

### Dealing with Extreme Events: From Planning, Response and Effective Resilience Implementation

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## Water Management & Hurricane Season

- Year-round preparation to ensure operational readiness for hurricanes and other emergencies that could impact water management
- Staff and operate in-house Emergency Operation Center
- Emergency trainings and exercises, testing of equipment
- Coordination with other EOC personnel from partner agencies
- Emergency Modeling information to support local and regional mitigation planning and responses
- Participation in Statewide and Local Mitigation Strategy Committees
- Coordination with local drainage districts before, during and after tropical storms or major rainfall events
- Drought emergency response



## Hurricane Ian, September 28, 2022



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CATEGORY 4 HURRICANE; LANDFALL ON CAYO COSTA (3 PM)



Image Courtesy: Brian McNoldy, UM/RSMAES



Wind

### TS WINDS EXTENDING 180 MILES FROM CENTER

## **Storm Surge**



Hurricane lan Wednesday September 28, 2022 07 AM EDT Advisory 23 NWS National Hurricane Center **User Notes:** Water levels along the immediate coast could reach the following heights above ground level within the indicated areas. Elevated water levels will likely be accompanied by large and destructive waves. Colors are determined by the highest values in the associated forecast peak surge range. Values shown on this graphic are inclusive of tide.

### MAXIMUM WATER HEIGHT – HINDCAST VALUES

CERA - Coastal Emergency Risks Assessment (coastalrisk.live)

Rainfall



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Return frequency estimated by comparing NOAA Atlas 14 Rainfall Frequency values to maximum rainfall totals for 24 hours and 72 hours, per NEXRAD pixel





Slide Courtesy: John Mitnik







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## **BCB COCO1 Coastal Structure Outfall Analysis**



- Peak Stage: 10.3 ft-NGVD (New Record High)
- Peak Exceeded Design Water Levels of Structure
- Surge ~400 CFS flow inland (negative flow)
- Recovery to normal levels ~12 hours (9/29/22 Morning)
- Structure locked fully open storm surge forecast & high potential for communication loss
- Loss of power & generator delayed return of normal structure control until October 3<sup>rd</sup>



## **BCB Cocohatchee Canal**

**Cocohatchee Canal Historic Average Daily Headwater Percentiles** 















23 25

## **Kissimmee Restoration Benefits**

### Flows rise and recede quickly out of Pool A (S65A)

Flows into Lake Okeechobee (S65E) take much longer to peak and recede as a result of the inundation of the flood plain

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Effect of KR Restoration on H. Ian Flood Flows



Preliminary Results — Slide Courtesy: Jose Otero

### Flooding Observations: Staff Reports & Environmental Conditions Team High Water Mark and Drone Surveys



Homosassa Springs

Tampa

St Peters

SWEWMD

Naples

Clearwater

### **Aerial Imagery**

#### Over 600 Images Collected

UAS/Drone Imagery is one of the most widely used and versatile products from drones. The EOC Drone team captured hundred of images from standard point and shoot shots, to precise mappings imagery. Utilizing the Drone Images provide a rapid turn around time to get live ground conditions back to the EOC. Click near the center of the hotspots on this map to see some images collected.



Deltona

Immokalee SPWMD

Palm Bay

Port St Lucie

Coral Springs

Pembroke Pines

Vest Palm Beach

SJRWID

### District Immediate Actions to Reduce Water Levels

Strategic draw-down of all canal levels within the impact area completed prior to tropical storm conditions and recovery operations

Temporary pumps in Upper Kissimmee Chain of Lakes

Debris removal in Lee County





## **Resiliency among District Priority Actions**

### **EXPANDING MONITORING AND DATA ANALYSIS**

ADVANCING FUTURE CONDITIONS ASSESSMENTS

HARDENING FLOOD PROTECTION INFRASTRUCTURE

**INVESTING IN ALTERNATIVE WATER SUPPLY SOURCES** 

#### **RESTORING NATURAL SYSTEMS**

PROMOTING STAKEHOLDER ENGAGEMENT AND OUTREACH



Hydrology

Sea Levels



Groundwater

Ecosystem



## **District Resiliency Planning**



### SEA LEVEL RISE AND FLOOD RESILIENCY PLAN

Building Resilience and Mitigating Risks on South Florida Water Resources

**SEPTEMBER 2022** 



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MODELS / TOOLS

## Coastal Structures Hardening and Self Preservation Mode

Additional Programing; storm resilient Back Up Controller instrument and platform Install Backup Controller and other automation features Modify gates for added high tide protection against reverse flow

or le Modify Structure by nst adding seals

Other automation and floodproofing needs

Control Panel Upgrades / Hardening

Urgent need to optimize and harden operation of structures during storm surge and higher tide events, addressing Hurricane Irma/Matthew/Dorian/Ian gate-open lockouts

- Water Supply exposure to saltwater intrusion: wellfield protection zones vulnerability – Regional Significant Assets (RSA)
- Exacerbated upstream flood risks (reflected in updated FEMA Coastal Zone A Maps)
- Short-term benefits: "self-preservation lockdown" system for several highly vulnerable critical structures
- Focus on enhancing electronic/mechanical components and floodproofing of RSAs





## Moving into Implementation: C-8 Basin Resiliency

- Recent Award Recommendation from FDEM/FEMA BRIC
- Currently Advancing Design
- Basinwide strategy to reduce flood risks due to sea-level rise and extreme rainfall; protect water resources and water supply sources
- Combination of Green and Gray Infrastruct.
- Increasing water management flexibility
- Restore S-28 Structure discharge capacity
- Increase the basin's flood protection level of service, including Miami Dade's secondary canal enhancements
- Enhance quality of life in the region



## How can you be involved?

□ □ News

B Dublic Noticer

Governing Board Meeting Notices

- Sign-up for our updates by visiting https://www.sfwmd.gov/news-events and following these steps:
  - 1 Click on the "Subscribe for Email" icon
  - 2 Enter your email address
  - 3 Select "District Resiliency" under Subscription Topics / News
- Contribute on our initiatives and send us an email to  $\bullet$ resiliency@sfwmd.gov (we are still collecting flooding images!)
- Visit <u>www.sfwmd.gov/resiliency</u> to get updated information
- Visit <u>www.sfwmd.gov/meetings</u> to attend and participate at District events



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# Discussions?

Photo by Miami DDA