RESILIENT JACKSONVILLE

City Council Update

January 17, 2023

CONSULTANT TEAM

RESILIENT JACKSONVILLE

THE WATER INSTITUTE OF THE GULF®

Project Management

Science-based Resilience Planning

fernleaf

Climate Data Analytics and Government Operations

HALFF

Local Policy, Governance and Engineering

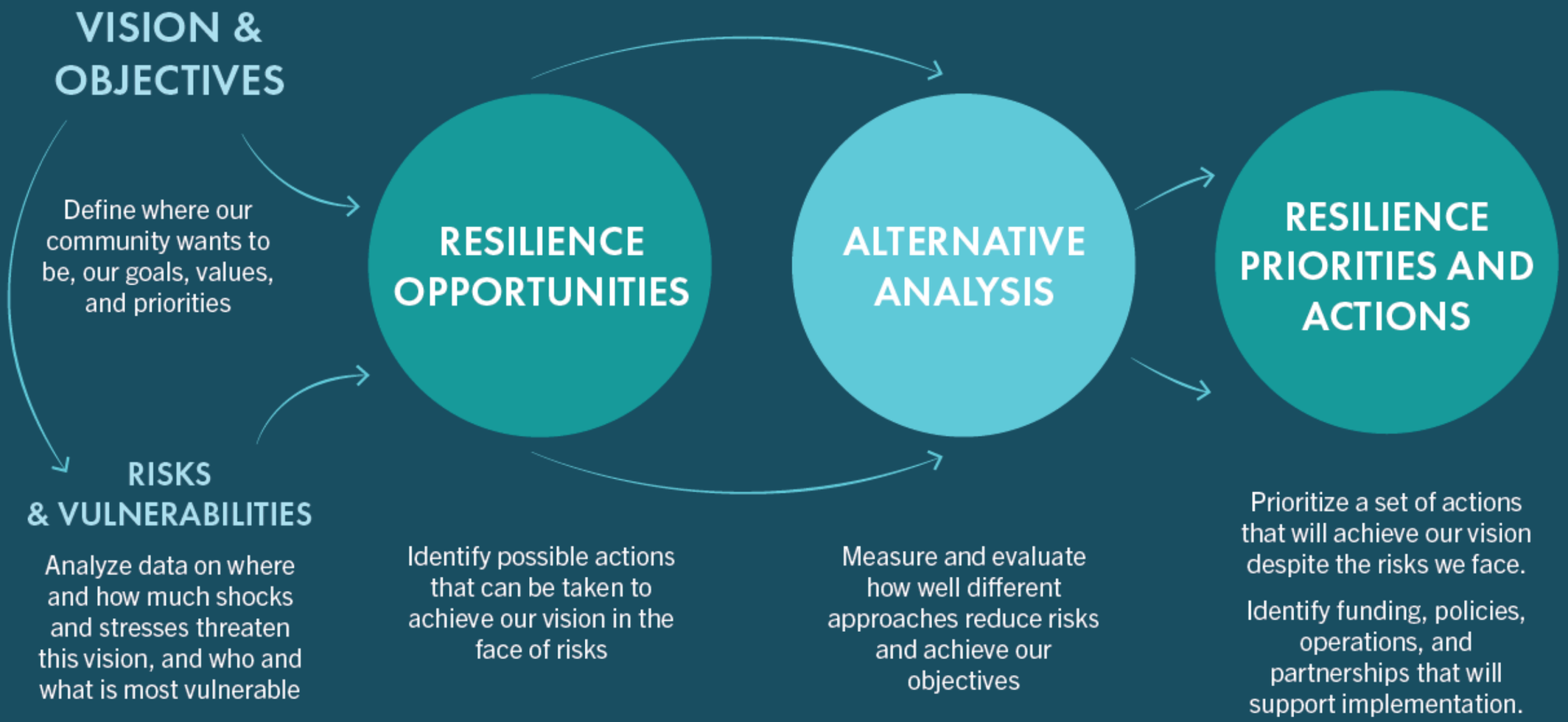
SCAPE

Resilient Design and Planning

ACUITY DESIGN GROUP

Engagement, Outreach and Communications

A PROCESS GROUNDED IN SOUND SCIENCE



WORK TO DATE


VISION & OBJECTIVES
Define where our community wants to be, our goals, values, and priorities
RISKS & VULNERABILITIES
Analyze data on where and how much shocks and stresses threaten this vision, and who and what is most vulnerable
RESILIENCE OPPORTUNITIES
Identify possible actions that can be taken to achieve our vision in the face of risks
ALTERNATIVE ANALYSIS
Measure and evaluate how well different approaches reduce risks and achieve our objectives
RESILIENCE PRIORITIES AND ACTIONS
Prioritize a set of actions that will achieve our vision despite the risks we face.
Identify funding, policies, operations, and partnerships that will support implementation.

Jacksonville's vision for resilience

looks toward the future and embraces change. Even as the city faces new, increasing, and uncertain risks, we believe Jacksonville's best days are ahead.

Jacksonville will draw from its essential characteristics as a ***welcoming city***, a ***water city***, and a ***growing and spacious city*** to build a resilient future for generations to come.

A RESILIENT JACKSONVILLE WILL BE A CITY THAT:

1. **PROACTIVELY ADAPTS**
2. **FOSTERS HEALTHY COMMUNITIES AND ENVIRONMENTS**
3. **EXPANDS OPPORTUNITY**
4. **BUILDS FOR THE FUTURE**

These themes are central to Jacksonville's vision for resilience. They set the direction of the **fundamental objectives** for the resilience strategy—the way we will evaluate and prioritize actions for ***how*** Jacksonville can become more resilient.

A Resilient Jacksonville will be a city that…

Proactively Adapts

Jacksonville will not only prepare for today's risks, but also proactively adapt for the future in the face of climate change and evolving social & economic conditions

- Minimize damage to property, infrastructure, and the environment from shocks/stresses
- Minimize negative effects of shocks/stresses on human health and well-being
- Minimize disruptions to the local economy
- Minimize disruptions to essential services

Expands Opportunity

Jacksonville will support innovative businesses, a diverse economy, and quality jobs to ensure widespread, shared prosperity during periods of economic growth and to provide a strong buffer against any potential future downturns.

- Maximize economic growth and prosperity
- Minimize barriers to economic mobility
- Maximize access to safe housing and essential services

Fosters Healthy Communities & Environments

Jacksonville will improve the health and well-being of all its people, communities and ecosystems, even as the city experiences increasing tolls from extreme heat, flooding, and other environmental and social stressors.

- Maximize residents' physical and mental health
- Reduce disparities in health and well-being
- Maximize ecosystem health and ecosystem services

Builds for the Future

Jacksonville will grow in a way that anticipates the needs and risks of future decades and ensures the city remains a world-class place to live for generations.

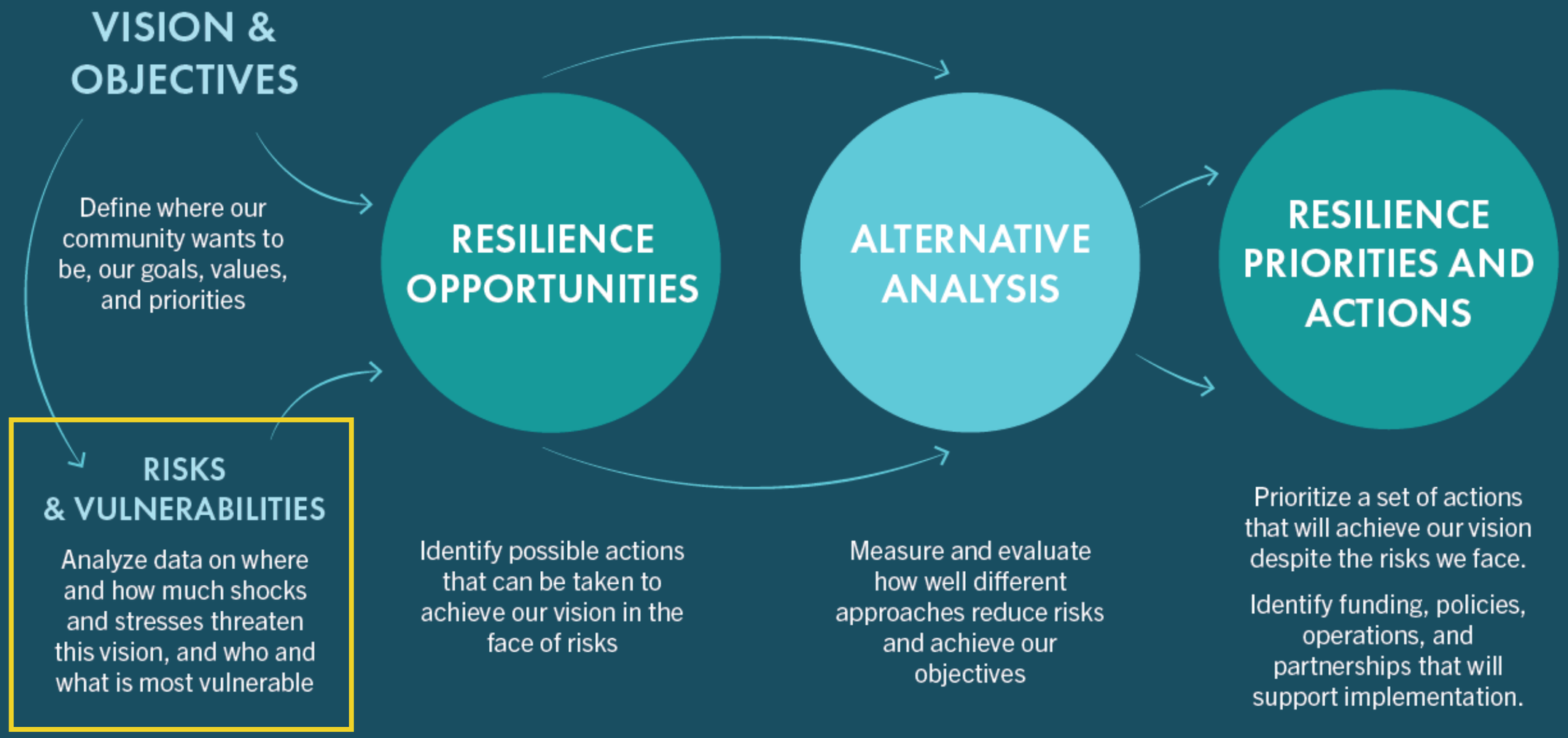
- Maximize smart and equitable development in areas that are safest from future hazards
- Maximize safe, active, and connected transportation options
- Maximize the sustainability and adaptiveness of infrastructure
- Maximize the benefits from public investments in the short- and long-term

BUILDING ON YEARS OF EFFORTS TO STRENGTHEN JACKSONVILLE'S RESILIENCE:

Resilient Jacksonville brings these and other existing and ongoing efforts under a comprehensive program so that we can prioritize investments based on sound science and our community's goals for the future.

- Storm Resiliency & Infrastructure Development Review Committee
- Adaptation Action Area Workgroup
- Duval County Local Mitigation Strategy
- City Council Special Committee on Resiliency
- 2030 Comprehensive Plan Update
- Tributary Flood Risk Modeling
- CAPA Strategies & UNF Heat Mapping Study
- McCoys Creek Restoration Project
- Emerald Trail Master Plan
- Hogans Creek Restoration Project

WORK TO DATE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SHOCKS & STRESSES CONSIDERED

ACUTE SHOCKS

- Extreme Rainfall Events
- Extreme Heat Events
- Hurricanes / Tropical Cyclones
- Winter Storms / Extreme Cold Events
- Infrastructure Failure or Disruption
- Energy Insecurity / Blackouts
- High Winds
- Wildfires
- Infectious Diseases
- Cyber Attack
- Hazardous Materials Incidents

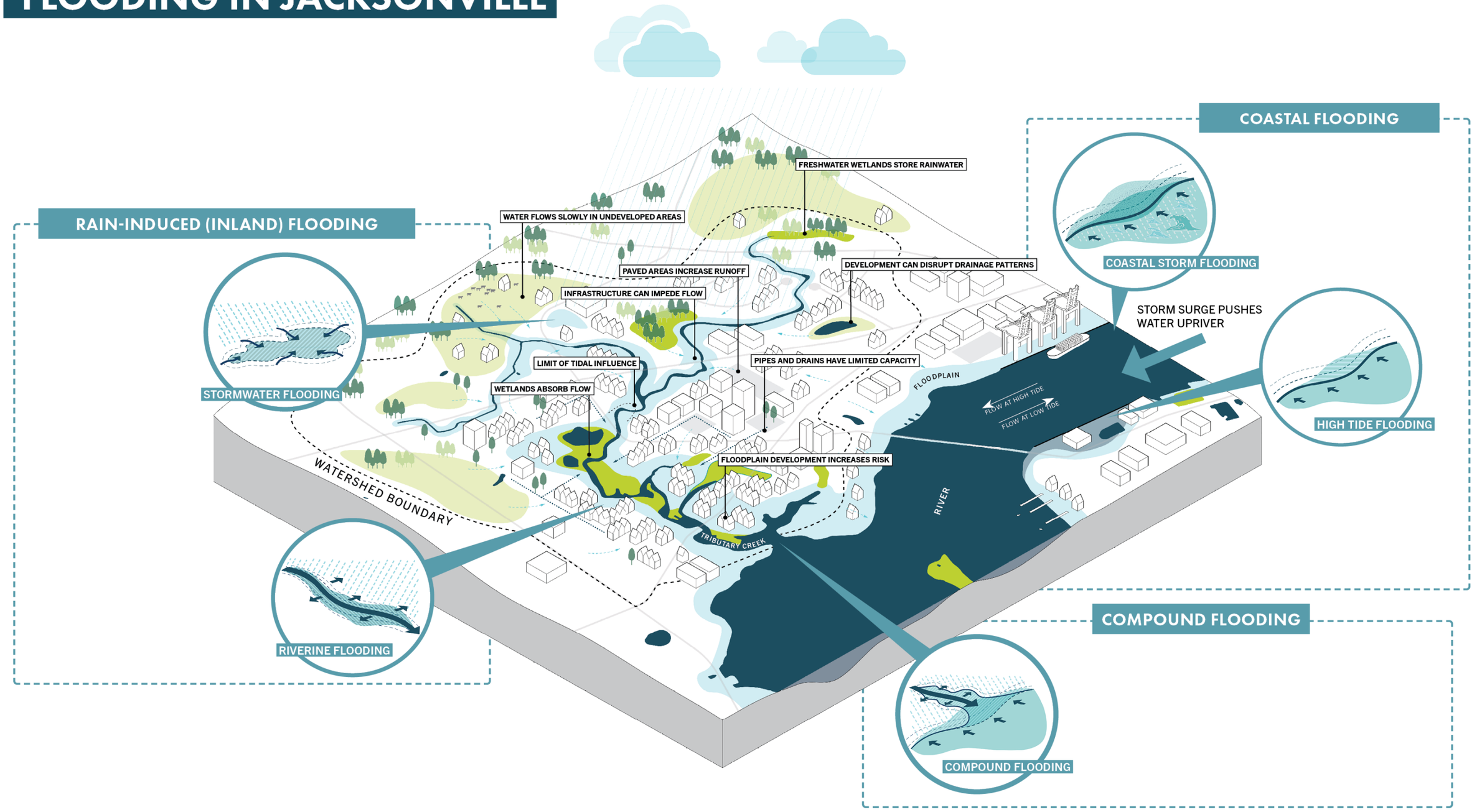
CHRONIC STRESSES

- Sea Level Rise
- High Tide Flooding
- Heavy Rainfall
- Coastal Erosion
- Saltwater Intrusion
- Groundwater Threats
- Urban Heat Island Effect
- Drought
- Aging Infrastructure
- Economic Downturns
- Poverty
- Social Inequality
- Lack of Reliable Transportation
- Lack of Safe and Affordable Housing
- Food Insecurity & Supply Chain Disruptions
- Lack of Healthcare Access
- Chronic and Infectious Diseases

*** Detailed Spatial Risk and Vulnerability Assessment for:**

- Flooding
- Heat
- High Winds
- Wildfire

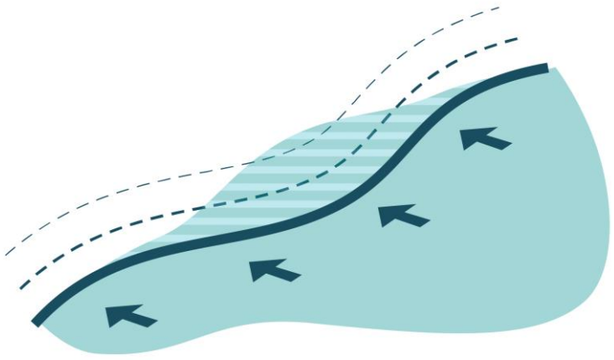
FLOODING IN JACKSONVILLE



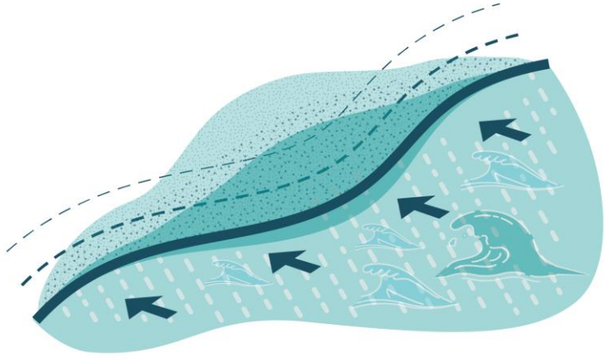
COASTAL FLOODING

HIGH TIDE FLOODING: *Flooding of low-lying coastal areas by high tides. This can occur during normal high tides or extreme high tide events (e.g., "king" tides or spring high tides).*

COASTAL STORM FLOODING: *Flooding caused by coastal storms like hurricanes. It includes the effects of storm surge and high waves.*



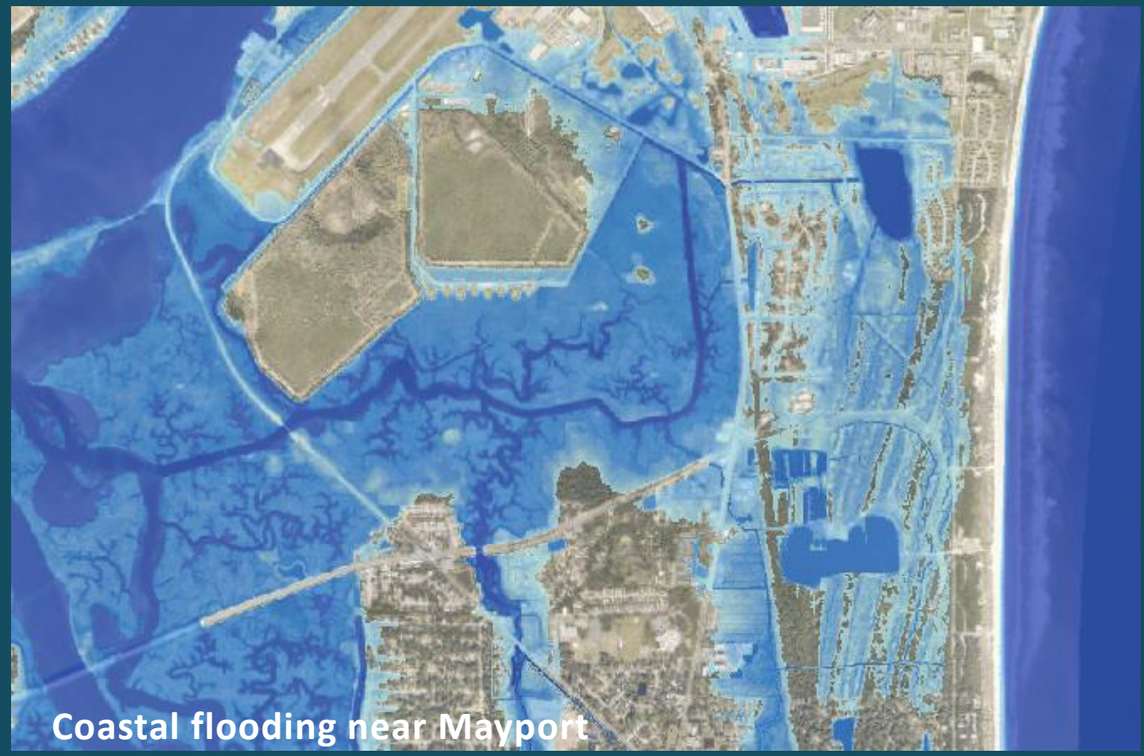
High tide flooding



Coastal storm flooding

DATA SOURCE: *USACE South Atlantic Coastal Study (SACS) Coastal Hazards System (CHS).*

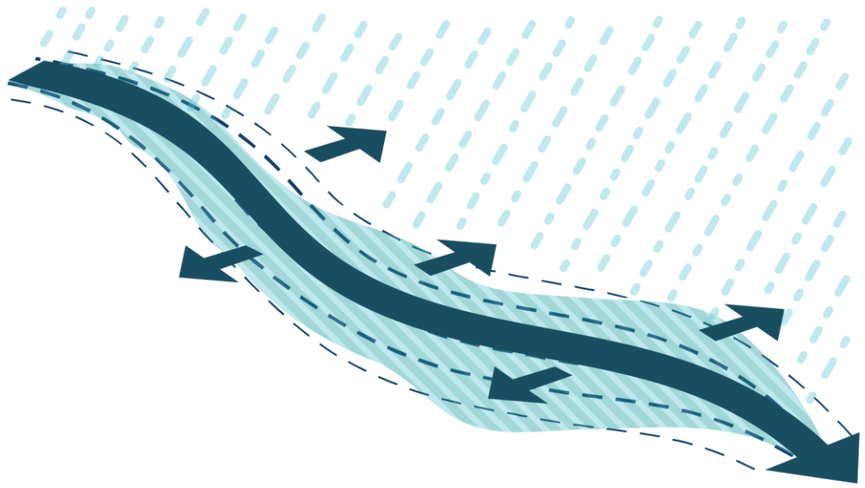
COASTAL STORM FLOODING SCENARIOS:
Current 10%, 1%, 0.2% AEP;
Future (2.3ft SLR) 10%, 1%, 0.2% AEP



Coastal flooding near Mayport

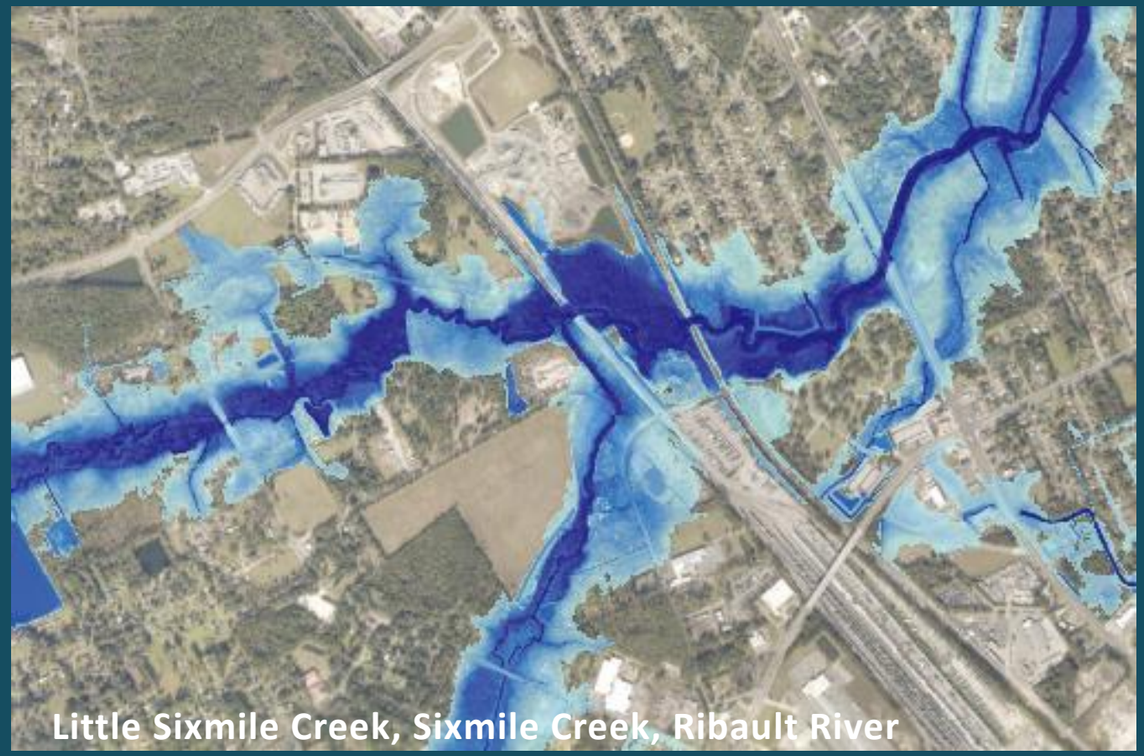
RIVERINE (FLUVIAL) FLOODING

When water in rivers, creeks, canals, or swales overtop their banks. This can happen due to local heavy rainfall. It can also result from rainfall upstream, even when it hasn't rained where the flooding occurs.



DATA SOURCES: *FEMA National Flood Hazard Layer (NFHL); COJ Master Stormwater Management Plan (MSMP) Flood Risk Assessment*

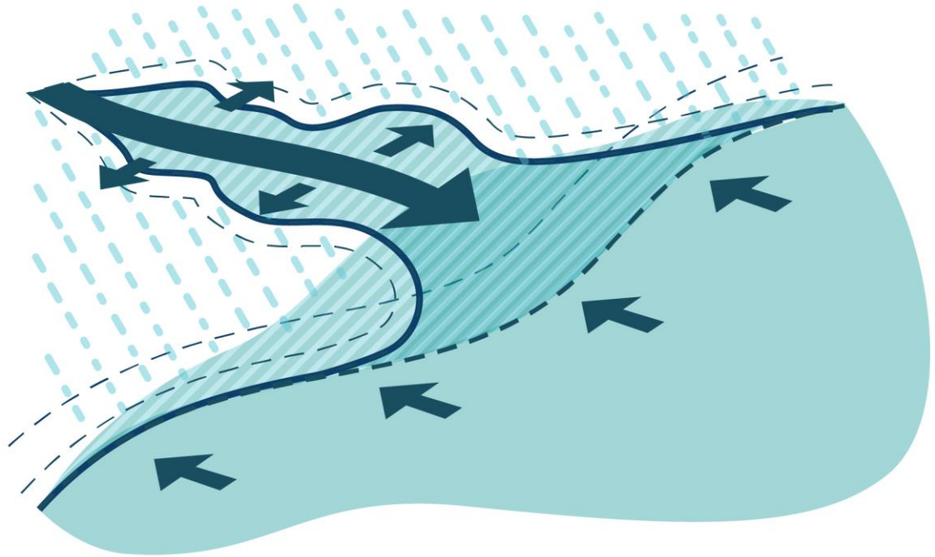
RIVERINE FLOODING SCENARIOS:
CURRENT 1%, 0.2% AEP (FEMA);
FUTURE (2.23ft SLR + 2.8ft high tide) 1% AEP (COJ)



Data with high uncertainty:

COMPOUND FLOODING

When different types of flooding occur at the same time. An example is when heavy rain falls during a coastal storm. Many places along the St. John's River and its tributaries are vulnerable to this kind of flooding, but this type of flooding is the most difficult to predict.



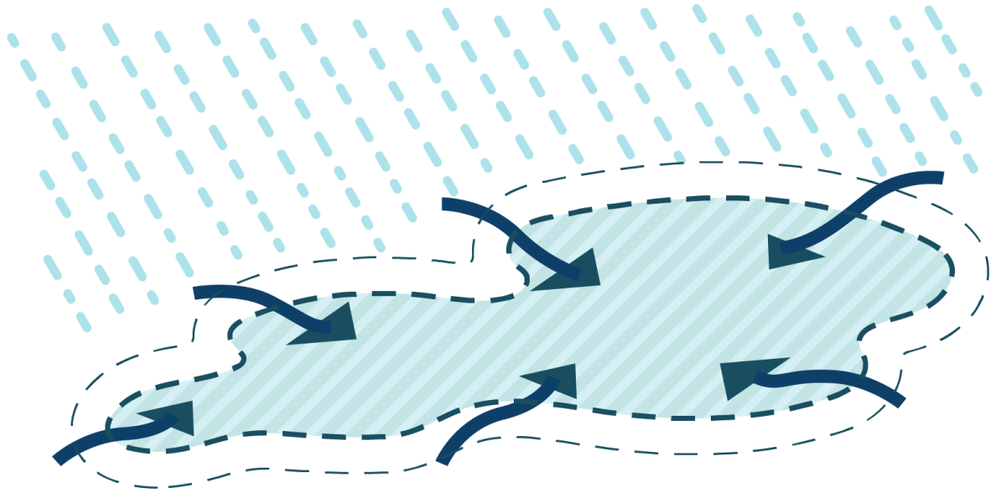
DATA GAPS: *Compound flooding scenarios are currently under-represented in the NFHL data. The COJ data gives one potential compound flooding scenario: riverine flooding during an annual high tide event.*

COMPOUND FLOODING SCENARIOS:
FUTURE (2.23ft SLR + 2.8ft high tide) 1% AEP (COJ)

What data is missing:

STORMWATER (PLUVIAL) FLOODING

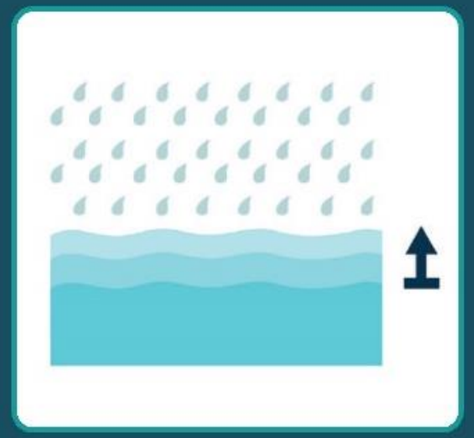
Flooding due to rainwater piling up in areas with poor drainage. This often happens during heavy rainfall events, when drains and pipes can't keep up with the rain.



DATA GAPS: *Existing flood risk data for Jacksonville does not fully account for surface stormwater (pluvial) flooding that might occur away from the river and tributaries.*

North Edgewood Ave

HOW WILL CLIMATE CHANGE IMPACT FLOODING?



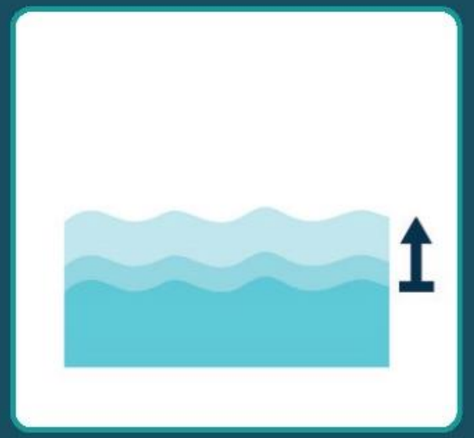
INLAND (RAIN-INDUCED) FLOODING

Jacksonville will experience more inland flooding due to more intense rainfall events (precipitation) and the associated stormwater runoff.

1.5-2x **INCREASE IN EXTREME PRECIPITATION EVENTS BY 2070**

COMPARED TO HISTORIC AVERAGE FOR THE SOUTHEAST US

SOURCE: FOURTH NATIONAL CLIMATE ASSESSMENT, 2018



COASTAL FLOODING

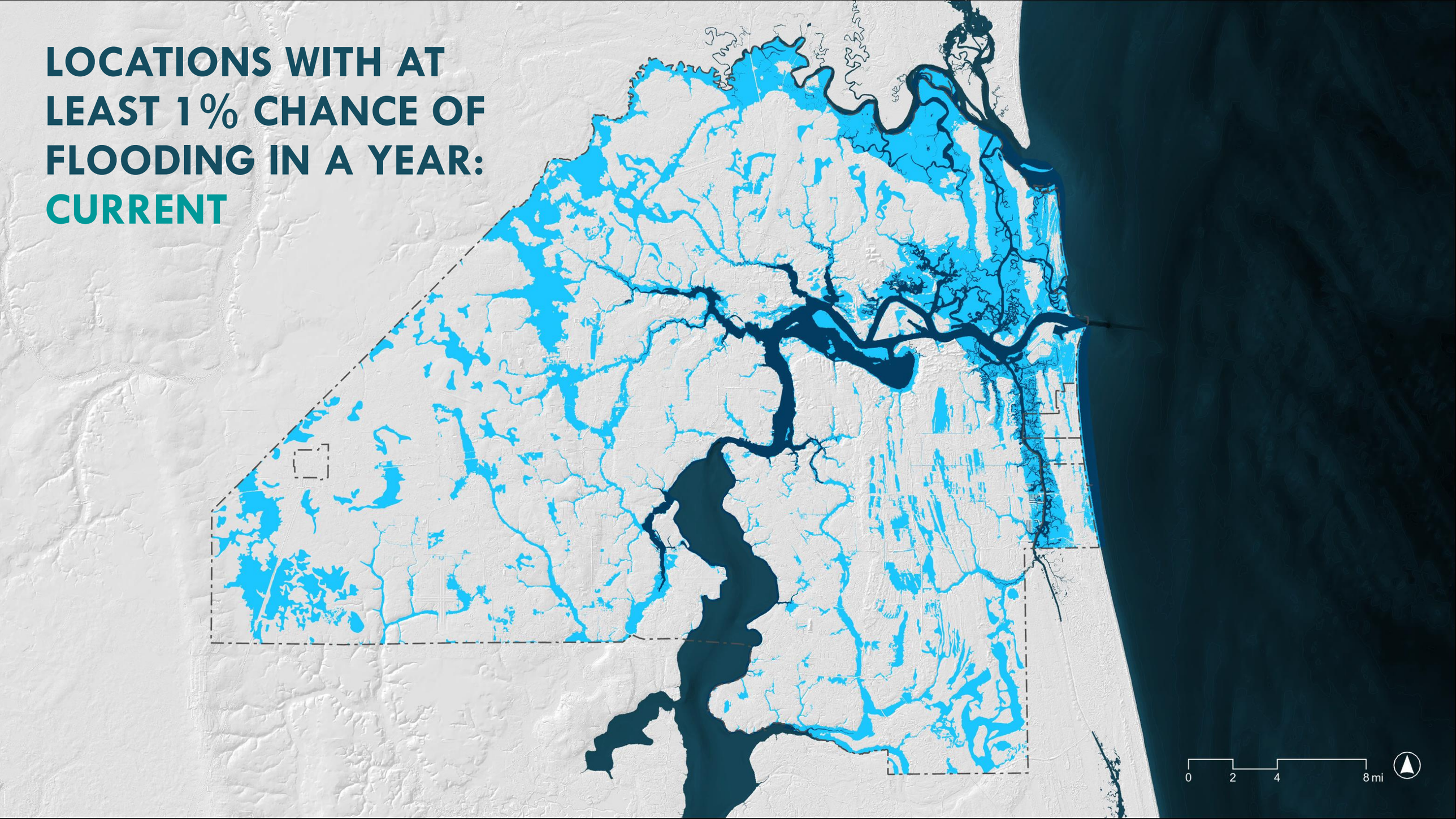
Jacksonville will experience more coastal flooding due to sea level rise and from stronger coastal storms.

40-60 **ANTICIPATED HIGH TIDE FLOODING DAYS IN 2050**

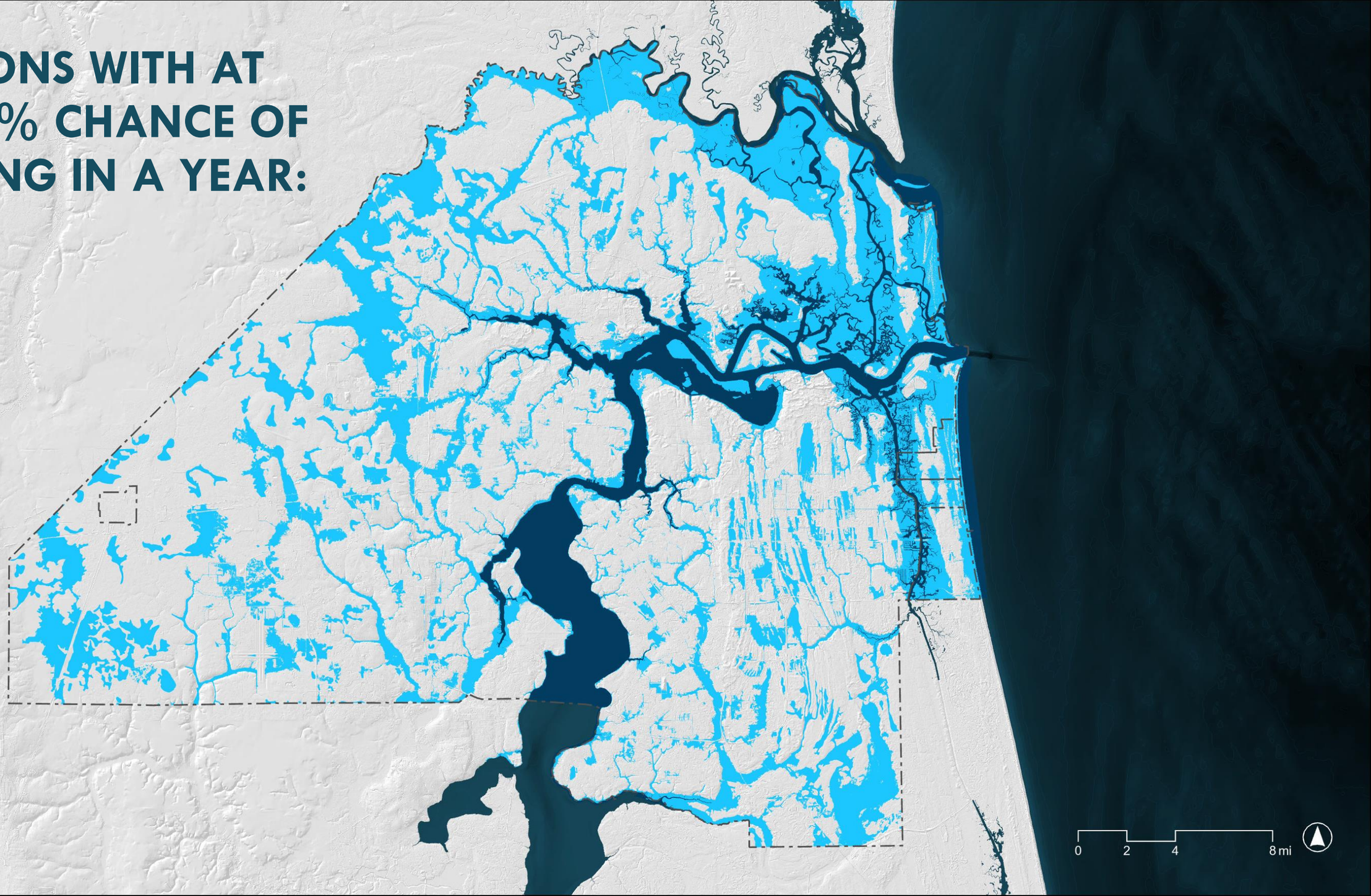
COMPARED TO 4 HIGH TIDE FLOODING DAYS IN 2021

SOURCE: NOAA STATE OF HIGH TIDE FLOODING AND 2022 ANNUAL OUTLOOK FOR MAYPORT, FL

LOCATIONS WITH AT LEAST 1% CHANCE OF FLOODING IN A YEAR: CURRENT



LOCATIONS WITH AT LEAST 1% CHANCE OF FLOODING IN A YEAR: FUTURE



2022 Heat Watch Study

Study Date

June 18th, 2022

406 mi²
Study Area

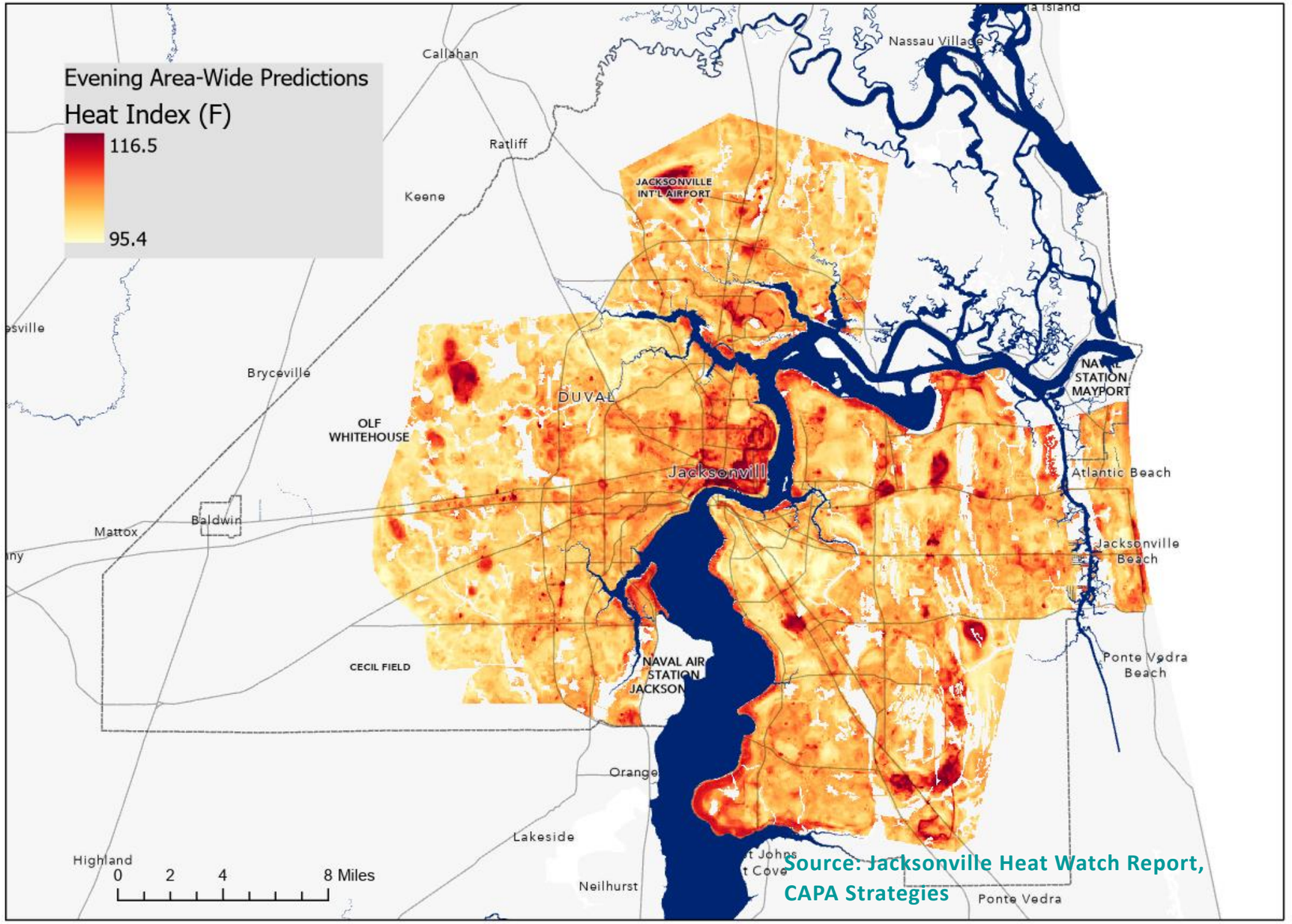
60
Volunteers

30
Routes

139,337
Measurements

94.7°
Max Temperature

11.8°
Temperature Differential

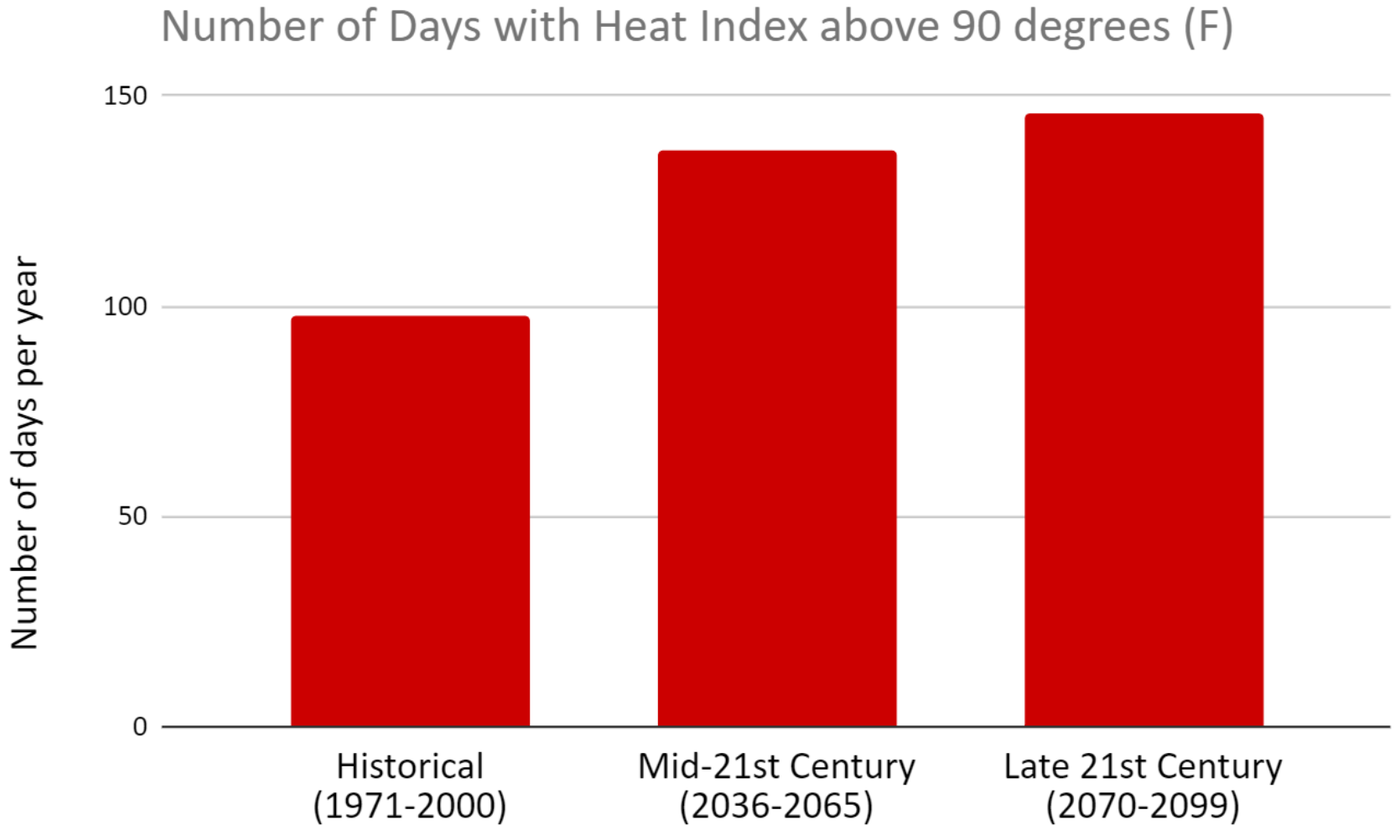


Source: Jacksonville Heat Watch Report, CAPA Strategies

Extreme heat is a growing risk.

The number of days with extreme heat are expected to increase sharply.

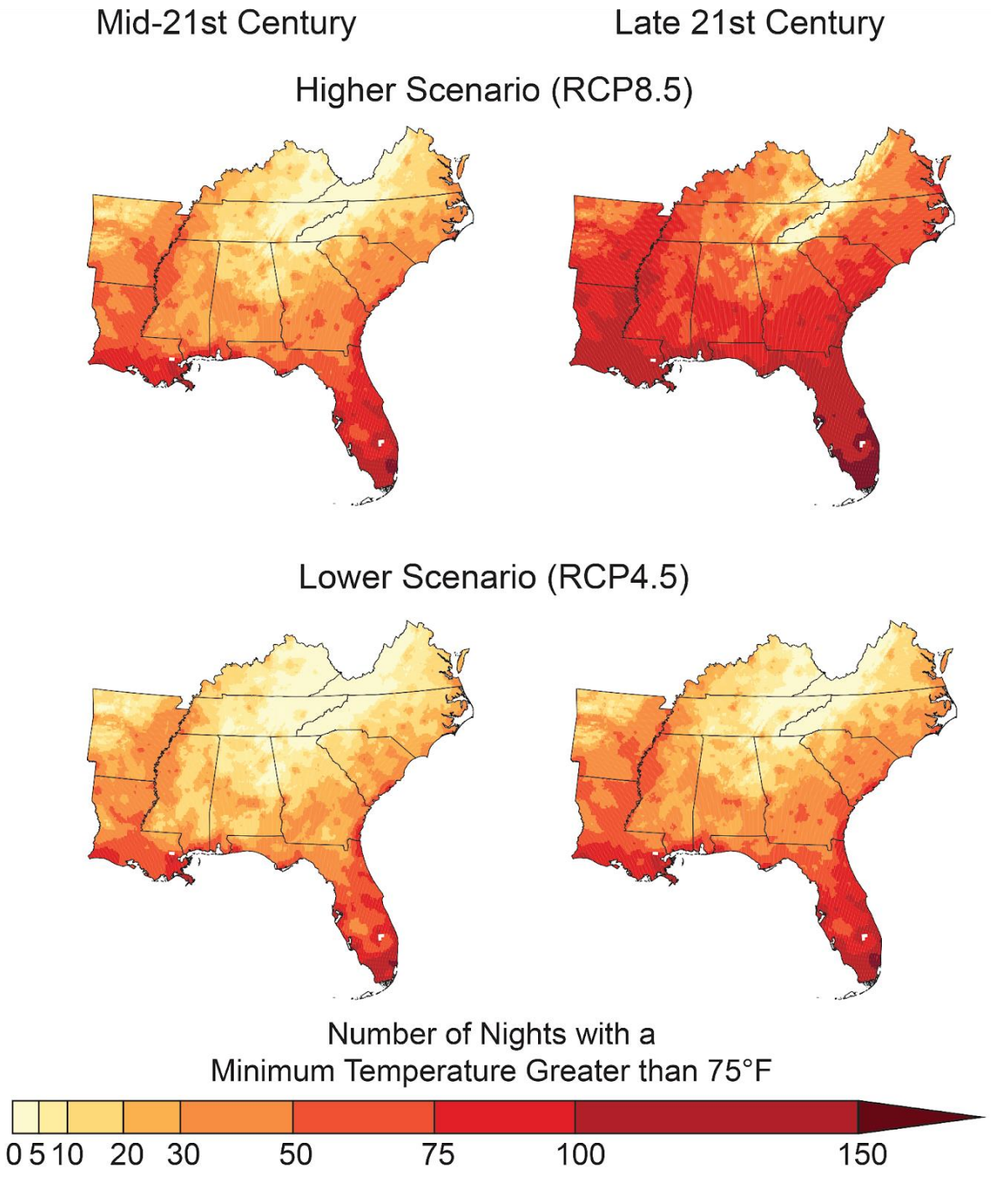
Duval county can see about a **40% increase in number of days with Heat Index above 90 degrees F per year by Mid-21st Century.**



Source: Union of Concerned Scientists Killer Heat in the US Report (2019)

Reduced night-time cooling is a major factor in heat stress and heat-related illnesses.

The region can see **about 50-100 additional 'warm nights' (over 75 °F) per year by mid-century** according to projections from the Fourth National Climate Assessment



Source: Fourth National Climate Assessment Report

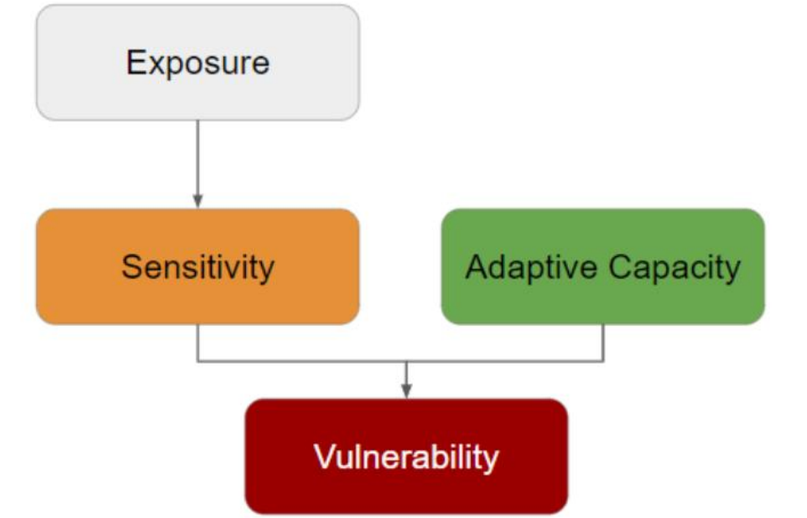
Same exposure - *different vulnerability*

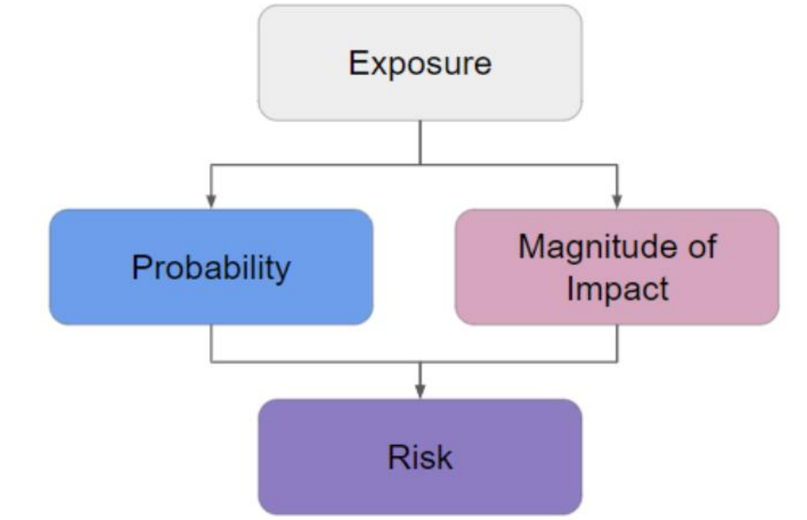
Vulnerability Assessment Approach

Consistent analytical framework
applied across threats and asset types

Floodplain Assessment Factors

- ✓ Location of parcel and building (exposure)
- ✓ Asset type and use (sensitivity)
- ✓ Effective year built & floodplain development BFE requirements (adaptive capacity)
- ✓ Depth of flooding (risk consequence)
- ✓ Likelihood of flooding (risk probability)





Community Assets Considered

Gov-owned Properties
city, county, state, and federal properties
(approx. 6,890 parcels)

Utility and Critical Services
utility properties; critical government-owned facilities; also privately-owned "critical facilities/services" such as hospitals, grocery stores, etc.
(approx. 2,434 parcels)

Cultural and Community Services
recreation; non-emergency services like childcare centers; parks and community centers; historical property**
public and private
(approx. 3,361 parcels)

Commercial Properties
hotels/motels, offices, retail, supermarkets, medical, etc.
(approx. 11.6K parcels)

Industrial Properties
industrial properties and warehouses
(approx. 5,113 parcels)

Residential Properties
single, multifamily, condos, mobile homes/parks, assisted housing, congregate living facilities
(approx. 308.5K parcels)

Vacant Land
parcels identified as vacant by the property assessor's office
(approx. 32.7K parcels)

Protected/Managed and Working Lands
agricultural properties; federal, state, local and privately managed lands; includes city parks
(approx. 4,284 parcels)

Road Network
evaluation of roadways and bridges that provide critical connection to neighborhoods and assets

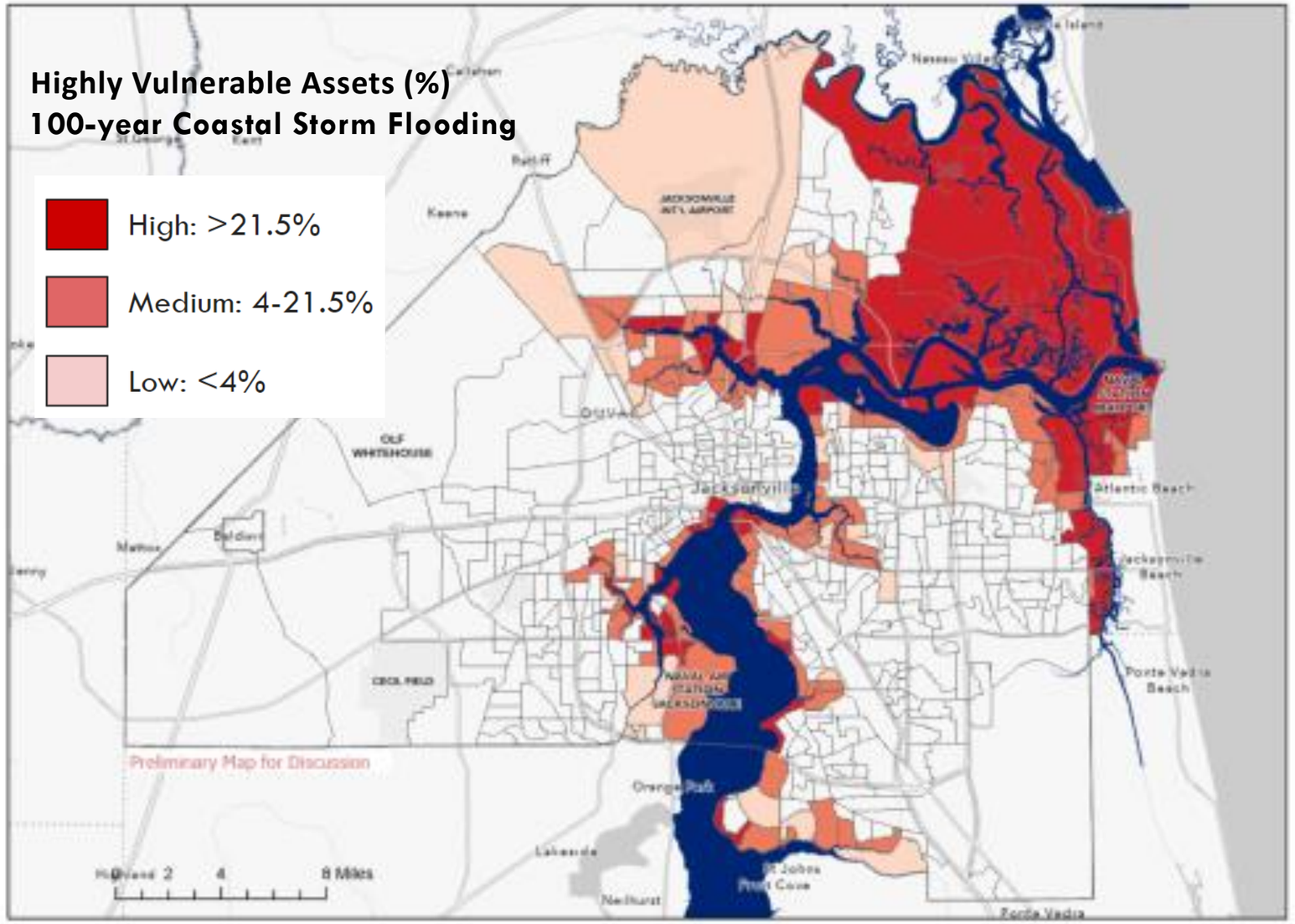
City-wide Vulnerability to Flooding

Preliminary Results for Discussion

Built-environment Assets	Total assets	Floodplain Inundation (FEMA)	Coastal Storm Flooding (USACE CHS)			
		100- & 500-year	Present		Future (+2.3 ft SLR)	
			10-year	100-year	10-year	100-year
		# and % of 'highly vulnerable' properties				
Residential	308,449	19.8K (6.42%)	7,473 (2%)	11,931 (4%)	9,451 (3%)	16,163 (5%)
Commercial	11,663	755 (6.47%)	145 (1.24%)	279 (2.39%)	210 (1.8%)	420 (3.6%)
Utility & Critical Facilities	2,434	258 (10.6%)	46 (1.9%)	101 (4.15%)	81 (3.34%)	150 (6.16%)
Cultural & Community Services	3,361	285 (8.48%)	217 (6.46%)	276 (8.21%)	247 (7.34%)	331 (9.84%)
Govt-owned Properties	6,890	772 (11.2%)	579 (8.4%)	833 (12.08%)	704 (10.2%)	999 (14.5%)

Residential Vulnerability to 100-year Coastal Storm

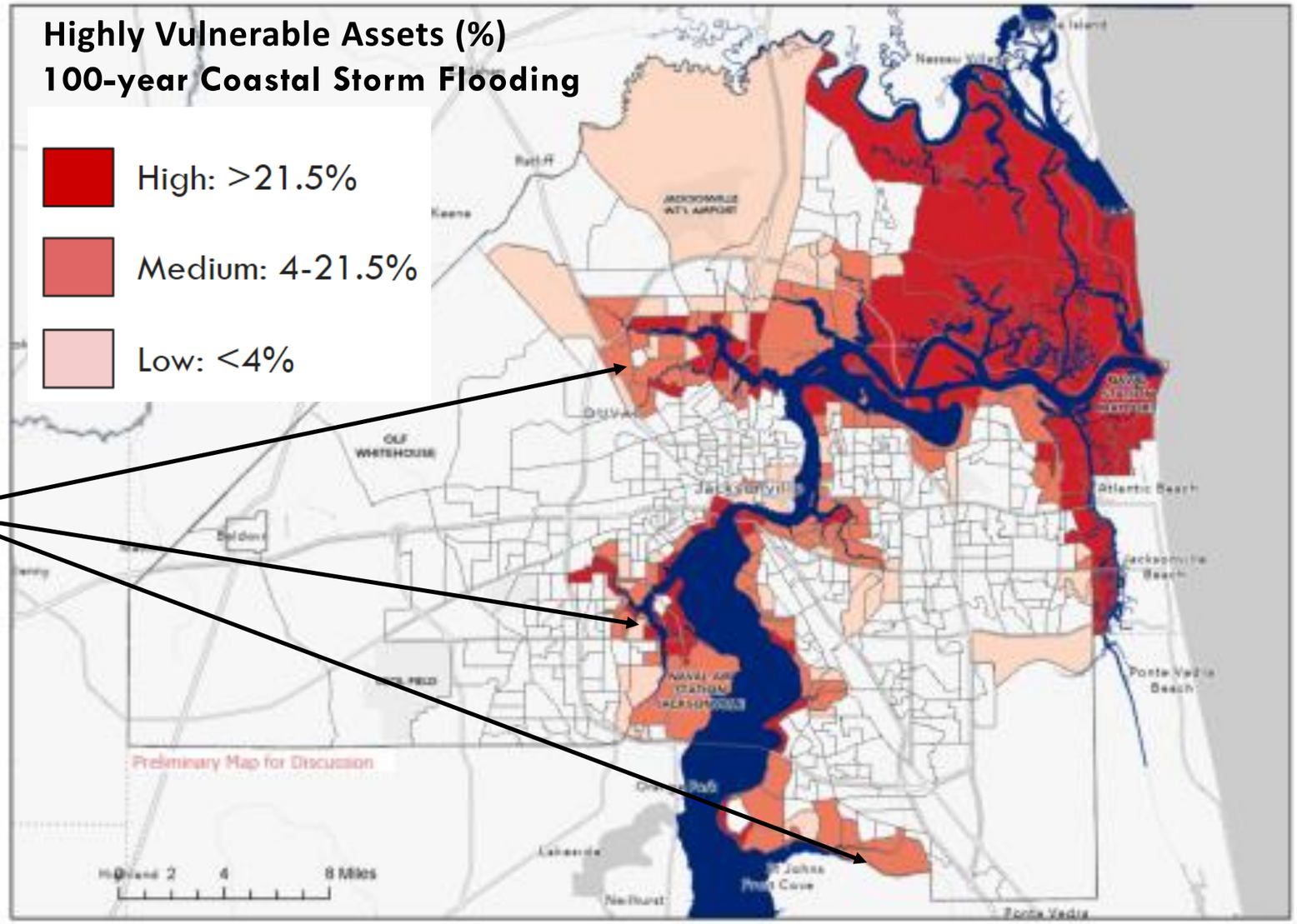
Block groups in dark red have some of the highest proportion of highly vulnerable homes to 100 and 500-year flooding



Residential Vulnerability to 100-year Coastal Storm (+2.3 ft SLR)

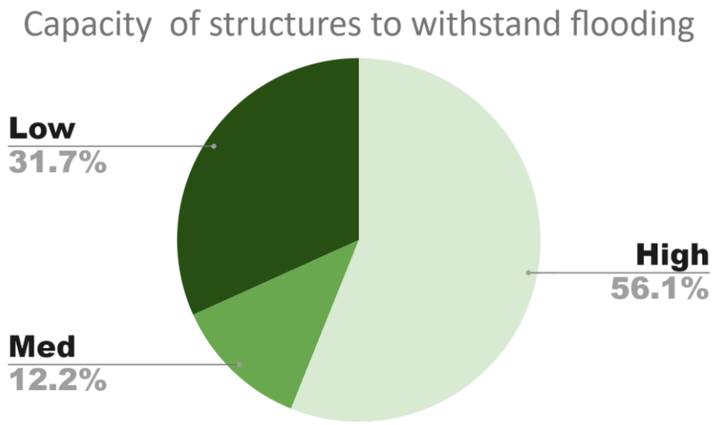
Future conditions assessed for both 10- and 100-year coastal storm flooding

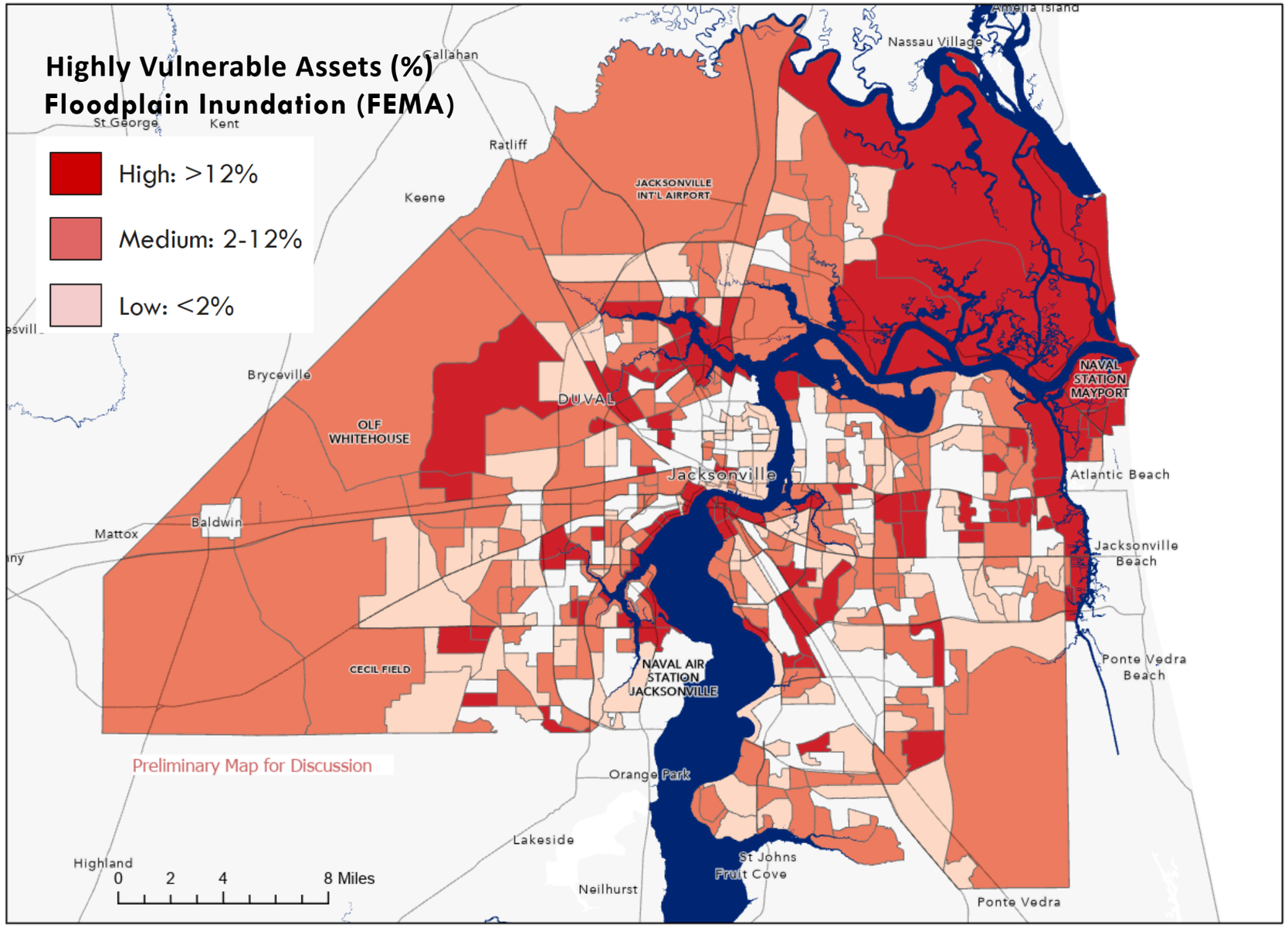
Areas with potential for increasing vulnerability in the future to 100-year coastal storm flooding (residential properties)



Widespread Residential Vulnerability to Floodplain Inundation (FEMA)

About 32% of exposed properties were either built before 1978 or outside the regulatory 100-year floodplain.

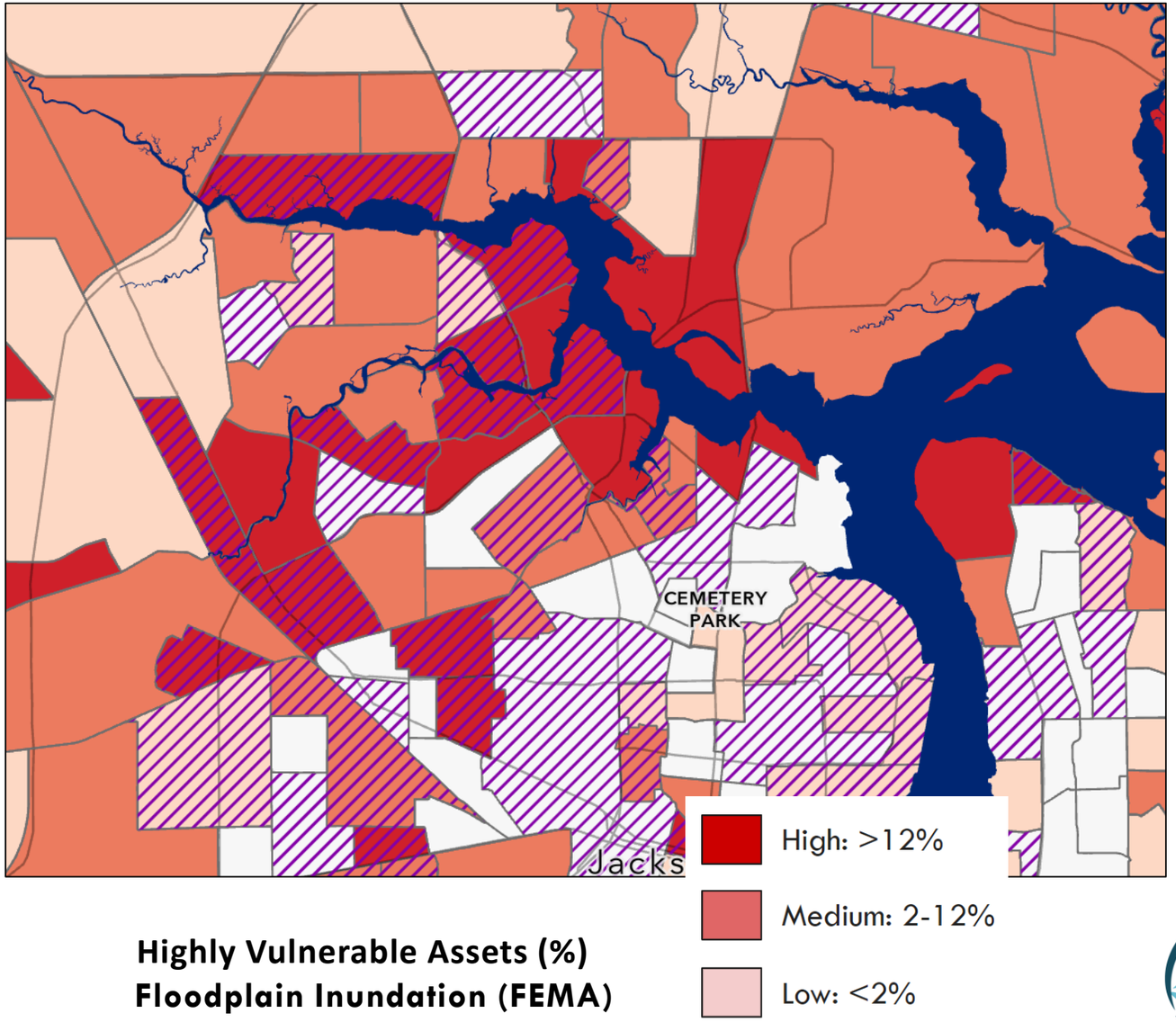




Compounding physical and social vulnerability

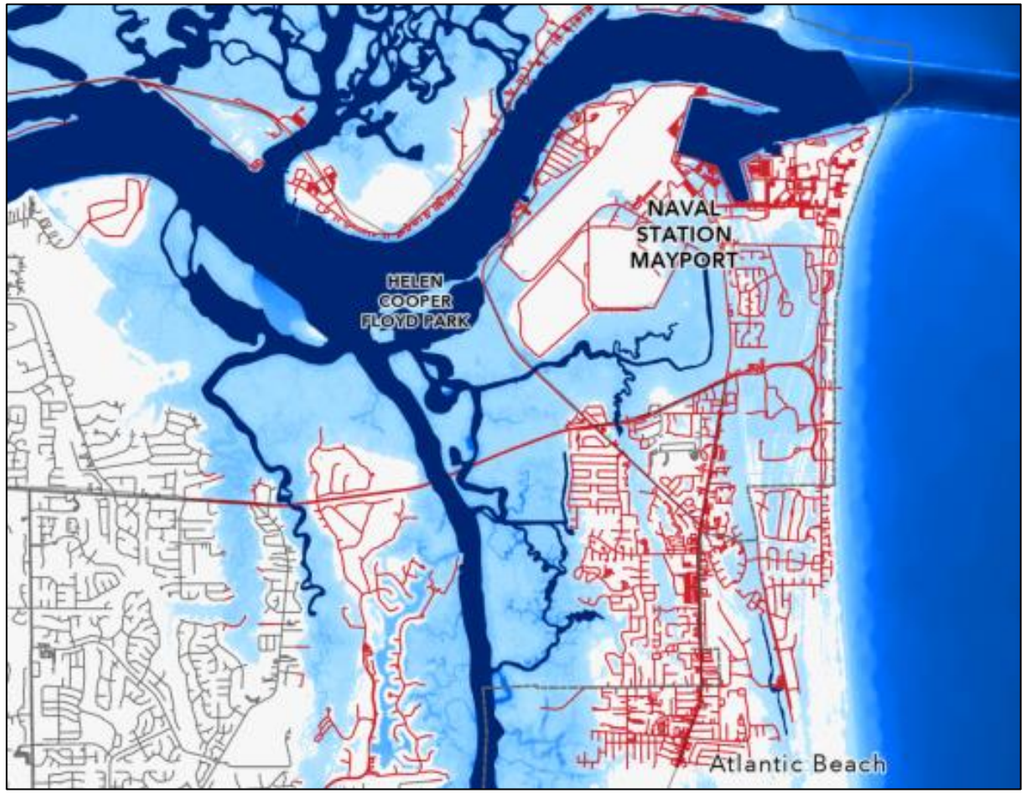
FLOODPLAIN INUNDATION (FEMA)

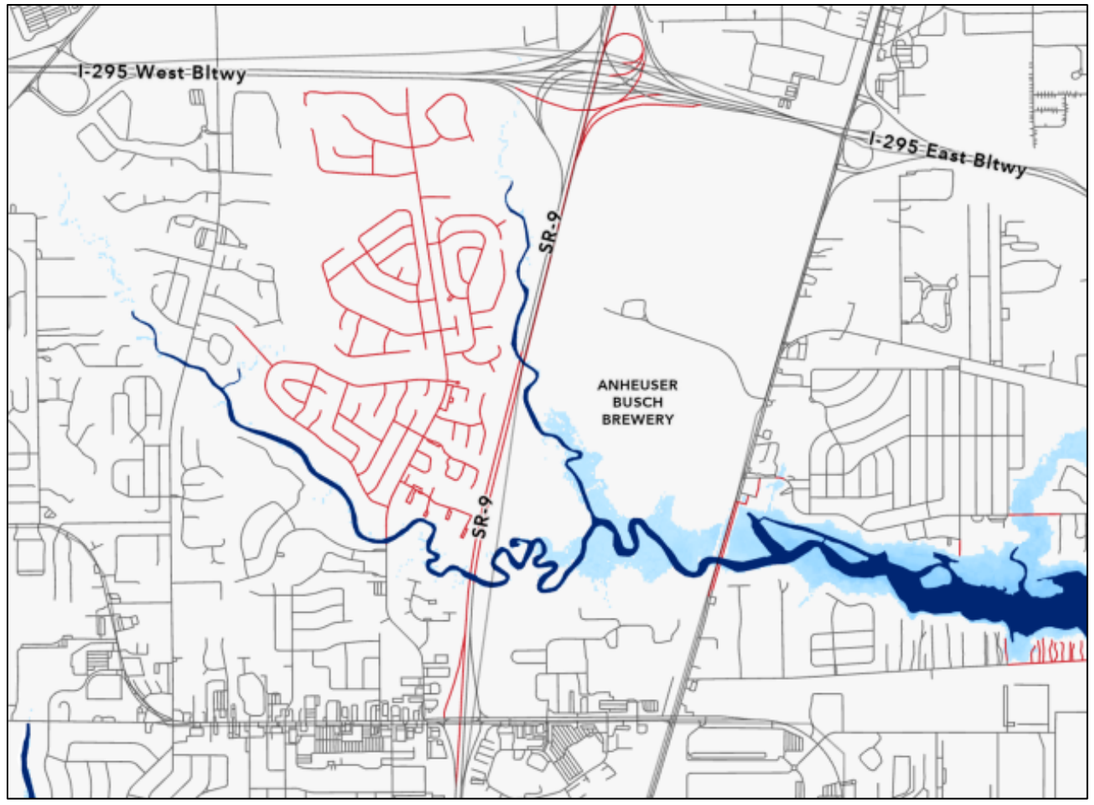
Across the city, 23 block groups have some of the highest vulnerable residential properties (>12%) and among the highest percentage of households with incomes below the poverty level (shown in purple hatching).



Neighborhoods isolated during a coastal storm event

Roads highlighted in red show neighborhood pockets that may be potentially isolated during a 100-year coastal storm event

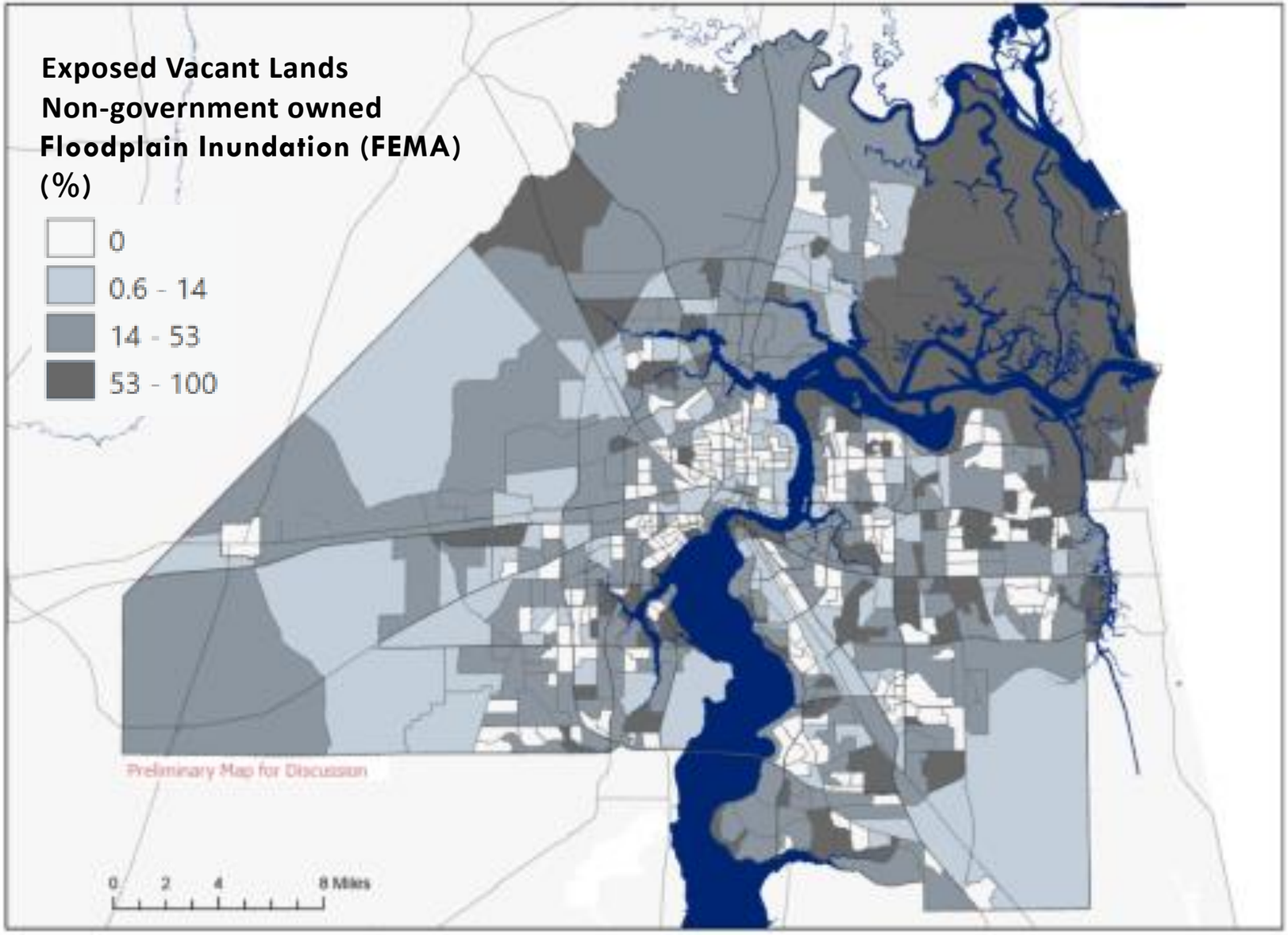




Vacant Lands and Opportunities for Resilient Growth

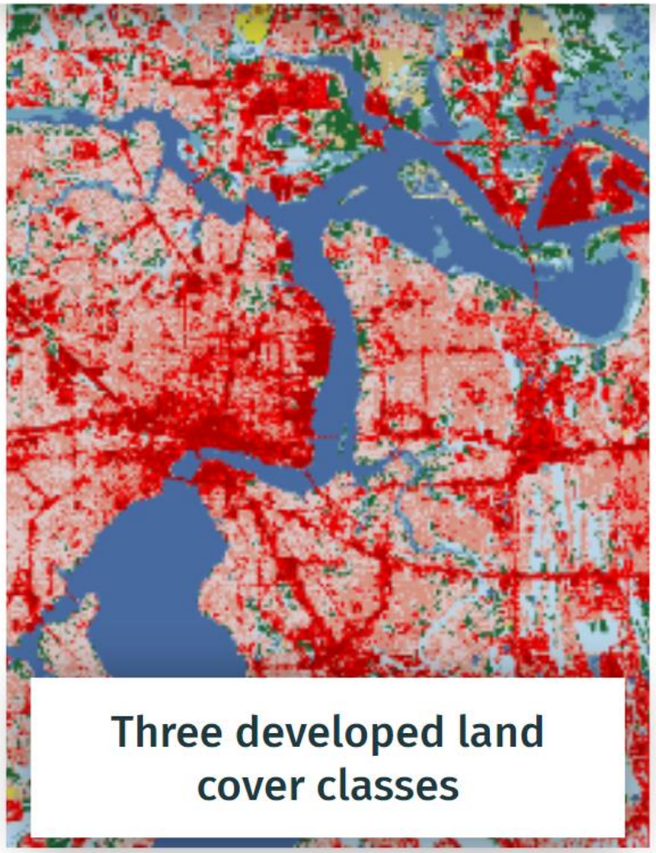
Within areas in dark grey, over half of vacant lands are exposed to flooding.

Areas in white and lightest grey have the least amount of flood-exposed vacant lands.



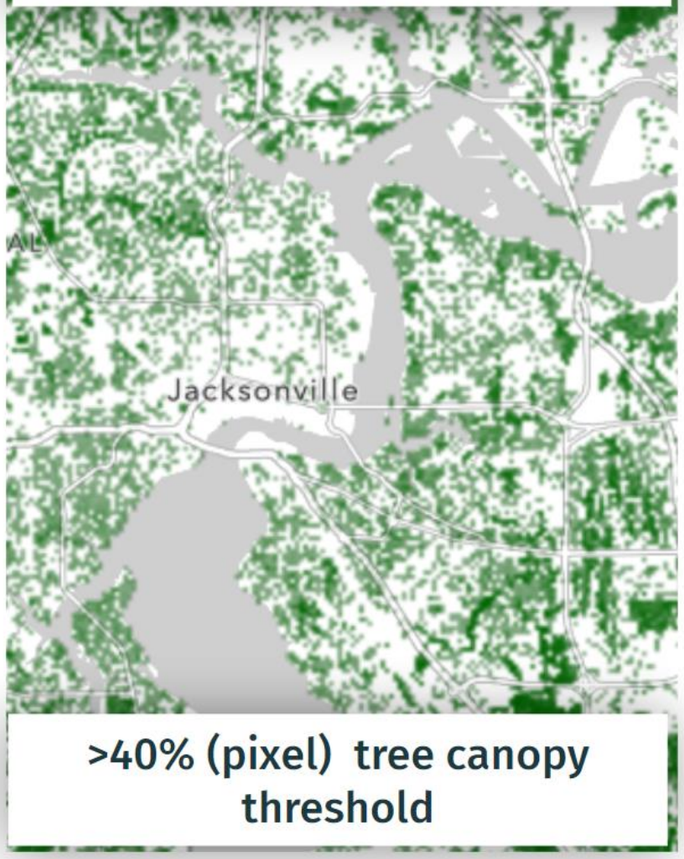
Extreme Heat Vulnerability: Approach

NLCD Land Cover 2019



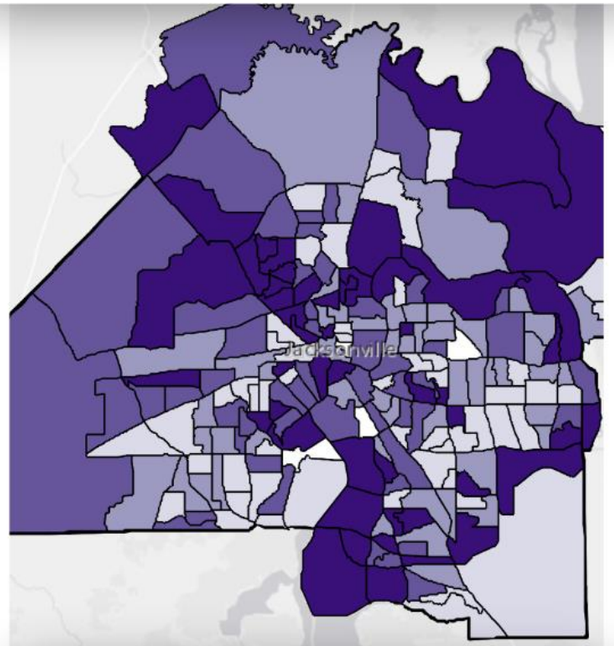
Three developed land cover classes

USFS Tree Canopy Cover 2016



>40% (pixel) tree canopy threshold

ACS 5 Year Census Data 3 variables

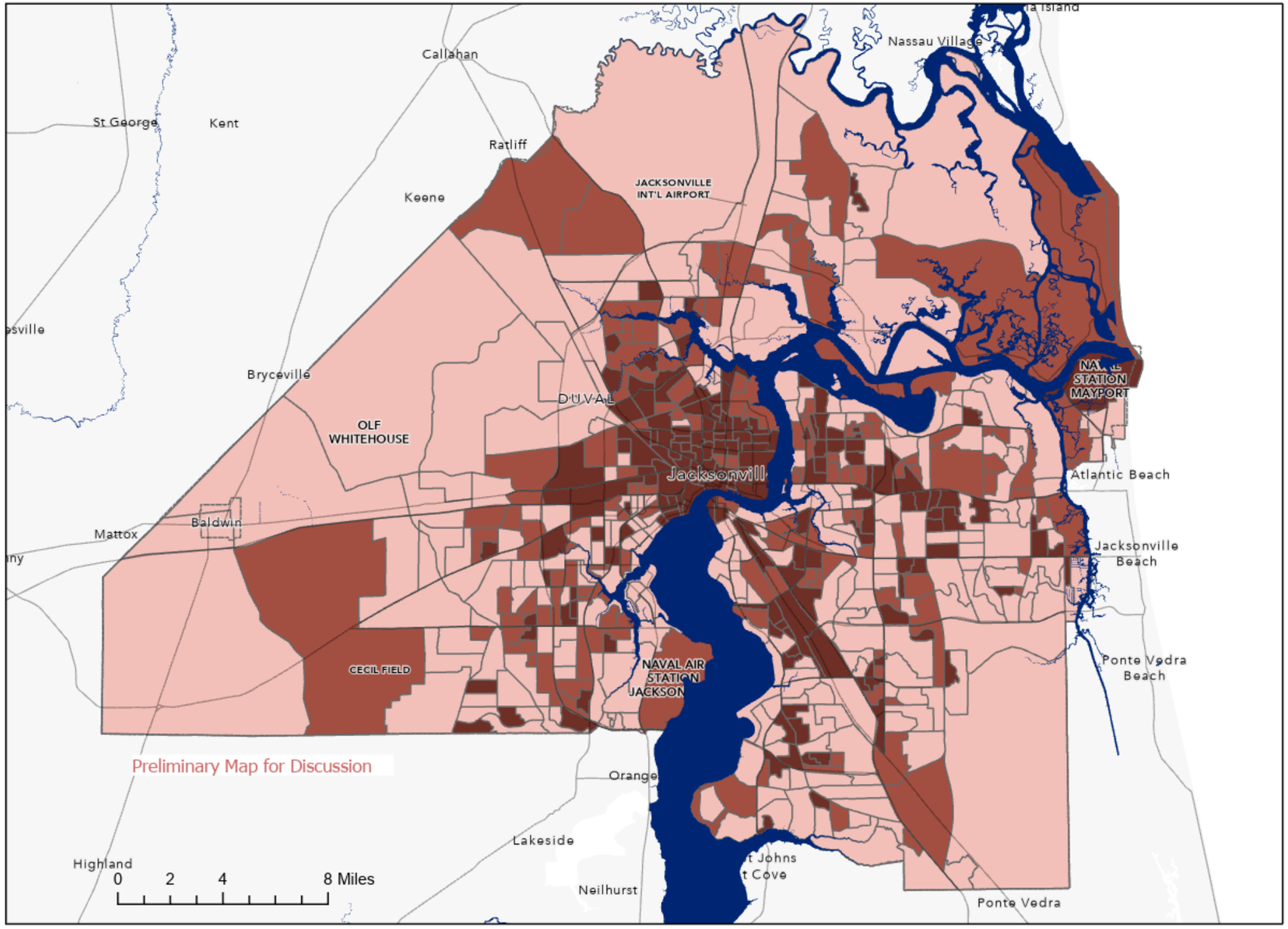


1) Over 65 individuals
2) Under 5 individuals
3) Median Income

Extreme Heat Vulnerability

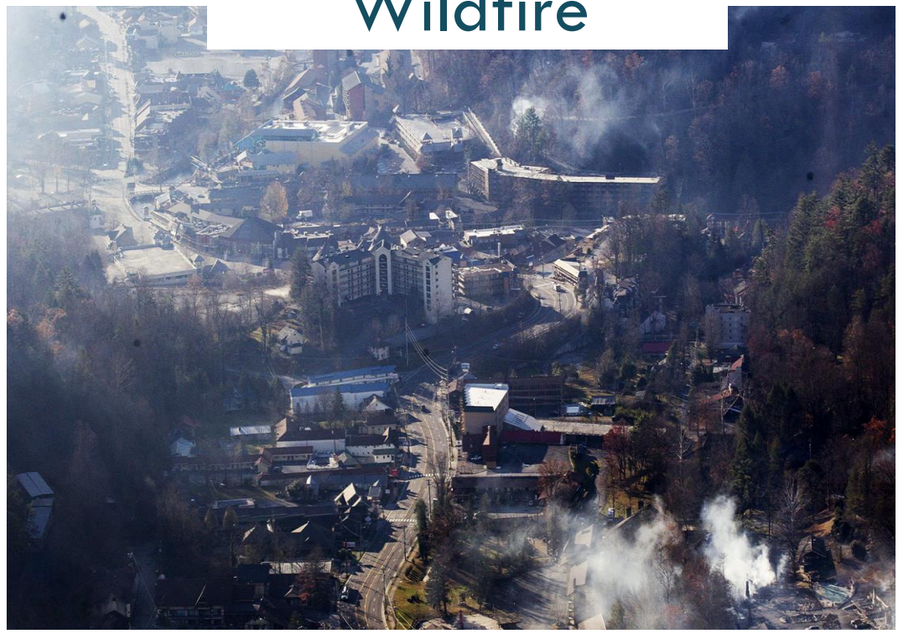
Block groups highlighted in dark brown are identified as the most vulnerable areas

These areas have higher percentage of developed land cover, lower tree canopy, and high percentage of sensitive individuals and those with lower incomes.



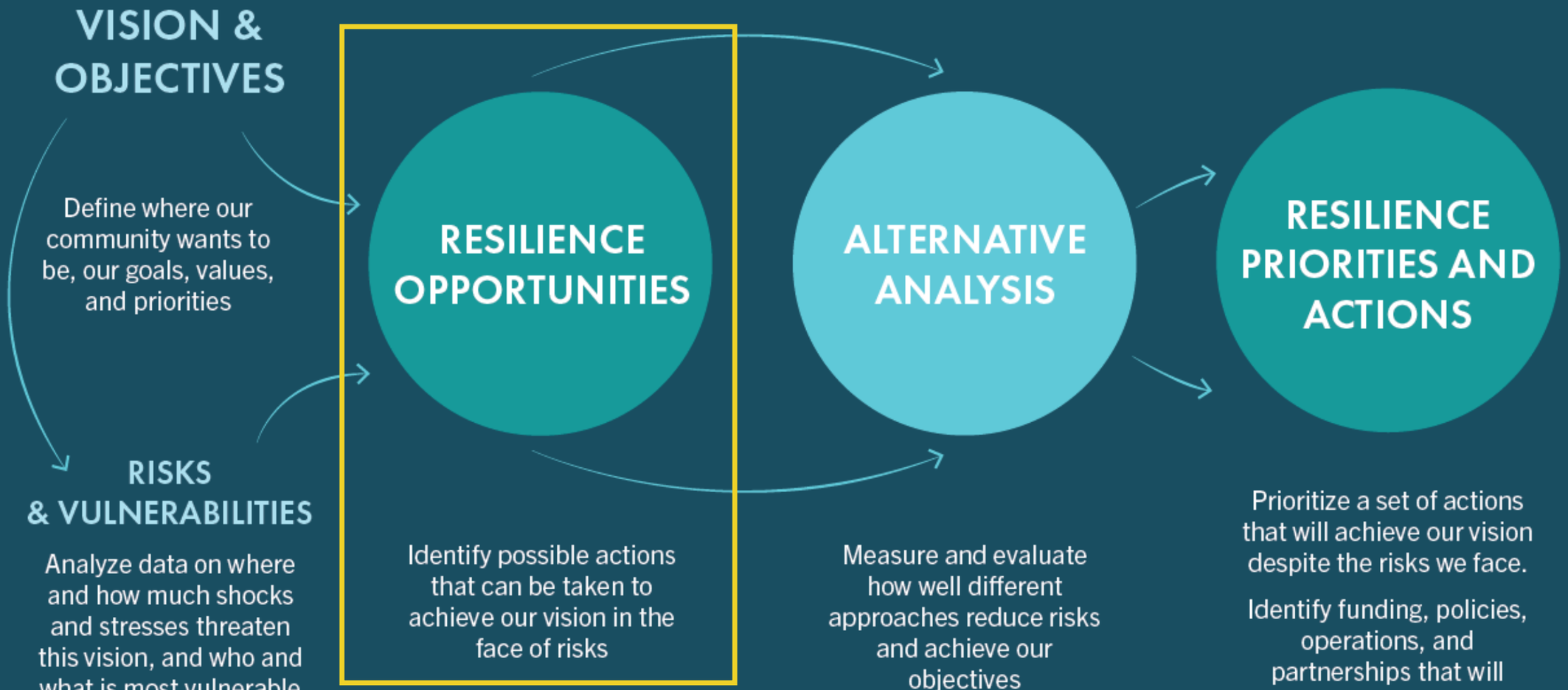
Other threats being considered spatially

Wildfire



High Winds

WHERE WE ARE NOW



WORKING GROUP SESSIONS

Working Group members shared their perspective and expertise with our team to:

- **Generate potential actions** for consideration in the resilience strategy.
- **Provide insights into local context** that may shape opportunities for action.
- **Identify mechanisms** to support implementation.

WORKING GROUPS OVERVIEW

PARKS, OPEN SPACE, AND ECOLOGY

LAND USE AND DEVELOPMENT

HEALTH AND QUALITY OF LIFE

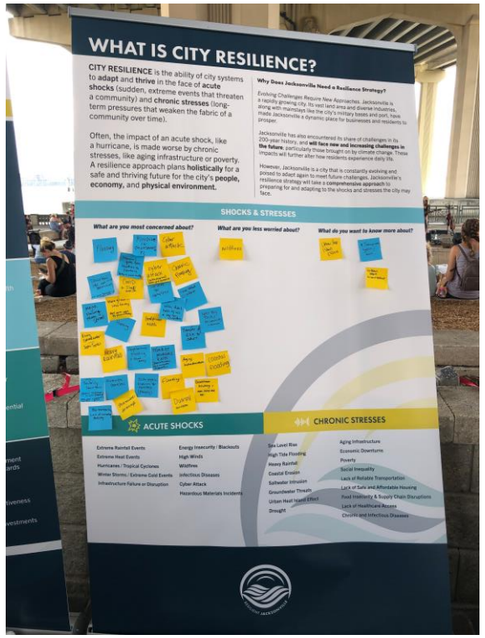
HYDROLOGY AND FLOOD RISK MANAGEMENT

CRITICAL INFRASTRUCTURE AND EMERGENCY SERVICES

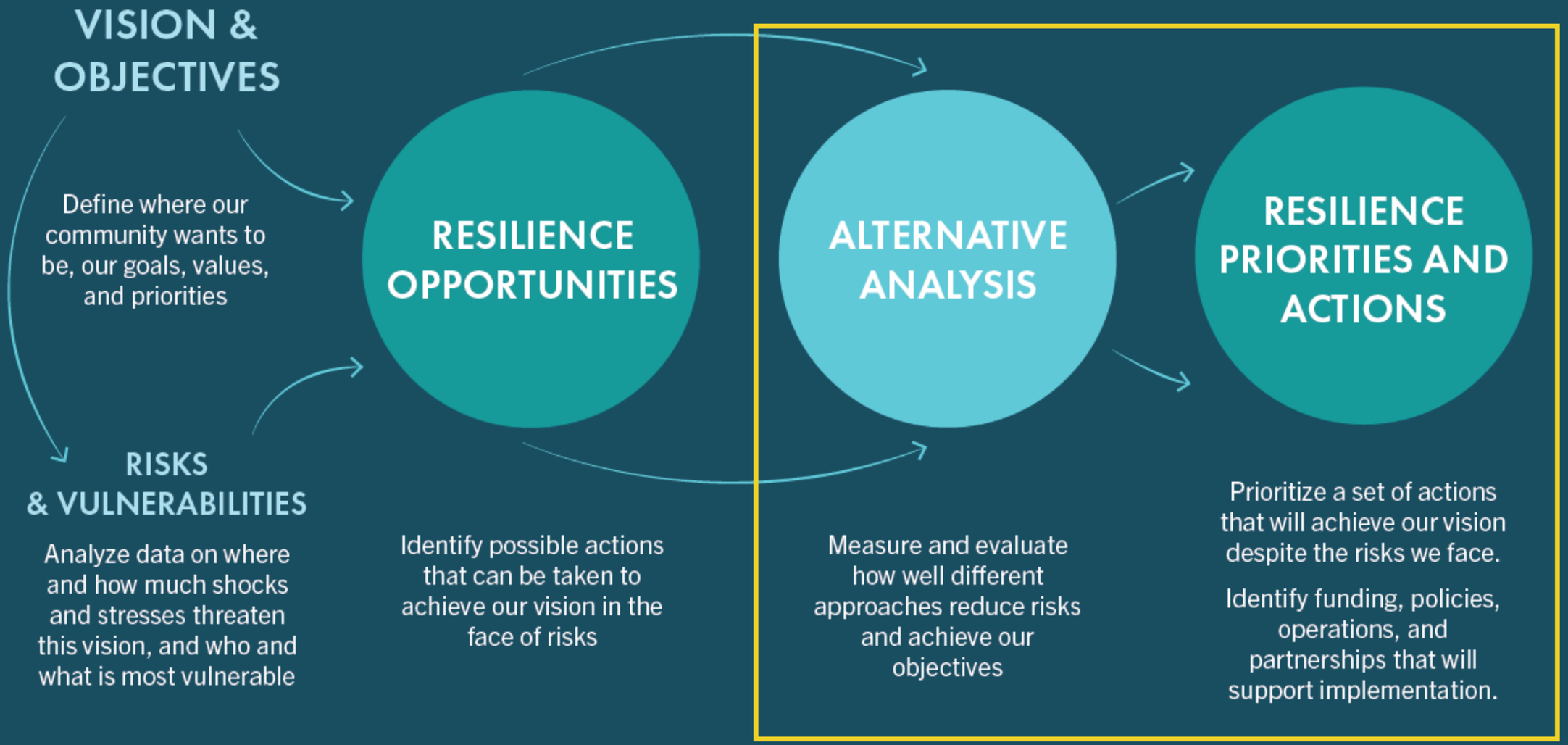
UPCOMING PUBLIC MEETINGS

The Resilience Team will be holding three public meetings on the resilience strategy:

- **February 9th – Legends Center @ *6pm***
- **February 13th – Ed Ball @ *6pm***
- **February 16th – Southeast Regional Library @ *6pm***



FUTURE STEPS



THANK YOU

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