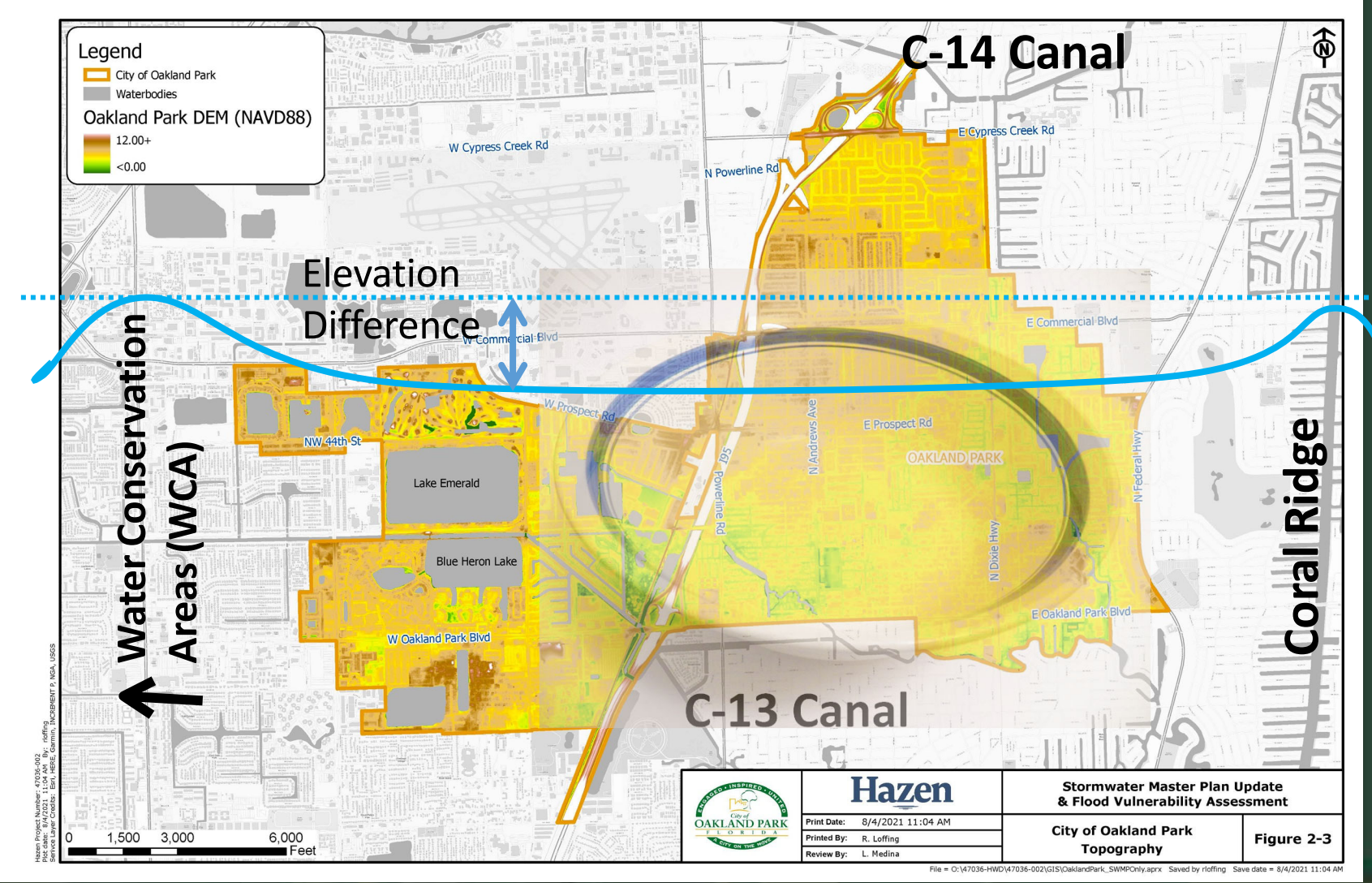


Fort Lauderdale Beach
2 miles





Port Everglades
8 miles

OP is in a "bowl":



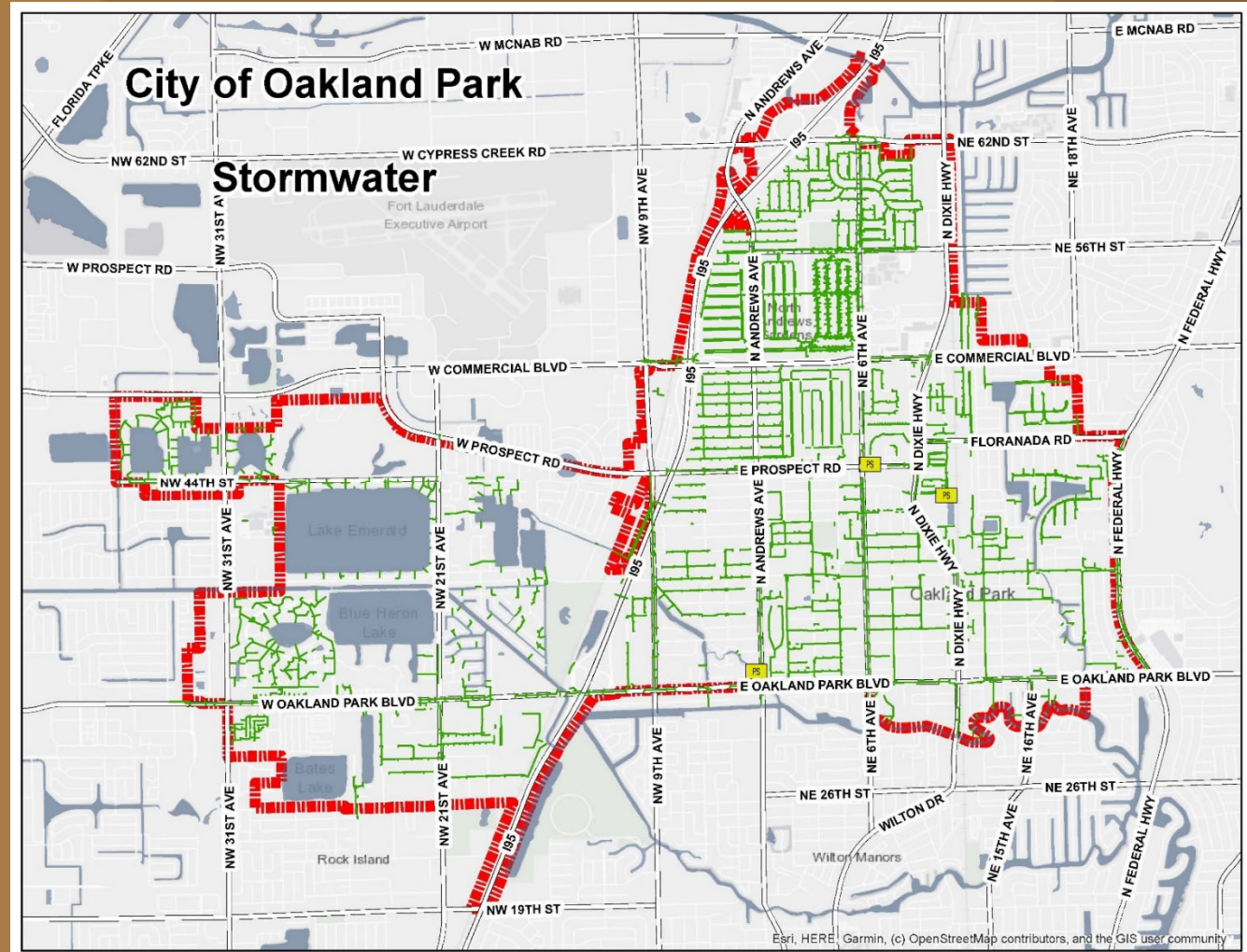
Hazen and Sawyer
 Project Number: 2019-042
 Project Name: Stormwater Master Plan Update & Flood Vulnerability Assessment
 Project Location: City of Oakland Park, Florida
 Project Start Date: 8/4/2021 11:04 AM
 Project End Date: 8/4/2021 11:04 AM
 Project Manager: R. Loffing
 Project Engineer: L. Medina
 Project Designer: L. Medina
 Project Checker: L. Medina
 Project Approver: L. Medina
 Project Status: In Progress

			Stormwater Master Plan Update & Flood Vulnerability Assessment	
	Print Date: 8/4/2021 11:04 AM Printed By: R. Loffing Review By: L. Medina	City of Oakland Park Topography		Figure 2-3

File = O:\47036-HWD\47036-002\GIS\OaklandPark_SWMPOnly.aprx Saved by rloffing Save date = 8/4/2021 11:04 AM

Oakland Park Drainage System

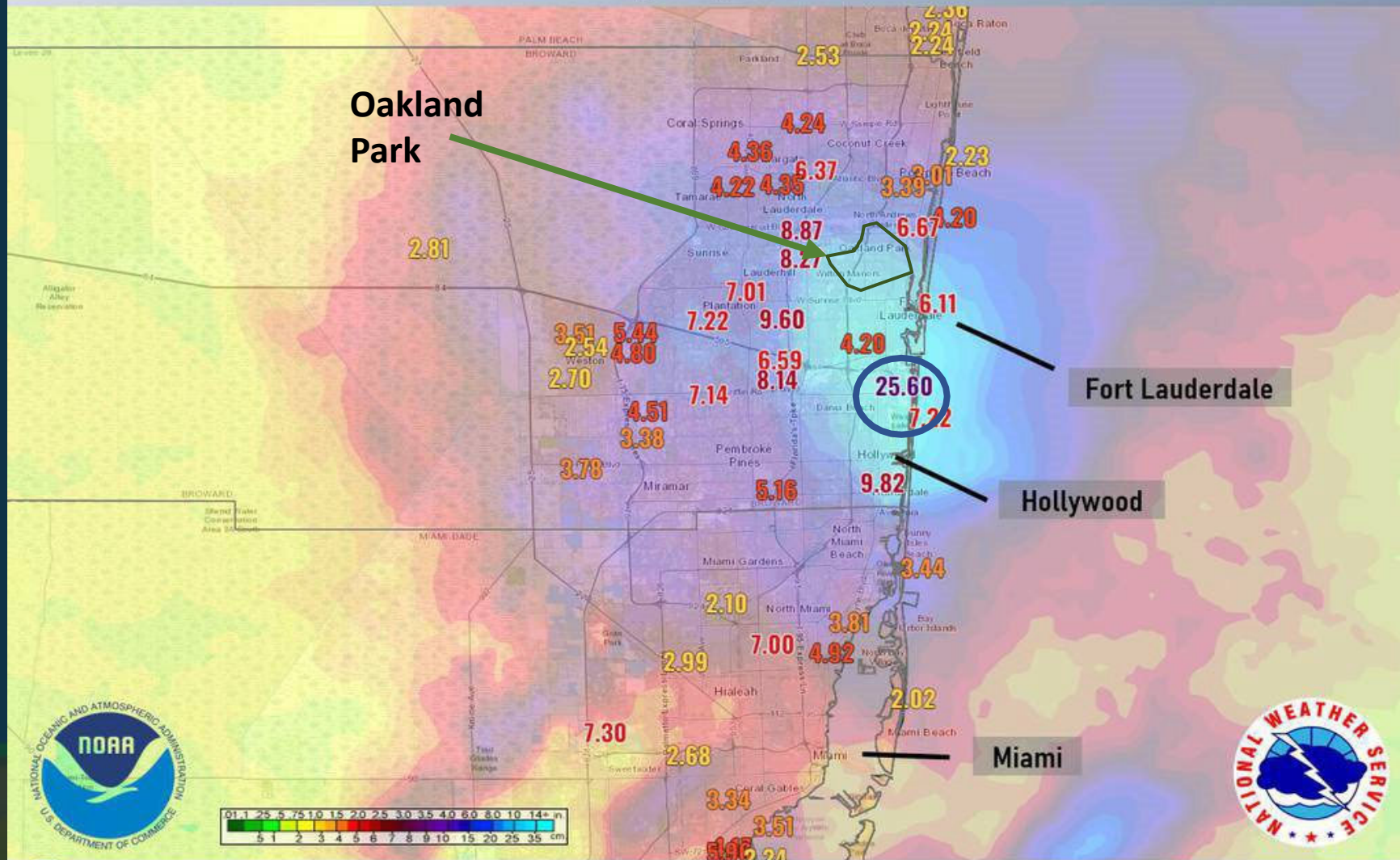
- City owned Rights of Way (RoW) and Streets
- City owned Lakes and Canals
 - 4.75 Miles of Waterways & Canals (13 waterways)
 - 195 Acres of Lakes
 - 2,700+ Catch Basins
 - 26 Miles of Swales & Ditches
 - 22+ Miles of Pipe Infrastructure
 - 1,260 Miles Street Sweep Annually
 - 5 Pump Stations
 - 7 Stormceptors



NWS Preliminary 24-hr Estimated Rainfall, Observed Precipitation

April 12, 2023

April 12, 2023



National Oceanic and Atmospheric Administration
U.S. Department of Commerce

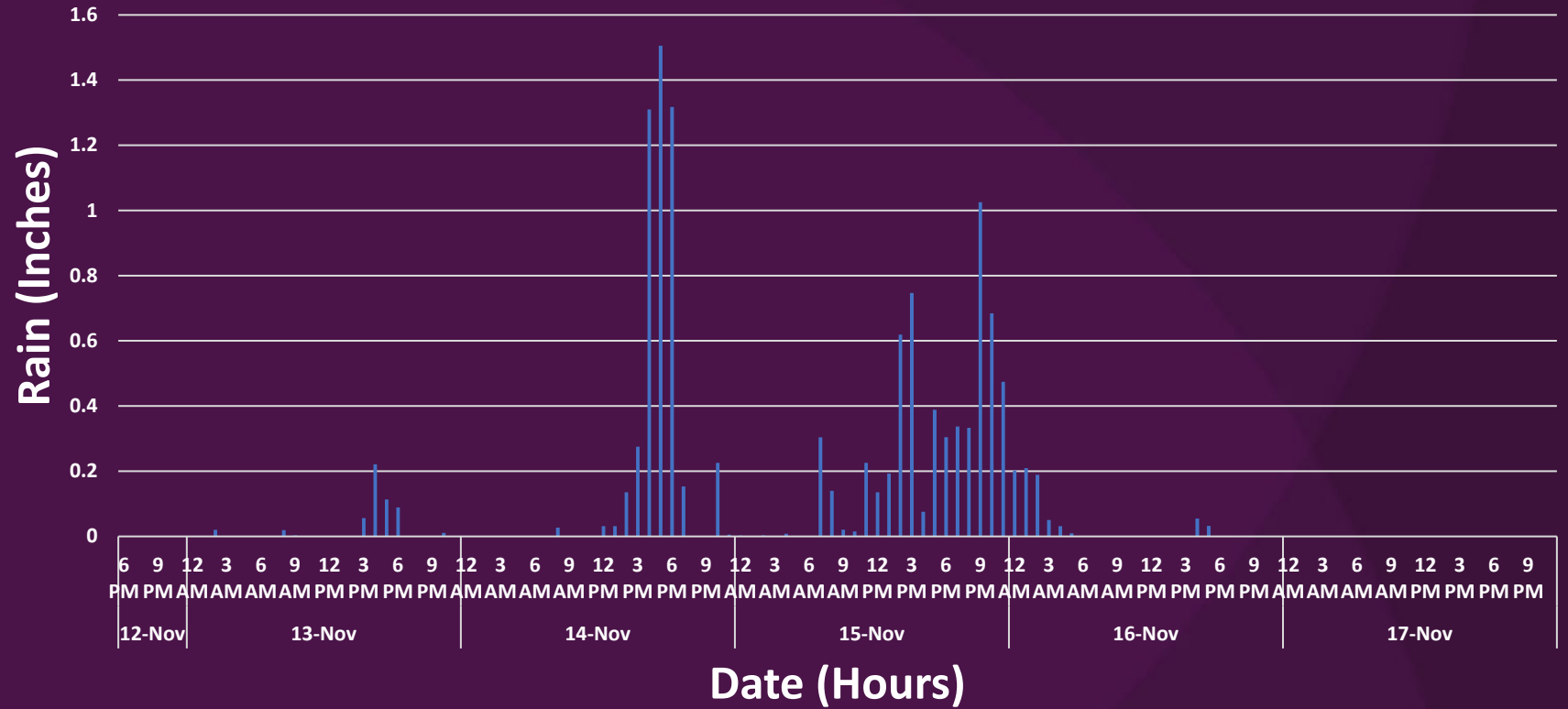
For more information go to:
www.wpc.ncep.noaa.gov and www.weather.gov



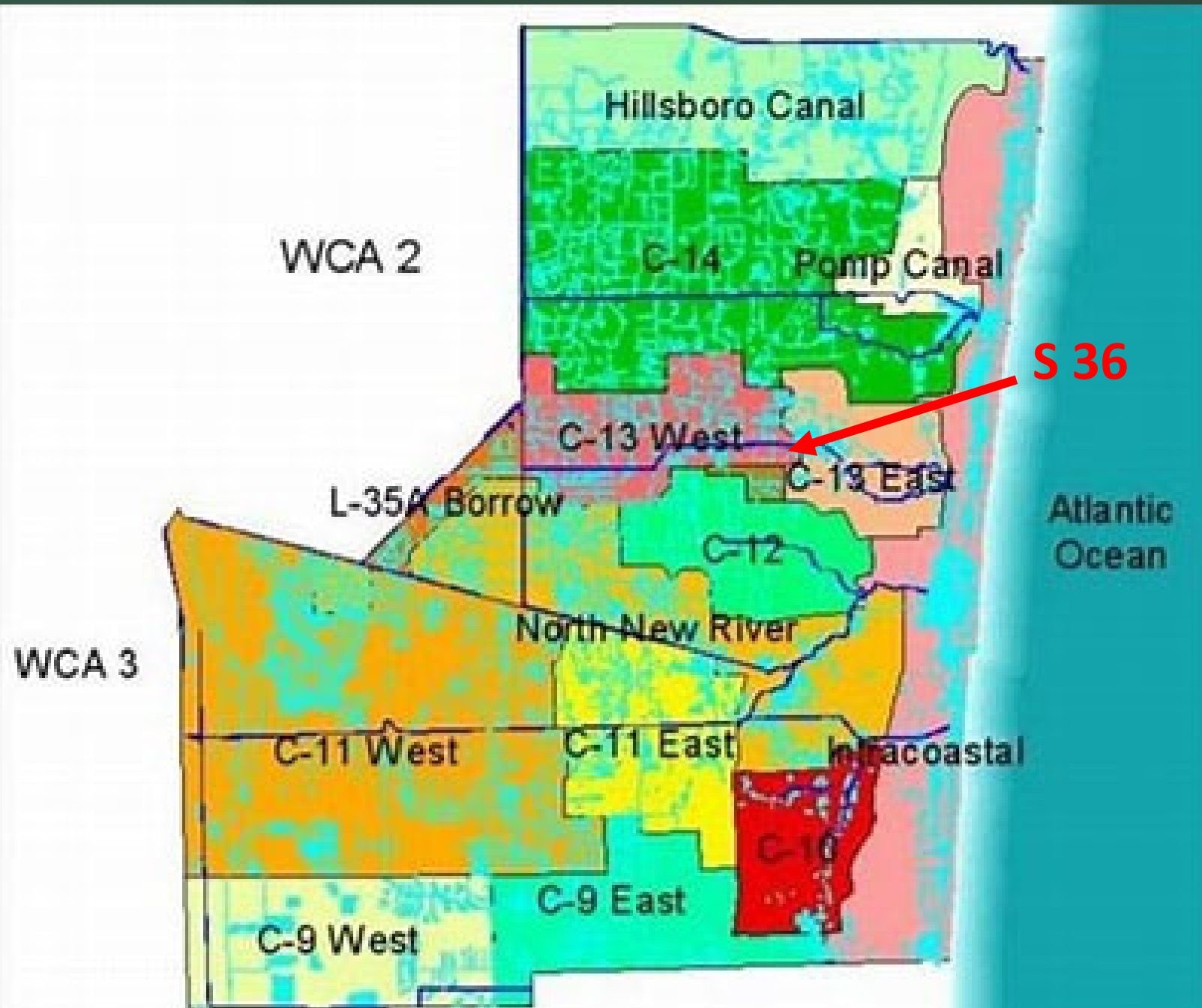
Weather Prediction Center
College Park, MD

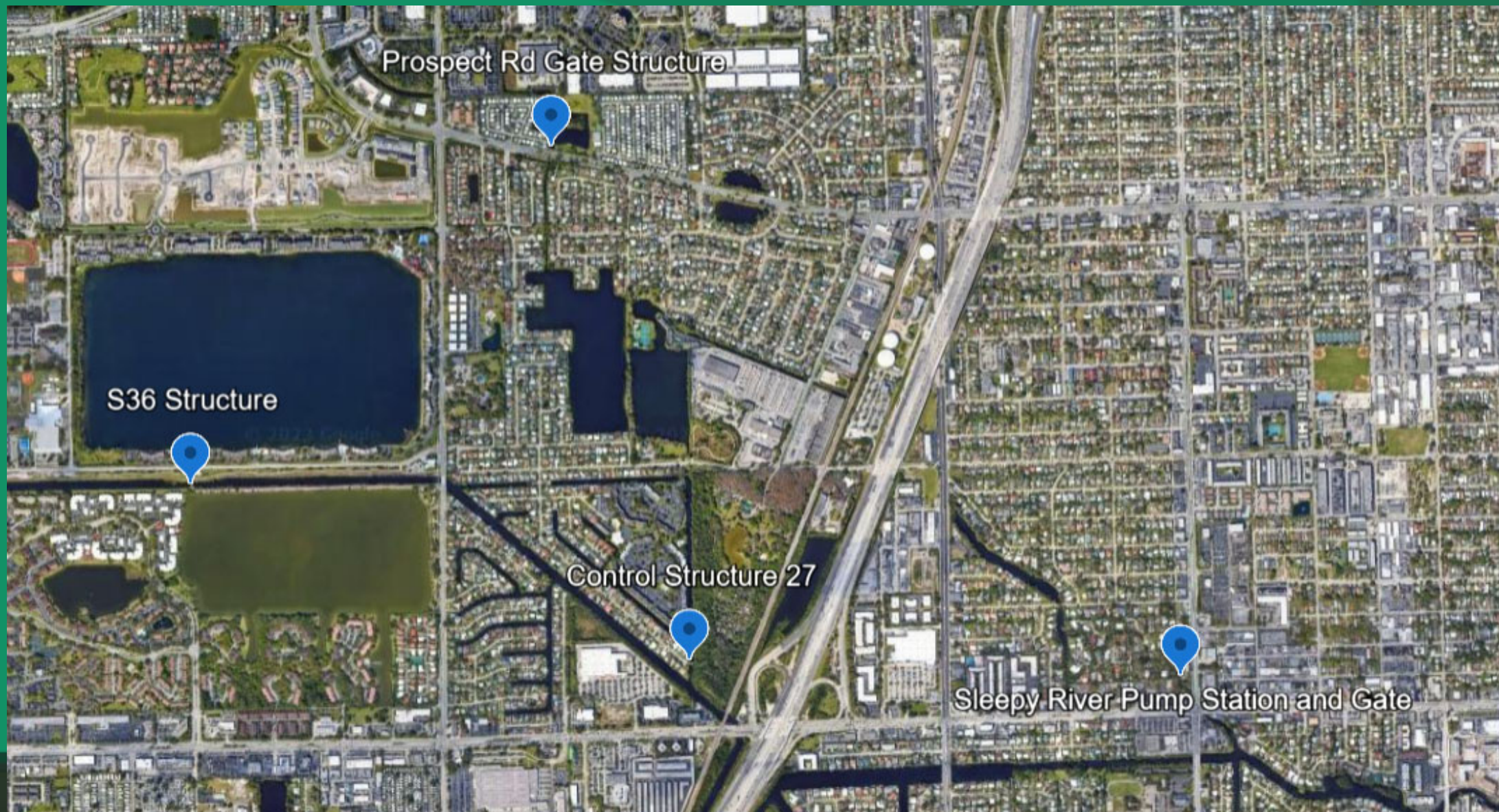
Total Rain in
Oakland Park
12.3"

November 2023 Rains



Broward County Drainage Map





Resiliency Coordination

- Operational Coordination
 - City
 - Broward County
 - SFMWD
- Capital Investment
 - City. 3 projects underway with city and outside funding
- City Vulnerability Assessment Update





Nov 14-16, 2023
No Name Storm

SFWMD Resiliency Forum

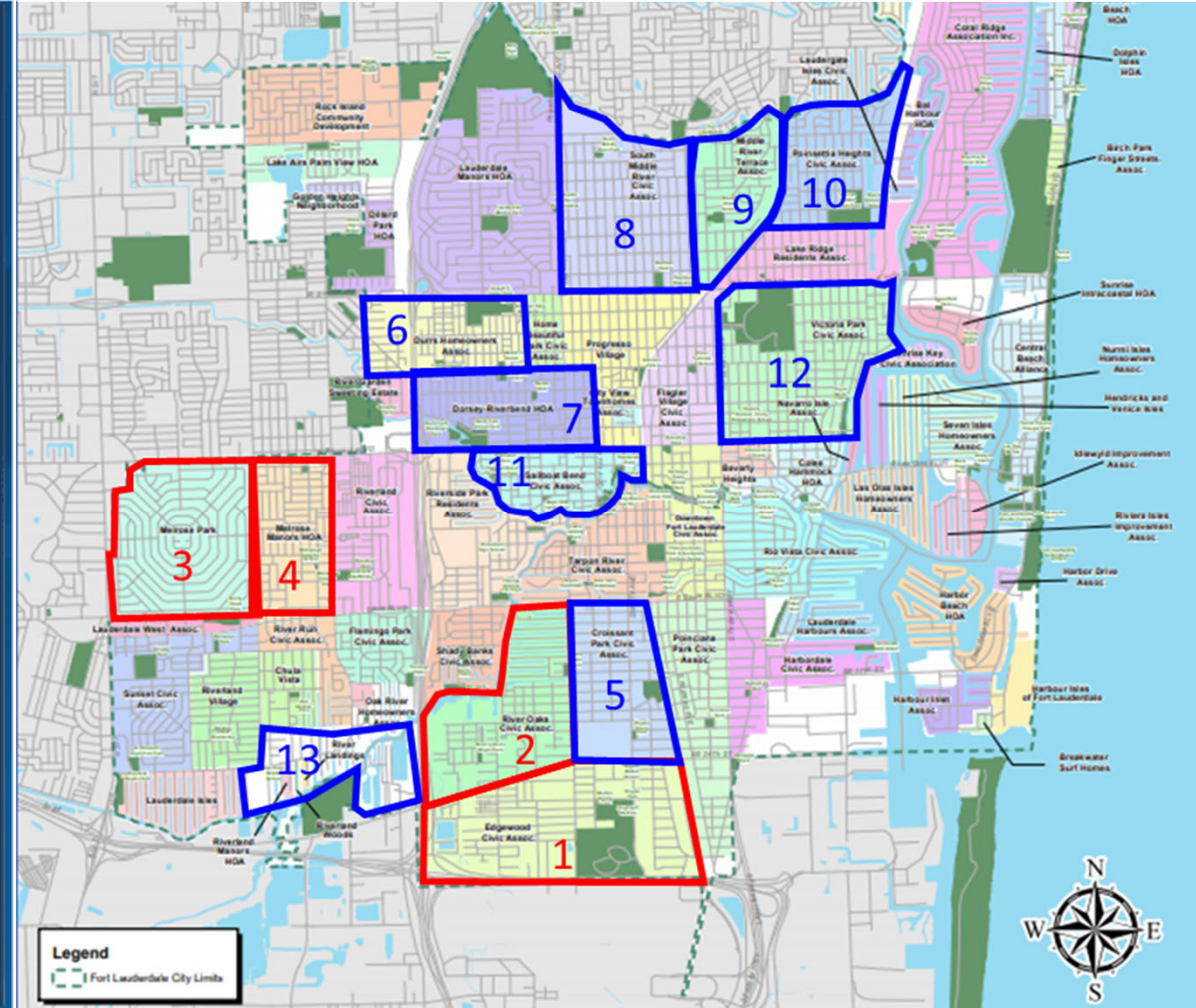
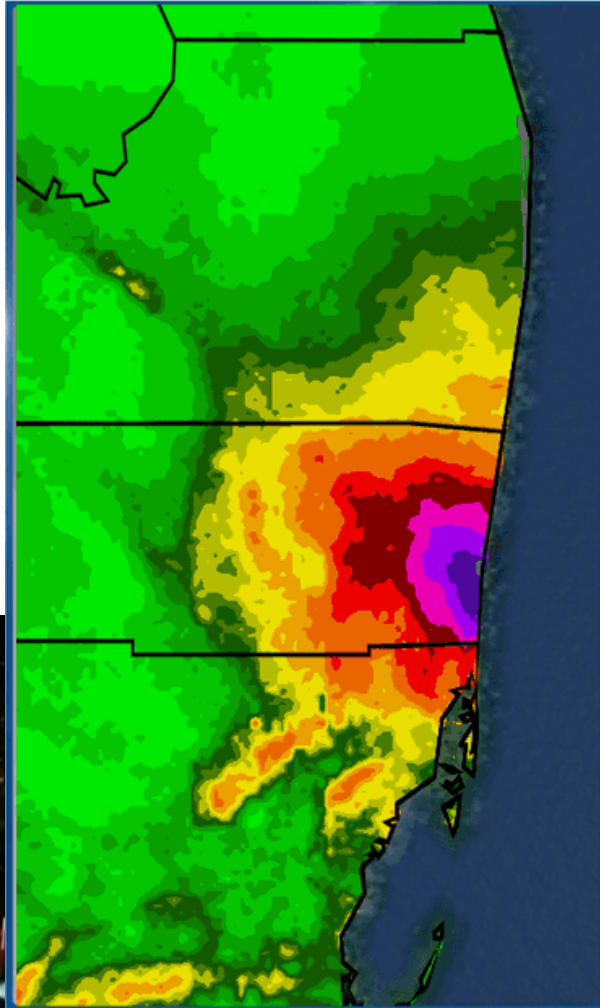
Nancy J. Gassman, Ph.D
Asst. Public Works Director
Fort Lauderdale, FL



Rain Event - April 12-13, 2023

> TOP RAIN TOTALS » YESTERDAY

Fort Lauderdale	25.91"
Hollywood	18.16"
Dania Beach	17.30"
Plantation	15.06"
Lauderhill	14.58"
Coconut Grove	13.15"





Rain Forecast – Nov 14-15, 2023

NBC NEWS

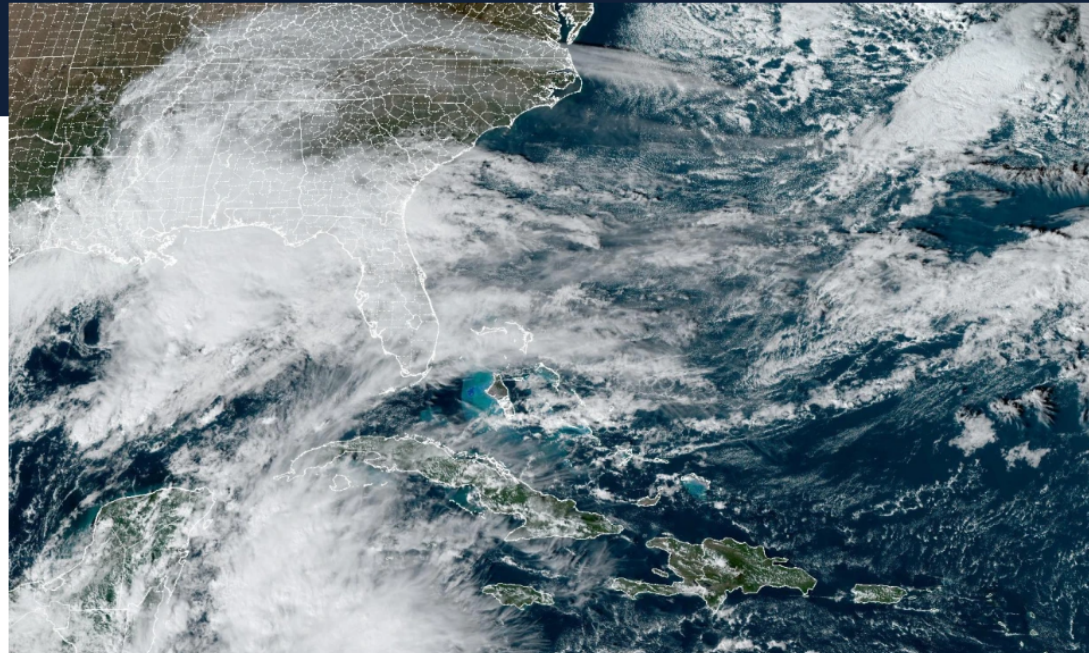
Flood risk growing for millions in South Florida with heavy rain expected

SHARE & SAVE –     

WEATHER

Flood risk growing for millions in South Florida with heavy rain expected

Fort Lauderdale has picked up nearly 100 inches of rain this year, which is more than 40 inches above average.



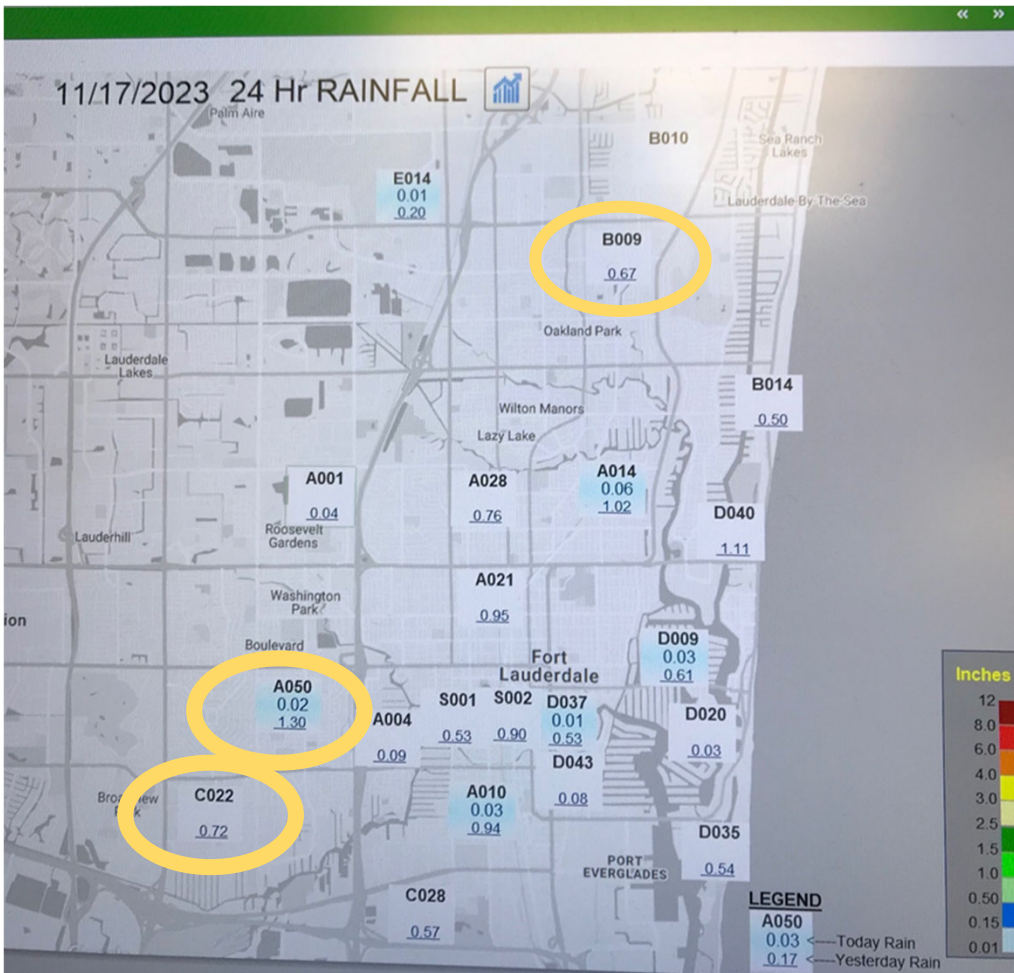


Conditions = No Name Nov Storm

Nov 17 10:30 a.m.

72 hour totals for Nov 14-16

24-hour rainfall	Nov 14	Nov 15	Nov 16	Total (inches)
Coral Ridge	5.31	1.23	0.67	7.21
Galt Ocean Mile	3.39	3.51	0.50	7.40
Central Beach	2.73	4.94	1.11	8.78
S. Middle River	2.80	6.02	0.90	9.72
Melrose Manors	2.87	6.24	1.30	10.41
Las Olas Isles	2.76	1.24	0.61	4.61
Edgewood	2.33	6.52	0.57	9.42
Lauderdale Isles	3.62	8.33	0.72	12.67





Neighborhood Conditions

(Nov 16, 2023 4:00 p.m. Briefing)

Neighborhood Flooding

- Melrose Manors: Estimated over 6"; 2 X 3,000 Gallon Pump Trucks and 1 X 4" Pump are on site
- Edgewood: Estimated over 6" (isolated to small area in SW corner of neighborhood); 2 x 6" pump from DMSI.
- River Oaks: Estimated over 6" (isolated to small area in SW corner of neighborhood); 5 pumps (2 x 8" pumps; 2 x 6", 1 x 4") being operated by Ric-Man Construction.
- Shady Banks: Estimated less than 6"; 1 X 4" pump from FG Construction
- Durrs: Estimated less than 6"
- Dorsey Riverbend: Estimated less than 6"
- Croissant Park: Estimated less than 6"; 2 Pump Trucks from Liquid Waste Recovery
- Chula Vista: Estimated less than 6"; 3 Pump Trucks from Liquid Waste Recovery
- Riverland Road – Broward County resources

While Fort Lauderdale experienced widespread road flooding, the number of homes flooded was minimal by comparison to the April Flash Flood.

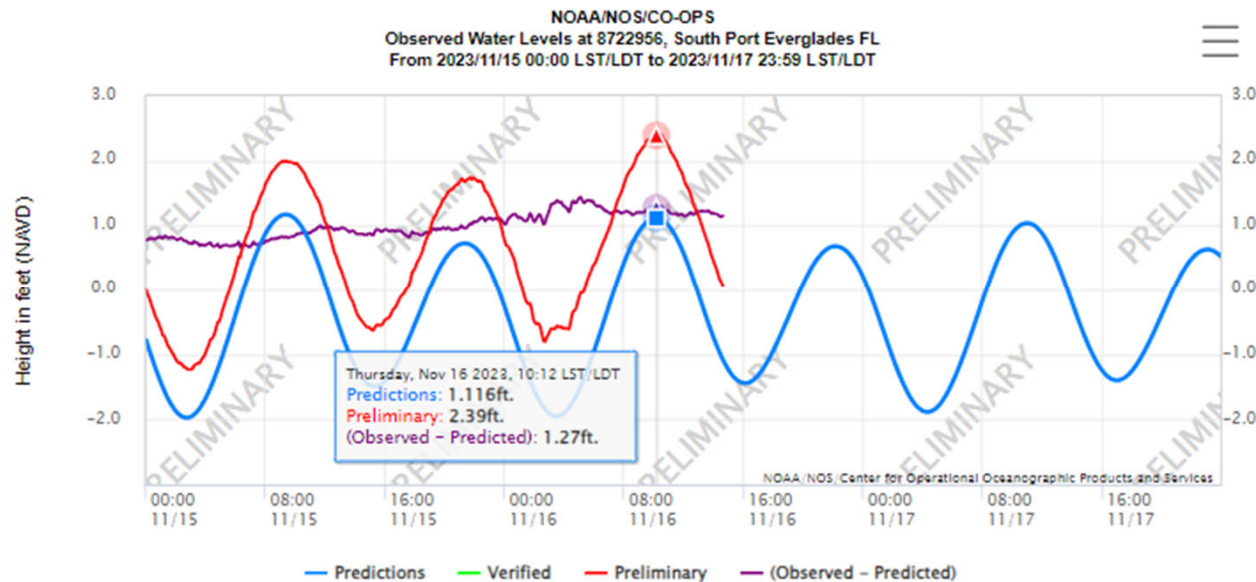
Roadway Conditions

- Staff has identified 34 flooded roadways, 7 cleared, 8 impacted by tides

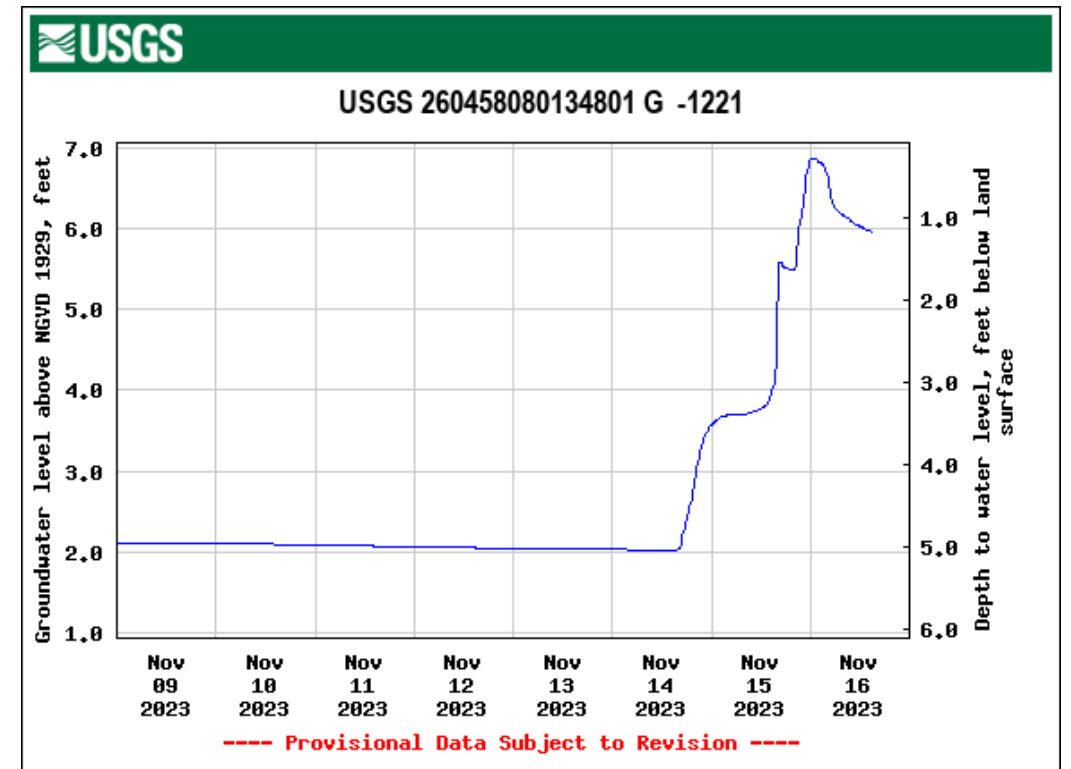


Conditions - (Nov 16, 2023 4:00 p.m. Briefing)

Groundwater Table – Rose to near saturation on Nov 15 and came down following the end of the rain.

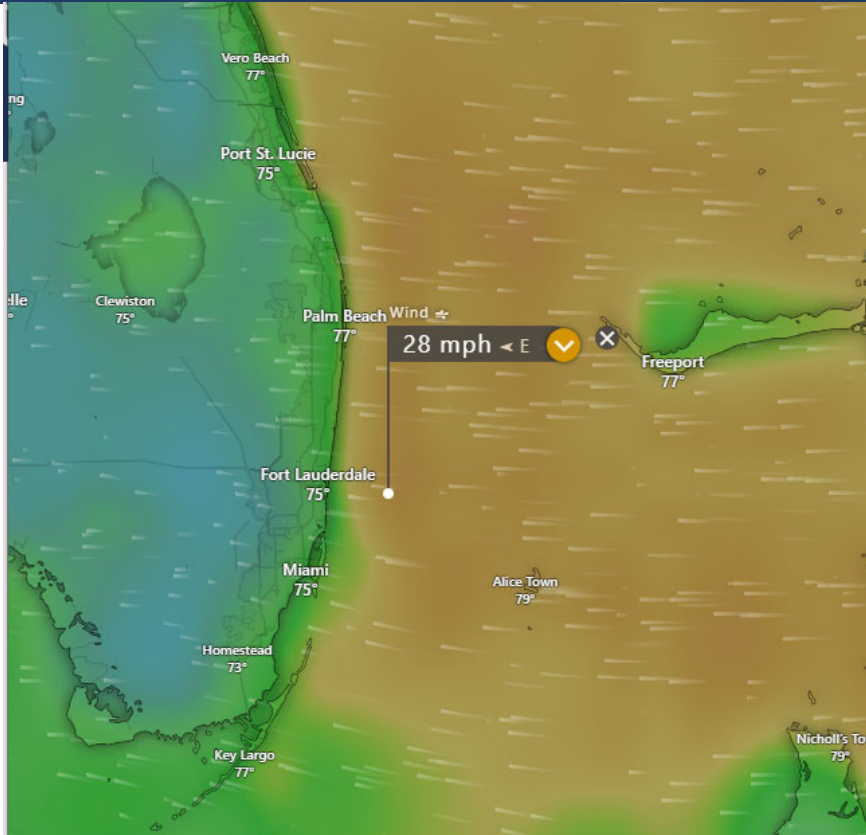


King Tide – High tide peaked Nov 16 at ~10:30 a.m. at 2.4 feet NAVD, the highest tide of the year. Low tide will occur at ~4:00 p.m.

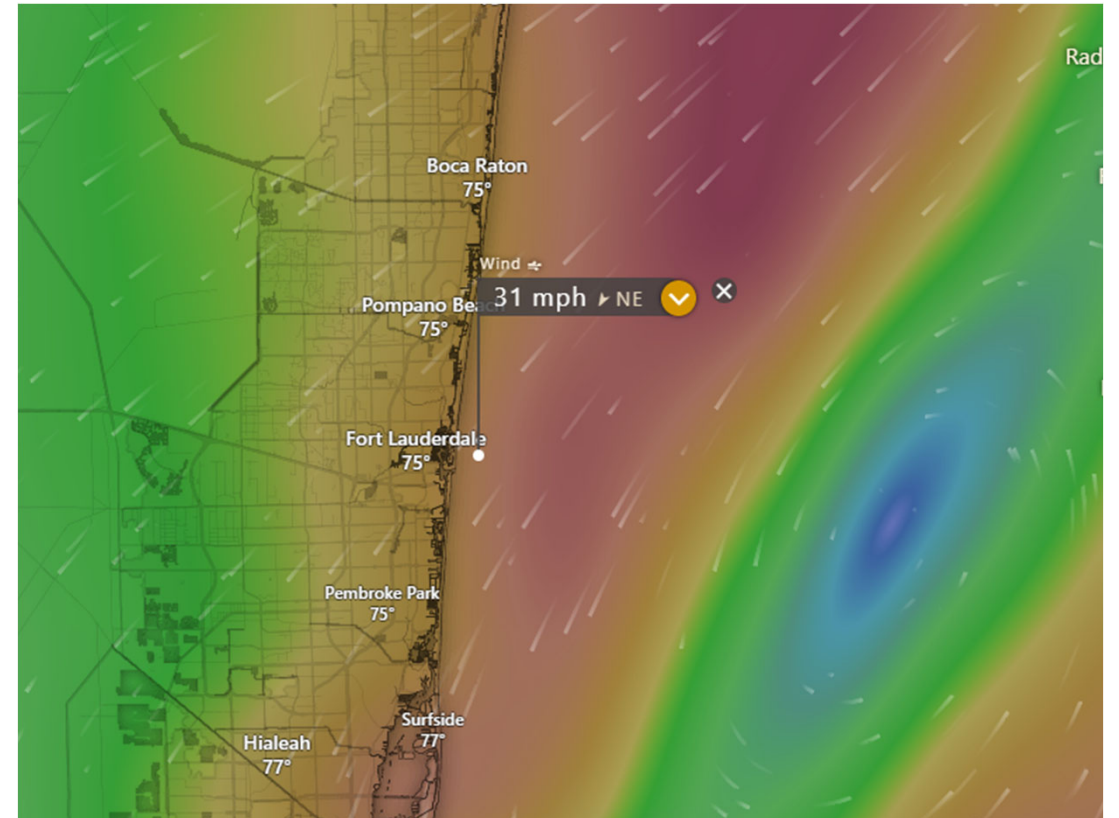




Wind Conditions - Nov 15 through 16



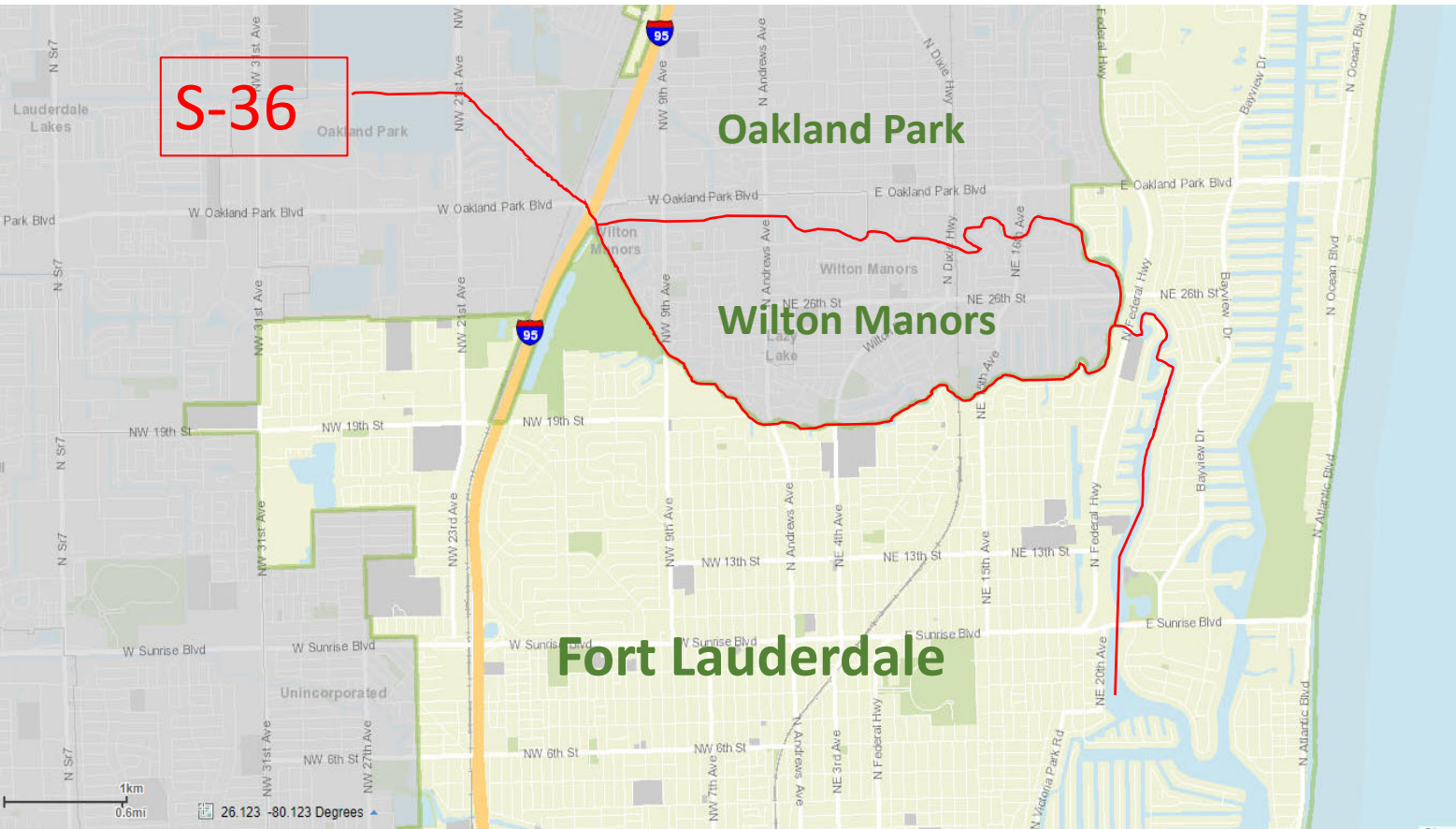
Winds— Strong winds (28 mph) out of the east heighten tide and extend time of peak high tide.



Winds— Strong winds continued and shifted out of NE, but still contributing to an elevated tidal state out of the east, heightening the tide and slowing drainage.



SFWMD STRUCTURES- S-36, MIDDLE RIVER



S-36 SPILLWAY ON CANAL C-13 AT U.S. HIGHWAY 441

✓ Active

[Go to site](#)

Field Station: Fort Lauderdale

Type: SPILLWAY

Spillway Discharge Design: 1,090 cfs

Latitude: 26.173183

Longitude: -80.179117

Canal: C-13

Control: Gated Spillway - Cable



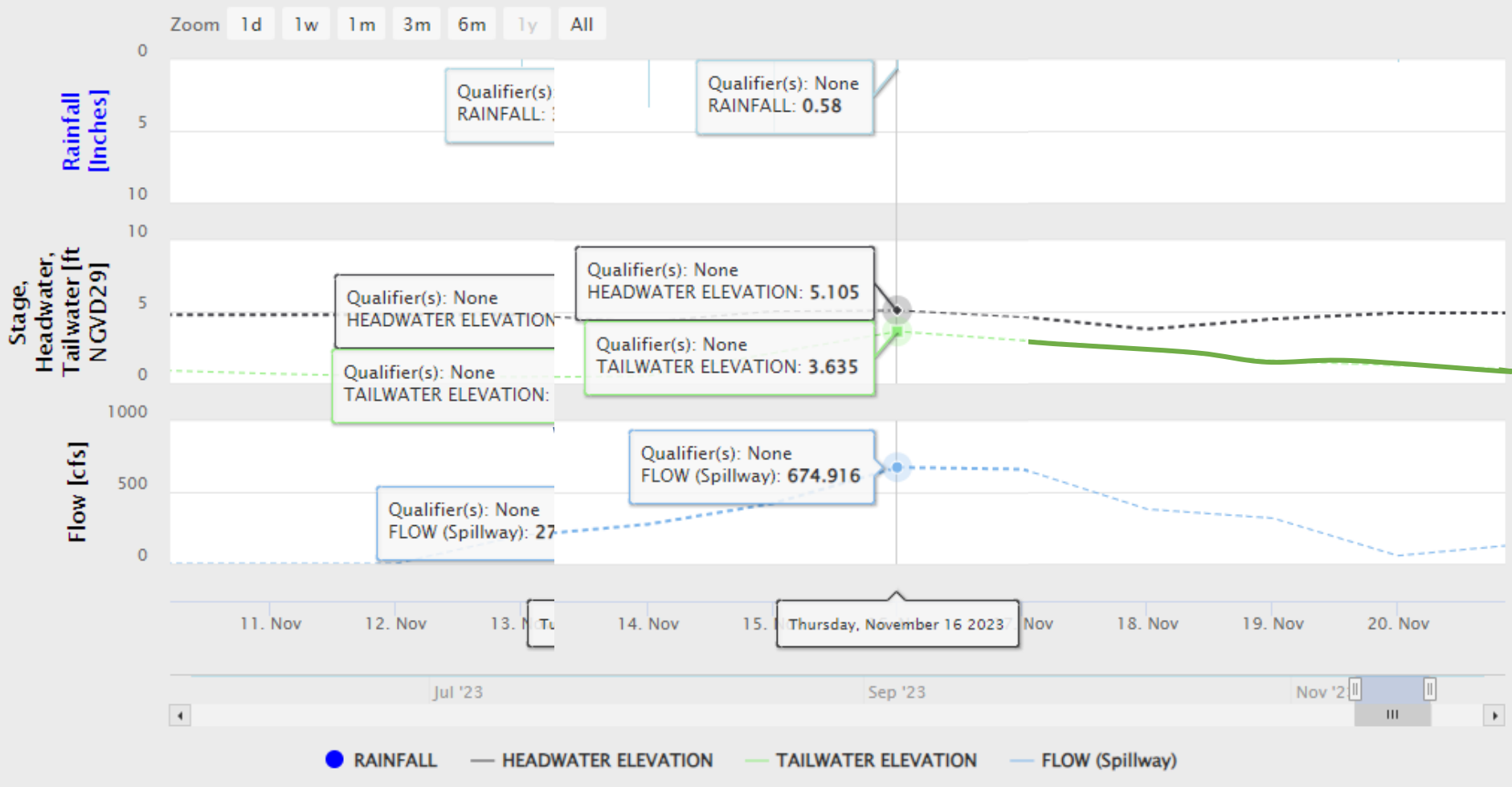
SFWMD S-36 structure discharges to the north and south forks of the Middle River.



November No Name Storm Water Levels At S-36 (Gate) Nov 11-20

Structure: S36

Provisional Data Display: Water Quality results highlighted yellow, Rainfall as a lighter shade of blue, and Others by a dashed line.



Middle River

Peak tailwater –
 Nov = 3.635 ft NGVD
 April = 4.339 ft NGVD

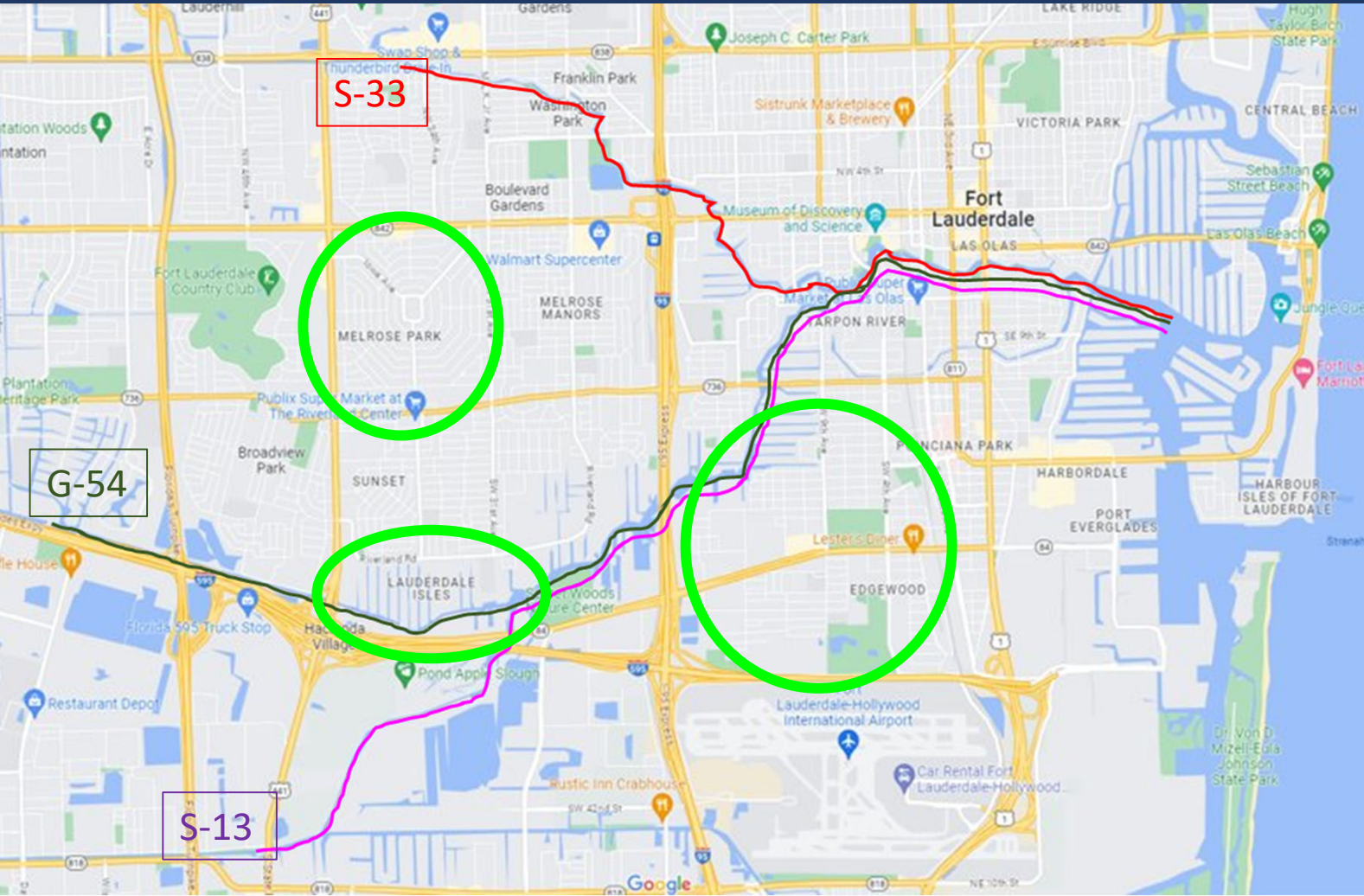
Nov 13-Nov 15
 - 72 hour rainfall : 8.65 in

Nov 13-Nov 16 :
 Headwaters ↑ by 0.785 ft
 Tailwater ↑ by 3.11 ft

Consequence: During the highest tide of the year on Nov 16 , the Middle River was receiving discharges from the West.



SFWMD Structures- New River



Three SFWMMD structures discharge into the north and south forks of the New River.

Flows from the west increase surface water levels in the tidal waterways in Fort Lauderdale, reducing the City's ability to drain our stormwater systems by gravity.



Conditions - Nov 16 - 4:00 pm

S33 - North Fork

Radar
10.5 Inches

Rainfall
Last 72 hours



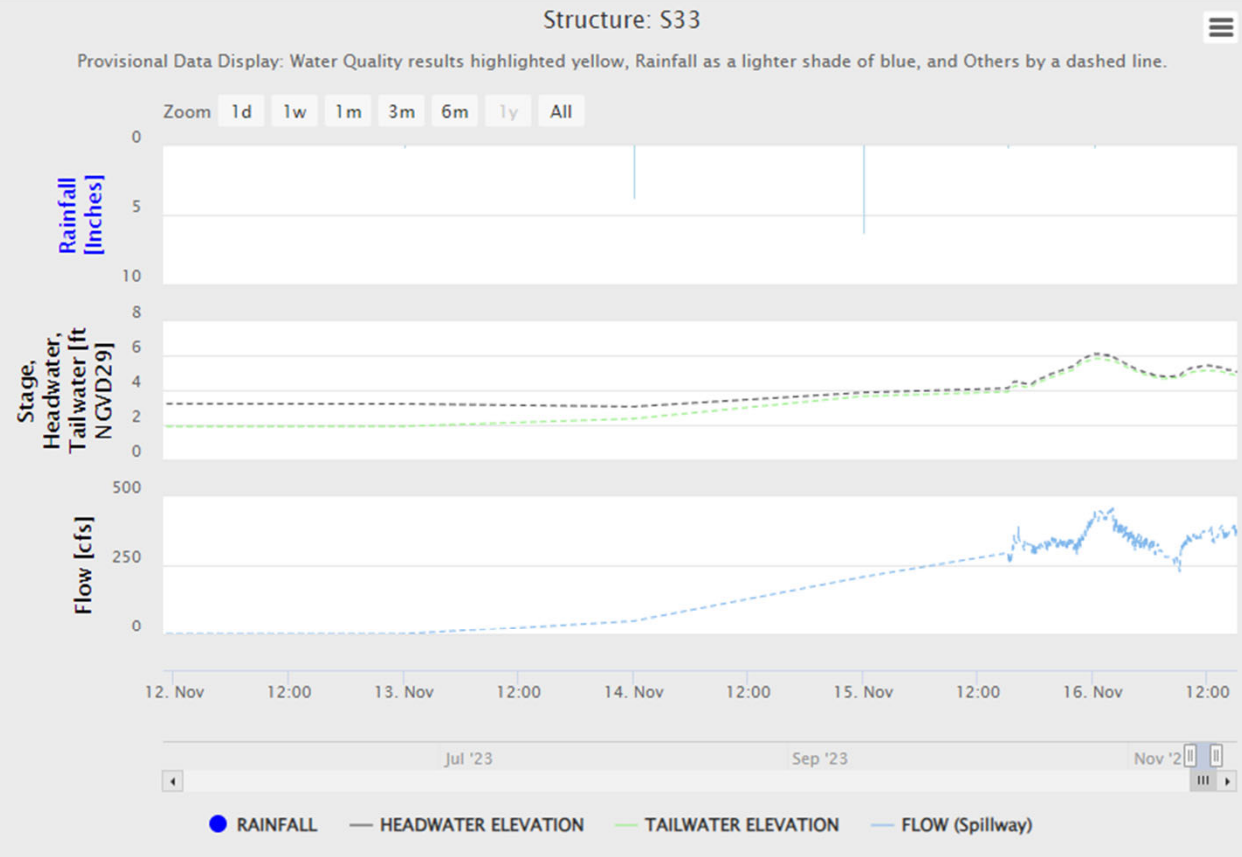
Gauge
N/A

Peak tailwater -

Nov No Name Storm = 4.85 ft NGVD
April Flash Flood = 6.511 ft NGVD



Discharges from west continue with elevated water levels in the roadway





Water Levels in SFWMD Structures

G-54 - Sewell Lock:

Nov 12-17

Radar
13.22
Inches

Rainfall
Last 72 hours



Gauge
N/A

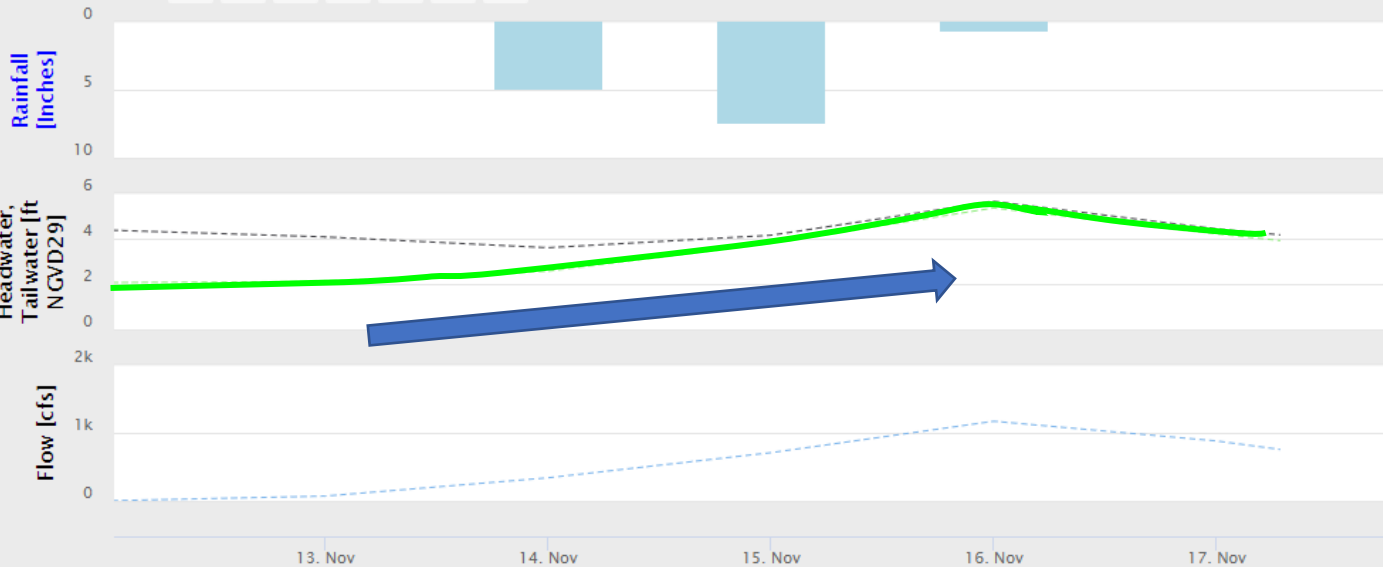
Peak tailwater -

Nov No Name Storm = 5.352 ft NGVD
April Flash Flood = 5.918 ft NGVD

Structure: G54

Provisional Data Display: Water Quality results highlighted yellow, Rainfall as a lighter shade of blue, and Others by a dashed line.

Zoom 1d 1w 1m 3m 6m 1y All



G-54 (SEWELL LOCKS) ON NORTH NEW RIVER CANAL

Active

[Go to site](#)

Field Station: Fort Lauderdale

Type: SPILLWAY

Spillway Discharge Design: 1,600 cfs

Latitude: 26.094845

Longitude: -80.229462

Canal: NORTH NEW RIVER CANAL

Control: Gated Spillway - Hyd



Griffin, east of University



Water Levels in SFWMD Structures

S-13 Nov 11-Nov 20

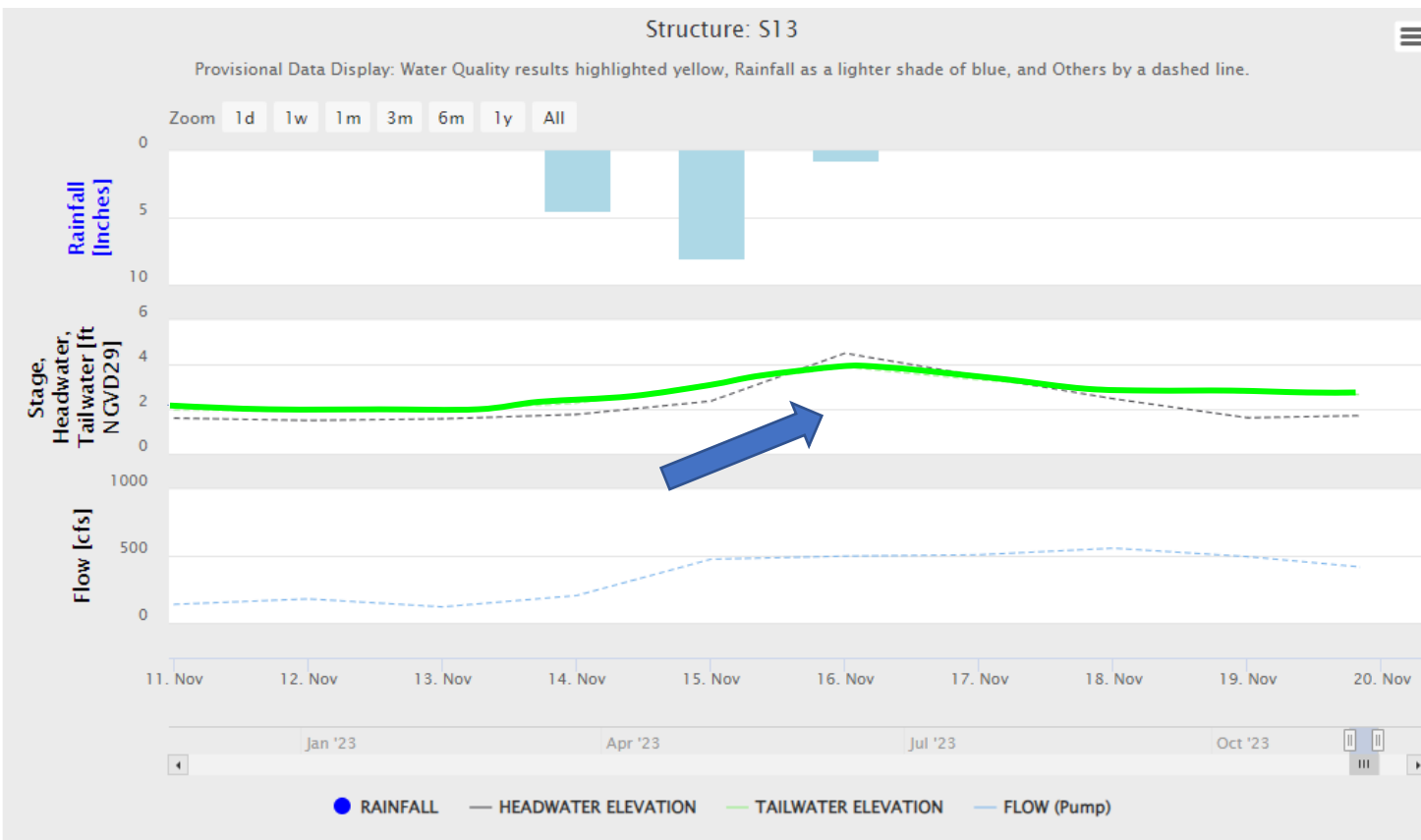
Rainfall
Last 72 hours

Radar **14.34 Inches**



Gauge **13.23 Inches**

Peak tailwater: **Nov No Name Storm = 3.877 ft NGVD**
April Flash Flood = 4.788 ft NGVD



S-13 PUMP ON SOUTH NEW RIVER CANAL NR DAVIE, FL

✓ Active
[Go to site](#)

Field Station: Fort Lauderdale
 Type: PUMP
 Pump Discharge Design: -999,999 cfs

Latitude: 26.066145
 Longitude: -80.208915
 Canal: C-11
 Control: Pump Stations

At 441 and Orange Drive – Discharges to South Fork of the New River



Conclusions

- The community was nervous following the April rain bomb.
- Rainfall was spread over several days and fell differentially across the City.
- The use of pumps (rather than pump trucks) in critical locations reduced the intensity and duration of the flooding event.
- Gravity drainage systems were impacted by the extreme high tide, groundwater table, rainfall, and discharges from the west.

Chula Vista and Riverland

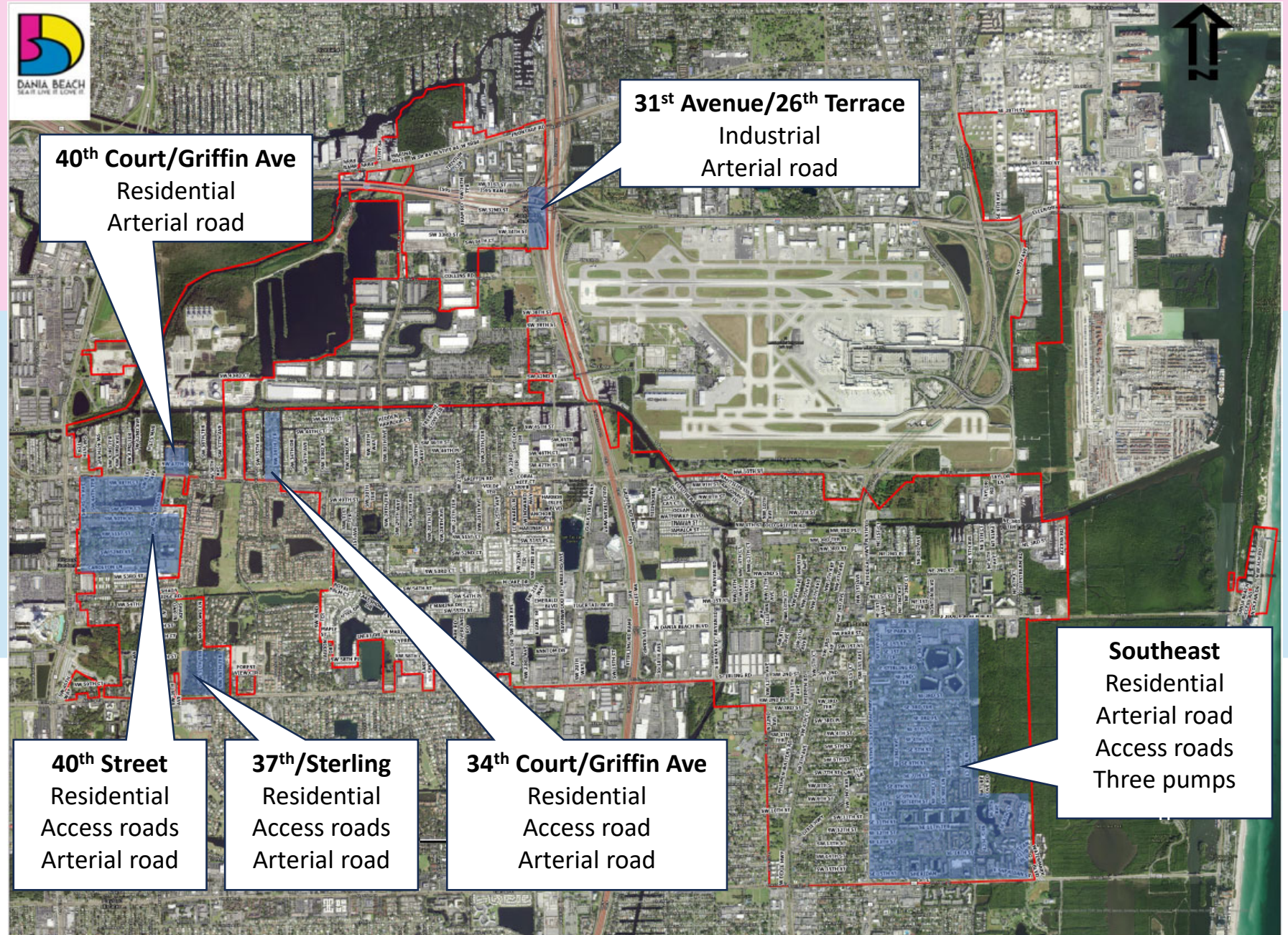




DANIA BEACH
SEA IT. LIVE IT. LOVE IT.

daniabeachfl.gov

Critical Low Points



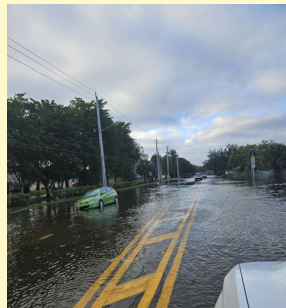
Operations & Water Management Systems

Operations

- Enable communications across city personnel
- Assess flood prone areas
- Place signage and detours
- Implement pumps and vacuum trucks

Water Management Systems

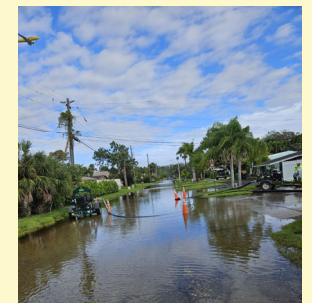
- Southeast drainage improvements
- Stormwater management plan / CIP



40th Avenue



Southeast



34th Court

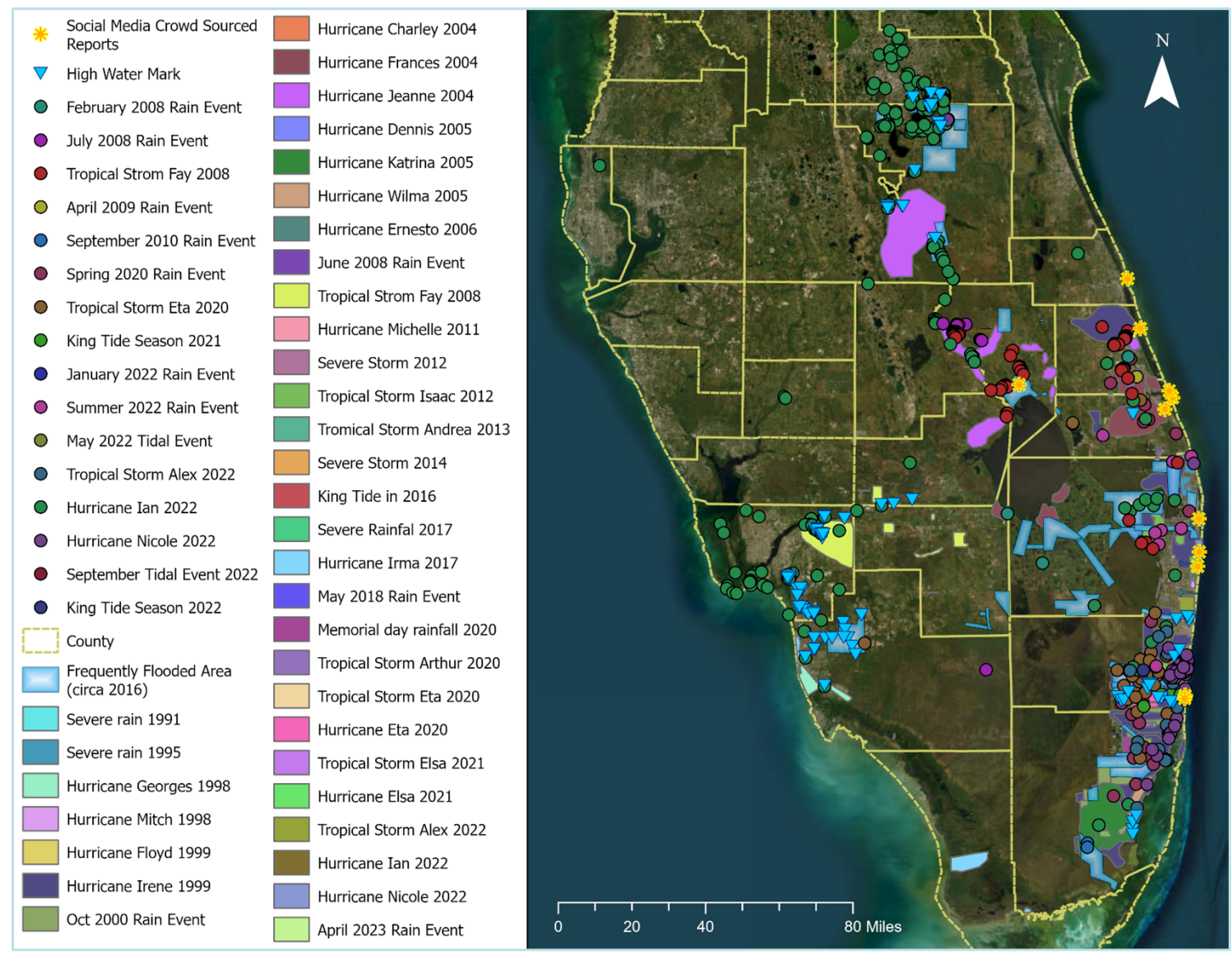
9. 2022-2023 Wet Season Flood Observations

Christine Carlson,
Geospatial Architect,
SFWMD

2022/2023 Wet Season Flood Observations

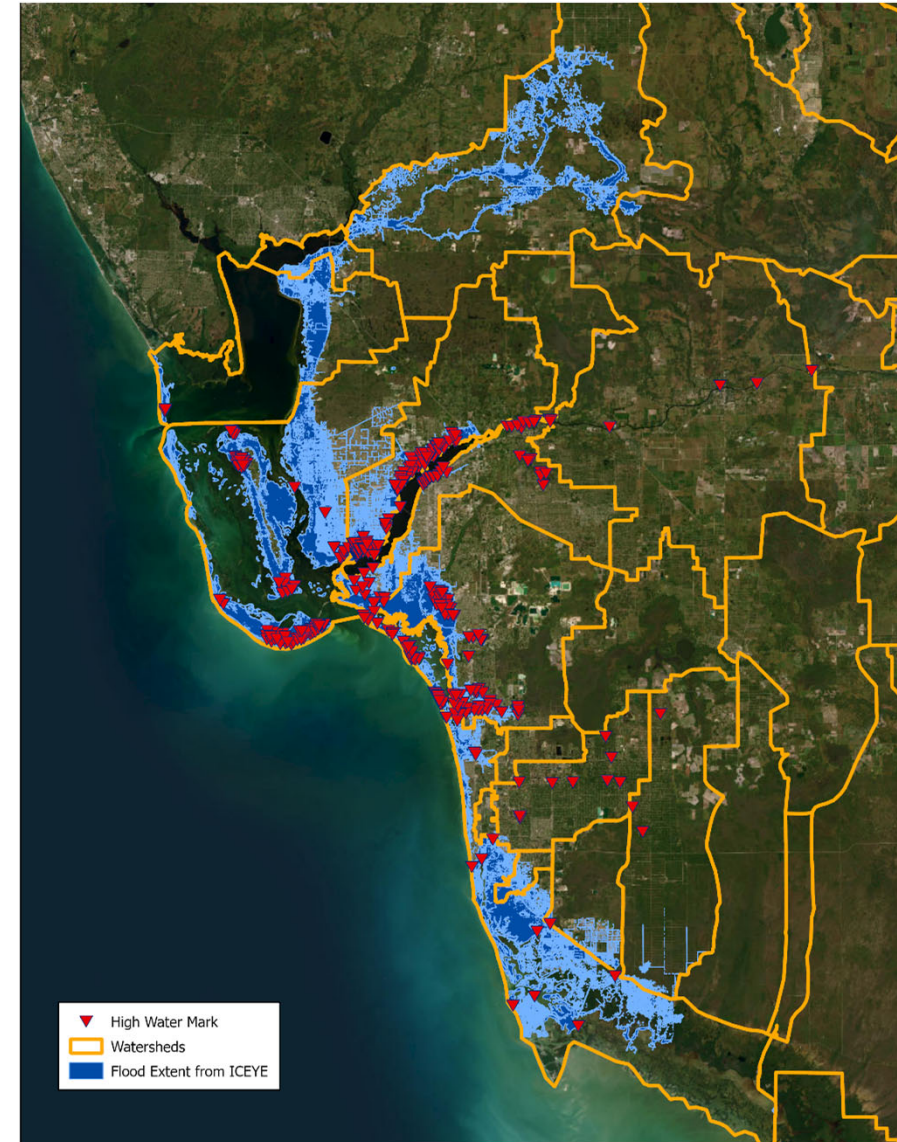
Christine Carlson, Geospatial Architect, IT Geospatial Services,
South Florida Water Management District

Flood Observation Brochure Map

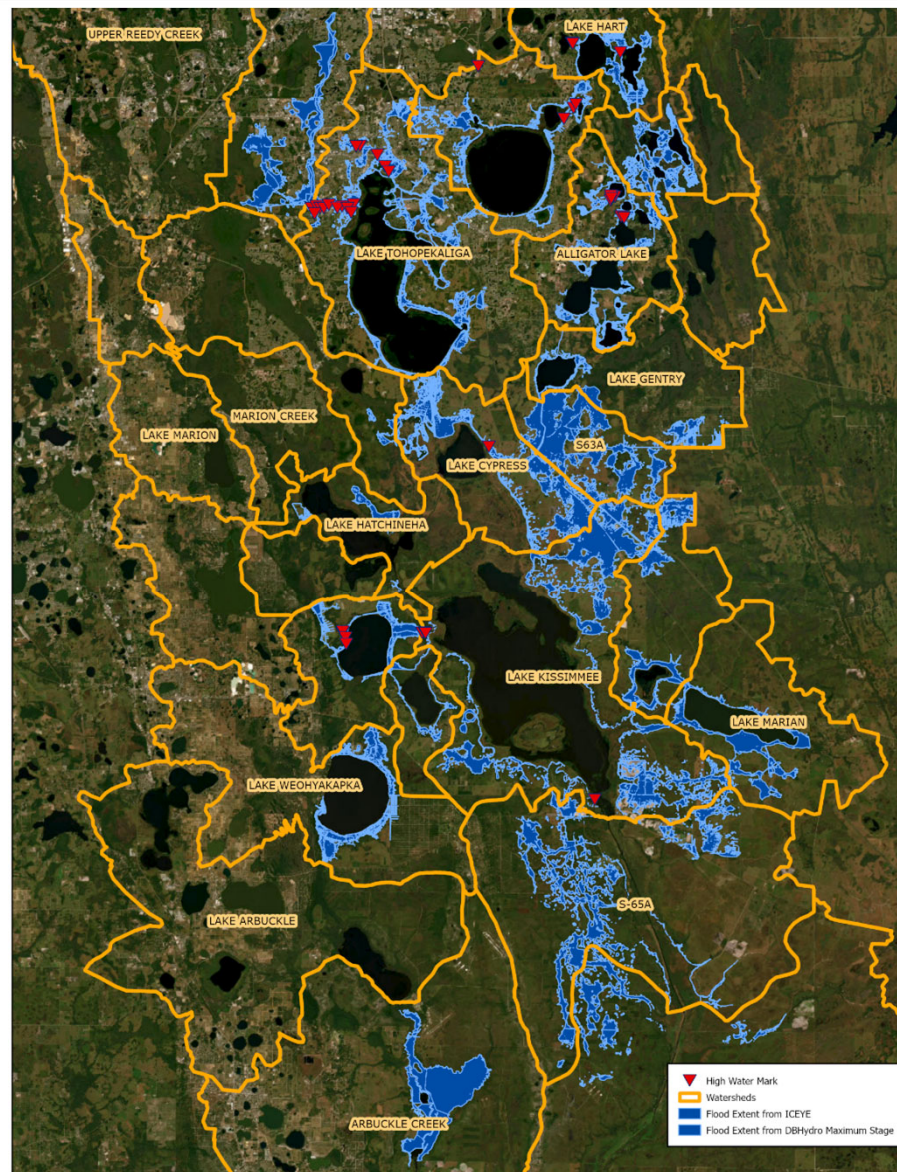


Hurricane Ian Flood Extent Southwest Florida - ICEYE

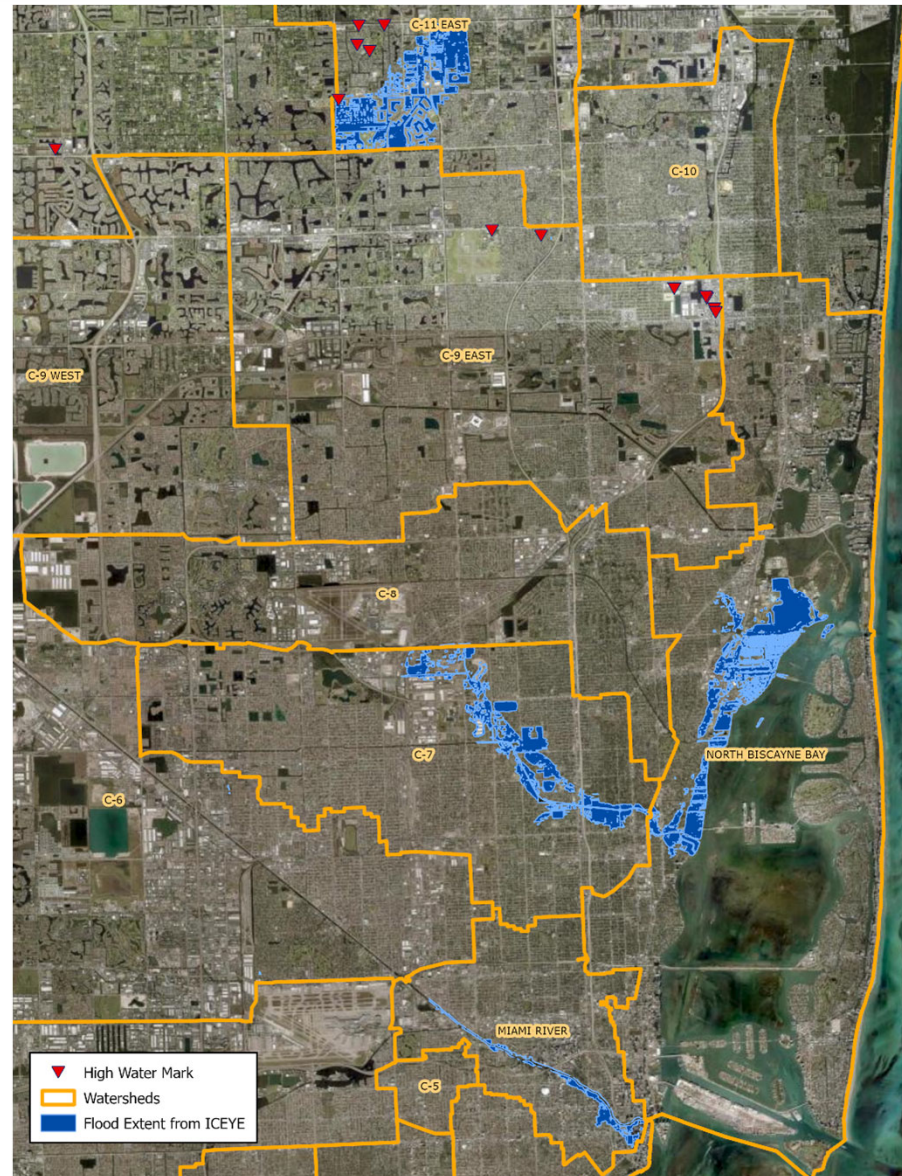
- ICEYE is a satellite data and analysis provider specializing in the acquisition and processing synthetic aperture radar (SAR) data
- SFWMD purchased ICEYE collected extent and depth data for Hurricane Ian
- These data are being used to evaluate the added value of these data in documenting flood occurrence



Hurricane Ian Flood Extent Upper Kissimmee Basin - ICEYE



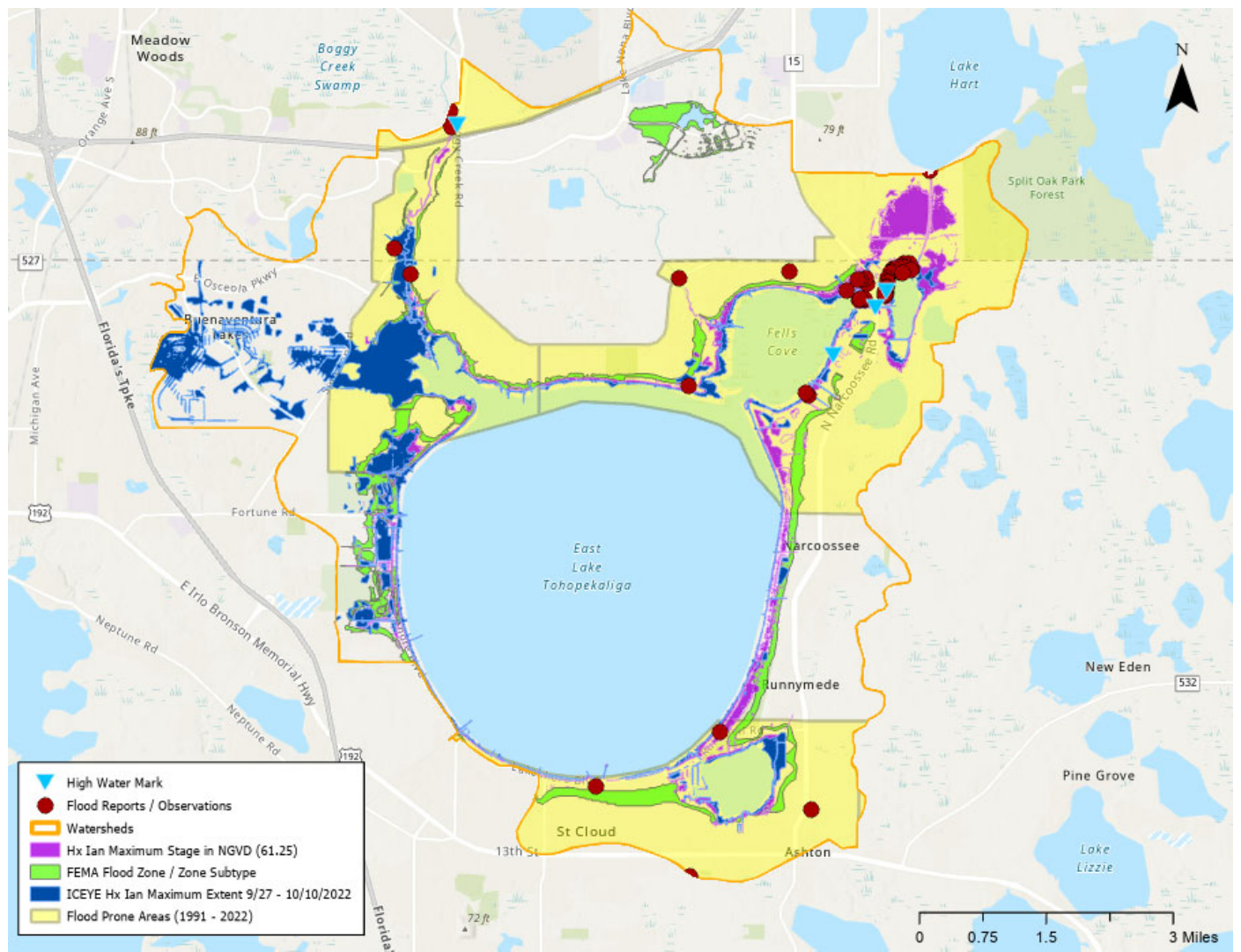
Hurricane Ian Flood Extent Southeast Florida - ICEYE



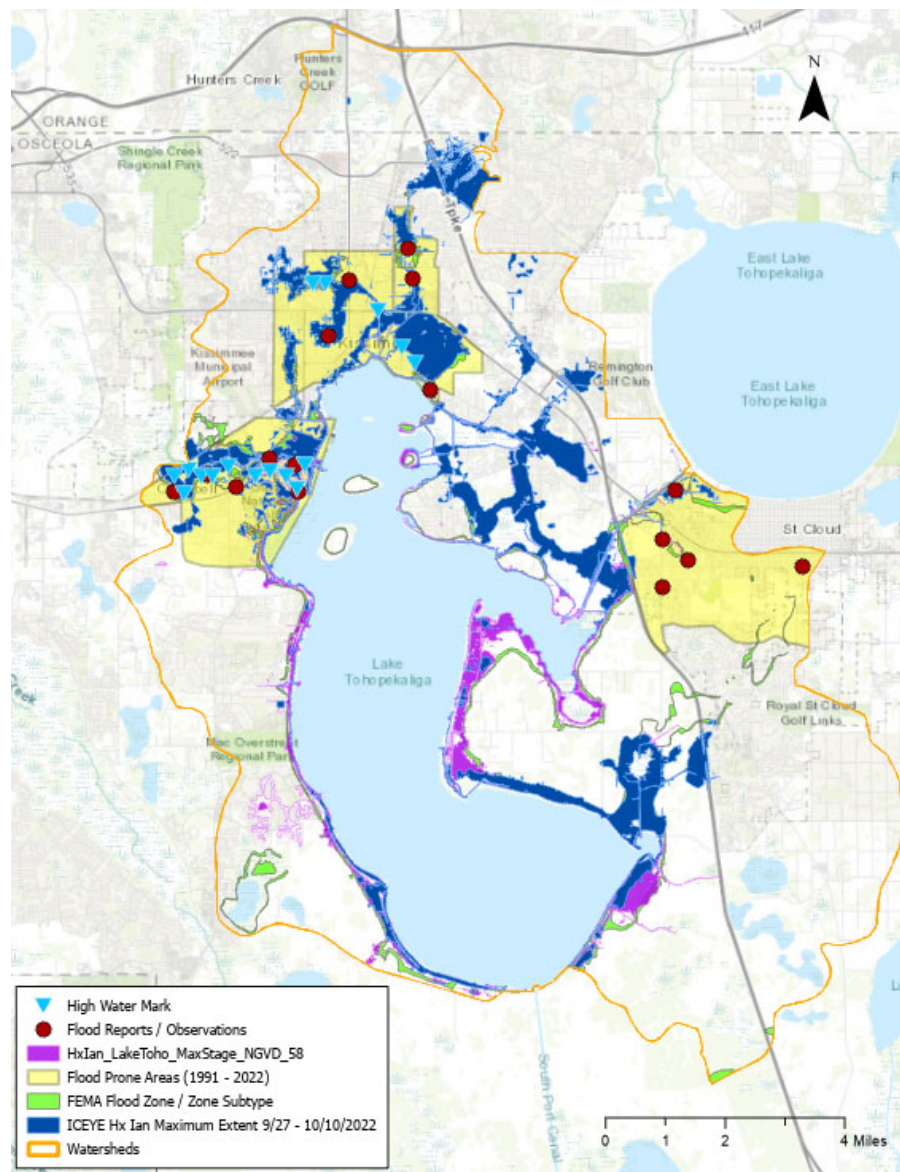
Hurricane Ian Flood Extent Key West - ICEYE



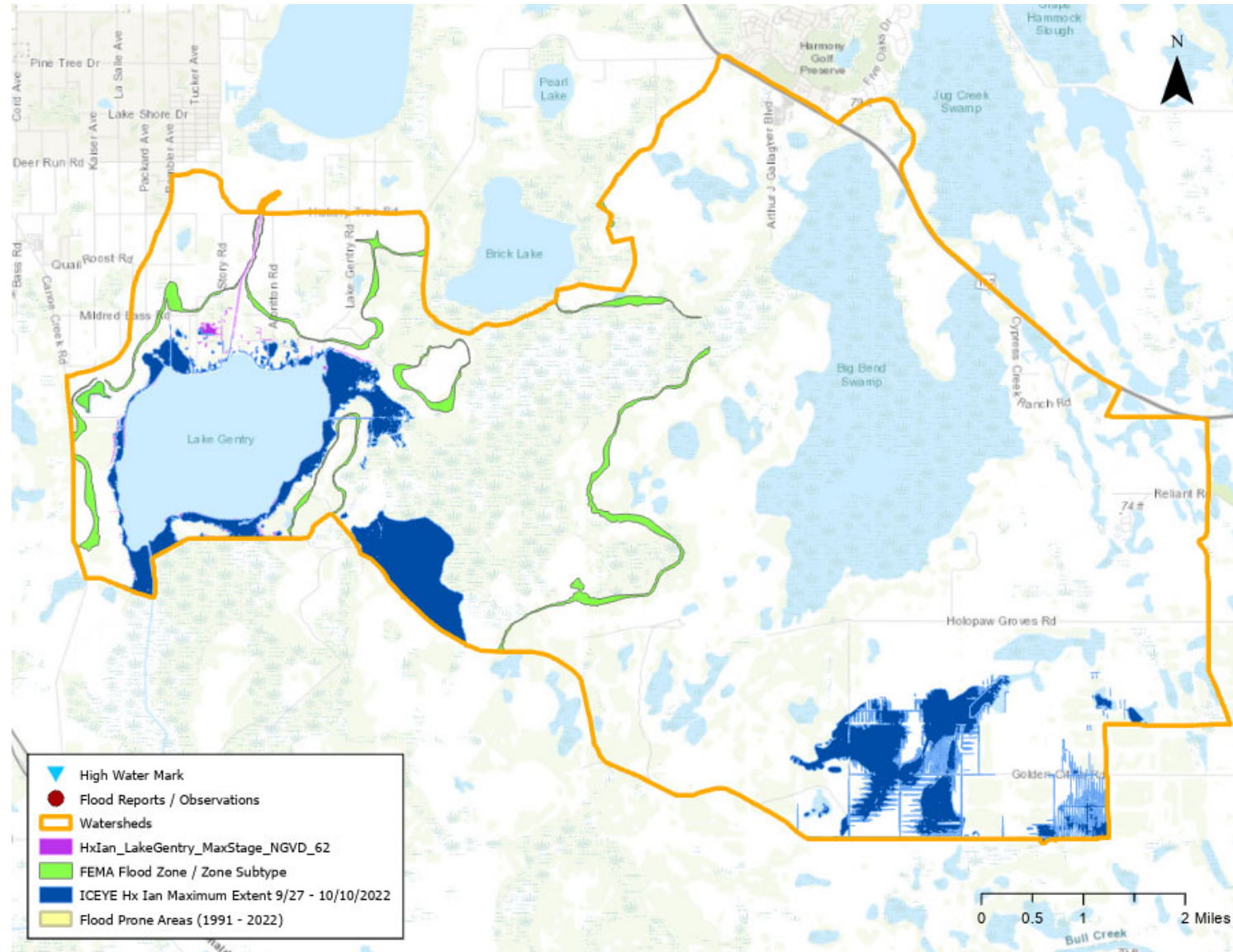
Comparison between ICEYE and Gauge Data – East Lake Toho



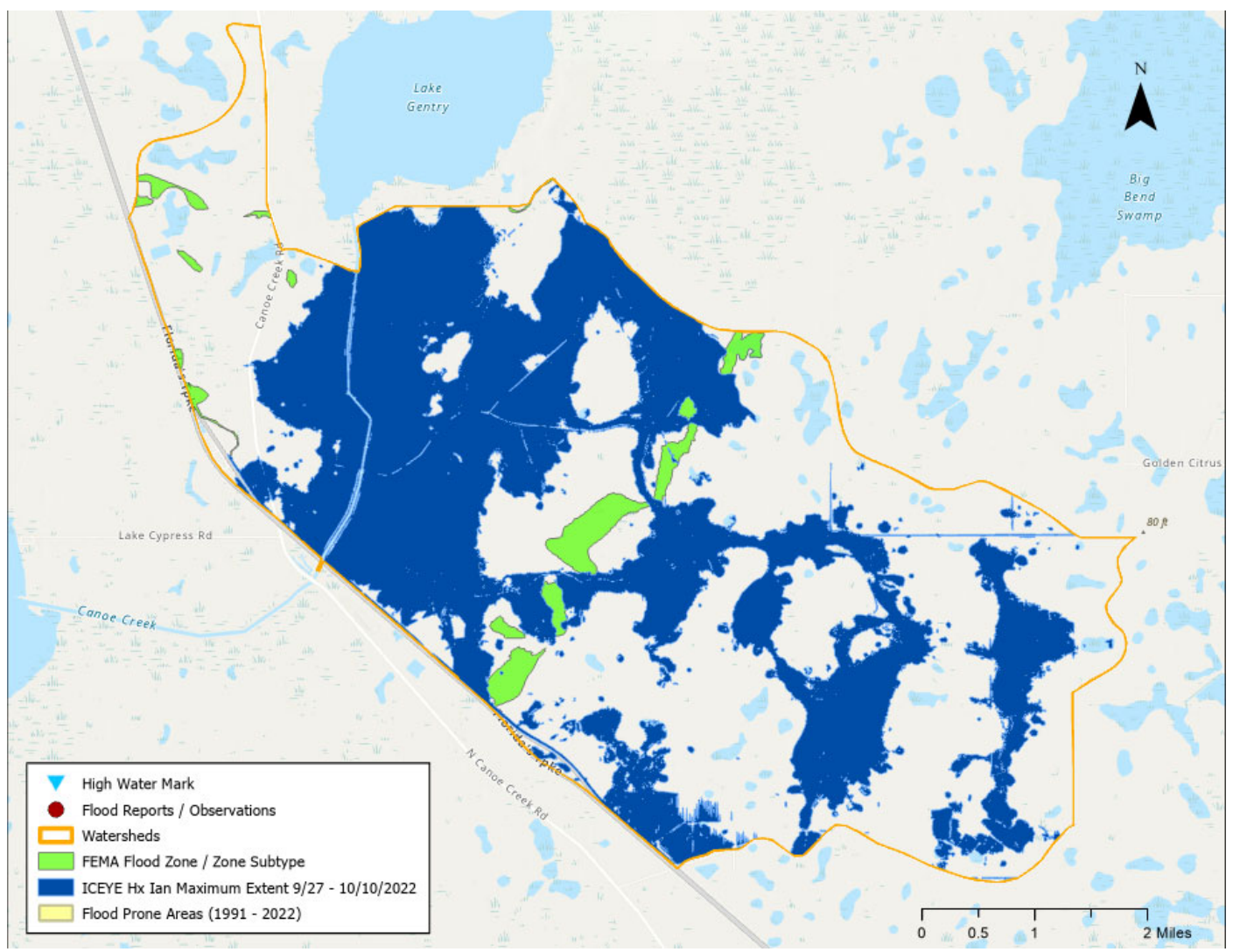
Comparison between ICEYE and Gauge Data – Lake Toho



Comparison between ICEYE and Gauge Data – Lake Gentry



Comparison between ICEYE and Gauge Data – S63A Watershed



Flood Documentation Database (GIS Layers)

- Flood Reports / Observations – Public, Partner Agencies and SFWMD Staff - Survey Submittals
 - Email Reports, Photo Database, Drone Surveys
 - Social Media Crowd Sourced Reports – GIS Corps
- High Water Mark – SFWMD, State EOC/FDEM, and USGS
- Flood Extent – Hx Ian ICEYE maximum flood extent and depth and stage derived flood extent estimates
 - Flood Extent Area and Volume Summary – Area and volume calculated from ICEYE raster (SAR Technology)
- Historical Event Impact Areas – Compiled from web resources and agency reports (SFER March 2024)
 - Flood Event Summary Documentation Table – Summary of records from the NOAA National Centers for Environmental Information (NCEI) Storm Events Database (Under development)
- Flood Prone Areas (1991 – 2022) – Areas identified based on historical flood observations and reports
 - Flood Prone Area Event Summary Table – Summary of flood documentation per flood prone area

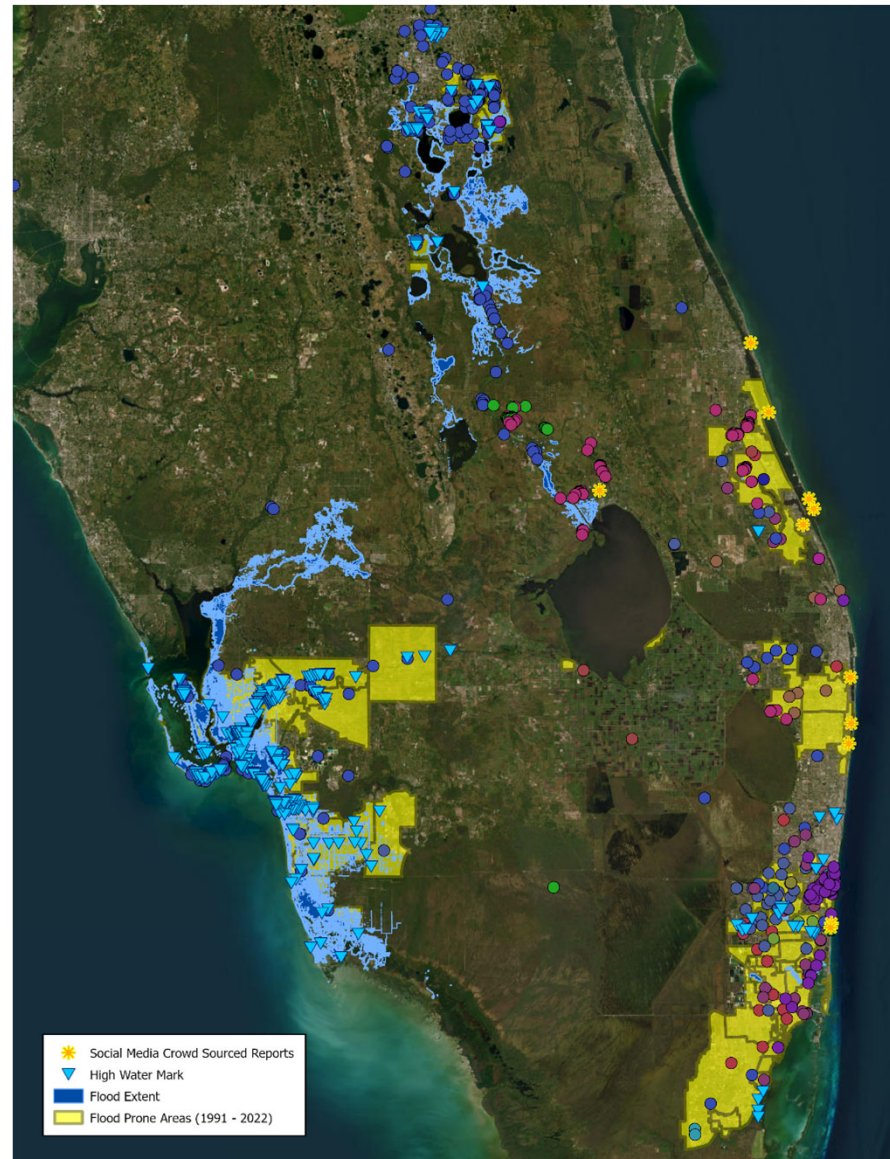
2024 Wet Season Tools

➤ South Florida Flood Information Resource HUB

- <https://sfresiliency-sfwmdgis.hub.arcgis.com/>
- Document the Flood Survey: [sfwmd.gov\FloodingApp](https://sfwmd.gov/FloodingApp)
- Who to Contact:
<https://apps.sfwmd.gov/WAB/LocalContactViewer/index.html>
- Resource Web Application
 - Photo Viewer
 - Event Viewer / Summary

Flood Observations with Flood Prone Areas

[Web Map](#)



2024 Wet Season Stakeholder Engagement


- Open Flood Observations Survey for Public Use with support from Resiliency Partners for broader engagement
- Encourage Resiliency partners to mark and collect high water marks and document using SFWMD's high water mark survey
- Coordinate with USGS on the identification of locations to deploy flood sensors.

9. SFWMD 2023 King Tide Season

Carolina Maran on behalf of Todd Kimberlain, Lead Meteorologist, SFWMD

2023 King Tide Season Communications

- Early outlook shared Thursday, September 7, 2023
- Weekly updates and two interim updates sent to over 290 *King Tide Forecasts* subscribers
 - Meteorological (wind and wind direction, sea surface temperature, sea level pressure, any major weather systems)
 - Oceanic (swells)
 - Anticipated impacts - coastal areas with potential flooding risks
- Last tidal outlook forecast period: Monday, November 27 through Dec 4.
 - A season wrap-up communication will follow.
- These communications were made possible by the SFWMD meteorologists who developed the District's Tidal Outlook:
 - Todd Kimberlain, Lead Meteorologist
 - Mark Nissenbaum, Senior Meteorologist
- Communications will resume in next year, ahead of the 2024 King Tide Season.



2023 King Tides Forecast

With approximately 700 miles of shoreline and 40+ gravity coastal structures upstream of tidally influenced canals, the South Florida Water Management District (SFWMD)'s water management mission is influenced by sea levels. Along with rainfall and surge, high tide events also contribute to flood risks in South Florida. The variation in strength and direction of the gravitational pull of the moon, especially during the new and full moon phases in the Fall, contributes to King Tide occurrences.

As the 2023 King Tide Season approaches, SFWMD is continuing efforts for the monitoring, operational response and documentation of these events. As part of our efforts, we're sharing some of our new data and tools with the public as they're available.

Extreme high tides are predicted by the National Oceanographic and Atmospheric Administration (NOAA) to peak above 2.5-3 feet Mean Lower Low Water (MLLW) along the South Florida Coast during the following days (peak varies by location):


- September 13-15 (New Moon)
- September 26 to October 4 (Full Moon)
- October 14-19 (New Moon)
- October 24 – November 2 (Full Moon)
- November 11-17 (New Moon)
- November 24-29 (Full Moon)

WEEKLY TIDAL OUTLOOK FORECAST

To improve these high tide forecasts, SFWMD is launching a weekly Tidal Outlook Forecast, published every Monday, to report conditions – such as wind strength and direction, ocean currents – that can cause tides to occur higher or lower than predicted at certain locations. These weekly updates are intended to be informational for interested stakeholders and the public. **To subscribe to receive these updates, please visit our [email signup](#) page, enter your email address and check the "King Tide Forecast" option.**

Enhanced Tidal Forecast in Partnership with University of Miami

SFWMD and the University of Miami (UM) - Rosenstiel School of Marine, Atmospheric, and Earth Science are partnering to improve current tidal predictions available from the National Oceanic and Atmospheric Administration (NOAA). These improved predictions will use dynamic model inputs that account for sea level rise and predict tidal conditions associated with meteorological and oceanic factors (i.e., wind, wind direction, sea surface temperature, and swell energy).



Weekly King Tide Forecast

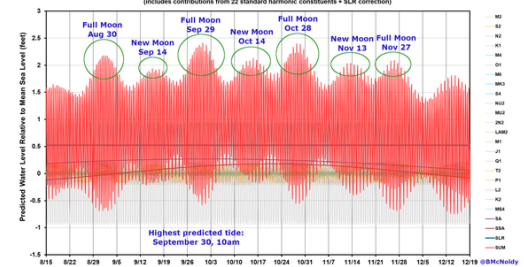
The South Florida Water Management District's Tidal Outlook for the forecast period of **September 11 through September 18, 2023 is now available**. Enhanced high tides are expected along Florida's upper east coast, which includes the coastal areas of Martin and St. Lucie counties. Only slight tidal increases are expected along the lower east coast, which includes Palm Beach, Broward, and Miami-Dade counties. As Hurricane Lee moves north through the Atlantic, a westward or eastward shift in its path has the potential to increase or decrease tidal swelling, respectively. No meteorological factors – such as wind strength and direction, sea level pressure – are expected to enhance tides through this Wednesday.

View the weekly Tidal Outlook [HERE](#).

SFWMD is continuing efforts for the monitoring, operational response and documentation of these events. These weekly updates are intended to be informational for interested stakeholders and the public. If conditions warrant, additional updates may be issued throughout the forecast period.

Hourly Water Level Predictions at Virginia Key, FL for 2023

(Includes contributions from 22 standard harmonic constituents + SLR correction)



Source: University of Miami

High tides are predicted by the National Oceanographic and Atmospheric Administration (NOAA) to peak above 2.5-3 feet Mean Lower Low Water (MLLW) along the South Florida Coast during the following days in 2023 (peak varies by location):

- September 13-15 (New Moon)
- September 26 to October 4 (Full Moon)
- October 14-19 (New Moon)
- October 24 to November 2 (Full Moon)
- November 11-17 (New Moon)
- November 24-29 (Full Moon)

To receive these weekly updates in 2024, please visit our [email signup](#) page, enter your email address and check the "King Tide Forecast" option.

SFWMD-UM Enhanced NOAA Tide Predictions

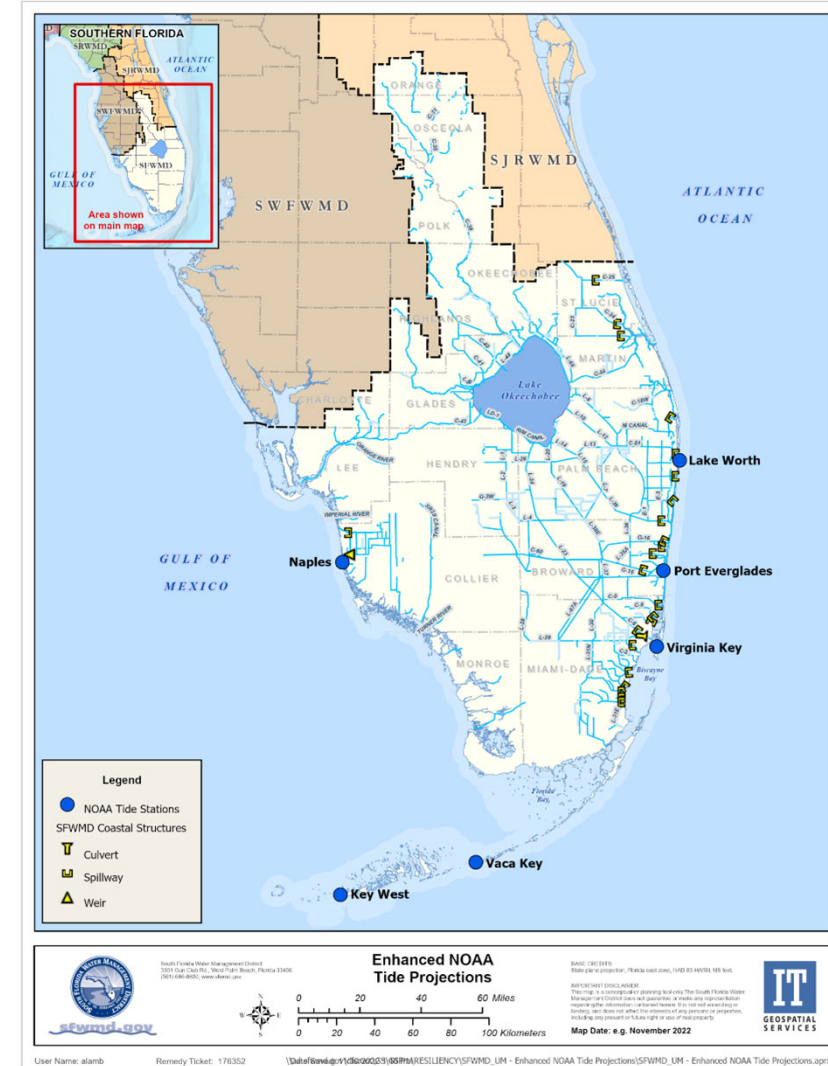
- SFWMD and University of Miami (UM) - Rosenstiel School of Marine, Atmospheric, and Earth Science – partnership to enhance NOAA tidal predictions
 - Project kick off - December 2022 (reaching mid-point)
 - The enhanced predictions were used to inform the Tidal Outlook and weekly King Tide updates
- Improved predictions use dynamic model inputs that account for sea level rise and predict tidal conditions associated with meteorological and oceanic factors (i.e., wind, wind direction, sea surface temperature, and swell energy).
- In 2024: automated forecasts available on the SFWMD's [Resilience Metrics Hub](#) for six tidal stations along South Florida's east and west coasts: Virginia Key, Port Everglades, Lake Worth, Key West, Vaca Key, and Naples.



Project Team

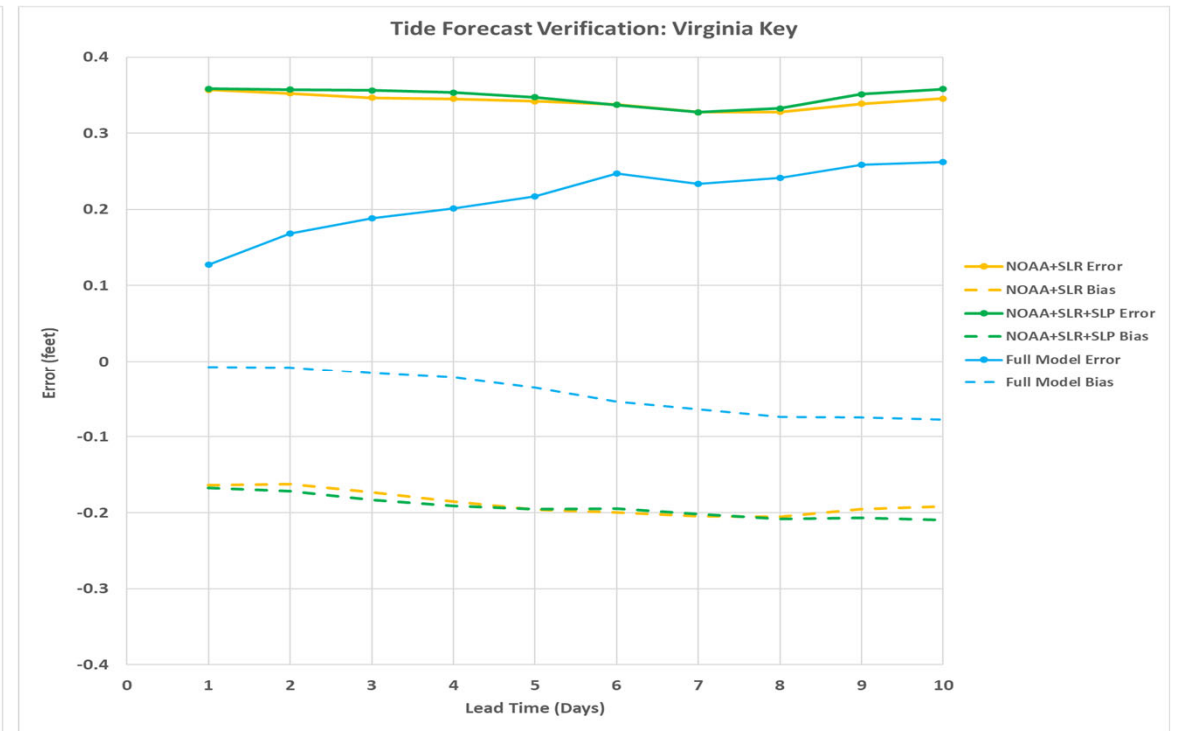
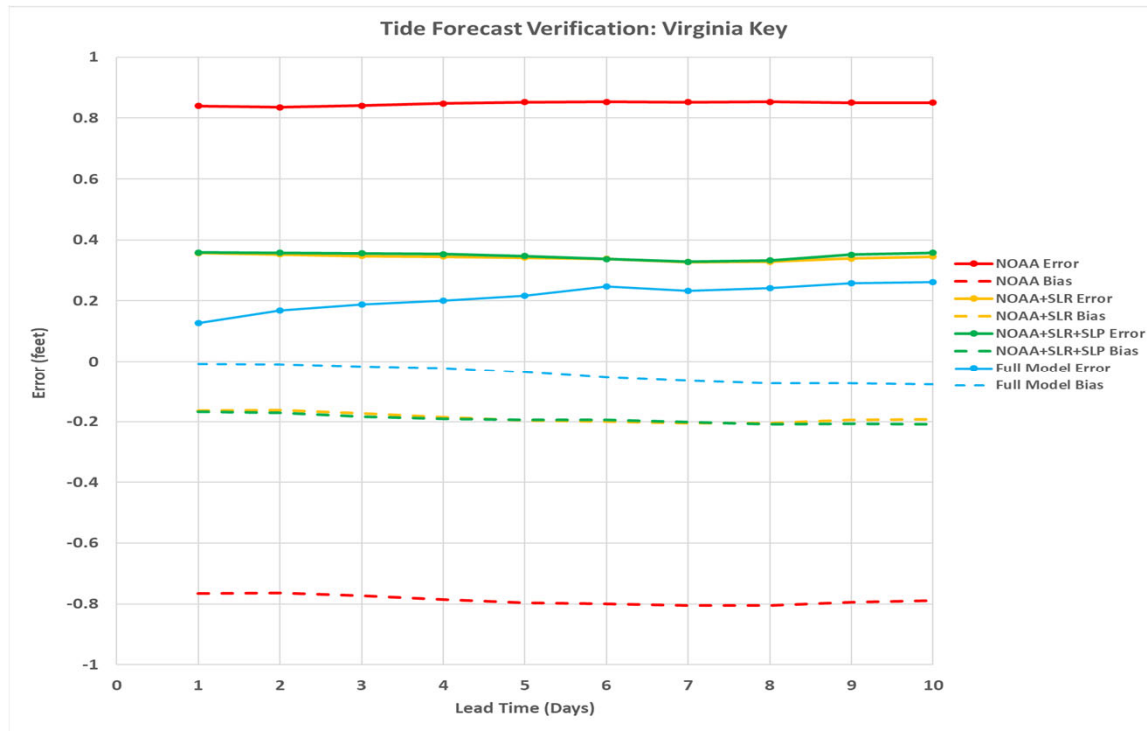


- Todd Kimberlain, SFWMD Technical Advisor
- Mark Nissenbaum, SFWMD Technical Advisor
- Carolina Maran, SFWMD Technical Advisor
- Nicole Cortez, SFWMD Project Manager
- Brian McNoldy, UM Principal Investigator and Project Manager
- Brian Soden, UM Principal Investigator
- Nathan Taminger, UM Research Associate



SFWMD-UM Enhanced NOAA Tide Predictions

Model predictions perform better than NOAA predictions + SLR




2023 King Tide Observations:

External Affairs, Drone, EM, Field Ops and Resiliency Teams Collaboration

- Two King Tide Events considered of low to moderate significance
 - September 29 – October 3: Highest peak of the season (50 Records)
 - October 30/31: Full Moon King Tide influenced by warm waters, last swell energy from Post-Tropical Storm Tammy and strong onshore winds (29 Records)
- Coastal Structures
- GIS provided technical training, equipment and logistical support to Field Stations
 - External Affairs (July)
 - Fort Lauderdale, Miami and Homestead (September 9)
 - West Palm and Okeechobee (October 17)

High Water Mark Survey



Questions with a red * are required.

Event type*

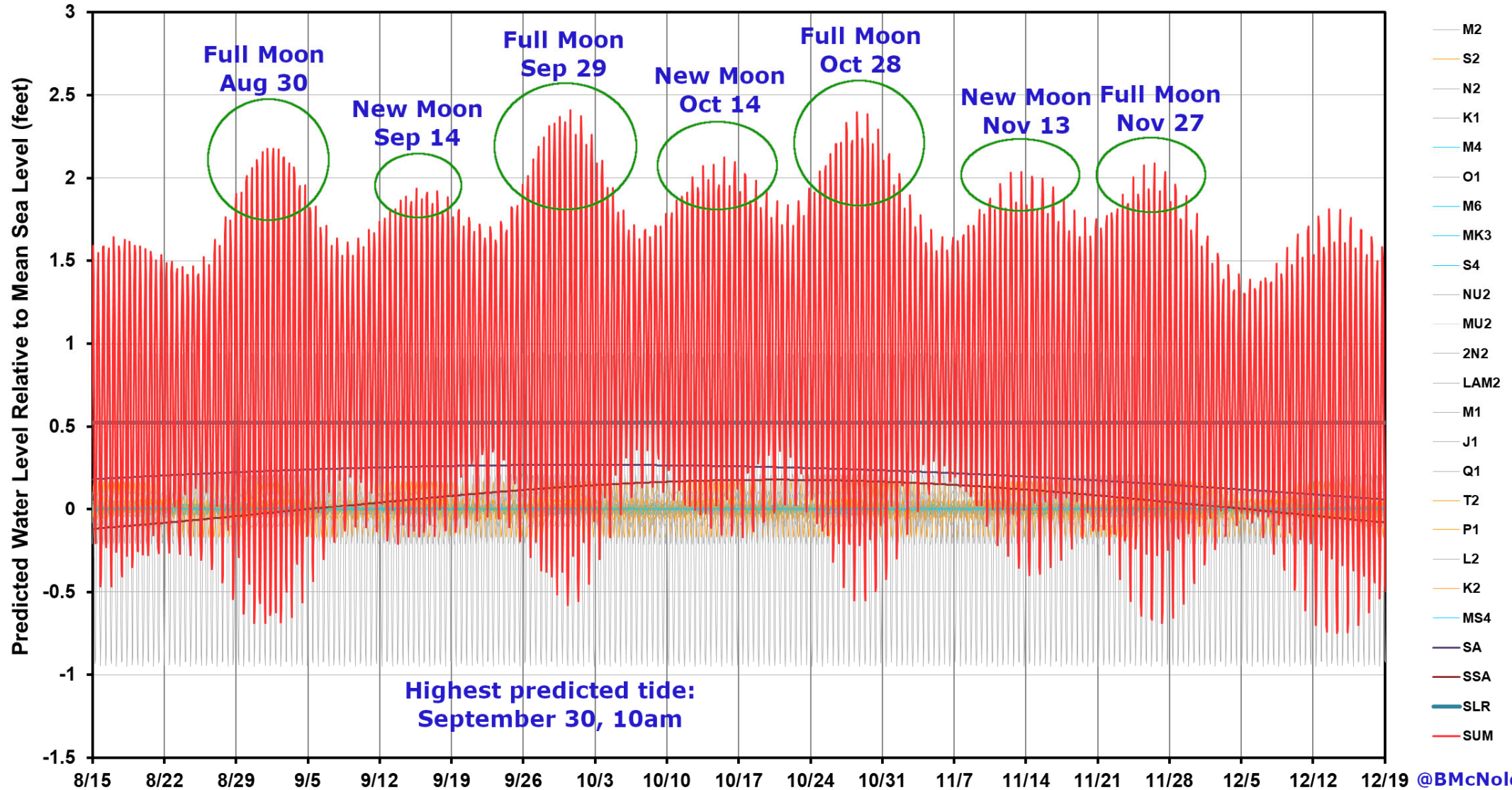
High Tide/Tidal Flooding

Rainfall/Storm/Hurricane

Both High Tide and Heavy Rain

Hourly Water Level Predictions at Virginia Key, FL for 2023

(includes contributions from 22 standard harmonic constituents + SLR correction)



Classic King Tide Event

28 September – 4 October



Brian McNoldy

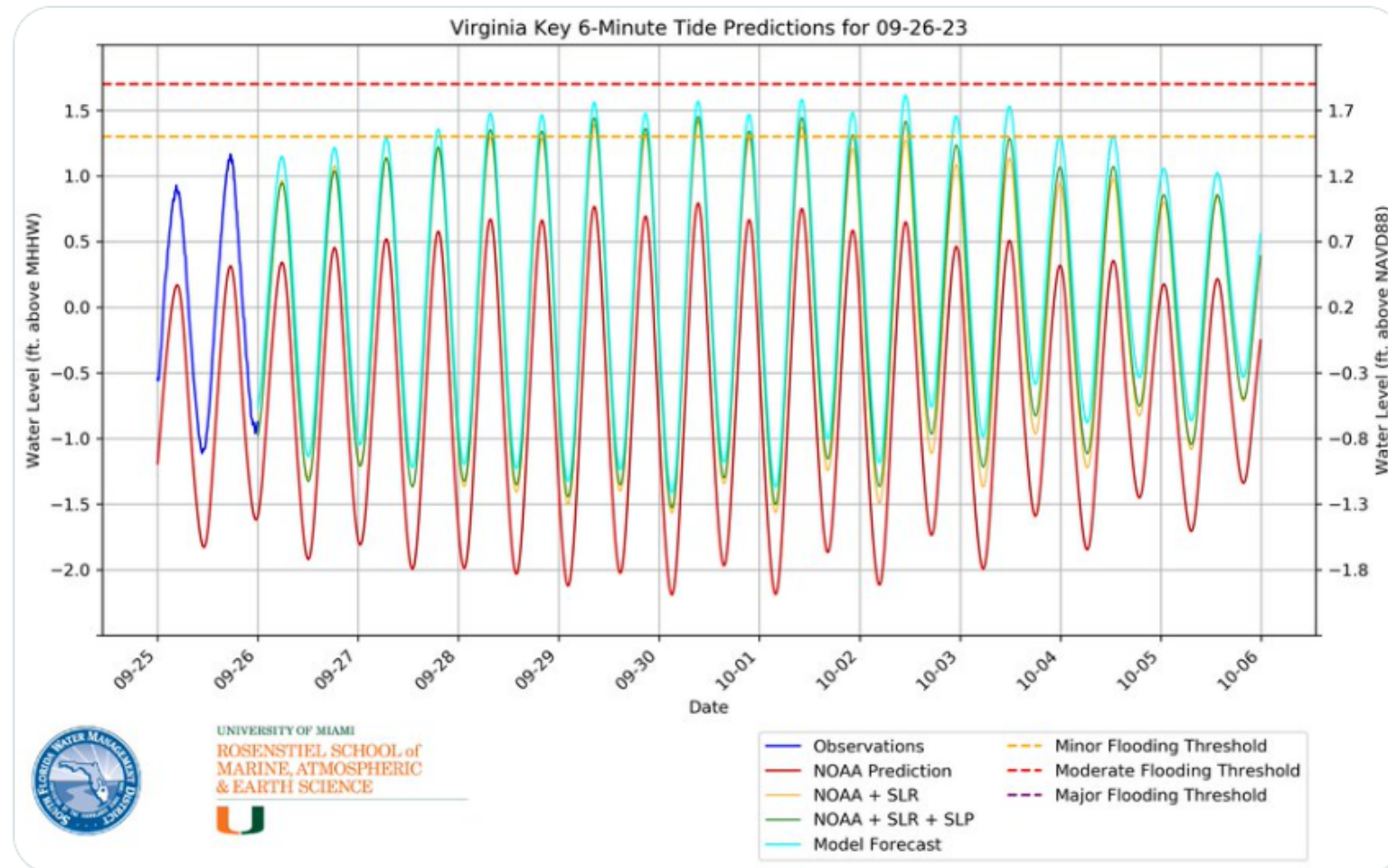
@BMcNoldy



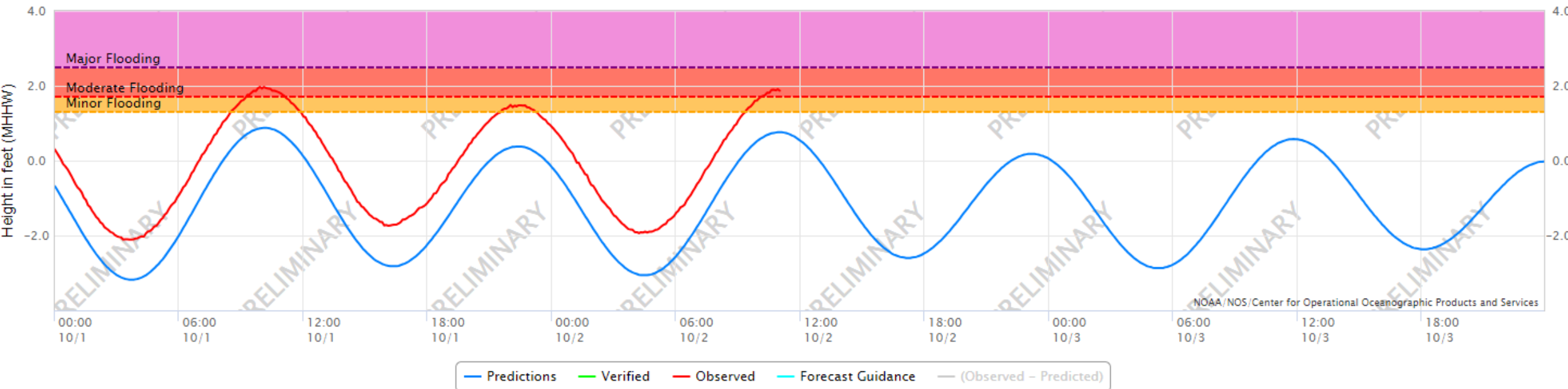
Confidence is increasing for tidal flooding issues in the #Miami area for 7-8 days near every high tide beginning on Wednesday.

bmcnoldy.earth.miami.edu/tide/

#KingTide

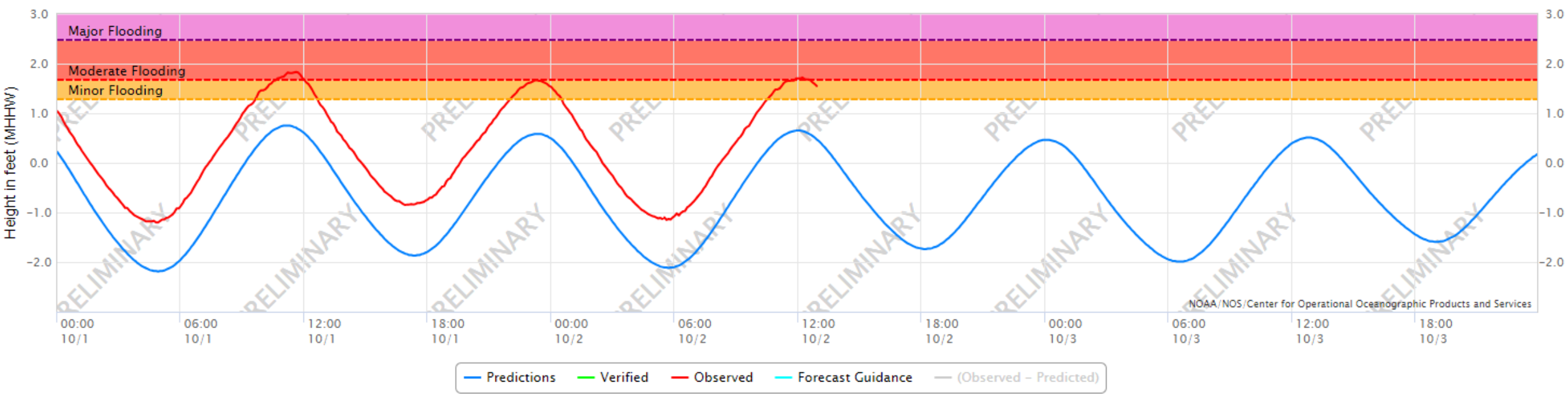


NOAA/NOS/CO-OPS
Observed Water Levels at 8722670, Lake Worth Pier, Atlantic Ocean FL
From 2023/10/01 00:00 LST/LDT to 2023/10/03 23:59 LST/LDT



NOAA/NOS/Center for Operational Oceanographic Products and Services

NOAA/NOS/CO-OPS
Observed Water Levels at 8723214, Virginia Key, Biscayne Bay FL
From 2023/10/01 00:00 LST/LDT to 2023/10/03 23:59 LST/LDT



**South Florida Water Management District
Tidal Outlook
10:55AM Monday, October 02, 2023 (tbk/mrn)**

FORECAST PERIOD: 2 - 9 October 2023

DISCUSSION:

Over the weekend, a large area of strong northerly to northwesterly winds occurred over the northwestern Atlantic Ocean in association with a frontal low pressure system located offshore the New England coast. The swells generated by these winds began arriving along the east coast of the SFWMD last night and will peak on Tuesday before diminishing by early Wednesday. The combination of the swell energy and higher-than-normal astronomical tides just after full moon is expected to cause minor to moderate coastal flooding along the east coast of the SFWMD at high tide through mid-week. After that time, water levels are likely to quickly subside to near-normal due to the absence of any tide-enhancing factors.

NEXT SCHEDULED UPDATE: 11 am, 9 October 2023



A1A HOLLYWOOD, FL



A1A HOLLYWOOD, FL



***DOWNTOWN WPB
2 OCT 2023***



Hollywood Beach.

Reels · 1h · Azimov · 🌐

[#North beach Hollywood](#), [#southflorida](#)



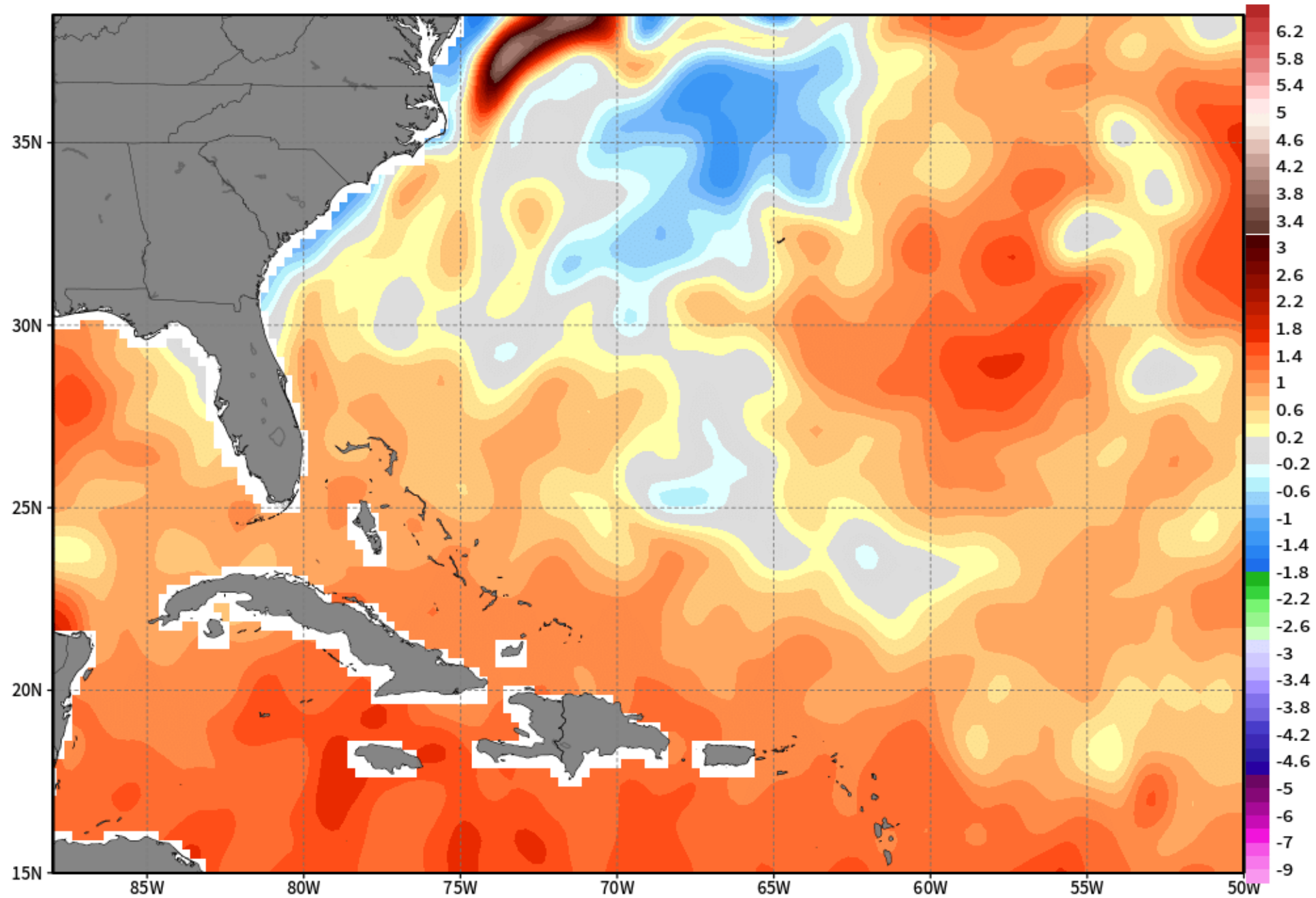
👍❤️😱 Christopher Harrison and 6 others · 1 comment · 91 views

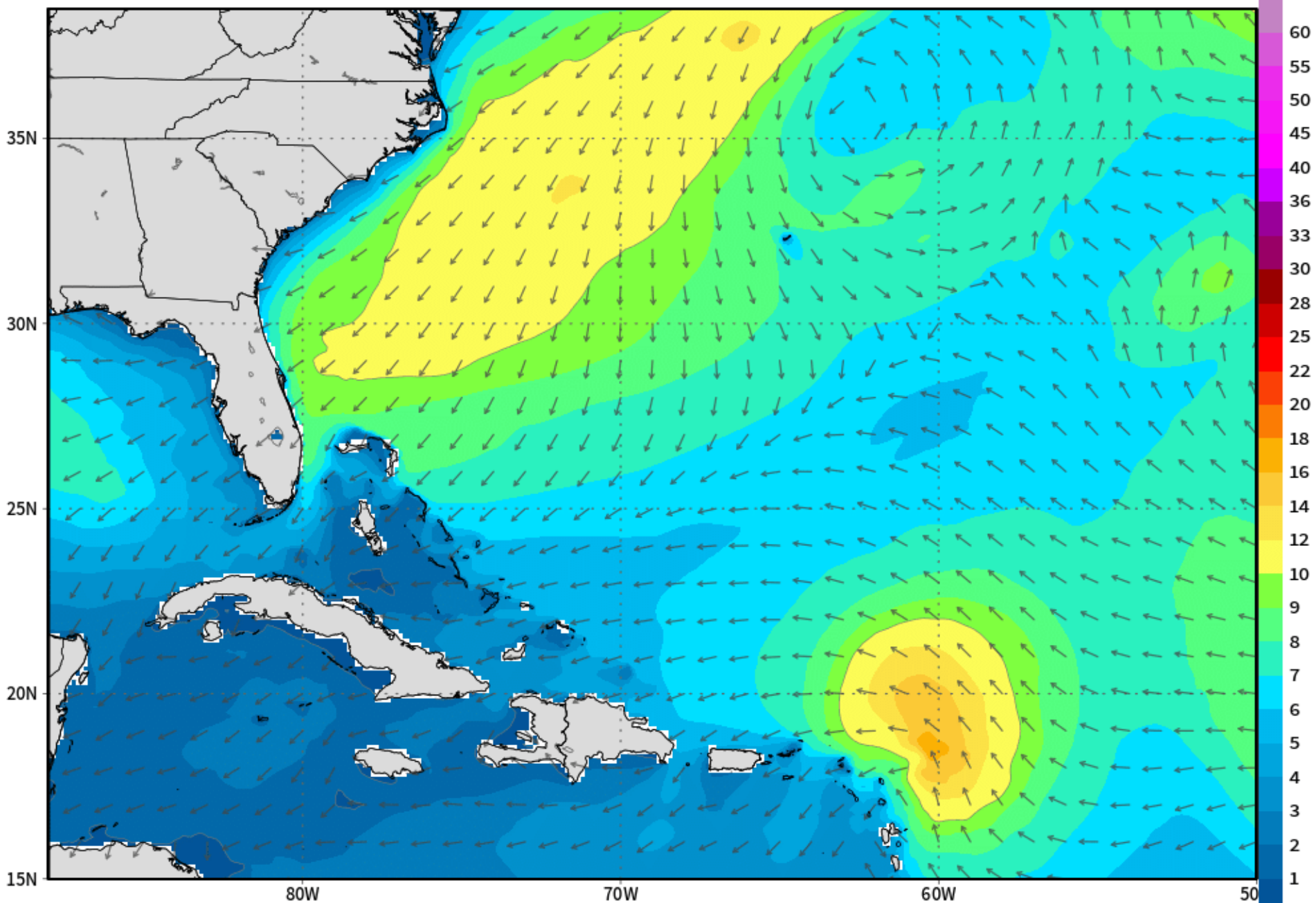
👍 Like

💬 Comment

➦ Share



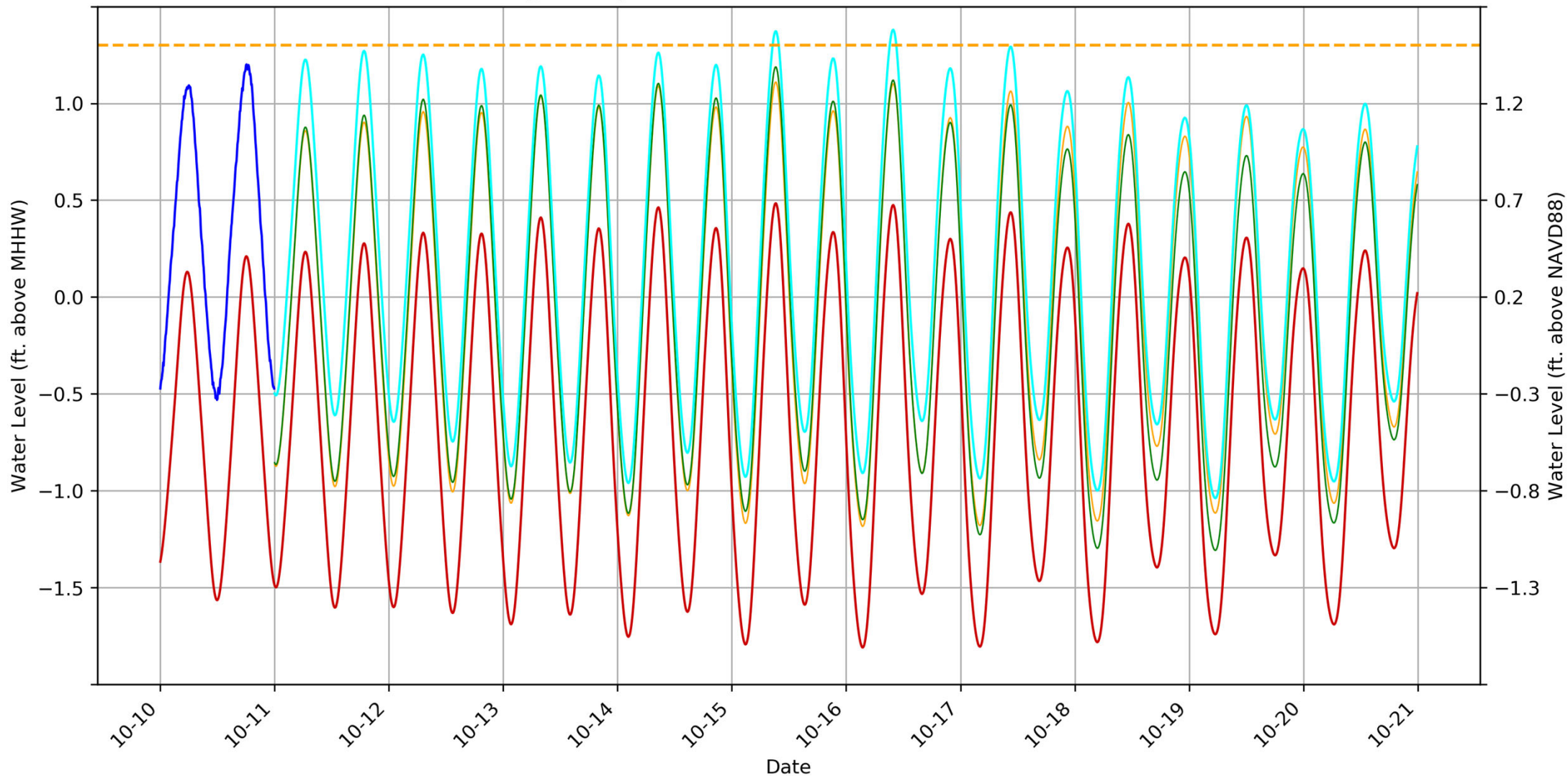




Minor King Tide Event (New Moon)

15 – 16 October

Virginia Key 6-Minute Tide Predictions for 10-11-23



UNIVERSITY OF MIAMI
**ROSENSTIEL SCHOOL of
 MARINE, ATMOSPHERIC
 & EARTH SCIENCE**



- Observations
- NOAA Prediction
- NOAA + SLR
- NOAA + SLR + SLP
- Model Forecast
- Minor Flooding Threshold
- Moderate Flooding Threshold
- Major Flooding Threshold

King Tide causes minor flooding across Southwest Florida

Writer: [Rachel Murphy](#)

Published: October 12, 2023 / Updated: October 12, 2023



Minor Flooding on Park Avenue in Fort Myers (CREDIT: Lenny Smith)

King Tide Event (Full Moon)

26 October – 1 November

**South Florida Water Management District
Tidal Outlook
9:33AM Monday, October 30, 2023**

FORECAST PERIOD: 30 October - 6 November 2023

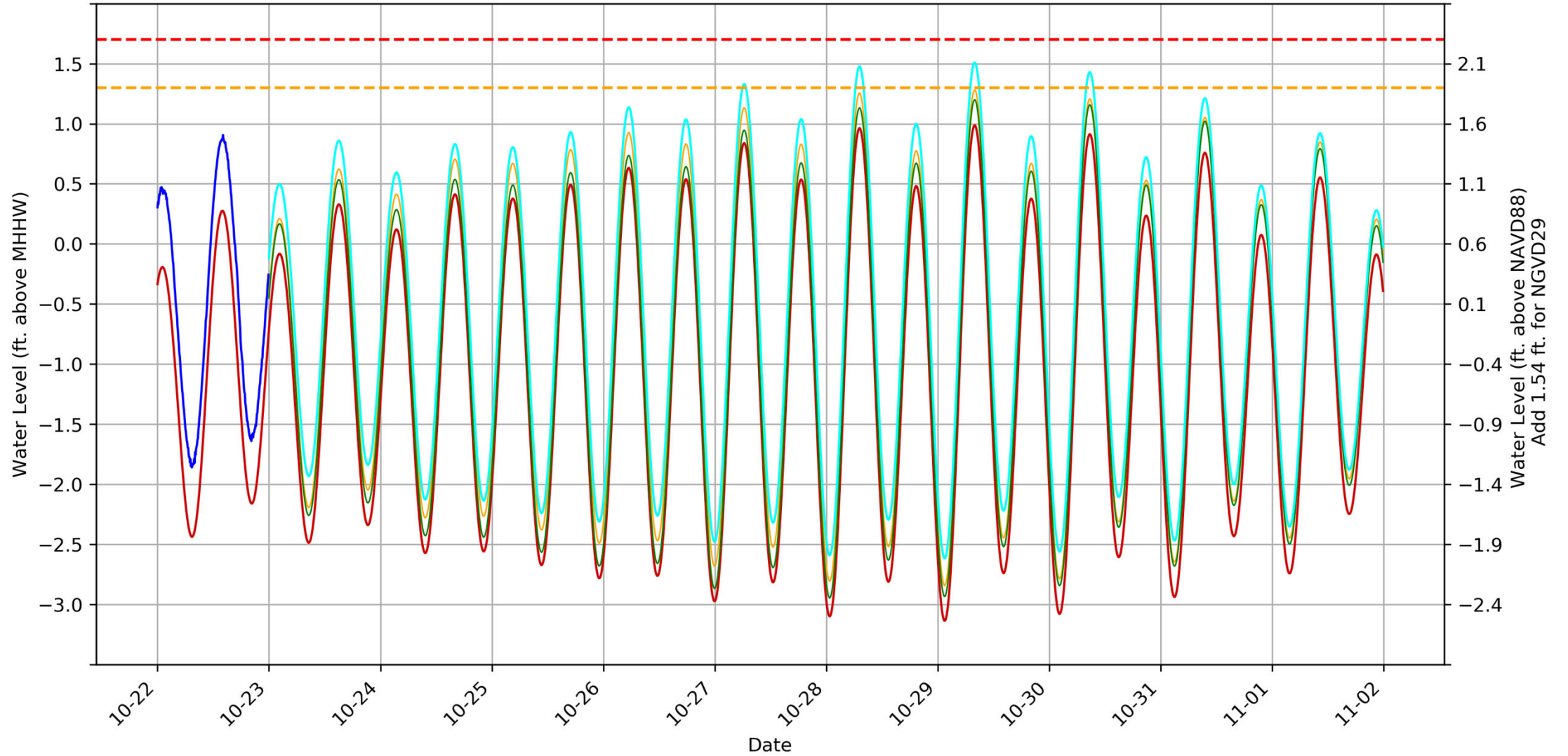
DISCUSSION:

Moderate coastal flooding at high tide will continue along the east coast of the SFWMD and the Florida Keys through Tuesday, primarily due to the Full Moon that just occurred on 28 October and very warm ocean temperatures. Water levels in some locations could be the highest since Hurricane Nicole last November. In contrast, no flooding concerns are expected along the west coast of the SFWMD.

Beginning on Wednesday, water levels are forecast to subside along the east coast of the SFWMD as the Full Moon wanes and significantly so by the weekend, with no further coastal flooding anticipated. However, minor to moderate coastal flooding could continue in portions of the Florida Keys through the weekend.

NEXT SCHEDULED UPDATE: 11 am 6 November 2023

Lake Worth 6-Minute Tide Predictions for 10-23-23

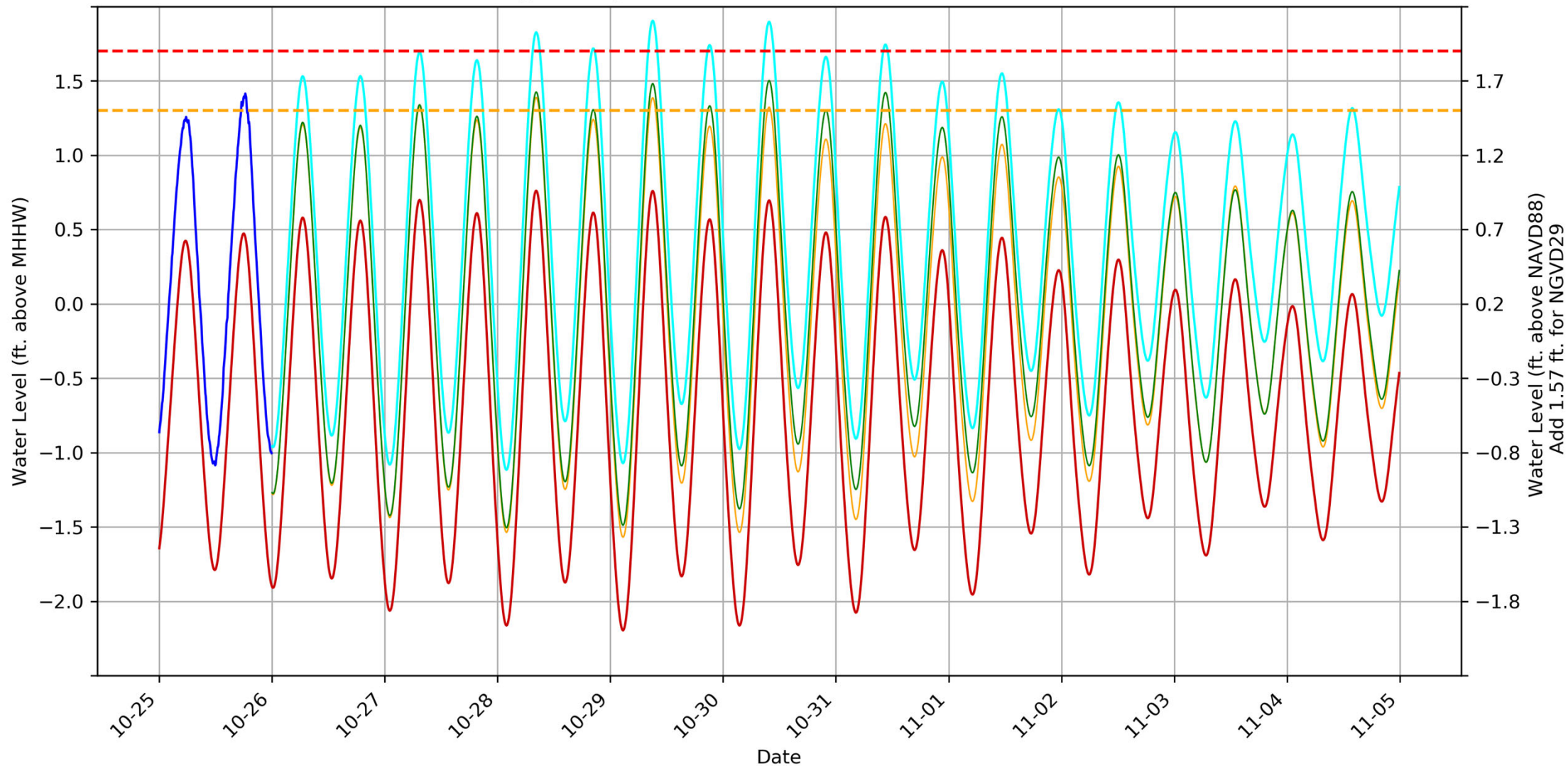


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 MARINE, ATMOSPHERIC
 & EARTH SCIENCE**



- Observations
- NOAA Prediction
- NOAA + SLR
- NOAA + SLR + SLP
- Model Forecast
- Minor Flooding Threshold
- Moderate Flooding Threshold
- Major Flooding Threshold

Virginia Key 6-Minute Tide Predictions for 10-26-23



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 MARINE, ATMOSPHERIC
 & EARTH SCIENCE**



- Observations
- NOAA Prediction
- NOAA + SLR
- NOAA + SLR + SLP
- Model Forecast
- Minor Flooding Threshold
- Moderate Flooding Threshold
- Major Flooding Threshold



King Tide Event
(Breezy Northeasterly Winds
After a Frontal Passage)

5 - 9 November

South Florida Water Management District
Tidal Outlook
11:25AM Monday, November 06, 2023

FORECAST PERIOD: 6 - 13 November 2023

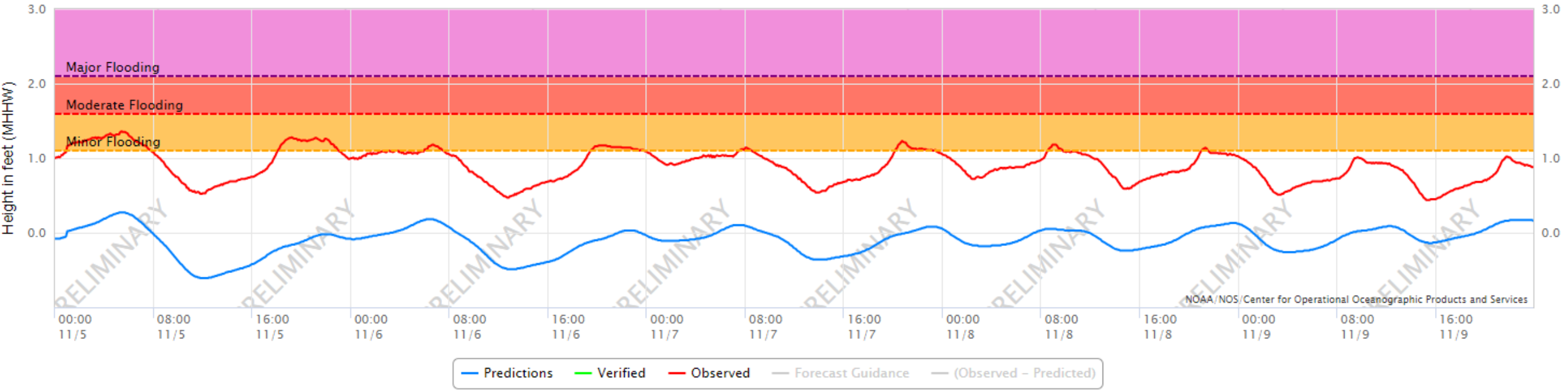
DISCUSSION:

Minor coastal flooding at high tide is possible along portions of the east coast of the SFWMD through Wednesday, 8 November. These enhanced tides are primarily driven by northeasterly winds following a frontal passage, generating swells that arrive unobstructed along the east coast of the SFWMD.

Early next week, the risk of minor coastal flooding could increase along portions of the east coast of the SFWMD, mostly due to the New Moon on Monday, 13 November.

NEXT SCHEDULED UPDATE: 11 am 13 November 2023

NOAA/NOS/CO-OPS
Observed Water Levels at 8723970, Vaca Key, Florida Bay FL
From 2023/11/05 00:00 LST/LDT to 2023/11/09 23:59 LST/LDT



NOAA/NOS/Center for Operational Oceanographic Products and Services

King Tide Event (New Moon & El Niño-Type Low)

14 - 16 November

South Florida Water Management District
Tidal Outlook
10:35AM Monday, November 13, 2023

FORECAST PERIOD: 13 - 20 November 2023

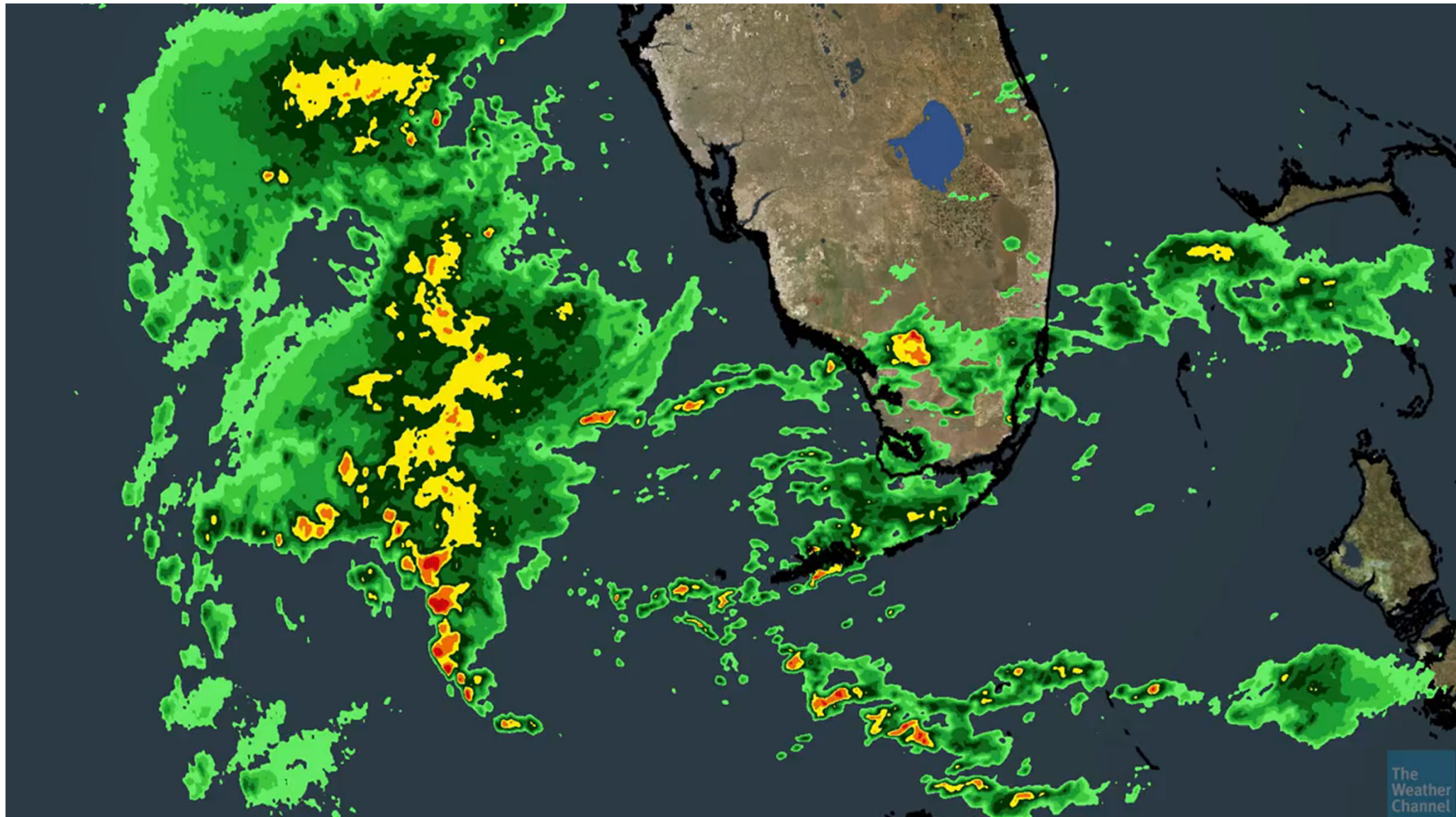
DISCUSSION:

Due to the New Moon on 13 November, enhanced tidal levels are expected along the SFWMD coastline, but they will remain below flood stage in all areas except for the Florida Keys.

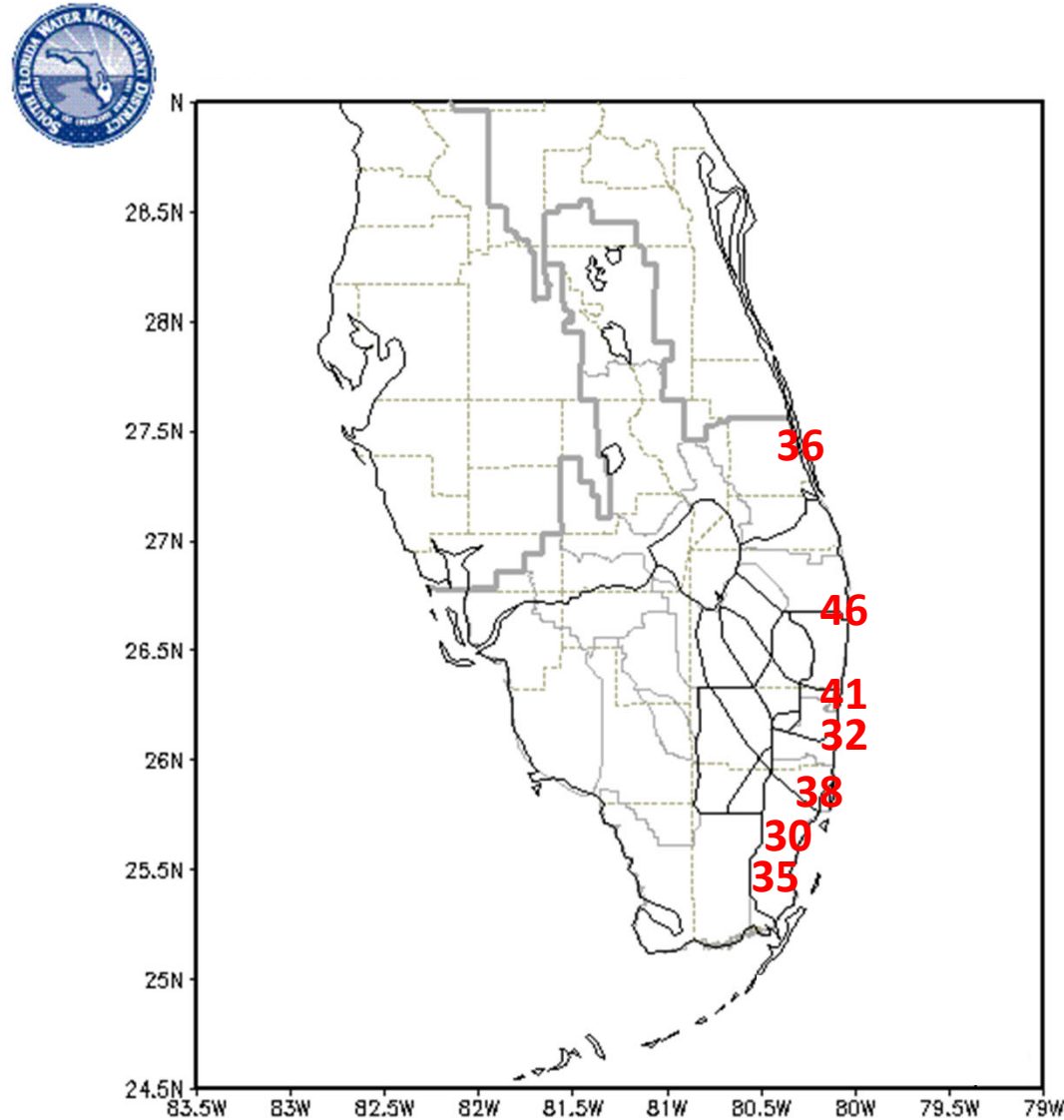
Next, a complex low-pressure system is forecast to develop near or over south Florida midweek. When the low-pressure system enters the western Atlantic Ocean, it will intensify, producing strong winds and generating swells that will arrive along the east coast of the SFWMD. As a result, minor coastal flooding is possible along the east coast of the SFWMD on Thursday 16 November through Saturday 18 November. coastal flood threat could continue into early next week along portions of the Florida Keys. No coastal flooding is expected along the west coast of the SFWMD.

NEXT SCHEDULED UPDATE: 11 am 20 November 2023

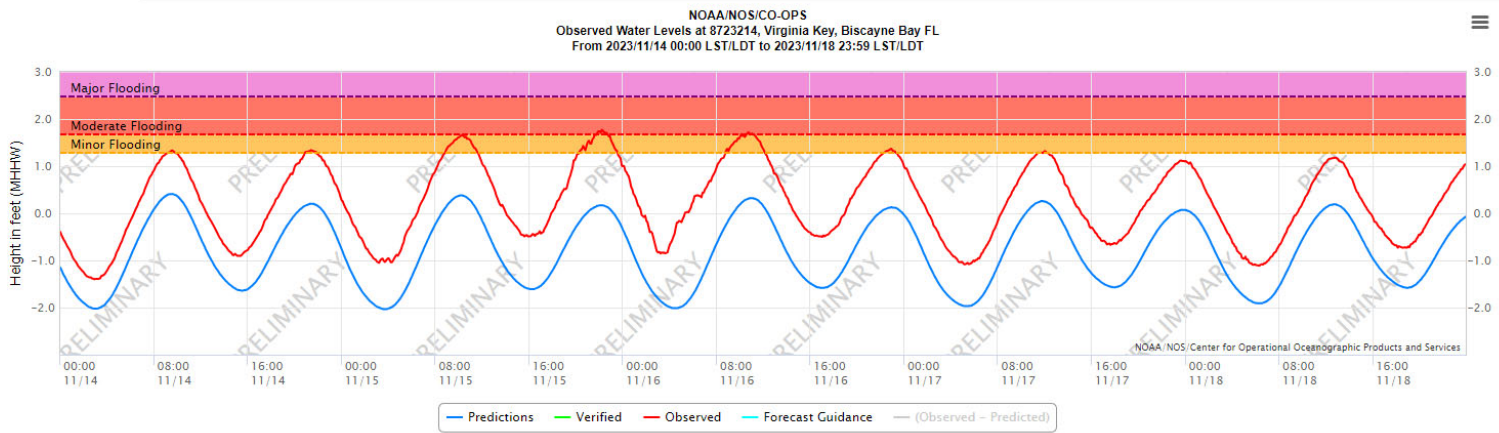
Mesolow Tracking Just South of Area



Peak Wind Gusts, 15-16 November



Moderate Coastal Flooding & Heavy Rainfall



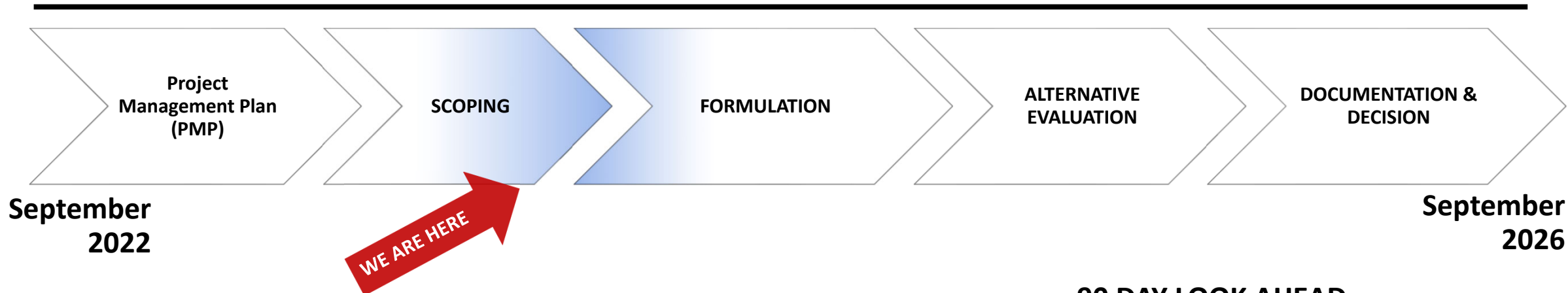
**EDGEWATER
15 NOV 2023**

Summary

- SFWMD weekly tidal outlooks correctly anticipated elevated tidal levels that caused minor to moderate coastal flooding in the Fall 2024.
- Special outlooks were occasionally issued outside of the normal issuance time (Monday morning) for notably significant events.
- Tidal outlooks are meant to provide a broad summary of tidal conditions but could contain additional detailed information in the future.
- The west coast of the SFWMD will be covered more frequently in the future, now that a Naples tidal forecast model is operational.
- A future goal could be more comprehensive and probabilistic outlooks.
- As the incidence of coastal flooding increases, the SFWMD might monitor tidal forecasts and issue tidal outlooks outside of King Tide season.

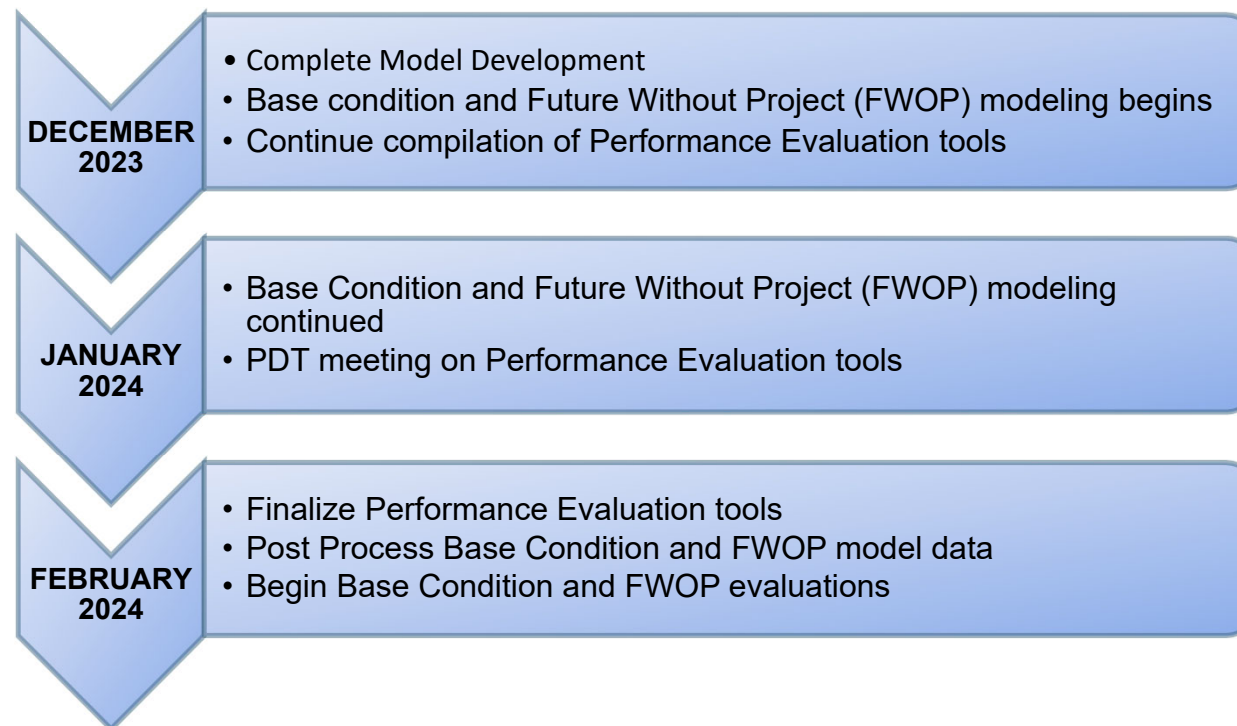
10. USACE / SFWMD C&SF Flood Resiliency Study Updates

Tim Gysan, P.E., Resilience Senior Project Manager, USACE and Jennifer Smith, Senior Project Manager, SFWMD



MILESTONE	DATE
Scoping Meetings	✓ January 2023
Alternatives Milestone Meeting (AMM)	✓ June 2023
Tentatively Selected Plan (TSP)	April 2025
Draft Integrated Report Release	June 2025
Agency Decision Milestone (ADM)	
Final Integrated Report Release	July 2026
Chief's Report	September 2026

90 DAY LOOK AHEAD



SOUTHEAST FLORIDA PROJECT INTEGRATION

Current Activities Update

USACE-NFS Integration Workshops

- **Date:** – date TBD
- **Topic:** Bring Non-Federal Sponsors of projects together with USACE teams to discuss concepts developed during September USACE workshop focused on EJ and Comp Benefits

Joint Environmental Justice Working Group

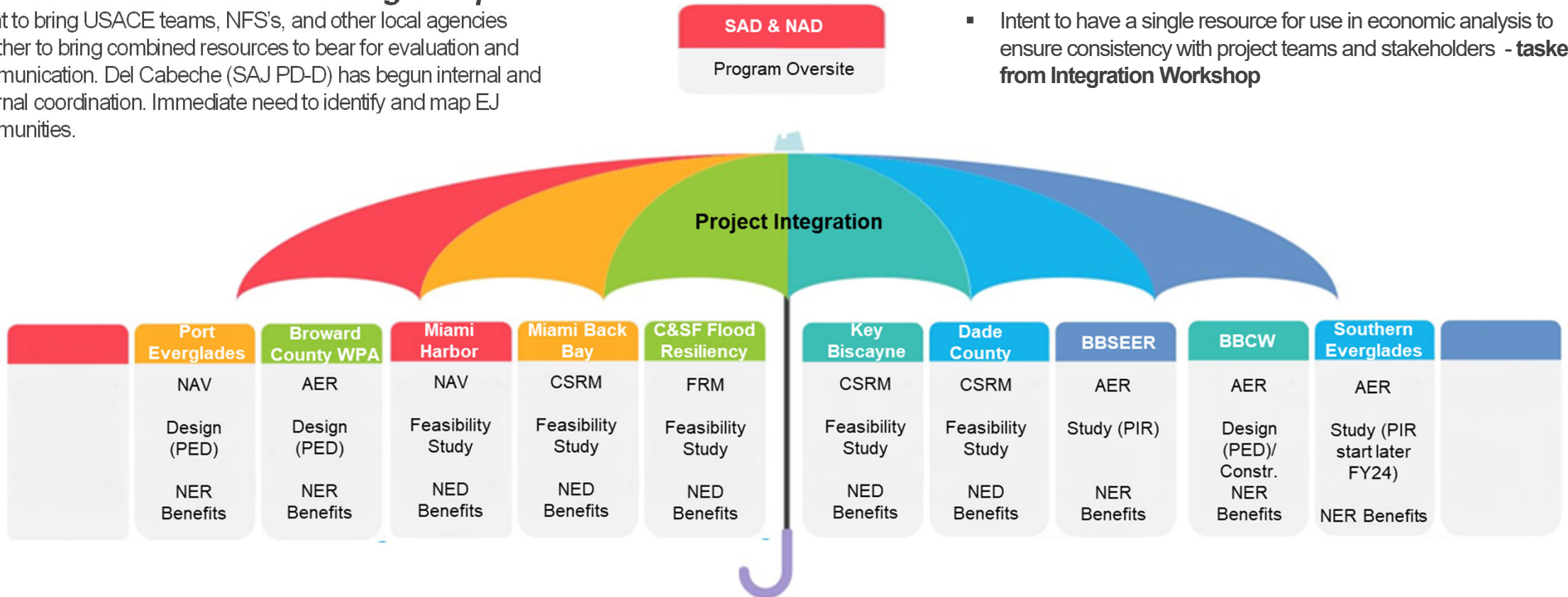
- Intent to bring USACE teams, NFS's, and other local agencies together to bring combined resources to bear for evaluation and communication. Del Cabeche (SAJ PD-D) has begun internal and external coordination. Immediate need to identify and map EJ communities.

USACE Quarterly Integration Newsletter

- **Topic:** Concept is to produce a newsletter each quarter for distribution to agency and public stakeholders to capture status and key messaging for each ongoing project. SAJ CCO is developing an initial draft for review.

Critical Infrastructure Database

- Intent to have a single resource for use in economic analysis to ensure consistency with project teams and stakeholders - **tasker from Integration Workshop**





11. Around the Table Updates from Local, Tribal and State Agencies

12. Public Comment

13. Closing Remarks

14. Adjourn