

Written Testimony – Dr. Jennifer Jurado, Chief Resilience Officer, Broward County, FL
Environment and Public Works Committee
November 1, 2023

Good Morning, Mr. Chairman.

Thank you for your climate leadership and for convening this hearing today.

As you know, Florida, especially South Florida, is no stranger to extreme weather, with hot-humid summers, intense afternoon thunderstorms, and the seasonal arrival of tropical storms and hurricanes. These conditions have been well accounted for in our infrastructure planning, design standards, emergency operations procedures and local mitigation strategies.

Flood risk is an acute concern, a function of our extensive shoreline, flat landscape, and low land elevations. Accordingly, our communities, state, and federal agency partners have invested in extensive drainage, flood control, and stormwater management systems needed to store, convey, and discharge the nearly 60 inches of rainfall we receive annually, on average. Additionally, in southeast Florida, we have adopted rigorous building codes to ensure our homes and other structures can withstand hurricane force winds.

Even so, as our region of more than 6 million people – a population which exceeds that of 31 other states – grapples with impacts of climate change, the limitations of these historic standards and investments are a focus of renewed assessment. A decade ago, it was the increase in tidally-induced flooding that prompted calls for action; more recently, record-breaking storm events are proving far more damaging, with flood conditions worsened by the combined impacts of sea level rise, increase in storm surge, higher king tides, and groundwater table rise. The result is an increase in property damage, economic losses, and service disruptions affecting both inland and coastal communities.

Unlike gradual sea level rise to which communities can slowly adapt, extreme weather events deliver shocks that now overwhelm our infrastructure and systems. This was the experience on April 12, 2023, in the coastal municipalities of Fort Lauderdale, Dania Beach, and Hollywood when a seemingly innocuous afternoon thunderstorm delivered an unprecedented 26 inches of rainfall in 12 hours, resulting in immediate flash flood conditions just before the 5 o'clock commute.

The severity of on-the-ground conditions during this storm is difficult to describe.

- In an instant, a standard 30-minute commute degraded into a 3-hour navigation of flood waters.
- Ramps connecting artillery roads to the interstate were impassable, preventing any possibility of a formal evacuation.
- Stalled vehicles were abandoned en masse, with losses estimated at 2,000 vehicles (public and private).
- The Fort Lauderdale-Hollywood International Airport shut down and remained closed for 40-hours, with flood depths up to 5-feet. Over 1,000 flights were cancelled. Total damages were estimated at \$17,500,000.
- Privately-owned oil terminals located at Port Everglades, which serve 12 counties and 5 international airports, experienced up to 26 inches of water in their facilities. Operations were suspended, disrupting the distribution of gasoline, diesel, and jet-fuel with shortages affecting the entire region, from Palm Beach County to the Florida Keys.

- Residents in the established Melrose Park and Edgewood communities were hit the hardest, with 2 to 3 feet of standing water.
- 600 residents were displaced and over 1000 homes sustained 'major' damage.
- FEMA delivered housing assistance for more than 3,800 applicants exceeding \$13 million, with another \$26 million in loans issued by the Small Business Administration.
- The City of Fort Lauderdale remains without a functional City Hall as the basement was filled with 5 feet of flood water, damaging a major energy transformer, the City's IT infrastructure, and servers, in addition to roof and other water damage.

Incredibly, the April 12, 2023, rainfall event occurred outside of the hurricane season, a 1:1,000-year event, having less than a 0.1 % probability of occurrence in any given year.

Yet similar unprecedented conditions were realized in November 2020, when tropical storm Eta delivered approximately 22 inches of rainfall over 3-days. With this event, extensive rainfall in the preceding weeks contributed to a total of 35 inches over 6 weeks (inclusive of tropical storm Eta). This rainfall amount was four-times the historic average for the same two-month period compared to the 30-year average.

While this event was also only characterized as a 1:100-year event, the flood conditions were worsened due to supersaturated soils following weeks of rain and king tides that prevented drainage from gravity operated stormwater systems. With the rise in the groundwater table, sanitary sewer collection systems were overwhelmed and wastewater utilities across the County urged residents to restrict household water use for days, including bathing, dishwashing, and laundry. Once again, the established community of Melrose Park (not located in a current flood zone) was under 2 feet of water along with western, inland parts of the County, which remained flooded for as much as 2 weeks.

In keeping with the 3-year interval, in June 2017, an 18-inch rain event required closure of Sawgrass Mills, the region's largest shopping center, for a period of 3 days, with an economic loss of \$30 million. These 3 extreme events in the past six years account for the highest annual rainfall totals in the last 30 years, exceeding 88 inches in 2020, and 70 inches in 2017 and 2023.

Like the experiences of communities across the United States, extremes and exceedances have become south Florida's new norm, and the conditions are not limited to flooding. Extreme heat is increasingly recognized as an equal, if not more pressing, climate threat. As with flooding, the year 2023 also broke heat records and is expected to become the hottest on record for Broward County. This year we experienced 37 days with a heat index over 105°F, compared to a historical average of 5 days, and 80 days predicted by midcentury. 2023 also topped records with 17 consecutive days reaching this threshold, the next highest being just 6 days in 2020.

We know that extreme heat disproportionately impacts our disadvantaged and underrepresented residents, outdoor workers, health compromised individuals, our youth and elders. In heat surveys undertaken by our agency:

- 10% of respondents shared that they did not have access to air conditioning or could not afford to run it.
- 10% of respondents also identified work commute as their top-rated heat-related economic concern; 54% identified the cost of energy bills.

- 13% of respondents identified sleep as a top activity impacted by heat, with 67% noting outdoor recreation and/or exercise.
- 40% of respondents noted heat to have negatively impacted their health or physical wellbeing.

These extreme heat conditions and concerns led the County to undertake a comprehensive heat education campaign for workers and employers, explore the use of the County’s electric bus fleet as mobile cooling centers, and pursue grant funding for deployable resilience hubs to support community cooling needs. The County Commission also petitioned the National Weather Service to lower thresholds for heat advisories and warnings in Broward County as in Miami-Dade County, for better alignment with temperatures recognized to affect public health to improve early warning systems and coordination with health care providers.

To respond and better prepare for greater flood extremes, Broward County has worked to incorporate future conditions projections, including sea level rise and rainfall intensification, in design standards for infrastructure. These improvements include:

- a future conditions groundwater table map to account for the influence of sea level rise on drainage and water management systems;
- resilience standards for seawalls, berms and other tidal flood barriers, accounting for the combined influence of sea level rise and high frequency storm surge on coastal water elevations; and
- a future conditions flood map that accounts for sea level rise, king tides, groundwater table rise, and rainfall intensification.

The United States Congress has also worked to ensure south Florida remains dry during wet weather events. Congress authorized the Central & South Florida (C&SF) Flood Control Project in 1948 – more than 70 years ago and it was constructed by the Army Corps of Engineers. The C&SF flood control system has served as an invaluable contributor to the economic success of Florida. However, it was designed to deliver flood protection for 2 million residents, not the 11 million it currently serves, nor the estimated 15 million people who are expected to live in the broader region in 30 years. Today, the C&SF system is under substantial stress due to changes in the physical environment, especially increased rainfall intensity and rising sea levels. Stormwater severely strains the system and sea level rise significantly threatens project operations.

As a region, we have advocated for the initiation of the Central and Southern Florida Flood Risk Resiliency Study led by the U.S. Army Corps of Engineers. We thank the Committee for its authorization of this Comprehensive Study as part of the 2022 Water Resources Development Act. Our communities heavily rely upon improvements to this network as the backbone for all water management operations in the region. This study will build upon a more focused Section 216 Study for the same system that the Administration and Corps of Engineers began a few years ago. We urge the Committee’s support for the funds needed to expedite these studies and the timely construction of project recommendations. Without these improvements, our local efforts will not be as effective.

Concurrent with these federal efforts, Broward County is developing a county-wide risk assessment and resilience plan focused on addressing flood and heat risk through infrastructure improvements and redevelopment strategies, in conjunction with our 31 municipalities, the Seminole Tribe of Indians, and water management partners. This plan incorporates new rainfall intensification estimates (increasing from 13 to 20%) and incorporates storm surge in the flood elevation scenarios. The plan will maximize

green infrastructure investments for water management and heat mitigation benefits, particularly where urban heat islands and vulnerable communities intersect.

Core to this analysis is an evaluation of economic risk and benefits associated with no action versus adaptation outcomes. Initial economic exposures provided by McKinsey Global point to potential average annual flood damages to property and contents of \$5 billion annually by the 2070, and losses in production equal to 0.7% of the value of the Broward economy, or \$0.8 billion in current prices. Increasing flood risk coupled with risk-reflective pricing could drive a 70+% decrease in the National Flood Insurance Program policy penetration rate to only 6% county-wide, with a doubling in the average single family home flood insurance premium. Given the increase in insurance cost, single family home flood insurance policies could be unaffordable in 35% of census tracts. As flood insurance coverage decreases where risk increases, annual uncovered damage could rise to \$1.5 billion by 2050, and \$3.4 billion by 2070.

While the adaptation strategies and outcomes are still under development, previous economic investigations undertaken as part of the Southeast Florida Business Case for Resilience (June 2020) indicate an average 4:1 return on investment for building-level adaptation and a 2:1 return on investment for community-wide adaptation through protection of property values and tax base, avoided losses, preservation of economic sectors, and job growth. These figures reinforce the importance of early and effective adaptation strategies as well as the diverse benefits to be gained by reducing carbon emissions that contribute to warming and the severity of climate impacts.

With this in mind, Broward County's resilience efforts include robust emissions reductions strategies alongside comprehensive adaptation planning for the climate impacts already underway.

- The County has adopted a net zero goal by 2050 and is currently procuring consultant services to assist with plan development.
- We have committed to a clean fleet goal by 2030 and are transitioning our entire bus fleet by 2035.
- We are building out electric vehicle charging infrastructure across county sites and are working on a community electric vehicle charging strategy.
- The County is offsetting its electricity consumption (132 megawatts) via utility-scale solar while investing in large-scale rooftop and solar parking canopies at more than a dozen county sites (nearly 4 megawatts of installed capacity).

Broward County is a partner with neighboring counties of Palm Beach, Miami-Dade and Monroe in developing a priority climate action plan supported by the Inflation Reduction Act and EPA's Climate Pollution Reduction Grant. The region celebrates the announcement of \$4.3 billion in implementation funds and is intent on achieving energy efficiency and related cost-saving for residents in multi-family housing. Our region also submitted several grant proposals in response to NOAA's coastal resilience challenge. We strongly support additional funding opportunities with a similar design.

In addition to the agency support already referenced, additional federal agency partners and valued program assistance includes:

- The United States Geological Survey (USGS), with whom we partner as a collaborator in hydrologic model development and environmental monitoring supporting essential to our resilience planning tools and activities.

- The technical assistance of NOAA, the U.S. Corps of Engineers, and USGS in developing sea level rise and rainfall intensification guidance for regional application.
- The Department of Energy's Charging Fueling Infrastructure (CFI) grant program, which offers extensive funding to further regional and local electric vehicle infrastructure charging initiatives.
- The IRA's direct pay tax credits for local governments, which is allowing our county to expand its most recent solar project by 30%, within our existing project budget.
- The Federal Emergency Management Agency's Building Resilient Infrastructure and Communities (BRIC) and Hazard Mitigation Grant Programs, providing vital funding sources for critical flood mitigation projects benefiting our County and region.
- The U.S. Corps of Engineers' partnership on the totality of resilience initiatives across the region of southeast Florida, including shoreline protection projects, the C&SF studies and future projects, and Back Bay and Navigation studies.

As our efforts advance, the sustained engagement of the U.S. Corps and federal support for the Central and Southern Flood Control Project is one of the most pressing needs for our region. This system is collectively recognized as already failing, with design standards already being exceeded and local partners scrambling to address immediate exposures while we press for the funds needed for comprehensive, long-term solutions.

While speaking in primary representation of Broward County, I would also like to highlight the efforts of the 4-county Southeast Florida Regional Climate Change Compact, established in 2010 as a collaboration amongst Broward, Palm Beach, Miami-Dade and Monroe counties to reduce greenhouse gas emissions and adapt to shared climate change impacts.

Nearly 14 years strong, our collaboration continues with recent notable accomplishments that include:

- Joint development and adoption of a 3rd iteration to our regional climate plan
- A strong focus on economic resilience, achieving broad endorsement by business leadership, including local chambers of commerce, and economic development councils across the region.
- Joint development and adoption of a 3rd iteration to our regional sea level rise projection.
- Preparation for our 15th Annual Regional Summit in just 2 weeks, hosted this year by Miami-Dade County, with a significant federal agency participation and a focus on coordination, risk reduction, and place-based strategies.

Increasingly, climate change will continue to test our systems and impact our communities in profound ways. Local governments remain on the front lines in resilience planning and investments needed, but federal leadership, technical expertise, and funding are paramount to timely and effective response. We must improve our ability to anticipate and deliver on risk reduction strategies, but we stand to deliver the greatest benefits for our communities if we can simultaneously work to reduce emissions. We urge continued leadership and support for more expansive and swift transitions to clean energy, alongside aggressive adaptation actions, so that we might preserve economic and community vitality as we transition, reposition, and reinvest.

Climate change is one of the most important pressing and all-encompassing issues facing our region, affecting all sectors. Please help us ensure that South Florida remains a vibrant, attractive, economically successful region for generations to come. We look forward to continued collaborations with our federal agency partners.

Thank you again for your support and the opportunity to speak to you today.