

Broward County Resilience

Presented to the Florida
Stormwater Association

November 29, 2023



Hazen



Overview

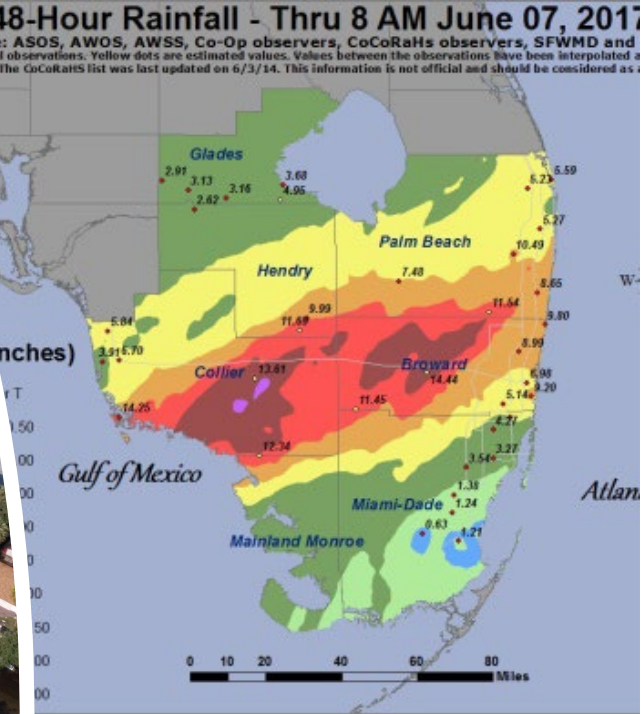
- Resilience Planning Efforts
 - Resilience Planning
 - County-wide Resilience Plan
 - Future Conditions
- Connecting with the Community
 - Underwater: Broward
 - Crowdsourcing Apps
 - Community Listening Sessions
 - Outreach
- New Technological Directions
 - Low-Cost Sensors
 - Drones



Broward County Resilience Planning Efforts

Resilience Planning and Standards

- Rising sea level, rainfall and storm surge
- Increases in flood severity, impacts and disruptions
- Infrastructure damage and safety concerns
- Economic implications
- Quality of life considerations



Resilience Planning and Standards

- Sea Level Rise Projection – 2012, 2015, 2019
- Priority Planning Area Map – 2012, 2015, 2020
- Future Conditions Map Series – 2017
- Resilience Standards
- Drainage infrastructure – 2017, 2023*
- Tidal flood barriers - 2020
- 100-Yr Flood elevations – 2021, 2023*
- Design storms–2021, 2023*

* Update Underway



Broward County Community-wide Risk Assessment and Resilience Plan



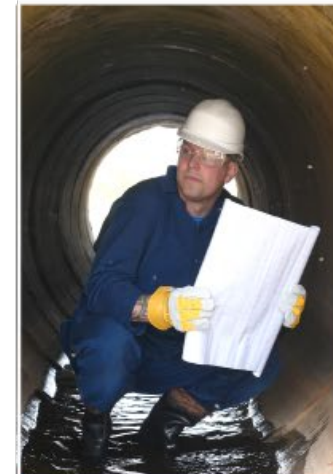
COMMUNITY
OUTREACH



RISK
ASSESSMENT



ECONOMIC
MODELING



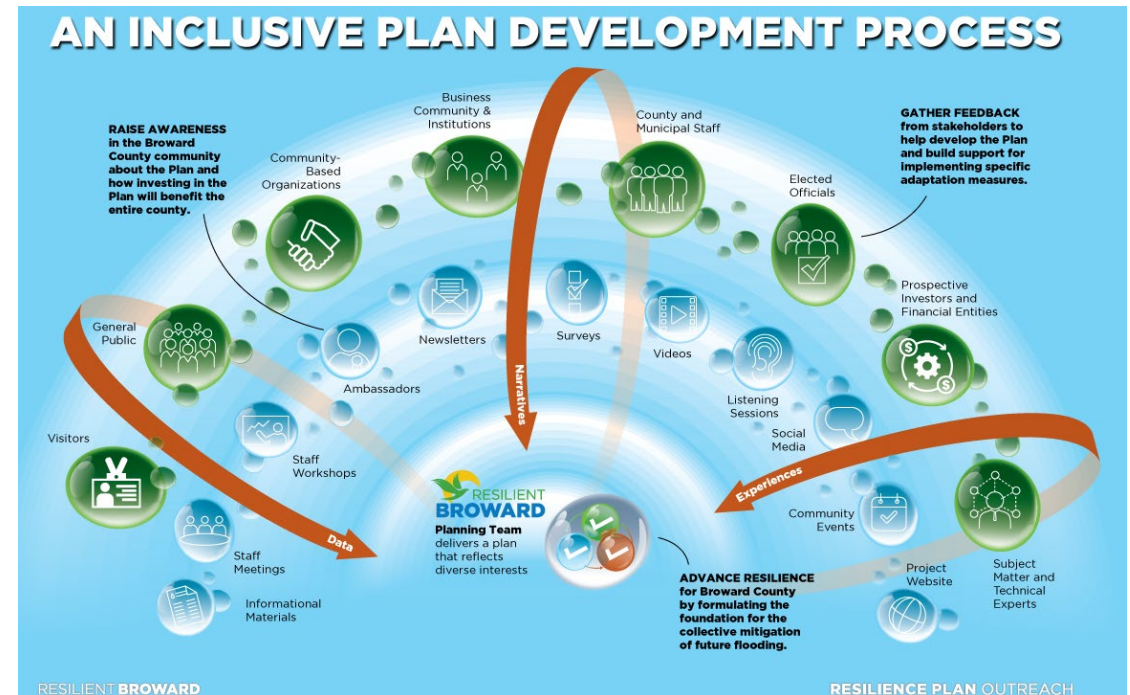
ADAPTATION
PLAN



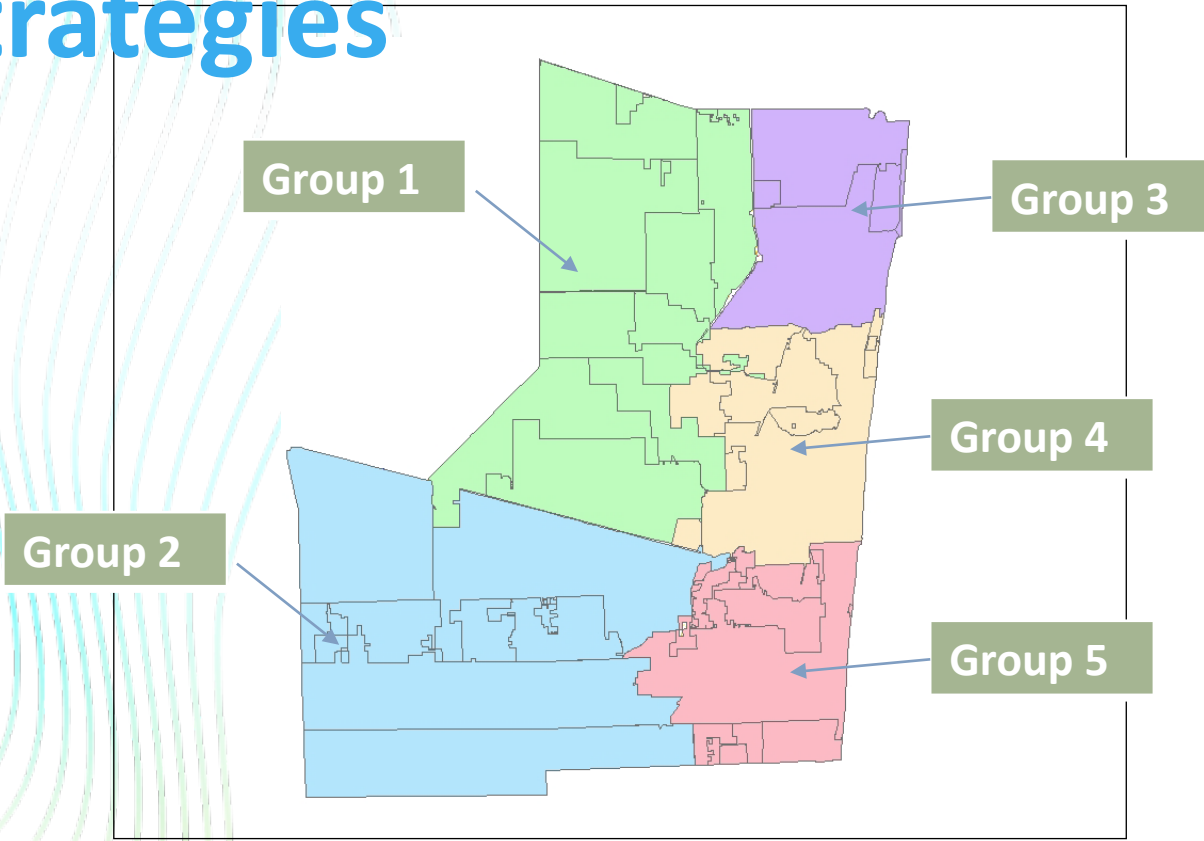
ONLINE
PLATFORM

Resilience Plan – Current Status

- Economic Modeling
 - No Action Scenario Completed
 - Paired with Adaptions Next
- Adaptation Scenarios
 - Sub-regional approach
 - Sensitivity Analyses
 - Feedback
- Listening Sessions
 - Impacts
 - Concerns
 - Priorities

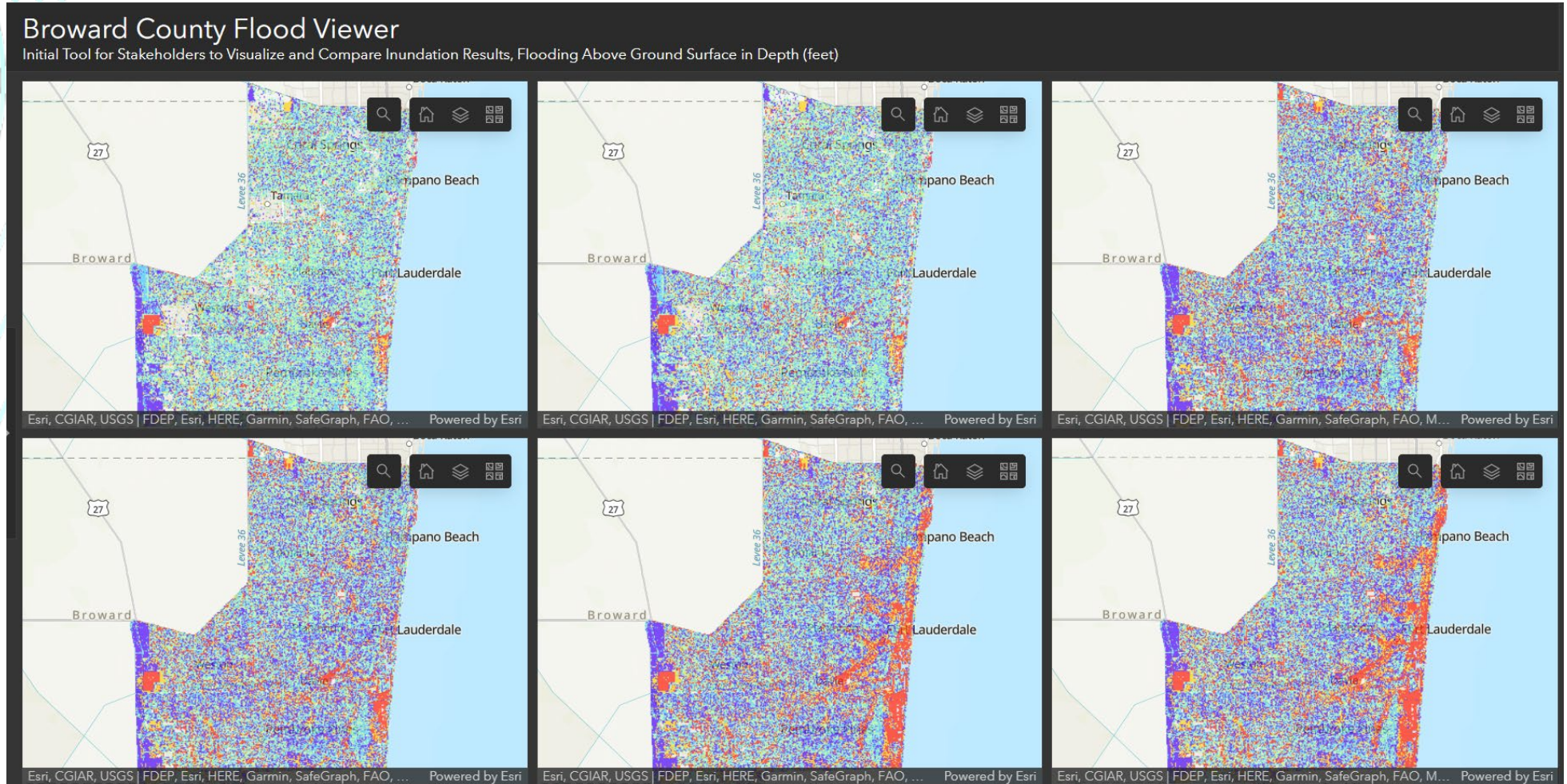


Subregional Stakeholder Review Workshops finetuned the model and informed adaptation strategies

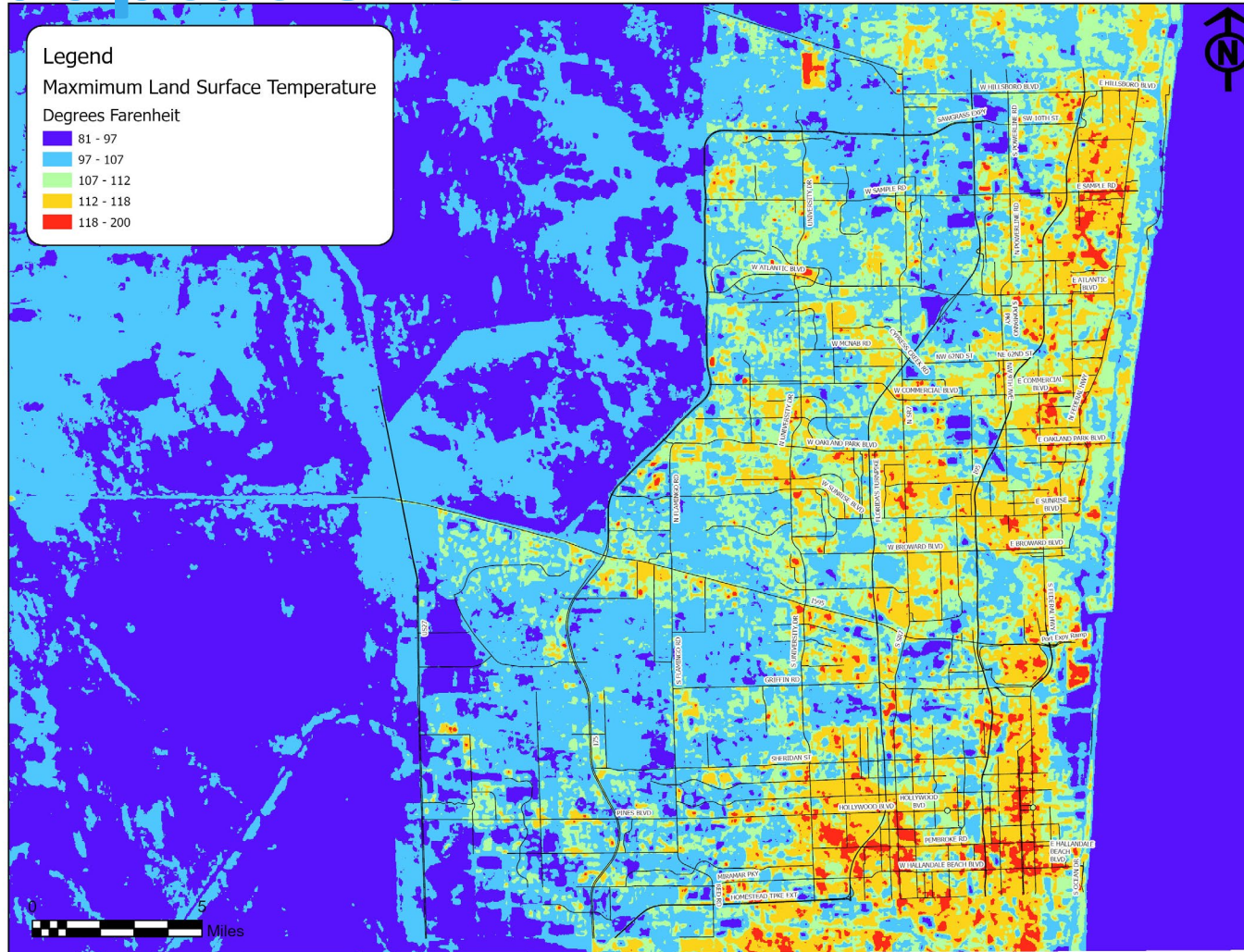


Five meetings
were held
in **May/June**

Multiple flooding scenarios were reviewed in parallel



Further, we reviewed hot spots and impacts of adaptations



Environmental Impacts

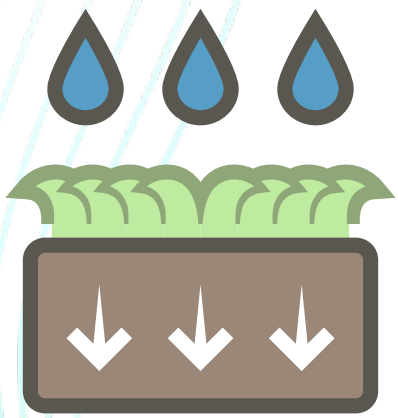
- Coastal and tidal influences
- Everglades Marshland

Identified Hotspots

- Visible hot spots consistent within summer and winter months
- The majority of Broward County is considered a metropolitan area, however, there are still “ultra-urban” areas where hot spots are visible

Primary strategies are being developed around four major concepts (delivered in multiple ways)

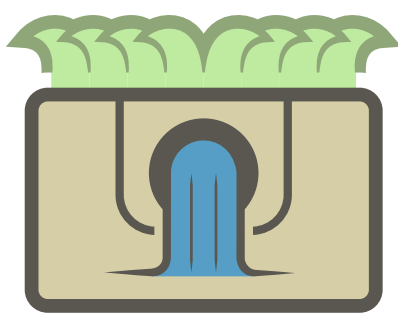
- Policy
- Infrastructure
- Procedures
- Regulation



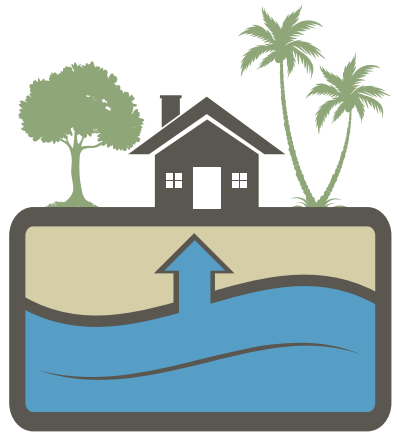
Runoff Reduction



Runoff Storage



Strategic Conveyance/
Discharge



Adapting to Water

Connecting with the Community

The Underwater: Broward

- Partnership with climate artist Xavier Cortada
- Integration of climate and art in the delivery of a high impact public engagement program
- Designed to educate, convene, and motivate
 - environmental,
 - community, and
 - public health



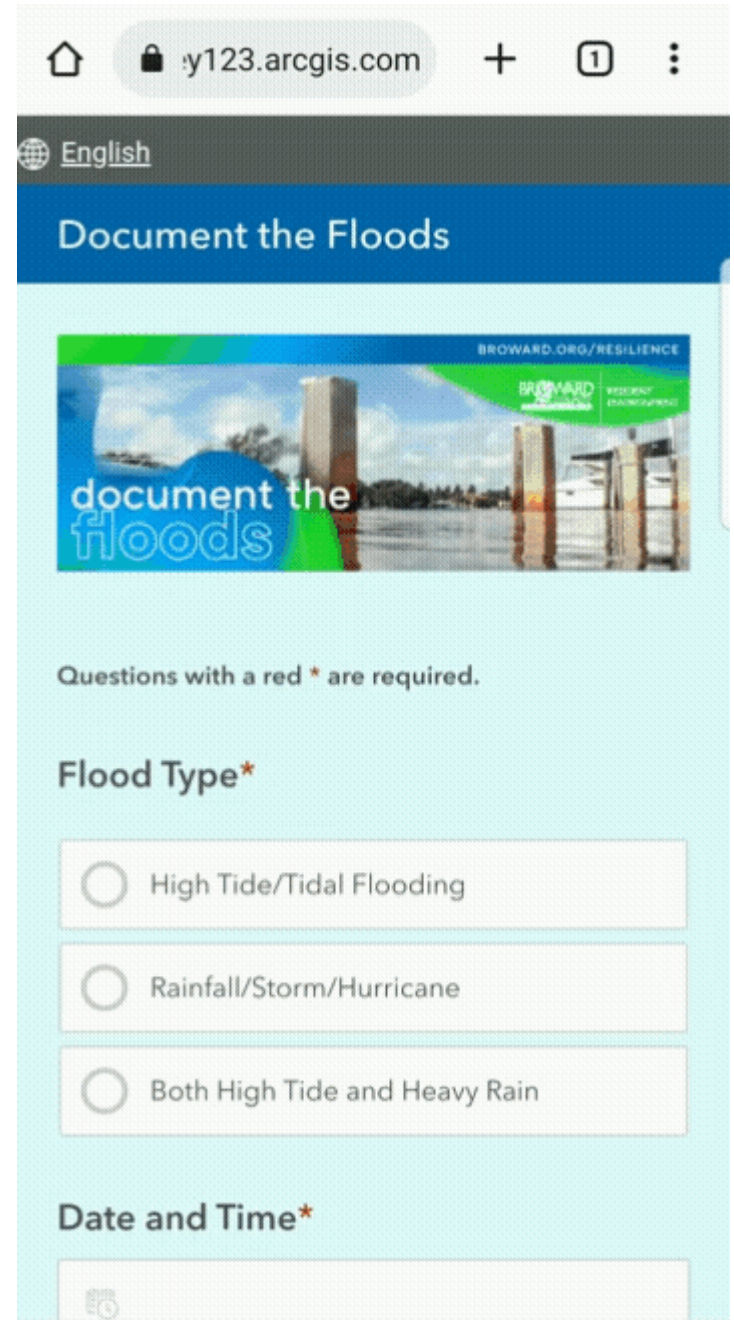
Public School Engagement

- Artist-led workshops across 10 Broward County Public Schools in 2023 - 2024
- Students research their elevation and artist guides the creation of elevation markers
- At least 100 personalized elevation markers to be created by students at each event



Document the Floods

- Data Collection
 - Open to public
 - Web accessible
 - User friendly
 - Simplified and streamlined
 - Inclusive
 - Multi-language support
 - Automation
 - Email notifications
 - Data enrichment
 - Address, Commission District, Zip Code, Weather Conditions
 - Security and data integrity



The screenshot shows a web browser window with the URL `y123.arcgis.com`. The page title is "Document the Floods". Below the title is a banner image with the text "document the floods" and "BROWARD.ORG/RESILIENCE". The main content area contains a form with the following elements:

- A note: "Questions with a red * are required."
- A section titled "Flood Type*" with three radio button options:
 - High Tide/Tidal Flooding
 - Rainfall/Storm/Hurricane
 - Both High Tide and Heavy Rain
- A section titled "Date and Time*" with a date and time input field.

Risk Assessment and Resilience Plan

Outreach: Listening Sessions



Urban League of
Broward County

Neighborhood Meeting - December 20, 2023



COMMUNITY
FOUNDATION
OF BROWARD

Staff Focus Group – October 31, 2023



MUSEUM OF DISCOVERY AND SCIENCE
AutoNation **IMAX 3D** Theater

Student Focus Group – November 14, 2023



Staff (and member) Focus Groups - TBD

Formal Communications

- RESILIENCE!
 - Produced Quarterly
 - Latest Edition Focused on Heat and the County's planning efforts
 - Spotlights on Local Business and our Schools
- "In the Making"
 - Provides Resilience Plan and Technical Updates
 - Geared to a Higher-Level Audience

RESILIENCE! OCTOBER 2023

THE HEAT IS ON

How Broward County is planning for rising temperatures and recovery

NEWSLETTER OF BROWARD COUNTY RESILIENT ENVIRONMENT DEPARTMENT

#ResilientBroward

November 2023

FOLLOW OUR PROGRESS: Broward.org/ResiliencePlan

A two-year planning effort focused on building community resilience to the impacts of climate change in Broward County

BROWARD COUNTY: A RESILIENCE PLAN IN THE MAKING

Baseline Economic Modeling

The County's consultant team has completed the "no-action" or "business as usual" evaluation of economic outcomes under various future conditions scenarios. The model approach offers a collective view of isolated and compound flood conditions for two and three foot sea level rise scenarios relative to today, assuming no notable change in overall adaptation investments, economics or demographics.

Initial findings point to potential average annual flood damages to property and contents of \$5 billion annually by 2070, and losses in production equal to 0.7% of the Broward economy. In a no-action scenario, increasing flood risk coupled with risk-reflective pricing could drive a doubling in the average flood insurance premium.

These early findings reinforce the importance of early and coordinated adaptation efforts to mitigate major flood impacts and losses across all sectors.

Substantial flood damage could affect 41% more vulnerable people by 2050

Census tracts with substantial flood damage and vulnerable population, total SVI metric.

- High-risk areas under current SLR
- Additional high-risk areas under 2.0ft SLR

Interim Results (Baseline/No adaptation actions considered)

Outreach Plan Efforts

An inclusive outreach strategy is being implemented to engage different voices and perspectives as we advance resilience in Broward County. Listening sessions are being scheduled with community partners and representative stakeholder groups to gain insight on how flooding and heat already impact people, property, and work, and what mitigation strategies are most desired across our communities.

Adaptation Kickoff

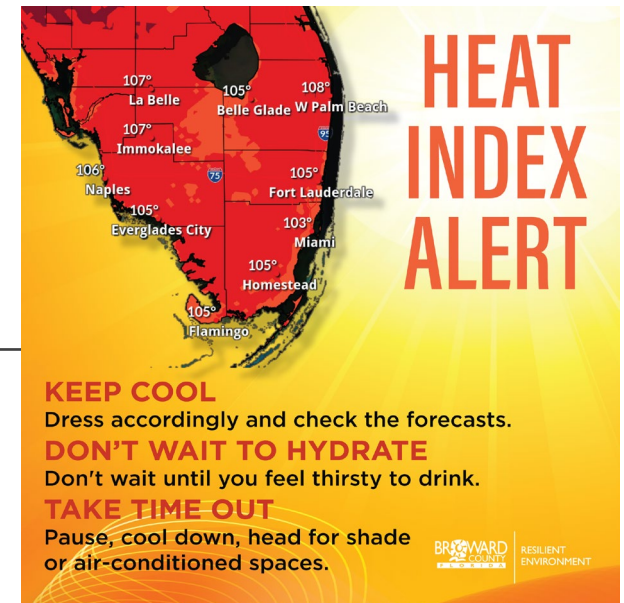
An initial internal workshop with the consultant team was hosted on August 28th to finalize the first-cut strategies to be evaluated in the first round of adaptation modeling. The strategies were developed based on sub-regional considerations, such as storage opportunities vs. limitations, extent of water conveyance systems, and the presence or absence of infrastructure for active water management. Additional strategies for adaptation include distributed storage, shared infrastructure, operational changes, removal of pervious surfaces, enhanced green infrastructure, updates to development codes and design standards. Initial adaptation model results will be available by the end of the year, with additional stakeholder workshops conducted in January/February 2024 to seek further input and refine the next phase of modeling.

Storm floods in downtown Fort Lauderdale, 2023.

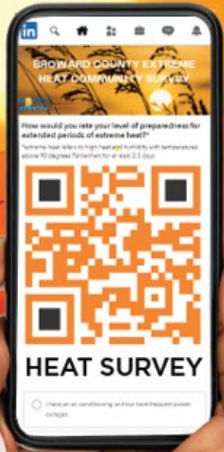
RESILIENT BROWARD Hazen BROWARD COUNTY RESILIENT ENVIRONMENT

Social Media

- Regular Campaigns
 - Focused on Current Events and Happenings
 - Heat, King Tides, Rainy Season...
- Highlight Key Efforts for Exposure
 - Solar
 - Energy Efficiency
- Art with a little AI help



BROWARD COUNTY EXTREME HEAT COMMUNITY SURVEY



HEAT SURVEY

We want to hear how extreme heat impacts you!


BROWARD COUNTY RESILIENT ENVIRONMENT

RESILIENT BROWARD

RESILIENCE BRIEFING

BROWARD COUNTY RESILIENT ENVIRONMENT

Extreme Heat At Work



Science indicates that extreme heat events and other severe weather are likely to become more frequent amidst a changing climate. GHGs in the atmosphere act as a blanket around the Earth's surface, and as that blanket gets thicker, we can expect it to get warmer!

Here are 10 tips outdoor workers and employers should consider to beat the heat.

EMPLOYEES

UNDERSTAND HEAT HAZARDS
Learn to recognize the risk of heat illness due to high temperature, humidity, sun or thermal exposure, work demands, & personal risk factors.

DON'T SKIP SHADE BREAKS
A heavy workload increases heat generated by the body. Don't skip rest breaks. Drinking a cup of water every 20 minutes and resting in the shade for at least 10 minutes can allow your body to cool down & recover from the heat.

LOOK OUT FOR EACH OTHER
Say something if you see a co-worker in a potentially dangerous situation, or appears to be suffering from heat exhaustion.

DRESS FOR THE HEAT
Wear lightweight, loose fitting clothes - light colors reflect the heat better than darker colors. Shirts with long sleeves cover the body and protect against sunburn.

SPEAK UP
Do not silently overexert yourself in hazardous conditions. If you need more frequent breaks, a schedule change to a cooler time of day, or you are not feeling well, communicate with your supervisor or employer.

EMPLOYERS

PROVIDE SHADE, WATER, & REST BREAKS
Maintain access to potable water, shade, and allow frequent paid rest breaks. The duration and frequency of breaks should increase as risk of heat stress increases.

IMPLEMENT A HEAT RISK ALERT SYSTEM
Heat Stress Metering can alert employers, employees and visitors in real time when the heat index is at a dangerous level.

PREVENTION PLANNING
Have a plan for heat illness prevention & emergency response. Implement acclimatization periods for new workers, be open to work schedule adjustments, PPE requirements, and make provision for on-site medical services.

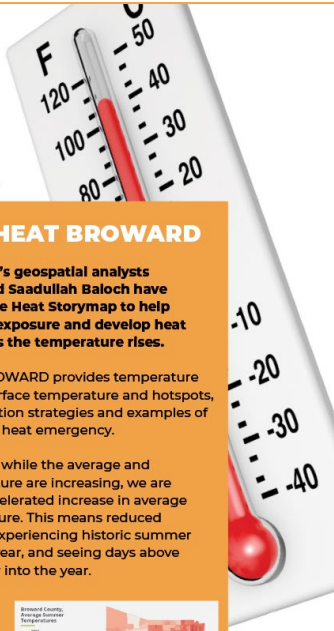
STAFF MONITORING
Designate staff to monitor conditions and workers for signs of heat related illness. Implement a Heat Illness Prevention & Emergency Response Plan

PROVIDE TRAINING
Educate workers on heat hazards, heat illness symptoms, and health impacts. Taking proactive measures to mitigate risks will promote well-being during hot weather conditions.

Broward.org/Climate

@browardresilience @browardgrowth
@browardresilience @browardresilience

BROWARD COUNTY RESILIENT ENVIRONMENT



"One of the major findings was that the hottest communities are also the communities with the highest socioeconomic vulnerability."

ADRIENNE AITKEN
BROWARD COUNTY GIS SPECIALIST, RESILIENCE UNIT

BEAT THE HEAT BROWARD

BROWARD COUNTY CLIMATE ACTION PLAN

Policy Objective #26:
Enhance the urban tree canopy to protect walkers, transit riders and bicyclists from heat and pollution.

Using GIS mapping and other tools, evaluate shade and cooling available at pedestrian, transit (train and bus) and bicycle facilities, and assess whether the urban tree canopy is sufficient to protect people from heat and pollution. Work with community and governmental partners to identify needs and involve community members in the policy and planning process.

Establish support for tree maintenance to encourage long-term canopy growth and tree retention. Enhance the tree canopy equitably countywide.

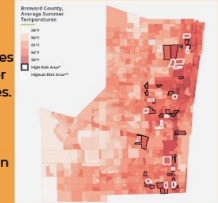
The Resilience Unit's geospatial analysts Adrienne Alken and Saadullah Baloch have built a new Beat the Heat Storymap to help communicate risk exposure and develop heat mitigation needs as the temperature rises.

BEAT THE HEAT BROWARD provides temperature trends, including surface temperature and hotspots, mitigation & adaptation strategies and examples of what we can do in a heat emergency.

Analyses reveal that while the average and maximum temperature are increasing, we are seeing the most accelerated increase in average minimum temperature. This means reduced periods of cooling, experiencing historic summer highs earlier in the year, and seeing days above 90°F extending later into the year.

Land surface temperature maps are a great tool to visualize communities with relatively higher surface temperatures. Check out the interactive maps to visualize the spatial distribution of heat in Broward County.

Go to Broward.org/Climate and choose 'Beat The Heat'.



A map to illustrate the areas with the highest average summer temperatures and the communities most vulnerable to that heat. source: Earth Economics, 2020

BROWARD RESILIENCE

BEAT THE HEAT

UNDERSTAND HEAT HAZARDS

Learn to recognize the risk of heat illness due to high temperature, humidity, sun or thermal exposure, work demands, & personal risk factors



BROWARD COUNTY RESILIENT ENVIRONMENT

BEAT THE HEAT

DON'T SKIP SHADE BREAKS

Allow your body to cool down and recover from the heat
Drink a cup of water every 20 mins
Rest in the shade for at least 10 minutes



BROWARD COUNTY RESILIENT ENVIRONMENT

BEAT THE HEAT

We want to hear how extreme heat impacts you!

BROWARD.ORG/CLIMATE



BROWARD COUNTY RESILIENT ENVIRONMENT

BEAT THE HEAT

LOOK OUT FOR ONE ANOTHER

Speak up if someone appears to be suffering
Take action if you see a coworker in a potentially dangerous situation



BROWARD COUNTY RESILIENT ENVIRONMENT

BEAT THE HEAT

DRESS FOR THE HEAT

Wear lightweight, loose fitting clothes
Shirts with long sleeves cover the body and protect against sunburn
Light-colors reflect the heat



BROWARD COUNTY RESILIENT ENVIRONMENT

New Technological Directions

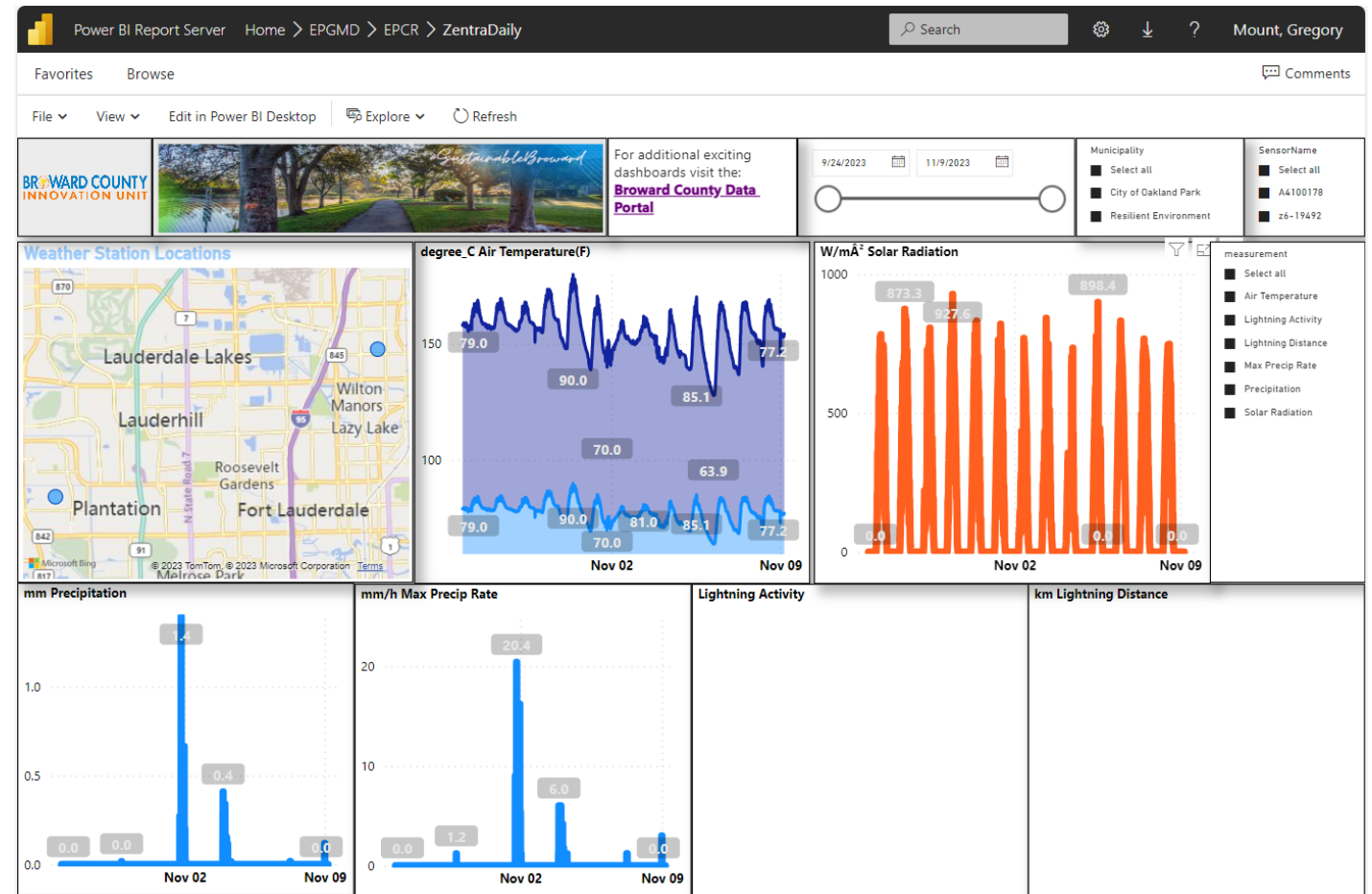
Drones

- Florida and Federal Compliance
 - Low-cost, Useful Options
- Capabilities
 - Multiple Payloads
 - Thermal
 - Hi-res RGB
 - LiDAR



Real-time Weather and Early Warnings

- Weather Sensors
 - Low-cost
 - Portable
 - Cloud Services/Custom with API
- Water Level Sensors
 - Potential for Catch Basins



Questions ?

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RESILIENT
ENVIRONMENT

