Duval County Local Mitigation Strategy

February 2025

Draft V1.7

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Local Mitigation Strategy Glossary

AAA	Adaptation Action Area
ARC	American Red Cross
BCR	Benefit-Cost Ratio
BLM	Bureau of Land Management
BMFA	Beach Management Funding Assistance Program
CAP	Cooperative Assistance Program
CCM	Conservation / Coastal Management
CDBG	Community Development Block Grants
CDC	Center for Disease Control
CEMP	Comprehensive Emergency Management Plan
CFR	Code of Federal Regulations
CHHA	Coastal High Hazard Area
CID	Critical Infrastructure Disruption
CIP	Capital Improvement Plans
COAB	City of Atlantic Beach
COJ	City of Jacksonville
COJB	City of Jacksonville Beach
COMP	Comprehensive Plan
CONB	City of Neptune Beach
CPAC	Citizens Planning Advisory Committees
CRS	Community Rating System
DCPS	Duval County Public Schools
DEP	Department of Environmental Protection
DHS	Department of Homeland Security
DOH	Department of Health
DOT	Department of Transportation
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EPD	Emergency Preparedness Division
FDEM	Florida Division of Emergency Management
FDLE	Florida Division of Law Enforcement
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance Program
FSCJ	Florida State College at Jacksonville
GIS	Geographic Information System
HCDD	Housing and Community Development Division – (Neighborhoods)
HIVA	Hazard Identification and Vulnerability Assessment
HMGP	Hazard Mitigation Grant Program
HSP	Hazard Specific Plans
ICW	Intracoastal Waterway

IED	Improvised Explosive Device
JAA	Jacksonville Aviation Authority
JAXPORT	Jacksonville Port Authority
JEA	Jacksonville Electric Authority
JFRD	Jacksonville Fire and Rescue Department
JSO	Jacksonville Sheriff's Office
JTA	Jacksonville Transit Authority
LMS	Local Mitigation Strategy
NASA	National Aeronautics and Space Administration
NEFRC	Northeast Florida Regional Planning Council
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OSHA	Occupational Safety and Health Administration
PDM	Pre-Disaster Mitigation Program
PDRP	Duval County Post Disaster Redevelopment Plan
PPD	Planning and Development Department
RFC	Repetitive Flood Claims
RL	Repetitive Loss
SEPPC	Security and Emergency Preparedness Planning Council
SHMP	Florida Enhanced State Hazard Mitigation Plan
SJRWMD	St. Johns River Water Management District
SLOSH	Sea, Lake and Overland Surges from Hurricanes
SRAIDRC	Storm Resiliency and Infrastructure Development Review Committee
SRL	Severe Repetitive Loss
THIRA	Threat and Hazard Identification and Risk Assessment
UNF	University of North Florida
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
WUI	Wildland Urban Interface

Section I

Introduction

SECTION I - INTRODUCTION

A. Local Mitigation Strategy (LMS)

Duval County is comprised of the City of Jacksonville, City of Jacksonville Beach, City of Atlantic Beach, City of Neptune Beach, and the Town of Baldwin, which are managed on a day-to-day basis by their respective governing bodies. Following the 1968 Charter, the Consolidated City of Jacksonville was established, which consolidated the city and county governments, defined resource allocations between the municipalities, and delegated emergency powers to the Mayor of the City of Jacksonville during an incident or disaster. Following the issuance of a State of Emergency, as outlined in Chapter 674.206 of the City of Jacksonville Ordinance, the Mayor of the City of Jacksonville, becomes the unified governing body over all municipalities.

For the purposes of this document and clarity when referencing different jurisdictional responsibilities and organization, the City of Jacksonville (COJ) and Duval County will be referenced as independent entities. When Duval County is referenced in this document, it is referring collectively to the City of Jacksonville, Jacksonville Beach, Atlantic Beach, Neptune Beach, and the Town of Baldwin. Therefore, in the body of this document "COJ" refers to the municipality and Duval County refers to the Consolidated City County Government.

Additionally, municipalities will be referred to by only the name and not the full title (e.g. City of Jacksonville Beach will be referred to as Jacksonville Beach or COJB).

Purpose

The Local Mitigation Strategy (LMS) is the primary component of a statewide process of community-based hazard mitigation planning. This process is implemented through a partnership between the Florida Division of Emergency Management (FDEM), the Duval County municipalities, local nonprofit organizations, and the private sector. The purpose of the LMS is to identify Duval County hazard vulnerability then identify actions to mitigate or prevent the negative impacts of those hazards. This unified all-hazards strategy has been developed and maintained by the LMS Working Group composed of public and private sector officials supported by a dedicated Advisory Committee, known as Duval Prepares. Within Duval County , the Security and Emergency Preparedness Planning Council (SEPPC) acts as the LMS Working Group. The Advisory Committee members includes subject matter experts, liaisons to Duval County municipalities, members of state and federal agencies, regulatory commissions, military partners, public and private sector organizations, education and healthcare sector partners, and members of the public.

The most fundamental element of the LMS is the Hazard Identification and Vulnerability Assessment (HIVA). The HIVA identifies potential hazards and defines the vulnerabilities of each hazard with associated hazard risk estimates. Mitigation initiatives were then developed to minimize or eliminate those vulnerabilities. The LMS is a living document updated every 5 years to integrate current and projected issues, as well as track mitigation measures and actions that are completed, in-progress, deferred, or cancelled. The HIVA conducted as part of the 2025 LMS revision indicates that Duval County is susceptible to the following natural as well as technological and man-made hazards. Below, they have been listed in order of descending overall vulnerability:

Natural Hazards:

1. Wind from Tropical Cyclones,
2. Severe Weather,
3. Storm Surge,
4. Extreme Heat,
5. Sea Level Rise,
6. Flooding,
7. Infectious Disease,
8. Drought,
9. Coastal Erosion,
10. Saltwater Intrusion,
11. Wildfire,
12. Winter Storms, and
13. Extreme Cold.

Technological and man-made hazards:

1. Critical Infrastructure Disruption (CID),
2. Hazardous Materials (HAZMAT) Accidents,
3. Improvised Explosive Devices,
4. Active Shooter Incidents,
5. Biological Attacks,
6. Cyber Attacks,
7. Terrorism and Targeted Violence, and
8. Chemical Attacks.

The top mitigation initiatives prioritized by the LMS Working Group includes retrofitting water, sewer, and electrical facilities to:

- Protect against failure caused by flooding and storm surge, hardening against wind impacts,
- Fully implementing stormwater management plans,
- Purchasing emergency generators for municipalities,
- Prioritizing redevelopment options prior to disaster loss,
- Operationalizing a safety review procedure for new development,
- Beach re-nourishment,
- Identifying specific vulnerable facilities which need to be relocated or elevated,
- Increasing education efforts regarding evacuation procedures,
- Funding regional stormwater retention impacts, and
- Developing a pre-disaster plan of locating underground utilities for post-disaster installation.

Policy changes recommended within the LMS include seeking alternative sources of funding for:

- Beach re-nourishment based on mitigation,
- Re-prioritizing stormwater management projects in light of new observations and studies,
- Requiring a public safety review of new development,
- Flood-proofing sewer lift stations and water wells,
- Developing a plan for underground utilities, and
- Adapting to climate change.

The LMS Advisory Committee supports the planning process by conducting data collection, hazard analysis, and preparation of recommendations for mitigation project prioritization. The LMS will be reviewed, revised, and updated periodically by the LMS Advisory Committee and approved by the LMS Working Group every 5 years.

B. Planning Process

History/Background

The LMS Advisory Committee, Duval Prepares, was established on September 24, 1998 by the Mayor's SEPPC as the city's official mitigation advisory group. The Advisory Committee meets on a quarterly basis to discuss hazard-related mitigation issues, projects, and ongoing LMS maintenance.

Organizational Structure

The Duval Prepares Partnership is a group of organizations and programs tasked with making the County more resilient. This Partnership includes public and private sector partners, local businesses, organizations, and associations. The Partnership is comprised of representatives from agencies, municipalities, entities with a commitment or interest in mitigation, as well as public/private sector partners (commercial, healthcare, education, faith-based).

During the planning phase, the Advisory Committee adopted all-hazard mitigation goals and objectives, identified mitigation policy needs to strengthen efforts, assigned data and critical facility needs to committee members, identified potential data sources, identified private sector roles and responsibilities, and identified methods for disseminating project-related information to the general public. One of the principal objectives and top priorities of the Partnership is maintaining the living LMS document to reflect current projects, goals, and objectives for Duval County. The Partnership is also charged with:

- Identifying guiding principles, relevant agencies, and mitigation-related functions.
- Evaluating adaptation, conflict resolution, and existing mitigation policies/ordinances/programs.
- Prioritizing procedures.
- Reviewing and assessing successful reduction to the loss of life and property.

Continuous LMS review ensures inclusion of new information and changing community needs between the scheduled 5-year updates. LMS revisions are proposed by the Partnership for review by the Working Group who can officially submit those changes to the Federal Emergency Management Agency (FEMA) and the State of Florida for final approval. Once approved by FEMA and the State, the new LMS is supplied to all jurisdictions for adoption.

5-Year Update Planning Process

The 2025 update occurred from August 2024 to January 2025. The planning process requires the Duval Prepares LMS Advisory Committee and the Risk Assessment and Planning Committee to review existing hazards and vulnerabilities as well as provided input for each of the mitigation project lists. Additionally, the Partnership met with representatives from each municipality and sent notification letters with a copy of the proposed updated LMS to the SEPPC membership, key stakeholders, and was posted for public comment in January 2025. The Emergency Preparedness Division (EPD) then reviewed all feedback and recommendations from the below groups who participated in the planning process (See Appendix _ for full list of representatives):

- Jacksonville (COJ)
- Jacksonville Beach (COJB)
- Atlantic Beach (COAB)
- Neptune Beach (CONB)
- Baldwin (TOB)
- Duval County
- Public / Private Partners
- The General Public

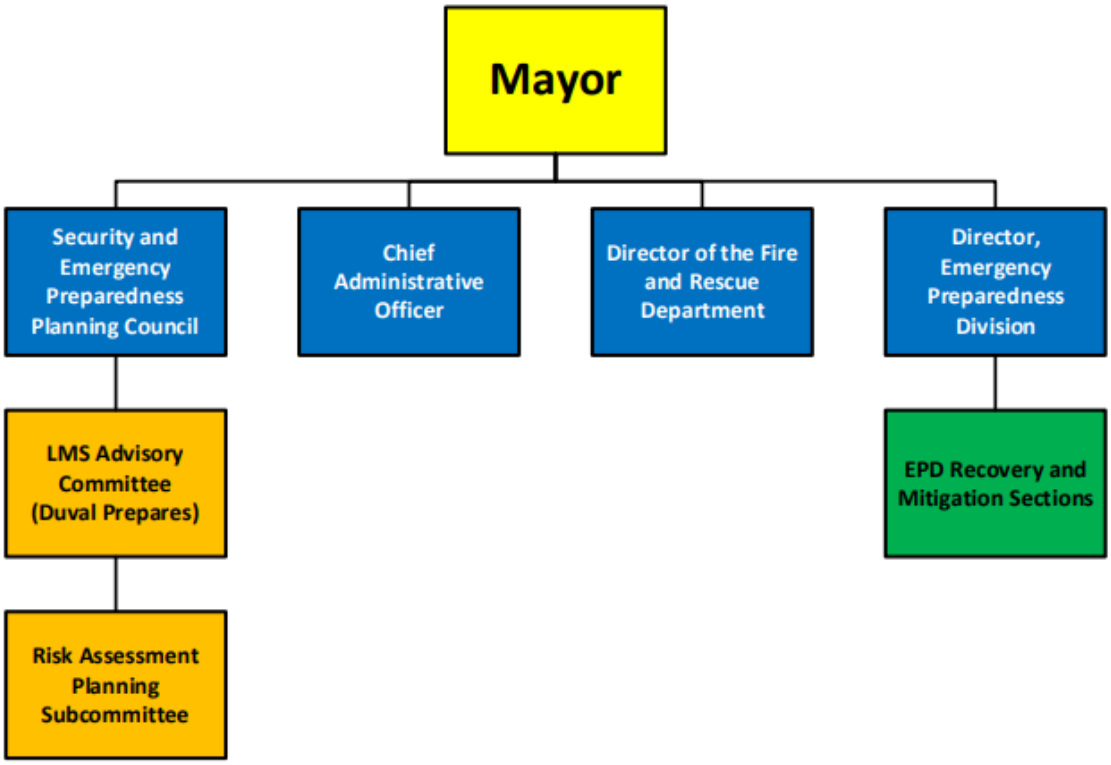
Coordination with Adjoining Counties in Northeast Florida

In a county-level mitigation strategy, input from neighboring counties is required to accurately assess the potential hazard impacts and effects beyond Duval County's jurisdictional boundaries. Duval County solicited input from adjoining counties in Florida Region 3, as delineated by the FDEM, to include cross-border planning considerations such as evacuation routes, economic development and stimulus, and developments of regional impact.

Table 1: Northeast Florida Counties Coordination Table

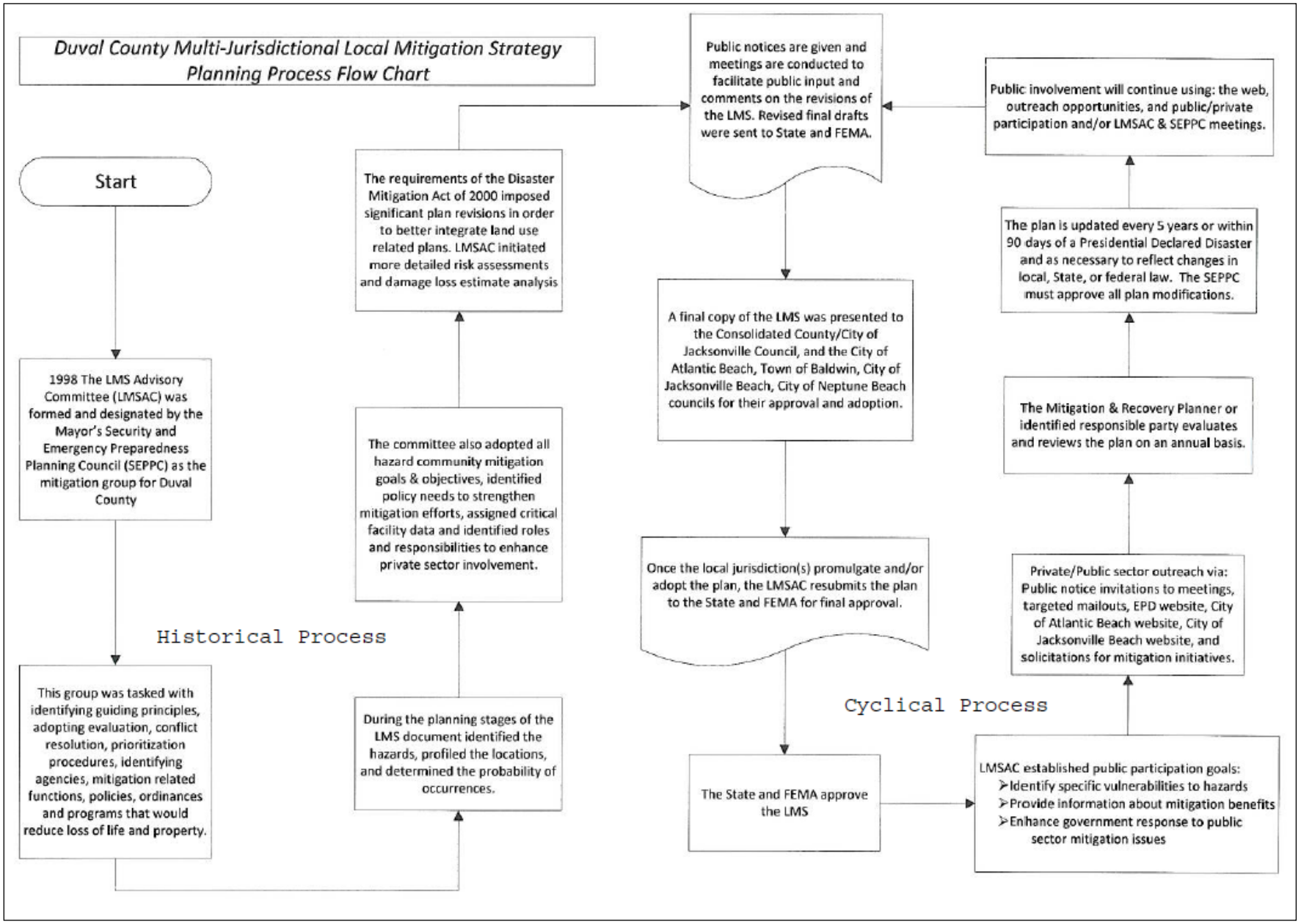
County	Date	Recipient of Request	Response
Baker	TBD	Emergency Manager	
Clay	TBD	Emergency Manager	
Flagler	TBD	Emergency Manager	
Nassau	TBD	Emergency Manager	
Putnam	TBD	Emergency Manager	
St. Johns	TBD	Emergency Manager	

Figure 1: Duval County Mitigation Organizational Structure, 2021 CEMP



Source: City of Jacksonville. Comprehensive Emergency Management Plan 2045, pg. 45 (2021). Retrieved from: https://www.jaxready.com/getmedia/ea306dbd-53a8-4ba7-8f3d-9e1499baabd9/Duval-County-2021-CEMP-Final.aspx

Figure 2: Local Mitigation Strategy (LMS) Planning Process Flow Chart



C. Community Participation

The public participation goal of the Partnership is to obtain solicited business and citizen-participants to help identify specific vulnerabilities to hazards, provide education about the benefits of mitigation, and enhance government responsiveness to public sector issues. The COJ has a unique governmental structure, an extensive geographic area, and a diverse economic base that requires a multi-directional effort to inform residents about participation opportunities.

The Partnership cultivates public engagement using printed newsletters, targeted mail distribution lists, the annual Emergency Preparedness Guide publication, social media posts, presentations, and the EPD's website www.JaxReady.com. Additionally, surveys targeting specific demographics, elected officials, builders, homeowners, and business owners were used to inform these groups about the potential mitigation measures and solicit prospective mitigation initiative suggestions. Public meeting notices are displayed to encourage the public to attend and participate in a workshop held to gather input from the public, Advisory Committee, Duval Prepares, and the Working Group.

Jacksonville's more than 200 neighborhoods are divided into six planning districts each with a Citizens Planning Advisory Committee or "CPAC". The primary purpose of the CPAC is to maintain open and effective communication between Jacksonville residents, businesses, neighborhoods, community organizations, educational institutions and city government. For the 2025 LMS update the Emergency Preparedness Division coordinated with the six CPACs to provide a presentation and invite comments from the public regarding the LMS update process and 2025 draft document.

D. Private Participation

Business representatives include economic development organizations like the Chamber of Commerce and specific key economic interests. In addition, a business representative on the Working Group through the Advisory Committee is the President of the Northeast Florida Chapter of the Association of Contingency Planners who serves as a liaison some of the larger employers in the area.

Motions are taken at the meetings for group discussion, review, input, and action. Currently, the Partners are not subject to mandatory attendance at the meetings and quorum is established by a simple majority. project prioritization at the Advisory Committee level are advanced to the Mayor's SEPPC for ratification and approval before advancing to the appropriate City Council, Commission, State, or Federal agency. Below is the extensive list of partners:

Prior to each meeting, a public notice is posted on the COJ EPD's website and posted at the City Council Chambers, where meetings are generally held. Additionally, an email invitation is sent out to every member of the Advisory Committee prior to the meeting. Efforts to recruit new members for the Duval Prepares group are continuously being made to include new groups, businesses, organizations, and individuals. Their names will then be added to the participant list and invitations will be sent for all future meetings.

LMS Advisory Group:

- ✓ AECOM Engineering
- ✓ American Red Cross (ARC) of North Florida
- ✓ AT&T
- ✓ Atlantic Beach Police Department
- ✓ Building Inspection Division
- ✓ Memorial Hospital – Jacksonville
- ✓ City of Atlantic Beach (COAB)
- ✓ City of Jacksonville (COJ)
- ✓ City of Jacksonville Beach (COJB)
- ✓ Florida Forestry Services
- ✓ Gate Petroleum
- ✓ Heartland Hospice Care
- ✓ Jacksonville Aviation Authority (JAA)
- ✓ Jacksonville Beach Fire Department (JBFD)
- ✓ Jacksonville Fire and Rescue Department
- ✓ Jacksonville International Airport
- ✓ Jacksonville Chamber of Commerce
- ✓ Jacksonville Electric Authority (JEA)

- ✓ COJ Community Development Department
- ✓ Jacksonville Port Authority (JAXPORT)
- ✓ Jacksonville Transportation Authority (JTA)
- ✓ Jacksonville Department of Parks & Recreation
- ✓ Jacksonville Department of Public Works
- ✓ Jacksonville Department of Risk Management
- ✓ Jacksonville Emergency Preparedness Division
- ✓ Jacksonville Neighborhoods Department
- ✓ Planning and Development Department (PPD)
- ✓ City of Neptune Beach (CONB)
- ✓ Comcast
- ✓ Department of Homeland Security (DHS)
- ✓ DMS Recovery
- ✓ Dostie Homes
- ✓ Duval County Health Department
- ✓ Duval County Public Schools (DCPS)
- ✓ Duval County School Police
- ✓ Eisman Russo
- ✓ Emergency Preparedness Division (EPD)
- ✓ Feeding Northeast Florida
- ✓ Fleet Architects
- ✓ Florida Blue
- ✓ Department of Transportation (DOT)
- ✓ Langton Consulting
- ✓ Local Initiatives Support Corporation (LISC)
- ✓ Lutheran Social Services
- ✓ Marine Corps Support Facility - Blount Island
- ✓ Mayo Hospital - Jacksonville Sheriff's Office
- ✓ National Weather Service (NWS) JAX
- ✓ Naval Air Station - Jacksonville
- ✓ Naval Station - Mayport
- ✓ Neptune Beach Police Department (NBPD)
- ✓ Northeast Florida Regional Council
- ✓ Prudential
- ✓ St. Johns River Keeper
- ✓ St. Johns River Water Management District
- ✓ State Farm Insurance Company
- ✓ Town of Baldwin (TOB)
- ✓ U.S. Army Corps of Engineers (USACE)
- ✓ U.S. Coast Guard - Sector Jacksonville
- ✓ U.S. Navy - Region Southeast Command
- ✓ United Way of Northeast Florida
- ✓ United Way of Northeast Florida
- ✓ University of Florida (UF)
- ✓ University of North Florida (UNF)
- ✓ Wells Fargo

LMS Working Group:

- ✓ American Red Cross (ARC) of North Florida
- ✓ Ascension St. Vincent's Riverside / Southside
- ✓ Baptist Medical Center Southside & Downtown
- ✓ Baptist Medical Center Beaches
- ✓ Jacksonville Public Works
- ✓ City of Atlantic Beach (COAB)
- ✓ City of Jacksonville Beach (COJB)
- ✓ City of Jacksonville City Council
- ✓ City of Jacksonville Office of the Mayor
- ✓ Jacksonville Port Authority (JAXPORT)
- ✓ Jacksonville Electric Authority (JEA)
- ✓ Jacksonville Transportation Authority (JTA)
- ✓ Jacksonville Medical Examiner's Office
- ✓ Jacksonville Neighborhoods Department
- ✓ City of Neptune Beach (CONB)
- ✓ Department of Homeland Security (DHS)
- ✓ Duval County Public Schools (DCPS)
- ✓ Elder Source
- ✓ Florida House of Representatives
- ✓ Florida State College Jacksonville
- ✓ Jacksonville Fire and Rescue Department (JFRD)
- ✓ Jacksonville International Airport
- ✓ Marine Corps Support Facility Blount Island
- ✓ Memorial Hospital – Jacksonville
- ✓ Salvation Army
- ✓ Town of Baldwin (TOB)
- ✓ University of Florida (UF) - Health Jacksonville
- ✓ University of North Florida (UNF)

E. Use and Incorporation of Existing Documents

Documents reviewed for hazard mitigation-related information are listed below and links to online source materials are in the following table:

- COJ Ordinances
- COJ Zoning Code
- COJ Flood Map Modernization Plan
- COJ Comprehensive (COMP) Plan
- Florida Administrative Codes
- Storm-water Management Plan
- Land Development Regulations
- Comprehensive Emergency Management Plan

- COJB COMP Plan
- COAB COMP Plan
- CONB COMP Plan
- TOB COMP Plan
- Floodplain Management Plan
- Resilient Jacksonville 2023
- Community Rating System (CRS) Plan
- Hurricane Preparedness Plan
- Emergency Operations Plan (EOP)
- Florida Statutes
- Florida Building Codes
- Hurricane Evacuation Traffic Management Plan
- FEMA National Risk Index
- Hurricane Evacuation Study 2021

The LMS Advisory Committee members studied existing policies, ordinances, plans, and programs of Duval County as well as local, regional, state, and federal agencies that support hazard mitigation. Members were asked to score each hazard based on the County's existing ability to support and enhance mitigation activities. During this process, goals, objectives, and policies in existing supportive documents were reviewed and incorporated into the LMS to help determine the effectiveness of existing strengths and identify any gaps needing improvement.

Programs, policies, and goals often change, and regular plan review assures the LMS information is current and applicable to current hazard mitigation initiatives efforts. Newly written and adopted plans, policies, and other relevant current events should be reviewed when they become available for incorporation into the plan if deemed necessary. All jurisdictions in Duval County are active participants in the National Flood Insurance Program (NFIP).

Table 2: Incorporated Existing Local Documents, 2024

Publishing Agency	Year	Name of Source Material	Link to Source Material (if available)
Atlantic Beach	2045	COMP Plan (Draft)	https://www.coab.us/DocumentCenter/View/17108/Draft-2045-Comprehensive-Plan
Atlantic Beach	2014	CEMP Plan	https://coab.us/DocumentCenter/View/7712/MCEMP-COAB-2014-07-19?bidId=
Atlantic Beach	2030	COMP Plan	https://www.coab.us/494/Comprehensive-Planning
Duval County	2021	CEMP Plan	https://www.jaxready.com/getmedia/ea306dbd-53a8-4ba7-8f3d-9e1499baabd9/Duval-County-2021-CEMP-Final.aspx
Duval County	2024	Capital Improvement Plans	https://www.jacksonville.gov/mayor/mayor-s-transparency-dashboards/capital-improvement-projects-dashboard
Duval County	2021	Housing and Community Development Division; Consolidated Plan	https://www.jacksonville.gov/departments/neighborhoods/housing-and-community-development/community-development-block-grant-disaster-recov/cdbg-dr-docs/matthew/2021-2025-consolidated-plan-city-of-jacksonville.aspx
Duval County	2012	Post-Disaster Recovery Plan	Available Upon Request
Duval County	2023	HAZMAT HSP	Available Upon Request
Duval County	2024	Flood HSP	Available Upon Request
Duval County	2024	Hurricane HSP	Available Upon Request
Duval County	2023	Terrorism Response HSP	Available Upon Request
Duval County	2024	Severe Weather HSP	Available Upon Request
Duval County	2018	Tornado HSP	Available Upon Request
Duval County	2024	Wildfire HSP	Available Upon Request
Jacksonville	2025	Emergency Preparedness and Response Guide	https://www.jaxready.com/getmedia/3ef02d3b-0da4-4268-8ff9-ee3429ca739c/EPG-2024-2025-FINAL.aspx
Jacksonville	2000	Better Jacksonville Plan	https://library.municode.com/fl/jacksonville/codes/code_of_ordinances?nodeId=TITXXIITA_CH761THBEJAPL
Jacksonville	2023	Resilient Jacksonville	https://drive.google.com/file/d/1j21eOUZoeX_hafPlkn1OdQZ1vY5QsALm/view
Jacksonville	2045	COMP Plan	Available Upon Request
Jacksonville	2014	Master Storm Water Management Plan	Available Upon Request
Jacksonville Beach	2030	COMP Plan	https://www.jacksonvillebeach.org/DocumentCenter/View/1422/2030-Comprehensive-Plan-Adopted?bidId=
Jacksonville Beach	2021	CEMP Plan	https://www.jacksonvillebeach.org/DocumentCenter/View/3783/MCEMP-Completed--2021-April-9?bidId=
Neptune Beach	2046	COMP Plan	https://www.nbfl.gov/sites/g/files/vyhlif3516/f/uploads/final_comprehensive_plan_adopted_

Publishing Agency	Year	Name of Source Material	Link to Source Material (if available)
			11.01.21.pdf
Neptune Beach	2020	CEMP Plan	https://www.ci.neptune-beach.fl.us/sites/g/files/vyhlif3516/f/uploads/rev._06_2020_mcemp_neptune_beach_0.pdf
SJRWMD	2024	Strategic Plan	http://static.sjrwmd.com/sjrwmd/plans/SJRWMD-2024-2028-Strategic-Plan.pdf
State of Florida	2024	COMP Plan	https://www.floridadisaster.org/globalassets/2024-cemp-base-plan.pdf
State of Florida	2023	Enhanced State Hazard Mitigation Plan	https://www.floridadisaster.org/dem/mitigation/statemitigationstrategy/state-hazard-mitigation-plan/
State of Florida	2023	Enhanced State Hazard Mitigation Plan	https://flshmp-floridadisaster.hub.arcgis.com/
State of Florida	2025	NE Florida Regional Evacuation Study	https://portal.floridadisaster.org/preparedness/RES/Studies/SitePages/RES.aspx#NEFRC
State of Florida	2023	Northeast and Eastern Central Florida Area Contingency Plan	Available Upon Request
Town of Baldwin	2025	COMP Plan	Available Upon Request
Town of Baldwin	---------	CEMP Plan	Available Upon Request

F. Incorporation of LMS into other Documents

Through the process of incorporating existing documents during update cycles, language pertinent to the LMS is integrated into the plan. In doing this, the Advisory Committee was able to identify ways to strengthen any identified gaps in the implementation and enforcement of those policies, or conflicts between policies. In this way, the principles and goals of the LMS can be incorporated into other existing documents to adequately address hazard mitigation issues.

Current mitigation initiatives include projects from the CRS Plan and annual community outreach activity that incorporated the mitigation of Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties with $1,000 to $5,000 in damage claims submitted to the NFIP. These mitigation projects include raising the structure's elevation off grade, facilitates the acquisition of, or the relocation of RL and SRL properties identified by the COJ CRS Plan.

Table 3: LMS Jurisdictional Plan Incorporation, 2024

Jurisdiction	Incorporated in COMP?	Incorporated in other document?
City of Jacksonville (COJ)	Yes	• COJ CEMP (2025) was updated to reflect the hazards and vulnerability rankings per LMS. • COJ developed an **Excessive Heat Hazard Specific Plan (HSP**), **Extreme Cold Weather HSP**, and **Critical infrastructure Disruption HSP** as a result of the 2020 LMS update. These HSPs were generated to ensure all hazards identified in the update had associated HSPs. • The Duval LMS was used as a source document to develop the City of Jacksonville's resilience strategy, **Resilient Jacksonville (2023).**
City of Jacksonville Beach (COJB)	Yes	
City of Atlantic Beach (COAB)	Yes	
City of Neptune Beach (CONB)	Yes	
Town of Baldwin (TOB)	Yes	

G. New Strategies for Mitigation and Resilience

The COJ's approach to mitigation is part of a larger resiliency initiative aligned with the most current practices to guide the city into a stronger, safer, and more resilient community. These efforts address the physical, social, and economic challenges that 21st century cities are increasingly facing. New Strategies for Mitigation and Resilience

The COJ's approach to mitigation is part of a larger resiliency initiative aligned with the most current practices to guide the city into a stronger, safer, and more resilient community. These efforts address the physical, social, and economic challenges that 21st century cities are increasingly facing.

The COJ supports the adoption and incorporation of both the initial hazard shock that is typically included in an LMS, as well as the subsequent chronic stresses that can affect communities for years after a disaster event. Examples of

chronic stresses include urban blight, homelessness, insufficient public transportation, or an increase in crime. By planning for both the initial hazard shocks and the subsequent stresses, a community can have the foresight to prioritize delivering additional human and social services as part of the recovery phase to mitigate and reduce long-term damages.

This document reflects "community resilience" as the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow despite the chronic stresses and acute shocks they experience.

Adaptation Action Area (AAA) Working Group

Pursuant to Florida Statutes Section 163.3177(6)(g)(10), the City adopted an AAA designation based on a 2-foot rise in sea level by 2060. The AAA policy tool facilitates the consideration of the potential for impacts related to sea level rise, designates vulnerable areas, and prioritizes appropriate adaptation strategies. An AAA Working Group was established

in 2019 to review existing programs and policies to determine any need for additional response funding for coastal flooding within the AAA. The Working Group's Tasks included:

TASK 1: Identify the Impacts of Coastal Flooding within the AAA

- Define the condition of, and effects resulting from, coastal flooding within the AAA.
    - At a minimum, considerations should include population, critical infrastructure, natural resources, and economic impact.

TASK 2: Evaluate the City's Existing Programs and Policies

- Examine the strengths, weaknesses, and opportunities of the City's existing policies and regulations in relation to the AAA.
    - The review may include, but is not limited to, drainage regulations and infrastructure, flood zone regulations, land use policies, and zoning regulations.

TASK 3: Recommendations

- Based on the findings of Task 2, recommend policy and regulatory changes deemed necessary and appropriate to protect private and public investment within the AAA.
    - Recommendations should include, but may not be limited to, additional and financially feasible actions and initiatives regarding to the AAA.

The tasks recommended by the Adaptation Action Area are still actively being implemented; their findings remain relevant and are included again in this 2025 update of the LMS.

City of Jacksonville Storm Resiliency and Infrastructure Development Review Committee

The COJ Storm Resiliency and Infrastructure Development Review Committee (SRAIDRC) was formed as a recommendation from the Jacksonville Waterways Commission in August, 2018. The SRAIDRC was instructed to "evaluate drainage and flood control; tidal impacts and water levels in the St. Johns River; the effects of failing or deficient drainage infrastructure and improvements, the loss of wetlands and natural habitats; and development activities within the floodplain and to offer recommendations as to opportunities for maintenance and preservation of wetlands and floodplains and various drainage and stormwater system improvements, which would contribute to the resiliency of the St. Johns River and Northeast Florida."

The SRAIDRC held bi-weekly meetings from February 15, 2019, to June 7, 2019. The committee was comprised of members of the COJ, FEMA, JEA, and the U.S. Navy. Additional liaisons from COJ, FDEP, St. Johns River Water Management District (SJRWMD), U.S. Army Corps of Engineers (USACE), FEMA, and JEA also contributed to the process. The recommendations of the SRAIDRC are still actively being implemented; their findings remain relevant and are included again in this 2025 update of the LMS.

Resilient Jacksonville

Resilient Jacksonville (2023) looks to the future of the city for the next 50 years and provides a roadmap for adapting to a changing climate, accommodating a growing population, guiding new urban development, and planning for uncertain shocks and stressors. The Strategy builds on many recent efforts in the wake of Hurricanes Matthew and Irma and leverages local expertise with science-based assessments to identify specific, implementable actions and prioritize investments that will strengthen the city's resilience. During the first year of implementation, the City worked diligently to achieve this vision, using a science-based approach to prioritizing actions and investments. The newly established Office of Resilience has added capacity and expertise to lead the implementation of Resilient Jacksonville with the same rigor as used in the development of the strategy. In the first year alone, the City has fostered a culture of resilience and moved swiftly to implement actions, with 38 of the 45 actions currently underway(Source: https://www.jacksonville.gov/resilience). Resilience actions and goals specific to mitigation have been incorporated into this 2025 LMS update.

FEMA National Risk Index

The 2025 LMS update incorporated data and measurements made available through FEMA's National Risk Index (NRI) dashboard. The NRI is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards. It was designed and built by FEMA in close collaboration with various stakeholders and partners in academia; local, state and federal government; and private industry. The NRI leverages available source data for natural hazard and community risk factors to develop a baseline risk measurement for each United States county and Census tract. This data was used to help validate the local vulnerability assessment and conclusions of the Duval County LMS.

Urban Area Working Group – THIRA/SPR

Jacksonville Metropolitan Statistical Area (MSA) Urban Area Working Group (UAWG) was assembled in 2023 as a result of receiving an award through the Urban Area Security Initiative (UASI) grant program. In preparation for this award, the Jacksonville MSA conducted a Threat Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) was developed over a 12-month period from July 2022 to July 2023. The THIRA was conducted at the regional/MSA scale, which includes Duval County, Baker County, Clay County, St. Johns County, and Nassau County. Sixteen groups of subject matter experts were convened during this process, representing nearly fifty local agencies. A high percentage of the participants from Duval County also serve on the LMS Working Group. Each county's LMS was referenced as a source of data during the initial THIRA effort. The THIRA will be conducted on a tri-annual basis going forward and leveraged as a source during the LMS update.

The first two steps of the THIRA process, *Identification of Risks and Hazards* and *Giving Context to Threats and Hazards,* overlapped heavily with the hazard assessment component of the LMS. Not surprisingly, the risk assessment within the Jacksonville MSA THIRA reflects the same hazards, vulnerabilities, and relative risk scores from each county's LMS. The geographies of each county were determined to be comparatively similar; vulnerabilities to specific natural hazards were found to be consistent across the entire region. Duval County was determined to high a slightly higher vulnerability to technological and man-made hazards due to the higher population density and concentration of critical infrastructure. Since the THIRA/SPR data was analyzed at a regional scale, the results were not directly transcribed into this LMS. However, the THIRA drew input from a wider variety of stakeholders, specifically within the public safety sector, which was beneficial in validating the vulnerability and risk assessment component of the Duval LMS (Section 3.) Key elements of the 2023 Jacksonville MSA THIRA are incorporated into the appendices for reference and were used to validate the vulnerability assessment scores for each hazard profile in this update of the LMS.

Map 1: Duval County Coastal High Hazard Areas, 2045 COMP

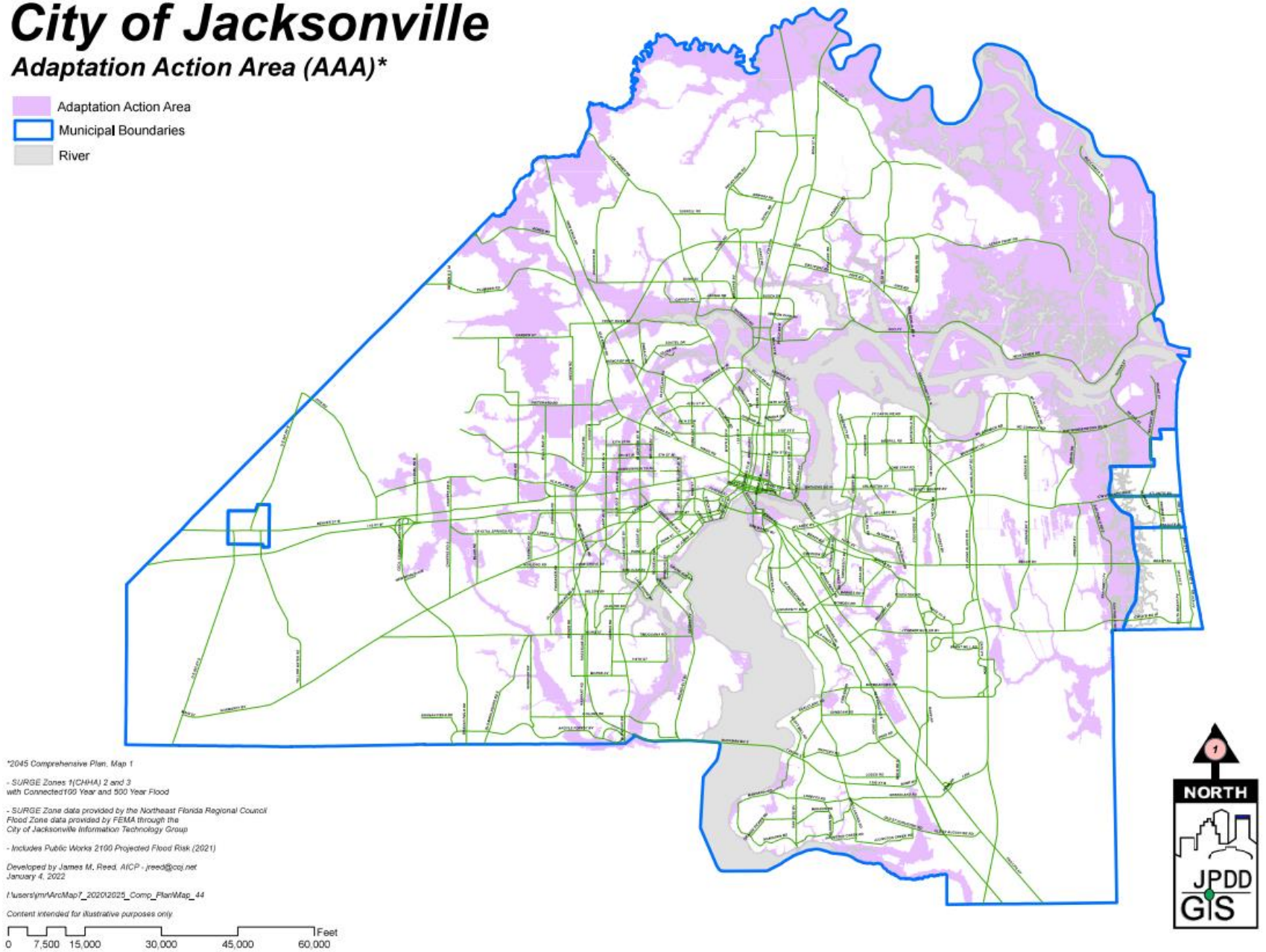


Table 4: Regional Dispute Resolution Process

Level I: Communication and Cooperation Emphasis on personal communication and listening skills, focusing on over-all project goals and objectives.
Level II: Consensus-Building and Facilitation Formal intergroup process to achieve mutual consensus. The process is based on a settlement meeting at which disagreeing parties explain their interests, explore options, and seek a mutually acceptable agreement. Most issues are expected to be resolved at this level, but if a solution is not reached additional settlement meetings can be held. Disputes and conflicts that cannot be resolved at this level can be escalated to mediation.
Level III: Mediation Formal technique using a trained, neutral third party to guide the dispute resolution process. If a solution is not reached following this procedure, the issue will be resolved through democratic rule with a 2/3 majority vote of the Working Group.

The overall goal of conflict resolution is to emphasize direct communication to control outcomes and quality while saving time, money, and reaching mutually beneficial solutions. Recognizing the diversity of SRAIDRC members, the LMS Advisory Committee agreed to resolve all conflicts in policy, procedures, and prioritization by following the below guidelines:

- The guiding principles, goals, and objectives adopted by the Advisory Committee will guide all decisions.
- All decisions will be ultimately resolved by democratic rule.
- All Advisory Committee representatives will have equal input into the process.
- Each Advisory Committee member will acknowledge and respect differing points of view.
- Decisions on resource allocation will be based on project criteria to be established by the Advisory Committee.
- Each member recognizes the importance of showing community consensus to potential funders and grantors.

Conflict Resolution

The Advisory Committee adopted a three-level conflict resolution process utilizing a combination of personal and inter-group communication skills based on the "Regional Dispute Resolution Process" model. This model was established by the Florida Legislature in the 1993 Environmental Land Management Study facilitate inter-governmental problem-solving. It offers a reasonable approach by providing a forum to cooperatively resolve conflicts between local governments and private interests in a timely, informal, and a cost-effective manner. This process was later amended in 2009 to make using the Regional Council for mediation mandatory in specific cases involving planning and growth management. The Advisory Committee will use this approach to internally resolve disputes and will escalate to the Regional Planning Council process when required by statute or if deemed necessary by the Advisory Committee.

H. Evaluation Process

The LMS is subject to redefinition and alteration over time. Structured periodic assessments of its ability to meet goals will be conducted with broad input from all stakeholders to assist policymakers and the public. Periodic review of mitigation activities and policies include a cost/benefit analysis of future damage reduction efforts. The Evaluation Procedures and Review Process was adopted by the Advisory Committee and incorporated in the Local Mitigation draft ordinance to be implemented under the LMS. Evaluation mechanisms may include:

- Broad-based, structured self-assessments of progress in implementing the Strategy,
- Periodic mitigation program customer surveys, through concise, easily understood survey instruments,
- Review of annual mitigation expenditures in public and private sector projects and programs, and
- Assessment of the ability of the Strategy process to maximize benefits and enhance resources.

Evaluation Criteria

- Supports LMS goals and objectives;
- Maintains opportunity for participation from all stakeholders;
- Considers all relevant/new/intensified hazards that affect local vulnerable people, property, and environment;
- Incorporates new technologies and information that may enhance or improve the mitigation effort;
- Demonstrates far-reaching, cost-effective use of limited resources, develops new resources, and encourages coalition-building, and partnerships to maximize resources; and,
- Encourages individual, family, and private sector participation and involvement.

Recommended Components of the Evaluation Process

- Designated responsible agency
- Ongoing communication
- Notification of funding cycles & solicitation of projects
- Collection of projects; coordination of potential funding sources
- Plan and project analysis
- Plan and projects forwarded for approval
- Approval process monitored
- Projects recycled
- Planning, study, revision

Annual Evaluation Procedures

Both Duval Prepares and the SEPPC meet quarterly to review grant cycles and post-disaster grant opportunities. The LMS is reviewed annually against updated manuals provided by FEMA, the FDEM, Emergency Management Accreditation Program standards, CRS Coordinator's Manual, the National Mitigation Framework, and any other relevant guidance. Between the adoption of the 2020 LMS and the 2025 LMS update, Duval Prepares and the Advisory Committee continued to review the plan on an annual basis. The quarterly meeting held in December 2024 served as the 2025 LMS annual maintenance meeting to review mitigation projects that are adopted, deferred, or completed.

I. Review and Maintenance

The LMS is also reviewed every 5 years by the Advisory Committee and must be approved by the SEPPC. Review and maintenance of the 2025 LMS Plan Update was implemented by the Working Group with assistance from EPD planning staff. The LMS update includes hazard identification and vulnerability elements, guiding principle elements, goals and objective elements, and mitigation initiative elements. Other elements will be reviewed periodically as determined by the Working Group or EPD planning staff with input from Duval Prepares, as necessary.

Monitoring of the Plan

The 2025 LMS update is the responsibility of the COJ EPD planning section on behalf of the Working Group and the Advisory Committee. The COJ currently utilizes comprehensive land use planning, capital improvements planning, and local building codes to guide and control development. Upon official adoption of the 2025 LMS update, these existing mechanisms will have hazard mitigation strategies integrated into them as set forth in the six guiding principles, six goals, and multiple objectives outlined in the LMS. Several goals require action through enhanced regulations, building code revisions, ordinance review or updates, and infrastructure improvements to increase overall community resiliency.

J. Continued Public Participation

The Partnership always solicits involvement from businesses, non-profits, and citizens in disaster preparedness and hazard mitigation planning. Future review, evaluation, maintenance and updates of the LMS will involve public notices of the Advisory Committee meetings and making the LMS available through the Duval Prepares webpage. The Partnership will incorporate other opportunities to educate the public on hazard mitigation efforts via seminars, events, and workshops.

K. Geographic Information

An inclusive hazards analysis is the basic component of any community's CEMP. A comprehensive understanding of a community's geography, demographics, and land use is essential to mitigating the loss of life and property by major natural or man-made hazards. The information developed can provide emergency managers with tools to organize response efforts based on established priorities and recommended actions for each hazard. The analysis involves estimates of the populations and property at risk of different hazards throughout Duval County. When a vulnerability analysis reflects the worst-case scenario based on available hazard information, the community can estimate the extent of damage, and the areas affected in the most extreme circumstances. Including the worst-case scenario is key to determining if present capabilities are adequate for mitigating, preparing for, and responding to an emergency, and identifying procedures needed to improve the whole community's capacity to protect life and property.

Geographic Characteristics

Duval County is in the northeast corner of Florida about 10 miles from Georgia. The Nassau River controls drainage in the western, northern, and central portions of Duval County. The eastern part of Duval is dominated by countless brackish streams that empty into the Intracoastal Waterway (ICW) or directly into the Atlantic Ocean.

Duval County is about 850 square miles, is 40 miles across and 33 miles long at its widest points. The highest elevation is 40 feet above sea level in the southwestern-most corner and gradually slopes eastward toward the Atlantic Ocean. The St. Johns River and its tributaries are the largest geographic feature in Duval County where 47,535 acres of the total 544,175 acres, or about 9%, is inland water. Duval County is characterized by coastal plains and ancient marine terraces or ridges that have been modified by stream erosion. A considerable amount of the city's northeast is comprised of salt marshes in the St. Johns River and Nassau River valleys. The freshwater wetlands are also found in conjunction with creeks and stream valleys in the southeastern, western, and northern portions of the city and some isolated pockets of the western sector.

Existing Land Use Characteristics

Over the past 200 years, the region developed from a simple river crossing at the St. Johns River into a sprawling, diversified community. Urban development officially began in 1822 when Jacksonville and Duval County were first surveyed and formally organized. Jacksonville was designated as the Duval County seat, originally established to serve river crossing traffic, but quickly became a heavily traveled route into the state's interior. The advent of railroads spurred further development, and the COJ became a tourist destination in the late 1800's and a transfer point for tourists proceeding upriver to interior resorts. An additional railroad line was built to Pablo Beach, now the City of Jacksonville Beach, establishing a new corridor of development.

Major commercial and industrial activity are now found radiating from the original center of COJ along major railroads and highways, as well as northward along the St. Johns River towards the Atlantic Ocean. Residential development often followed this commercial and industrial growth with some major residential developments in remote areas of Duval County. Areas such as Arlington, Mandarin, Ortega and the three Beaches grew to attract commercial uses to support residential pockets that make up the modern unified urban fabric.

Surface Water System

The St. Johns River headwaters are in marsh areas west of Fort Pierce in St. Lucie County, more than 300 miles from the river's mouth at Mayport. Across these 300 miles the elevation drops about 25 feet, where approximately 20 feet occur in a span of about 90 miles. For this reason, the river has the appearance of a vast lake due to its regularly invisible current. The St. John's River mouth allows for tidal conditions to be visible because the drainage basin encompasses 8,850 square miles. Due to the County's extremely flat terrain, high evapotranspiration rates, and variable freshwater flows, the tidal effects can be experienced 115 miles from the coast at Lake George in Volusia and Putnam County. Tidal effects have been recorded as far as 161 miles upstream at Lake Monroe in Volusia and Seminole County during extreme drought and high tide. The river's flow normally reverses with the change in tide from north Lake George to the Atlantic Ocean. The average discharge at the St. Johns River mouth is 8,300 cubic feet per second (CFS), but the reversal of river flow by coastal tide can cause stream flow in Jacksonville to reach 130,000 CFS. Flood tides at the St. Johns River entrance have an average velocity of 1.9 knots with ebb tides at an average velocity of 2.3 knots. However, at Mandarin Point, essentially opposite Orange Park (Clay County), the average flood tide and ebb tide velocities are diminished to 0.6 and 0.7 knots, respectively.

Flood Plain Areas

Extensive floodplains exist because of the relatively flat topography around the St. Johns River, its tributaries, coastal lagoons, and salt marshes. Additionally, there are large areas of Duval County's interior that experience periodic flooding as a result of flat, poorly drained land that accumulates rainfall on the surface. The city's residential construction includes a significant amount of older housing that were not built using current building codes, have not been brought up-to-code, and were built before the FEMA flood maps were drawn. Even severe thunderstorms can cause flooding in some areas that were previously not susceptible 100 years ago and some are now be categorized as RL or SRL structures.

The tremendous capacity of the St. Johns River between Palatka and Jacksonville is due to the low hydraulic gradients and floodplains that can span more than 10 miles wide in some areas. The coastal region experiences its most severe flooding when heavy rainfall is accompanied by storm surge during high tide. Hurricanes, tropical storms, and severe nor'easters are the primary cause of severe flooding and stormwater can be stored in the floodplain for long periods of time before being discharged into the Atlantic Ocean. The most notable recent events we can analyze to assess the community's current vulnerabilities are Tropical Storm Fay (2008), Tropical Storm Debby (2012), Hurricane Matthew (2016), Hurricane Irma (2017), Hurricane Dorian (2019), Tropical Storm Nicole (2022), Hurricanes Debby and Helene (2024).

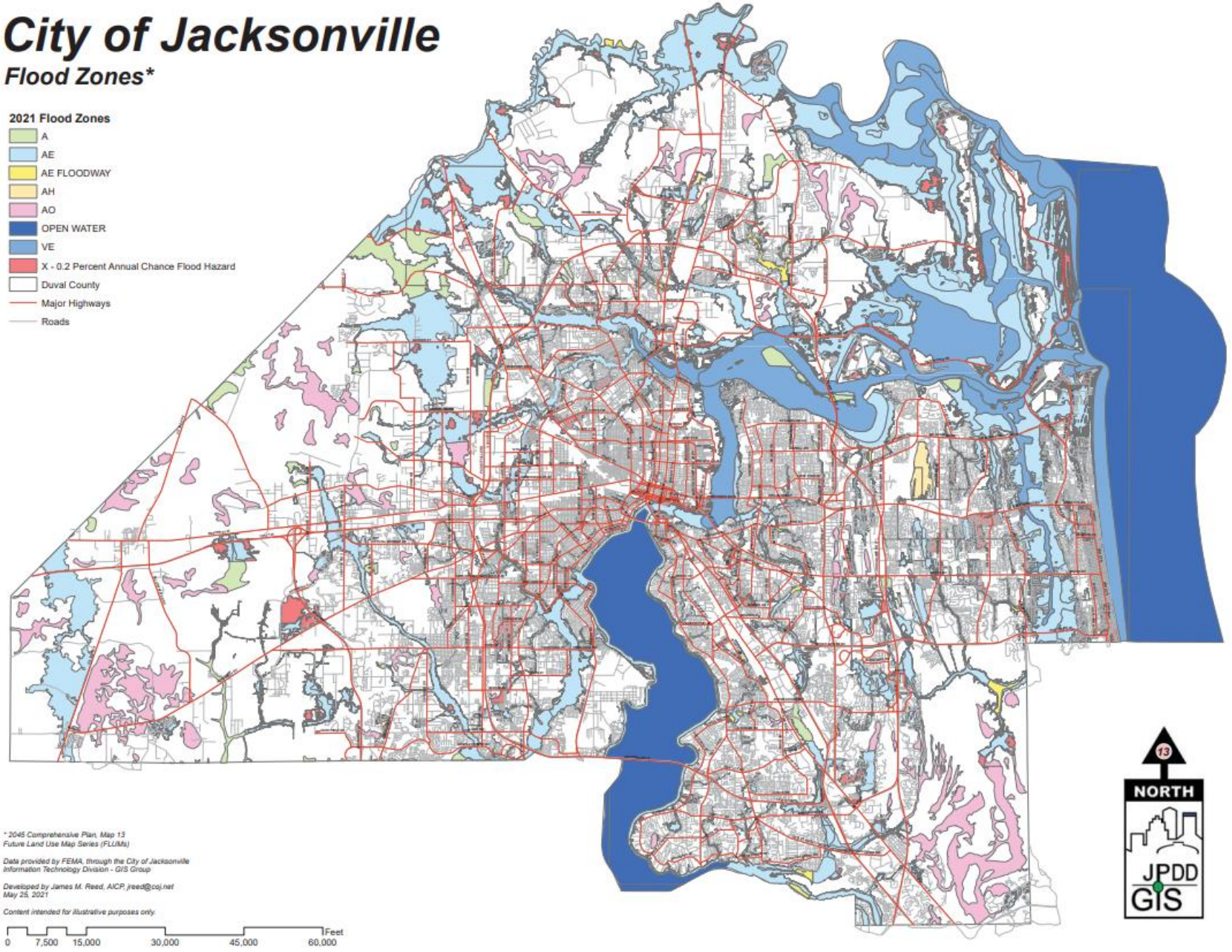
Flood Hazard Areas

One of the largest continuous flood hazard areas is in the relatively undeveloped southeast corner of Duval County. The Cedar River, Sawmill Creek, and Ribault River comprise the main flood plain in the northwest part of Duval County. Isolated parcels of flood hazard areas can be found in the western and southwestern parts of Duval County, even though they are at a relatively high elevation. Aside from the highest uplands and barrier island ridges, the majority of all land east of Dames Point falls within the 100-Year Flood Hazard Zone. Several low areas along the St. Johns River in the Southeast District would be flooded by a 100-year flood as well. The Nassau River and ICW are surrounded by extensive marsh lands at risk of flooding. Julington Creek forms a major flood plain area in conjunction with its tributaries.

Large portions of land located east of the ICW are outside the 100-year flood zone, but the three Beach Municipalities are susceptible to flooding from coastal storms. Low-lying areas next to high surface runoff or bodies of water are largely at risk because they have been developed for residential use. Flood hazard zones of irregular size and shape are scattered throughout Duval County. The areas described below are developed residential areas at high risk of flooding near the urban core:

1. Southside Blvd. to the west, Hodges Blvd. to the east, J. Turner Butler Blvd. to the south, Beach Blvd. to the north
2. J. Turner Butler Blvd. on the south, Southside Blvd. on the west, and is southwest of U.S. 1.
3. Between Hood Rd. and Losco Rd. in Mandarin.
4. Pablo Creek surrounding the University of North Florida (UNF), from Mill Dam Branch to Cedar Swamp Creek.
5. McGirts Creek and the Ortega River form a major floodplain area that extends from Old Plank Rd. southeast to the Clay County line, then curves northeast where it meets the Cedar River and enters the St. Johns River.
6. McCormick Rd., south of Fort Caroline, beyond Beach Blvd.

Map 2: Duval County Flood Zones, COJ 2045 COMP



L. Demographics

Since 2010, the land from Southside Blvd. to the three Beaches, consisting of Jacksonville Beach, Atlantic Beach, and Neptune Beach, have increased residential development at an average of 3-4 dwelling units per acre . The three Beaches had a combined population of 43,653 per the 2022 Census.

The majority of the COJ population is primarily along the St. Johns River radiating out from the downtown core. The COJ estimated population in 2022 was 949,611; of which 488,370, or 51.4%, are females and 461,833, or 48.6%, are males. Additionally, 77.4% are under 18 years old and 15% are 65 years and older. Data has been collected from the 2022 American Community Survey, which is the most recent survey available as of August 1, 2024.

Table 5: Future COJ Population Density and Distribution Estimates, 2017

Linear by Planning District									
	1980	**1990**	**2000**	**2006**	**2011**	**2016**	**2021**	**2026**	**2031**
Urban Core	56,295	46,622	42,635	43,569	46,636	49,708	52,702	55,495	57,989
Arlington	110,286	147,927	186,072	209,557	224,310	239,088	253,487	266,921	278,919
Southeast	95,753	146,175	195,721	229,088	245,215	261,371	277,112	291,798	304,914
Southwest	102,861	122,527	133,867	161,790	173,180	184,589	195,706	206,078	215,341
Northwest	142,317	132,584	128,848	139,069	148,860	158,667	168,223	177,138	185,100
North	33,408	39,395	48,474	67,025	71,744	76,470	81,076	85,373	89,210
Beaches & Baldwin	30,083	37,741	43,262	41,094	43,987	46,884	49,708	52,343	54,695
Totals	**571,003**	**672,971**	**778,879**	**891,192**	**953,932**	**1,016,778**	**1,078,014**	**1,135,147**	**1,186,169**

Source: U.S. Census Bureau 2022, Florida Office of Vital Statistics, COJ PDD

Table 6: Duval County Medium Population Projection, 2010-2050

Duval County, Florida								
Census			**Population Projections "Medium"**					
2010	2015	2020	2025	2030	2035	2040	2045	2050
864,263	890,673	948,651	1,083,200	1,149,800	1,198,100	1,235,900	1,265,400	1,291,400

Source: Projections of Florida Population by County, 2025-2050 (2024). UF Bureau of Economic and Business Research.
Retrieved from: projections_2024.pdf (ufl.edu)

Table 7: Estimated Population by Municipality, 2025-2050

Municipality	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
City of Atlantic Beach (COAB)	13,636	13,734	13,642	13,486	13,316	13,133
Town of Baldwin (TOB)	1,400	1,390	1,366	1,338	1,304	1,275
City of Jacksonville (COJ)	1,031,509	1,094,193	1,142,022	1,178,051	1,208,946	1,237,461
City of Jacksonville Beach (COJB)	24,725	25,504	25,904	26,025	26,018	26,000
City of Neptune Beach (CONB)	7,329	7,381	7,367	7,301	7,216	7,128

Source: Population Projections, Total (Permanent + Institutional), 2010-2050. Comprehensive Data Results. Florida Housing Data Clearinghouse
Retrieved from; http://flhousingdata.shimberg.ufl.edu/comprehensive-plan-data/results?nid=1504&nid=1506&nid=1509&nid=1512&nid=1515

Figure 3: Age and Race Demographics in the City of Jacksonville, 2022 Census

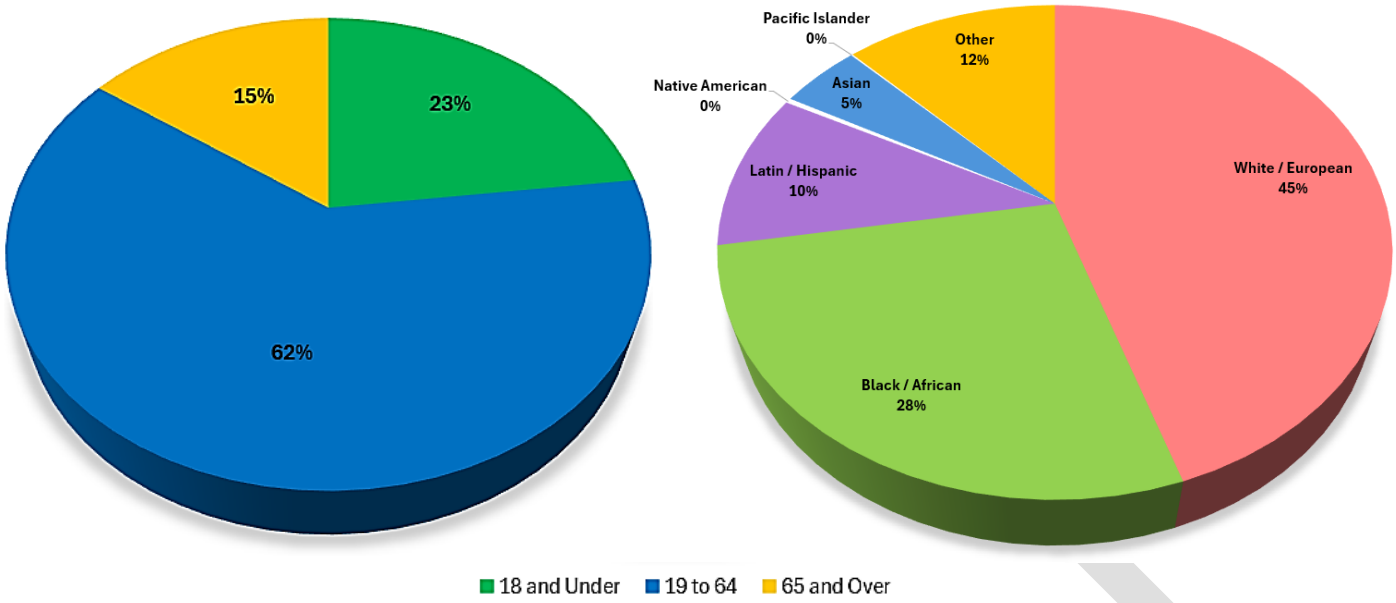


Table 8: COJ Population Demographics, 2022 Census

Jurisdictional Demographic Data

The COJ Urban Core District, which had previously experienced population decline over the previous two census periods, 17% loss in 1980-90 and 9% loss in 1990-2000, has been increasing in population since 2000. The Florida Housing Data Clearinghouse projected the COJ will have approximately 1,179,900 residents by the year 2040, making it the sixth largest county by population in Florida where more than 45,000 people live in other Duval municipalities.

The Beaches remain stable due to their existing high density near built-out status, separate population counts for the COJ, COAB, COJB, CONB, and TOB are shown above. This population growth will affect disaster planning and evacuation route capabilities for the Beach populations, in addition to the proposed new vessels at the Mayport Naval Station, estimated to be about 5,000 people *(Source: Population Projections, Total [Permanent + Institutional], 2010-2050; Comprehensive Data Results; Florida Housing Data Clearinghouse).*

Figure 4: Duval County Social Vulnerability Community Report, 2024
Social groups in Duval County, FL have a **Relatively High** susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S.

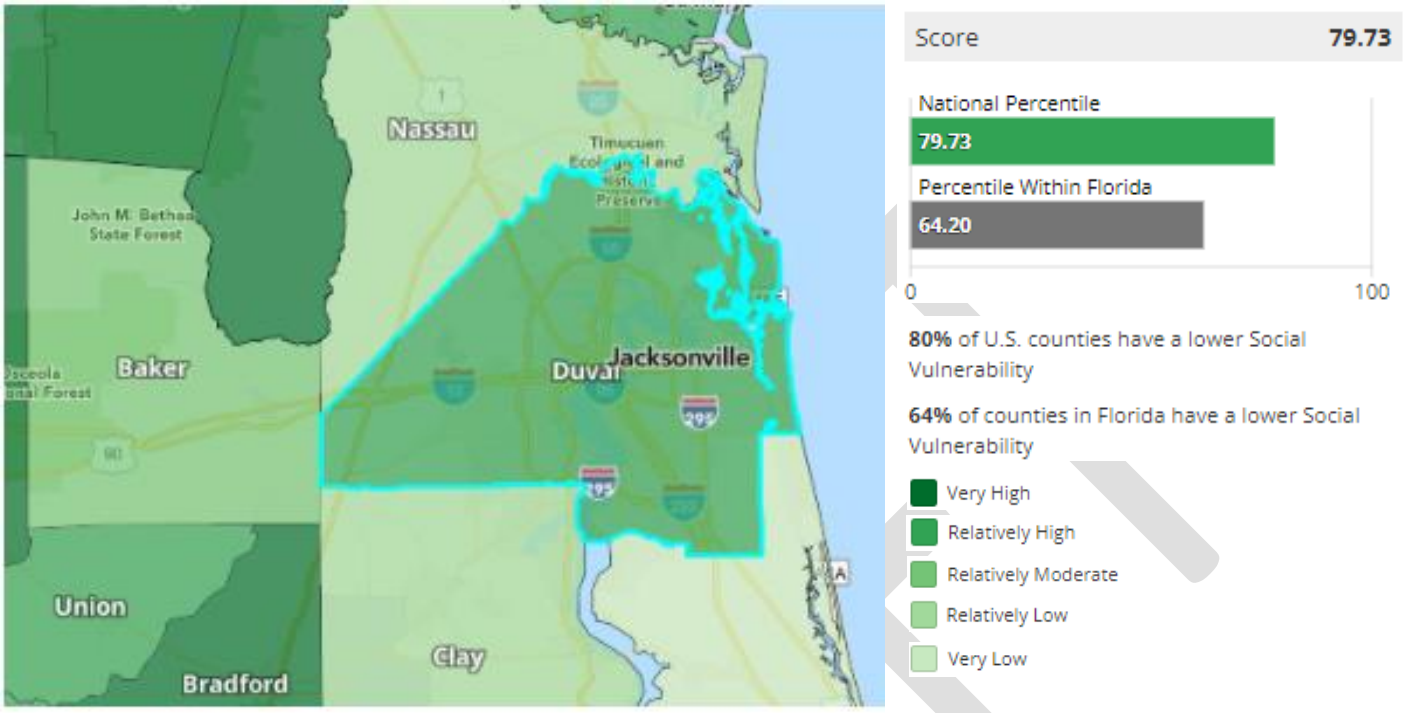
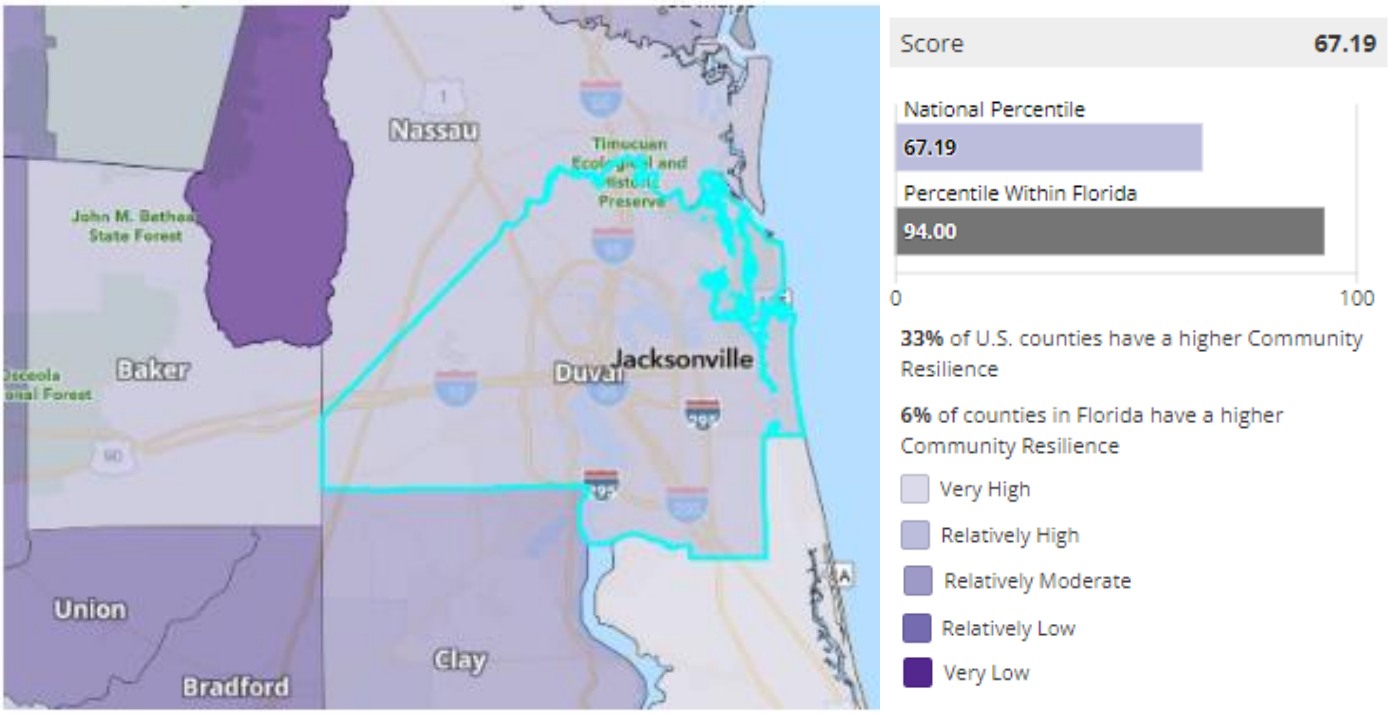


Figure 5: Duval County Community Resilience Report, 2024
Communities in Duval County, FL have a **Relatively High** ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the U.S.



Source: Community Report – Duval County, FL. National Risk Index. (2024).
Retrieved from: https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C12031

M. NFIP Participation

Local Government Status in the NFIP

The significance of the National Flood Insurance Program (NFIP) is that citizens would not be able to buy flood insurance if their local jurisdictional government does not participate in the NFIP. Communities are classified in a system scored between 1 -10. Class 1 affords the highest premium reduction allowed, and Class 10 affords no reduction to their premiums. Communities not participating are classified as Class 10 by default and their residents are not eligible for the NFIP. The COJ is a participant in the NFIP and participates in the CRS, which allows communities to have a discount on the premium rates paid by their citizens for flood insurance. COJ residents may receive flood zone determinations or CRS information from the Development Management Group Office in the PPD where a certified Floodplain Manager coordinates the city's participation.

Table 9: National Flood Insurance Program Ratings, 2024

NFIP CRS Rating	Jacksonville = 6	Jacksonville Beach = 6	Atlantic Beach = 6	Neptune Beach = 7
Discount %	Jacksonville = 20%	Jacksonville Beach = 20%	Atlantic Beach = 20%	Neptune Beach = 15%

Much of Duval County's development was built prior to adoption of NFIP standards and rating zones along the coast and rivers. It is anticipated that a major hurricane would result in complete losses that would require structures to be rebuilt or replaced to meet the NFIP and Florida State Building Code standards. To support federal mitigation efforts associated with the NFIP, the COJ participates in the Federal Unified Hazard Mitigation Assistance Program and hosts local workshops to educate residents on flood damage reduction techniques. The CRS has identified RL areas in Duval County that have a combined 521 properties. General descriptions of these areas are listed below: *(Source: FEMA Flood Insurance Detail Report; Duval County; 2023).*

Repetitive Loss (RL) Areas in the City of Jacksonville

North Side

Sandra Lane
Located on the north side of Jacksonville, this area has been developed with residential and some commercial. This rural area has minimal grade changes that slows drainage to rivers, which can cause flooding on local properties.

South Side

Bedford Road, Hickson Road, and Martha Ann Drive
These areas are forested with low-density wetlands, where half of the land in each area is left open for the drainage basin. Class A and D soils combined with the high water table can result in high runoff potential. Many older properties would not meet today's development standards for finished floor elevation near floodways, minimum drainage infrastructure, and flow potentials to Little Pottsburg Creek. The RL area is located in Doctor's Branch Restricted Basin, where pre- and post-discharge is limited to ½ CFS per acre for the COJ and proposed new developments.

Caddell Drive
This area is mostly medium density residential, nearing the development capacity for the area. The remaining land is forest or open space being converted to medium density residential and commercial uses. Large storm events cause stormwater to buildup instead of draining into the St. Johns River due to the outdated drainage infrastructure.

San Marco
This area is mostly medium density residential with commercial areas in the drainage basin that has been an established built-out location for many years. The commercial improvements created large runoff events due to

outdated drainage infrastructure that causes runoff to slow and build in the roadway and on private property. This area drains directly into the St. Johns River, causing the tide to also affect the drainage system during coastal storms.

Short Road

Predominantly medium density residential on large lots create large portions of open, privately owned land. Some roadways are private dirt roads with no drainage infrastructure that are not maintained by the COJ. There is also a large section of wetlands along the upper portions of Julington Creek that have a vast storage capacity, but development has encroached in some locations that reduces its stormwater and runoff water retention potential.

West Side

Bakersfield Drive

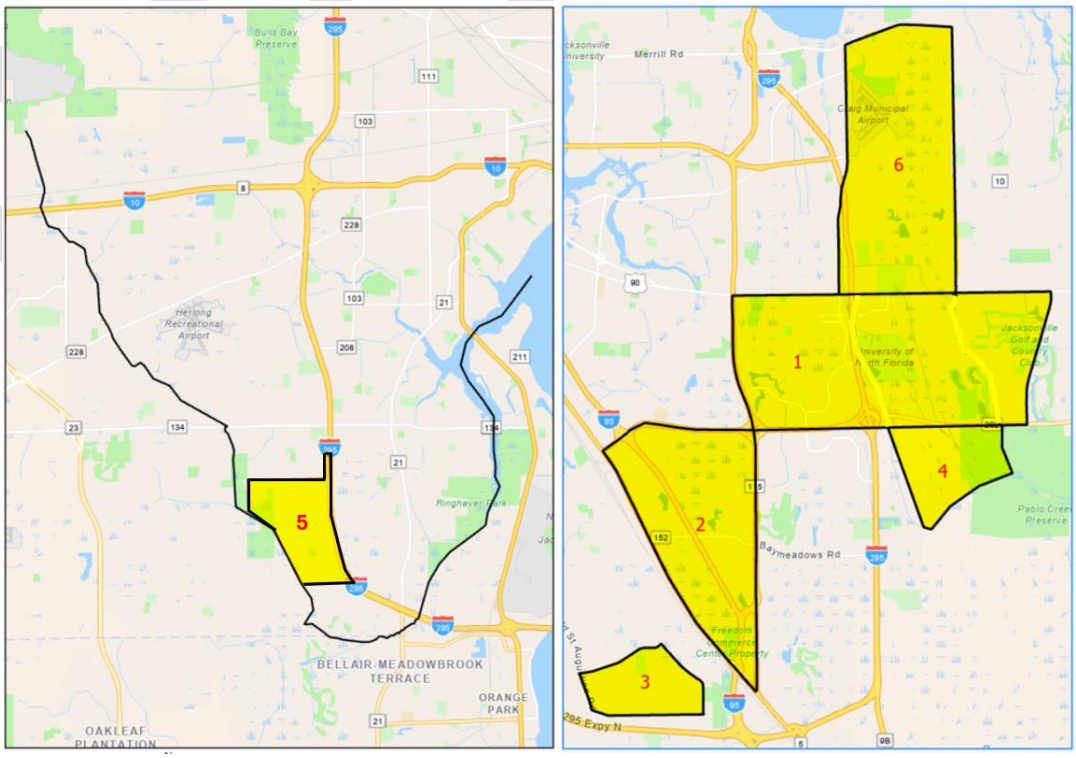
Land uses in the drainage basin are predominant forest, open space, medium residential, and commercial/light industrial development. Future development plans include converted forest and open spaces into medium density residential or commercial/light industrial. Some homes built on low banks of Wills Branch, which is tidally influenced during heavy storms, are affected by water overflowing the banks when Cedar River and Wills Branch Creek exceed their storage capacity. Theis section of the channel has been straightened and dredged by the USACE and the COJ is responsible for the ongoing maintenance of the Cedar Creek and Wills Branch Restricted Basin designated by the COJ. Proposed future development must use a volumetric calculation for pre- and post-runoff.

Machelle Drive

This area is primarily open forest with medium density residential south of RL area. Land use trends will continue with future in-fill, which will exacerbate existing drainage issues in the undersized secondary stormwater management system. The runoff drains into the upper reaches of McGirts Creek.

West 4th Street

This area is highly developed with residential, parks, commercial, and industrial developments. The sub-basin is built-out with street paving to divert water into roadside ditches that are often at street level. This area outfalls into Upper McCoy's Creek where a series of bridges and culverts are severely overtopped and experience flooding.



Repetitive Loss (RL) Areas in Duval County

According to the April 2019 NFIP Flood Insurance Manual, Appendix F: CRS, jurisdictions that participate in the NFIP are the COJ, COJB, COAB, and CONB. The number of RL structures is 106 and SRL structures is 35 in the COJ, according to the validated 2019 property list furnished by FEMA. The total number of structures will increase over time based on flooding and damage claims submitted by individual property owners.

- The COJ COMP Coastal Conservation Management Element, Policy 7.3.2, states that the City shall continue to participate in the NFIP.
- The COJB COMP Coastal Management Element, Policy CM.3.1.2, states that the City's Floodplain Management and Stormwater Ordinance shall comply with the minimum building elevations of the FEMA Flood Insurance Rate Maps (FIRM) and the building requirements of the NFIP.
- The CONB COMP Policy E.1.5.3 states, the City will enforce the requirements of the NFIP and consider increasing those requirements, if appropriate.
- The COAB Code of Ordinances, Section 8-3, states that flood load and flood resistant construction requirements are adopted to in part meet the requirements of the NFIP for community participation.
- The TOB Code of Ordinances, Section 22-233, states that the purpose of the Floodplain Management Ordinance is to meet the requirements of the NFIP for community participation.

Table 10: Description of Repetitive Loss (RL) Structures in Duval County, 2024

Jurisdiction	RL Structures	SRL Structures	Single-Family	2-4 Family	Other Res.	Condo	Non-Res.
Duval County	530*	95	469	9	16		36
Atlantic Beach (COAB)	9	0	5	4			
Jacksonville Beach (COJB)	50	6	36	7			7
Neptune Beach (CONB)	2	0	1	1			

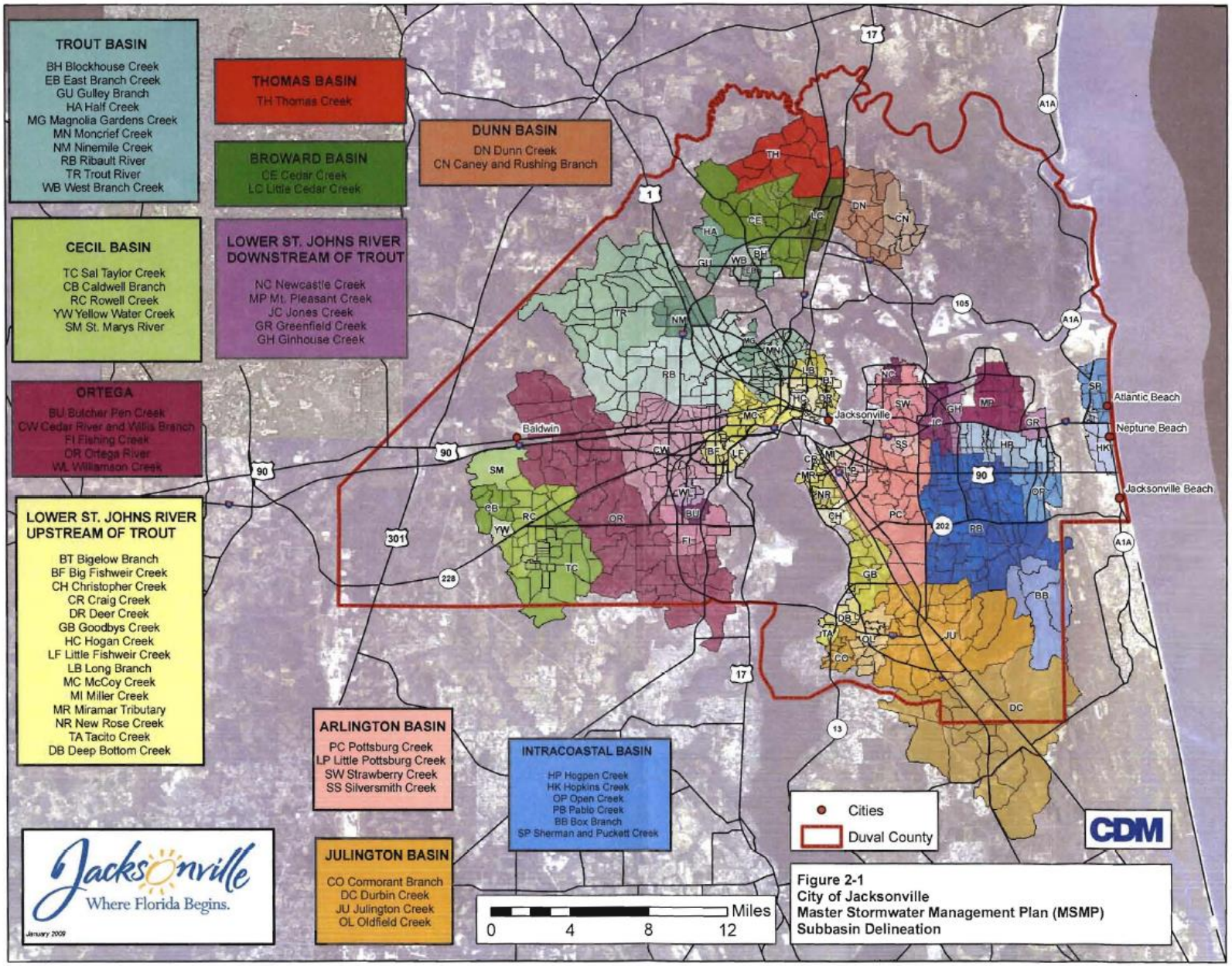
**13 mitigated. Source: JAX GIS. 2024; NFIP.*

Continued NFIP Participation Methods

All Duval County jurisdictions participate in CRS and NFIP activities and will continue the commitment to the NFIP by:

- Enforce ordinances that regulate new development/substantial improvements in the special flood hazard areas
- Inform the community by the Preparedness Guide and open public meetings
- Perform community outreach
- Maintain elevation certificates on file for all new construction/substantial improvements in the SFHAS
- Use best available flood map data for issuing construction permits
- Provide updated mapping provided to each jurisdiction
- Maintain public records and make them available for review
- Promote NFIP through the publication of the annual Emergency Preparedness Guide
- Maintain records pertaining to LOMAS and LOMRS
- Provide information related to flood hazards, flood maps, etc., to the public upon request
- Promote community outreach efforts for compliance with the CRS program
- Integrate new NFIP information and mapping into already existing strong community presentations
- Promote flood insurance to property owners
- Identify and acquire land in the SFHA open space and preservation
- Promote hazard flood mitigation to the public LMS and Grant information on Duval County’s website
- Provide drain maintenance and fund drainage system improvement projects
- Perform floodplain management activities and target a Class 5 Rating
- Participate in the Northeast Florida CRS User Group

Map 3: Duval County Repetitive Loss Areas



Source: Master Stormwater Management Plan. PPD. Development Services. COJ

Section II

Guiding Principles and Goals

SECTION II - GUIDING PRINCIPLES AND GOALS

A. Guiding Principles

During the planning process, the LMS Advisory Committee developed a set of community values and Guiding Principles that serve as a vision for hazard mitigation in the COJ. These Guiding Principles aided the formulation of specific goals and objectives, directed the planning process, and helped the selection and implementation of mitigation initiatives and programs. The set of Guiding Principles affirmed by the Advisory Committee are:

I. Hazard mitigation should prevent future losses by reducing the risk to people and property;
II. Hazard mitigation should emphasize both pre and post disaster efforts for decreasing the vulnerability of existing and new construction to loss;
III. Hazard mitigation should emphasize prevention of repetitive losses from hazards;
IV. Hazard mitigation efforts should strengthen and utilize land use guides to comprehensive planning, regional and local area plans, zoning codes, development standards and incentives to protect vulnerable properties and vulnerable areas;
V. Hazard mitigation efforts should strive to protect the public and private sectors by reducing their economic vulnerability and increasing their recovery capabilities; and
VI. Hazard mitigation should promote personal awareness and responsibility, with an emphasis on education and training for property owners, families and individuals, which should be communicated to the public in a simple, easy to understand format.

B. LMS Goals and Objectives

The 2025 version of the LMS incorporated the 2023 COJ Resilience Strategy into the table of Goals and Objectives.

The following goals and objectives stem from values prioritized by the Advisory Committee:

Goal 1: Minimize future losses from disasters by reducing the risk to people and property.

Goal 2: Emphasize pre- and post-disaster planning to decrease vulnerability of existing and new construction to loss.

Goal 3: Prevent flood-related repetitive losses from natural disasters through retrofitting, infrastructure protection, regulation, and education.

Goal 4: Strengthen and utilize comprehensive planning, regional and local area plans, zoning codes, development standards and incentives to protect vulnerable properties and vulnerable areas, and support development in less vulnerable areas.

Goal 5: Strive to protect the public and private sector by reducing their economic vulnerability and increasing their recovery capabilities.

Goal 6: Hazard Mitigation should promote personal awareness and responsibility, with an emphasis on education and training for property owners, families and individuals, which should be communicated to the public in a simple, easy to understand format.

The information below is included to further classify goals and objectives. Revisions have been incorporated with the following classifications and definitions.

- **Activity classes** were incorporated to further define each individual objective and facilitate the logical grouping of mitigation project initiatives included in Section IV of the LMS. The activity classifications were as follows: prevention, property protection, natural resource protection, and public education and awareness.
- **Prevention** is defined in this capacity to refer to government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space, preservation and stormwater management regulation.
- **Property Protection** is defined as actions involving the modification of existing building or infrastructure to protect from hazards or remove from the hazard area. Examples include acquisition, elevation, relocation, retrofits, flood proofing, storm shutters, and impact-resistant glass. This can include actions that involve the construction of stormwater controls, floodwalls, seawalls, retaining walls, and safe rooms. Physical measures to provide mitigation fall into the category of property protection.
- **Public Education and Awareness** encompasses actions to educate residents, elected officials, and property owners about potential risks from hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.
- **Natural Resource Protection** includes actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management and wetland restoration and preservation. This category may include regulatory, administrative, or physical mitigation components.
- **Suggested actions** to take to accomplish each objective have been incorporated. The actions range from broad suggestions to specific examples of how each objective may be accomplished. The purpose of including these actions is to facilitate development of mitigation project initiatives included in Section IV of the LMS. These actions should correlate directly to projects included in the list and ensure that new projects can be straightforwardly tied to the LMS Goals and Objectives. Existing documentation that supports the objectives and actions has been identified, along with agencies that are responsible or may otherwise have an interest in supporting the objectives. A timeline has been included for reference to identify the estimated length of time required to address each objective. The length of time is described using general terminology, such as long or short term, ongoing, etc. Additional information about specific implementation documentation, to include plans, policies, and procedures immediately follows and is included in the Policies, Ordinances, and Programs.
- **Local agencies** are encouraged to determine how to measure the progress made on goals, objectives, and policies. The below table provides a representation of existing policies and agency responsibilities. The table does not describe what constitutes accomplishment of a goal, objective, or policy. Local agencies, authorities, nonprofits, and other stakeholders should incorporate the mitigation goals and objectives into their respective strategic plans and adopt performance measures as necessary.

Table 11: LMS Goals and Objectives

Activity Class	Objectives	Actions	Implementation Documents	Agency Depts.	Timeline
Goal 1: Prevention	Objective 1.1: Protection of populations and properties in the COJ susceptible to economic or physical loss from natural and man-made disasters shall be consistent with the standards established in the LMS and other planning documents.	1. Examine current practices related to construction of infrastructure 2. Identify ways to build infrastructure more resiliently 3. Identify ways to retrofit resiliency and build it into new construction 4. Identify regulations that need changes to allow for wet / dry flood-proofing or elevating 5. Change regulations to allow or require resiliency 6. Identify areas appropriate for development limitations 7. Increase and safeguard the supply of affordable housing in low-risk and well-connected neighborhoods 8. Improve critical infrastructure and asset digital security from cyberattacks 9. Improve housing conditions and quality 10. Coordinate resilience actions and policies across agencies and relevant independent authorities	COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, DPW, PDD, COJ Housing and Community Development Division (HCDD - Neighborhoods)	Ongoing
Goal 1: Prevention	Objective 1.2: Encourage higher standards of maintenance to existing drainage systems and retention ponds and monitor cumulative development impacts with a macroscopic view.	1. Implement solutions of the Storm Resiliency & Infrastructure Development Review Committee 2. Coordinate with USACE and FDEP to discover best practices from other communities within Florida 3. Build ecological and recreational connections across COJ's parks and open spaces 4. Develop a green stormwater infrastructure program across COJ based on the best available science and data 5. Strengthen community cohesion in all COJ's neighborhoods through quality public spaces, events, and activities	COJ Ordinance (2018-157-E) , COJ Resilience Strategy (2023)	COJ DPW, PDD, JEA	Short Term Ongoing

Activity Class	Objectives	Actions	Implementation Documents	Agency Depts.	Timeline
Goal 1: Prevention	Objective 1.3: Work with the National Weather Service (NWS) to enhance communication and coordination before and during severe weather events.	1. Ensure NWS is contacted prior to any event, and during plan review process 2. Review and revise Hazard Specific Plans (HSPs) and Emergency Operations Plans (EOP) to ensure NWS is included as an assisting agency 3. Strengthen citywide response to extreme heat and other public health emergencies	COJ CEMP, HSPs, EOPs, Incident Action Plans, COJ Resilience Strategy (2023)	COJ EPD, JSO, NWS Jacksonville	Per Incident Ongoing
Goal 2: Property Protection	Objective 2.1: Identify and prioritize vulnerable properties by using topographic and storm surge maps, traffic analysis and evacuation modeling, economic and environmental impact analysis.	1. Implement recommendations for AAAWG 2. Determine "critical" infrastructure improvements 3. Prioritize Infrastructure Improvements 4. Develop CIP (5, 10, 25, 50 year) 5. Create connected and multimodal transportation options	Section 163.3177 (6)(g)(10) Florida Statutes, COJ 2030 COMP - CCM Element, COJ Resilience Strategy (2023)	COJ EPD, PDD, HCDD – Neighborhoods, Private Sector	Short Term Ongoing
Goal 2: Prevention	Objective 2.2: Review evacuation time estimates taking into consideration the impact of railroad and bridge openings on travel times.	1. Consult with transportation agencies during planning process and prior to or during incidents 2. Strengthen emergency response and evacuation plans	Regional Evacuation Study, Hurricane HSP, Evacuation EOP, COJ Resilience Strategy (2023)	COJ EPD	Short Term Per Incident
Goal 2: Property Protection	Objective 2.3: Encourage structure retrofit programs to address identified flood, wind, and evacuation vulnerabilities based on income level.	1. Require resiliency be considered in affordable housing programs 2. Strengthen COJ's lifelines and supply chains to withstand extended disruptions to regular operations and commerce	COMP Plans, COJ Resilience Strategy (2023)	COJ HCDD - Neighborhoods	Long Term
Goal 2: Property Protection	Objective 2.4: Where feasible, purchase land in known vulnerable areas to prevent placing people and infrastructure in high-risk areas.	1. Leverage pre- and post-disaster mitigation grant program funding to acquire property when possible 2. Make room for the river and tributaries 3. Preserve ecologically important areas with the capacity to manage water and mitigate extreme heat	COMP Plans, COJ CEMP, COJ Resilience Strategy (2023)	COJ EPD, DPW, Real Estate, HCDD - Neighborhoods	Ongoing

Activity Class	Objectives	Actions	Implementation Documents	Agency Depts.	Timeline
Goal 2: Natural Resource Protection	Objective 2.5: Identify post-storm redevelopment options in vulnerable coastal areas, taking into consideration short and long-term environmental, economic, and structural issues.	1. Perform comprehensive coastal vulnerability analysis 2. Leverage federal and state-funded vulnerability analyses 3. Improve land management and stewardship to enhance ecosystem value 4. Enhance ecosystem and community health by improving water, soil and air quality	COMP Plans: CCM Elements, PDRP - Section 3.1.2, Florida Resilient Coastlines Program, COJ Resilience Strategy (2023)	COJ PDD, DPW, EQD, SJRWMD	Short Term
Goal 2: Property Protection	Objective 2.6: Identify vulnerable existing public and private critical facilities and encourage pre-disaster retrofit.	1. Recognize JEA vulnerable/resiliency work 2. Perform comprehensive vulnerability analysis 3. Harden vulnerable critical assets to mitigate damage from hazards and ensure continuity of operations	COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, DPW, JEA, Private Sector	Ongoing
Goal 3: Property Protection	Objective 3.1: Develop and support public and private projects and programs to retrofit, relocate or acquire properties susceptible to repetitive flooding.	1. Continue direct outreach to RL and SRL property owners 2. Highlight successes and showcase previously acquired properties that have been returned to conservation area 3. Streamline voluntary residential buyout and relocation programs for high-risk areas	COJ Ordinance Ch. 652, Floodplain Management and Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ PDD, EPD, HCDD - Neighborhoods, Real Estate	Ongoing Long-term strategy for RL areas
Goal 3: Prevention	Objective 3.2: Require systematic maintenance programs for stormwater management systems.	1. Revise Master Stormwater Management Plans as needed 2. Incorporate resiliency analysis into Master Stormwater Management Plans 3. Ensure infrastructure investments are aligned with land use priorities for growth and conservation	COJ Ordinance Ch. 652, Floodplain Management, TOB, COJ Resilience Strategy (2023)	COJ DPW, JEA	Ongoing

Activity Class	Objectives	Actions	Implementation Documents	Agency Depts.	Timeline
Goal 3: Prevention	Objective 3.3: Encourage non-residential or low-density residential development in flood zones consistent with municipal plans and policies that guide development.	1. Amend ordinances or adopt new ordinances to promote desired growth patterns 2. Guide future growth in areas that are at low risk and well-connected to infrastructure 3. Develop design guidelines for climate adaptive and low-impact new subdivisions, neighborhoods, and planned developments 4. Expand COJ's tree canopy	COMP Plans, COJ Ordinance Ch. 656, Zoning Code and Ch. 654, Code of Subdivision Regulations, COJ Resilience Strategy (2023)	COJ PDD, The three Beaches PDD	Ongoing
Goal 4: Prevention	Objective 4.1: Monitor floodplain regulations and enforcement to assess effectiveness.	1. Monitor floodplain regulations and enforcement 2. Assess effectiveness and provide recommendations for policy updates as necessary 3. Invest strategically in existing parks to increase stormwater management capacity and reduce urban heat	Land Development Procedures Manual, COJ Ordinance Ch. 652, Floodplain Management, COJ Resilience Strategy (2023)	COJ PDD (Floodplain Manager)	Ongoing
Goal 4: Property Protection	Objective 4.2: Develop and support economic incentive programs for both public and private sectors promoting benefits of structural retrofitting.	1. Identify funding sources for incentives 2. Develop promotional material to educate public and private sector about benefits of retrofitting 3. Expand retrofit programs for residential and commercial buildings to improve building energy performance, storm fortification, cooling, and stormwater detention	CEMP, FEMA Hazard Mitigation Planning Resources (Planning Advisory Service Report # 560, 576, 584), COJ Resilience Strategy (2023)	Office of Economic Opportunity, Small Business Administration, COJ EPD, Private Sector Partners	Short Term
Goal 4: Prevention	Objective 4.3: Discourage variances and exceptions in flood hazard areas as identified by FIRMs, storm surge, and historical flooding.	1. Assess current criteria that allows for variances and exceptions 2. Revise criteria as necessary 3. Address rising flood and homeowner's insurance costs by investing in risk reduction	COJ Ordinance Ch. 656, Zoning Code, COJ Resilience Strategy (2023)	COJ PDD	Short Term

Activity Class	Objectives	Actions	Implementation Documents	Agency Depts.	Timeline
Goal 4: Prevention	Objective 4.4: Promote the Florida Building Code standards requiring new developments and construction to meet applicable wind load standards for proximity to coast.	1. Enforce current regulations 2. Provide comment as necessary to the Florida Building Commission regarding building code standards	Florida Building Code, Sixth Edition (2017), COJ Ordinance Ch. 321, Building Code	COJ PDD, The three Beaches PDD	Ongoing
Goal 4: Prevention	Objective 4.5: Promote regulations for new structures in 100-year flood areas to be elevated in conformance with or exceeding current Florida Building Code.	1. Require building at higher elevations, i.e., BFE + height required by ordinance 2. Implement resilient standards and codes for existing and new construction	Land Development Procedures Manual, COJ Ordinance Ch. 652, Floodplain Management, COJ Resilience Strategy (2023)	COJ PDD	Short Term
Goal 4: Property Protection	Objective 4.6: Encourage locations of critical facilities (schools, hospitals, etc.) to be away from the proximity of identified hazardous material facilities and areas prone to flooding.	1. Define and expand "critical buffer facilities." 2. Identify zones for hazard areas 3. Develop relocation plans for vulnerable critical assets that can be moved outside the floodplain	COMP Plans, COJ Resilience Strategy (2023)	COJ EPD, PDD	Long Term
Goal 4: Property Protection	Objective 4.7: Enact development standards in Wildland Urban Interface (WUI) areas, such as setbacks, forest maintenance, access of response vehicles and construction materials.	1. Research existing standards in other locations 2. Devise local standards 3. Adopt local standards 4. Update public works design standards to account for climate change impacts and support resilient infrastructure development	Potentially COJ COMP Plan & COJ Zoning Code Ch. 656 (None currently exist), TOB 2025 COMP, COJ Resilience Strategy (2023)	COJ PDD	Long Term
Goal 4: Property Protection	Objective 4.8: Strengthen existing land use regulations and policies through enhancement of review, procedures, and enforcement.	1. Analyze current regulation effectiveness 2. Strengthen enforcement of current regulations 3. Discourage development in current and future undeveloped high-risk areas and mitigate downstream impacts in the watershed	COMP Plans, COJ Resilience Strategy (2023)	COJ PDD, The three Beaches PDD	Short Term

Activity Class	Objectives	Actions	Implementation Documents	Agency Depts.	Timeline
Goal 4: Property Protection	Objective 4.9: Review and consider policies to assure more permeable area in development, by limiting construction of paved surfaces and decreasing run-off.	1. Research additional policies to promote permeable areas 2. Implement policies that limit construction of paved surfaces in vulnerable areas 3. Repurpose vacant land for uses that best support resilience goals 4. Retrofit parking lots and impervious surfaces to reduce urban heat and increase stormwater infiltration and storage	Land Development Procedures Manual, TOB Code of Ordinances Land Development Code Article VIII Division 3 Section 22-384-409, COJ Resilience Strategy (2023)	COJ PDD	Long Term
Goal 4: Property Protection	Objective 4.10: Promote and support incentives to encourage higher standards of protection to structures and facilities from hazards.	1. Review existing standards of protection for effectiveness 2. Develop incentive schemes for adherence to higher standards of protection 3. Maximize the resilience of city-owned buildings and assets 4. Support regional resilience efforts 5. Coordinate and leverage resilience investments with federal partners and resources, including military partners	Land Development Procedures Manual, COMP, COJ Ordinance Ch. 652, COJ Ordinance Ch. 321, COJ Resilience Strategy (2023)	COJ PDD	Short Term Ongoing
Goal 4: Natural Resource Protection	Objective 4.11: Identify and implement a system to rebuild and protect the dunes system, with crossovers, restoration, and revalidation.	1. Conduct pre-storm planning to address dune resilience 2. Identify funding sources to implement dune resilience system 3. Invest strategically in hardened shorelines 4. Identify shorelines where natural and nature-based solutions can provide long-lasting ecosystem service benefits	COMP Plans, COJ Resilience Strategy (2023)	COJ PDD, COJ DPW, USACE	Long Term Ongoing

Activity Class	Objectives	Actions	Implementation Documents	Agency Depts.	Timeline
Goal 5: Public Education & Awareness	Objective 5.1: Encourage disaster planning training through collaborative programs with appropriate government agencies and the private sector.	1. Identify appropriate agencies / private sector partners to engage with in training 2. Revise County Multi-Year Training and Exercise Program (MYTEP) component of Integrated Preparedness Plan (IPP) to bring disaster planning training 3. Provide disaster training to the public 4. Engage COJ youth to guide future resilience and climate action	MYTEP, COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, Public / Private Sector Partners, Northeast Florida Regional Planning Council (NEFRC)	Ongoing
Goal 5: Public Education & Awareness	Objective 5.2: Analyze the factors involved in small business decision making when preparing for disasters or integrating hazard mitigation into management practices.	1. Perform research and analysis for small business decision making 2. Perform stakeholder meetings and education sessions for best practices 3. Expand digital and financial infrastructure necessary for full economic participation	COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, Public / Private Sector Partners, NEFRC	Ongoing
Goal 5: Public Education & Awareness	Objective 5.3: Promote mitigation guidelines for businesses to raise awareness about local hazards, assist in vulnerability assessment, aid in the identification of financial and technical assistance available, and facilitate hazard mitigation implementation to include continuity of operations.	1. Develop mitigation guidelines 2. Perform stakeholder meetings with businesses to discuss mitigation guidelines and strategies 3. Market COJ's resilient business climate to attract new companies and investment 4. Develop a Climate Action Plan that aligns COJ's resilience goals with actions to promote sustainability	COJ Ordinance Ch. 674, Emergency Preparedness, NEFRC Community Conversations, COJ Resilience Strategy (2023)	COJ EPD, NEFRC	Ongoing
Goal 6: Public Education & Awareness	Objective 6.1: Promote disaster preparedness education and awareness programs, targeting specific benefits to homeowners, families and individuals.	1. Produce and continually revise disaster preparedness educational programs 2. Identify most effective means to reach the target population	COJ Ordinance Ch. 674, Emergency Preparedness	COJ EPD	Short Term

Activity Class	Objectives	Actions	Implementation Documents	Agency Depts.	Timeline
Goal 6: Public Education & Awareness	Objective 6.2: Promote disaster preparedness education and awareness programs, targeting specific benefits to public and private sector.	1. Produce and continually revise disaster preparedness educational programs 2. Identify the most effective means to reach the target population 3. Expand Community knowledge and participation in resilience actions	COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, NEFRC	Short Term
Goal 6: Public Education & Awareness	Objective 6.3: Encourage public information programs for hazard mitigation, emphasizing its direct benefits to citizens, including public officials and private businesses.	1. Produce and continually revise hazard mitigation educational programs 2. Identify the most effective means to reach the target population 3. Develop, implement, and monitor plans in support of eliminating all bicycle and pedestrian deaths in COJ	COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, NEFRC	Ongoing
Goal 6: Public Education & Awareness	Objective 6.4: Identify and coordinate hazard mitigation public information programs and events such as contests and festivals with public and private partners.	1. Research existing programs and events 2. Participate in the planning and implementation of programs and events 3. Increase health and well-being across COJ through tailored resource delivery	COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, NEFRC	Short Term
Goal 6: Public Education & Awareness	Objective 6.5: Identify and seek multiple funding sources that will support hazard mitigation awareness and training program.	1. Identify funding sources 2. Establish a distribution list and provide information as it becomes available 3. Create new jobs, training, and business development opportunities by leveraging funding spent on resilience projects and programs	COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, COJ Grants Office	Ongoing
Goal 6: Public Education & Awareness	Objective 6.6: Educate and promote elected officials, builders and potential homeowners, the economic and safety benefits of designing mitigation features into new construction.	1. Produce and continually revise disaster preparedness educational programs 2. Identify the most effective means to reach the target population 3. Establish an Office of Resilience to facilitate the ongoing implementation of the Resilience Strategy	COJ Ordinance Ch. 674, Emergency Preparedness, COJ Resilience Strategy (2023)	COJ EPD, COJ PDD, The three Beaches PDD, NEFRC	Short Term

C. Policies, Ordinances, and Programs

Local PDDs are responsible for ensuring adherence to their Land Development Codes and Zoning Codes when updating their plans and policies in response to external plan and policy updates to ensure compatibility and compliance.

The following tables contain information on policies, ordinances and programs for Duval County's associated jurisdictions, agencies, and the local U.S. Coast Guard (USCG). Mitigation-related policies, ordinances and programs were identified and evaluated by the Advisory Committee. The information was collected and categorized into 13 major issue areas, were evaluated by assessing their effectiveness and were reviewed for the 2025 LMS Update. The policies, ordinances, and programs referenced in the table below identify several local planning documents that contain goals, objectives, policies, and some action items. These documents include:

- Comprehensive Plans (COMP)
    - COMPs are long-range planning documents that express a community's overarching vision, goals, objectives, policies, and strategies for the future growth, development, and preservation of the community, protection of community assets, and provision of services.
- Emergency Operations Plans (EOP)
    - EOPs details what the facility and agency will DO during a disaster (incident command implementation, command center location and activities, specific plans by department, etc.).
- Comprehensive Emergency Management Plans (CEMP)
    - CEMPs establish procedures to prepare for emergencies, as well as the management structure for coordinating and managing the response to emergency situations.

The COJ EPD is responsible for overseeing the review process and updating the CEMP and LMS in coordination with partner agencies and stakeholders. Municipal Planning and Development Departments (PDD) are responsible for maintaining local planning documents and policies. According to the Florida Administrative Code, Rule Chapter 73C-49, at least every 7 years local governments with COMP Plans are responsible for updating the plan to reflect changes in state requirements since the last update. This applies to all municipalities participating in the COJ LMS Process. All municipalities represented in the Duval County LMS have to determine if their local COMP Plan needs to be updated to reflect policy changes related to hazard mitigation. Representatives from various departments and divisions of the COJ, COJB, COAB, CONB, and the TOB actively participate in LMS meetings. Sign-in sheets for LMS quarterly meetings, update meetings, and special meetings show active participation by all jurisdictions within Duval County.

The COJ COMP Plan's Coastal Management Element, Policy 7.5.7, states Emergency Management shall propose amendments that reflect interagency report recommendations and other reports prepared pursuant to Section 406 of the Disaster Relief Act of 1974. Plans like CEMPs and PDRPs are reviewed and updated to maintain consistency with hazard mitigation goals and policies in the LMS. The Jacksonville Beach COMP Plan's Coastal Management Policy, CM.5.2.2, states that the City shall assist the County with the development of the LMS. The CEMP identifies that the EPD for the COJ will spearhead County Mitigation Advisory Committee efforts. The Atlantic Beach COMP Plan's Coastal Management Element, Policy D.1.2.2, states the City will participate in the COJ LMS update process. Objective A.1.8 is supported by a Policy for the City to participate in LMS Planning, and Policies D.2.3.1 and D.2.3.2 support the implementation of hazard mitigation policies as well.

Table 12: Duval County, Local Mitigation Plans and Policies

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
Decrease Vulnerability	
COAB 2045 COMP – Infrastructure Goal C.2	**Goal C.2:** Adequate stormwater management and provisions for drainage shall be provided to afford reasonable protection from flooding and to prevent degradation in the quality of receiving surface water and ground water. • Objective C.2.1: Protection of Natural Drainage Features • Objective C.2.2: Stormwater Management and Drainage Facilities
Coastal Management Goal D.2 Objective D.2.1 Objective D.2.2 Objective D.2.3	**Goal D.2**: The City shall maximize, to the extent feasible, provisions and opportunities for the protection of life and property from the effects of hurricanes and other natural disasters. • Objective D.2.1: Hurricane Evacuation • Objective D.2.2: Redevelopment after a Natural Event • Objective D.2.3: Hazard Mitigation
Duval County 2025 CEMP – Basic Plan	The CEMP establishes the framework, as authorized by Chapter 252, Florida Statutes, to ensure that the City of Jacksonville is resilient and prepared to address all hazards, regardless of the magnitude of the incident or disaster. Once the decision to fully activate the Emergency Preparedness Organization is made, the structure and responsibilities will be consistent with Section 674.203, City of Jacksonville Ordinance Code.
Evacuation Plan	The City of Jacksonville Evacuation Plan details the logistics and response activities associated with the successful evacuation of the residents and visitors in the City of Jacksonville. Procedures tested through training and exercises.
Exercises	The purpose of the exercise process is to provide an opportunity for the City of Jacksonville stakeholders to demonstrate roles and responsibilities. These inter-agency exercises may be seminars, workshops, tabletops, functional, drills, or full-scale exercises. The types of training activities depend on the scenarios, participants, and objectives of the exercises. All exercises are conducted according to the requirements of the Homeland Security Exercise Evaluation Program (HSEEP). At the conclusion of each exercise, the EPD seeks feedback and analysis from exercise participants.
Training	The EPD is responsible for ensuring that all members of the EOC Staff and personnel with incident response (ICS) roles are trained. Training and Exercise Coordinator is responsible for the coordination of local training programs.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
COJ 2045 COMP – Coastal Management Goal 6 Objective 6.2 Objective 6.3	**Goal 6:** The City shall protect, conserve, and manage its sandy beach coastline and dune system and the St. John's River and its tributaries. The City shall continue to ensure access to beaches, coastal shoreline, and the St. John's River and tributaries are available to the public. • Objective 6.2: The City shall encourage the continuance of the federally authorized Jacksonville Beach Restoration Project. • Objective 6.3: The City shall maintain construction standards which minimize the impacts of man-made structures on beach or dune systems.
Goal 7 Objective 7.1 Objective 7.3 Objective 7.5	**Goal 7**: The City shall make every reasonable effort to ensure the public safety, health, and welfare of people and property from the effects of coastal storm and hurricane damage. • Objective 7.1: The City, acting as Duval County, shall reduce excessive hurricane evacuation times where they exist within specific areas of designated Hurricane Evacuation Zones and maintain all other evacuation times within the acceptable standard. • Objective 7.3: Limit public expenditures that subsidize growth by ensuring that building and development activities are carried out in a manner which minimizes danger to life and property from natural disasters and restricting the intensity of development within designated Coastal High Hazard Areas consistent with public safety needs. • Objective 7.5: Within 60 days of the occurrence of a major destructive storm or similar disaster, the City shall prepare a post-disaster redevelopment plan designed to reduce or eliminate the exposure of human life and property to natural hazards.
Goal 10 Objective 10.3 Objective 10.4	**Goal 10**: To provide for the siting and operation of boat facilities in such a manner as to protect water quality, maintain propagation of fish and wildlife, and maintain fishing, recreation, and swimming in a manner consistent with the Future Land Use Element, the Recreation and Open Space Element and Conservation/Coastal Management Element of the Comprehensive Plan, and the Manatee Protection Plan 4th Edition, dated November 2017 (MPP) as adopted by the City Council and approved by Florida Fish and Wildlife Conservation Commission (FWC) and the City of Jacksonville 2045 Comprehensive Plan Conservation/Coastal Management Element 52 U.S. Fish and Wildlife Service (USFWS) and incorporated into the City of Jacksonville Comprehensive Plan by reference. • Objective 10.3: New or expanding boat facilities shall provide adequate protection against storm surges, winds, hurricanes, petroleum, chemicals, or other hazardous material spills. • Objective 10.4: All boat facilities must ensure protection of water quality consistent with water quality requirements of the Comprehensive Plan.
Capital Improvements Goal 1 Objective 1.1 Policy 1.1.5	**Goal 1**: The City shall undertake actions to provide and maintain, in a timely and efficient manner, necessary and adequate public facilities to all residents within its jurisdiction and to promote compact urban growth in areas identified through the Comprehensive Plan as having existing capacity. • Objective 1.1: The City shall provide capital improvements to correct existing public facilities determined to be deficient, to accommodate desired future growth, and replace those facilities determined to be irreparable in a capital improvements schedule within the element. Replacing an entire facility with a new structure requires City Council authorization.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
	○ Policy 1.1.5: The City shall implement a Concurrency Management System that addresses schools, potable water, sanitary sewer, solid waste, drainage, and parks and recreation. The City has replaced the transportation concurrency system with a Mobility System that addresses roadways, mass transit, and active transportation facilities.
Future Land Use Objective 1.5	**Goal 1**: To ensure that the character and location of land uses optimize the combined potentials for economic benefit, enjoyment, wellness and protection of natural resources, while minimizing the threat to health, safety and welfare posed by hazards, nuisances, incompatible land uses and environmental degradation. • Objective 1.5: Maintain, enhance and conserve natural and environmental resources, especially coastal resources.
Infrastructure Goal 1 Objective 1.4 Policy 1.4.1 Objective 1.5 Policy 1.5.2	**Goal 1**: The Public Works Department shall provide a stormwater management system which will increase the efficiency of the existing systems, create regional facilities where appropriate and improve water quality by reducing non-point sources of pollution. • Objective 1.4: The City shall maximize the efficiency of operations of its stormwater facilities through scheduled and proper maintenance. • Policy 1.4.1: The City shall maintain a method for financing the operation and management of stormwater facilities. The funding shall be used to reduce existing flooding, improve water quality, and preserve or restore the values of the natural systems. • Objective 1.5: The City shall continue to protect existing streams, rivers, and floodways through its development review process to ensure that no harm is done to the natural drainage system. ○ Policy 1.5.2: The Development Services Division of the Planning and Development Department shall continue to deny permits to any new development that fills a flood plain without compensation for the fill by excavating an equal volume or improvement to the drainage system or a combination of both.
Transportation Goal 3 Objective 3.1	**Goal 3**: Strive to develop a sustainable transportation network to increase the efficiency and safety of roadways. Plan, develop, operate, and maintain safe, efficient, and economical traffic circulation for the City of Jacksonville to ensure the movement City of Jacksonville 2045 Comprehensive Plan Transportation Element 20 of persons and goods. Provide accessibility and mobility to accommodate all users and modes of transportation, especially during the time of emergency evacuations. • Objective 3.1: The City shall coordinate with local and state government agencies to ensure proper evacuation protocols are in place and strive to reduce evacuation times for developments within areas designated as Hurricane Evacuation Zones.
COJB 2030 COMP – Transportation Goal TE 1 Objective 1.2	**Goal TE 1**: Establish a multi-modal transportation system that provides mobility for pedestrians, bicyclists, transit users, motorized-vehicle users, and is sensitive to the environmental amenities of Jacksonville Beach, Florida. • Objective TE 1.2: The City shall coordinate with other agencies, local governments, and state agencies in their efforts to implement planning and programming activities for transportation facilities and alternative transportation modes.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
Coastal Management Goal CM.3 Objective 3.1 Objective 3.2 Objective 3.3	**Goal CM.3**: The vulnerability of the people and property of Jacksonville Beach to coastal hazards such as hurricane damage and coastal flooding shall be minimized. • Objective 3.1: By April 1, 1991, the City shall ensure that future development will minimize the exposure of population and property to storm damage by adopting and enforcing requirements pursuant to the standards established by Policies CM.3.1.1 through CM.3.1.9 to restrict development within coastal high-hazard areas and curtail public funding within these areas. • Objective 3.2: The City's hurricane evacuation time for a Category 3 storm shall be less than 12 hours. This evacuation time shall be re-examined and adjusted accordingly following analysis of the Statewide Evacuation Study Program, Northeast Florida Study", released in December 2010. • Objective 3.3: The City shall provide immediate response to post-disaster emergency situations. Priority shall be given to ensure public health, safety and welfare.
Goal CM.5 Objective CM.5.2	**Goal CM.5**: Coastal resource management will address natural systems without regard to political boundaries. • Objective CM.5.2: The City shall implement appropriate portions of existing resource protection plans addressing coastal and estuarine areas.
CONB 2046 COMP – Future Land Use Goal A.1 Objective A.1.1 Objective A.1.6	**Goal A.1**: Preserve the pleasant character of the City and ensure that the scarce developable land remaining will serve the whole community. • Objective A.1.1: Maintaining Residential Character Future development and redevelopment shall preserve the residential character of the City by 1) retaining the primarily residential character of Neptune Beach, 2) coordinating densities on the Future Land Use Map (FLUM) and the Zoning Map with desirable existing conditions, and 3) protecting and preserving the dense tree canopy and coastal waterway access. • Objective A.1.6: Environmental Resources = The City shall protect, conserve, and enhance natural features and any other environmental resources including wetlands, wildlife habitats, estuarine systems, and surface groundwater resources.
Infrastructure Goal D.3 Objective D.3.1	**Goal D.3:** The functions of natural groundwater aquifer recharge areas within the City will be protected and maintained. • Objective D.3.1: Where feasible, the City shall conserve its potable water resources through regulations, policies, and coordination activities which shall reduce consumption and promote water reuse.
Coastal Management Goal E.1 Objectives E.1.4 Objectives E.1.5 Objectives E.1.6	**Goal E.1**: The coast of Neptune Beach has primarily been developed for urban use. The City shall eliminate any further new development or redevelopment that would destroy or otherwise damage coastal resources. The City shall protect, enhance, and preserve beach and wetland dune systems, as well as other coastal resources of environmental value, through proper maintenance and management practices, and the prohibition of inappropriate use and development, including public-financed improvements within the Coastal High Hazard Area (Map E-1). The city shall conserve, utilize, and protect its natural resources to ensure that adequate resources are available for future generations. • Objective E.1.4: Coastal High Hazard Area = Within the Coastal High Hazard Areas (Map E-1), Neptune Beach shall discourage further urban development and shall limit public expenditures that subsidize development except for the restoration or enhancement of natural resources and the provision for appropriate public access to and use of natural resources

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
	• Objective E.1.5: Environmental Conditions = The City shall limit new development of shoreline sites to conform to the reduction of environmental degradation, as well as to encourage visual and physical accessibility, open space conservation, wildlife preservation, and compatibility between adjacent uses. • Objective E.1.6: Post-Disaster Redevelopment Plan = The City shall prepare a post-disaster redevelopment plan (9J-5.012(3)(b)(8)). Redevelopment activities within the Coastal High Hazard Area (Map E-1) shall serve the purpose of reducing the vulnerability of people, property, and natural resources to damages from coastal storms. Further in accordance with F.S. Chapter 163.3178(2)(f)4, the City shall be consistent with, or more stringent than, the flood-resistant construction requirements in the Florida Building Code and applicable flood plain management regulations set forth in 44 C.F.R. part 60. As indicated in Policy 1.4.4, the City shall require any construction activities seaward of the coastal construction control lines established pursuant to s. 161.053 to be consistent with chapter 161, per F.S. Ch. 163.3178(2)(f)5.
TOB 2025 COMP - Conservation Goal C.7 Objective C.1.7	**Goal C.7:** • Objective C.1.7:
Future Land Use Element Goal 1 Objective 1.1	**Goal 1:** • Objective 1.1:
COJ Code of Ordinances - Chapter 674 - Disaster Preparedness and Mayor's Executive order 96-201	To create and maintain a local disaster preparedness agency in the city and to authorize cooperation with the federal and state governments, other local disaster preparedness agencies, and other local groups and individuals. Disaster preparedness and civil emergency. Establishes SEPPC and specifies disaster preparedness, response and recovery procedures.
COJ Growth Management Task Force Report - Transportation Section, p. 5	Master transportation plan should address area wide integrated, multi-modal transportation approach that includes roadway prioritization and linkages of transportation facilities for ultimate build out of City. Broad transportation master planning process funding initiated in 1998.
COJB Code of Ordinances - Buildings & Regulations	**Chapter 7**: All buildings must be built to withstand various wind loads.
COJB Emergency Operations Plan	Calls for evacuation of entire city for Category 3, 4, or 5 hurricanes. Outlines emergency procedures – Hurricane SOP calls for identification and initiation of long-term mitigation strategies based on COMP. Now superseded by new Storm Surge evacuation Zone maps. Post-disaster, ongoing.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
CONB Code of Ordinances - Section 8-26	CONB adopted the latest edition of the Florida Building Code.
CONB Hurricane Preparedness Plan	Hurricane evacuation procedures for community and CONB city government; protection of public health and welfare, critical records and facilities during evacuation, response, and recovery. Plan anticipates 4-day operation of government without outside assistance; reviewed each April.
Education/Awareness/ Training/Communication	
Duval County 2025 CEMP – Inter-agency Coordination Goal 1 Goal 2 Goal 3	**Goal 1:** Coordinate the planning and policy making of the City with that of the surrounding municipalities, county, regional, State, federal and special authority governments to ensure consistency in development and in the provision of services and to implement the goals, objectives and policies of the 2030 Comprehensive Plan. **Goal 2**: The City shall foster and encourage intergovernmental coordination for schools among the City, DCPS, and other municipalities, and other adjacent local governments, and regional, state and federal governmental agencies. **Goal 3**: Ensure successful implementation of the City's strategic vision and integrated mission through coordination among departments and independent agencies.
Mitigation Opportunities	Mitigation opportunities will be addressed during the Public Assistance Process, as outlined in the City of Jacksonville Recovery Plan. Based on the data gathered from the damage assessments, recommendations regarding potential mitigation projects will be made by the Duval Prepares Committee, the SEPPC, and the Recovery Task Force. Voluntary organization that communicates mitigation opportunities through educational outreach programs.
Public Awareness and Education	Pursuant to Chapter 674.215 of the City of Jacksonville Ordinance Code, the EPD has a comprehensive educational program that focuses on emergency preparedness. Using a whole community approach, EPD engages the media, retailers, banks, utilities, and various other stakeholder agencies to reach visitors and citizens in the City. Information is communicated to the public throughout the year about hazards, vulnerabilities and disaster preparedness. Public education promotions and on-site presentations are conducted annually.
COJ Emergency Preparedness Programs	Public education and awareness for disaster preparedness. On-going Programs.
COJ Hurricane Evacuation Traffic Management Plan	Enhanced procedures and routes to facilitate expedient evacuation.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
COJB 2030 COMP – Coastal Management Goal CM.5 Objective CM.5.1 Policy CM.5.1.4	**Goal CM.5**: Coastal resource management will address natural systems without regard to political boundaries. • Objective CM.5.1: An intergovernmental coordination mechanism shall be established in order to manage coastal resources affecting or affected by governments other than the City. ○ Policy CM.5.1.4: The City shall assist the Consolidated City of Jacksonville in the development of an all-hazards Local Mitigation strategy (LMS) for the entire Duval County area, to be completed by December 1999. Assistance shall include Jacksonville Beach representation on the LMS advisory committee.
Increase Recovery Capabilities of Business and Industry	
COJ Growth Management Task Force Report – p. 58	Page 58: Promote more "Supply side" economic development opportunities. Encourages diversification with 2 initiatives.
Land Use/ Zoning / Development Controls / Incentives	
COAB 2045 COMP – Coastal Management Goal A.1 Objective A.1.8	**Goal A.1**: The City shall manage growth and redevelopment in a manner, which results in a pattern of land uses that: 1) encourages, creates and maintains a healthy and aesthetically pleasing built environment, 2) avoids blighting influences, 3) preserves and enhances coastal, environmental, natural, historic and cultural resources, 4) maintains the City's distinct residential community character, 5) provides for reasonable public safety and security from hazardous conditions associated with coastal locations, 6) that provides public services and facilities in a timely and cost effective manner, and 7) that encourages energy efficiency and the use of renewable energy resources. • Objective A.1.8: Post-Disaster Redevelopment = The City shall encourage innovative land development approaches and concepts in the event of post disaster redevelopment, which will have the effect of reducing dependence upon automobile travel, conserving valuable natural resources and Environmentally Sensitive Areas, and preventing property damage as well as threats to human safety and security.
Goal D.1 Objective D.1.2 Policy D 1.2.1 Policy D.1.2.2	**Goal D.1**: The City shall protect, enhance and preserve coastal wetlands and beach and dune systems, as well as other coastal resources of environmental value, through proper maintenance and management practices, the avoidance of inappropriate use and development, including publicly-financed improvements within the Coastal High Hazard Area, and shall continue an ongoing program of revegetation and installation of properly designed public access-ways in areas that are subject to erosion such as the dune system. • Objective D.1.2: Storm and Flood Hazards = The City encourages the use of best practices for development and redevelopment, including principles, strategies, and engineering solutions that will result in the removal of coastal real property from flood zone designations established by the Federal Emergency Management Agency. ○ Policy D 1.2.1: Wetlands, Environmentally Sensitive Areas and Estuarine Environments

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
	○ Policy D.1.2.2: The City shall protect wetlands and estuarine environments from the adverse impacts of development and shall prohibit the establishment of incompatible land uses adjacent to wetlands. Such incompatible land uses shall include all Industrial uses, but shall also include uses, which have the potential to disturb, contaminate or degrade wetland functions or natural systems associated with wetlands and estuaries.
COAB Code of Ordinances - Chapter 8 - Flood Hazard Areas	The purposes of this chapter and the flood load and flood resistant construction requirements of the Florida Building Code are to establish minimum requirements to safeguard the public health, safety, and general welfare and to minimize public and private losses due to flooding through regulation of development in flood hazard areas.
Section 8-62 CHHA	In coastal high hazard areas, alteration of sand dunes and mangrove stands shall be permitted only if such alteration is approved by the Florida Department of Environmental Protection and only if the engineering analysis required by section 8-32(4) of this chapter demonstrates that the proposed alteration will not increase the potential for flood damage. Construction or restoration of dunes under or around elevated buildings and structures shall comply with section 8-82(3) of this chapter.
COJ 2045 COMP – Coastal Management Goal 11 Objective 11.1	Goal 11: To ensure that development and redevelopment within the Coastal Area is compatible with the Coastal Area's natural character. • Objective 11.1: To establish land use criteria which give priority to the siting and development of water-dependent uses within the Coastal Area, as compared with other shoreline uses.
COJ Code of Ordinances Chapter 654 – Subdivisions	(a) Land subdivision is the first step in community development. Once land has been subdivided into streets, lots and blocks and publicly recorded, the correction of defects is costly and difficult. Subdivided land sooner or later becomes a public responsibility in that roads, drainage and utilities must be maintained and various customary municipal services must be provided. The welfare of the entire City is directly affected by land subdivision. It is in the interest of all taxpayers and citizens, the developer and future residents that subdivisions be conceived, designed and developed in accordance with sound practice and appropriate standards. (b) The intent and purpose of these regulations is to provide for the harmonious development of the City; to secure a coordinated layout and adequate provision for traffic within subdivisions and with other existing or planned streets; and to secure adequate provision for light, air, recreation, transportation, potable water, flood prevention, drainage, sewers, other sanitary facilities, environmental protection and City services. It is also the legislative intent that the guidelines and general standards set out in the 2030 Comprehensive Plan, shall be observed in the administration of these regulations, so that the growth and development of subdivisions which are approved under this Chapter are consistent with the 2030 Comprehensive Plan. Natural areas, wetlands, and native vegetative areas with native habitat should be considered in the overall final design so as to minimize degradation of these areas.
Chapter 656 - Zoning Code	The purpose of the Zoning Code shall be to promote the health, safety, morals and general welfare of the public, to regulate the use of land and buildings and to implement the Comprehensive Plan adopted pursuant to Chapter 650, Ordinance Code and F.S. Ch. 163, Pt. II (Local Government Comprehensive Planning and Land Development Regulation Act), hereinafter referred to as *LGCPLDRA*.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
COJ FEMA Programs	NFIP/CRS/FIRM standards and requirements for flood insurance policies, community discounts. City passed FEMA audit. Application submitted for CRS.
COJ Growth Management Task Force Report – Final Recommendations: Issue Six	Page 53: Encourage infill development and improve and maintain sound infrastructure conditions such as roads, drainage, water and sewer. Incentives for infill housing investments in specified area adopted; mixed use districts being established; Springfield Zoning Overlay Study completed; funding for septic tank replacement complete. Page 61: Recommends protection of environmentally sensitive and unique features with Special Management Area activities such as natural drainage systems. 5 areas created by COJ COMP for conservation. One area, Timucuan Preserve, protected under Federal program Public Law 100-249 (1988). Under F.S. Ch.258, Aquatic Preserve, third area, Julington Durbin Creek Peninsula, acquired by COJ, State and SJRWMD. Conservation easement over portion of 4th area (Cedar Swamp) was acquired by COJ, State and the SJRWMD.
COJB 2030 COMP – Coastal Management Goal CM.3 Objective 3.1 Policy CM.3.1.7 Objective CM.3.2 Policy CM.3.2.2	**Goal CM.3**: The vulnerability of the people and property of Jacksonville Beach to coastal hazards such as hurricane damage and coastal flooding shall be minimized • Objective CM.3.1: By April 1, 1991, the City shall ensure that future development will minimize the exposure of population and property to storm damage by adopting and enforcing requirements pursuant to the standards established by Policies CM.3.1.1 through CM.3.1.9 to restrict development within coastal high-hazard areas and curtail public funding within these areas. o Policy CM.3.1.7: Undeveloped lands within the coastal high-hazard area shall be designated "conservation-protected areas" on the Future Land Use Map, and the coastal high-hazard areas shall be shown on the zoning maps. • Objective C.3.2: The City's hurricane evacuation time for a Category 3 storm shall be less than 12 hours. This evacuation time shall be re-examined and adjusted accordingly following analysis of the Statewide Evacuation Study Program, Northeast Florida Study", released in December 2010. o Policy CM.3.2.2: Land use plan amendments shall not be approved within all designated Category 3 Hurricane Vulnerability Zones as delineated by the Northeast Florida Regional Planning Council unless the change is made to reflect existing conditions, the requested change is for a lower density, a requested increase in density is offset by a decrease in density in another part of the Category 3 Hurricane Vulnerability Zone, or the developer mitigates the added evacuation route loading by paying an impact fee for additional roadway improvements.
COJB Land Development Regulations – Section 34-467 Flood Hazard Areas	The purposes of this ordinance and the flood load and flood resistant construction requirements of the Florida Building Code are to establish minimum requirements to safeguard the public health, safety, and general welfare and to minimize public and private losses due to flooding through regulation of development in flood hazard areas.
COJB Zoning Code	For any structure damaged by more than 50% of its assessed value, the entire structure must be brought into compliance with current codes.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
CONB 2046 COMP – Infrastructure Goal D.1 Objective D.1.3 Policy D.1.3.1	**Goal D.1:** Provide needed public facilities in a manner which protects investments in existing facilities, promotes efficient and appropriate use by existing and future development, protects public health and safety, and ensures that adequate facility capacity is available at the time a development permit is issued or will be available when needed to serve the development. • Objective D.1.3: Elimination of Septic Tanks = The City shall protect natural resources and provide safe and sanitary sewer service. It is the intent of the City to eliminate all septic tanks within its borders. On-site wastewater treatment systems shall be limited to the two areas currently using septic tanks, and the City shall install central sewer service in accordance with the Capital Improvements budgeting and planning in order to reduce the number of septic tanks. ○ Policy D.1.3.1: The City will enforce the Coastal Construction Code, and the Florida Building Code as these codes regulate construction within Coastal Areas.
Coastal Management Goal E.1 Objective E.1.2 Policy E.1.2.1 Objectives E.1.4 Policy E.1.4.1 Objectives E.1.5 Objectives E.1.6	**Goal E.1**: The coast of Neptune Beach has primarily been developed for urban use. The City shall eliminate any further new development or redevelopment that would destroy or otherwise damage coastal resources. The City shall protect, enhance, and preserve beach and wetland dune systems, as well as other coastal resources of environmental value, through proper maintenance and management practices, and the prohibition of inappropriate use and development, including public-financed improvements within the Coastal High Hazard Area (Map E-1). The city shall conserve, utilize, and protect its natural resources to ensure that adequate resources are available for future generations. ○ Objective E.1.2: Storm and Flood Hazards = The City shall continue best management practices that are intended to reduce damage and erosion of dune systems, dune vegetation, and estuarine environments that result from pedestrian traffic. In accordance with F.S. Chapter 163, 3178(2)(f)2, the City encourages the use of best practices for development and redevelopment, including principles, strategies, and engineering solutions that will result in the removal of coastal real property from flood zone designations established by the Federal Emergency Management Agency. Further, per Chapter 153. 3178(2)(f)3., the City has identified the following site development techniques and best practices that may reduce losses due to flooding and claims made under flood insurance policies issued in this state. ○ Policy E.1.2.1: The City will enforce its floodplain management regulations to conform with or exceed the requirements of the FEMA's NFIP and capture any additional CRS benefits. • Objectives E.1.4: Coastal High Hazard Area ○ Policy E.1.4.1: The city will limit public expenditures in high-hazard areas to improvements that do not increase density; to that which customarily supports recreation and open-space use of the beach and waterway related resources; and which achieves dune stabilization and prevention of erosion through environmentally sound practices. • Objectives E.1.5: Environmental Conditions • Objectives E.1.6: Post-Disaster Redevelopment Plan
Goal E.2 Objective E.2.2	**Goal E.2:** The City shall maximize, to the extent feasible, provisions and opportunities for the protection of life and property from the effects of hurricanes and other natural disasters. • Objective E.2.2: The City shall seek appropriate means of reducing the potential for loss of life and property through provisions within the Land Development Regulations, including implementation of hazard mitigation policies from the Local Mitigation Strategy.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
Inter-governmental Coord. Goal G.1	Goal G.1: The City shall coordinate and cooperate with the various governmental agencies to achieve coordination of the following: 1) equitable and reasonable sharing of authority, responsibility, and resources in the provision of services, education, and housing; 2) provision for effective development review and permitting; 3) effective representation on behalf of the City in decisions related to future growth management, planning, and funding resources.
TOB 2025 COMP - Conservation Objective C.1.2.3	Objective C.1.2.3:
Future Land Use Element Policy L.1.1.9	Policy L.1.1.9:
TOB Code of Ordinances - Land Development Code Article VIII Division 3 Article XI Division 5 Division 6	Floodplains = The provisions of this article shall apply to all development that is wholly within or partially within any flood hazard area, including but not limited to the subdivision of land; filling, grading, and other site improvements and utility installations; construction, alteration, remodeling, enlargement, improvement, replacement, repair, relocation or demolition of buildings, structures, and facilities that are exempt from the Florida Building Code, placement, installation, or replacement of manufactured homes and manufactured buildings; installation or replacement of tanks; placement of recreational vehicles; installation of swimming pools; and any other development. Flood Resistant Development = Provides minimum requirements for all buildings and structures, subdivisions, site improvements, utilities and limitations, manufactured homes, recreational vehicles and park trailers, tanks, and other development. Utilities = All electric, telephone, cable television, other communication lines, and gas distribution lines shall be placed underground within easements or dedicated public rights-of-way. This regulation serves both aesthetic and mitigation purposes and is being implemented. Stormwater Management = Regulates stormwater performance and design standards; use natural systems to “maximum extent practicable”. Implemented as development proposals are submitted for review.
Prevent Repetitive Flooding	
COJ Code of Ordinances – Chapter 652 Floodplain Management	The purposes of this Chapter and the flood load and flood resistant construction requirements of the Florida Building Code are to establish minimum requirements to safeguard the public health, safety, and general welfare and to minimize public and private losses due to flooding through regulation of development in flood hazard areas.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
TOB 2025 COMP – Future Land Use Policy L.1.1.6	Policy L.1.1.6:
Reduce Risk	
COAB 2045 COMP – Coastal Management Goal D.1 Objective D.1.1	**Goal D.1**: The City shall protect, enhance and preserve coastal wetlands and beach and dune systems, as well as other coastal resources of environmental value, through proper maintenance and management practices, the avoidance of inappropriate use and development, including publicly-financed improvements within the Coastal High Hazard Area, and shall continue an ongoing program of revegetation and installation of properly designed public access-ways in areas that are subject to erosion such as the dune system. **Objective D.1.1:** Coastal High Hazard Area = The City shall limit public expenditures that subsidize development within the Coastal High Hazard Area except for the maintenance, restoration, or enhancement of natural resources, and the provision for appropriate public access to and use of natural resources.
COJ 2045 COMP – Coastal Management Goal 2 Objective 2.3 Policy 2.3.3 Objective 2.5 Objective 2.6 Objective 2.7 Goal 6 Objective 6.3	**Goal 2**: Preserve, conserve, appropriately use, protect and improve the quality and quantity of current and projected water resources, including waters that flow into estuarine waters, oceanic waters, groundwater and other waters in the City. The City of Jacksonville 2045 Comprehensive Plan Conservation/Coastal Management Element 6 City shall require that all water conservation options be fully explored and employed for new development. • Objective 2.3: Reduce the potential for water quality degradation from stormwater runoff. • Policy 2.3.3: The City and JEA shall continue to implement its hazardous waste management program for the proper storage, recycling, collection, transfer and disposal of hazardous wastes in order to protect natural resources. • Objective 2.5: The City and JEA shall continue to implement its hazardous waste management program for the proper storage, recycling, collection, transfer and disposal of hazardous wastes in order to protect natural resources. • Objective 2.6: The City shall protect the hydrological and ecological benefits of flood plain areas, such as water quality, fish and wildlife habitat, and prevention of downstream flooding. • Objective 2.7: The City shall reduce the rate of soil erosion caused by land development and other human activities in areas known to have experienced soil erosion problems. **Goal 6:** The City shall protect, conserve, and manage its sandy beach coastline and dune system and the St. John's River and its tributaries. The City shall continue to ensure access to beaches, coastal shoreline, and the St. John's River and tributaries are available to the public. • Objective 6.3: The City shall maintain construction standards which minimize the impacts of man-made structures on beach or dune systems.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
Goal 7 Objective 7.2 Policies 7.2.1 Policies 7.2.6 Objective 7.4	**Goal 7:** The City shall make every reasonable effort to ensure the public safety, health, and welfare of people and property from the effects of coastal storm and hurricane damage. • Objective 7.2: The City, acting as Duval County, shall increase its shelter capacity. All new or retrofit school projects and community centers located outside of Evacuation Zones shall be evaluated for sheltering of special needs as well as general populations. When appropriately located, designed and constructed, the following types of facilities are City of Jacksonville 2045 Comprehensive Plan Conservation/Coastal Management Element 44 considered suitable for use as public hurricane evacuation shelters: community and civic centers, meeting halls, gymnasiums, auditoriums, cafeterias and open floor multipurpose facilities, exhibition halls, sports arenas, field houses, conference and training centers, certain classroom buildings, and other public assembly facilities as outlined in Chapters 252.385 and 1013.372, Florida Statutes. ○ Policies 7.2.1: The City, acting as Duval County, shall increase its shelter capacity. All new or retrofit school projects and community centers located outside of Evacuation Zones shall be evaluated for sheltering of special needs as well as general populations. When appropriately located, designed and constructed, the following types of facilities are City of Jacksonville 2045 Comprehensive Plan Conservation/Coastal Management Element 44 considered suitable for use as public hurricane evacuation shelters: community and civic centers, meeting halls, gymnasiums, auditoriums, cafeterias and open floor multipurpose facilities, exhibition halls, sports arenas, field houses, conference and training centers, certain classroom buildings, and other public assembly facilities as outlined in Chapters 252.385 and 1013.372, Florida Statutes. ○ Policies 7.2.6: For purposes of determining an owner's assessment for the cost of emergency shelter space in new and existing school sites and community centers, the City shall use a quantitative formula **Objective 7.4:** Limit development density and intensity within the Coastal High Hazard Area (CHHA) and direct it outside of the CHHA, and mitigate the impact of natural hazards in the area.
<u>Capital Improvements</u> Goal 1 Objective 1.4 Policy 1.4.4	**Goal 1**: The City shall undertake actions to provide and maintain, in a timely and efficient manner, necessary and adequate public facilities to all residents within its jurisdiction and to promote compact urban growth in areas identified through the Comprehensive Plan as having existing capacity. • Objective 1.4: The City shall limit public expenditures in Coastal High Hazard Areas, as defined in the Conservation/Coastal Management Element, to those improvements which restore or enhance natural resources or which maintain existing public facilities and services at their existing levels, except for public recreational facilities, which may be expanded and improved. ○ Policy 1.4.4: The City shall continue to promote financial support for research and planning to ensure water quality health for the St. Johns River and its tributaries, as well as to meet the City's water supply needs.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
Future Land Use Goal 4 Objective 4.1 Policy 4.1.1	**Goal 4:** To ensure implementation of the Future Land Use Element of the Comprehensive Plan. • Objective 4.1: Maintain and enforce citywide Land Development Regulations that are consistent with the Comprehensive Plan. ○ Policy 4.1.1: Upon completion of revisions to the Future Land Use Element and the other elements of the Comprehensive Plan, the City will identify necessary changes to the Land Development Regulations and all development orders consistent with those development regulations as per the timeframe provided for in Chapter 163 (Part II), F.S. but no later than one year after completion of the revised Comprehensive Plan. Land Development Regulations should be evaluated to identify and remove barriers to mixed-use, mobility friendly, transit-supportive, and/or energy efficient development. Prior to adopting revisions to the Land Development Regulations, the City will consider implementation of mechanisms, such as form based zoning, to better enable mixed-uses to flourish.
COJ Code of Ordinances – Chapter 754 Master Storm-water Mngt. Utility Code	Storm Water Management Plan. To improve the public health, safety and welfare by providing for the safe and efficient capture and conveyance of storm water runoff and the correction of storm-water problems.
COJ Growth Management Task Force Report – p.17 p. 30 p.55, 59	Page 17: Recommends underground utilities where possible. Recommended for both aesthetic reasons and as a mitigation function. Page 30: Evaluate potential sensitive natural areas for protection. Conservation dedications encouraged where possible with land use changes. Page 55, 59: Promote implementation of on-going stormwater management program and create dedicated funding source such as long-term funding for drainage projects. Funding for drainage improvements.
COJ 2012 PDRP – Plan Implementation, Training and Maintenance Goal 3.1.2	**Goal 3.1.2:** Post-Disaster PDRP Activation = The post-disaster activation of the PDRP includes addressing short-term and long-term recovery actions. Examples of short-term recovery actions includes communications, damage assessment, temporary housing, debris operations and emergency repairs; measures that can impact long-term redevelopment. Examples of long-term redevelopment actions focus on economic resumption, land use planning, infrastructure reconstruction, structural and facility repair, environmental restoration, historic and cultural site preservation and restoration and hazard mitigation.
Capacity Assessment 5.3.1.1	**5.3.1.1**: Emergency Management Planning = Emergency management planning includes preparedness, response, recovery, mitigation and redevelopment measures and operations. Recovery is generally described as the process of taking the steps necessary, following a disaster, to return a community to the condition it was in before the event occurred. There are two general phases of recovery: short-term and long-term. Short-term recovery activities are generally those activities that have to take place following a disaster in order for citizens to return to their homes. They are typically initiated in the COJ/Duval County EOC while in emergency response mode. Short-term recovery activities include such functions as: implementing a curfew; conducting impact assessments; re-establishing the critical infrastructure necessary for community reconstruction; re-establishing critical services that meet the physical and safety needs of the community (e.g., water, food, ice, medicine and medical care, emergency access and continuity of government operations); and coordinating re-entry procedures. Short-term recovery typically does not include reconstruction of the built environment.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
Recovery & Redevelopment Goal 2.1 2.1.5 Goal 5.3 5.3.8 Goal 5.4 5.4.4 Goal 6.6 6.6.2 6.6.7	**Goal 2.1:** Preserve and protect historic properties, documents and artifacts. • 2.1.5: Establish and coordinate damage assessment reports and mitigation opportunities for historic structure and sites. **Goal 5.3:** Support the Development of ordinances, emergency orders and other means by which to expedite housing recovery. • 5.3.8: Determine how to assess recovery needs prior to issuing permits (e.g., allowing time for debris clearance for health and safety, building back safer, using hazard mitigation measures, alternate siting, etc.). **Goal 5.4:** Identify protocols for habitability (life/Safety) evaluations. • 5.4.4: Damage assessments inspectors need to be cross-trained for various issues (e.g., damage thresholds, hazard mitigation opportunities, non-conforming uses, etc.). **Goal 6.6**: Support long term infrastructure and facility repairs and restoration • 6.6.2: Identify critical infrastructure mitigation project sites. • 6.6.7: Encourage requiring damaged structures to be restored using hazard mitigation measures to reduce vulnerability (Railroad, JAXPORT, JAA)
COJB 2030 COMP – Coastal Management Goal CM.1 Objective CM.1.3 Policy CM.1.3.1	**Goal CM.1:** To conserve, manage, and protect natural resources, and maintain and enhance the natural balance of ecological functions, in the coastal area of Jacksonville Beach. • Objective CM.1.3: By April 1, 1991, the City shall act to protect, conserve, restore, and enhance its beach and dune systems by adopting management practices and construction standards which will complement the Beach Renourishment Project and enhance its performance in accordance with the standards set forth in Policies CM.1.3.1, CM.1.3.2, CM.1.3.3, CM.1.3.4, CM.1.3.5, CM.1.3.6, and CM.1.3.7. ○ Policy CM.1.3.1: Construction seaward of the Coastal Construction Control Line (CCCL) shall be strongly discouraged. Any development which does occur, including construction of coastal or shore protection structures, shall be carried out in strict compliance with existing regulations.
Conservation Goal CO.1 Objective CO.1.3 Policy CO.1.3.1	**Goal CO.1:** • Objective CO.1.3: ○ Policy CO.1.3.1: The City shall identify and recommend to the State and the St. Johns River Water Management District floodplains that would warrant acquisition under the Conservation and Recreation Lands (CARL) Program.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
Future Land Use Element Goal LU.1 Objective LU.1.1 Policy LU.1.4.7	**Goal LU.1:** Provide for a continued high quality of life in Jacksonville Beach by planning for population growth, public and private development and redevelopment, energy conservation; and the proper distribution, location, and extent of land uses by type, density, and intensity consistent with efficient and adequate levels of services and facilities, and the protection of natural and environmental resources. • Objective LU.1.1: Future growth and development will be managed through the preparation, adoption, implementation, and enforcement of land development regulations in accordance with Chapter 163.3202, Florida Statutes. ○ Policy LU.1.4.7: Future land development shall be carried out in a manner which will protect air and water quality, conserve the water supply, protect the natural functions of floodplains, and native vegetation communities and wildlife habitats in accordance with the goals, objectives, and policies set forth in the Conservation Element.
CONB 2046 COMP – Infrastructure Goal D.1 Policy D.1.1.1 Goal D.3 Objectives D.3.1	**Goal D.1:** Provide needed public facilities in a manner which protects investments in existing facilities, promotes efficient and appropriate use by existing and future development, protects public health and safety, and ensures that adequate facility capacity is available at the time a development permit is issued or will be available when needed to serve the development. ○ Policy D.1.1.1: To ensure that adequate capacity is maintained, methodologies for determining available capacity and demand shall incorporate appropriate peak demand coefficients for each facility and for the type of development proposed. **Goal D.3**: The functions of natural groundwater aquifer recharge areas within the City will be protected and maintained. • Objective D.3.1: Protection of Aquifer Recharge Areas = Where feasible, the City shall conserve its potable water resources through regulations, policies, and coordination activities which shall reduce consumption and promote water reuse.
Coastal Management Goal E.1 Objectives E.1.2	**Goal E.1:** The coast of Neptune Beach has primarily been developed for urban use. The City shall eliminate any further new development or redevelopment that would destroy or otherwise damage coastal resources. The City shall protect, enhance, and preserve beach and wetland dune systems, as well as other coastal resources of environmental value, through proper maintenance and management practices, and the prohibition of inappropriate use and development, including public-financed improvements within the Coastal High Hazard Area (Map E-1). The city shall conserve, utilize, and protect its natural resources to ensure that adequate resources are available for future generations. • Objective E.1.2: Storm and Flood Hazards = The City shall continue best management practices that are intended to reduce damage and erosion of dune systems, dune vegetation, and estuarine environments that result from pedestrian traffic. In accordance with F.S. Chapter 163, 3178(2)(f)2, the City encourages the use of best practices for development and redevelopment, including principles, strategies, and engineering solutions that will result in the removal of coastal real property from flood zone designations established by the Federal Emergency Management Agency. Further, per Chapter 153. 3178(2)(f)3., the City has identified the following site development techniques and best practices that may reduce losses due to flooding and claims made under flood insurance policies issued in this state.

Duval County, Local Mitigation Plans and Policies	
Source	**Goal / Objective / Policy**
Goal E.2 Objective E.2.2	**Goal E.2**: The City shall maximize, to the extent feasible, provisions and opportunities for the protection of life and property from the effects of hurricanes and other natural disasters. Objective E.2.2: Hazard Mitigation = The City shall seek appropriate means of reducing the potential for loss of life and property through provisions within the Land Development Regulations, including implementation of hazard mitigation policies from the Local Mitigation Strategy.
Capital Improvements Goal H.1 Objective H.1.1 Objective H.1.2	**Goal H.1**: The City shall provide public facilities, which are sufficient to enable the City to: 1) accommodate the needs of present and future populations in a timely and cost-effective manner; 2) maximize the use of existing facilities; and 3) maintain or enhance the City's services, physical environment, and fiscal integrity. • Objective H.1.1: Capital Improvements Planning= Capital projects needed to support development shall be evaluated annually, and when financially feasible, based on the annual adopted budget for the City, they shall become part of the five (5) year Schedule of Capital Improvements of the Capital Improvement Program (CIP). Updates to the CIP shall be included in the City's adopted Comprehensive Plan as part of the annual review and amendment to this Capital Improvements Element. • Objective H.1.2: Public Expenditures within the Coastal High Hazard Area (CHHA) = The City shall not make public expenditures that subsidize land development within the Coastal High Hazard Area except for improvements required to implement the Objectives and Policies identified within the Coastal/Conservation Element, the Capital Improvements Element, and those expenditures necessary for the health and safety of the residents of these areas.
TOB 2025 COMP – Future Land Use Element Goal L.1 Objective L.1.9 Policy L.1.9.4	Goal L.1: • Objective L.1.9: ○ Policy L.1.9.4:
Water Goal U.1 Objective U.1.3 U.1.3.1 Goal U.3	Goal U.1: • Objective U.1.3: • Policy U.1.3.1: Goal U.3:

D. U.S. Coast Guard (USCG) Maritime Mitigation Plans

The USCG maintains jurisdictional responsibility for safety and security of Jacksonville's Port facilities and coastal waters. The membership, schedule, agenda, and final delivery of products are the responsibility of the appropriate Jacksonville USCG representatives who also act as the Executive Secretary for the committees. Most committees meet on a semi-annual or quarterly basis. Various standing Area and Port committees that provide contingency planning and response support for pre-incident planning and response mitigation within the maritime domain are listed below:

Harbor Safety Committee: Led by the local Marine Exchange, this committee provides professional maritime expertise and recommendations to the USCG in regard to navigation safety and maritime response planning issues. This group meets quarterly. Recent topics include the development of Regulated Navigation Areas within the port, maritime firefighting procedures, and towing vessel safety issues.

Area Maritime Security Committee: Co-chaired by the USCG Captain of the Port and the Jacksonville Port Authority (JAXPORT) and developed post 9-11, this group provides insight and guidance into the development of risk reduction strategies in Northeast and East Central Florida Ports. This includes development and management of the Area Maritime Security Plan, conducting annual Security Risk Analysis and Mitigation Planning, and coordinating multiple federal, state, and local agency resources for post-incident response management.

Area Planning Committee: Chaired and led by the USCG and the Florida Department of Environmental Protection (FDEP), this committee provides subject matter expertise and guidance into the development of the Area Contingency Plan for Oil and Hazardous Material Response. This COMP provides detailed information on pre-identified high risk environmental risk areas, critical wildlife habitats, pre-determined priority protection strategies, resources, and incident management organization. This committee also aligns closely with the Local Emergency Planning Committees in Duval Country to ensure alignment of plans and integration of resources in addition to pre-incident training and collaboration opportunities.

The Area Maritime Security Plan will require registration in Homeport and the completion of a Non-Disclosure Agreement prior to receiving access to the contingency plan. Contingency plans contain elements of prevention, preparedness, response, and recovery, which can be found on Jacksonville's USCG Homeport Website: https://homeport.uscg.mil/jacksonville. All other plans can also be accessed on the open-source side of homeport, but do not require registration.

Table 13: U.S. Coast Guard (USCG) Maritime Plans

Committee	Hazard Type	Applicable Contingency Plan(s)
Harbor Safety Committee	Heavy Weather (Hurricane or Tropical Storm)	Port Heavy Weather Plan for NE and East Central Florida
	Marine Firefighting	ACP for NE and East Central Florida
	Vessel Sinking or Marine Casualty	Salvage Response Plan for NE and East Central Florida
	Port Closure or Port Business Interruption	NE and East Central Florida Marine Transportation System Recovery Plan
	Oil Discharge or Spill	ACP for NE and East Central Florida
	Transportation Security Incident	Area Contingency Plan for NE and East Central Florida, Sector Jacksonville Marine Transportation System Recovery Plan
	Hazardous Material Discharge/Incident Response	ACP for NE and East Central Florida
Area Maritime Security Committee	Transportation Security Incident	NE and East Central Florida Area Maritime Security Plan
	Port Closure or Port Business Interruption	Sector Jacksonville Marine Transportation System Recovery Plan
Area Planning Committee (2 committees – NE and East Central Florida)	Heavy Weather	Port Heavy Weather Plan for NE and East Central Florida
	Marine Firefighting	ACP for NE and East Central Florida
	Oil Spill	ACP for NE and East Central Florida
	Hazardous Material Discharge/Incident Response	ACP for NE and East Central Florida

Source: Northeast and Eastern Central Florida Area Contingency Plan (Version 2023). United States Coast Guard, Homeport. 2024. Retrieved from: https://homeport.uscg.mil/my-homeport/contingency-plans/area-contingency-plan?cotpid=29

Section III

Hazard Identification and Vulnerability Analysis

SECTION III - HAZARD IDENTIFICATION AND VULNERABILITY ANALYSIS

A. Identifying Hazards

The implementation of an effective mitigation program has grown exponentially since the inception of the Disaster Mitigation Act of 2000. Over the past 25 years, Duval County has integrated the plans and strategies that comprise mitigation and resilience as a "whole community" approach adopted by FEMA. The program follows through the cycle of preparedness, response, recovery, and mitigation. FEMA defines natural hazards as events caused by nature that threaten lives, property, and other assets. Therefore, emergency management planning focuses on identifying community vulnerability, hazard probability, and potential risk.

To ensure the development of a living document that will facilitate hazard mitigation activities in Duval County, the LMS Advisory Committee, also known as Duval Prepares, continues to examine a county-wide HIVA that considered natural, man-made, and technological hazards. This assessment built upon the initial LMS adopted in 1998, which was ratified and expanded in the subsequent 2005, 2010, 2015, and 2020 updates. This comprehensive hazard assessment provides pre-disaster statistics as the basis for calculating anticipated post-disaster needs, identifying areas of vulnerability, geographic and demographic factors, and assessing existing efforts to mitigate the long-term impacts on Duval's "whole community".

Planning Assumptions

The LMS Advisory Committee established the bases for prioritizing hazards, vulnerabilities, and risks:

- Hazard identification was accomplished by examining Duval County's geography, population estimates, demographics, land use, and development patterns.
- The LMS Advisory Committee examined the most significant hazards based on:
    - Probability of occurrence,
    - Severity of the hazard,
    - Percent of population affected,
    - Frequency of occurrence, and
    - Potential Impacts from hazards.
- As ratified in the 2015 LMS Update, thunderstorms, hail, and tornados were combined into one hazard; this combination was maintained as "Severe Weather" in the 2020 and 2025 update.
- All information not attributed in the LMS to a specific source is sourced with the Duval County CEMP, updated in 2021. The CEMP will be updated to reflect any new hazards identified in the 2025 LMS when approved and adopted.
- Specific impacts were included for each hazard, and a range of potential impacts to the following core areas were analyzed. Wherever possible, these potential impacts were standardized to the impacts included in the Florida Enhanced State Hazard Mitigation Plan *(SHMP, 2018)* for consistency in planning and funding source allocation:
    - Public
    - Responders
    - Continuity of Operations; delivery services))
    - Property, Facilities, Infrastructure
    - Cost of repairing damage to property
    - Environment
    - Economic Condition
    - Public Confidence in Local Government
- Numerous natural and man-made disaster events have impacted Duval County in the past, which provide information significant to disaster types, extent of impact, and frequency of occurrence. However, neither past frequency nor the historical absence of a hazard on record can predict with perfect accuracy the future frequency or magnitude of any hazard. Therefore, assumptions must be made using available data for Duval County and the surrounding region to make the best predictions possible to protect life and property to the best of our ability. The hazard analysis does include potential catastrophic events to simulate worst-case scenarios.

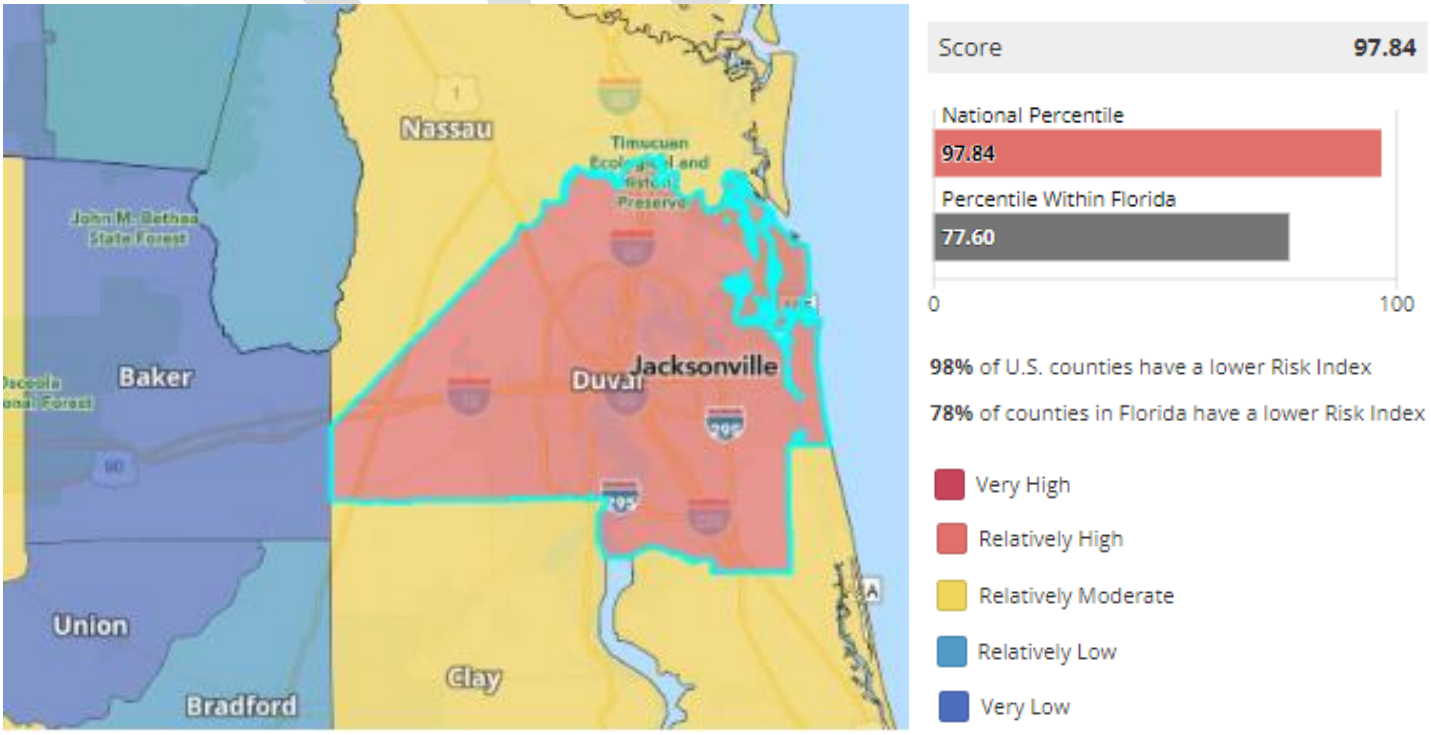
- The risk assessment was conducted with an all-hazards approach and a few hazards were not considered to be significant enough to be address in the final document. To ensure compliance and cohesion among the baseline documents used for emergency management planning, the following hazards were eliminated in the 2020 update. This was due to extremely low probability of occurrence, no historic data in Duval County, and prediction difficulty:
    - Dams and Levee Failure
    - Earthquake
    - Tsunami
    - Volcano
- Two natural hazards addressed through non-infrastructure-based mitigation strategies are:
    - Extreme Temperatures
    - Drought
- Man-made and technological hazards that remain a concern for the County were identified by the Duval Prepares Advisory Committee based on vulnerability, risk and frequency. Subject matter experts also provided assessments from the military, Florida Department of Health (DOH), the Jacksonville Department of Environmental Compliance, Jacksonville Sheriff's Office (JSO), DHS, JEA, as well as water and sewer utilities serving 99% of Duval County:
    - Cyber Attacks
    - Hazardous Materials Incidents
    - Terrorism and Targeted Violence
    - Critical Infrastructure Disruption

Natural Hazards

The description of the hurricane hazard in Duval County is based on information in the 2021 Florida Statewide Regional Hurricane Evacuation Program, hereafter referred to as the Hurricane Evacuation Study. The National Weather Service (NWS) updated the natural hazard analysis using a 64-year period rate of return for the following hazards:

- Tropical Cyclone
- Flooding
- Human & Animal Diseases
- Severe Weather
- Sea Level Rise
- Drought
- Extreme Heat
- Storm Surge
- Winter Storm / Freezing Temp.
- Saltwater Intrusion
- Coastal Erosion

Figure 6: Duval County Community Risk Index, 2024
The Risk Index rating is Relatively High for Duval County, FL when compared to the rest of the U.S.



Source: Community Report – Duval County, FL. National Risk Index. (2024).
Retrieved from: https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C12031

B. Geography and Land Use in Duval County

The population of Duval County is in significant segments of floodplain, coastal plains, and other areas vulnerable to the hazards identified in this LMS analysis. The business, commercial, and industrial development in the county led to the expansion of economic and residential growth. Satellite developments continue to expand in remote areas, such as Arlington, Mandarin, Ortega, and the three Beach communities. These areas were once remote and isolated but make up the unified urban fabric of Duval County today.

Transportation Network

Duval County is well-connected by several interstate and federal highways, an international airport, two municipal airports, an extensive rail system provided by three major railroads, and JAXPORT for ocean and river traffic. Duval County contains approximately 152 miles of highways, 403 miles of arterial roads, and 465 miles of collector streets *(COJ PPD, 2018).* In recent years, the I-295 Beltway connecting roads have been completed, enabling adjoining St. Johns and Clay counties improved access to and through the County. The transportation network would be impacted by the natural and man-made hazards for which the city has the most susceptibility, as well as tropical cyclone/hurricane evacuation times would be impacted by the limitations of road clearance capabilities.

Development Patterns

More than 950,203 persons are estimated to live in the COJ as of 2022. The pattern of development has resulted in large, scattered, and undeveloped areas within the City. While some areas contain farms and residential uses, large expanses of Duval County, notably the southwest portion, are minimally developed and devoted to tree farming. It is expected that new development will be proposed in areas with significant concentrations of conservation land, rural residences, agriculture, and marshland. Development towards the ICW has resurged as the economy continues to stabilize. The following is a description of the most distinctive transportation, land use, and development patterns geographic features within Duval County that contribute to the community's risk and vulnerability: (*Source: American Community Survey 2022 5-year Estimate; U.S. Census Bureau (2024); Retrieved from: https://data.census.gov/table/ACSST5Y2022.S0101?g=050XX00US12031*).

As a result of oceanfront development and attendant seawall construction, inlet improvements to stabilize the beaches has been jeopardized along the Duval County shoreline. Approximately 10.1 miles of shoreline in the County, which includes all three Beach municipalities and a portion of Little Talbot Island, is considered critically eroded. This area is part of a continually maintained Federal and State beach restoration project *(Source: Beaches and Coastal Systems; FDEP).*

COJB: Jacksonville Beach is the largest inland area in Duval County, occupying more than 22 square miles. It has 3.8 miles of beach, which experiences erosion mainly from northeasters and seasonal tropical storms. Approximately 68% of COJB is developed and about 25% of the land area along the ICW is wetlands. Current residential use of developed land is 32.1%. *(Source: COMP Plan; COJB; 2030).*

COAB: Atlantic Beach is approximately 3.75 square miles, with about 2 miles on the Atlantic Ocean. Three physiographic regions can be found in Atlantic Beach: coastal, upland, and wetlands. Development in the city has been toward the coastal area, which is almost fully developed with low to medium density residential. The wetland zone is not suited for development and remains open, while the upland zone is undergoing development with a wide range of land use types. COAB is nearly built out with less than 10% of the incorporated land area currently undeveloped *(Source: COMP Plan; COAB; 2030)*.

CONB: Neptune Beach is approximately 2.5 square miles and predominantly residential (more than 37%). It has more than 1 mile of beachfront and about 275 acres of marshland between the developed section on the western edge and the ICW. The City Public Works Department reported that infill is Neptune Beach's primary development type since the city is mostly built out. All new development must adhere to the new flood plain ordinance and the new stormwater ordinance (Ord. # 2013-02, CONB) *(Source: COMP Plan; CONB; 2046).*

TOB: The Town of Baldwin is 1,275 acres with only 29% developed residential. More than 60% of total land use in TOB is undeveloped, leaving large areas in and around TOB for agricultural use. The town has large industrial facilities, a central rail facility, and major highway transportation corridors in close proximity. Through inter-local agreements, water, sewer and police services in the town are provided from the outside *(Source: COMP Plan; TOB; 2025).*

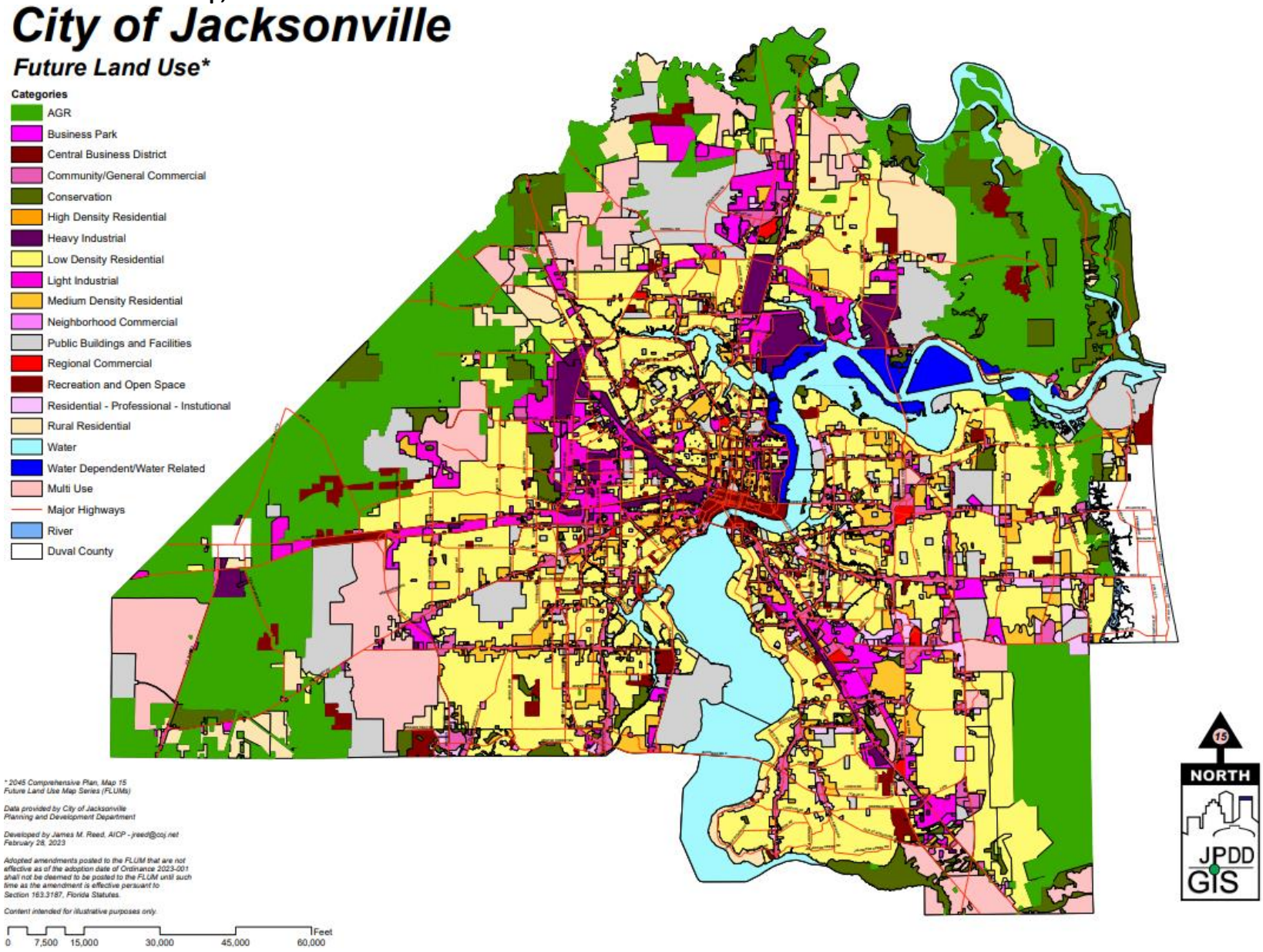
Future land use plans and economic incentives are encouraging development in the north and northwest areas of Duval, including development around the Jacksonville International Airport. On the west side of Jacksonville, the COJ Office of Economic Opportunity (OEO), formerly the Jacksonville Economic Development Commission, has continued the redevelopment master plan for Cecil Field, the former Naval Air Station, for public and commercial use. Since the conveyance of approximately 8,300 acres, the OEO continues to promote the site as a prime location for companies in manufacturing, industrial, distribution, as well as supporting retail, office, education, and recreation. As of 2019, the OEO reported the complex is 100% occupied. Vacant, developable land is limited in the three Beach communities. COJB and CONB are both approaching maximum build-out capacity, and their boundaries cannot be extended *(Source: COMP Plan; CONB; 2046. COMP Plan; COJB. 2030).*

Table 14: COJ Generalized Future Land Use, 2021

Code	Land Use Category	Acres	% of Duval
AG	Agriculture	127,727	23.17%
COM	Commercial / Office	32,876	5.96%
CONS	Conservation Land	27,293	4.95%
IND	Industrial	22,818	4.14%
MU	Mixed-Use	33,178	6.02%
PUB	Public Land	54,982	9.97%
REC	Recreation / Open Space	9,552	1.73%
RL	Residential (low density)	18,370	3.33%
RM	Residential (medium density)	174,355	31.63%
RH	Residential (high density)	178	0.03%
WAT	Bodies of Water	49,885	9.05%
TOTAL		**551,214 acres**	

Source: City of Jacksonville 2030 COMP Plan. Planning and Development Department.

Map 4: COJ Future Land Use Map, 2045 COMP



Source: City of Jacksonville 2045 COMP Plan. Planning and Development Department. 2024

C. Hazards Matrix

Listed below are hazards that were ranked by the LMS Working Group for the 2020 LMS update. During the fall of 2018, the LMS Advisory Committee initiated the process to re-examine hazards and their impacts Duval County. The 2025 LMS update defined these vulnerabilities, probabilities and risks as an ordinal series of measurements of “very low,” “low,” “moderate,” “high,” and “very high.” According to the COJ CEMP, no specific emergency sequence can be isolated as a uniform model to plan for all hazard related emergencies because they have different consequences, both in variables and severity. Therefore, the parameters for planning are based upon knowledge of the potential consequences, timing, and release characteristics for the spectrum of disasters Duval County is vulnerable to. Emergency management planning focuses on vulnerability, probability, and risk.

Wherever possible, for planning consistency purposes, predictions of potential impacts listed in the Impact Analysis sections of each hazard profile were standardized with the impact predictions included in the State of Florida Enhanced Hazard Mitigation Plan (2018). In 2020, the LMS Working Group listed the below natural, technological, and man-made hazards in order of descending overall vulnerability:

Natural Hazards:

1. Wind from Tropical Cyclones,
2. Severe Weather,
3. Storm Surge,
4. Extreme Heat,
5. Sea Level Rise,
6. Flooding,
7. Infectious Disease,
8. Drought,
9. Coastal Erosion,
10. Saltwater Intrusion,
11. Wildfire,
12. Winter Storms, and
13. Extreme Cold.

Technological and man-made hazards:

1. Critical Infrastructure Disruption (CID),
2. Hazardous Materials (HAZMAT) Accidents,
3. Improvised Explosive Devices,
4. Active Shooter Incidents,
5. Biological Attacks,
6. Cyber Attacks,
7. Terrorism and Targeted Violence, and
8. Chemical Attacks.

Table 15: Vulnerability Assessment Rubric

Category	Point Scale	Description		
Frequency	0 – 10	Consider frequency of events occurring per year:		
		1 year	Very High	10 points
		10 years	High	8 points
		25 years	Moderate	6 points
		50 years	Increased	4 points
		100 years	Low	2 points
		500 Years	Very Low	1 point
Probability	0 - 5	Probability that event will result in impacts to the city 0% Probability – 0 Pts, Low 20% Probability – 1 Pts, Very Low 40% Probability – 2 Pts, Low 60% Probability – 3 Pts, Moderate 80% Probability – 4 Pts, High 100% Probability – 5 Pts, Very High		
Injuries/Deaths	0 – 5	No Deaths – 0 Pts Indirect Deaths – 1 Pt Direct Deaths, MCI Level 1 or 2 (5 – 20 victims) - 2 Pts Direct Deaths, MCI Level 3 (21 – 100 victims) - 3 Pts Direct Deaths, MCI Level 4 (101 – 1000 victims) - 4 Pts Direct Deaths, MCI Level 5 (Over 1,000 victims) - 5 Pts		
Infrastructure	0 – 5	Localized, Minimal – 0 Pts Localized, Moderate – 1 Pt Localized, Severe - 2 Pts Countywide, Minimal -3 Pts Countywide, Moderate - 4 Pts Countywide, Severe - 5 Pts		
Environment	0 – 5	Localized, Minimal – 0 Pts Localized, Moderate – 1 Pt Localized, Severe - 2 Pts Countywide, Minimal -3 Pts Countywide, Moderate - 4 Pts Countywide, Severe - 5 Pts		

Very Low Risk	Low Risk	Moderate Risk	High Risk	Very High Risk
0 – 6	7 – 12	13 – 18	19 – 24	25 - 30

Table 16: Duval County Hazard Risk Assessment, 1950– 2025

Hazard	Frequency	Probability	Injury/ Death	Infrastructure	Environment	Total Score (Max: 30)		Duval	COJ	COJB	COAB	CONB	TOB
Natural Hazards													
Wind (Tropical Cyclone/ Hurricane)	10	5	3	5	4	**Very High**	27	Y	Y	Y	Y	Y	Y
Storm Surge (Tropical Cyclone/ Hurricane)	9	4	3	5	4	**Very High**	25	Y	Y	Y	Y	Y	Y
Severe Weather	10	5	3	4	4	**Very High**	26	Y	Y	Y	Y	Y	No
Extreme Heat	10	5	5	0	0	**High**	20	Y	Y	Y	Y	Y	Y
Sea Level Rise	8	5	1	2	4	**High**	20	Y	Y	Y	Y	Y	Y
Flooding	10	5	0	2	1	**High**	19	Y	Y	Y	Y	Y	Y
Infectious Disease	10	4	5	0	0	**High**	19	Y	Y	Y		Y	Y
Drought	8	3	1	2	4	**Moderate**	18	Y	Y	Y	Y	Y	Y
Coastal Erosion (Environmental Degradation)	10	5	0	1	2	**Moderate**	18	Y	Y	Y	Y	Y	No
Saltwater Intrusion (Environmental Degradation)	10	5	0	0	2	**Moderate**	17	Y	Y	Y	Y	Y	Y
Wildfires	8	3	2	2	1	**Moderate**	16	Y	Y	Y	Y	Y	Y
Winter Storm	2	2	1	0	1	**Very Low**	6	Y	Y	Y	Y	Y	Y

Hazard	Frequency	Probability	Injury/ Death	Infrastructure	Environment	Total Score (Max: 30		Duval	COJ	COJB	COAB	CONB	TOB
Technological Hazards													
Critical Infrastructure Disruption	10	5	2	2	1	**High**	20	Y	Y	Y	Y	Y	Y
Hazardous Materials (HAZMAT)	10	5	1	1	2	**Moderate**	18	Y	Y	Y	Y	Y	Y
Man-made Hazards													
Improvised Explosive Device	10	5	3	2	1	**High**	22	Y	Y	Y	Y	Y	Y
Active Shooter	10	5	2	1	0	**Moderate**	18	Y	Y	Y	Y	Y	Y
Biological	8	5	3	1	1	**Moderate**	18	Y	Y	Y	Y	Y	Y
Cyber Attacks	10	5	0	2	0	**Moderate**	17	Y	Y	Y	Y	Y	Y
Terrorism / Targeted Violence	6	2	2	2	2	**Moderate**	14	Y	Y	Y	Y	Y	Y
Chemical	2	4	0	1	1	**Low**	8	Y	Y	Y	Y	Y	Y

Table 17: Hazard Identification Table

Hazard	Identification Records	Identification Reason
Tropical Cyclone Winds	Review EPD Event Files – Incident Action Plans and After Action Reports, FDEM After Action Reports, NWS Data, Risk Assessments	All jurisdictions in Duval County are at risk of tropical storm force wind on an annual basis. Impact of hurricane, tropical storm force wind, and nor'easters have caused significant damage to people and property.
Severe Weather	NWS data, EPD Incident Records	The county is at risk of impact near touchdown areas, although dollar damage may not be very high.
Storm Surge	SLOSH 2018 Model Review, NWS data, Review of 2018 FEMA FIRM maps	The three Beaches and riverine sections of City subject to storm surge on an annual basis. Impact of hurricane and tropical storm force wind events caused significant damage to persons and property.
Extreme Heat	EPD incident files, Small Business Administration disaster declarations, NWS records, JEA records	Impact upon sensitive populations (elderly, special needs, homeless). Potential damages to agricultural concerns. Impact on electric grid in high temperatures, resulting in "brown-outs" during peak demand times.
Sea Level Rise	NOAA studies, FEMA studies, NASA, Academic studies and conferences, Florida DEM Enhanced Mitigation Strategy, 2018 Regional planning materials	Impacts upon the population. Potential dollar damage to economic sectors. Long term coastal flooding salinization of potable water climatological conditions leading to drought, unusual weather patterns
Flooding	EPD Incident files, Review of 2018 FEMA FIRM maps, CRS 2019 Data for RL areas	Seasonal storms (tropical storm force wind events and Nor'easters) affect all jurisdictions; area includes the upper St. Johns River watershed, rivers, streams, creeks, tributaries, low lying marshes, and drainage basins.
Infectious (Human & Animal) Disease	CDC Files, Florida DOH, EPD Files	Human and animal outbreaks can be local or regional. The City was analyzed in a global context where applicable.
Drought	Southeast Regional Climate Center, USC, Fl. Dept of Agriculture records, Keetch-Byram Drought Index, Palmer Drought Index	Entire county is at risk of impact to agricultural interests
Environmental Degradation	NOAA studies, FEMA studies, NASA, Academic studies and conferences, Florida DEM Enhanced Mitigation Strategy, 2018 Regional planning materials	Impacts upon the population. Potential dollar damage to economic sectors. Long term coastal flooding, salinization of potable water, climatological conditions leading to drought, and unusual weather patterns.
Wildfires	FL. Forest Service, COJ Fire Marshal incident records, COJ FRD records	Increasing impact on urban and rural populations in the County, particularly to west and north sides. Potential damage to interface populations / agricultural concerns.
Winter Storm / Freezing Temperatures	EPD incident files, Small Business Administration disaster declarations, NWS records, JEA records	Impact upon sensitive populations, such as the elderly, special needs, and homeless. Potential dollar damage to agricultural concerns. Impact upon the electric grid of the City, particular with high temperatures, resulting in "brown-outs" when there is peak demand for service.
Cyber-Attack	Subject matter expert assessments (JSO/DHS/FEMA).	Becoming increasingly common across all sectors of government and society, could be inflicted by individuals, groups, or hostile foreign actors.
Terrorism / Targeted Violence	Subject matter experts, military, health, assessments.	U.S. Marine Corps Identification Matrix, Florida DOH Risk Assessment Study, Florida Department of Law Enforcement Fusion Center
Critical Infrastructure Disruption	JEA records, EPD event files, Special Needs Registration Database	Potential dollar impact to business disruption from an event. Impact to sensitive populations in facilities such as nursing homes, hospitals, and congregate care.
Hazardous Material Release	COJ HAZMAT Hazard Specific Plan, Dept. of Regulatory Compliance data review, Local Emergency Planning Committee files	Major transportation corridors; I-95, I-10, CXS railways (N-S and E-W). High volume of truck traffic increases vulnerability. Railroads transport HAZMAT

D. Hazard Prioritization Process

The Duval Prepares partnership evaluated the historic hazards previously identified in the 2015 and 2020 LMS Updates. Each municipality experiences different degrees of exposure and Duval Prepares reviewed new data to identify any hazards that might need to be added to the LMS, but none were found during the 2025 Update. Duval Prepares members reviewed the existing hazards as previously identified and ranked the hazards based on frequency, severity, damage estimates, and professional knowledge to prioritize all applicable hazards. Duval Prepares reaffirmed the below hazards to be the top priority, in alphabetical order, for the 2025 LMS Update:

- Active Shooter
- Biological
- Chemical
- Coastal Erosion
- Critical Infrastructure Disruption
- Cyber-Attack
- Drought
- Extreme Heat
- Flooding
- Hazardous Material
- Infectious (Human and Animal) Disease
- Improvised Explosive Device
- Sea Level Rise
- Saltwater Intrusion
- Severe Weather
- Storm Surge
- Terrorism / Targeted Violence
- Wildfires
- Winds From Tropical Cyclones
- Winter Storm / Freezing Temp

Type of Hazard

All disaster events and incidents that have taken place or have the probability to take place, with exception of hazards removed from further consideration, are updated by the Duval Prepares Advisory Committee.

Resilience and Climate Change

In the 2015 LMS update, the Duval Prepares partnership recommended including a section called “Adaptation to Climate Change”, to address the multiple impacts Duval County can anticipate in the next 15 to 30 years. This risk includes impacts from drought, flooding from rising waters, storm surge inundation from tropical cyclone, population displacement, salinization of fresh water sources, loss of land to coastal water, and economic impacts. The 2020 revision updated the effects of climate change and analyzed the implications in greater detail by incorporating a section entitled “Potential Effects of Climate Change” to each hazard profile below. Climate change was analyzed with respect to its various components such as global temperature warming trends and sea level rise rather than as a singular phenomenon.

Documentation and Data Sources

- COAB COMP (2045)
- COAB CEMP (2014)
- COJ EPD event response files
- COJ Public Works
- COJ Planning and Development
- COJ COMP (2045)
- COJ Master Storm Water Management Plan (2014)
- COJ Resilient Jacksonville (2023)
- COJB COMP (2030)
- COJB CEMP (2021)
- CONB COMP (2046)
- CONB CEMP (2020)
- Duval CEMP (2021)
- Duval Capital Improvement Plans (2024)
- Duval HCDD Consolidated Plan (2021)
- Duval Post-Disaster Recovery Plan (2012)
- Duval HAZMAT HSP (2023)
- Duval Flood HSP (2024)
- Duval Hurricane HSP (2024)
- Duval Terrorism Response HSP (2023)
- Duval Severe Weather HSP (2024)
- Duval Tornado HSP (2018)
- Duval Wildfire HSP (2024)
- Early Alert Response Systems (EARS)
- Emergency Preparedness & Response Guide (2025)
- FL Forest Service
- FL COMP Plan (2024)
- FL Enhanced State Hazard Mitigation Plan (2023)

- JEA compliance records
- National Weather Service, Jacksonville
- NE Florida Regional Evacuation Study (2025)
- NFIP CRS data
- SJRWMD Strategic Plan (2024)
- Southern Wildfire Risk Assessment (2019)
- TOB COMP (2025)
- TOB CEMP ()

E. Probability of Reccurrence based on Historic Data - Summary

Determining event probability with any reasonable degree of certainty requires analyzing the compiled local historic data to include possible disasters with low probabilities but devastating potential impacts. Historical data and probabilities of recurrence are discussed within each Hazard Profile in Section IV.

Table 18: Duval County Major Disaster Declarations, 1953-2023

Year of Declaration	Disaster Record Title	Disaster Number
1968	Hurricane Gladys	DR-252
1992	Severe Storms, Tornadoes and Flooding	DR-966
1993	Tornadoes, Flooding, High Winds, High Tides, and Freezing	DR-982
1996	Severe Storms and Flooding	DR-1141
1999	Hurricane Floyd	DR-1300
2004	Hurricane Charley / Tropical Storm Bonnie Hurricane Frances Hurricane Jeanne	DR-1539 DR-1545 DR-1561
2008	Tropical Storm Fay	DR-1785
2012	Tropical Storm Debby	DR-4068
2016	Hurricane Matthew	DR-4283
2017	Hurricane Irma	DR-4337
2019	Hurricane Dorian	DR-4468
2022	Hurricane Ian Hurricane Nicole	DR-4673 DR-4680
2023	Hurricane Idalia	DR-4734
2024	Hurricane Debby Hurricane Helene Hurricane Milton	DR-4806 DR-4828 DR-4834

Source: FEMA's Open FEMA Datasets. Retrieved July 2024 from; https://www.fema.gov/locations/florida

1. Historical Occurrences of Tropical Cyclones

For hurricanes, three conclusions can be drawn from local historic data that was compiled for the purposes of this LMS and used in the Duval County Hazard Specific Plans, mentioned above. One conclusion drawn from this data analysis is that Duval County will be affected by a hurricane, although the probability of a hurricane hitting the city directly is low in any given year.

The second conclusion is that a hurricane striking the area is likely to possess Category 1 or 2 winds, since these are more common than storms in higher categories. There is little in the area to mitigate wind effects, except for a location's

distance from the coastline that cannot be changed. Wind damage, including tornados, is likely a risk factor contributing to storm-caused flooding. The State of Florida adopted new construction standards with the 2010 State Building Code, with which new construction and permitted retrofits will aid with the mitigation of hurricane wind effects.

The third conclusion is that the infrequency of hurricanes and the substantial growth of populations without personal experience in a hurricane has created a population that has become complacent. In determining personal risk, exposure, and consequences of being exposed to a hurricane is not an imminent threat in the minds of the general public. The pressures placed on the existing roadway system greatly complicates evacuation measures as the population increases. The emphasis placed on the danger of hurricanes has downplayed the danger of tropical storms, which affect Duval County more often than hurricanes.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Wind from Tropical Storm > 39MPH	100%	100%	100%	100%	100%	100%
Storm Surge (Hurricane, Tropical Storms, Nor'easters)	71%	71%	0%	100%	100%	100%

The NWS reported that during the 172-year period from 1851 to 2023, 104 tropical cyclones, 79 tropical storms, and 25 hurricanes have passed within 65nm of Jacksonville. All people living in the three Beach communities, in manufactured homes, or in the 100-year flood zones are all at risk of serious property damage and personal injury. Flooding and high winds associated with storms up to a Category 3, which can be expected every 5 to 30 years, is a huge risk to these vulnerable populations.

2. Historic Occurrences of Severe Weather

According to the NWS, Duval County experienced 824 severe thunderstorm wind events from 1950 through 2023 averaging 11.29 events per year. From 1950-2023, 29 injuries, 5 deaths, and more than $15 million in property damages have been associated with these events. The below table includes the Hail, Lightning, Thunderstorm Wind, and Tornado categories into one hazard profile, Severe Weather, as combined in the 2015 LMS Update.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Severe Weather	100%	100%	100%	100%	100%	100%

3. Historical Occurrences of Wildfire

Wildfires are common within the County, occurring 87 times and consuming 1,170 acres annually, on average. These events are typically not large in scope, averaging 13 acres each.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Wildfire	>30%	>30%	100%	<25%	< 25%	< 25%

4. i. Historical Occurrences of Coastal Erosion

Coastal Erosion is a natural geological process has been underway for millennia. Some notable events in recent history have led to widespread erosion; Hurricane Matthew in 2016 and Hurricane Irma in 2017 both lead to sand dune changes along almost all 15 miles of Duval County coastline. The USACE was contracted to re-nourish the beaches with sand following these events at a cost of over $11 million dollars *(Source: FEMA Public Assistance Program; DR4283 / DR4337).*

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Coastal Erosion	15%	10%	0%	100%	100%	100%

ii. Historical Occurrences of Saltwater Intrusion

There are no specific incidents to cite but the U.S. Geologic Survey has estimated water levels within the Duval County aquifer system in have gradually declined at the rate of 0.3-0.75 feet per year due to the increased demand. Lower water levels in the aquifer have increased the potential for saltwater intrusion into the Floridan Aquifer System.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Saltwater Intrusion	100%	100%	100%	100%	100%	100%

5. Historical Occurrences of Extreme Heat

The U.S. Census Bureau estimates 14.6% of households are in poverty and especially susceptible to extreme heat.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Extreme Heat	100%	100%	100%	100%	100%	100%

Table 19: Duval County Hottest Days On Record, 1870-2023

104°F	103°F	102°F	
July 28, 1872	August 14, 1995	July 21, 1942	July 20, 1986
July 11, 1879	August 7, 2007	June 27, 1950	August 10, 1987
June 19, 1998	June 23, 2022	June 27, 1952	August 22, 2014
		June 13, 1977	June 20, 2015
		June 4, 1985	August 11, 2023

Source: National Climate Data Center; Accessed July 2024

6. Historical Occurrences of Winter Storms and Freezes

November 21, 2019: A hard freeze warning was issued for Northeast Florida to include the COJ. Rain from the previous day froze overnight creating icy conditions.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Winter Storm	<20%	17%	17%	17%	17%	17%

7. Historical Occurrences of Drought

The impact of droughts on Duval County been relatively indirect. When a drought is combined with a lowered water supply and lightning strikes, wildfires can occur and complicate the capacity to respond to fires. The NWS reported that a rate of return for a major drought lasting more than six months, without rain, could be experienced once every 15 years. All of Duval County is susceptible to drought.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Drought	100%	100%	>90%	100%	100%	100%

8. Historical Occurrences of Flooding

FEMA reports that there are 5,541 historical flood insurance claims paid between 1978 and 2019, totaling $200,168,173 in damages. The NWS Storm Events Database records at least 130 different flooding events as one of the following categories: Coastal Flood, Flash Flood, Flood, and Storm Surge. Duval County is in the upper St. Johns River watershed with numerous rivers, streams, creeks, tributaries, marshes, and drainage basins. The formulas are based on the number of people residing in the 100-year and 500-year floodplains as outlined in the 2018 FEMA FIRM maps and drainage basins.

The upper St. Johns River watershed was designated as an American Heritage River in 1998 by U.S. DEP. Major rivers and tributaries experience tidal influences which are increased by the effects of flooding, seasonal tropical storm rain, and rain associated with hurricane hazard. Duval County evacuation zones were established using a Zone A-F designation to better account for the storm surge hazard, using the SLOSH Model Depth Analysis coupled with NWS modeling. The COJ adopted the Evacuation Zones A-F in 2014 to derive the population at risk for exposure to storm surge.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Flooding	20% in FEMA Flood Zones	17%	<5%	100%	100%	100%

9. Historical Occurrences of Infectious Disease (Human & Animal)

During the update of the 2020 LMS, the city has been engaged in an unprecedented response to COVID-19 and continued to respond and mitigate the effects of the spread beyond the last Emergency Executive Proclamation 2021-002 that extended the emergency Declaration through March 26, 2021. The long-term effects of the COVID-19 global lockdowns and community impacts are still developing as we return to "the new normal" after lockdowns were lifted. The 2025 Update has is being completed after the effects of the COVID-19 lockdowns have mostly subsided in day-to-day life.

Some diseases may spread globally and have historically affected Duval County. In this century, the following global diseases have been of concern: Influenza (H1N1), Influenza (H5N1), Seasonal Influenza, Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome Coronavirus (MERS-CoV), Ebola Hemorrhagic Fever, Enterovirus D68 (EV-D68), and a Tuberculosis outbreak was observed within Duval County in 2012. Flue season has been represented in the above pie graph.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Human and Animal Disease	100%	100%	100%	100%	100%	100%

10. Historical Occurrences of Sea Level Rise

According to NOAA, the major causes of global sea level rise are due to two factors: Ice Melt and Thermal Expansion. Ice Melt is the melting of glaciers and continental ice masses, such as the Greenland ice sheet, which are linked to changes in atmospheric temperature and increased freshwater drainage to the oceans. Thermal Expansion is a steady increase in atmospheric temperature creating increased saline sea water (salt water) molecules, thereby increasing ocean volume. The oceans are absorbing more than 90% of the increased atmospheric heat associated with emissions from human activity. According to NOAA, sea level has risen 8–9 inches (21–24 centimeters) since 1880.

Significant portions of the County and the coastal area are susceptible to Sea Level Rise. The jurisdictions of COAB, COJB and CONB are especially exposed to this hazard both directly and indirectly by secondary stresses. During the past decade, potential impacts have been substantiated through coastal erosion and the mitigation strategy used by USACE to periodically re-nourish the shoreline. The COJ is exposed in the area east of the ICW and to the north towards Mayport. The TOB is relatively immune to coastal hazard threats, although climatic changes could impact agricultural interests, and increase the vulnerability to wildfire conditions.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Sea Level Rise (4ft.)	2.5%	3%	0%	8.5%	4%	1.5%

11. Historical Occurrences of Cyber Attack

Below are examples of cyberattacks or cybersecurity technical failures that may be relevant to local stakeholders *(Source: Significant Cyber Incidents; Center for Strategic and International Studies):*

- ✓ January 2010: Google network breach, cyberattack

- ✓ June 2011: Citibank major network/data breach
- ✓ July 2012: 17-fold increase in cyber incident at American infrastructure companies between 2009 and 2011.
- ✓ May 2013: U.S. electrical grid constantly probed by multiple actors, including Iran.
- ✓ June 2013: FBI charged five Ukrainian and Russian hackers with stealing over 160 million credit card numbers.
- ✓ March 2014: 40 million credit card numbers stolen from Target; an additional 70 million accounts compromised.
- ✓ October 2014: U.S.P.S. servers hacked, exposing employees' names, addresses, and Social Security numbers.
- ✓ April 2015: hackers gained access to White House networks and sensitive information.
- ✓ April 2017: growing cyber-espionage campaign originating in China targeting the U.S., Europe, and Japan.
- ✓ November 2017: Uber paid hackers $100,000 to delete stolen data of 57 million customers and drivers.
- ✓ March 2018: The FBI and DHS issued a joint technical alert to warn of Russian cyber-attacks against U.S. critical infrastructure. Targets included energy, nuclear, water, aviation, and manufacturing facilities.
- ✓ May 2019: encrypting ransomware attack took the City of Baltimore's IT systems hostage.
- ✓ December 2019 – January 2020: Four U.S. cities, including New Orleans and Pensacola, were hit with ransomware.
- ✓ July 2024: A Microsoft Windows update issued by cybersecurity firm CrowdStrike caused a global IT outage that disrupted critical infrastructure around the world. The faulty software update affected approximately 8.5 million machines and cost Fortune 500 companies $5.4 billion.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Cyber-Attack	100%	100%	100%	100%	100%	100%

12. Historical Occurrences of HAZMAT Incidents

Between 2017-2019, a 3-year period, Duval County reported 866 HAZMAT incidents that required some type of cleanup crews. In compliance with §403.077, F.S., and the public interest, the DEP has made any Notices of Pollution that it has received publicly available. Excerpts from these notices are summarized within the HAZMAT hazard specific section, presented as provided by the reporting entity. The COJ or DEP are not responsible for the accuracy of any information submitted.

13. Historical Occurrences of Critical Infrastructure Disruption

To date, most disruptions have occurred during tropical cyclone events. See the Tropical Cyclone Hazard Profile for any mention of notable power outages. All populations in Duval County are susceptible to this hazard unless there are backup generators present *(Source: Electric System Reliability History; JEA Compliance Standards)*. Wind from Tropical Storm Force Winds (greater than 39 MPH): Population had to be re-distributed as the Wind Speed Zones were eliminated in the Florida State Building Code of 2010. The wind speed map is posted on the City JAXGIS site, and the population was distributed according to that map.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Critical Infrastructure Disruption	100%	100%	100%	100%	100%	100%

14. Historical Occurrences of Terrorism and Targeted Violence

All properties and populations are susceptible to terrorism. Potential high target areas within the county include I-95, I-10, I-295, Haines St./ 20th St., the channel of the St. Johns River, major rail corridors, and properties contained in JAXPORT. The most vulnerable population for HAZMAT material accidents are residents in the downtown area reaching as far north as the Trout River due to the rail lines through this lower income area. About one third of the recorded river spills have taken place in the St. Johns River adjacent to this area *(Source: Duval County CEMP 2021; U.S. Marine Corps Threat Identification Matrix; Duval Risk Assessment Tool; Florida DOH).*

According to the U.S. Secret Service, 173 mass attacks were carried out by 180 attackers in public or semi-public locations between January 2016 and December 2020. In total, 513 people were killed and 1,234 people were injured. The U.S. had the two deadliest mass attacks in modern history, including a 2017 shooting at an outdoor concert in Las Vegas that killed 58 and injured 869. The number of attacks between 2016 to 2020 were counted at 30 mass attacks in 2016, 38 mass attacks in 2017, 31 mass attacks in 2018, 34 mass attacks in 2019, and 40 mass attacks in 2020.

Potential Impact on Population	Duval	COJ	TOB	COJB	CONB	COAB
Terrorism and Targeted Violence	100%	100%	100%	100%	100%	100%

F. Multi-Hazard Economic Vulnerability and Loss Estimates

The data sets used to establish the risks to populations within Duval County are the HAZUS and SLOSH models used in analyzing vulnerability in the Vulnerability Analysis of the 2021 Hurricane Evacuation Study, inclusive of Duval County. These vulnerability analyses document the highest levels of risk to Duval County for the following hazards: Hurricane hazards, including high winds and storm surge; wildfire in the wildland and urban interface hazard; hazardous material impacts; hazard flooding hazard, and tornado hazard.

The multi-hazard risk maps were subsequently consolidated into a map that depicts the market value of properties throughout Duval County by zip code. This incorporates a vulnerability assessment based on economic impact for all jurisdictions in the County. A reviewer who examines the hazards maps in **Section III** should be able to compare the property value information in the vulnerability analysis to determine the correlation of hazards risk to zip code. All market value information is collected from the Duval County Property Appraiser's data base using 2024 values for the 2025 Update. The fair market value is assessed at 99% confidence level per the valuation process used by the Property Appraisers. A total of 359,878 structures valued $60.13 Billion. The properties that these structures are located on have a combined market value of approximately $90 Billion.

Geographic Areas Vulnerable to Hazards

Hurricanes were determined to be the highest risk to Duval's population, inclusive of wind and storm surge, and is the greatest risk to the geographic area from the coastal inland to the ICW. Populations living in low-lying areas, housing not built to current building codes, manufactured housing, or housing in the FIRM floodplain are at highest risk. According to the U.S. Census Bureau, Duval County's total area is 762.19 square miles with the COJ encompassing a total area of 747 square miles, making Jacksonville the largest city in land area in the contiguous U.S.; of this, approximately 87% is land and 13% is water. Duval County's 2020 population is estimated at 995,567 of which 902,488 live within the COJ, which is approximately 1,306 people per square mile.

Just south of Jacksonville and north of Saint Augustine is the boundary of where the Floridian Peninsula ends, and Continental North America begins; Jacksonville is north of that line. While still in the North American Coastal plain, the topography begins to take on slight Piedmont characteristics. Like the Central Florida Ridge and Piedmont, the area begins sloping several miles inland. On the west side of Jacksonville, a series of low ridges predominate. The high point of Jacksonville, at Trial Ridge along the western border with Baker County, is about 190 feet above sea level.

At Risk Properties

According to 2020 data from the Insurance Information Institute, in Florida, 2.85 million homes are at risk from hurricane related hazards. These homes would cost $552.4 trillion to completely rebuild, including labor and materials. Florida leads the nation in the number of flood policies, according to the NFIP, with about 1.8 million policies in force in 2024. The number of people living in coastal areas in Florida increased by 4.2 million, or 27%, from 15.6 million in 2000 to 19.8 million in 2020, according to the U.S. Census Bureau. About 98% of the total population of Florida lives in one of the coastal counties. Jacksonville is ranked eighth among Florida counties in terms of exposure of property at risk from hazards associated with hurricanes. Duval County is reporting $9.3 billion in insured property values in 2024. (*Source:*

https://nfipservices.floodsmart.gov/reports-flood-insurance-data). These figures are based on insurance company estimates of what costs would be necessary to replacement structures and contents. More comprehensive data, drawn from figures supplied by the Duval County Property Appraiser, estimates the actual dollar value and the fair market value of property in the City somewhat differently than the estimate indicated by the Hurricane Catastrophe Fund's data. Providing information on the value of real property in the City as a whole, as well as the values estimated for property in the three more vulnerable Beach Municipalities *(Source: Catastrophes; Insurance Information Institute; Retrieved from: https://www.iii.org/table-archive/220281)*

Table 20: Construction Value by City, 2021

City	No. of Buildings	Building Value	Property Market Value
City of Atlantic Beach (COAB)	9,103	$1.59 Billion	$3.35 Billion
City of Jacksonville Beach (COJB)	13,825	$3.08 Billion	$5.78 Billion
City of Neptune Beach (CONB)	3,00	$5.4 Million	$ 1.35 Billion

Source: Duval County Property Appraisers, December 2021

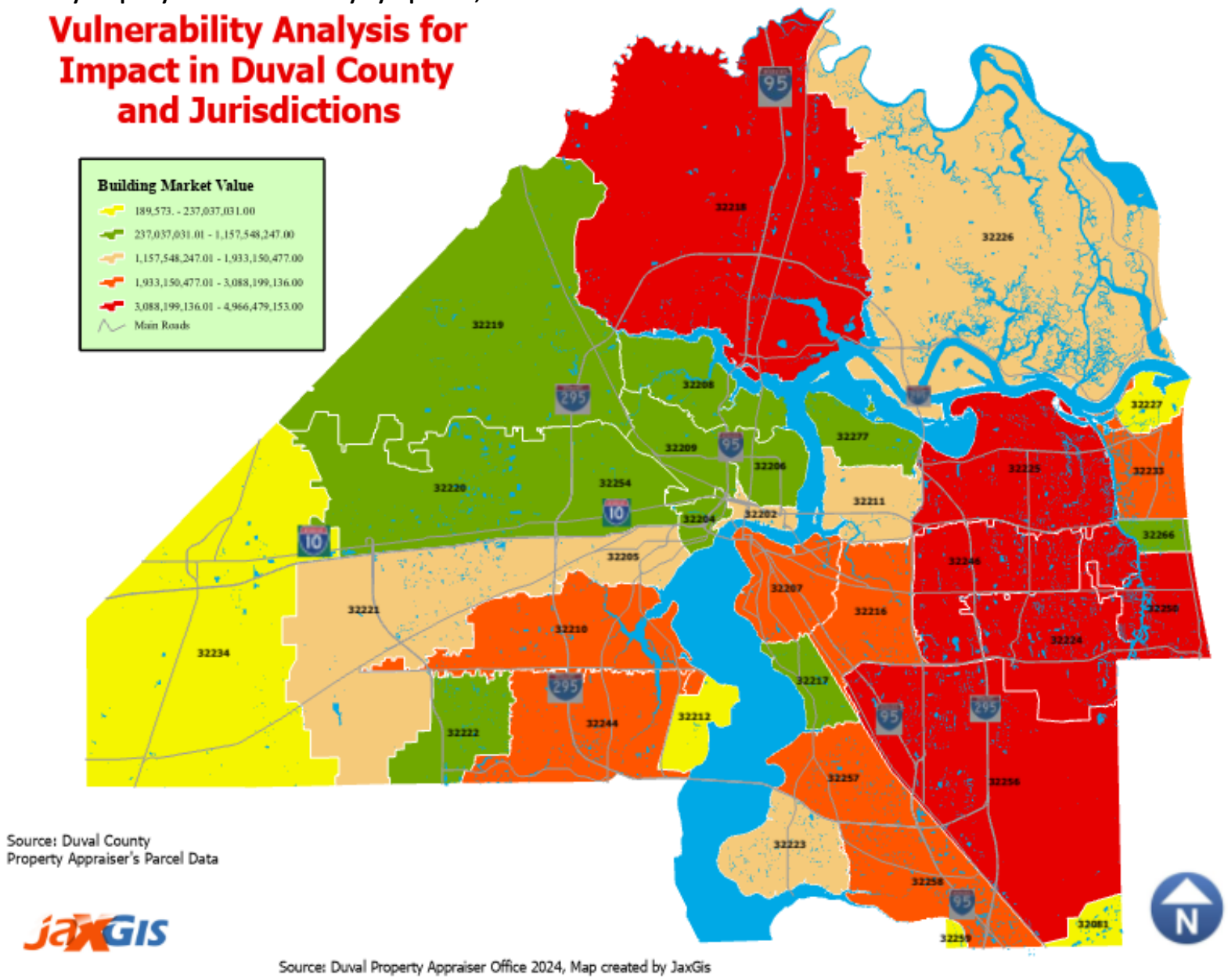
Manufactured housing is extremely vulnerable to hurricane force winds, especially along the coast. The value of residential construction for each of the three Beaches is shown above, illustrating more than a billion dollars of property improvements at risk. The emphasis placed on the dangers of hurricanes is vastly more publicized than the dangers of tropical storms, which affect Duval County more often.

A Category 3 Hurricane can also be expected to disrupt economic activity for several months, potentially resulting in the permanent loss of more than 50% of small businesses over the 5-year period following the disaster, without the implementation of additional mitigation efforts. The risk of taking no action to mitigate will be a detriment to the whole community.

Table 21: Duval County Property Values by Zip Code, 2024

ZIP Code	Number of Buildings	Total Building Value	Total Market Value
32081	1049	$519,837,542	$722,050,290
32202	1875	$2,485,617,850	$3,226,822,689
32204	3588	$1,667,273,812	$2,297,710,195
32205	13099	$2,565,508,154	$3,862,242,239
32206	8680	$1,089,989,080	$1,588,479,446
32207	15130	$4,537,105,583	$6,760,150,638
32208	14339	$1,589,886,673	$2,143,196,095
32209	15245	$1,701,451,317	$2,095,955,320
32210	24325	$4,403,718,321	$6,747,033,041
32211	12373	$2,224,855,274	$3,135,110,672
32212	2 (NAS JAX)	$192,827	$37,046,487
32216	14893	$3,925,173,008	$5,381,899,612
32217	7647	$1,795,321,625	$2,760,510,204
32218	27125	$6,899,022,054	$9,740,440,245
32219	7435	$1,696,502,997	$2,491,043,173
32220	5993	$1,110,635,486	$1,716,899,668
32221	12113	$2,662,313,003	$3,666,842,178
32222	6928	$1,546,259,207	$2,088,460,795
32223	10596	$2,969,112,551	$4,469,289,874
32224	13842	$6,189,144,501	$8,344,704,917
32225	20495	$5,795,586,207	$8,451,936,486
32226	9077	$2,551,981,857	$4,420,671,232
32227	1 (Nas Mayport)	$207,609,300	$299,623,900
32233	9305	$2,560,601,059	$5,454,378,368
32234	2710	$490,222,620	$820,409,321
32244	21577	$3,921,646,893	$5,608,740,434
32246	19147	$5,790,166,864	$7,994,857,658
32250	13938	$4,756,016,930	$8,873,107,774
32254	7741	$1,301,029,907	$1,871,484,297
32256	20114	$8,685,633,986	$11,606,900,820
32257	14429	$3,440,336,257	$5,314,590,016
32258	13507	$4,692,938,397	$6,121,868,109
32259	682	$191,741,436	$266,108,288
32266	3012	$780,532,848	$2,048,667,919
32277	9501	$2,014,270,352	$2,708,753,429

Map 5: Duval County Property Value Vulnerability by Zip Code, 2024



Source: Duval Property Appraiser Office 2024, Map created by JaxGis

Table 22: Florida Hurricane Catastrophe Fund Exposures Concentration by County, 2024

County	$ Amount of FHCF Exposure	% of Total FHCF Exposure
Palm Beach	$275.5 Billion	8.33%
Miami-Dade	$224.4 Billion	6.79%
Broward	$215.9 Billion	6.53%
Hillsborough	$208.6 Billion	6.31%
Orange	$206.9 Billion	6.26%
Lee	$159.1 Billion	4.81%
Duval	$140.3 Billion	4.25%
Pinellas	$135.8 Billion	4.11%
Collier	$128.8 Billion	3.89%
Brevard	$103.0 Billion	3.11%
All Other Counties	$1,507.6 Billion	45.60%
Florida Total	**$3,306.8 Billion**	**100%**

Source: 2023-2024 Annual Report; Retrieved from: https://fhcf.sbafla.com/media/jezfd0d1/2023-fhcf-annual-report.pdf

Vulnerable Critical Facilities

All non-critical municipal public buildings and facilities will be maintained by each jurisdiction within Duval County. The COJ EPD and the IT Department maintain a Critical Facilities Inventory consisting of critical facilities, NFIP RL data, historic flood data, and the locations of HAZMAT materials that fall under the jurisdiction of Section 302 of the Federal Emergency Planning and Community Right to Know Act. This data has been furnished by the COJ Department of Regulatory Compliance and a copy of the below list has been supplied to FDEM as well. The following facilities are deemed critical by the state and federal governments:

- Hospitals
- Fire Stations
- Hurricane Risk Shelters
- Public Schools, Colleges, and Universities
- Evacuation Routes
- Water Treatment Plants
- Sewage Treatment Plans
- Electric Substations
- Government Buildings
- Emergency Response Facilities

The COJ and the JEA have prioritized critical facilities power restoration. The priority facilities include the following:

Level 1 – Hospitals.
Level 2 – Includes the Federal Aviation Authority Transmitting Towers, Jacksonville International Airport, government buildings inclusive of fire stations and military complexes, JEA substations for electrical power and sewer facilities; waste treatment plants.
Level 3 – Includes, but not limited to, the COJ EOC, dialysis centers, and the activated hurricane risk shelters.
Level 4 – Includes, but not limited to, ARC Command Post, City Hall Complex, Motor Pool Complex, CSX transportation, blood alliance center, jail and correctional institutes within the city.
Level 5 – Includes, but not limited to, JEA lift stations and major intersections on the evacuation routes.

Vulnerable Populations

The most vulnerable populations include people with physical, cognitive, or developmental disabilities, people with limited English proficiency, those who are geographically or culturally isolated, who are medically or chemically dependent, or are homeless, frail, elderly, children, or require additional support for evacuation, transportation, and disaster sheltering.

The most vulnerable populations also include those living in manufactured housing along the coast and low-lying areas that are flood and storm surge hazard zones. Approximately, 27,394 households, or 7.2%, in the COJ do not have access to personal transportation, making them more vulnerable during an evacuation according to the U.S. Census Bureau, U.S. Census 2022 ACS 5-Year Survey.

Maximum Evacuating Population Clearances

From a road capacity standpoint, it is important to understand the maximum number of vehicles that can evacuate at various time intervals to prevent disruptions or gridlock. Should storm conditions change during an evacuation, emergency managers will need to be able to estimate what portion of the population is estimated to evacuate from hazard zones to other areas of the county for hazards that are not county-wide. Using the base scenarios, which assume 100% of the vulnerable population is evacuating from adjacent counties as well, estimates were calculated for the maximum population realistically able to evacuate each county by the time clearance intervals of 12, 18, 24, and 36 hours.

The COJ COMP Plan's Hurricane Evacuation Timing section 7.1.5 states, the PDD and the EPD shall maintain procedures and guidelines for assessing the impact of a new development and redevelopment on hurricane evacuation times. Such procedures and guidelines shall be adopted and implemented in a manner consistent with the requirements of Section 163.3202(1), F.S., and therefore shall be formalized and integrated into the City's Land Development Regulations.

It is important to note that these estimates consider many variables including roadway capacity, in-county evacuations, out of county evacuations, evacuations through Duval from other counties, and background traffic that can contribute to delayed evacuation speeds. For this reason, the maximum evacuation population by time interval varies slightly between evacuation level and either increase or decrease from one evacuation level to the next. After extensive analysis, the COJ EPD adjusted the clearance times to include changes based on ongoing road construction and changes in population density. The adjusted evacuaiton times are as follows.

Table 23: Duval County "Maximum Evacuating Population by Time Interval", 2020 and 2025

2020 Study					
Evacuation Time	**Evacuation Level A**	**Evacuation Level B**	**Evacuation Level C**	**Evacuation Level D**	**Evacuation Level E**
12 Hours	**234,465**	**210,042**	**261,367**	**265,024**	**231,454**
18 Hours	**293,081**	**315,063**	**392,051**	**397,536**	**347,181**
24 Hours	**333,321**	**358,822**	**490,064**	**530,048**	**462,908**
36 Hours	**333,321**	**394,130**	**525,175**	**563,176**	**636,499**

2025 Study					
Evacuation Time	**Evacuation Level A**	**Evacuation Level B**	**Evacuation Level C**	**Evacuation Level D**	**Evacuation Level E**
12 Hours	**198,160**	**219,381**	**269,354**	**297,218**	**306,174**
18 Hours	**297,239**	**329,072**	**404,031**	**445,827**	**459,261**
24 Hours	**355,036**	**420,481**	**538,708**	**594,436**	**612,348**
36 Hours	**355,036**	**420,481**	**561,154**	**668,741**	**752,678**

Source: Hurricane Evacuation Study, 2024. Retrieved from:
https://portal.floridadisaster.org/preparedness/RES/Studies/SitePages/RES.aspx#NEFRC

Emergency Shelters

There may be significant demand for public shelters to be opened in the Northeast Florida region during a hazard event requiring evacuations. The number of evacuees who choose public shelters as their evacuation destination is based on demographic characteristics of the population including income, age, proximity to hazardc area, and housing type. Public shelter demand is the result of several factors:

- No friends or relatives in a safe location.
- No means to evacuate to a hotel or motel.
- No vacant hotel / motel outside of evacuation zone.
- Lack of understanding all options.
- Choosing public shelter for safety.

Duval County currently has 29 shelters; 9 of which are special needs with 6 of the 9 special needs being dual use and 4 of the 29 are pet friendly. The 29 shelters have a total capacity of 35,689 spaces at 20 sq. ft. or 2,810 spaces at 60 sq. ft. The COJ shelter capacity remains sufficient for the population anticipated to evacuate in case of a CAT 2 or higher hurricane, prior to considering the out of county evacuees from surrounding counties and elsewhere.

It should also be noted that evacuation population figures will not remain static east of the ICW, which will result in an increase due to future residential development and increased density. Improved economic conditions have begun to reflect increased development in the areas surrounding the CHHA, as defined by the State of Florida. Development design and new construction in hazard areas must conform to current State building codes that will mitigate the impacts. Nonetheless, the increased population density will require additional resources to accommodate increased stress on existing transportation infrastructure to improve hurricane evacuation routes and sheltering capacities.

Estimated Losses – Summary

The analysis of potential vulnerable structure losses within Duval County includes methodology descriptions, hazard maps, and data tables for each analysis. The Hazards U.S. and Multi-Hazard (HAZUS-MH) software was used to generate the 2021 Hurricane Evacuation Study's regional inventory of assets, advanced analysis functions, and mapping capabilities. The HAZUZ-MH data allow advanced Geographic Information System (GIS) layers, inclusive of census tracts and blocks featuring demographics, general building inventories, linear data features, inclusive of utilities and roads. Additionally, there are point data features such as critical infrastructure, high potential loss facilities, and bridge crossings.

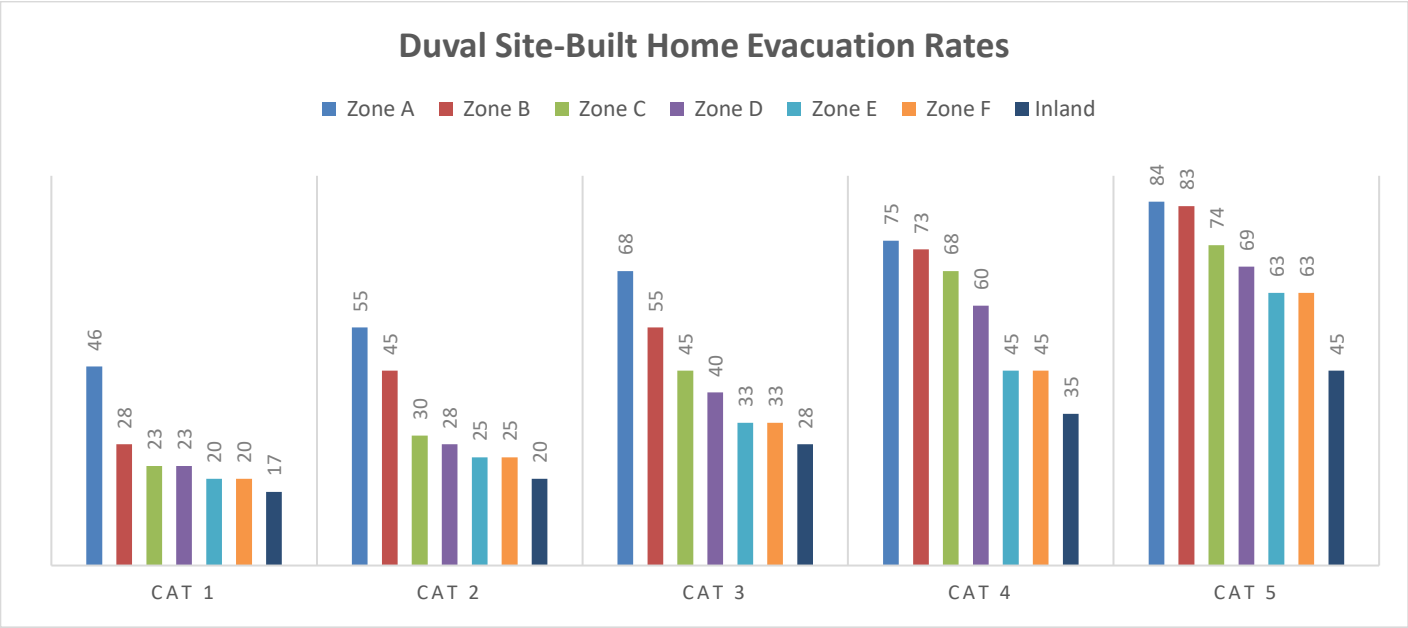
To supplement information derived from the damage loss estimate alternative methods, information has been provided by the Duval County Property Appraiser's Office to demonstrate assessed property values in the County. The Property Appraiser determines just value, also called market value, for all real estate in Duval County in accordance with Florida law. The market value listed on the annual notices of property assessment as of January 1 each year, so market value is typically determined by analyzing sales data of comparable properties which have occurred prior to January 1.

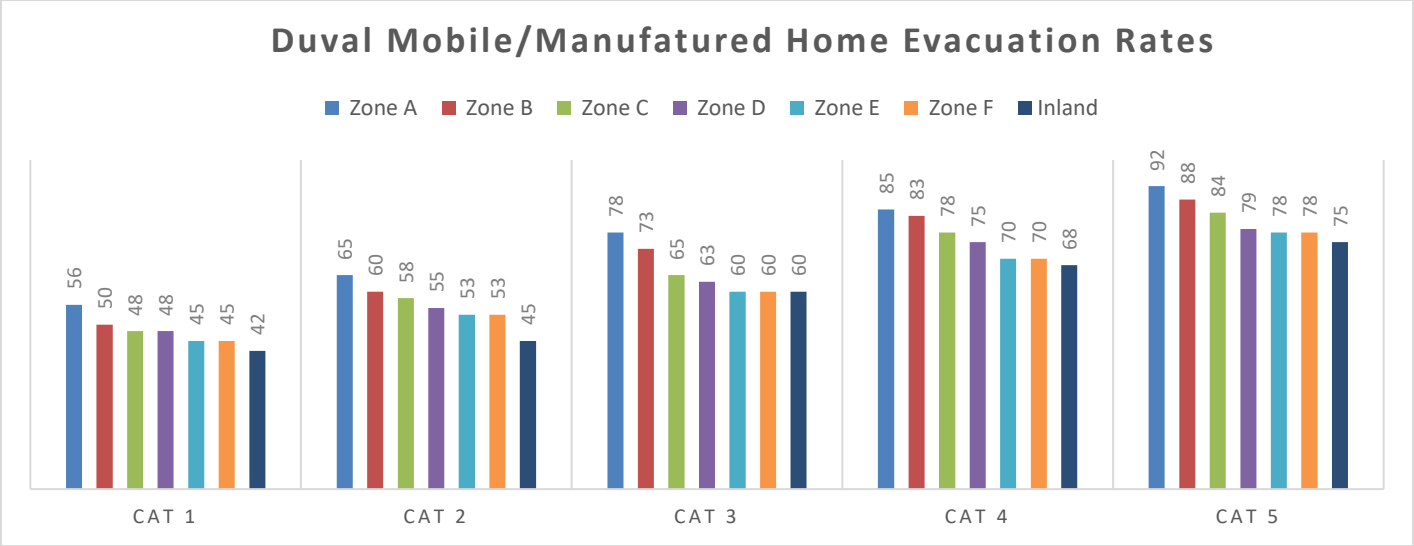
Hazards Formula

The planning goal is to determine what percentage of the population is exposed to each hazard, vulnerability, or risk by using available statistical models such as Sea, Lake and Overland Surges from Hurricanes (SLOSH) or HAZUS data. Otherwise, percentages were calculated for the population exposed to specific hazards if additional models were unavailable. The following hazards were not rated because they are not expected to occur in the County, based on historical research:

- Sinkhole
- Landslide
- Tsunami
- Earthquake
- Dams and Levee Failure
- Volcano

Figure 7: Evacuation Participation Rates: Duval County, 2021





Source: NE FL Regional Evacuation Study: Participation Rates 2021. Retrieved from: https://portal.floridadisaster.org/preparedness/RES/Studies/SitePages/RES.aspx#NEFRC

Figure 8: Duval County Access and Functional Needs Profile, 2021

Access and Functional Needs Profile, Duval County						
Indicator	**Year(s)**	**Measure**	**County Count**	**County Rate**	**State Count**	**State Rate**
Demographic DataDemographic Data						
Total PopulationTotal Population	2021	Count	994,778		22,005,587	
Resident Live BirthsResident Live Births	2021	Per 1,000 Population	12,603	12.7	216,189	9.8
Population (Aged 65-84 Years) Population (Aged 65-84 Years)	2021	Percent of Total Population	131,950	13.3%	4,084,197	18.6%
Population (Aged 85 Years and Older) Population (Aged 85 Years and Older)	2021	Percent of Total Population	15,639	1.6%	601,986	2.7%
Individuals Living Alone (Aged 65 Years and Older)Individuals Living Alone (Aged 65 Years and Older)	2021	Percent of Population 65+	38,534	28.3%	1,047,479	24.5%
Children in Foster Care (Aged 0-17 Years)Children in Foster Care (Aged 0-17 Years)	2021	Per 100,000 Population, Under 18	1,327	588.9	25,475	590.4
Socioeconomic DataSocioeconomic Data						
Individuals Below Poverty Level (Census)Individuals Below Poverty Level (Census)	2021	Population for Whom Poverty Status is Determined	139,089	14.5%	2,744,612	13.1%
Population Uninsured (Aged 0-64 Years) (Census)Population Uninsured (Aged 0-64 Years) (Census)	2021	Count	113,154		2,608,912	
Households Receiving Cash Public Assistance or Food StampsHouseholds Receiving Cash Public Assistance or Food Stamps	2021	Percent of Households	62,758	16.2%	1,151,577	14.1%
Monthly Medicaid EnrollmentMonthly Medicaid Enrollment	2021	Per 100,000 Population	260,685	26205.3	4,939,359	22445.9
Women, Infants and Children (WIC) EligiblesWomen, Infants and Children (WIC) Eligibles	2021	Percent of Total Population	36,796	3.7%	636,067	2.9%
Women, Infants and Children (WIC) Eligibles ServedWomen, Infants and Children (WIC) Eligibles Served	2021	Percent of WIC Eligibles	16,861	45.8%	400,966	63%
Homeless Estimate Homeless Estimate	2021	Percent of Total Population	1,137	0.1%	21,141	0.1%
Population That Speak English Less Than Very Well (Aged 5 Years and Older)Population That Speak English Less Than Very Well (Aged 5 Years and Older)	2021	Percent of Census Population 5+	54,363	5.9%	2,388,642	11.8%
Spanish-Speakers Among Population That Speak English Less Than Very Well (Aged 5 Years and Older)Spanish-Speakers Among Population That Speak English Less Than Very Well (Aged 5 Years and Older)	2021	Limited English Proficiency Ages 5 and Over	26,749	49.2%	1,860,400	77.9%
Vulnerability DataVulnerability Data						
Adults Who Are Limited in Any Way in Any Activities Because of Physical, Mental or Emotional ProblemsAdults Who Are Limited in Any Way in Any Activities Because of Physical, Mental or Emotional Problems	2016	Percent		23.5%		21.2%
Adults Who Use Special Equipment Because of a Health ProblemAdults Who Use Special Equipment Because of a Health Problem	2016	Percent		9.7%		9.9%
Population Civilian Non-Institutionalized With a DisabilityPopulation Civilian Non-Institutionalized With a Disability	2021	Percent of Civilian non-institutionalized population	124,070	12.9%	2,818,838	13.4%
Developmentally Disabled ClientsDevelopmentally Disabled Clients	2021	Count	3,169		61,574	
Clients Who Sustained a Brain and/or Spinal Cord InjuryClients Who Sustained a Brain and/or Spinal Cord Injury	2021	Count	30		540	

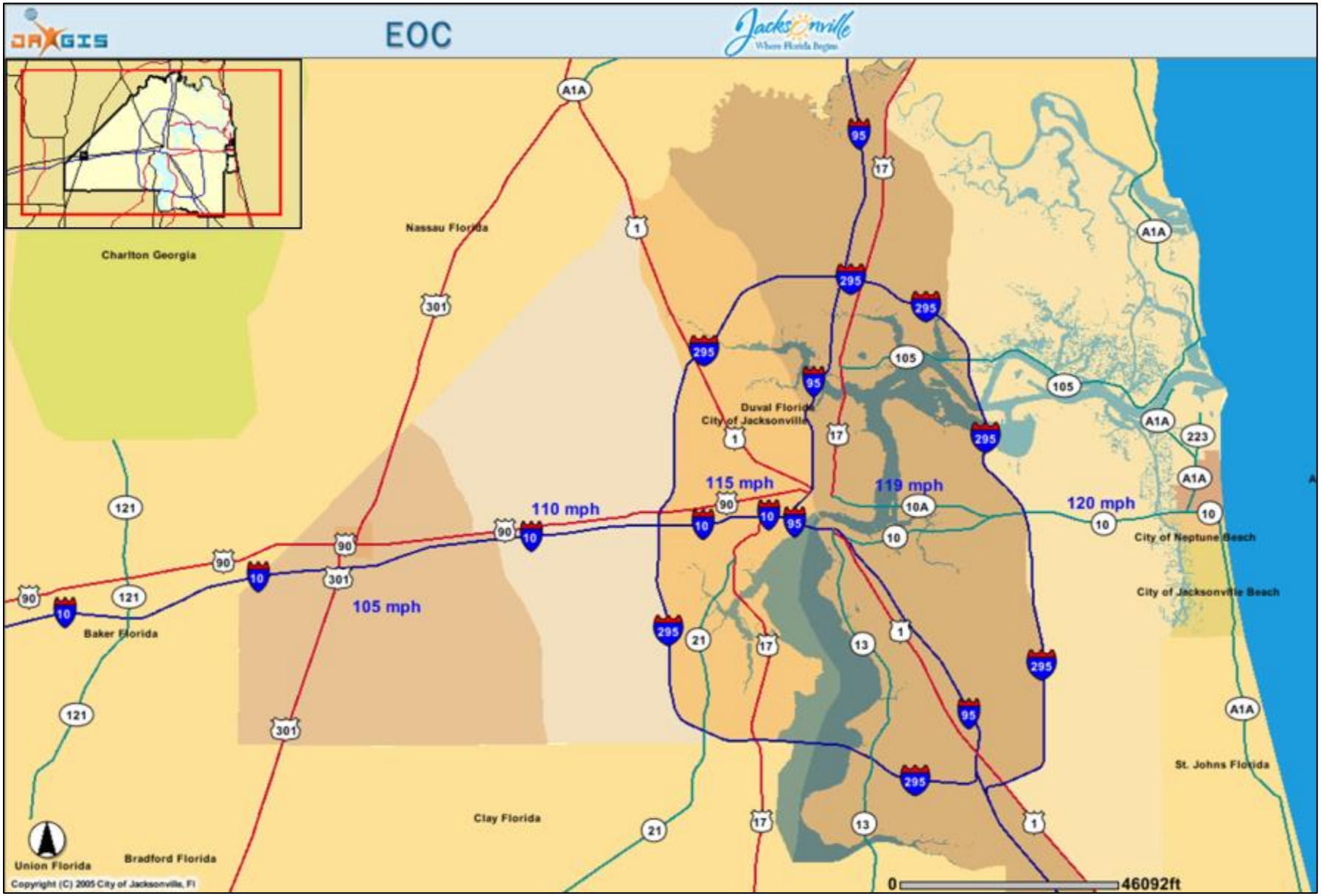
Hospitalizations From Mental DisordersHospitalizations From Mental Disorders	2021	Per 100,000 Population	10,573	1062.9	206,204	937.1
Clients Who Sustained a Brain and/or Spinal Cord Injury Clients Who Sustained a Brain and/or Spinal Cord Injury	2021	Count	30		540	
Population With Vision Difficulty (Aged 18-64 Years) (Census)Population With Vision Difficulty (Aged 18-64 Years) (Census)	2021	Percent of Census Population 18-64	12,015	1.9%	247,494	1.9%
Population With Hearing Difficulty (Aged 18-64 Years) (Census)Population With Hearing Difficulty (Aged 18-64 Years) (Census)	2021	Percent of Census Population 18-64	10,469	1.7%	225,318	1.8%
Medicare Beneficiaries Enrolled in Medical Essential Electric Utility ProgramMedicare Beneficiaries Enrolled in Medical Essential Electric Utility Program	2021	Count	7,381		168,855	
Adult Substance Abuse Program Enrollees (Aged 18 Years and Older)Adult Substance Abuse Program Enrollees (Aged 18 Years and Older)	2021	Count	1,393		42,298	
Population With an Independent Living Disability (Aged 18-64 Years) (Census)Population With an Independent Living Disability (Aged 18-64 Years) (Census)	2021	Percent of Census Population 18-64	22,860	3.7%	446,580	3.5%
Children Through Age 20Children Through Age 20						
Population With Vision Difficulty (Aged 0-17 Years) (Census)Population With Vision Difficulty (Aged 0-17 Years) (Census)	2021	Percent of Census Population Under 18	1,352	0.6%	34,286	0.8%
Population With Hearing Difficulty (Aged 0-17 Years) (Census)Population With Hearing Difficulty (Aged 0-17 Years) (Census)	2021	Percent of Census Population Under 18	531	0.2%	22,723	0.5%
Medical Foster Care Children Medical Foster Care Children	2021	Count	16		400	
Florida Children's Medical Services (CMS) ClientsFlorida Children's Medical Services (CMS) Clients	2021	Percent of Population Under 21	3,680	1.4%	110,419	2.2%
Child Substance Abuse Program Enrollees (Aged 0-17 Years)Child Substance Abuse Program Enrollees (Aged 0-17 Years)	2021	Count	179		7,458	
Elderly Ages 65+Elderly Ages 65+						
Population With Vision Difficulty (Aged 65 Years and Older) (Census)Population With Vision Difficulty (Aged 65 Years and Older) (Census)	2021	Percent of Census Population 65+	9,839	7.1%	257,006	5.9%
Population With Hearing Difficulty (Aged 65 Years and Older) (Census)Population With Hearing Difficulty (Aged 65 Years and Older) (Census)	2021	Percent of Census Population 65+	15,959	11.5%	547,096	12.6%
Probable Alzheimer's Cases (Aged 65 Years and Older)Probable Alzheimer's Cases (Aged 65 Years and Older)	2021	Percent of Population 65+	15,947	10.8%	553,736	11.8%

Source: Florida Health Charts; Access and Functional Needs

Table 24: Population by Wind Speed Zones

Geographic Area	Wind Speed	Est. Population Impacted
Three Beach Municipalities, Mayport – Atlantic Ocean west to I-295	120 MPH	100,200
East Jacksonville west of I-295 to I-95	119 MPH	403,000
West Jacksonville, east of I-95 to I-295 Loop northbound	115 MPH	196,000
West Jacksonville, east of I-295 to Cecil Field	110 MPH	113,000
West of Cecil Field, including Whitehouse, TOB	105 MPH	6,250

Map 6: Duval County Wind Speed



Source: EOC Maps, JAXGIS, retrieved January 28, 2024

1.

Tropical Cyclone

Hazard Profile

1. Tropical Cyclone Hazard Profile

Winds With Tropical Cyclones

Overview

A tropical cyclone is a rotating, organized system of clouds and thunderstorms that originates over tropical or subtropical waters and has a closed low-level circulation. These storms are further classified as tropical storms and hurricanes based on the speed of the winds generated by the system. Duval County is at risk of experiencing tropical cyclones of various magnitudes due to its tropical climate and vicinity to the Atlantic Ocean. Winds from tropical cyclones are capable of affecting all areas of the city, with higher impacts expected along the coast. Damage from tropical cyclone events varies from minor damage to structures, to catastrophic damage leading to large parts of the city becoming uninhabitable.

Very High
27 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
Very High 10 / 10	Very High 5 / 5	Moderate 3 / 5	Very High 5 / 5	High 4 / 5

Storm Surge with Tropical Cyclones

Overview

Storm surge is the abnormal rise in seawater level during a storm, measured as the height of the water above the normal predicted astronomical tide. The surge is caused primarily by a storm's winds pushing water onshore. The amplitude of the storm surge at any given location depends on the orientation of the coastline with the storm track; the intensity, size, and speed of the storm; and the local bathymetry.

Very High
26 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
Very High 9 / 10	High 4 / 5	Moderate 3 / 5	Very High 5 / 5	High 4 / 5

Tropical Cyclone Description

Tropical cyclones are defined as a warm-core non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center. Once formed, a tropical cyclone is maintained by the extraction of heat energy from the ocean at high temperature and heat export at the low temperatures of the upper troposphere. Tropical cyclones and the extent and intensity of the system are commonly classified according to wind velocity. A tropical cyclone in which the maximum sustained surface wind speed ranges from 39mph to 73mph is a Tropical Storm. A tropical cyclone in which the maximum sustained surface wind is 74mph or more is known as a Hurricane. Hurricanes are further categorized by the Saffir-Simpson Hurricane Scale, which assigns a numerical value between 1 and 5 based on the maximum wind speeds. See below for the associated wind speeds and description of the impacts. The Saffir-Simpson Hurricane Wind Scale does not consider other hazards.

Table 25: Saffir-Simpson Hurricane Wind Scale Damage Descriptions

Scale number (category)	Sustained winds (mph)	Expected Damage
1	74 - 95	• Very dangerous winds will produce some damage • Minor damage to structure exteriors • Tree branches, uprooting smaller trees • Extensive power line damage, power outages
2	96-110	• Extremely dangerous winds will cause extensive damage • Major damage to structure exteriors • Uprooting of small trees and blocking roads • Guaranteed power outages for extended periods of time
3 = MAJOR	111 - 129	• Devastating damage will occur • Extensive damage to structure exteriors • Many trees uprooted and many roads blocked • Extremely limited availability of water and electricity
4 = MAJOR	130 -156	• Catastrophic damage will occur • Loss of roof structure and/or some exterior walls • Most trees uprooted and most power lines down • Isolated residential access due to debris pile up • Power outages lasting for weeks to months
5 = MAJOR	157 or higher	• Catastrophic damage will occur • High percentage of structures will be destroyed • Fallen trees and power lines isolate residential areas • Power outages lasting for weeks to months • Most areas will become temporarily uninhabitable

Source: NHC NOAA, https://www.nhc.noaa.gov/aboutsshws.php, Retrieved January 2025

i. Tropical Cyclone Winds

Wind is the second most dangerous components of a hurricane's destructive force. Strong winds can be a very dangerous, reaching up to more than one hundred miles inland of the coast, which can result in injury or death from structural damage or airborne debris. Gale force winds and tornados associated with hurricanes are very hazardous to manufactured housing, power lines, and trees, which result in obstructions to roadways, loss of power, and structural damage. Wind from tropical cyclones may impact all construction in the County, including residential, commercial, healthcare facilities, education facilities, and public infrastructure.

ii. Tropical Cyclone Storm Surge

Storm tide is defined as the water level due to the combination of storm surge and the astronomical tide and is expressed in terms of height above a vertical datum such as the North American Vertical Datum of 1988 (NAVD88) or Mean Lower Low Water (MLLW). Astronomical tides are caused by the gravitational pull of the sun and the moon and have their greatest effects on seawater level during new and full moons—when the sun, the moon, and the Earth are in alignment. As a result, the highest storm tides are often observed during storms that coincide with a new or full moon.

Inundation is the total water level that occurs on normally dry ground as a result of storm tide and is expressed in terms of height above ground level. At the coast, normally dry land is roughly defined as areas higher than the normal high tide line or Mean Higher High Water (MHHW) *(Source: NOAA https://ocean.weather.gov/defining_storm_surge.pdf).*

As defined by the NWS, several terms are used to describe the abnormal rise of water generated by a storm, over and above the predicted astronomical tide, expressed in terms of height above normal tide levels. The surge is caused primarily by a storm's winds pushing water onshore. The amplitude of the storm surge at any given location depends on the orientation of the coastline within the storm track and the local bathymetry; intensity, size, and speed. Because storm surge represents a deviation from normal water levels, it is not referenced to a vertical datum.

According to the NWS, Storm surge is considered the most destructive of the forces related to hurricanes. It is a phenomenon that occurs when the winds and forward motion associated with a hurricane pile water up in front as it moves toward shore. Storm surge heights, wind speed, fetch length, pressure, and associated waves are dependent upon the configuration of the continental shelf and the depth of the ocean bottom. These as well as other factors can affect storm surge height and wave height. A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water in close proximity to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. This is the situation along most of the Atlantic Ocean coastline, which is the source of impact for the County.

Storm surge is caused by the frictional forces of hurricane winds on the water's surface, resulting in a high dome of wind-driven water. This surge of water contains immense, destructive power. Debris propelled by the storm surge can also act as a battering ram destroying objects in its path.

Geographic Areas Affected by Tropical Cyclones

- ✓ Hurricane Dora (1964) was the last storm that brought sustained hurricane force winds with landfall in Duval County.
- ✓ Hurricane Matthew (2016) skirted the east coast of Florida, bringing tropical storm force winds. Damage estimates exceed $55 million dollars.
- ✓ Hurricane Irma (2017) travelled across the state before bringing hurricane force wind gusts, ten inches of rain, and nearly six feet of surge to the St. Johns River. Damage estimates exceed $77 million dollars.

Historical Occurrences of Tropical Cyclones

In the last 5 years, there have been 7 tropical cyclones affecting Duval County with an estimated $10 million in property damage. The NWS reported that during the 172-year period from 1851 to 2023, 104 tropical cyclones, 79 tropical storms, and 25 hurricanes have passed within 65nm of Jacksonville. In Duval County, the most expensive disasters related to tropical cyclones have occurred within the past 10 years. Historical records and recent data are described below:

Hurricane Dora (1964) produced significant tidal effects and caused the highest recorded flooding of the St. Johns River in the 20th century. High levels of rainfall during the storm and in the four-days following Hurricane Dora, with abnormally high tides sustained by strong offshore winds of long duration, produced river flooding that caused over $100 million in damages total, and $2 million dollars in damages locally. According to the Geological Survey prepared in cooperation with federal, state, and local agencies, the highest tides from this hurricane in 1964 was in the St. Augustine Area, where observers reported tides estimated at 12 feet high. Strong southerly winds caused the river to overtop its north bank in

the area where the river turns east to the Atlantic Ocean. The one fatality in Florida directly attributed to the storm was a drowning at Live Oak. High tides along the Atlantic coast caused extensive beach erosion, inundated most beach communities, and washed out or undermined beach roads. High winds in Duval County, including metropolitan Jacksonville, caused a massive utilities failure. Numerous trees were uprooted throughout the coastal counties and added to the overall destruction when they fell on buildings and utility lines. The wind-induced flooding along the St. Johns River in Duval County forced the evacuation of several riverfront communities *(Source: Water Shortage Plan Report; USGS).*

Significant recent events include:

Hurricane Matthew (2016) brought a high storm surge, where several NOS tide gauges from Mayport, as well as along the St. Johns River, measured their highest water levels on record. In Florida, the combined effects of surge and tide produced maximum inundation levels of 5 to 7 feet above ground level along the coasts of Flagler, St. Johns, and Duval Counties. According to the NWS, Peak Water Levels at CO-OPS stations exceed historical maximum water levels (MHHW):

- Mayport, Bar Pilots Dock, FL: 3.28 feet. The previous record was 2.47 feet during Hurricane Gabrielle 2001.
- Dames Point, FL: 2.80 feet. The previous record 2.40 feet during Hurricane Sandy in 2012.
- Red Bay Point, St Johns River, FL: 3.24 feet. The previous record 2.93 feet during Hurricane Jeanne in 2004. (*Source: Hurricane Matthew Data. NOAA. 2016*).

Hurricane Irma (2017) brought a high storm surge and, according to the NWS, the St Johns River at the Buckman Bridge set a record flood stage at 5.63 feet. Pottsburg Creek at Beach Blvd. set the record flood stage at 5.84 feet. Pottsburg Creek at Bowden Rd. set the record flood stage at 10.04 feet. Trout River at Lem Turner Rd. crested at 4.16 feet. Approximately 3.3 million customers were without power in Florida following Hurricane Irma.

Tropical Storm Nicole (2023) brought a high storm surge of 3.82 feet at I-295 at the Buckman Bridge, 3.29 feet at the Southbank Riverwalk along the St Johns River, and 3.57 feet at Mayport.

Hurricane Debby (2024) brought a high storm surge of 1.92 .10 feet at Broward Rive below Biscayne Blvd.

Hurricane Helene (2024) brought a high storm surge of 2.10 feet at I-295 at the Buckman Bridge and 2.01 feet at the Southbank Riverwalk along the St Johns River.

Hurricane Milton (2024) brought a high storm surge of 3.01 feet at I-295 at the Buckman Bridge and 2.57 feet at the Southbank Riverwalk along the St Johns River.

The Hurricane Evacuation Zone Map for Duval County was last updated in 2014, taking into consideration updated NWS topographical surveys and additional data on wind, storm surge, and flooding.

Table 26: Potential Storm High Tide

Storm Strength	Category 1	Category 2	Category 3	Category 4	Category 5
Duval	0 < 6.6’	6.7’ < 11.0’	11.1’ < 19.9’	20.0’ < 22.2’	22.3’ < 28.2’

Table 27: Duval County Hurricane, Tropical Depression, and Tropical Storm Records, 1950-2024

Hurricanes and Tropical Storms (Duval)	
Number of Days with Event	27
Number of Days with Death	2
Number of Days with Injury	2
Number of Days with Property Damage	3
Number of Days with Crop Damage	0

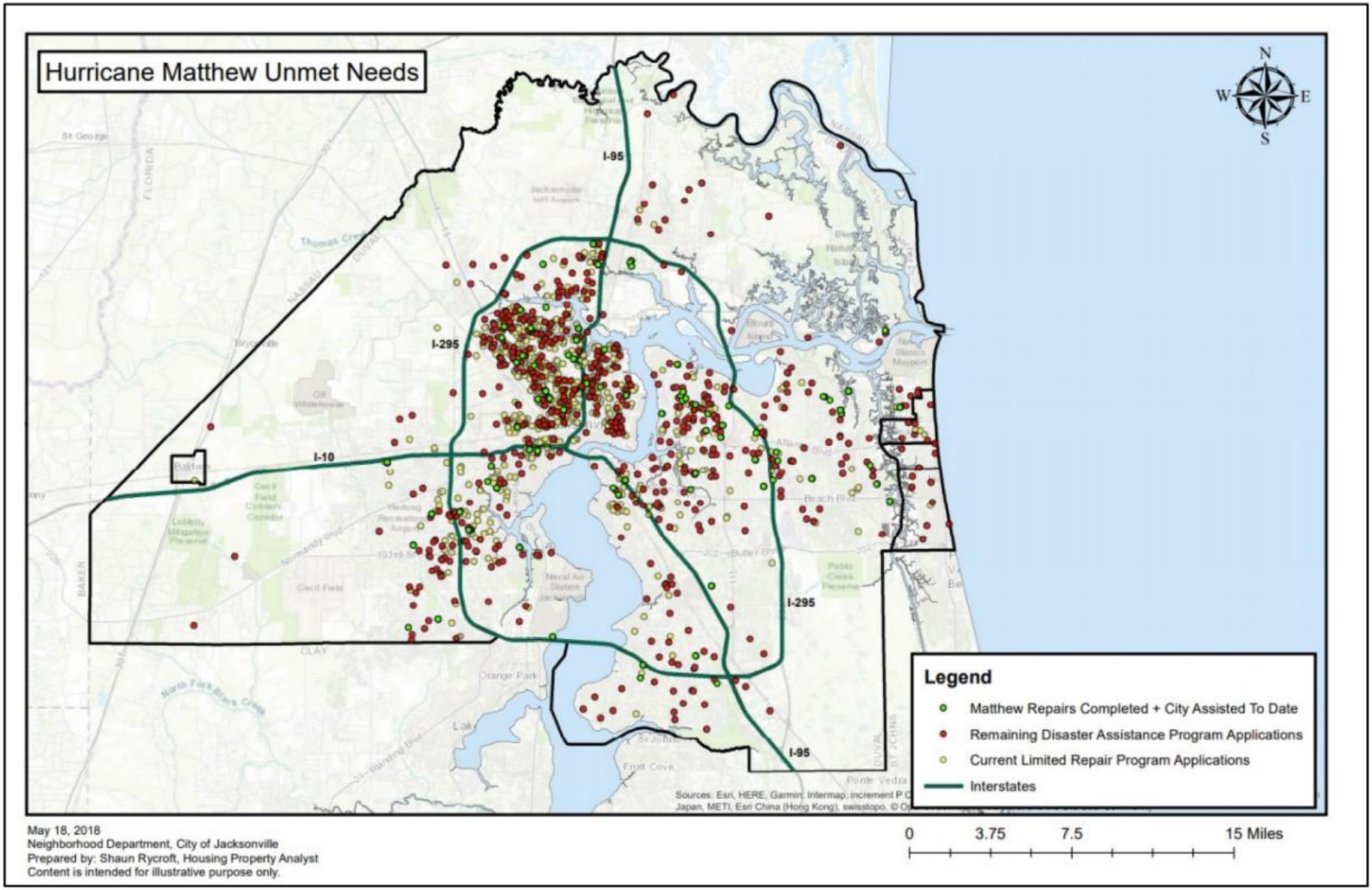
36 events were reported between 01/01/1950 and 10/31/2024 (27060 days)

Source: Storm Events Database. National Centers for Environmental Information. NOAA.
Retrieved from: https://www.ncdc.noaa.gov/stormevents/

The 2021 Hurricane Evacuation Study provided maps in the Storm Tide Atlas to depict SLOSH-modeled surge depth and extent of flood inundation for hurricanes with five different intensities. Surge depth was modeled using the Maximum of Maximums, representing the total flooding from the five categories of storm intensity of the Saffir/Simpson Hurricane Wind Scale. *(Source: Hurricane Evacuation Study, Vol. 9, pg. 11).*

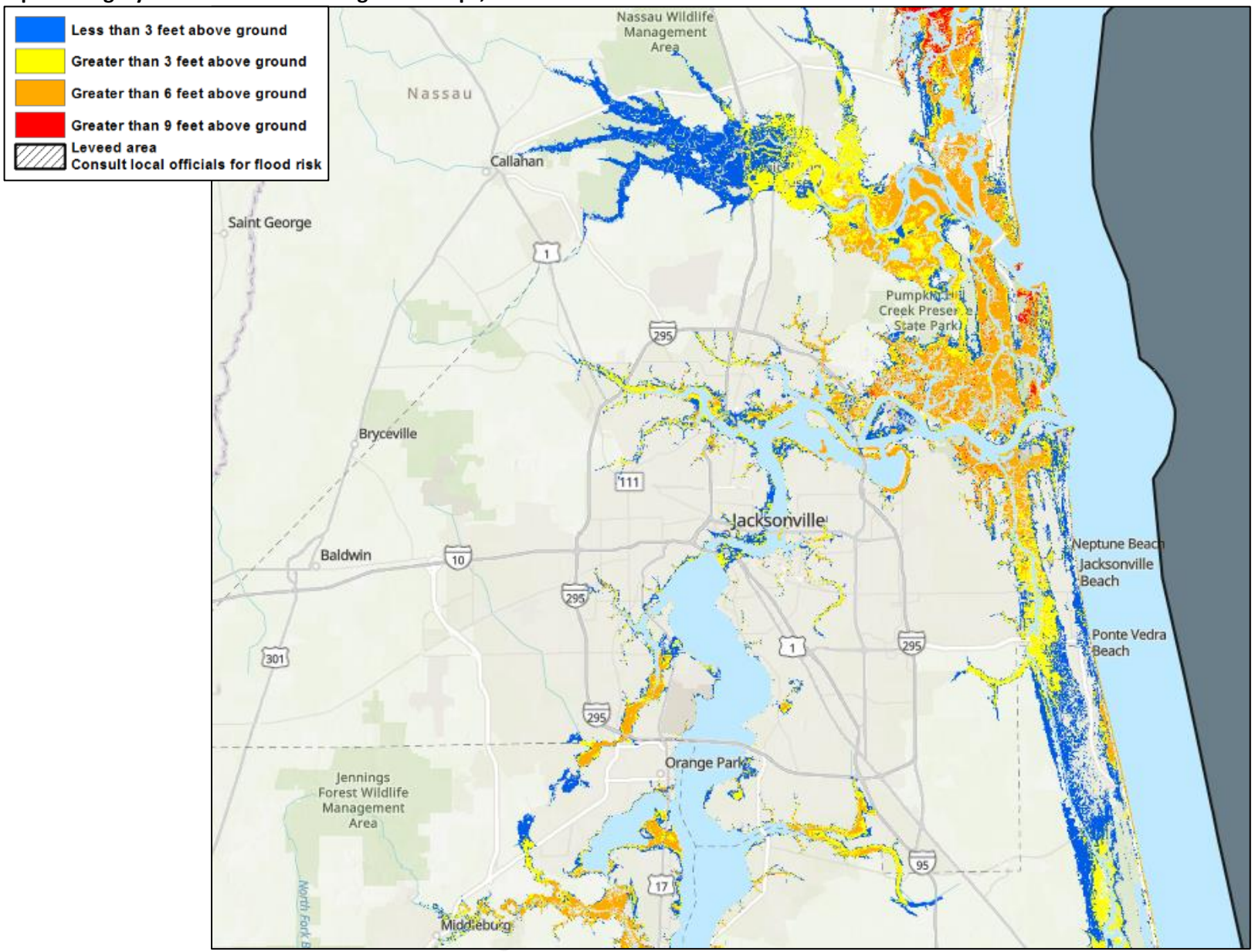
Secondary destructive forces resulting from storm surge include beach erosion and inlet formation. Studies have shown that the impact of storm surge can be expected along the entire St. Johns River and its tributaries. Storm surge and wind emanating from hurricanes can destroy or heavily damage beachfront homes, commercial establishments, piers, seawalls, boardwalks, etc. A major hurricane would likely cause massive destruction on coastal barrier islands, and particularly in coastal municipalities including Atlantic Beach, Neptune Beach, and Jacksonville Beach.

Map 7: Duval County Hurricane Matthew CDBG-DR Environmental Review, 2019



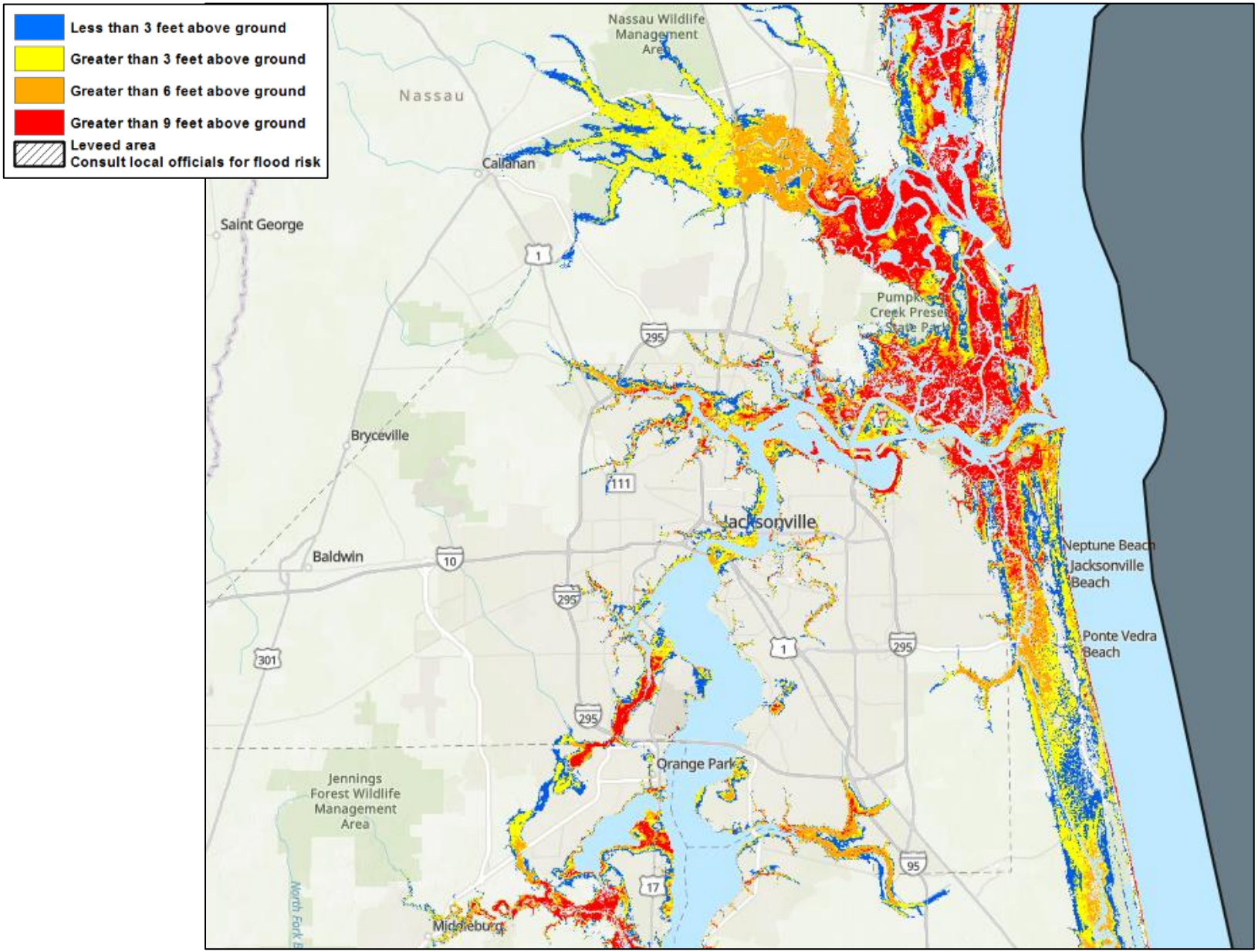
Source: COJ, Housing and Community Development Division, Community Development Block Grant – Disaster Recovery, Environmental Review
https://www.jacksonville.gov/departments/neighborhoods/housing-and-community-development/community-development-block-grant-disaster-recov/cdbg-dr-docs/matthew/environmental-review-record-city-of-jacksonville.aspx

Map 8: Category 1 Hurricane Storm Surge Risk Maps, 2024



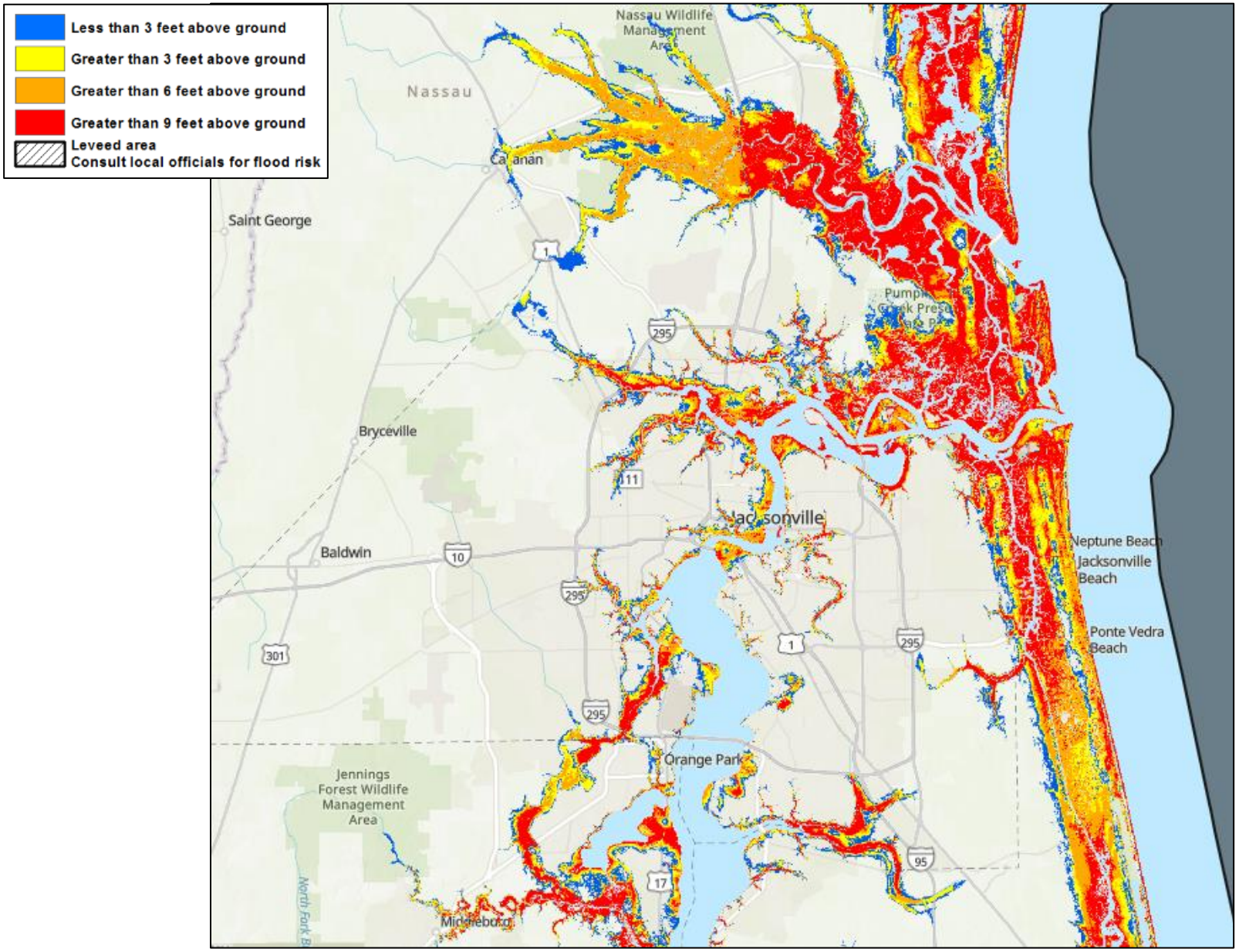
Source: Storm Surge Risk Maps, Category 1. National Hurricane Center. (2024).
Retrieved from: https://experience.arcgis.com/experience/203f772571cb48b1b8b50fdcc3272e2c/page/Category-1/

Map 9: Category 2 Hurricane Storm Surge Risk Maps, 2024



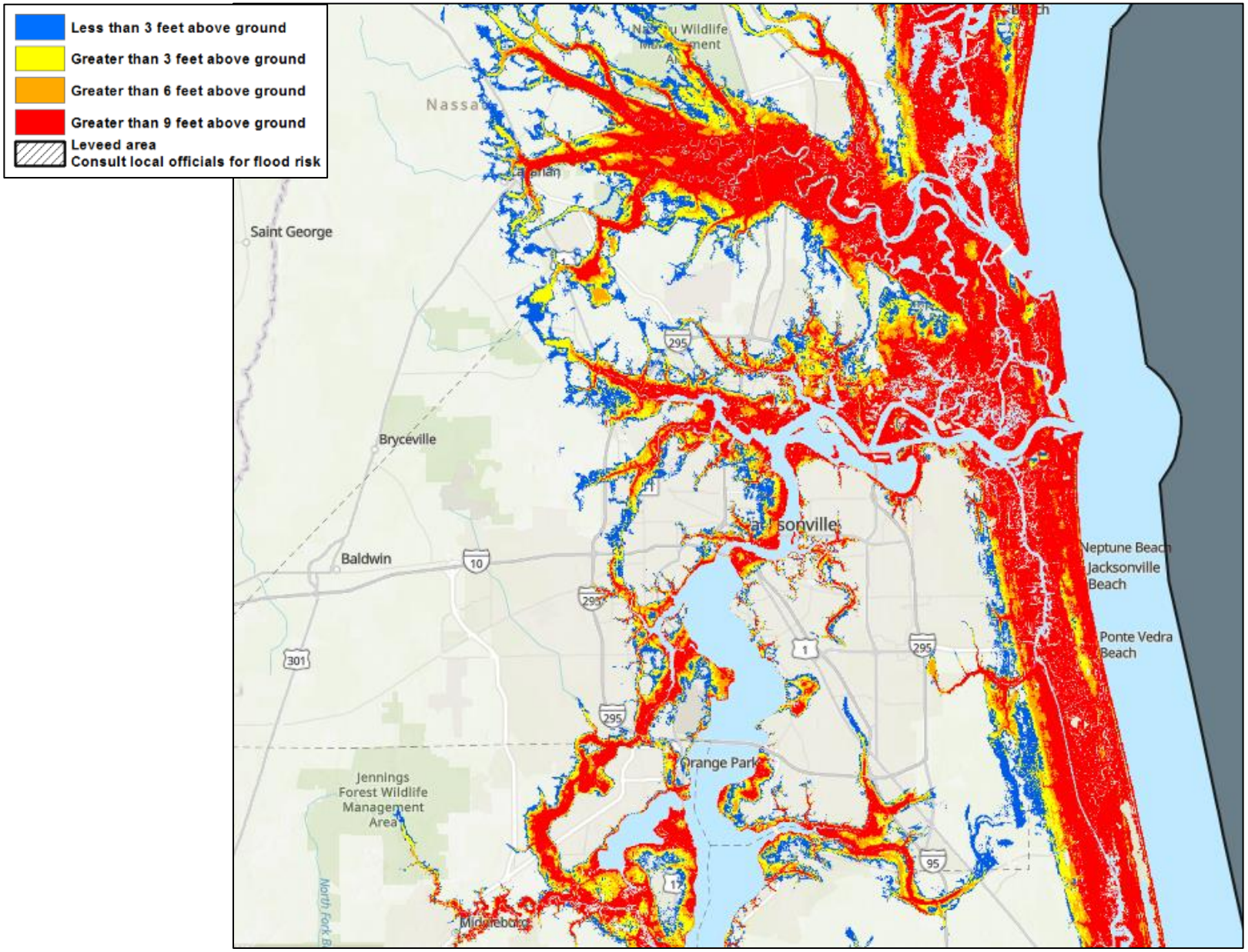
Source: Storm Surge Risk Maps, Category 2. National Hurricane Center. (2024).
Retrieved from: https://experience.arcgis.com/experience/203f772571cb48b1b8b50fdcc3272e2c/page/Category-2/

Map 10: Category 3 Hurricane Storm Surge Risk Maps, 2024



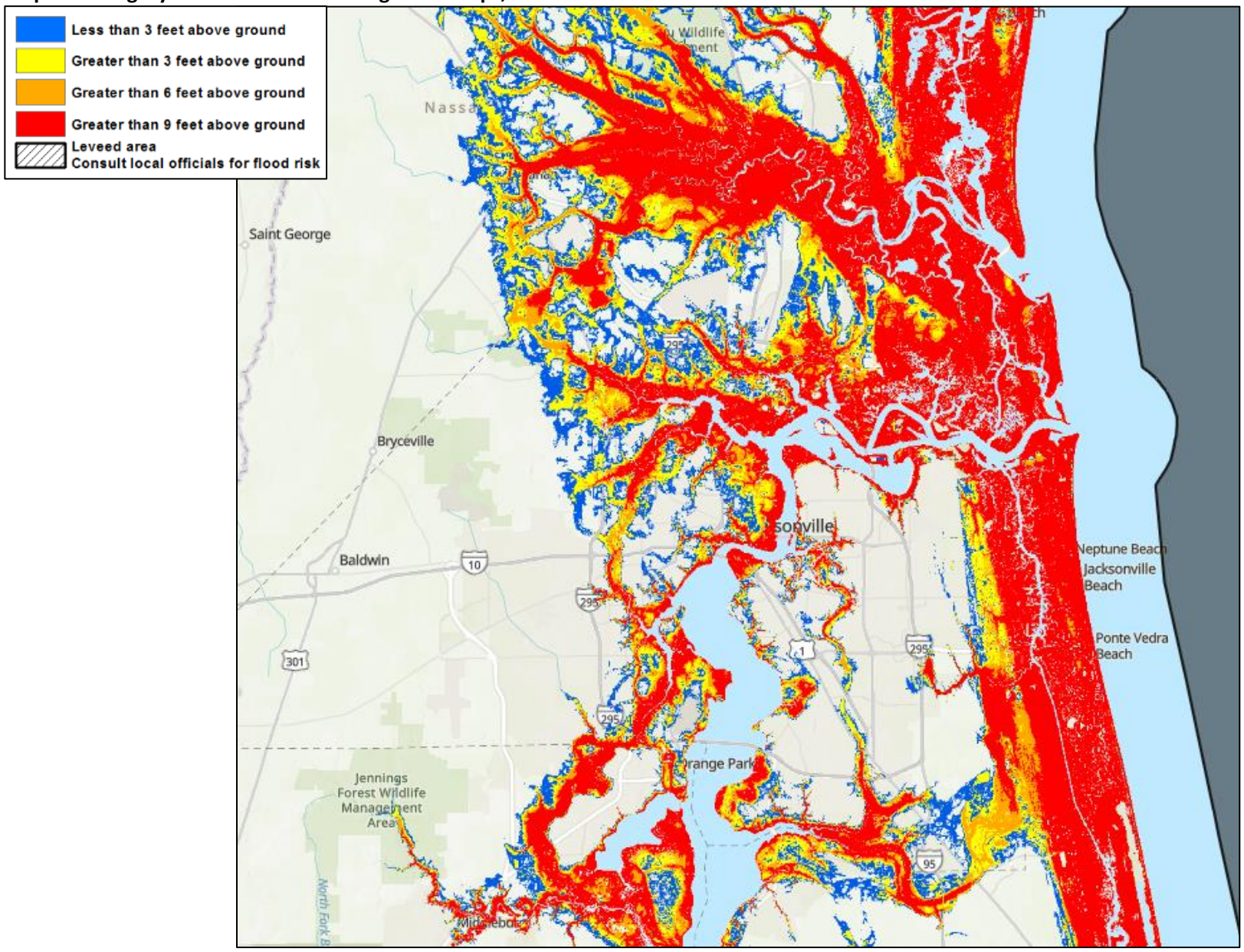
Source: Storm Surge Risk Maps, Category 3. National Hurricane Center. (2024).
Retrieved from: https://experience.arcgis.com/experience/203f772571cb48b1b8b50fdcc3272e2c/page/Category-3/

Map 11: Category 4 Hurricane Storm Surge Risk Maps, 2024



Source: Storm Surge Risk Maps, Category 4. National Hurricane Center. (2024).
Retrieved from: https://experience.arcgis.com/experience/203f772571cb48b1b8b50fdcc3272e2c/page/Category-4/

Map 12: Category 5 Hurricane Storm Surge Risk Maps, 2024



Source: Storm Surge Risk Maps, Category 5. National Hurricane Center. (2024).
Retrieved from: https://experience.arcgis.com/experience/203f772571cb48b1b8b50fdcc3272e2c/page/Category-5/

Probability of Future Tropical Cyclones

The return period for a tropical cyclone is approximately 13 years, and the return period for a major hurricane is approximately 40 years. Based on historical data and a National Hurricane Center risk analysis, tropical cyclones are most likely to affect the County with major hurricanes remaining a high-risk hazard. The Florida Building Code of 2017 eliminated the wind speed velocity zones formerly established to categorize wind speed across Duval County. The 2023 (8th Edition) Building Code requires strengthened designs and higher wind load capacities, making it one of the strongest building codes in the U.S.

Raw frequency counts do not provide a specific probability for the occurrence of a hurricane in a given year. Events do not occur evenly throughout time. Climatological patterns give rise to periods of more frequent and severe hurricanes, as well as periods in which such storms are less frequent or less severe on average. Duval County will be impacted by a tropical cyclone in the future, although the probability of a major hurricane hitting the County directly is low.

The NWS provides data for tropical cyclones that have passed within 65nm of the Downtown Jacksonville center point. A 15nm range ring distance + 65nm area of interest = 80nm used to search all storms within 65nm. COJ EPD staff used the Coastal Services Center Hurricane Tracks webpage for the period of 1851 to 2024 and searched the storm events where the center line or best track passed within 80nm of 30.330227, -81.673974, the location of the center point in downtown.

The NWS reported that during the 172-year period from 1851 to 2024, 134 tropical cyclones, including 92 tropical storms and 32 hurricanes, have passed within 65nm of Jacksonville. This presents an average of approximately one tropical cyclone within 65nm every 1.3 years. There is a very high probability that a future tropical cyclone or hurricane will create a scenario that could lead to injuries, potential deaths and property damage. Because of the high level of risk and vulnerability of coastal communities with exposure to tropical cyclonic winds, this hazard is rated with a very high degree of probable recurrence.

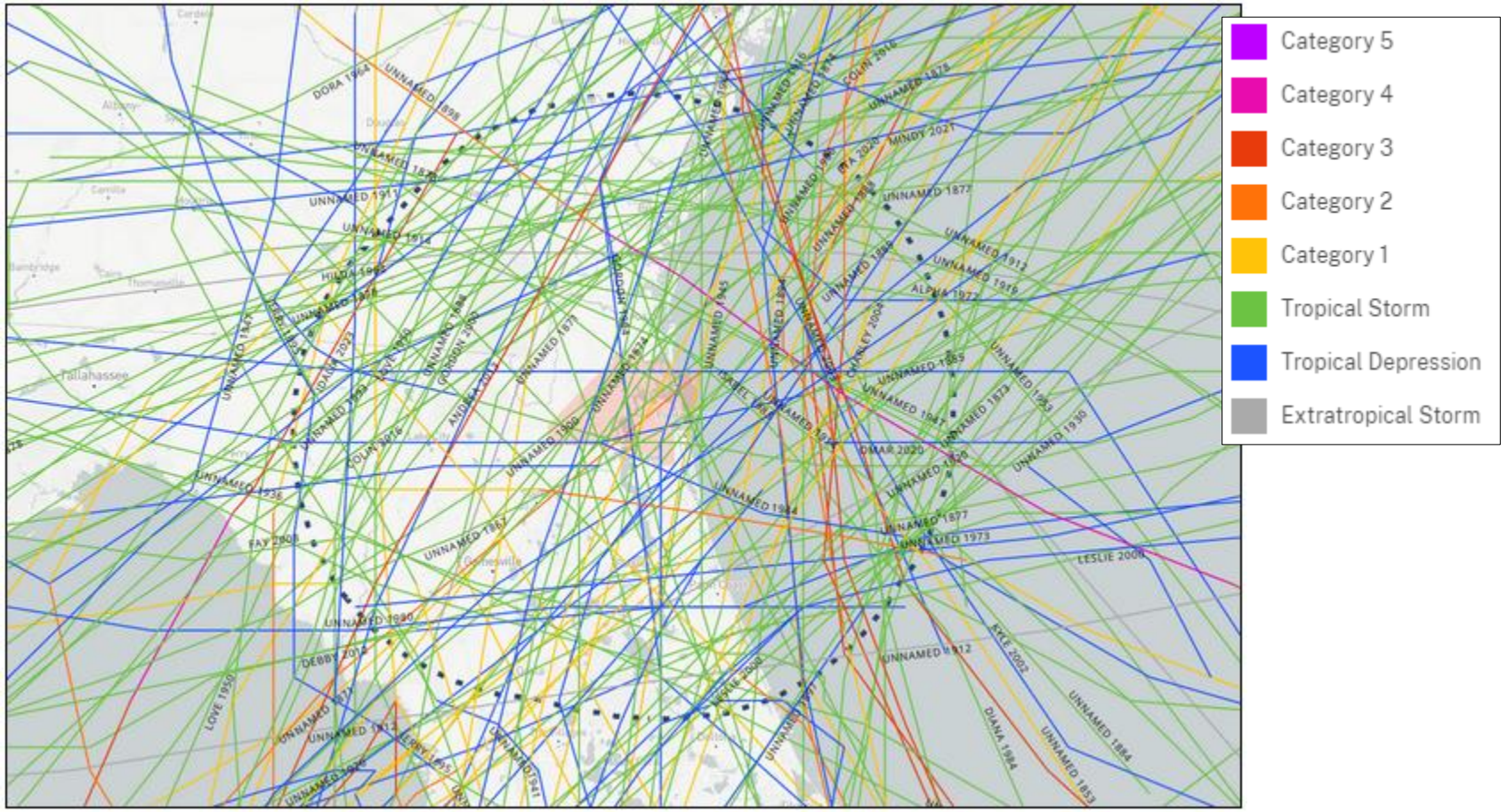
The NWS provided updates for the estimated frequency of tropical cyclone and hurricane hazards, winds, and storm surge using their ARC Mapping and GIS systems. System improvements since the previous LMS Update enabled drawing more precise shape files to configure the 65nm buffer zone statistics. The NWS used a reference point for the COJ at Latitude 30.330227, Longitude 81.673974, placing the center of the city in downtown Jacksonville, near McCoy's Creek. The NWS drew a series of buffer zones in Nautical Miles (nm) that best approximated the COJ boundary, about 15nm from the center.

Tropical Cyclones Impact Analysis

There are no geographic features within the County that mitigate wind effects. In contrast to the effects of storm surge and the high winds associated with a tropical storm, a hurricane will have an impact inland as well as coastal areas. Inland and coastal areas will experience downed trees and power lines, which result in obstructed roadways, loss of power, and structural damage. A great concern is the severity of hurricane winds that can cause widespread devastation far beyond the coastal areas. Manufactured homes and older developments throughout Duval County are particularly vulnerable to strong winds from tropical storms and hurricanes. The extensive tree canopy in the COJ will likely create large amounts of vegetative debris from a strong tropical storm or weak hurricane event.

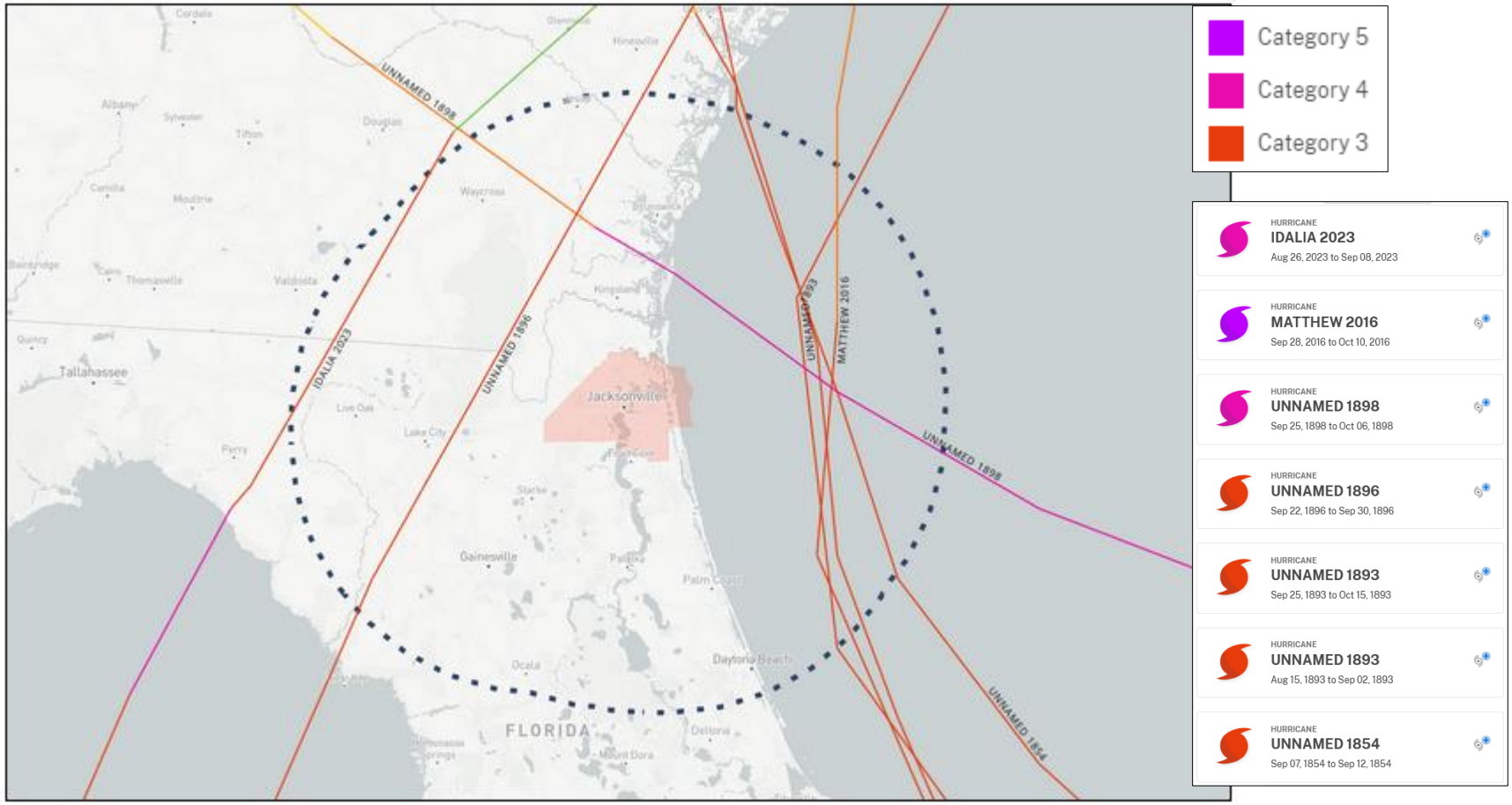
Strong winds can damage or destroy vehicles, buildings, bridges, trees, personal property, and can turn objects into loose debris or flying projectiles. Tropical cyclones and hurricanes can disrupt power, preventing vital communication, obstruct rescue efforts. Damage can include destroyed bridges, overpasses, and roads that complicate efforts to transport food, clean water, and medicine. Furthermore, the damage caused to buildings and dwellings may result in economic damage to the region or need to re-locate portions of the population.

Map 13: All Hurricanes within 65 Nautical Miles (nm) of Downtown COJ, 1851-2023



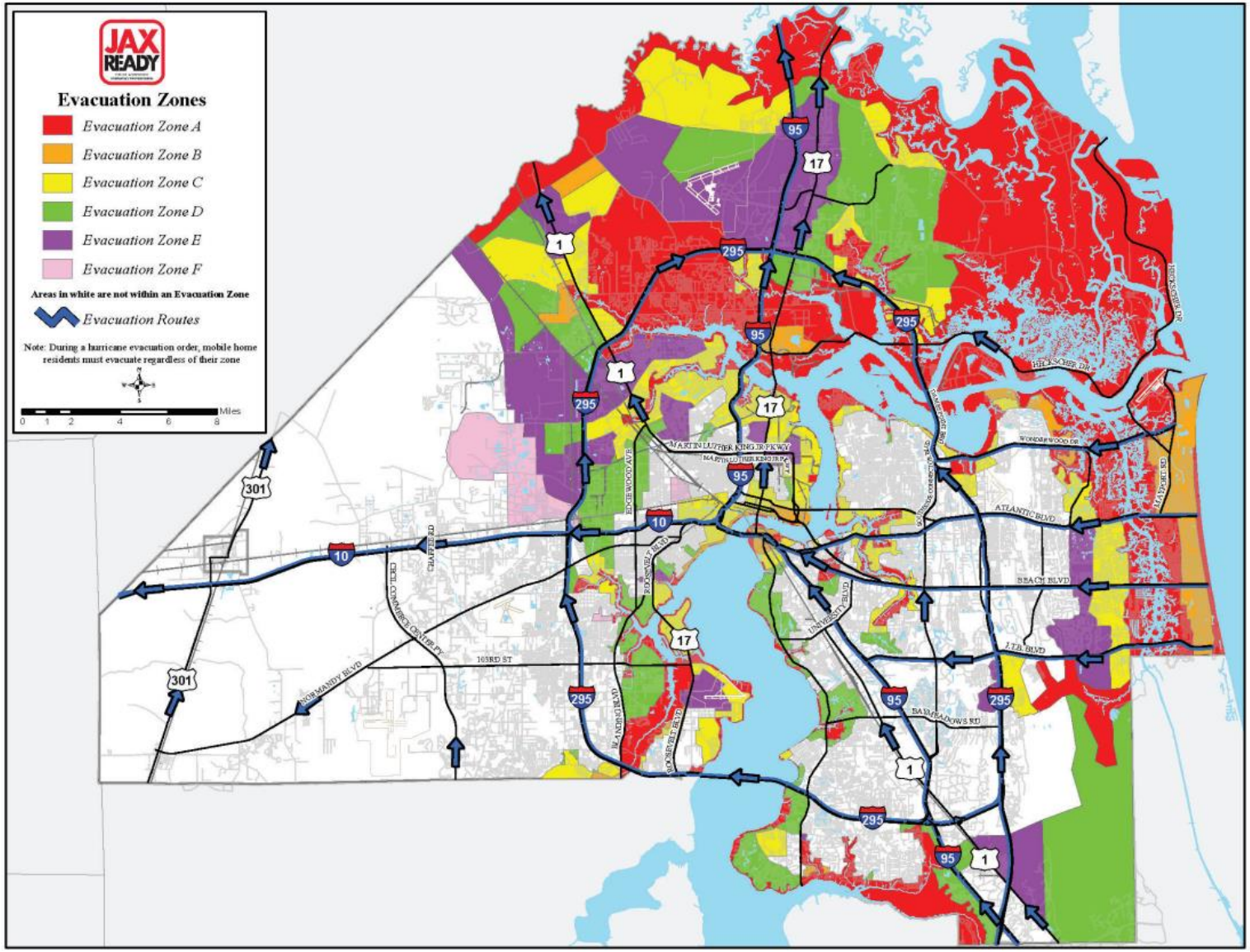
Source: Historical Hurricane Tracks. National Oceanic and Atmospheric Administration. (2024). Retrieved from: https://coast.noaa.gov/hurricanes/#map=4/32/-80

Map 14: Major Hurricanes within 65 Nautical Miles (nm) of Downtown COJ, 1851-2022



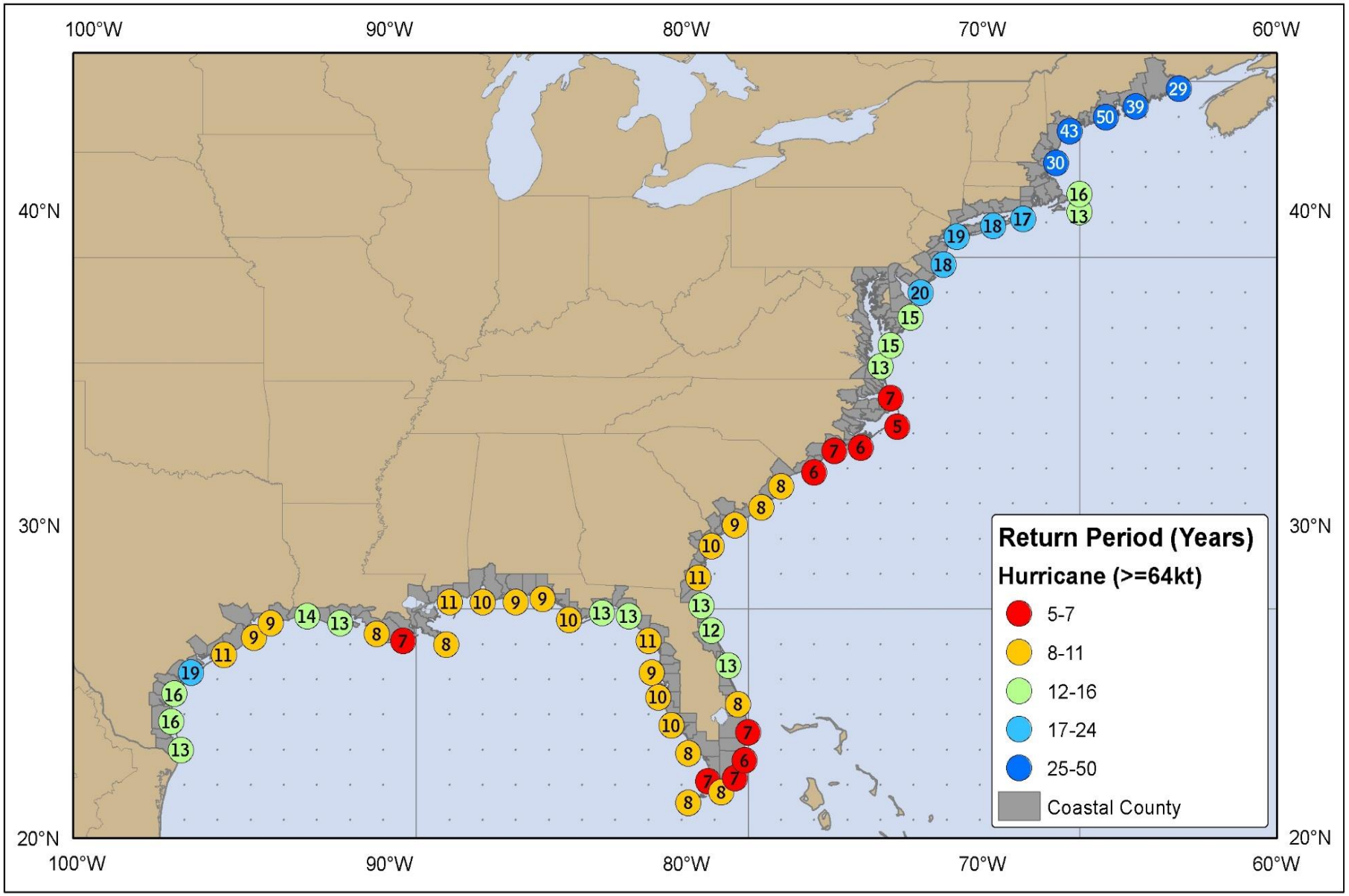
Source: Historical Hurricane Tracks. National Oceanic and Atmospheric Administration. (2024). Retrieved from: https://coast.noaa.gov/hurricanes/#map=4/32/-80

Map 15: COJ Hurricane Evacuation Zones



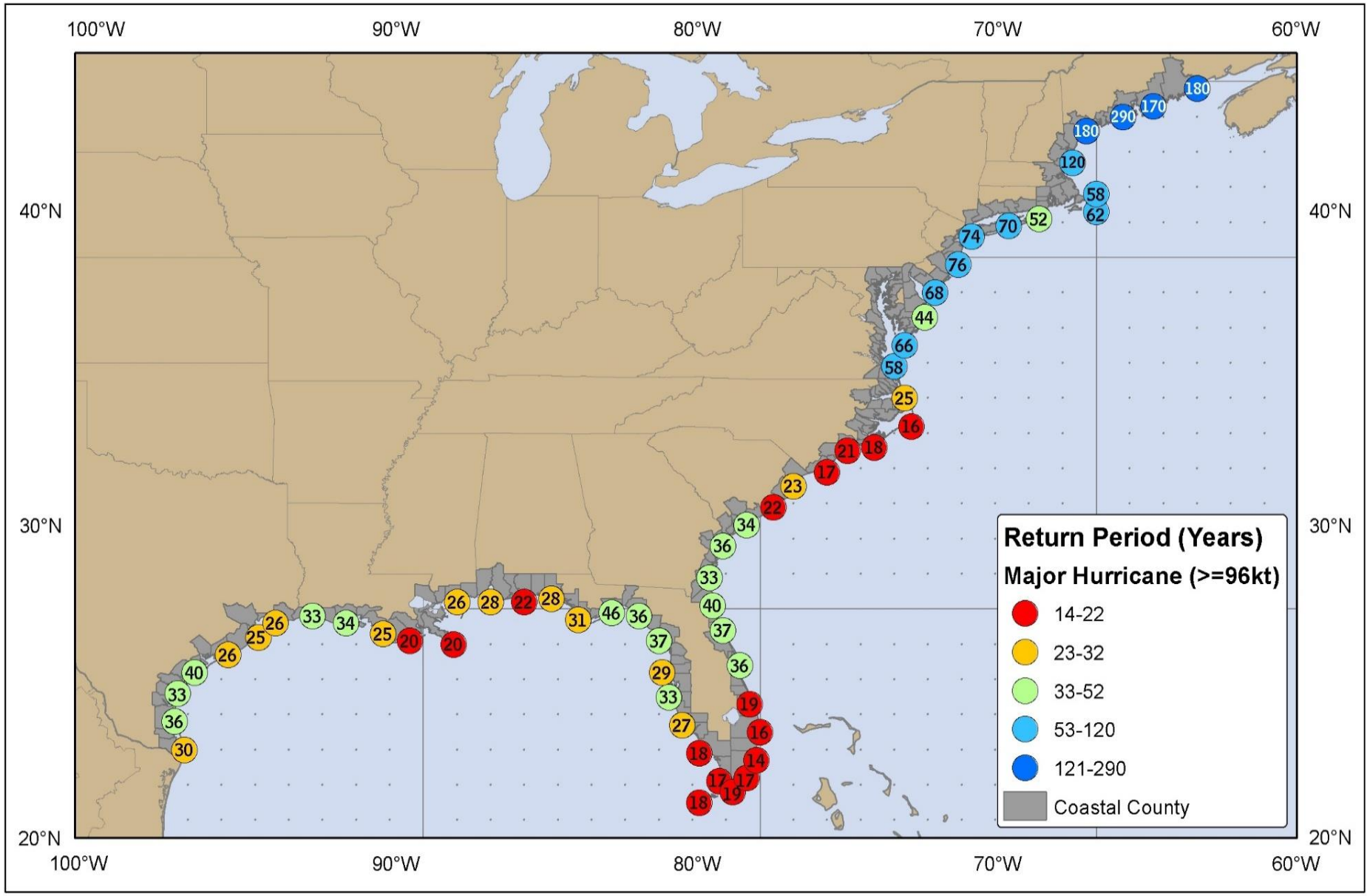
Source: Duval County Hurricane Evacuation Zones. City of Jacksonville. Retrieved from: https://www.JaxReady.com

Map 16: Estimated Recurrence of All Hurricanes within 50 Nautical Miles (nm) of the East Coast



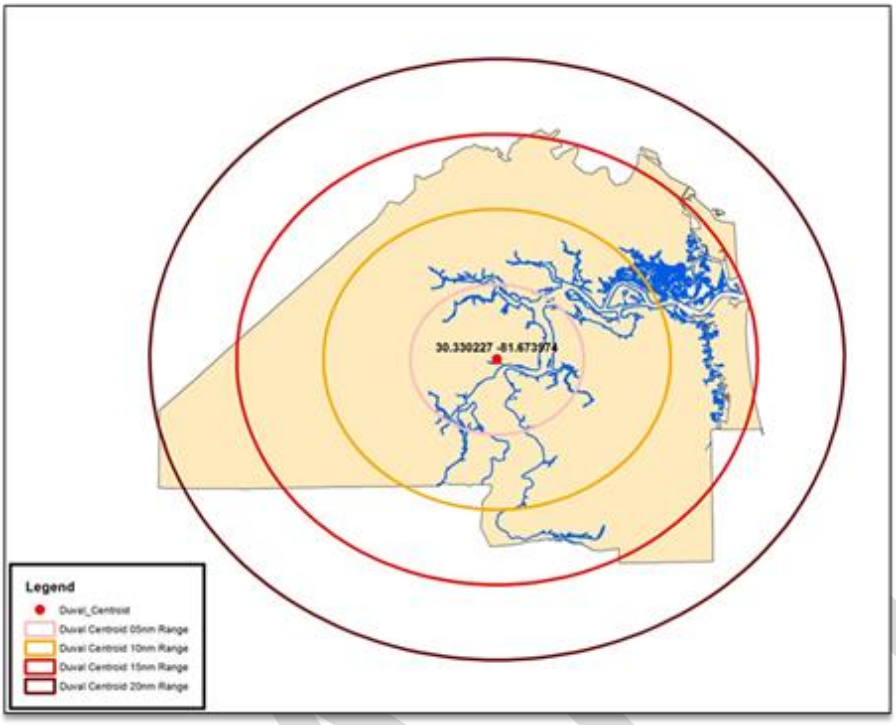
Source: National Hurricane Center , Risk Analysis Program (HURISK). Retrieved from: https://www.nhc.noaa.gov/climo/ , 2024

Map 17: Estimated Recurrence of Major Hurricanes within 50 Nautical Miles (nm) of the East Coast



Source: National Hurricane Center, Risk Analysis Program (HURISK). Retrieved from: https://www.nhc.noaa.gov/climo/ , *2024*

Figure 9: COJ Centroid Buffer



Source: National Weather Service

Some general impacts from Tropical cyclone events include:

Public

- Injury/death
  - Car accidents from flooding, high winds, panic, evacuation traffic jams, and power outages
  - Becoming isolated from emergency responders during storm
  - Delayed emergency response because of blocked roads
  - Drowning in flood waters
  - Debris related trauma
  - Stranding on roof because of flooding
  - Exposure to hazardous materials
  - Illness from contaminated water
  - Pet and other animal deaths from the above factors
- Damage to home or property
  - Power loss or damage to power connections on home
  - Mold damage causing the need for expensive mold remediation actions
  - Cost to replace damaged and destroyed items, such as furniture, drywall, and flooring
  - Cost and labor to repair damaged homes and other structures
  - If the property was uninsured, the cost falls upon the property owner
  - Hotel room fees or having to live in a shelter until damage is repaired or home is replaced
  - Damaged or washed-away vehicles
  - Lost wages because no way to get to work if roads are blocked or if vehicles were damaged in storm or if employer experienced damage
  - Possibly forced to evacuate
  - Cost of travel and lodging
  - Loss of wages if out of town
  - Loss of food and other perishable items

Responders

- Injury or death
    - Responding during tropical cyclones must be done safely
    - Responding immediately after tropical storms may be unsafe because of debris, hazardous materials, unstable transportation infrastructure, unstable structures
- Stress and mental anguish

Continuity of Operations (including continued delivery of services)

- Loss of revenue if businesses cannot operate during or after event
- Loss of wages if your employer's organization is damaged or destroyed and employees cannot work
- Utility failures such as electric or gas may prevent businesses from opening even if there is no damage
- Utility failures may impede or prevent government offices from continuing daily services
- Severe damage and interruption to transportation systems and infrastructure such as roads and bridges, communication systems, power, water, wastewater

Property, Facilities, Infrastructure

- Damaged or destroyed property, such as homes and other buildings
- Roofing is particularly susceptible to damage from high winds
- The first floor of many buildings, plus all the items on lower levels are susceptible to severe damage from flooding

Cost of repairing damage to property such as buildings

- Cost of replacing items damaged such as furniture on the first floor of a flooded home
- Crop damage or loss
- Damage to transportation infrastructure, like a road being washed out or a bridge collapsing
- Inability to get clean water
- Inability to control wastewater
- Release of hazardous materials

Environment

- Beach and dune erosion
- Downed trees
- Eroded riverbanks
- Release of hazardous materials
- Loss or damage to habitat for animals because of flooding or high winds
- Crop damage or loss
- Event generated marine debris impacting waterway navigation and submerged wetland habitats

Economic Condition

- Damaged and destroyed businesses leading to long-term closures and possibly permanent closures
- Delayed re-opening of businesses because of utility issues or road blockages
- Crop damage or loss from flooding and high winds
- Absenteeism from work
- Loss of tourism because of eroded beaches or damaged attractions

Public Confidence in Jurisdiction's Governance

- How evacuation and shelter orders are viewed by the public
- How official communications are viewed by the public

<u>Potential Effects of Climate Change on Tropical Cyclones</u>

According to the 2023 State of Florida Enhanced Hazard Mitigation Plan, a warmer atmosphere could influence multiple factors that generate and strengthen tropical cyclones. A warmer atmosphere will lead to increased thermal energy from higher sea surface temperatures and result in increased vertical wind shear. Tropical cyclone tracks and the probability a

storm will make landfall in Florida could be influenced by atmospheric steering currents as well as El Niño-Southern Oscillation, North Atlantic Oscillation, Atlantic Meridional Mode, and Madden-Julian Oscillation. As stated in the Flood Hazard Profile below, higher rainfall intensity is likely to increase and, when paired with expected Sea Level Rise, will produce more dramatic flooding from storm surge both inland and along the more vulnerable coastal areas.

Vulnerability Analysis and Loss Estimation

The risk of death, injury, and property damage from winds and storm surge from a category 1 or 2 hurricane is greatest at the Beach Municipalities; extending north from Ponte Vedra to the northern coastal boundary of Duval. The below four areas will experience category 2 force winds in addition to the Beaches;

1. South of the St. Johns River from Mill Cove to the Charter Point area, north of Fort Caroline Rd.;
2. The north bank of the St. Johns River from the intersection of Heckscher Drive and Imeson Park Blvd. west to I-95 and south to 27th street;
3. The north bank of the river in the eastern quadrant of the downtown core from State St. on the north west to Main St.;
4. The western bank of the St. Johns River from the intersection of King St. and the river bank in Riverside west to Cassat Ave. and south to Wilson Blvd. near Ortega; continuing all lands east of Roosevelt Blvd. as far south as the I-295 and the County line.

All of these areas are primarily residential with densities in the 3 to 4 dwelling units per acre. Preliminary indications from storm surge calculations show a category 2 hurricane would cause significant flooding and is expected to be, in a worst-case scenario, across all the land from Third Ave. and the Atlantic Ocean in all three Beach communities. Flooding is also projected to cover the City of Atlantic Beach, almost entirely. Land on both sides of the ICW from Beach Blvd. on the north, San Pablo Rd. on the west, and Butler Blvd. on the south is expected to be below 3 to 4 feet under water. The next largest area affected by storm surge are the lands north and south of the Trout River and Ribault River basins in northwest Jacksonville's Riverview neighborhood. Most of the other affected lands are relatively small in size and include the north end of University Blvd., both sides of the Arlington River, and parts of the San Marco, Riverside, and Ortega neighborhoods.

Areas with the highest level of risk include coastal barrier islands, particularly in the coastal municipalities of COAB, COJB and CONB. Based on the recently updated storm surge data, planned bridge closures at the onset of tropical storm force winds, and the anticipated inundation of low-lying roads, most land east of the ICW is included in the Evacuation Zone A and B for a Category 2 or higher rated hurricane event.

In addition to residents living in low-lying or flood-prone areas, residents who live in manufactured housing and structures built to older, less robust building code standards are also vulnerable to hurricanes and tropical storms. According to the 2022 5-year Estimates from the Census Data Table, manufactured housing makes up 14,612 units out of 411,541 units, or 3.6% of COJ housing structures. Federal law passed after Hurricane Andrew in 1992 requires manufactured housing be constructed with two-inch by six-inch lumber, have tie-downs, and be able to withstand winds of 110 miles per hour on the coast and 100 miles per hour inland. However, approximately 90% of the 849,000 Florida manufactured housing *(Source: Census of Housing; U.S. Census Bureau; Revised 2020)*, were built before the 1992 law was enacted. The older manufactured homes built before 1976 had no wind requirements, and those built after 1976 were built to withstand 90 mile per hour winds (Source: The Tornado Project).

The 2021 Hurricane Evacuation Study identified populations vulnerable to the effects of hurricanes and analyzed the behavioral patterns of those people. The new data incorporates a storm's angle of approach, direction and intensity, and the risks of isolation from road blockage, indicating the areas of impact. Based on the recent storm surge data, and the anticipated inundation of low-lying roads, most of the land east of the ICW is included in the Evacuation Zone A and B, for a Category 2 or higher rated hurricane event.

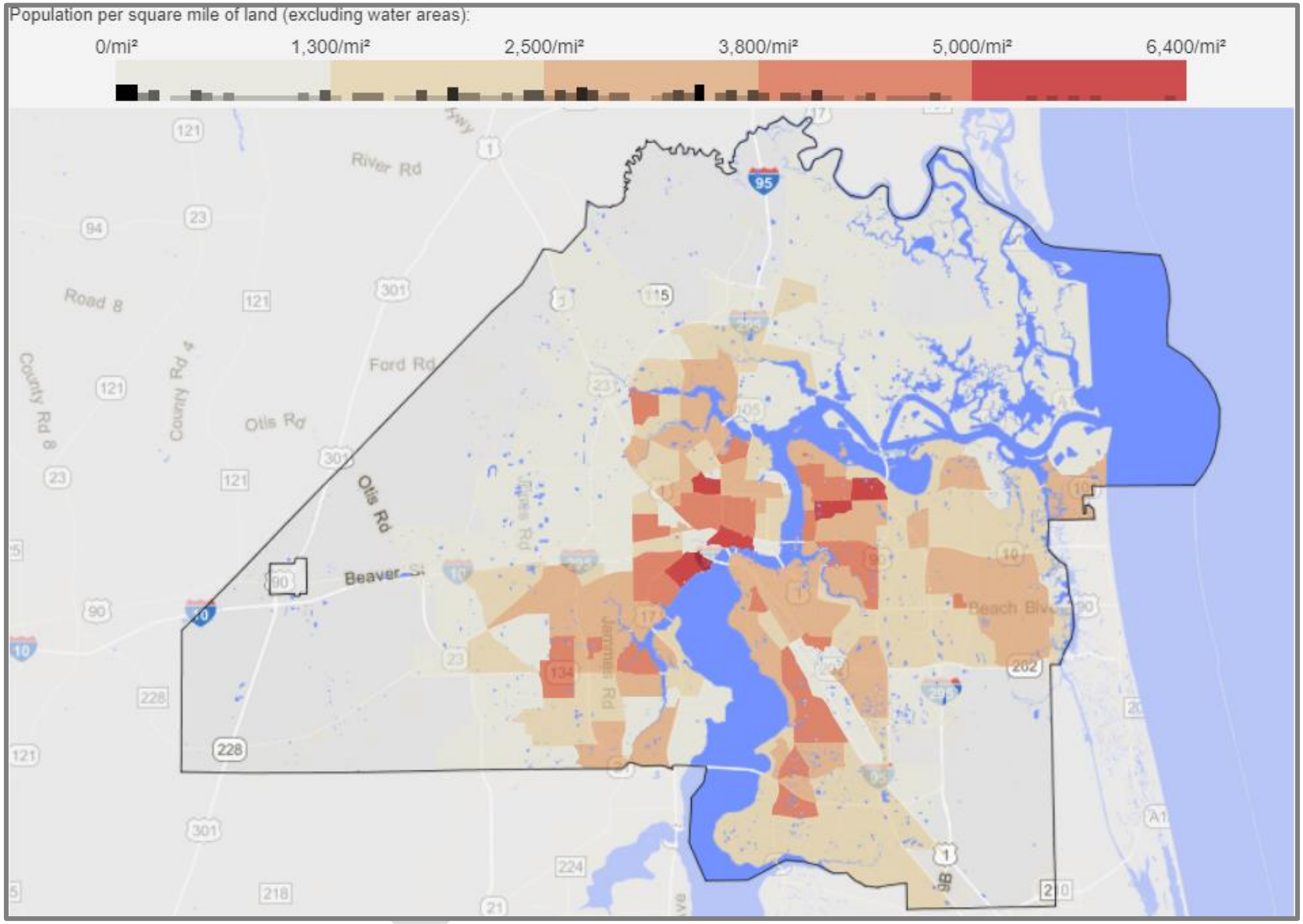
Areas most at risk from storm surge are those located in Evacuation Zones A through E, as established through the 2014 COJ evacuation zones update process. The areas that would flood first are Evacuation Zones A and B and a new category including freshwater flooding, Zone F. The COJ GIS Division estimates the expected numbers of people in evacuation Zones A through E is approximately 722,000 persons *(Source: JaxGIS; COJ 2019).*

The flooding hazard associated with storm surge and wind-driven water emanating from a Category 1 or Category 2 hurricane can damage piers, seawalls, and boardwalks. Storm surge and wind associated with a Category 3 or higher can cause extensive damage to coastal barrier islands, particularly in coastal municipalities of COAB, COJB and CONB.

Although a total evacuation of all 949,611 residents and a variable number of visitors is achievable, the clearance times for a fast-moving Category 4 or 5 hurricane could require evacuation start times beyond the current ability to accurately predict a storm's location of landfall and intensity *(Source: 2022 estimates from the U.S. Census American Fact Finder and Quick Facts, Retrieved August 2024)*. The clearance time requirements increase if the magnitude of the storm or its predicted landfall requires the evacuation of adjacent counties. The problems that arise from merging the evacuees from Duval and neighboring counties may extend clearance times beyond reasonable limits. As a result, residents of Duval County are encouraged to shelter in place as a last resort unless they are utilizing air transportation or are able to successfully evacuate when instructed to do so.

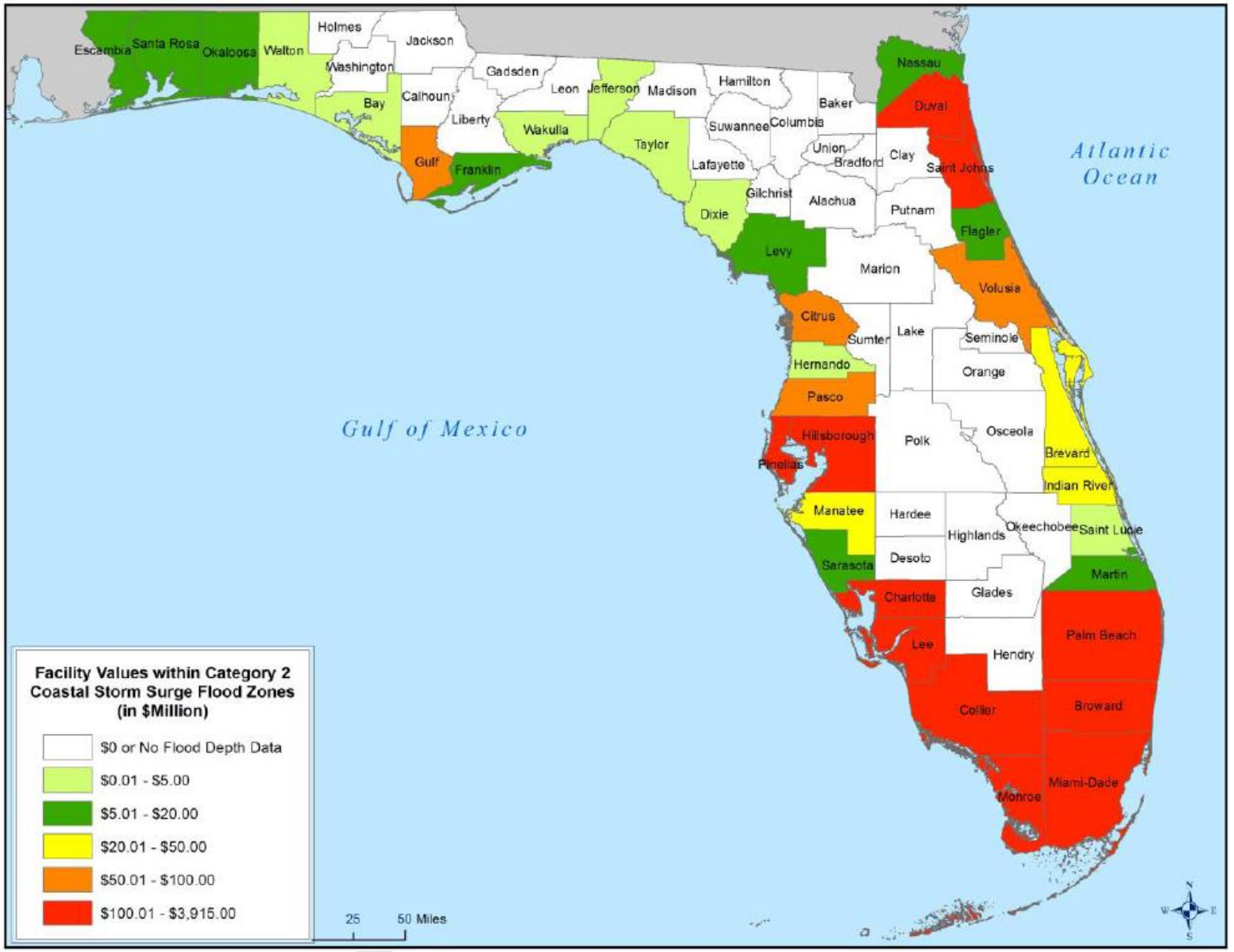
According to the Florida State Risk Assessment for a category 2 hurricane, Duval County has 51 facility types that could be affected by some level of surge worth $307.7 million dollars. For a category 5 hurricane, Duval County has 236 total facilities with a value of $952.51 million dollars.
(Source: Section 3.0 State Risk Assessment; Florida Disaster.org; August 2013. Retrieved from: https://www.floridadisaster.org/contentassets/d493c8a71f1d46a2a69045fea878c9c8/section20320state20risk20assessment20final.pdf)

Map 18: Duval County Population per Square Mile, 2024



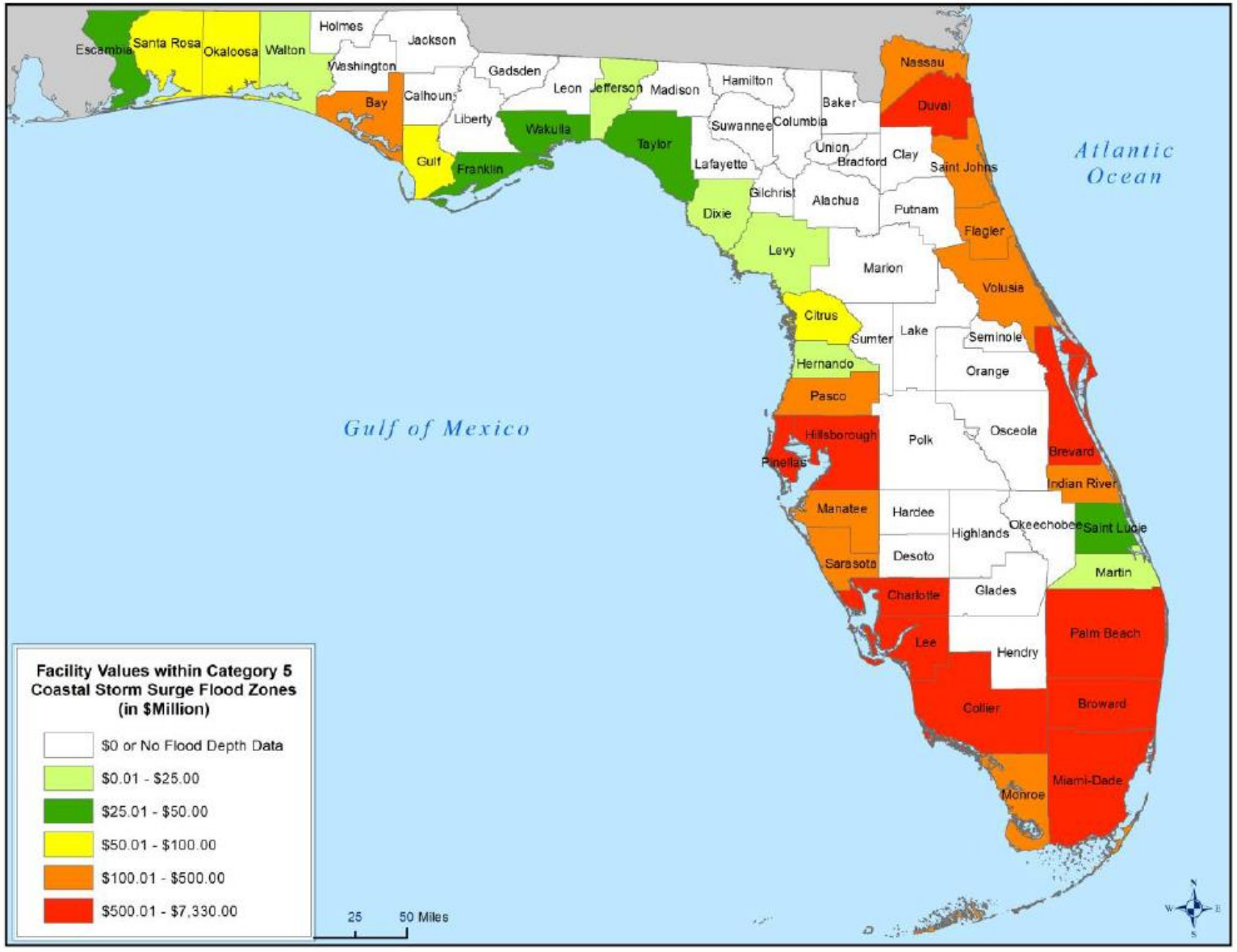
Source: Population of Jacksonville, FL. Statistical Atlas. Accessed July 2024. *Retrieved from:* https://statisticalatlas.com/place/Florida/Jacksonville/Population

Map 19: State of Florida Facility Values Vulnerable to Storm Surge; Category 2 Hurricane



Source: State of Florida Enhanced Hazard Mitigation Plan (2018), pg. 3.62
Retrieved from: https://www.floridadisaster.org/globalassets/dem/mitigation/mitigate-fl--shmp/shmp-2018-full_final_approved.6.11.2018.pdf

Map 20: State of Florida Facility Values Vulnerable to Storm Surge; Category 5 Hurricane



Source: State of Florida Enhanced Hazard Mitigation Plan (2018), pg. 3.63
Retrieved from: https://www.floridadisaster.org/globalassets/dem/mitigation/mitigate-fl--shmp/shmp-2018-full_final_approved.6.11.2018.pdf

2.

Severe Weather

Hazard Profile

2. Severe Weather Hazard Profile

<table>
<tr><th colspan="5">Severe Weather Hazard Profile</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">Very High

26 / 30</td></tr>
<tr><td colspan="4">Thunderstorms, lightning, hail, and tornados are combined into one severe weather hazard. A thunderstorm is a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder. Lightning is an electrical discharge in the atmosphere between clouds, the air, or the ground. Energy from lightning channels heat the air to around 18,000 degrees Fahrenheit. This causes the air to rapidly expand, creating a sound wave known as thunder. Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust and debris.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="3">Potential Magnitude</td></tr>
<tr><td rowspan="2">Very High
10 / 10</td><td rowspan="2">Very High
5 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Moderate
3 / 5</td><td>High
4 / 5</td><td>High
4 / 5</td></tr>
</table>

Severe Weather (Thunderstorms, Tornadoes, Hail) Description

The 2015 LMS update combined thunderstorms, lightning, hail, and tornadoes into one hazard profile: Severe Weather. Severe weather risk categories are utilized by the Storm Prediction Center to describe the potential extent of the impacts from severe weather events.

- A **thunderstorm** is a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder.
- **Lightning** is a giant spark of electricity in the atmosphere between clouds, the air, or the ground. Energy from a lightning channel heats the air to around 18,000 degrees Fahrenheit. This causes the air to rapidly expand, creating a sound wave known as thunder.
- **Hail** is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice.
- A **tornado** is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust and debris.

Below are the advisories that the NWS issues regarding severe weather:

- Severe Thunderstorm Watch: Issued when severe thunderstorms are possible in and near the watch area. It does not mean that they will occur. It only means they are possible.
- Severe Thunderstorm Warning: Issued when severe thunderstorms are occurring or imminent in the warning area.
- Tornado Watch: Issued when severe thunderstorms and tornadoes are possible in and near the watch area. It does not mean that they will occur, it only means they are possible.

- Tornado Warning: Issued when a tornado is imminent. Seek safe shelter immediately.
- Flash Flood Watch: Issued when conditions are favorable for flooding. It does not mean flooding will occur, but it is possible.
- Flash Flood Warning: Issued when flooding is imminent or occurring.

The Severe Weather Risks categorized by the NWS Storm Prediction Center are:

- **TSTM (light green)** - General or non-severe thunderstorms - Delineates, to the right of a line, where a 10% or greater probability of thunderstorms is forecast during the valid period.
- **1-MRGL (dark green)** - Marginal risk - An area of severe storms of either limited organization and longevity, or very low coverage and marginal intensity.
- **2-SLGT (yellow)** - Slight risk - An area of organized severe storms, which is not widespread in coverage with varying levels of intensity.
- **3-ENH (orange)** - Enhanced risk - An area of greater (relative to Slight risk) severe storm coverage with varying levels of intensity.
- **4-MDT (red)** - Moderate risk - An area where widespread severe weather with several tornadoes and/or numerous severe thunderstorms is likely, some of which should be intense. This risk is usually reserved for days with several supercells producing intense tornadoes and very large hail, or intense squall line with widespread wind damage.
- **5-HIGH (magenta)** - High risk - An area where a severe weather outbreak is expected from either numerous intense and long-tracked tornadoes or a long-lived derecho-producing thunderstorm complex that produces hurricane-force wind gusts and widespread damage. This risk is reserved for when high confidence exists in widespread coverage of severe weather with embedded instances of extreme severity, including violent tornadoes or very damaging convective wind events.

Geographic Areas Affected by Severe Storms

All geographic areas of Duval County are affected by severe thunderstorms and the secondary flooding, power outages, lightning-generated fires, and storm-generated debris. Severe flooding and wind damage have both resulted in Presidential Declarations of Disaster for the County in the past. All of Duval County is vulnerable to tornados, although the risk for any given sector is low. Tropical cyclone and hurricane wind shear allows for thunderstorms to start spinning, which starts the processes that can lead to tornadoes. Tropical tornadoes typically occur in thunderstorms on the outer bands of a tropical cyclone where the warm humid air feeds into the cell.

Historic Occurrences of Severe Weather

In the last 5 years, there have been 181 severe weather events reported in Duval County (Hail, Lightning, Thunderstorms, and Tornados) with an estimated of $1.26 million in property damage . According to the NWS, Duval County experienced 1,161 severe weather events from 1950 through 2023, averaging 15.90 events based on 73 years of data. From 1950-2023, 40 injuries, 6 deaths, and $33.73 million in property damages have been associated with these events.

Table 28: Duval County Severe Weather Events, 1950-2023

1,161 events were reported between 01/01/1950 and 12/31/2023 (27028 days)

Hail, Lightning, Thunderstorms, and Tornados (Duval)	
Number of Days with Event	608
Number of Days with Death	6
Number of Days with Injury	40
Number of Days with Property Damage	241
Number of Days with Crop Damage	1

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

During the 2004 Hurricane Season, Duval County was included in three Presidential Disaster Declarations: Hurricane Charley and Tropical Storm Bonnie (FEMA-1539-DR-FL), Hurricane Frances (FEMA-1545-DR-FL), and Hurricane Jeanne (FEMA-1561-DR-FL). Thunderstorm and winds from these events caused enough damage for the county to be designated as Tier One for FEMA post-disaster grants.

Table 29: Duval County Severe Weather Disaster Declarations, 1950-2024 in Designated areas for Individual and Public Assistance in Duval

Year of Declaration	Title	Disaster Number
1968	Hurricane Gladys	DR-252
1992	Severe Storms, Tornadoes and Flooding	DR-966
1993	Tornadoes, Flooding, High Winds, High Tides, and Freezing	DR-982
1996	Severe Storms and Flooding	DR-1141
1999	Hurricane Floyd	DR-1300
2004	Hurricane Charley / Tropical Storm Bonnie	DR-1539
2004	Hurricane Frances	DR-1545
2004	Hurricane Jeanne	DR-1561
2008	Tropical Storm Fay	DR-1785
2012	Tropical Storm Debby	DR-4068
2016	Hurricane Matthew	DR-4283
2017	Hurricane Irma	DR-4337
2019	Hurricane Dorian	DR-4468
2022	Hurricane Ian	DR-4673
2022	Hurricane Nicole	DR-4680
2023	Hurricane Idalia	DR-4734
2024	Tropical Storm Debby	DR-4806
2024	Hurricane Helene	DR-4828
2024	Hurricane Milton	DR-4834

Source: FEMA's Open FEMA Datasets, January 2025. Retrieved from: https://www.fema.gov/locations/florida

According to the NWS, Duval County experienced 109 lightning events from 1950 through 2024 averaging 1.47 events per year. Since 1950, 18 injuries, 4 deaths, and $1.65 million in property damages have been associated with these events. Below are a few of the NOAA tracked event incidents for reference. The Thunderstorm Events database table was divided into three reporting periods, which were 1950-1990, 1990-2020, and 2020-2023 due to a maximum search result limit of 500 records.

Table 30: Duval County Thunderstorm Wind Events, 1950-2024

More than 500 events were reported between 01/01/1950 and 04/30/2024 (27,149 days)

Thunderstorm Wind (Duval)	
Number of Days with Event	325
Number of Days with Death	0
Number of Days with Injury	10
Number of Days with Property Damage	112
Number of Days with Crop Damage	1

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

- ✓ 08/18/2017: A lightning strike caused an apartment fire along Gate Pkwy.. Five people were displaced.
- ✓ 06/13/2018: A lightning strike causes an apartment fire in the 8500 block of Touchton Rd.
- ✓ 04/19/2019: Lightning hit a building along New Kings Rd and caused a structure fire. Lightning also caused a transformer fire along Sawpit Rd.
- ✓ 05/28/2019: Lightning strikes caused a fire in a hangar at Naval Air Station Jacksonville.
- ✓ 05/28/2019: Lightning caused as structure fire at 2304 N Myrtle Ave.

Table 31: Duval County Lighting Events, 1950-2024

109 events were reported between 01/01/1950 and 04/30/2024 (27149 days)

Lightning (Duval)	
Number of Days with Event	89
Number of Days with Death	4
Number of Days with Injury	18
Number of Days with Property Damage	64
Number of Days with Crop Damage	0

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

According to the NWS, Duval County experienced 283 hail events from 1950 through 2024, averaging 3.82 events per year. No injuries or deaths have been associated with these events; however, there is minor property damage reported

Table 32: Duval County Hail Events, 1950-2024

283 events were reported between 01/01/1950 and 04/30/2024 (27149 days)

Hail (Duval)	
Number of Days with Event	179
Number of Days with Death	0
Number of Days with Injury	0
Number of Days with Property Damage	1
Number of Days with Crop Damage	0

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

According to the NWS, Duval County experienced 76 tornado events from 1950 through 2024 averaging 1.02 events per year. Between 1950 and 2019, 5 injuries, 1 death, and $15.89 million in damages have been associated with these events. Below are two notable occurrences of tornadoes in Duval County.

- ✓ 2/02/1996: An EF-2 tornado touched-down at Park St. and Cassat Ave. and moved to just north of I-10/I-95. Sixty-one homes reported minor damage, three with major damage. Four businesses reported major damage. 12 RVs overturned valued up to 70K. Trees, power lines and traffic lights were blown down along the path.
- ✓ 8/01/2013: An EF-1 tornado touched down in the Arlington area, ENE of downtown Jacksonville around 4:20 p.m. EDT along Monument Rd. and Derringer Rd.. The tornado briefly reached EF-1 intensity just south of Willowood Drive; there it damaged an apartment complex. The Jacksonville Sheriff's Office reported 5-6 homes were damaged and 15-20 structures were damaged. There was 1 injury associated with wind damage about 1 mile SW of the Fort Caroline area.

Table 33: Duval County Tornado Events, 1950-2024

76 events were reported between 01/01/1950 and 04/30/2024 (27149 days)

Tornado (Duval)	
Number of Days with Event	66
Number of Days with Death	1
Number of Days with Injury	5
Number of Days with Property Damage	41
Number of Days with Crop Damage	0

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

According to the Storm Prediction Center, the 2024 hurricane season ranked third for the most tropical cyclone-induced tornadoes in a hurricane season over the past 30 years. A total of 178 tornadoes were spawned from tropical cyclones in 2024, 237 tornadoes were spawned in 2005, and 317 tornadoes were spawned in 2004. Hurricane Milton's strongest tornado was an EF-3 with an estimated wind speed of 155mph that killed 6 people. Only about six tropical cyclone-induced tornadoes have been rated EF-3 or higher since 2000, making them quite rare. During Hurricane Beryl, 68 tornadoes were recorded, making it the most prolific tropical cyclone-related tornado event in the country since Hurricane Rita in 2005. Damages from Hurricane Beryl tornadoes totaled just under $7 billion nationwide and includes an EF-2 tornado that was traveling for 90 minutes across 54 miles in Louisiana; it is the longest-tracked tornado in recorded history. Additionally, Hurricane Milton created 46 tornadoes on October 9, 2024, resulting in the second-highest tropical cyclone-related tornado event in a single day.

Table 34: Fujita Tornado Intensity Scale

Enhanced Fujita (EF) Scale					
EF-0	**EF-1**	**EF-2**	**EF-3**	**EF-4**	**EF-5**
Light Damage	Moderate Damage	Considerable Damage	Severe Damage	Devastating Damage	Incredible Damage

Probability of Future Occurrences of Severe Weather

In averaging Duval County's 1,161 severe weather events as a combined total over a period of 73 years, there is a 15.90% probability each year that a severe weather event could occur. In the last 73 years, there was 1 hail damage claim for $4,000, 64 lightning damage claims for $1.857 million with 4 deaths, 147 thunderstorm damage claims for $15.98 million, and 41 tornado damage claims for $15.89 million with 1 death. The largest single non-tropical severe weather disaster claim was upwards of $12 million from a 2008 thunderstorm which contributed to the loss of two cranes at JAXPORT's Blount Island Facility. The entire population of the County is at risk for severe weather hazards based on past occurrence.

According to the NOAA Storm Prediction Center's preliminary tornado reports for 2024, the country recorded 1,732 tornadoes, which is well above the 14-year average of 1,355 since 2010. Therefore, it is reasonable to assume tornadoes and other severe weather related to hurricanes and tropical storms will impact Duval County in the future. This is specifically because the wind shear can create thunderstorms and tornadoes on the outer bands where the warm, humid air feeds into a tropical storm. Hurricanes and tropical storms typically spawn tornadoes in their outer rainbands

Severe Storm Impact Analysis

The impact of a tornado is comparable to a hurricane, given the exposure and vulnerability of the older housing stock. Unlike a hurricane, a tornado tends to have a specific track, and the damage is localized to specific areas of impact.

Public

- Injury or death from being struck by lightning
- Injury or death from hail
- Injury or death from flying debris
- Injury or death from tornadoes and not having adequate shelter

- Car accidents
- Indirect deaths
- Mental Health Issues

Responders

- Responding during a severe storm can be dangerous because of heavy rains, strong winds, hail, lightning, and tornadoes

Continuity of Operations, including continued delivery of services

- Responding during a severe storm can be very dangerous because of heavy rain, strong winds, hail, lightning, and tornadoes

Property, Facilities, Infrastructure

- Damage to property, including homes and businesses can occur from strong winds, flooding, or tornadoes. The damage can range from minor roof damage to total structure loss.
- Damage to critical facilities, such as transformer stations, can result from fallen trees and limbs, causing power outages

Environment

- Damage to the environment, from strong winds, flooding, and tornadoes
- There may be severe damage to vegetation in localized areas from a tornado

Economic Condition

- Power outages cause lost revenue and lost wages for businesses and employees

Public Confidence in Jurisdiction's Governance

- Ability to restore power and essential services

Potential Effects of Climate Change on Severe Storms

There has been an increase in the number of severe storm and tornado reports over the last 50 years, and it is believed that this increase is attributed to the technological improvements that allow for better identification and reporting of storms. According to the 2018 Florida Enhanced State Hazard Mitigation Plan (SHMP), temperatures and humidity may increase atmospheric instability which leads to the generation of severe storms. Additionally, vertical wind shear may decrease, resulting in fewer or weaker severe thunderstorms and tornadoes. Decreases in vertical wind shear are most likely to occur when convective potential energy is high in spring and summer months, which can result in more frequent severe storms. Days with high convective potential energy are also likely to occur during times of the year with strong low-level wind shear, increasing the likelihood of the most severe storm events, including tornadoes.

Vulnerability Analysis and Loss Estimation

The County is vulnerable to severe weather including rain, hail, high winds, tornados, flooding, lightning, wildfires, and extreme heat. Localized flooding creates a common inconvenience but occasionally results in more extreme effects that can affect all facility types.

The extensive tree canopy is significantly vulnerable to high winds which directly affects the electrical distribution grid, particularly in areas outside of downtown Jacksonville. The uprooting of old-growth trees can damage electric and other utility lines, block roads, generate storm debris, and contribute largely to the recovery costs. Trees are both economic and aesthetic assets, creating physical damage along with lasting emotional stress *(Source: Debris Management Records; COJ; 2023).*

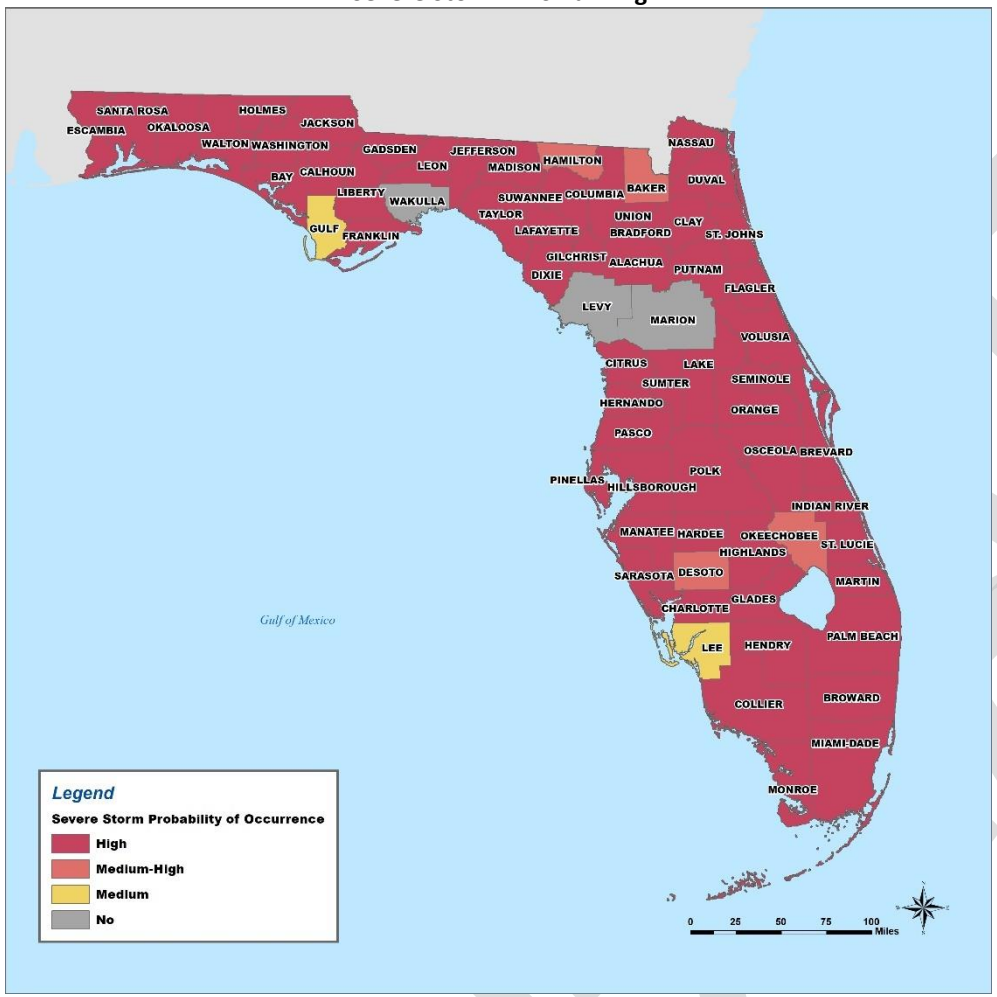
Duval County is vulnerable to the impacts of tornado-induced damage due to their unpredictable pattern. The probability of occurrence is low, but the damage potential is high due to population concentrations and the location of manufactured housing. The "Winds from Tropical Cyclones" Vulnerability Analysis section has additional information related to the prevalence and location of manufactured housing. The total number of non-compliant residential structures is unknown and building regulations vary in policy by jurisdiction, permitting procedures, and enforcement. There are no formal

tornado safe rooms according to the Public Buildings Division and the Risk Management Office of the DCPS. Therefore, mitigating the tornado hazard is achieved through community education and outreach for all residents.

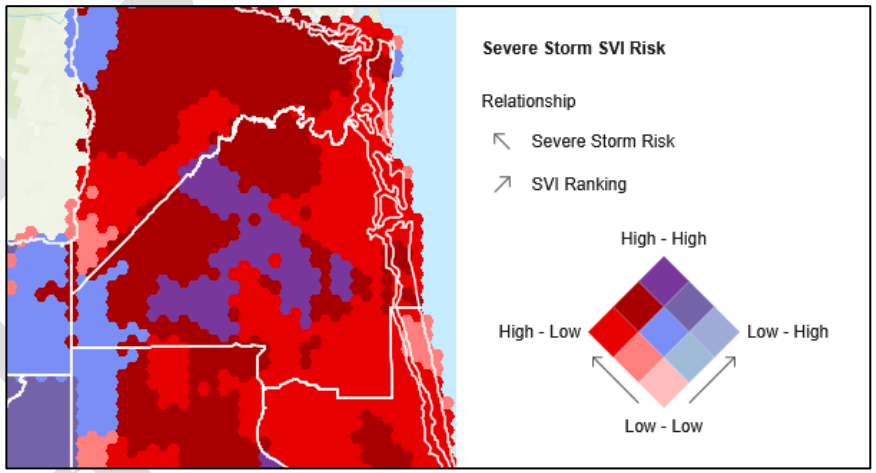
The population impacts depend upon the location and intensity of severe weather events. The County protects citizens through the implementation of the Severe Weather Hazard Specific Plan, the Tornado Hazard Specific Plan, and the Alert Warning Notifications Systems utilized by the EPD; NAWAS, IPAWS, EverBridge, print and electronic media, social media, the COJ's mobile application, and the COJ alert program "AlertJax". According to the 2018 Florida Enhanced SHMP, most counties in Florida share a High Risk for severe storms. Conversely, Duval County is among only 6 counties that share a Low Risk for tornados. A statewide ranking below illustrates the relative risk for the County compared with the rest of Florida.

Map 21: State of Florida Severe Storm Risk, 2023

Severe Storm LMS Ranking



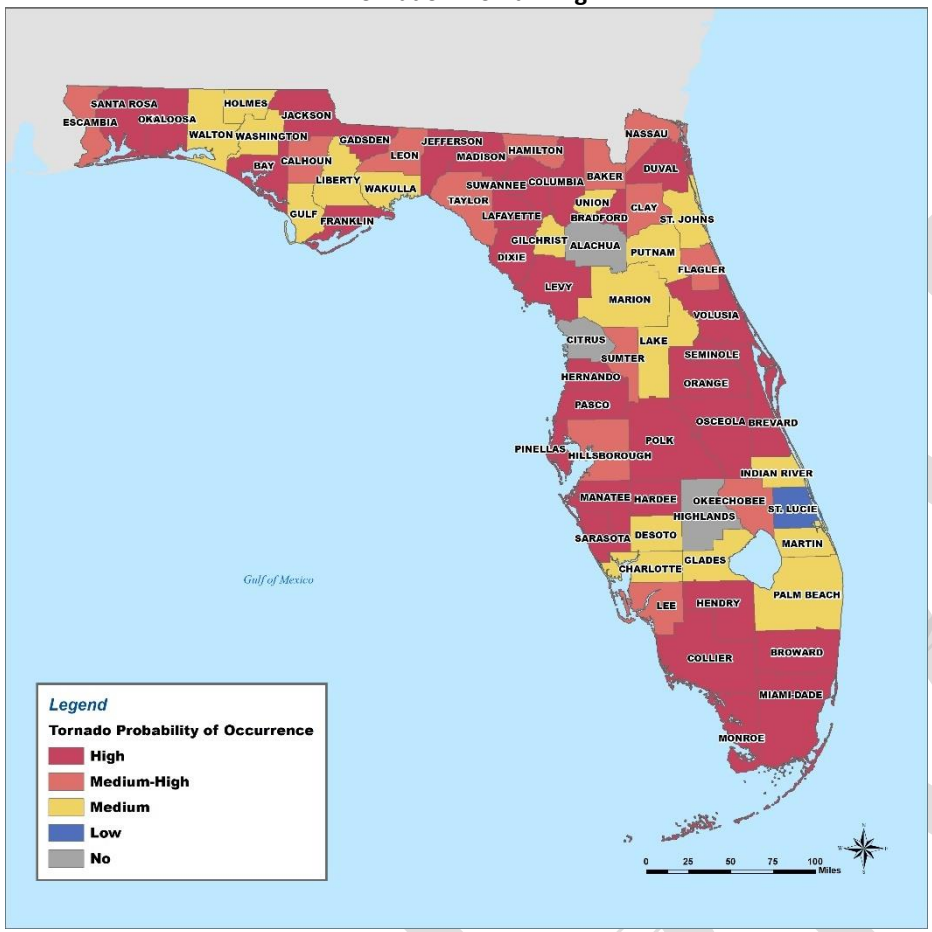
Severe Storm Risk with SVI



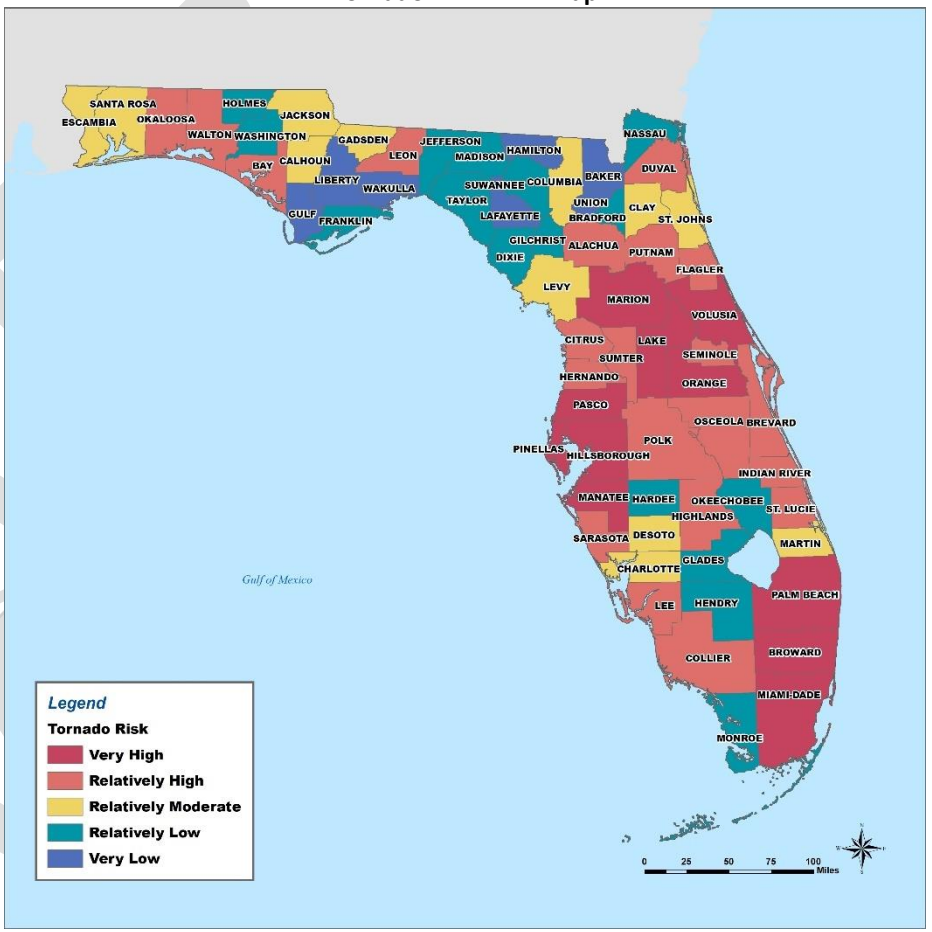
Source: State of Florida Enhanced Hazard Mitigation Plan (2023), Severe Storm Hazard Profile page
Retrieved from: https://flshmp-floridadisaster.hub.arcgis.com/pages/severe-thunderstorm

Map 22: State of Florida Tornado Hazard Ranking, 2023

Tornado LMS Ranking



Tornado FEMA NRI Map



Source: State of Florida Enhanced Hazard Mitigation Plan (2023), Severe Storm Hazard Profile page
Retrieved from: https://flshmp-floridadisaster.hub.arcgis.com/pages/severe-thunderstorm

3.

Wildfire

Hazard Profile

3. Wildfire Hazard Profile

<table>
<tr><th colspan="5">Wildfires</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">Moderate
16 / 30</td></tr>
<tr><td colspan="4">Wildfires are defined as free burning uncontainable wildland fires that are not part of a controlled burn for areas with natural fuels that feed and support the spread of wild fires. Wildfires occur throughout Florida every year and are part of the natural cycle of Florida’s fire-adapted ecosystems that are often quickly suppressed before they damage or destroy property, homes, and lives. Environmental short-term loss caused by a wildland fire can include the destruction of wildlife habitat and watersheds. Long-term effects include reduced access to affected recreational areas, destruction of cultural and economic resources and community infrastructure, and vulnerability to flooding due to the destruction of watersheds. The type and amount of fuel, as well as its burning qualities and level of moisture, affect wildfire potential and behavior. Data from the SGSF Wildfire Risk Assessment Portal provided a geo-spatial visualization of WUI, Community Protection Zones, Wildfire Ignition Density, and produced an overall wildfire Risk Index that was cross-referenced with local data to arrive at the figures incorporated into the LMS Vulnerability Assessment.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="3">Potential Magnitude</td></tr>
<tr><td rowspan="2">High
8 / 10</td><td rowspan="2">Moderate
3 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Low
2 / 5</td><td>Low
2 / 5</td><td>Very Low
1 / 5</td></tr>
</table>

Wildfire Description

Wildfires are defined by the Florida Forest Service as any fire that does not meet management objectives or is not a controlled burn. According to the 2023 Florida Enhanced Mitigation Plan, wildfires occur annually throughout Florida and are part of the natural cycle of Florida’s fire-adapted ecosystem. Many wildfires are quickly suppressed before they can damage property or result in loss of life. There are four types of wildfires:

- **Surface Fires:** Burn along the forest floor consuming the litter layer and small branches on or near the ground.
- **Ground Fires:** Smolder or creep slowly underground. These fires usually occur during periods of prolonged drought and may burn for weeks or months until sufficient rainfall extinguishes the fire, or it runs out of fuel.
- **Crown Fires:** Spread rapidly by the wind, moving through the tops of the trees.
- **Wildland Urban Interface (WUI) Fires:** Fires occurring within the WUI in areas where structures and other human developments meet or intermingle with wildlands or vegetative fuels. Homes and other flammable structures can become fuel for WUI fires. This is type of fire emphasized and addressed by the Duval County LMS. For the Duval County project area, it is estimated that 722,375 people or 83.6% of the total project area population (863,863) live within the WUI. (Southern Wildfire Risk Assessment, South WRAP Summary Report 2024) The key measure utilized by the Florida Forest Service, WUI Risk Index, reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes.

Prescribed or controlled burns are used on both public and private lands across to replace the natural benefits provided by wildfires. Controlled burns help reduce the amount of flammable vegetation in an area, which lessens the intensity of a wildfire that may occur naturally or by accident; approximately 70% to 80% of all wildfires in Florida are caused by humans. Controlled burns provide firefighters time to suppress the fires while they are small and easier to control. Wildfire prevention and public awareness campaigns have greatly reduced the number of accidental, uncontrolled, or natural wildfires in Florida. Other measures used to help reduce the number and severity of wildfires include red flag warnings issued by the NWS and burn bans. The County enforces a year-round burn ban that requires official permits for all prescribed burns and open burning activity.

Environmental short-term losses from wildland fires can include the destruction of wildlife habitat and watersheds. Long-term effects include reduced access to recreational areas, destruction of cultural resources, destruction of community infrastructure, and vulnerability to flooding due to the destruction of vegetation. The continuity of both horizontal and vertical fuel components are also a factor because it expresses the pattern of vegetative growth and open lands. Topography affects the movement of air over the ground's surface, where the slope and shape of terrain can change the rate of speed at which a wildfire travels. Temperature, humidity, and wind can all affect the severity and duration of a wildfire as described in the following sections using acres burned as the unit of measurement for this hazard.

Buildings ignite during wildfires as a result of embers, radiant heat, and direct flame contact.

- **Embers** are light enough to be blown through the air and can result in the rapid spread of fire. Should these embers land on or near a structure, they could easily ignite nearby vegetation or accumulated debris, enter the home or attic through openings or vents, igniting furnishing, or ignite material in those locations.
- If the **radiant heat** is high enough, an ignition will result. Even if the radiant heat exposure is not enough to result in ignition, it can preheat surfaces and make them more vulnerable to ignition from direct flame contact. With one of these exposures, if immediate suppression is not able to extinguish the fire, the fire will grow and spread.
- Research and on-the-ground observations during wildfires have shown that the main **flame** front moves through an area in a very short period of time, anywhere from 1 to 10 minutes, depending on the vegetation type. One of the misconceptions about home loss during wildfires is that the loss occurs as the main body of the fire passes. Structures do not spontaneously ignite, they are lost because of the growth of initially small fires, either in or around the home or building *(Source: Landscape and Building Design for Bushfire Areas; Butler et al. 2003; Ramsay and Rudolph 2003).*

<u>Geographic Areas Affected by Wildfire</u>

Developed parcels surrounding undeveloped and heavily forested areas are most vulnerable because wildfires often spread through vegetation such as shrubs, grasslands, forests, or ground debris. Wildfires can often cross over roadways and rivers via fuel sources, resulting in an unpredictable spread, resulting in possible consumption of entire structures and can pose a threat to human life before they are able to be fully contained. Generally, all the developed land outside the 295/9A loop is vulnerable to wildfires, mostly west of Kernan Rd. from Beach Blvd. northward to Monument Rd.. Fire protection from 62 fire stations in the County are near developed, making the few hundreds of homes and businesses that are isolated from other developments at greater risk in the event of drought.

The Wildland Urban Interface (WUI) is "The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels." In simpler terms, WUI areas are locations where human structures and forests / wildlands meet or intermingle. Some examples are:

- Where the edge of a community transitions to forest land
- Individual farms or vacation homes surrounded by woodlands
- Structures around the edge of a (wooded) city park or preserve

Historical Occurrences of Wildfire

In the last 5 years, there have been 2 wildfire events in Duval County with no reported property damage. Wildfires are common within the city, occurring 87 times per year on average and consuming 1,170 acres annually, averaging a modest 13 acres per incident (*Source: Florida Forest Service. 2024*). Duval County is experiencing increased development, with the accompanying influx of residents living in WUI zones adjacent to forests. The continued rapid development trends in the north side are increasing pressures in that WUI area where fires can spread rapidly from traditionally rural and unpopulated regions into new high-density neighborhoods. The 2024 Southern Wildfire Risk Assessment Summary Report was generated through a web mapping portal called SouthWRAP, sponsored by the Southern Group of State Foresters and produced by the Florida Forest Service for wildfire risk assessment.

Florida's fire-dependent ecosystem has a very long growing season and typically receives large amounts of rainfall, contributing to massive accumulations of flammable native vegetation. In the early 1950s, Floridians actively began suppressing all fires to protect newly planted forests and new developments. Thereafter, vegetative fuel has become dense and thick, which fuels dangerous wildfires that often damage the natural surroundings due to the extremely unhealthy burn rate. Florida will experience 3,711 wildfires that burn nearly 177,501 acres each year. Years with hard freezes followed by windy spring seasons also increase the probability of wildfire activity. The Florida Forest Service reports no "Significant Wildfires" for Duval County between 1981 and 2018 *(Source: Significant Wildfires in Florida 1981-2018; Florida Forest Service).*

Table 34: Duval County Wildfire, 1950-2023

11 events were reported between 01/01/1950 and 12/31/2023 (27028 days)

Wildfire (Duval)	
Number of Days with Event	**11**
Number of Days with Death	**0**
Number of Days with Injury	**0**
Number of Days with Property Damage	**0**
Number of Days with Crop Damage	**0**

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

Significant wildfire events on record:

- ✓ 1989: 154 wildfires burned 2,353 acres.
- ✓ 1990: 193 wildfires burned 2,031 acres.
- ✓ 1998: 400 wildfires burned 8,730 acres.
- ✓ 1999: 149 wildfires burned 3,316 acres.

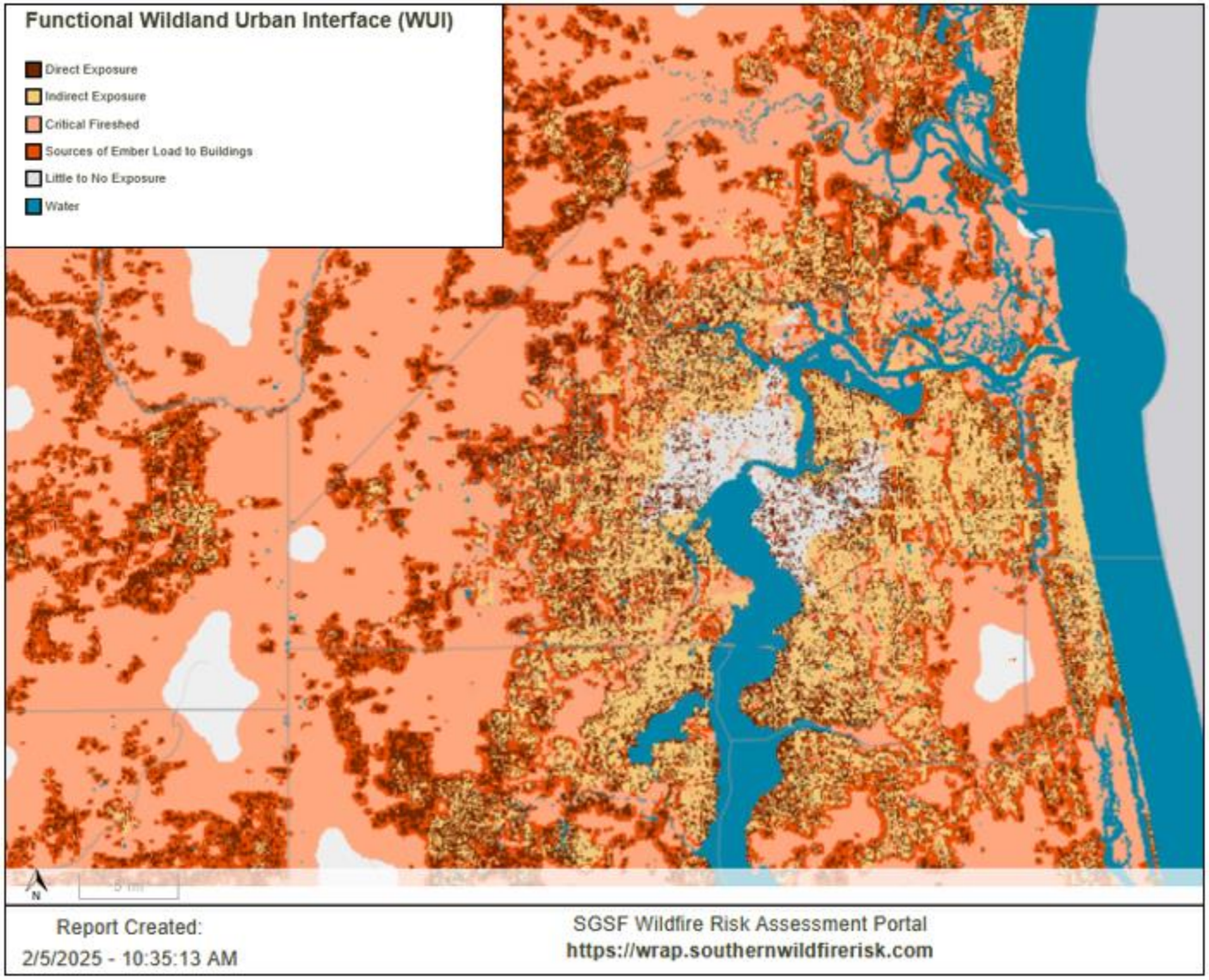
Above average wildfire seasons tend to coincide with periods of drought, particularly the years of 1985 and 1998. From 2010 through 2024, the Florida Forest Service reported two residences, and three outbuildings were damaged by wildfire. They were able to rebuild. Another two outbuildings were lost to wildfire, but no residences were lost.

- ✓ 1998: a particularly active wildfire season occurred across the State of Florida. From June 1 through July 2, half a million acres burned statewide, where wildfires were reported in all 67 counties. Fortunately, Duval County recorded 140 wildfires, no deaths, and no homes destroyed. The area's most severely impacted were close to the TOB, near Yellow Water Rd., and areas in the extreme southeast corner of Duval County, south of J.T. Butler Blvd...
- ✓ 2000: the Normandy Rd. Fire burned 2,258 acres north of Normandy Blvd. and east of U.S. 301 in Maxville. The cause of the fire was a trailer dragging a chain, which started more than 30 fires along the road.
- ✓ 2006: the Marsh Fire burned 422 acres in an isolated section of marsh off the north side of Yellow Bluff Rd... Firefighters were unable to reach the fire and were forced to allow it to burn itself out.
- ✓ 2010: dry conditions assisted the growth of a brush fire (Normandy Fire) in the southwest part of the County.
- ✓ 2012: the Baldwin Bay Fire burned 953 acres off CR 121, north of U.S. 90. Dry conditions caused this swampy area to smolder for three months.

- ✓ 2013: the Pumpkin Hill Fire burned 363 acres off the north side of Cedar Point Rd.. No lives were lost and no injuries were documented.
- ✓ 2017: the Garfield Rd. Fire occurred along the Nassau/Duval County border. Nearly 700 acres burned, 150 residents were temporarily displaced, two homes were destroyed, and 8 homes were otherwise affected.
- ✓ May 2019: the Yellow Bluff Road Fire caused I-95 to be completely shut down along the Nassau/Duval County border for several days due to unsafe road conditions. (*Source: Incident Situation Reports. EPD After Action Reports*).

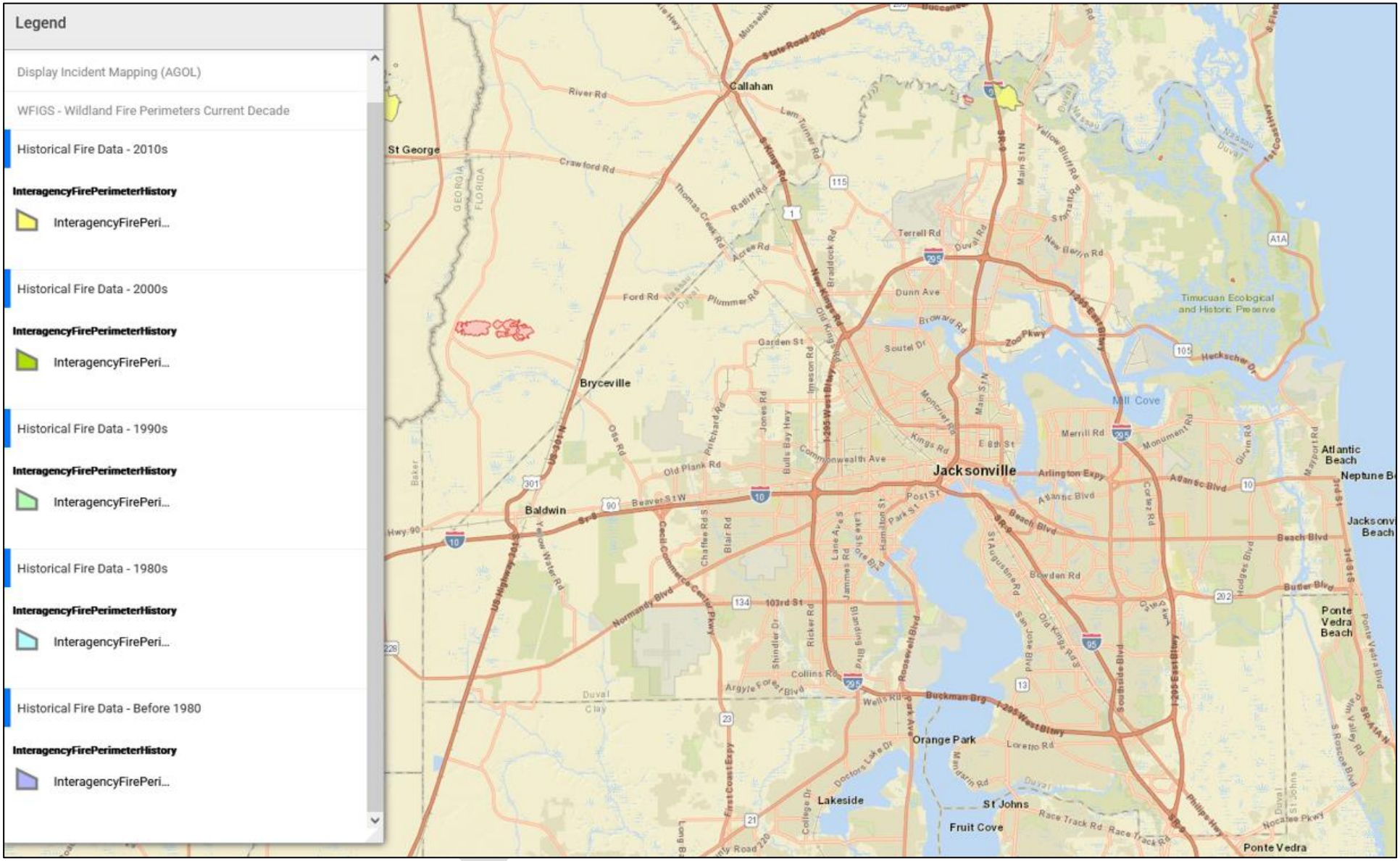
As the City's growth continues in areas that were previously farmland, more homes will be threatened by wildfires. According to the Florida Forest Service, the areas of Duval County most susceptible to wild-land fires are west of I-295 near Cecil Commerce Center and the Argyle Forest area, on the north side in the Tisonia area and around the International Airport, and on the south side near Bayard, east of US1 and along Hodges and Kernan Boulevards. The County is very susceptible to wildfires with ignition sources from escaped yard debris burns and lightning strikes, particularly during north Florida's dry season from March through June, and during extended periods of drought.

Map 23: Duval County Wildland Urban Interface (WUI)



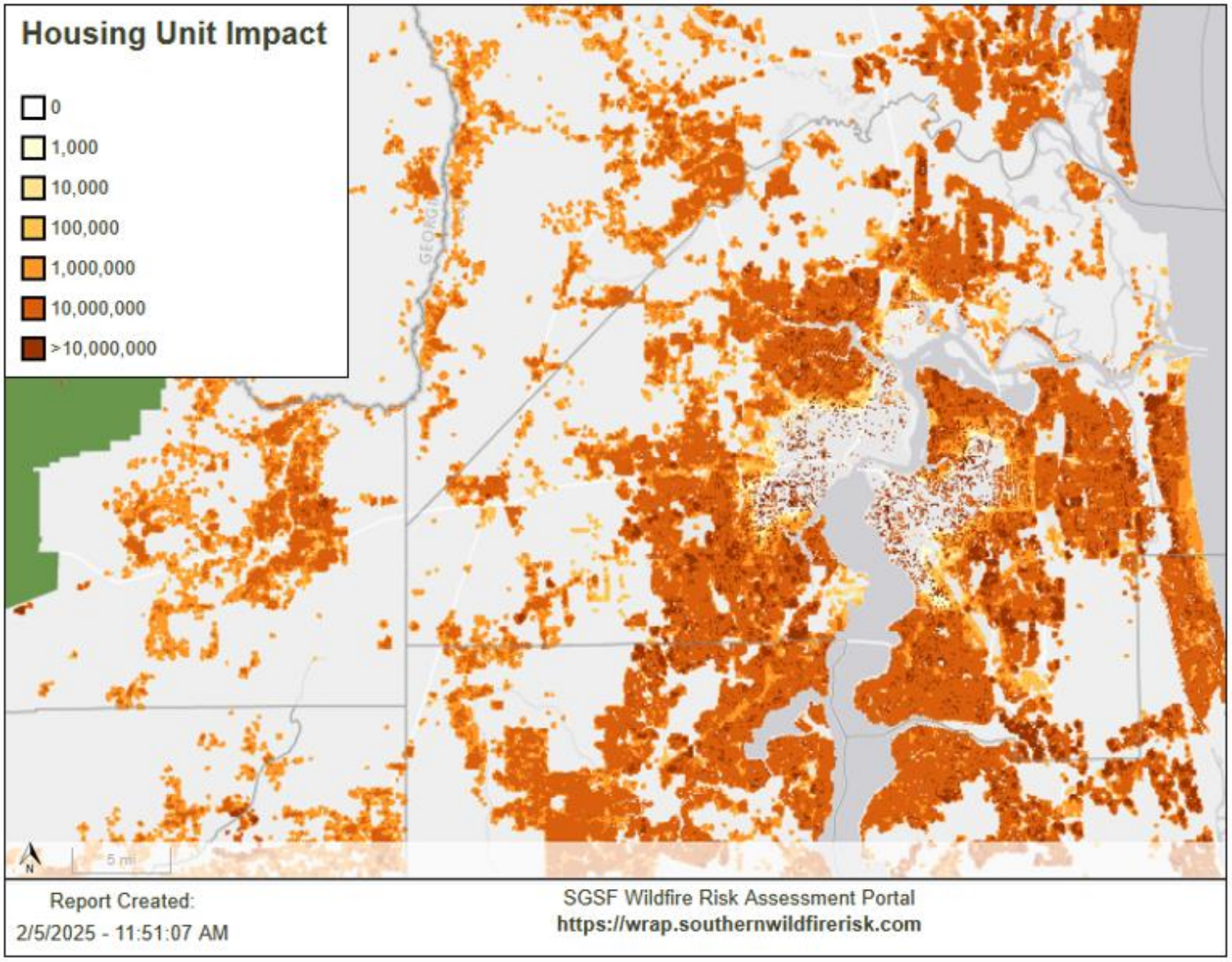
Source: Southern Wildfire Risk Assessment Portal. Southern Group of State Foresters. 2025. Retrieved from: https://wrap.southernwildfirerisk.com/

Map 24: Duval County Wildfire History – Fire Perimeters by Decade



Source: Fire Enterprise Geospatial Portal; https://famit.nwcg.gov/applications/EGP

Map 25: Duval County Housing Unit Impacts from Wildfire



Housing Unit Impact (HUImpact) incorporates housing-unit counts with the general consequences of fire on a home as a function of fire intensity *(Source: Southern Wildfire Risk Assessment Portal. Southern Group of State Foresters. 2025. Retrieved from: https://wrap.southernwildfirerisk.com/).*

Probability of Future Occurrences of Wildfire

The WUI Risk Index is derived using a Response Function modeling approach. Response functions are a method of assigning a net change in the value to a resource or asset based on susceptibility to fire at different intensity levels, such as flame length. The WUI Risk Index ranges from -1 to -9, with -1 representing the least damaging impact and -9 representing the most damaging impact. Therefore, areas with high housing density and high flame lengths are rated -9 while areas with low housing density and low flame lengths are rated -1. To calculate the WUI Risk Index, the WUI housing density data was combined with Flame Length data, then response functions were applied to represent potential impacts for all unique conditions. The response functions were defined by a team of experts based on values defined by the Southern Wildfire Risk Assessment update technical team. By combining flame length with the WUI housing density data, it is possible to determine where the greatest potential impacts to the whole community is likely to occur.

In addition to the Risk Index, the Risk Assessment Portal provides a dataset that depicts an area's Burn Probability. The Burn Probability layer is based on current landscape conditions, percentile weather, historical ignition patterns, and historical fire prevention and suppression efforts. The fire growth projections, when run repeatedly with different ignition locations and weather conditions, generate burn probabilities and fire behavior distributions. Results are objectively evaluated through comparison with historical fire patterns and statistics, including the mean annual burn probability and fire size distribution for each Fire Planning Unit. This evaluation is part of the *FSim* calibration process for each Fire Planning Unit, whereby simulation inputs are adjusted until the slopes of the historical and modeled fire size distributions are similar and the modeled average burn probability falls within an acceptable range of the historical reference value.

The risk output projection maps are derived at a 30-meter resolution chosen to be consistent with the accuracy of the primary surface fuels dataset used in the assessment.

The Southern Group of State Foresters, in partnership with agencies such as the U.S. Forest Service, Florida Forest Service, and U.S. Fish and Wildlife Service have developed a web-based GIS mapping application called the Southern Wildfire Risk Assessment. This system provides statewide risk data that assists in determining high-risk areas and can be accessed at https://southernwildfirerisk.com/ . The Southern Wildfire Risk Assessment WUI Risk Index layer is a rating of potential impact from wildfires on people and property. The WUI input reflects housing density (houses per acre) consistent with Federal Register National Standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts.

Approximately 80% of all wildfires in Florida occur within one mile of the WUI. Florida has a year-round fire season with the most active part taking place from April to July. According to the Florida Forest Service Report System, most wildfires in Florida, approximately 65%, are caused by humans with arson and escaped debris being the top two causes. The largest number of lightning-caused fires occurs in July. On average, the drier months tend to be January, February and March depending on drought conditions and frequency of frontal passages. Dry months, combined with low humidity and high wind have the highest number of fires reported.

Figure 10: Duval County Wildfires 1995-2021

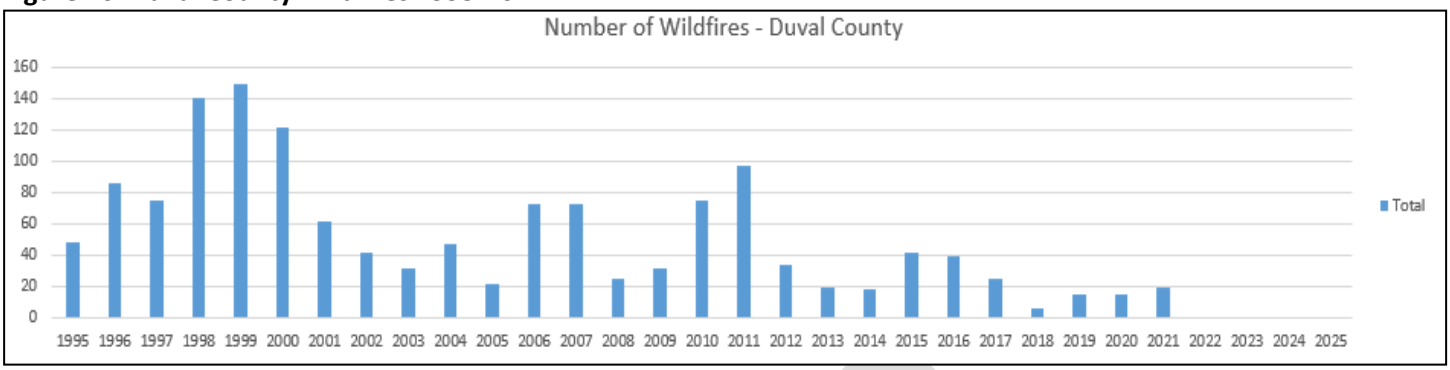


Figure 11: Duval County Acres Burned 1995-2021

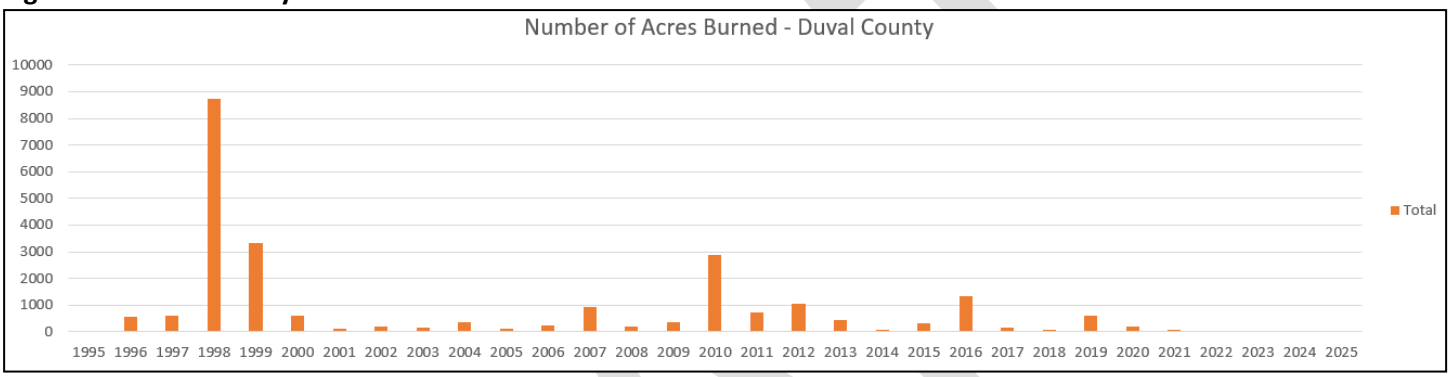
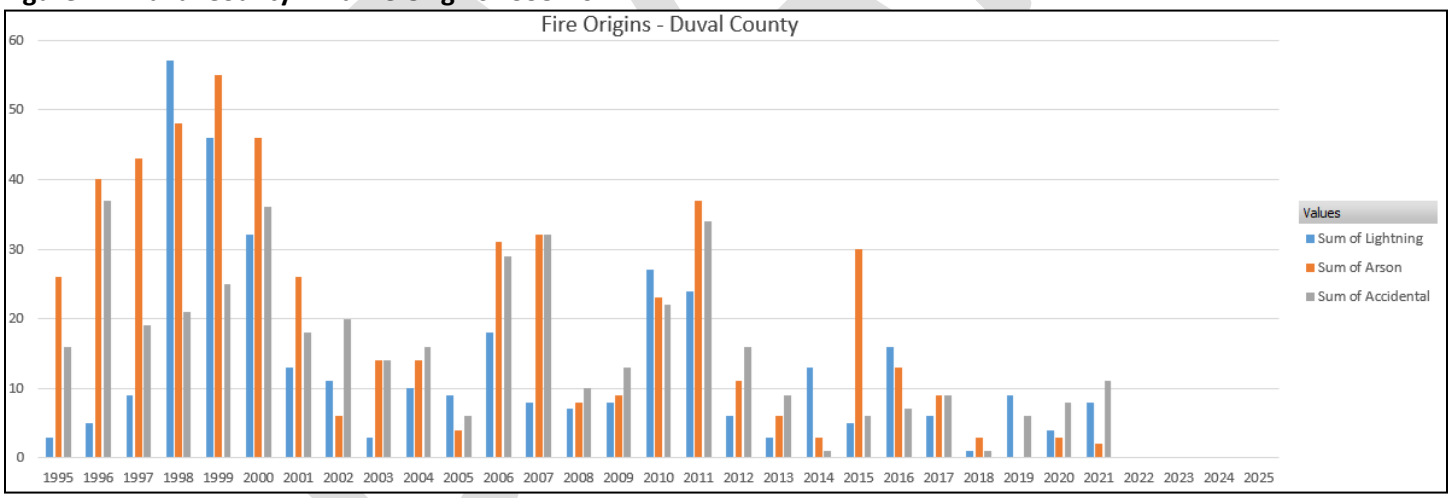
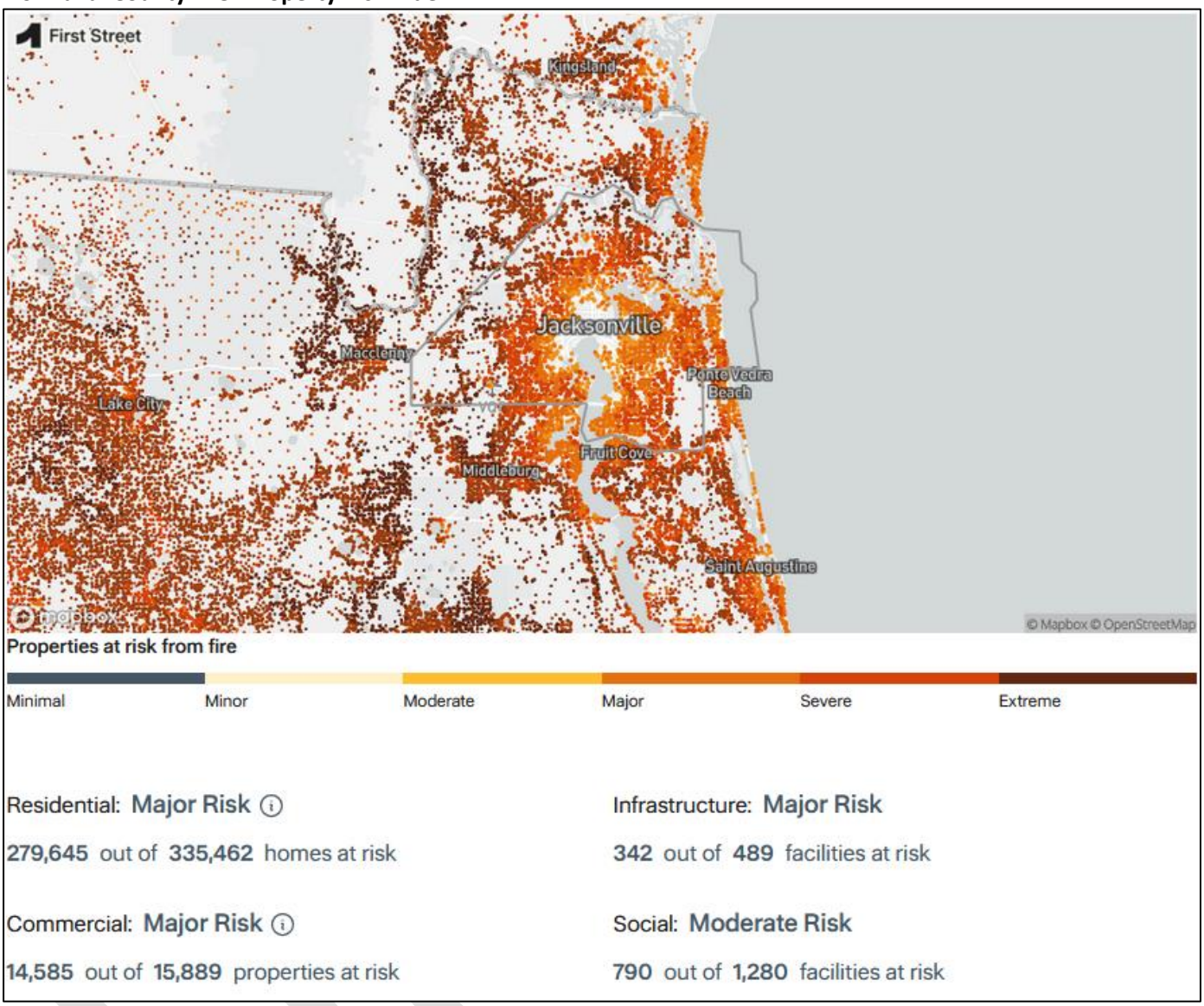


Figure 12: Duval County Wildfire Origins 1995-2021



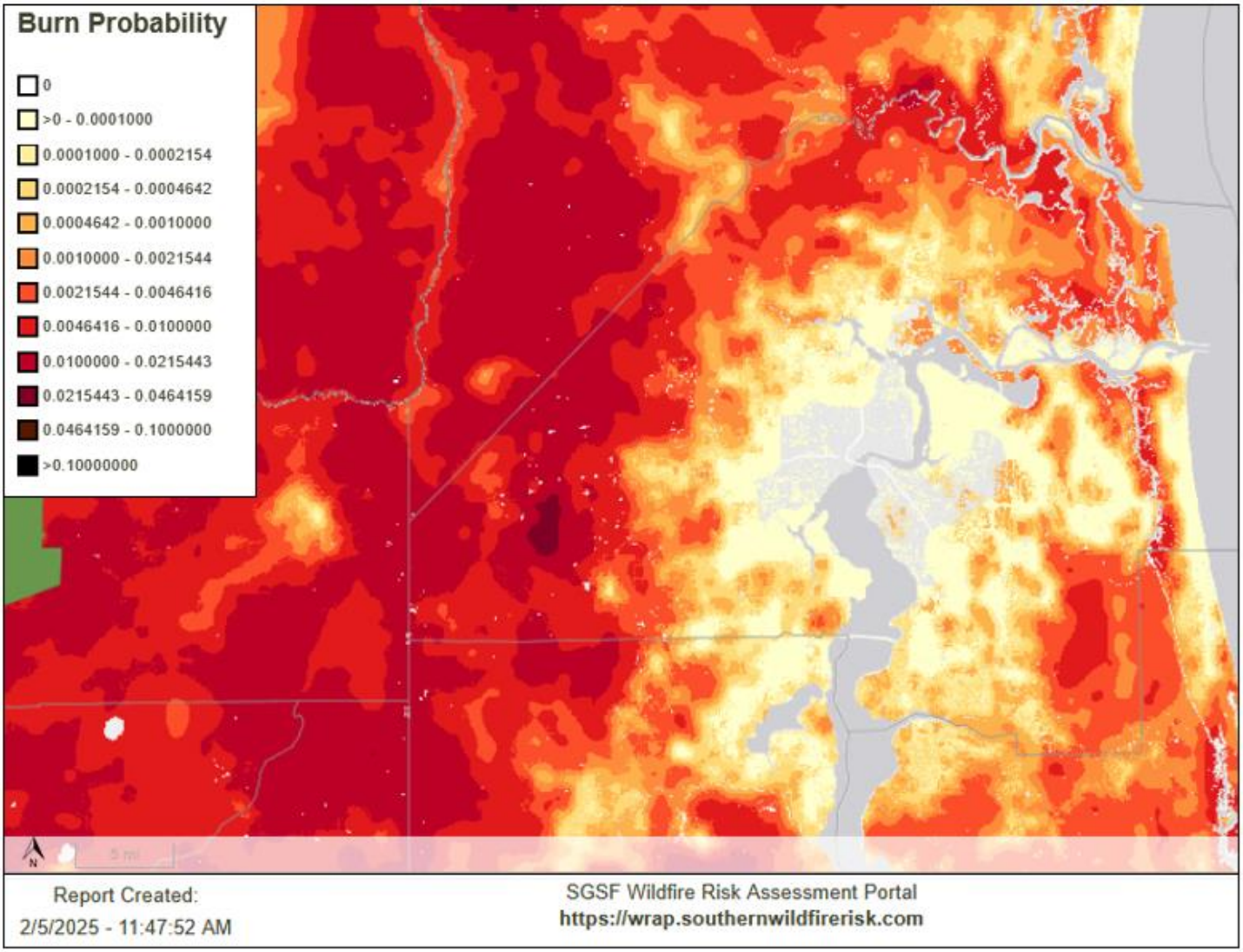
Source: Florida Forest Service. COJ District Office. 2021.

Map 26: Duval County WUI Property Risk Index



Source: First Street Climate Risk Report. Retrieved from: https://firststreet.org/county/duval-county-fl/12031_fsid/fire

Map 27: Duval County Burn Probability Index



Burn probability is the likelihood of wildfire burning a specific location within a set time frame, commonly represented as the chance of burning during one calendar year or wildfire season. (*Source: Southern Wildfire Risk Assessment Portal. Southern Group of State Foresters. 2025. Retrieved from: https://wrap.southernwildfirerisk.com/*)

Wildfire Impact Analysis

Potential wildfire stresses include destruction of land, property, and structures, as well as injuries and loss of life. Although rare, deaths and injuries can occur at the beginning stages of wildfires when sudden flare-ups result from high wind conditions. In most situations people can evacuate the area and avoid bodily harm, while first responders are most at risk during the process of fire suppression. Firefighters may become trapped when fires grow or suddenly change directions. Wildfires are usually small, quickly contained, and are not expected to result in the loss of normal government functions or reduced connectivity. However, major fires can disrupt transportation along wooded corridors of the interstate.

Specific impacts may include:

Public
- Injury or death from fire
- Injury or death from smoke inhalation
- Injury or death while evacuating
- Vehicle accidents due to decreased visibility due to smoke

Responders
- Injury or death during wildfire suppression, especially during high wind conditions
- Injury or death from vehicle accidents due to decreased visibility
- Injury or death from evacuation and rescue missions
- Injury or death from smoke inhalation

Continuity of Operations, including continued delivery of services
- Inability to operate businesses if evacuations are ordered, leading to lost wages and revenue
- Employee absenteeism if employees are evacuated
- Blocked transportation routes because of decreased visibility

Property, Facilities, Infrastructure
- Damage or loss to personal structures and businesses
- Damage or loss to critical infrastructure such as schools, hospitals, government buildings, and utilities
- Damage or loss of agricultural crops and timber, which leads to loss of income and loss of revenue

Environment
- Damage or loss to large, forested areas
- Damage or loss to habitats

Economic Condition
- Closure of businesses if in evacuee area leading to lost wages and revenue
- Employee absenteeism leading to forced business closure which results in lost wages and lost revenue
- Damage or loss to agricultural crops and timber, which leads to loss of income and loss of revenue
- Loss of tourism if wildfires are in popular tourist areas

Public Confidence in Jurisdiction's Governance
- Public perception of evacuation decisions

Potential Effects of Climate Change on Wildfire

The 2023 Florida Enhanced SHMP reported, "the increased frequency or intensity of extreme heat or drought events, due to the augmenting of existing fuel flammability, could affect wildfire behavior. Changes in vegetation types could also alter fuel mixtures. Reducing moisture of living vegetation, soils, and decomposing organic matter during drought or extreme heat events is associated with increased incidence of wildfires. Furthermore, changes over time in vegetation types could change the mixture and flammability of fuels. As these transitions occur, wildfire occurrences and severity could increase with the introduction of more flammable vegetation types or decrease with the introduction of more fire-resistant species. As the flood hazard profile discussed that arid areas may become drier and moist areas to become wetter. Florida has

weather patterns that lead to both dry and wet periods each year. Climate change may cause one or the other, or both to increase in occurrences and magnitude" *(Florida SHMP 2023).*

Vulnerability Analysis and Loss Estimation

Duval County encompasses 545,174 acres of mixed industrial, residential, agricultural, commercial, and other miscellaneous land uses; listed below. Of the half million acres of land in the County, 319,350.7 acres or 58% could be classified as having a moderate to high risk of wildfires. These high-risk areas are primarily located in the rural areas of the County, outside of the I-295 loop. There are 298,729 properties in Duval County that have some risk of being affected by wildfire over the next 30 years. This represents 76% of all properties in Duval County. Overall, Duval County has a major risk of wildfire over the next 30 years. This is based on the level of risk the properties face rather than the proportion of properties with risk *(Source: First Street 12th National Risk Assessment, https://firststreet.org/county/duval-county-fl/12031_fsid/fire).*

Table 35: Duval County Risk of Wildfire by Development Type, 2019

Duval County Land Use	Acres
Total Residential	114,156.7
Low Density (2 dwellings per acre)	30,382.8
Medium Density (2-5 Dwellings per acre)	55,353.3
High Density (6 or more dwellings per acre)	28,420.6
Commercial	21,775.5
Industrial	6,781.1
Institutional (military and other)	10,456.7
Recreation	6,554.8
Agricultural (pastures and cropland)	15,775.1
Total Upland, not forested	19,472.1
Herbaceous uplands	8,131.4
Shrub and brushland	6,362.8
Mixed upland, non-forested	4,988.0
Upland Forest	129,428.9
Wetland Forest	79,234.8
Wetland non-forest	51,909.4
Transportation and Utilities	23,007.3
Barren and Disturbed Land	7,318.8
Water	58,070.8
Other (no data) [Open Land]	1,232.2
Total	**589,627.36**
Total Acres at Risk from Wildfire	**263,726**

Source: Florida Forest Service, 2019

4.
Environmental Degradation
Hazard Profile

4. Environmental Degradation Hazard Profile

Coastal Erosion

Overview

Erosion and saltwater intrusion are natural processes that takes place over a range of time scales. Erosion that leads to saltwater intrusion can be accelerated by human activities. Duval County is vulnerable to erosion caused by natural and man-made events. Duval County experiences smaller-scale (short-term) hazard events, such as storms, regular wave action, tides and winds. Wind, waves and currents are natural forces that easily move the unconsolidated sand and soils in the coastal area, resulting in rapid changes in the position of the shoreline. Climate Change and sea level rise contribute to ongoing costal erosion. The clearing of coastal forests and trees due to cyclonic storms has increased the vulnerability of coastal erosion. Duval County has 15 miles of coastline, which can suffer from erosion mainly from northeasters and seasonal tropical storms.

Moderate

18 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
Very High 10 / 10	Very High 5 / 5	Very Low 0 / 5	Very Low 1 / 5	Low 2 / 5

Saltwater Intrusion

Overview

Erosion and saltwater intrusion are natural processes that takes place over a range of time scales. Saltwater intrusion occurs by many mechanisms, including lateral encroachment from coastal waters and vertical upcoming near discharging wells. Saltwater intrusion can naturally occur in coastal aquifers, owing to the hydraulic connection between groundwater and seawater. Saltwater intrusion can be very problematic to coastal communities such as Duval County that rely on fresh groundwater supplies.

Moderate

17 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
Very High 10 / 10	Very High 5 / 5	Very Low 0 / 5	Very Low 0 / 5	Low 2 / 5

Hazard Description

i. Coastal Erosion

NOAA's definition glossary defines Erosion as the wearing away and transporting of earth materials by natural forces like water, wind, waves, and ice. Coastal erosion is the wearing away of land, or the removal of beach sand dune sediments along ocean shores. A less critical process of degradation is weathering, because it does not imply removal of any material. Human land use and resource extraction can lead to coastal erosion through direct removal of material or exacerbation of natural processes. Construction of jetties, sea walls, piers, and other structures can result in coastal erosion. Duval County does experience smaller-scale storms, wave action, tides, and winds with regular frequency. During tropical cyclone events in particular, wind, waves, and ocean currents can easily move unconsolidated sand and soils in the coastal area, resulting in changes in the position of the shoreline.

ii. Saltwater Intrusion

USGS defines saltwater intrusion as the movement saline water flows into freshwater aquifers, which can lead to groundwater quality degradation and other stresses. Saltwater intrusion can naturally occur in coastal aquifers, owing to the hydraulic connection between groundwater and seawater, which can be very problematic for coastal communities that rely on groundwater. The USGS studied how excessive groundwater pumping, sea level rise, and other factors contribute to the encroachment of seawater into fresh groundwater supplies.

According to the COJ's Environmental Quality Division, in the 1880s, COJ was one of the first municipalities to utilize the Floridan Aquifer as a public water supply source. According to the USGS, an estimated 3 billion gallons of water per day are withdrawn from the Floridan Aquifer for public, residential, industrial and agricultural uses. In 1995, Duval County withdrew over 140 million gallons of water per day from the Floridan Aquifer *(Source: Ground Water Basic Facts; Neighborhoods Department; COJ).*

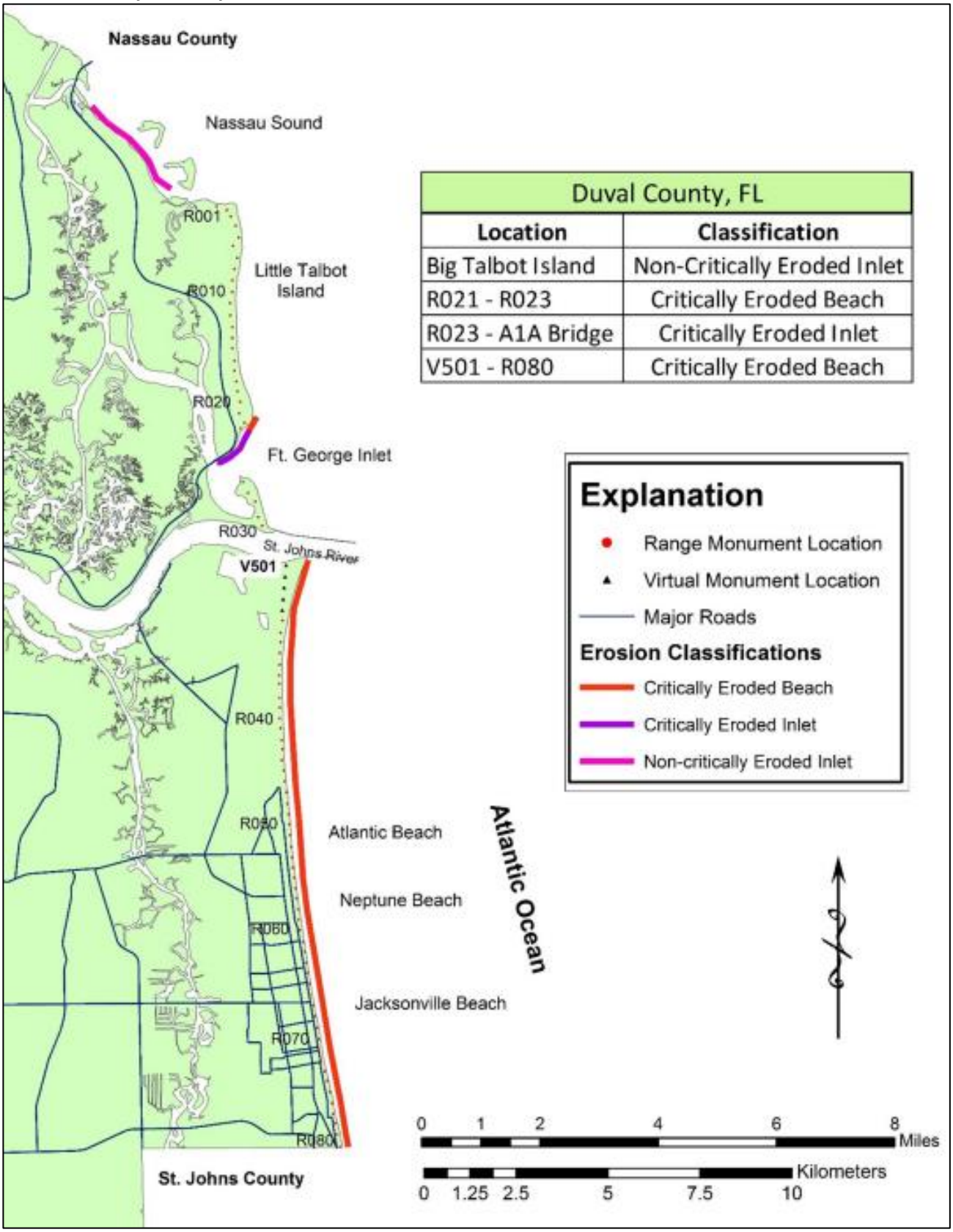
Under natural conditions, the seaward movement of freshwater prevents saltwater from encroaching on freshwater coastal aquifers. This interface between freshwater and saltwater is maintained near the coast and far below the land surface; a diffuse zone where freshwater and saltwater mix. This zone is referred to as the zone of dispersion or the zone of transition. Groundwater pumping can reduce freshwater flow toward coastal areas and cause saltwater to be drawn toward the freshwater zones of the aquifer.

Geographic Areas Affected by Coastal Erosion and Saltwater Intrusion

Duval County contains over 15 miles of coastline. The cities of CONB, COAB and COJB are all located along the shoreline. The FDEP has identified two critically eroded beach areas (10.4 miles), one critically eroded inlet shoreline area (0.7 mile) and one non-critically eroded inlet shoreline area (2.0 miles) in Duval County (*Source: https://floridadep.gov/rcp/coastal-engineering-geology/documents/critically-eroded-beaches-florida)*

The non-critically eroded inlet shoreline area extends 2.0 miles along the Big Talbot Island shoreline of Nassau Sound. Although significantly eroding a portion of Big Talbot Island State Park, this area is still considered non-critical. The southern 0.3 mile of Atlantic Ocean fronting beach on Little Talbot Island (R21 – R23) is critically eroded, as is the 0.7 mile along Ft. George Inlet (R23 – AIA Bridge). These critically eroded beach and inlet shoreline areas, resulting from the northward migration of Fort George Inlet, are experiencing a threat to recreational interests at Little Talbot Island State Park and State Road AIA. The southern 10.1 miles of Atlantic Ocean fronting beaches in Duval County (V501 – R80) are designated as critically eroded due to past threats to development and recreational interests. This area is part of a beach restoration project, which is continually maintained.

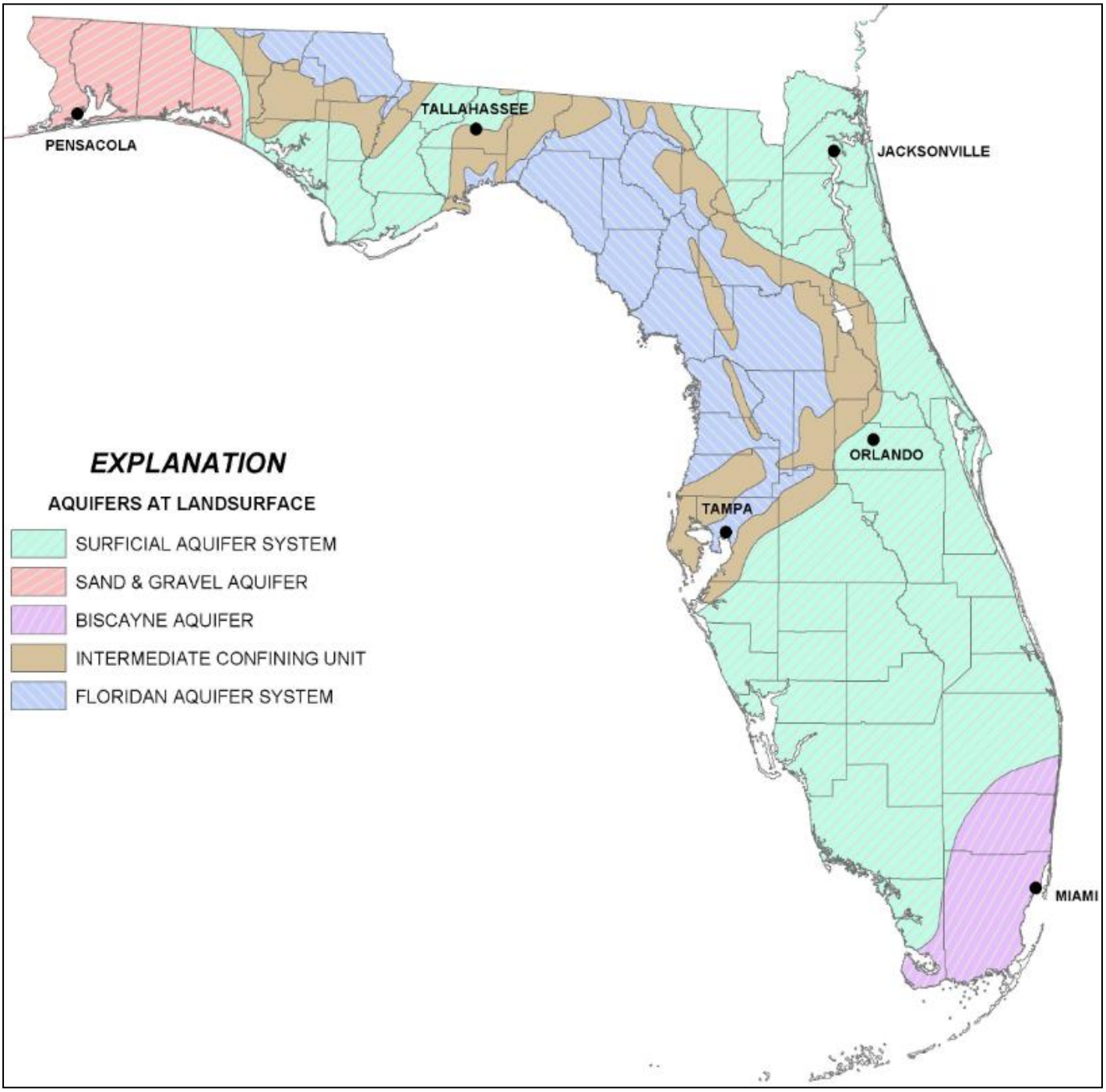
Map 28: Duval County Critically Eroded Beaches, 2024



Source: Critically Eroded Beaches in Florida. Florida Department of Environmental Protection. 2024.
Retrieved from: https://floridadep.gov/sites/default/files/FDEP_Critically%20Eroded%20Beaches_08-2024_0.pdf

The entire Florida aquifer is interconnected and one of the highest producing aquifers in the world. It is found throughout Florida and extends into the southern portions of Alabama, Georgia, and South Carolina. This aquifer system is comprised of limestone and dolomite, which varies in thickness from about 250 feet in Georgia to about 3000 feet in south Florida. The Florida aquifer system has been divided into an upper and lower aquifer, separated by a unit of lower permeable material. The upper Floridan aquifer is the principal source of water supply in Duval County.

Map 29: State of Florida Aquifer Systems



Source: Florida Department of Environmental Protection.
Retrieved from: https://fldep.dep.state.fl.us/swapp/Aquifer.asp#

Historical Occurrences of Coastal Erosion

The natural geological process of Coastal Erosion has been underway for millions of years. Some recent notable events that led to widespread erosion include Hurricane Matthew in 2016, and Hurricane Irma in 2017. They both lead to widespread erosion and changes to sand dunes along nearly all of Duval County's 15 miles of coastal beaches. The USACE was contracted to re-nourish the beaches with sand following at a cost of over $11 million dollars after these two hurricane events *(Source: COJ, FEMA Public Assistance Program Project Worksheets DR4283 and DR4337).* Coastal erosion is a process that occurs over long periods of time or through larger events as a secondary stresson.

Probability of Future Occurrences of Coastal Erosion

The clearing of coastal forests and trees due to cyclonic storms has increased the vulnerability of coastal erosion. In 2022, the USGS reported Beaches in South Carolina, Virginia, Louisiana, and Texas have lost more than 2 meters of shoreline a year over the last century, with coastal erosion estimates for much of the country expected to increase in the coming decades." (*Source: Coastal Erosion is more Severe Under Climate Change; Climate Adaptation Science Centers; USGS; Retrieved from: https://www.usgs.gov/media/images/coastal-erosion-more-severe-under-climate-change*).

Human activities within the County that contribute to coastal erosion and saltwater intrusion include port development, river catchments and watersheds, river damming, and offshore dredging or sand mining. Oceanfront developments, attendant seawall construction, inlet improvements, and similar human activities that can contribute to increased coastal erosion. In 2019, JAXPORT signed a 25-year agreement with Seattle-based port operator SSA Marine to expand a container terminal on Blount Island to accommodate additional large ships. Duval County is occupied by many catchments and watersheds that mostly lead to the St. Johns River, and there is a Dam located at Guana River that separates Lake Ponte Vedra and the Intercostal Waterway.

Coastal Erosion Impact Analysis

The increased density along the shoreline, increased freshwater demands to service the community, and natural forces are eroding the sandy barrier islands and natural barriers that reduce the impacts of storm surge. The coastal zones are a delicate protective barrier that dissipate waves, limit flooding, separate saltwater from freshwater, and provide habitat for wild animals. Erosion along the coastline is difficult to mitigate once it has begun because the natural protective barriers are gone and the more easily damaged ecosystems are exposed to saltwater infiltration, flooding, erosion, and human-caused damage from developments and recreation.

Public

- May lose property
- May damage sandy beaches, dunes or mangroves, which could lead to storm surge flooding

Continuity of Operations, including continued delivery of services

- Businesses/critical infrastructure/government building might be hindered by structural damage
- Operations may be hindered if roads to the structures are damaged from erosion
- Continuity of transportation network may be interrupted because of erosion damage to roads

Property, Facilities, Infrastructure

- Structures may be damaged when coastal erosion damages the ground

Environment

- Coastal areas, marshes, mangroves, and sandy beaches may be damaged from coastal erosion which is a habitat for many species of plants and animals
- If large portions of coastal areas and dunes are washed away from coastal erosion, storm surge from the next storm could threaten homes, businesses, roads

Public's Confidence in Jurisdiction's Governance

- If damage from coastal erosion occurs, it should be addressed in a timely manner

Historical Occurrences of Saltwater Intrusion

There are no specific or noteworthy incidents of Saltwater Intrusion. However, the USGS has estimated water levels within the Floridan aquifer system, specifically in Duval County, have gradually declined at the rate of 0.3 to 0.75 feet per year due to the increased water demand. Lower water levels in the aquifer may increase the risk of contamination by surface and subsurface pollution. Additionally, the lower water levels increase potential saltwater intrusion into the aquifer. While both coastal erosion and saltwater intrusion are natural processes, there are human activities that intensify the effects and can result in increased harmful effects. These human activities, in combination with natural forces, often exacerbate impacts of tropical storms on the coastline.

Probability of Future Occurrences of Saltwater Intrusion

The USACE has proposed dredging a 13-mile reach of the St. Johns River navigation channel in COJ, deepening it to between 50 and 54 feet below the North American Vertical Datum of 1988. The dredging operation was successfully completed in June 2021, both under budget and ahead of schedule. The project removed about 10 feet of sediments from the surficial aquifer system, limestone in some locations, and a potential impact of deepening the navigation channel is saltwater intrusion in the freshwater system.

According to the USGS, groundwater pumping reduces freshwater flow toward coastal areas and contributes to saltwater being drawn toward the aquifer. Saltwater intrusion decreases freshwater storage in the aquifers and, in extreme cases, can result in the abandonment of freshwater wells. Saltwater intrusion can occur by many ways, including lateral encroachment from coastal waters and vertical movement of saltwater near discharging wells. The intrusion of saltwater caused by withdrawals of freshwater from the groundwater system can make the resource unsuitable for use.

Saltwater Intrusion Impact Analysis

Saltwater intrusion is a potential threat to the quality of ground water in northeastern Florida. According to USGS Water-Resources Investigations Report 92-4174 (Spechler, 1994), “elevated chloride concentrations have been observed in more than 70 wells tapping the Upper Floridan and the upper zone of the Lower Floridan aquifers. In Duval and northern St. Johns County, increased chloride concentrations in water from some wells along the coast and up to 14 miles inland indicate that saline water is gradually intruding into the freshwater zones of the Floridan aquifer system.”

Public

- Contamination of drinking water can lead to health concerns
- Higher costs for utility companies and their customers

Continuity of Operations, including continued delivery of services

- Utility service costs may increase due to increased strain on municipal water supplies

Property, Facilities, Infrastructure

- Wells may become abandoned if tainted by saltwater

Environment

- Floridan Aquifer is at risk of saltwater intrusion

Economic Condition

- Increased costs for municipal water
- Increased costs for agriculture and farming

Public’s Confidence in Jurisdiction’s Governance

- Jurisdictions should ensure safe drinking water

Potential Effects of Climate Change on Coastal Erosion and Saltwater Intrusion

Climate Change and sea level rise contribute to ongoing costal erosion and warmer temperatures may lead to increased frequency and intensity of tropical cyclones that contribute to coastal erosion. In addition to sea levels rise, the location of the freshwater-saltwater interface may recede further upstream. This encroachment would be further exacerbated by drought, reduced rainfall, and increased freshwater demand, which are all anticipated impacts of warmer global temperatures.

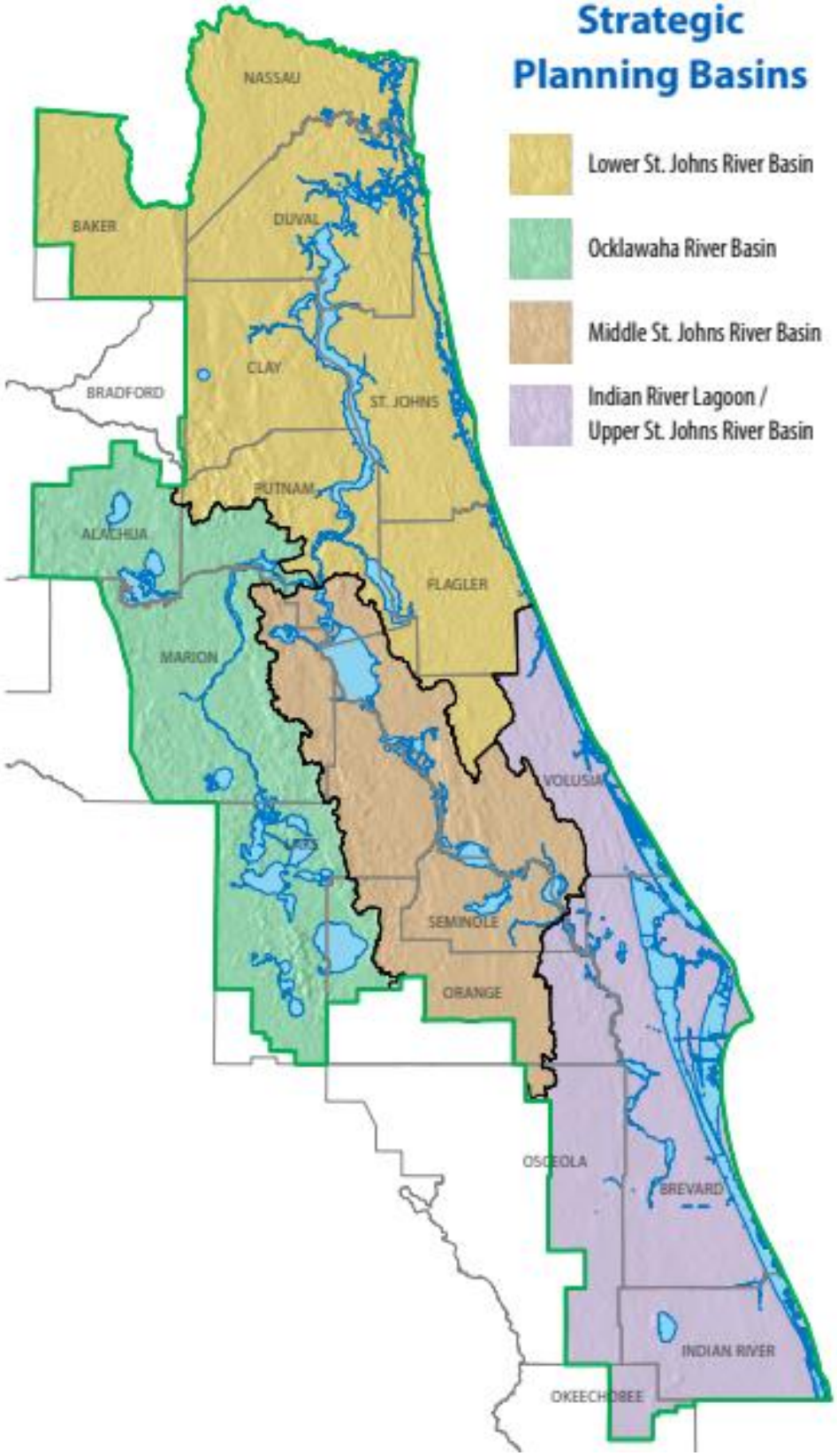
Vulnerability Analysis and Loss Estimation

Duval County contains over 15 miles of coastline, mostly located along the shoreline of CONB, COAB and COJB. There are two critically eroded beach areas (10.4 miles), one critically eroded inlet shoreline area (0.7mile), and one non-critically eroded inlet shoreline area (2.0 miles). Property along the coastal waterfront are vulnerable to secondary effects of coastal erosion, which include increased exposure to wave run-up and storm surge from storm events. Losses in property value or direct damage costs due to coastal erosion cannot be predicted directly, but it does deepen financial losses caused by storms and tropical cyclones.

Many critically endangered species that inhabit the natural coastal environment are highly at risk from temperature, salination, human encroachment, and extreme heat. However, over the past decade, impacts have been diminished through the mitigation strategy used by USACE to periodically re-nourish the shoreline. According to the COJ's Environmental Quality Division, current trends in development within Northeast Florida have increased the demand placed on the aquifer system. In order to meet the needs of the public, increasing amounts of water are being withdrawn from the aquifer which has gradually declined the water table at the rate of 0.3 to 0.75-feet per year in Duval County.

Lower water levels in the aquifer increases the risk of contamination by surface and subsurface pollution. Additionally, the gradually declining water level can increase the risk of saltwater intrusion. When an aquifer or a well is contaminated, it becomes a threat to the health and safety of the community and the natural environment. Therefore, ground water contamination can jeopardize the economic welfare of a whole community because cleaning up an aquifer, or providing alternative sources of drinking water, is expensive and difficult; costs can exceed $100 million per incident.

Map 30: St. Johns River Water Management District's Strategic Planning Basins, 2024



Source: 2024-2028 Strategic Plan. St. Johns River Water Management District.
Retrieved from: http://static.sjrwmd.com/sjrwmd/plans/SJRWMD-2024-2028-Strategic-Plan.pdf

5.

Extreme Heat

Hazard Profile

5. Extreme Heat Hazard Profile

<table>
<tr><th colspan="6">Extreme Heat</th></tr>
<tr><td colspan="5">Overview</td><td rowspan="4">High
20 / 30</td></tr>
<tr><td colspan="5">Extreme heat is defined as an extended period where the temperature and relative humidity combine for a dangerous heat index. The NWS's excessive heat criteria: heat index of at least 105°F for more than 3 hours per day for 2 consecutive days, or heat index more than 115°F for any period of time. Extreme heat can occur in Duval County but typically occurs in the summer between the months of June and September. The CDC reports, extreme heat events can be dangerous to health, even fatal. Extreme temperature events result in increased hospital admissions for heat-related illness, as well as cardiovascular and respiratory disorder complications.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="3">Potential Magnitude</td></tr>
<tr><td rowspan="2">Very High
10 / 10</td><td rowspan="2">Very High
5 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Very High
5 / 5</td><td>Very Low
0 / 5</td><td>Very Low
0 / 5</td></tr>
</table>

Extreme Heat Description

Extreme heat is defined as an extended period where the temperature and relative humidity combine into a dangerous heat index. The NWS's excessive heat criteria is either 1) heat index of at least 108°F for more than 3 hours per day for 2 consecutive days, or 2) heat index more than 115°F for any period of time. Extreme heat can occur anytime, but typically occurs in the summer between the months of June and September. The CDC reports extreme heat events are dangerous to health and can even be fatal. Extreme heat events result in increased hospital admissions for heat-related illness, as well as cardiovascular and respiratory disorder complications.

Heat Warnings are issued by the NWS by county when any location within that county is expected to meet one of the two criteria above. Studies in Canada, Europe, and the U.S. have indicated mortality begins to increase exponentially as the heat increases, or stays above a heat index of 104°F. In addition to raising public awareness, the issuance of a heat warning alerts hospitals and officials to prepare for increased emergency calls and to activate programs that check on vulnerable persons, like the elderly and home-bound disabled. In some cases, cooling centers will be opened and donation programs activated for fans and air conditioner equipment. In the case of a heat advisory, plans to turn off people's electricity for non-payment, scheduled evictions, and normal outside work will be postponed for safety.

NOAA's heat alert procedures are heavily based on Heat Index Values, sometimes referred to as the apparent temperature, in degrees Fahrenheit. The Heat Index is a measurement of how hot it feels when relative humidity is factored in with the measured air temperature. Heat related illnesses , listed in order of severity, are:

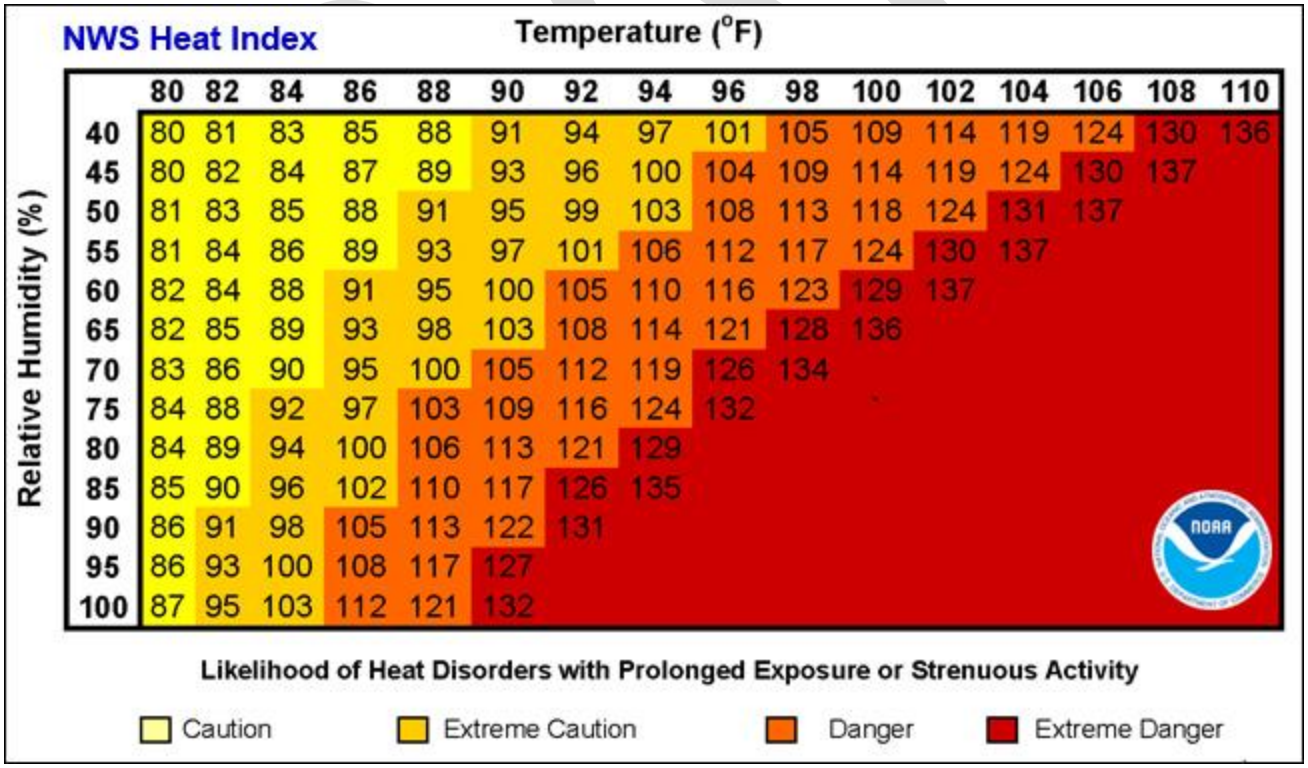
- **Heat Rash** – presents as skin irritation from excessive sweating. It is more common in young children.
- **Heat Cramps** – muscle pain and spasms normally in the abdomen, arms, and legs. Sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion.

- **Heat Exhaustion** - heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating. Symptoms of heat exhaustion include headache, nausea, dizziness, weakness, irritability, thirst, heavy sweating, elevated body temperature, and decreased urine output. Heat exhaustion can happen after several days of exposure to high temperatures and not enough fluids. If heat exhaustion is not treated, it can turn into heat stroke.
- **Heat Stroke** - a life-threatening illness in which body temperature may rise above 106° F in minutes. Heat stroke occurs when the body becomes unable to control its temperature. Body temperature rises rapidly, the sweating mechanism fails, and the body cannot cool down. Symptoms of heat stroke include confusion, altered mental status, slurred speech, loss of consciousness (coma), hot, dry skin or profuse sweating, seizures, very high body temperature. This condition can cause death or permanent disability if emergency treatment is not given.
- **Rhabdomyolysis** - Rhabdomyolysis is a medical condition associated with heat stress and prolonged physical exertion, resulting in the rapid breakdown, rupture, and death of muscle. When muscle tissue dies, electrolytes and large proteins are released into the bloodstream that can cause irregular heartbeats.

Geographic Areas Affected by Extreme Heat

Duval County is uniformly susceptible to the effects of extreme heat, where some locations are more susceptible due to geographic or man-made features, such as Urban Cores. The downtown area may experience temperatures higher than surrounding rural areas due to the Urban Heat Island Effect. The Island Effect is caused by buildings, roads, and other infrastructure that absorbs and re-emits the sun's heat more than natural landscapes like forests and bodies of water. Atmospheric conditions, such as a coastal sea breeze, may result in temperatures varying between coastal and inland sections of the County. Therefore, the heat index on the beach, in forested rural areas, in commercial shopping centers, and on tree-lined streets can all be different based on the surrounding environment; both built and natural.

Figure 13: NOAA Heat Index Value Scale



Source: Heat Index. National Weather Service. Retrieved from: https://www.weather.gov/bgm/heat

Historical Occurrences of Extreme Heat

In the last 5 years, there have been recorded highs of 103^{O}F in 2022 and 102^{O}F in 2023.

Table 36: Duval County Hottest Days On Record, 1870-2023

104°F	103°F	102°F	
July 28, 1872	August 14, 1995	July 21, 1942	July 20, 1986
July 11, 1879	August 7, 2007	June 27, 1950	August 10, 1987
June 19, 1998	June 23, 2022	June 27, 1952	August 22, 2014
		June 13, 1977	June 20, 2015
		June 4, 1985	August 11, 2023

Source: National Climate Data Center; Accessed July 2024

Listed are the heat advisories issued for Jacksonville Florida over the past 15 years:

Table 37: Duval County Heat Advisories Issued, 2009-2023

Year	Advisories (108^{o} +)
2023	25 issued
2022	4 issued
2021	3 issued
2020	2 issued
2019	8 issued
2018	1 issued
2017	0
2016	4 issued
2015	6 issued
2014	6 issued
2013	None issued
2012	7 issued
2011	7 issued
2010	2 issued
2009	1 issued

Source: NOAA Federal supplied upon request for 2025 LMS Update.

Probability of Future Occurrences of Extreme Heat

Humidity is a significant contributor to dangerous conditions requiring heat advisories to be issued and warnings of caution to be distributed to the public. In the last 15 years, 2023 had the most heat advisories, surpassing the second highest year, 2019, by 17 advisories for temperatures over 108^{o}F. Heat advisories issued for dangerously high temperatures are certain to occur on a near-annual basis. Average highs do not necessarily translate to instances of extreme heat, but extreme heat becomes more likely and more frequent as average temperatures increase over time. Temperature trends indicate that historic highs are being recorded multiple times per year, with 2019 being the hottest year on record. The record for the highest number of heat advisories was 33 issued in 1981.

Extreme Heat Impact Analysis

Extreme heat can create impacts to numerous sectors of the population and economy. Some notable impacts are listed below.

Agriculture: Various sectors of the agriculture community are affected by extreme heat. Livestock, such as rabbits and poultry, are severely impacted by heat waves. Millions of birds have been lost during heat waves. Milk production and cattle reproduction also decreases during heat waves. Pigs are also adversely impacted by extreme heat. High temperatures at the wrong time inhibit crop yields. Wheat, rice, maize, potato, and soybean crop yields can all be significantly reduced by extreme high temperatures at key development stages.

Energy: The electric transmission system is impacted when power lines sag in high temperatures. Sagging transmission lines can short out. The combination of extreme heat and the added demand for electricity to run air conditioning causes transmission line temperatures to rise. When the demand for electricity is above normal, the supply becomes outstripped causing electric companies to have rolling black outs.

Water Resources: The demand for water increases during periods of hot weather reducing water supply and pressure in many areas. This can significantly contribute to fire suppression problems for both urban and rural fire departments. The rise in water temperature during heat waves contributes to the degradation of water quality and negatively impacts fish populations. It can also lead to the death of many other organisms in the water ecosystem. High temperatures are also linked to rampant algae growth, causing fish kills in rivers and lakes.

Disease Outbreaks: Prolonged high temperature climate conditions increase susceptibility for tropical-disease transmission by the Aedes aegypti mosquito. The city has a modern mosquito control program that has been active since 1957, the COJ Mosquito Control Division. Requests for Mosquito Control can be made by phone at 630-CITY (2489) or online. COJ Mosquito Control Division routinely coordinates with the Duval County Health Department regarding viruses and responds quickly with surveillance and appropriate treatments when warranted.

Urban Homeless: High concentrations of buildings in urban areas cause urban heat island effect, generation and absorbing heat, making the urban center several degrees warmer than surrounding areas. The city has a large homeless population that does not have access to air conditioning, many of which are located in the downtown area, putting them at a higher risk for heat illness. According to FLHealthCHARTS, Duval County had 1,176 people experiencing homelessness in 2023.

Public

- Injury or death from overexposure, especially to infants, children, the elderly, those who are overweight, those with chronic illnesses, those who take certain medications

Responders

- Injury or death from over exertion in heat

Continuity of Operations, including continued delivery of services

- Not likely to impact continuity of operations

Property, Facilities, Infrastructure

- Less efficient cooling systems or systems that must run constantly to effectively cool a building

Environment

- Faster evaporation
- Damage to green spaces and agricultural lands
- Death of plants and animals

Economic Condition

- Crop damage or loss

Public Confidence in Jurisdiction's Governance

- Extreme weather requires appropriate actions by the government

Potential Effects of Climate Change on Extreme Heat

Various climatological reports indicate the average global temperatures are expected to increase by the end of the 21st century. A 2016 report from Climate Central states Florida faces the single greatest increase in the dangerous combination of heat and humidity over the next several decades. All top 13 metro areas projected to see the greatest increase in days with a Heat Index exceeding 105°F by the year 2050 are in Florida; the COJ ranks #18 on the list of U.S. top 25. The COJ is expected to see an additional 97 days where the heat index is more than 104°F by 2050 *(Source: 2015 Summer Review; Climate Central; Retrieved from: https://www.climatecentral.org/climate-matters/2015-summer-review).*

Vulnerability Analysis and Loss Estimation

Extreme heat events can trigger a variety of stress on the community. Small children, the elderly, people with chronic diseases, those who are sick or overweight, low-income populations, and outdoor workers are all at higher risk for heat-related illnesses. Both Type I and Type II diabetes are chronic conditions which may impair an individual's ability to properly maintain thermal equilibrium due to inadequate dilatation of blood vessels in the skin, leading to poor heat dispersion. Higher temperatures also contribute to respiratory disorders due to the build-up of harmful air pollutants. Therefore, the city maintains a special needs database that includes at-risk populations to increase the effectiveness of response care.

In addition to medical conditions that can directly increase the risk of illness, taking certain medications or drinking excess amounts of alcohol can also exacerbate the effects of extreme heat and humidity. There is no economic data available regarding the impacts of this hazard in Duval County and the probability of economic impact from extreme heat is low.

According to the CDC, in 2017 Hurricane Irma was attributed to 17 (13.2%) heat-related deaths associated with a lack of air conditioning in Florida, Georgia, and North Carolina. More specifically, 14 (10.9%) of the heat-related deaths occurred among geriatric patients with existing chronic diseases who resided in an assisted-living facility in Florida that were without power for several days after the hurricane's landfall *(Source: Morbidity and Mortality Weekly Report, Deaths Related to Hurricane Irma – Florida, Georgia, and North Carolina, Sep. 4, to Oct. 10, 2017. CDC; Retrieved from: https://www.cdc.gov/mmwr/volumes/67/wr/pdfs/mm6730a5-h.pdf).*

Table 38: Duval County Social Vulnerabilities Demographics, 2022

Social Vulnerability		
Social Vulnerability Category	% of Population	Population (2022 est.)
Over 65 years old	14.7%	146,674
Under 5 years old	6.5%	64,308
Language other than English spoken at home	15.6%	145,583
Disabled (not institutionalized)	13.5%	133,943
Poverty Level	14.3%	139,341

Source: American Community Survey 2022 5-year Estimate. U.S. Census Bureau (2024)
Retrieved from: https://data.census.gov/table/ACSST5Y2022.S0101?g=050XX00US12031

Extreme Heat emergencies are often slow to develop and take several days of continuous heat before noteworthy impacts are recorded. Heat waves may not strike victims immediately, rather, their cumulative effects take the lives of vulnerable populations slowly through dehydration, exposure, heat exhaustion, and heat stroke. The elderly and economically disadvantaged populations tend to be concentrated in the north and northwest sector of the County, while the remainder of the vulnerable population is distributed sporadically throughout the city.

6.

Winter Storm / Extreme Cold

Hazard Profile

6. Winter Storm and Extreme Cold Hazard Profile

<table>
<tr><th colspan="5">Winter Storms & Extreme Cold</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">Very Low
6 / 30</td></tr>
<tr><td colspan="4">Winter storms create a higher risk of travel hazards, hypothermia, frostbite, carbon monoxide poisoning, and heart attacks from overexertion. Winter storms can bring extreme cold, freezing rain, snow, ice, and high winds. Although freezing temperatures are expected each year in Duval County, extreme cold that presents a threat to life and property is exceedingly rare. The lowest temperatures ever recorded in Duval County were on February 8, 1835, when it fell to 8° F, and January 21, 1985, when the temperature fell to 7° F. Light snow is expected approximately every seven years. The last significant snowfall occurred during “The Big Freeze of 1899,” where approximately two inches of snow fell, and temperatures hovered around 10° F for several days.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="3">Potential Magnitude</td></tr>
<tr><td rowspan="2">Low
2 / 10</td><td rowspan="2">Low
2 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Low
1 / 5</td><td>Very Low
0 / 5</td><td>Low
1 / 5</td></tr>
</table>

Winter Storm and Freezing Temperature Hazard Description

NOAA defines a winter storm as an event in which the main types of precipitation are snow, sleet or freezing rain. A winter storm is a combination of heavy snow, blowing snow and/or dangerous wind chills, which can be life-threatening.

Three basic ingredients are necessary to make a winter storm: 1) Cold Air below freezing temperatures in the clouds and near the ground is necessary to make snow and/or ice; 2) Lift is something to raise the moist air to form the clouds and cause precipitation. An example of lift is warm air colliding with cold air and being forced to rise over the cold dome. The boundary between the warm and cold air masses is called a front; and 3) Moisture forms clouds and precipitation. Air blowing across a body of water, such as a large lake or the ocean, is an excellent source of moisture.

- **Snow:** Most precipitation that forms in wintertime clouds start out as snow because the top layer of the storm is usually cold enough to create snowflakes. Snowflakes are just collections of ice crystals that cling to each other as they fall toward the ground. Precipitation continues to fall as snow when the temperature remains at or below 0 degrees Celsius from the cloud base to the ground. Snow that reaches ground level is rare in Duval County and occurs only once every few decades.
- **Sleet:** Sleet occurs when snowflakes only partially melt when they fall through a shallow layer of warm air. These slushy drops refreeze as they next fall through a deep layer of freezing air above the surface, and eventually reach the ground as frozen rain drops that bounce on impact.
- **Freezing Rain:** Freezing rain occurs when snowflakes descend into a warmer layer of air and melt completely. When these liquid water drops fall through another thin layer of freezing air just above the surface, they don't have enough time to refreeze before reaching the ground. Because they are “supercooled,” they instantly refreeze upon contact with anything that is at or below 0 degrees C, creating a glaze of ice on the ground, trees, power lines, or other objects. A significant accumulation of freezing rain lasting several hours, or more is called an ice storm.

Northeast Florida is susceptible to a type of winter storm known as Nor'easters. The official definition by NOAA is a strong low-pressure system that affects the Mid-Atlantic and New England states. These systems can form over land in the eastern U.S. and over the Atlantic coastal waters. Nor'easters are notorious for producing heavy snow, rain, and tremendous waves that crash onto Atlantic's coastline, often causing beach erosion and structural damage. Wind gusts associated with Nor'easters can reach hurricane strength on the Saffir-Simpson scale. This storm type gets its name from the continuously strong northeasterly winds blowing in from the ocean, ahead of the storm over coastal areas. Warm and moist air from the Atlantic Ocean feeds these systems, which causes them to grow explosively.

One measurement of cold temperature's extent is Wind Chill. Wind Chill is a quantitative expression of the lowering air temperature caused by wind, especially affecting the rate of heat loss from an object or as perceived by an exposed person. The NWS Wind Chill Temperature index uses advances in science, technology, and computer modeling to provide an accurate, understandable, and useful formula for calculating the dangers from winter winds and freezing temperatures. The index does the following:

- Calculates wind speed at an average height of 5 feet, the typical height of an adult human face,
- Utilizes readings from the national standard height of 33 feet, which is the typical height of an anemometer,
- Is based on a human face model,
- Incorporates heat transfer theory based on heat loss from the body to its surroundings, during cold and breezy or windy days,
- Lowers the calm wind threshold to 3 mph,
- Uses a consistent standard for skin tissue resistance, and
- Assumes no impact from the sun, or clear night sky.

Figure 14: NOAA Wind Chill Chart

WIND SPEED (mph) \ AIR TEMPERATURE (F)	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
5	48	42	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57
10	46	40	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66
15	45	38	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71
20	44	37	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74
25	43	36	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78
30	42	35	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80
35	41	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82
40	41	34	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84
45	40	33	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86
50	40	33	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88
55	40	32	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89
60	39	32	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91
65	39	32	24	17	10	2	-5	-12	-19	-27	-34	-41	-49	-56	-63	-70	-78	-85	-92
70	38	31	24	16	9	2	-6	-13	-20	-27	-35	-42	-49	-57	-64	-71	-79	-86	-93
75	38	31	23	16	9	1	-6	-13	-21	-28	-36	-43	-50	-58	-65	-72	-80	-87	-95
80	38	30	23	16	8	1	-7	-14	-21	-29	-36	-44	-51	-59	-66	-73	-81	-88	-96
85	38	30	23	15	8	0	-7	-15	-22	-30	-37	-44	-52	-59	-67	-74	-82	-89	-97
90	37	30	22	15	7	0	-8	-15	-23	-30	-38	-45	-53	-60	-68	-75	-83	-90	-98
95	37	29	22	14	7	-1	-8	-16	-23	-31	-38	-46	-53	-61	-68	-76	-84	-91	-99
100	37	29	22	14	6	-1	-9	-16	-24	-31	-39	-47	-54	-62	-69	-77	-84	-92	-100

Approx frostbite times — 30 min — 10 min — 5 min

Geographic Areas Affected by Winter Storms and Freezes

Duval County is uniformly susceptible to the effects of extreme temperatures and winter storms. Some locations may be more susceptible to stronger impacts due to specific geographic or man-made features. Nor'easters produce stronger impacts along coastal areas, while inland areas are more susceptible to winter storms that may originate from the Arctic, such as Arctic Blasts which are an unstable Polar Vortex (NWS). Therefore, atmospheric conditions, such as the coastal sea breeze, may result in varying temperatures between coastal and inland Duval.

Historical Occurrences of Winter Storms and Freezes

There have been no reports of winter storms or Freezes in the last 5 years for Duval County. Some notable occurrences of winter storms are listed below:

- ✓ February 8, 1835: The temperature in Duval County was recorded at 8 degrees F.
- ✓ February 12, 1899: According to the Jacksonville Historical Society, the rain changed to sleet and then later to snow. Jacksonville received two inches of snow overnight and the temperature stood around 10 degrees. The snow remained in some places for up to five days and the vegetable crops, fruit trees, and some forest trees were destroyed beyond recovery. The plumbing of the city was badly damaged resulting in two months of repairs throughout the city (*Source: The Big Freeze of 1899; Jax History; Retrieved from:*
  - *http://www.jaxhistory.org/portfolio-items/the-big-freeze-of-1899/*).
- ✓ January 21, 1985: The lowest temperature ever recorded in Duval County was when the temperature fell to 7 degrees.
- ✓ February 20, 2015: A low of 24 degrees was recorded at Jacksonville International Airport. According to the NWS, temperatures were even lower at some stations, such as Cecil Commerce Center, where it was 19 degrees. A hard freeze warning was issued for all Northeast Florida.
- ✓ January 3, 2018: The NWS issued a winter storm warning along with a wind chill advisory for Duval County. Wind chill advisories are issued in this part of Florida when wind chill value drops below 35 degrees, a threshold much different than in other parts of the U.S. The Emergency Operations Center (EOC) activated in response to the potential for widespread black ice on county roadways.
- ✓ November 21, 2019: A hard freeze warning was issued for Northeast Florida to include Duval County. Rain from the previous day froze overnight creating icy conditions.

Table 39: Duval County Winter Storms and Winter Weather, 1950-2024

5 events were reported between 10/01/1950 and 10/31/2024 (27060 days)

Winter Storms and Freezes (Duval)	
Number of Days with Event	3
Number of Days with Death	5
Number of Days with Injury	0
Number of Days with Property Damage	2
Number of Days with Crop Damage	0

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

Probability of Future Occurrences of Winter Storms and Freezes

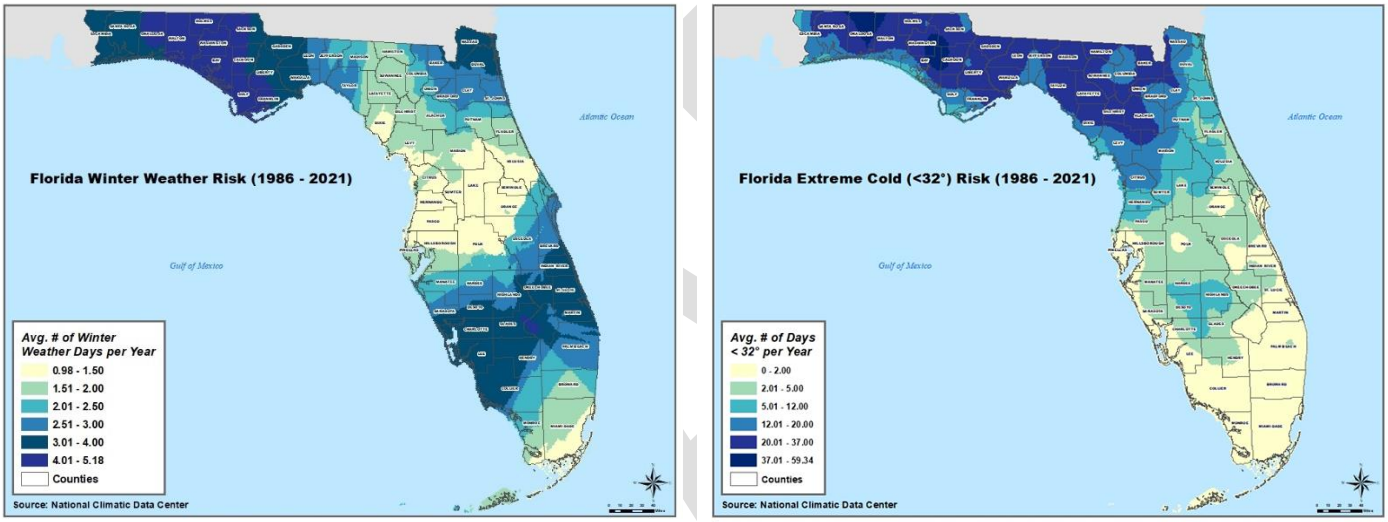
Although freezing temperatures are expected each year, extreme cold that is a threat to life and safety is exceedingly rare. According to the National Climate Data Center, Duval County will experience between two and twelve days of below-freezing temperatures on average each year. There were no reported instances of extreme cold / wind chill in the past 5 years at the time of publication.

Winter Storms and Freezing Temperature Impact Analysis

According to NOAA, recent observations show that most deaths from winter storms are not directly related to the storm itself, but as a result of traffic accidents on icy roads. All people will experience hypothermia from prolonged exposure to cold if not wearing adequate protective clothing, regardless of age or health condition. Additionally, the U.S. Consumer Product Safety Commission estimates that more than 25,000 residential fires every year are associated with the use of space heaters, causing more than 300 deaths. The most extreme impacts of winter storms are rare in Duval County, but anyone may be at risk of bodily harm during winter storms without proper protection. Regarding injuries related to exposure to cold, nearly 50% of injuries are sustained by people over 60 years old, over 75% of victims are males, and about 20% occur in their own homes. *(Source: Severe Weather 101 – Winter Weather. National Severe Storms Laboratory. NOAA. Retrieved from: https://www.nssl.noaa.gov/education/svrwx101/winter/).*

Map 31: Florida Extreme Cold (<32 degrees) Risk, 1986-2016

Winter Weather Risk Map **Extreme Cold Risk Map**



Source: State of Florida Enhanced Hazard Mitigation Plan 2023, Winter Weather Hazard Profile
Retrieved from: https://flshmp-floridadisaster.hub.arcgis.com/pages/winter-weather

Outdoor pipes and plants are extremely susceptible to damage from freezing temperature exposure shock. To prevent freezing and breaks in outdoor water pipes, all pipes should be wrapped, drained, or allowed to drip slowly in advance of the temperature dropping when the water is still liquid. In-ground sprinkler systems should be covered along with any above-ground pipes to protect from freezing. Pets should also have access to heated areas and liquid drinking water, or kept indoors, during periods of extreme cold. Economic impacts from winter storms and freezes are low to minimal. Specific impacts include:

Public

- Injury or death, as well as possible property damage from car accidents because of ice on roads and bridges.
- Injury or death from exposure to cold weather, either because of being stranded outside, or inside without proper heating systems.
- Deaths and injuries have resulted from accidents including automobile collisions due to poor driving conditions.
- Emergency medical response can be severely hindered from the effects of a winter storm event.

Responders

- First responders are increasingly at risk as they respond to traffic incidents and calls for medical attention. They are vulnerable to the same transportation dangers as other citizens, but often have to go out in hazardous conditions when ordinary citizens would not.

Continuity of Operations, including continued delivery of services

- During a winter storm and the days that follow, many people do not travel due to the road conditions. The absenteeism of workers affects the overall continuity of operations of the government.

Property, Facilities, Infrastructure

- Loss or damage of crops and agricultural revenue because of frost or freeze events.
- Roads and highways are most vulnerable to the effects of winter storms. Roads can become iced over, resulting in accidents, injuries, deaths, and traffic congestion. Roads can be heavily damaged due to winter weather events. Potholes and cracks can be found on roadways after a winter weather event, resulting in the need for repairs, causing further economic losses to the local area.
- Electrical transmission lines are highly vulnerable to severe winter weather. Trees frequently fall due to the extra weight of ice accumulating on branches.
- Other impacts resulting from winter storms include damage to plumbing, sewers, and waterlines, as well as minor roof damage and house fires resulting from portable heaters.

Environment

- Loss or damage to environment, including green spaces, habitats, species because of cold weather, winter weather, frost or freeze events.

Economic Condition

- Loss or damage to crops because of freezes result in the loss of capital
- During a winter storm and the days that follow, many people do not travel due to the road conditions. The absenteeism of workers affects the economy.

Public Confidence in Jurisdiction's Governance

- Governments should have adequate plans for winter storms

Potential Effects of Climate Change on Winter Storms and Freezing Temperatures

Climate change may result in increased occurrences or stronger winter storms in Florida. Climate variability continues to influence daily temperatures, so isolated and prolonged winter storm events are likely. Severe winter storms may increase as global average temperatures increase because temperature instability will result in more occurrences of extreme cold weather. Warmer-than-average ocean surface temperatures in the Atlantic can lead to exceptionally high amounts of moisture flowing into winter storms and contribute to greater intensification. Therefore, isolated or prolonged winter freeze events in Florida may still occur even though average temperatures increase overall.

The National Climate Data Center reports increasing surface temperatures and reductions in Arctic Sea Ice may counterintuitively produce atmospheric circulation patterns that are favorable for winter storm development in the eastern U.S. A greater prevalence of high-pressure blocking patterns over the North Atlantic result in cold outbreaks in the eastern U.S., along with slower moving systems that further exacerbate the persistence and severity of a storm *(Source: Climate Change and Extreme Snow U.S.; National Climate Data Center; NOAA; Retrieved from: https://www.ncdc.noaa.gov/news/climate-change-and-extreme-snow-us*).

Vulnerability Analysis and Loss Estimation

The city has a large population of people experiencing homeless that does not have access to air conditioning, many of which are in the downtown area, putting them at a higher risk for heat illness due to the built environment. According to FLHealthCHARTS, Duval County had 1,176 homeless people in 2023, which is highly concerning as people exposed to extreme cold are susceptible to frostbite in a matter of minutes. Areas of the body most prone to frostbite are uncovered

skin and the extremities, such as the face, hands, and feet. Hypothermia is another threat during extreme cold, which occurs when the body loses heat faster than it can be produced. Cold weather can also affect crops in late spring or early fall, when cold air outbreaks can damage or kill produce for farmers, as well as residential plants and flowers. A freeze occurs when the temperature drops below 32°F. To prevent damage to plans, bring potted plants indoors where possible. If they cannot be brought indoors, cover tender vegetation outdoors for protection.

Duval County's elderly population 65 years and over are at risk for suffering from the effects of extreme cold temperatures. Frequent checks on the elderly to ensure their heaters are working properly can prevent injury and death to that demographic. As of the 2022 5-year census statistics, Duval's elderly population was 142,441, which is 15.0% of the total population of the County. Cases of frostbite and hypothermia are also common for elderly residents who remain in their homes without access to heat.

7.

Drought

Hazard Profile

7. Drought Hazard Profile

<table>
<tr><th colspan="5">Drought</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">Moderate

18 / 30</td></tr>
<tr><td colspan="4">Drought is a deficiency of moisture that results in adverse impacts on people, animals, or vegetation over a sizeable area. A drought originates from a deficiency of precipitation over an extended period of time, resulting in water shortages. Climatic factors such as high temperature, high wind, and low relative humidity can significantly intensify the severity. Drought is often associated with periods of long and intense heat. Extreme heat can cause injury and even death, particularly with children, elderly citizens, and other special needs populations. The largest impact of prolonged drought is the financial impact to farmers with crops and livestock. Drought over a number of years could have long-term environmental impacts on the area, including species endangerment and changes to the local agricultural makeup.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="3">Potential Magnitude</td></tr>
<tr><td rowspan="2">High
8 / 10</td><td rowspan="2">Moderate
3 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Very Low
1 / 5</td><td>Low
2 / 5</td><td>High
4 / 5</td></tr>
</table>

Drought Description

According to the 2023 Florida Enhanced Mitigation Plan, drought originates from a deficiency of precipitation over an extended period, resulting in a water shortage for an activity, group, or environmental sector. Factors like high temperature, high wind, and low relative humidity are often associated with drought and can intensify its severity. When drought begins, the agricultural sector is usually the first to be impacted because of its heavy dependence on water stored in the soil. Those who rely on surface water like reservoirs and lakes, as well as subsurface water like wells, are usually the last to be affected. A short-term drought that persists for 3 to 6 months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.

The Keetch-Byram Drought Index (KBDI) is a method of examining the extent of drought and provides a continuous reference scale for estimating the dryness of the soil and duff layers. The range of the index is determined by assuming there are 8 inches of moisture in saturated soil readily available to vegetation. The index increases each day without rain, and the amount of increase depends on the daily high temperature; the index decreases when it rains. The scale ranges from 0, no moisture deficit, to 800. For different soil types, the depth of soil required to hold 8 inches of moisture varies; loam is 30 inches, clay is 25 inches, and sand 80 inches. A prolonged drought, or a high KBDI, influences fire intensity because more fuel is available for combustion with a lower moisture content. In addition, the drying organic material in soil can lead to increased difficulty in fire suppression response efforts.

The Palmer Drought Severity Index (PDSI), shown below, was to provide measurements of moisture conditions that were standardized so that comparisons using the index could be made between locations and between months. In 1965, W.C. Palmer developed an index to measure the departure of the moisture supply. Palmer based his index on the supply-and-demand concept of the water balance equation, considering more than just the precipitation deficit at specific locations. The PDSI is most effective in determining long-term drought over several months, and is not as reliable with short-term

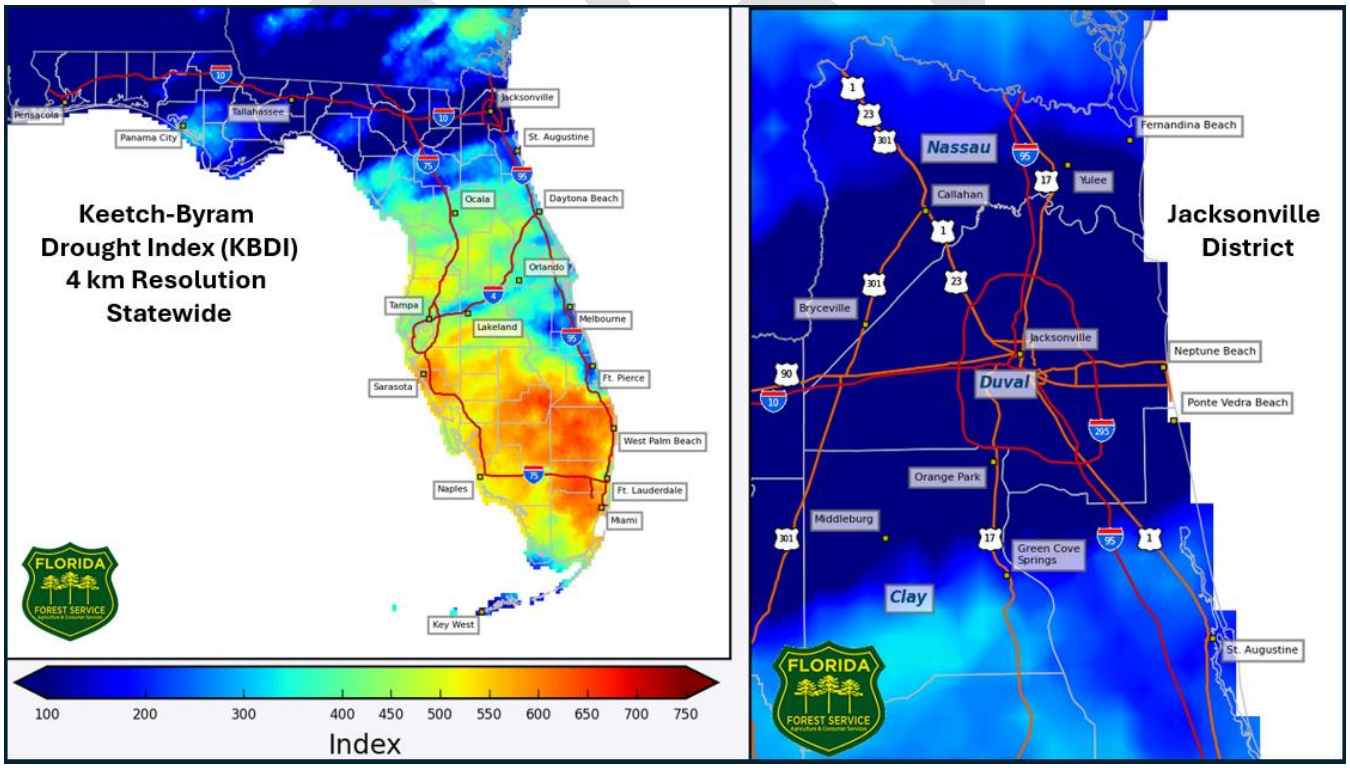
forecasts, lasting a few weeks. The PDSI uses 0 as normal, and drought is shown in terms of negative numbers; for example, -2 is moderate drought, -3 is severe drought, and -4 is extreme drought. The advantage of the PDSI is that it is standardized to a local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions.

Table 40: Palmer Drought Severity Index (PSDI)

PDSI Value	Classification
4.00 or more	Extremely Wet
3.00 to 3.99	Very Wet
2.00 to 2.99	Moderately Wet
1.00 to 1.99	Slightly Wet
0.50 to 0.99	Incipient Wet Spell
0.49 to -0.49	Near Normal
-0.50 to -0.99	Incipient Dry Spell
-1.00 to -1.99	Mild Drought
-2.00 to -2.99	Moderate Drought
-3.00 to -3.99	Severe Drought
-4 or less	Extreme Drought

Source: National Climate Data Center

Figure 15: Keetch Byram Drought Index



Source: Florida Forest Service. 2024. Retrieved from http://fireweather.fdacs.gov/wx/kbdi_4km.html

Geographic Areas Affected by Drought

Drought is a deficiency of moisture that results in adverse impacts on people, animals, and vegetation over a sizeable area. While Duval County does not have a large agricultural product base susceptible to drought, this condition does affect the urban areas dependent on water storage areas. Decreased water levels due to insufficient rain have led to the restriction of water use in amount and type throughout the County. Also, the increased pumping of groundwater and surface irrigation in periods of drought can result in land subsidence problems. These manifest as failures of roadway construction as slopes or grades appear to be 'sinking', road or sidewalk collapse, and the development of depressions in soil that are sometimes interpreted incorrectly as sinkholes. The impacts of subsidence such as infrastructure repairs can be costly.

Historical Occurrences of Drought

There have been no reported droughts in Duval County in the last 5 years. The impact of droughts on the County has historically been relatively indirect. When a drought is combined with a lowered water supply and lightning strikes, urban wildfires can occur in conditions difficult to contain the fires. The facilities in each jurisdiction potentially impacted by drought events include residential, commercial, industrial, public facilities, agricultural, recreational, and historic preservation sites.

The last Disaster Declaration for drought was declared April 15-29, 1999, for "Fire and Drought for Emergency Protective Measures" through FEMA Public Assistance Category B. According to the National Integrated Drought Information System (NDIS), since 2000 the longest duration of drought (D1-D4) in Florida lasted 124 weeks beginning on April 11, 2006 and ending on August 19, 2008. No deaths or injuries from drought are on record through the National Climactic Data Center during the period of 2010 through 2024, and no notable events have occurred in the last 5 years.

Table 41: Duval County Drought, 1950-2023

1 event was reported between 01/01/1950 and 12/31/2023 (27028 days)

Drought (Duval)	
Number of Days with Event	1
Number of Days with Death	0
Number of Days with Injury	0
Number of Days with Property Damage	0
Number of Days with Crop Damage	0

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

Probability of Future Occurrences of Drought

The NWS reported a rate of return for a major drought period over 6 months without rain is anticipated once every 15 years. The 2023 Florida Hazard Mitigation Plan stated that, based on previous occurrences of drought conditions, the probability of future drought events occurring over the long term at some frequency remains a high probability, and most of North Florida is likely to experience between 11 and 15 weeks of drought each year. As Florida continues to develop with higher populations, higher water demands, and more demands related to agriculture and livestock, these drought conditions and drier trends may begin to have an impact on the whole state. Duval County has significant acreage designated for conservation, public lands, and a diminishing amount of agricultural land as the County continues to be developed.

The St. Johns Water Management District (SJWMD) has a Water Shortage Plan which is codified in its respective chapter of the Florida Administrative Code. Each Florida Water Management District has a Water Shortage Plan, and definitions of water shortage vary slightly by district. The SJWMD Plan defines water shortage as a "situation within all or a specifically defined geographic area of the district when insufficient water is available to meet the needs of the users, or when conditions are such as to require temporary reduction in total use within a particular area to protect water resources from serious harm. A water shortage usually occurs due to drought." (SJRWMD Water Shortage Plan; Chapter 40C-21.051 F.A.C.)

Drought Impact Analysis

The direct physical effects of drought include poor crops, vegetative loss, increased fuel for wildfire, dry soil, low water level in streams and reservoirs, and less water available for wildlife and livestock. These stresses lead to indirect effects such as low farm income and reduced revenues for vendors who serve agricultural producers. Drought conditions can also cause trees to become unstable, which can lead to falling trees during a wind or rain event. The extent of social stresses from extreme drought and heat waves includes brown outs, potential loss of life in the elderly and at-risk populations, and possible water restrictions. The County has experienced a number of dry periods in the past 20 years, including prolonged drought conditions between 1998 and 2008 that resulted in drought declaration through the U.S. Small Business Administration and ecological impacts to businesses in 2007. The probability of economic impact are considered low due to the number of people impacted. Some impacts include:

Public

- Lack of water or water restrictions for personal use
- Damage to property, such as grass and other vegetation dying from lack of water

Responders

- Lack of water to extinguish fires

Continuity of Operations, including continued delivery of services

- Lack of water and water restrictions may impact the public use of water or wastewater utilities. The public may have to restrict bathing time or watering their gardens and lawns.

Property, Facilities, Infrastructure

- Facilities and infrastructure should not be directly affected by drought
- Property, such as green spaces, gardens, and crops, may be damaged from lack of water

Environment

- Areas such as green spaces, gardens, and forests may be damaged from drought

Economic Condition

- Crop damage or loss from drought can severely impact farmers and the agricultural economy, which can in turn affect the economy of an area if it is dependent upon the sales of the crops
- Employment loss due to lower demand for services such as landscaping, lawn care, and car wash

Public Confidence in Jurisdiction's Governance

- Governments should have a plan in place to address droughts

Potential Effects of Climate Change on Drought

The expected global pattern of climate change is for arid areas to become drier, meaning that droughts may occur more frequently and be more severe. This assertion is reinforced by NASA's recent article 'Earth's Freshwater Future: Extremes of Flood and Drought', which concludes some areas are projected to get more rain over time, while others become much drier. NASA's research shows that humans have already been influencing global patterns of drought for nearly a century. The research indicates the Southwestern U.S. is at a higher risk to climate change induced drought, but did not make direct predictions for Southeast Florida specifically *(Source: Earths Freshwater Future Extremes of Flood and Drought; NASA; 2019; Retrieved from: https://science.nasa.gov/earth/natural-disasters/droughts/earths-freshwater-future-extremes-of-flood-and-drought/).*

Vulnerability Analysis and Loss Estimation

Drought is often associated with periods of long intense heat that does not typically affect humans directly. However, extreme heat can cause injury and even death in children, the elderly, and other medically vulnerable populations. Rationing water supplies would most likely be the worst-case scenario for severe drought impacts on the whole community. The County has promulgated spring and summer watering restrictions for over a decade. Injuries and

potential deaths are most likely to impact rural, poor areas that lack air conditioning and immediate medical care to treat heat related illnesses. The largest impact of prolonged drought is the financial impact to farmers who cultivate crops and livestock, as it can damage and possibly destroy crops, as well as reduce the number of livestock that can be properly cared for. The USDA 2022 Census of Agriculture for the Duval County profile reported there were about $6.8 million in agricultural products sold in 2022, comprised of $5.5 million in crops and $1.3 million in livestock, poultry, and animal products *(Source: Agricultural Census; USDA; 2022).* Prolonged drought over several years could have long-term environmental impacts on the area, including species endangerment and necessary changes to the local agriculture.

8.

Flooding

Hazard Profile

8. Flooding Hazard Profile

<table>
<tr><th colspan="5">Flooding</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">High
19 / 30</td></tr>
<tr><td colspan="4">Flooding is any high flow, overflow, or inundation by water which causes or threatens damage. All of Duval County is vulnerable to damage from wind driven rain and flooding from rain, as well as riverine flooding, storm surge, and flooding attributable to tropical storms and hurricanes. The most common flooding in the city occurs during the rainy season from June to November. Areas of the county have experienced flooding from tributaries and creeks of the St. Johns River. Current statistics contribute concerns for flooding in low-lying coastal and riverine areas. Impacts from flooding, including, but not limited to, loss of life and property, injuries related to drowning and electrocution, interruption of life activities, incapacitated vehicles due to rising water, inaccessible roads, agricultural loss, and economic disruption.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="3">Potential Magnitude</td></tr>
<tr><td rowspan="2">Very High
10 / 10</td><td rowspan="2">Very High
5 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Very Low
0 / 5</td><td>Low
2 / 5</td><td>Very Low
1 / 5</td></tr>
</table>

Flooding Description

Flooding is a high flow, overflow, or inundation of property or roadways causing damage or blocking access roads. The 2023 Florida Hazard Mitigation Plan defines flooding as temporary conditions of partial or complete inundation of normally dry land from the overflow of inland or tidal waters and surface water runoff from any source. Floodplains are defined as any land areas susceptible to being inundated by water from any source as part of the area's natural feature. Flooding can also result from a variety of conditions, including severe weather or man-made structure failures like dams and levees; Duval County is not at risk for flooding due to dam or levee failure.

The types of flooding recognized by the County are riverine, flash floods, or coastal tidal flooding. Tropical Storms may exacerbate flooding by producing storm surge water levels inland, particularly along the St. Johns River, in the ICW, and along the coast. Riverine flooding occurs when water levels rise over the top of riverbanks due to excessive rain from tropical systems making landfall, and persistent thunderstorms over the same area for extended periods of time can occur. Coastal flooding is the inundation of land along the coast which is caused by higher-than-average high tide and worsened by heavy rainfall with onshore winds.

Storm surge is an abnormal rise in water level in coastal areas, over and above the regular astronomical tide, caused by forces generated from a severe storm's wind, waves, and low atmospheric pressure. Extreme flooding can occur in coastal areas particularly when storm surge coincides with normal high tide, resulting in storm tides. A study conducted from 1970 to 1999 by the National Hurricane Center found that freshwater flooding accounted for more than half of the tropical cyclone deaths in the U.S. FEMA estimates that about 41% of Florida is flood prone, which is the highest percentage of all 50 states. Because of the potential for flood damage, Florida has the most flood insurance policies as required by the NFIP than any other state.

Once a river reaches flood stage, the flood severity categories used by the NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat. The following are the recognized measures of the extent of flooding:

- **Minor Flooding**: Minimal or no property damage, but possibly some public threat or inconvenience.
- **Moderate Flooding:** Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- **Major Flooding:** Extensive inundation of structures and roads. Significant evacuations of people and transfer of property to higher elevations.

Geographic Areas Affected by Flooding

The COJ has more than 120,000 people living within the 100-year flood zone and another 31,000 living in the 500-year flood zone *(Source: 2021 Hurricane Evacuation Study, Vol. 6-4, pg. 9).* Many of these properties are adjacent to the St. Johns River, creeks, or stormwater retention facilities in the form of lakes and other bodies of water. Nearly every major water basin in the County is lined with waterfront developments that are vulnerable to flooding along both sides of the ICW and the three Beaches Communities. FEMA has identified more than 20 residential properties as Severe RL, which is defined in common terms as four (4) or more incidents of damage resulting in at least $5,000 worth of damage for each claim, or two (2) claims exceeding the value of the insured structure.

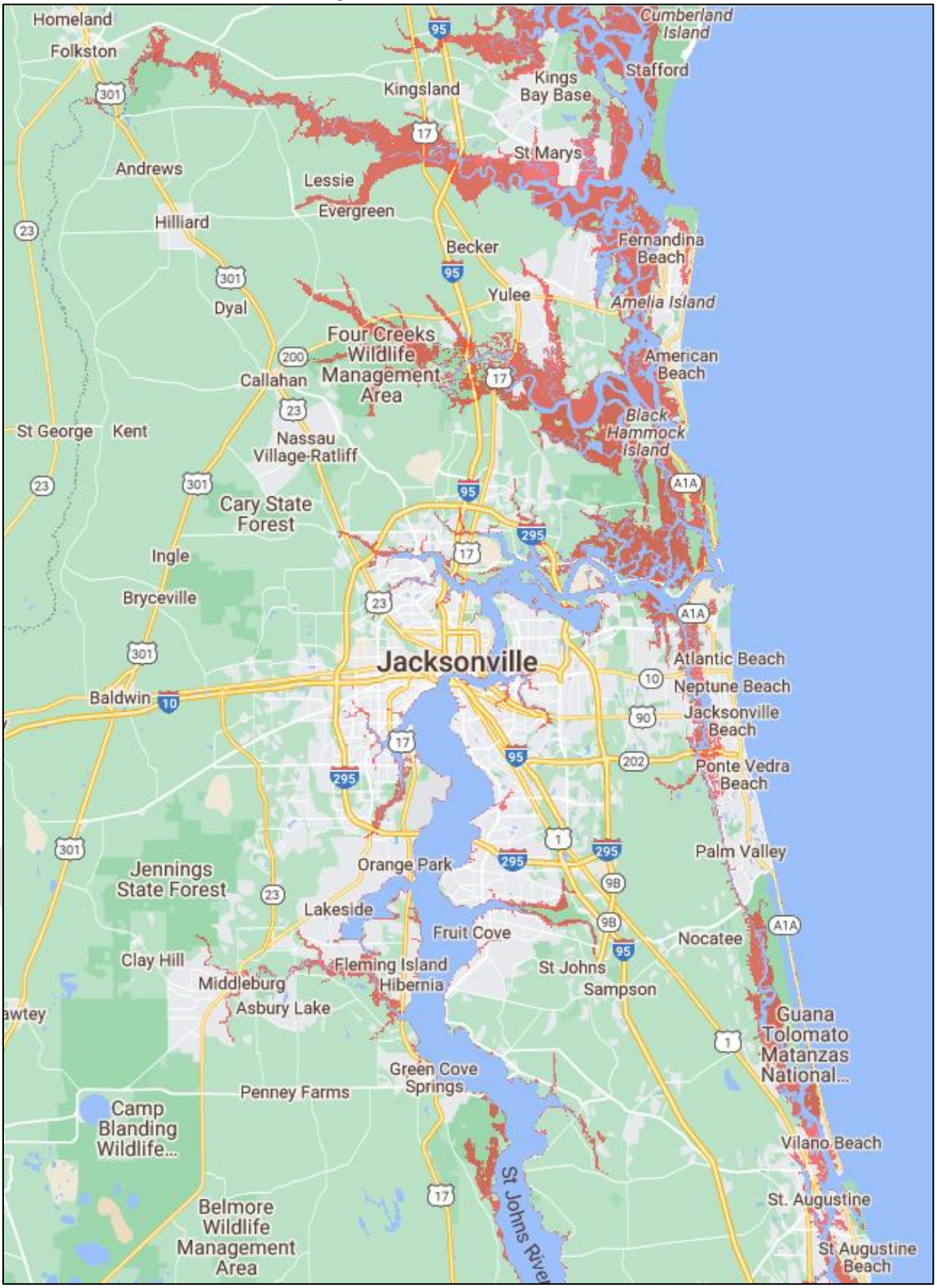
The demand for waterfront development is high, leaving the most logical course of mitigation is to strictly enforce construction standards for building elevated finished floor elevations and elevated foundations a minimum of 12 inches above Base Flood Elevation (BFE) according to the COJ freeboard requirement in order to minimize or eliminate damage due to flooding. In contrast with the three Beaches Communities, the inland County has areas that are low-lying with poor drainage susceptible to urban, neighborhood localized flooding caused by heavy rain. Rains from hurricanes rank 3rd in order of a hurricane's destructive force. During the average 24-hour period that it normally takes a hurricane to pass over an area, an average rainfall of between 5 to 10 inches may occur. Normally, this happens concurrently with the arrival of gale force winds, however, in Florida there have been hurricane-related rainfalls ranging from 12 to 20 inches.

The greatest concentration of RL properties were historically located along a single body of water called Wills Branch Creek. A drainage improvement project under the USACE was completed in 2001 to resolve flooding issues, and as a result, Duval County is now responsible for ongoing dredging of the creek to curtail this type of flooding vulnerability. Several flood prone homes along Wills Branch were spared serious flood damage during Tropical Storm Fay in 2008 due to the dredging project immediately preceding the storm. Additionally, the remaining flood prone properties will benefit from improved maintenance of existing drainage improvements. The County is sustaining a long-term mitigation strategy that consists of the acquisition and demolition of structures in the area through voluntary residential participation. To date, over a dozen homes adjacent to the creek have been acquired and returned to open space.

Historical Occurrences of Flooding

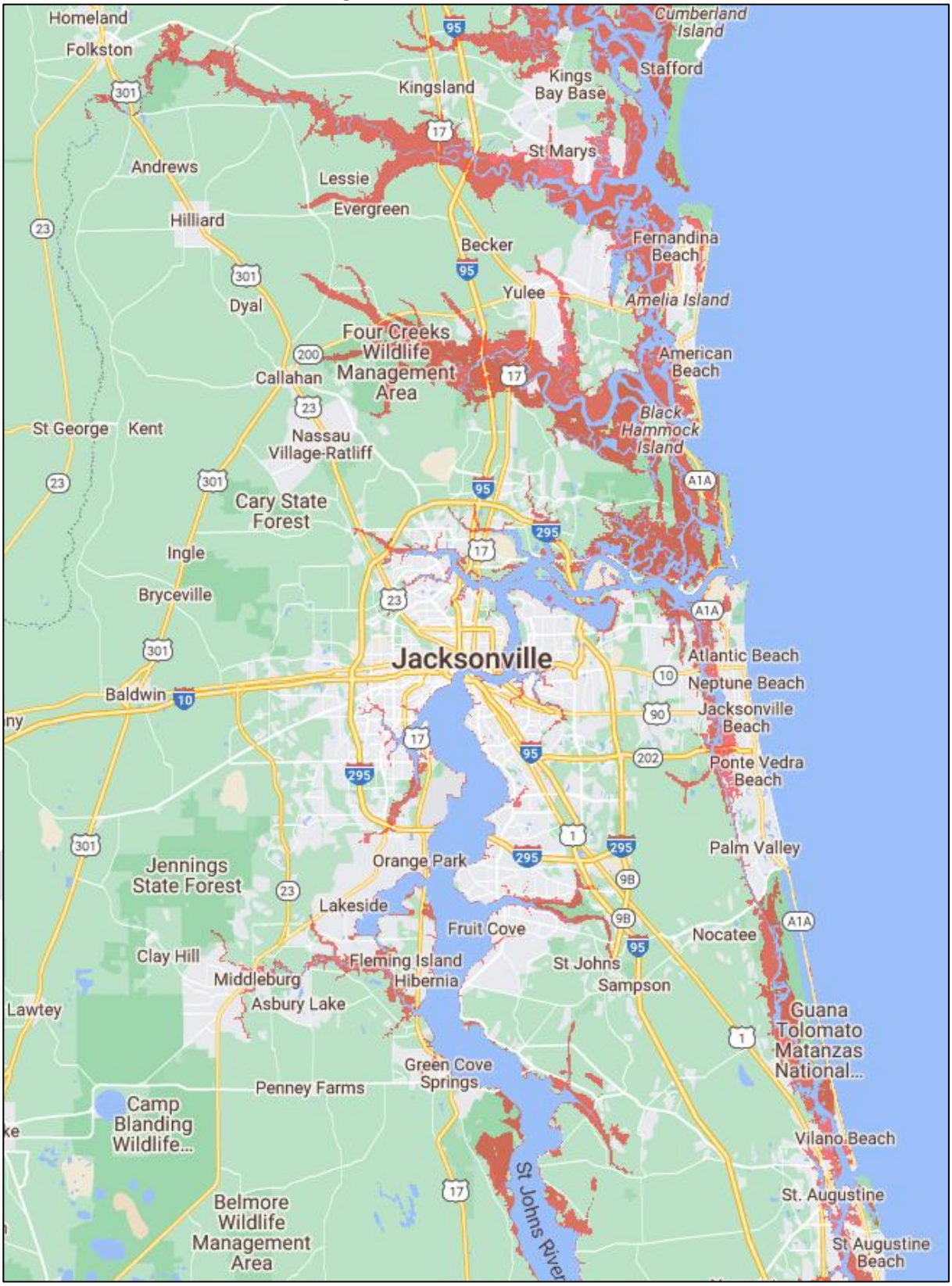
In the last 10 years, there have been 71 reported events of flooding in Duval County. FEMA reports that there are 5,541 historical flood insurance claims paid between 1978 and 2019, totaling $200 million in damages. The NWS Storm Events Database records at least 130 different flooding events into the following categories: Coastal Flood, Flash Flood, Flood, and Storm Surge.

Map 32: One (1) Ft. Elevation Coastal Flooding Risk in NE Florida, 2024



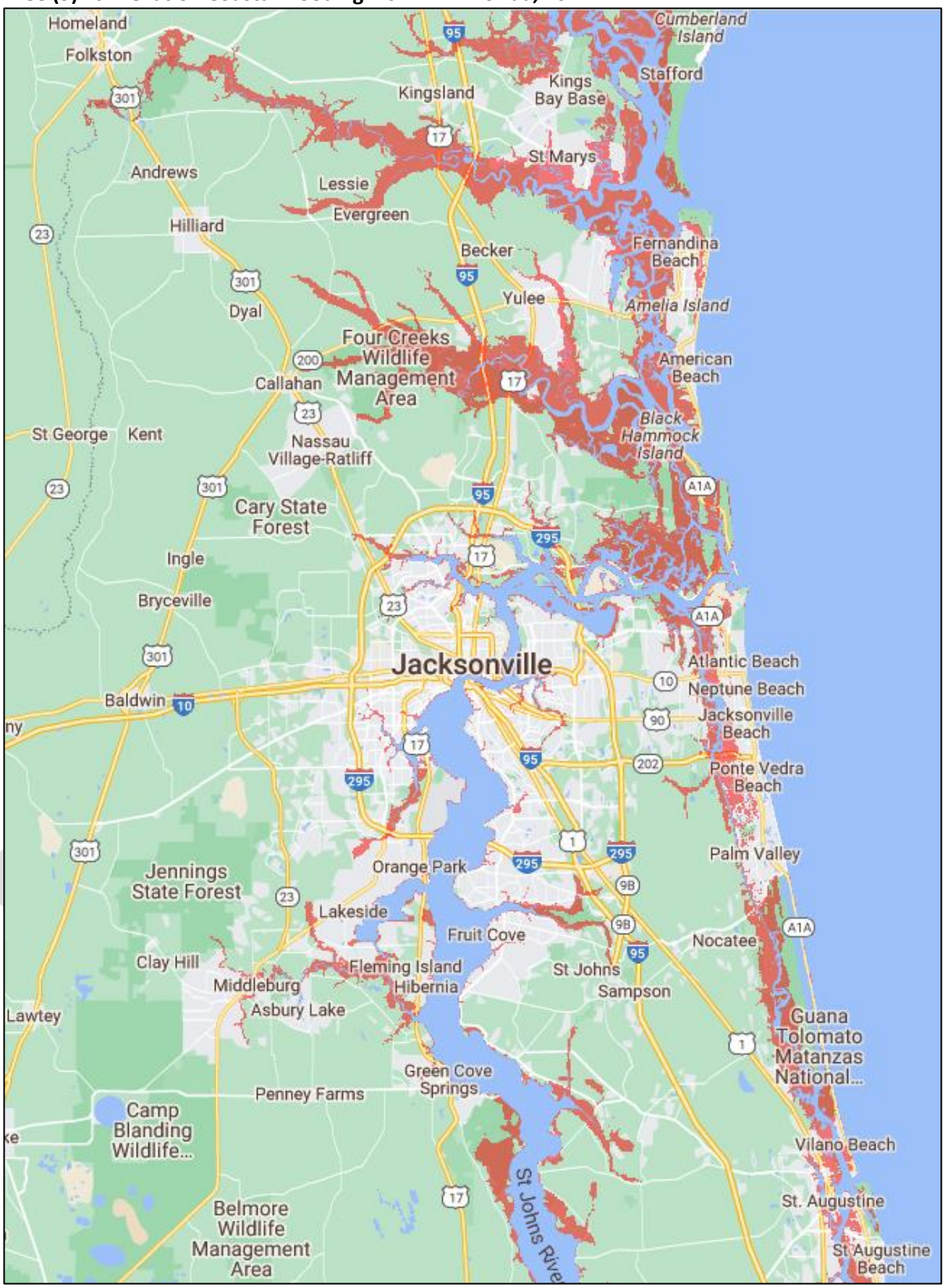
Source: Coastal Risk Screening Tool. Climate Central. Retrieved August 2024 from: https://coastal.climatecentral.org/map/

Map 33: Two (2) Ft. Elevation Coastal Flooding Risk in NE Florida, 2024



Source: Coastal Risk Screening Tool. Climate Central. Retrieved August 2024 from: https://coastal.climatecentral.org/map/

Map 34: Three (3) Ft. Elevation Coastal Flooding Risk in NE Florida, 2024



Source: Coastal Risk Screening Tool. Climate Central. Retrieved August 2024 from: https://coastal.climatecentral.org/map/

Table 42: Duval County Flooding Events, 1950-2024

Event Types: Coastal Flooding, Flash Flood, Flood, Storm Surge/Tide
202 events were reported between 01/01/1950 and 10/31/2024 (27333 days)

Duval	Flooding	Flash Flood	Coastal Flood	Storm Surge
Number of Days with Event	78	40	34	2
Number of Days with Death	0			
Number of Days with Injury	0			
Number of Days with Property Damage	16	16		
Number of Days with Crop Damage	1			
Number of Event Types	1	1	1	1

Source: Storm Events Database. National Centers for Environmental Information. NOAA. Retrieved from: https://www.ncdc.noaa.gov/stormevents/

Probability of Future Occurrences of Flooding

In the last 5 years, there were 71 reported flooding events in Duval County including flash flood, flood, and coastal flood. Based upon historical observations, minor flooding is a certainty on an annual basis within many parts of Duval County. Floods that present a danger to life or property are rarer and may occur during a severe storm or in conjunction with a tropical cyclone event. FEMA provides a standard methodology to determine the probability of flooding impacts for the purpose of determining flood insurance premiums through the NFIP. Their product, known as the FIRM, depicts a probabilistic representation of flood risk on an annual basis across the U.S. Two types of flood events, known as the 100-year flood zone, which is a 1% chance annually to observe flooding of this magnitude, and the 500-year flood zone, which is a 0.2% chance annually to observe flooding of this magnitude, are represented and used as the benchmarks to assign flood insurance premium rates.

Decade	Flash Flood	Flood	Coastal Flood
1954-1963	0	0	0
1964-1973	0	0	0
1974-1983	0	0	0
1984-1993	0	0	0
1994-2003	15	7	0
2004-2013	15	29	13
2014-2024	21	71	28

Flooding Impact Analysis

Impacts from flooding include loss of life and property, injuries related to drowning and electrocution, interruption of life saving activities, incapacitated vehicles by flood water, inaccessible roads, and agricultural and economic disruption. Floodwater presents an additional hazard as a public health problem when waters inundate drinking water facilities, chemical and waste storage facilities, wastewater treatment facilities, and solid waste disposal sites.

The flood hazard associated with storm surge and wind-driven water from a Category 1 or Category 2 Hurricane can damage beachfront properties, piers, seawalls, and boardwalks. Storm surge and wind from Category 3 or higher storms are expected to cause massive destruction on coastal barrier islands, particularly in coastal municipalities including the three Beaches and communities close to the St. John's River, or its tributaries.

Of particular concern within Duval County's population are those with special needs and limited resources for post-disaster recovery due to age, disability, income level, or low English proficiency.

Table 43: Social Vulnerabilities Demographics in Duval County, 2022

Social Vulnerability		
Social Vulnerability Category	**% of Population**	**Population (2022 est.)**
Over 65 years old	14.7%	146,674
Under 5 years old	6.5%	64,308
Language other than English spoken at home	15.6%	145,583
Disabled (not institutionalized)	13.5%	133,943
Poverty Level	14.3%	139,341

Source: American Community Survey 2022 5-year Estimate. U.S. Census Bureau (2024)
Retrieved from: https://data.census.gov/table/ACSST5Y2022.S0101?q=050XX00US12031

Socially vulnerable demographics are accounted for in the transportation analysis to support evacuation clearance times. There is added risk to isolated populations, even in elevated areas, due to flooded or destroyed roads preventing emergency services and utility crews access. These considerations indicate an area of impact may require more evacuation clearance times due to their vulnerable infrastructure causing delays or unsafe evacuation conditions.

The percentage of vulnerable population exposed to the flood hazard by living in structures built within the 100-year and 500-year floodplain before the FEMA flood maps were drawn are also important to consider. In addition, inland communities with residents living in low-lying or flood-prone areas, mobile or manufactured housing, and structures below current building code standards, are also vulnerable to storm surge. According to the 2022 5-year Estimates from the Census Data Table, manufactured housing makes up 14,612 units out of 411,541 units, or 3.6% of housing; these structures are more vulnerable to high winds than other structures.

The series of maps that depict the 100-year floodplain and major drainage basins in the County highlight the probability of flood impact on whole community. The CHHA is outlined with a description of the legislative developments in the past decade to better define the CHHA. It has been adopted into the COJ COMP plan.

Some general impacts that may occur due flooding are as follows:

Public

- Injury or Death
  - Drowning
  - Vehicle accidents
  - Increase in emergency response times
  - Become stranded on rooftop, or trapped inside a building or car
  - Exposure to hazardous materials or wastewater
  - Traffic accidents from driving through flooded roads – car washed away, water deeper than expected
- Damage to property
  - Mold infestation
  - Need to replace property damaged, furniture, and clothes
  - Repairing damaged property
  - Issues with damage to uninsured property

Responders

- Injury or Death
- Responding to calls during flooding, traversing flooded roads
- Drowning
- Dangerous rescue missions, from roofs, unstable buildings, stranded cars
- Exposure to hazardous materials or wastewater
- Power outage dangers, live downed wires

Continuity of Operations, including continued delivery of services

- Floodwaters may damage buildings, electrical systems, contents, making continued operations difficult or impossible
- Floodwaters may hinder access, preventing employees and the public from entering a building

Property, Facilities, Infrastructure

- Property damage
  - Floodwaters can damage property or carry heavy debris that could cause damage
- Infrastructure damage
  - If water overwhelms the drainage systems, it can backup and cause damage to drains or even result in wastewater release

Environment

- Release of wastewater could damage environment
- Damage to habitat for plants and animals
- Inundation of agricultural areas could destroy crops
- Event generated debris impacting waterway navigation and submerged wetland habitats

Economic Condition

- Damage from floodwaters will likely require time and resources to repair, which causes loss of income on a potentially massive scale
- FEMA reports that almost 40% of small businesses never reopen their doors following a flood because just a few inches of water can cause tens of thousands of dollars in damage
- Floodwaters may hinder access to buildings, creating further lost profits

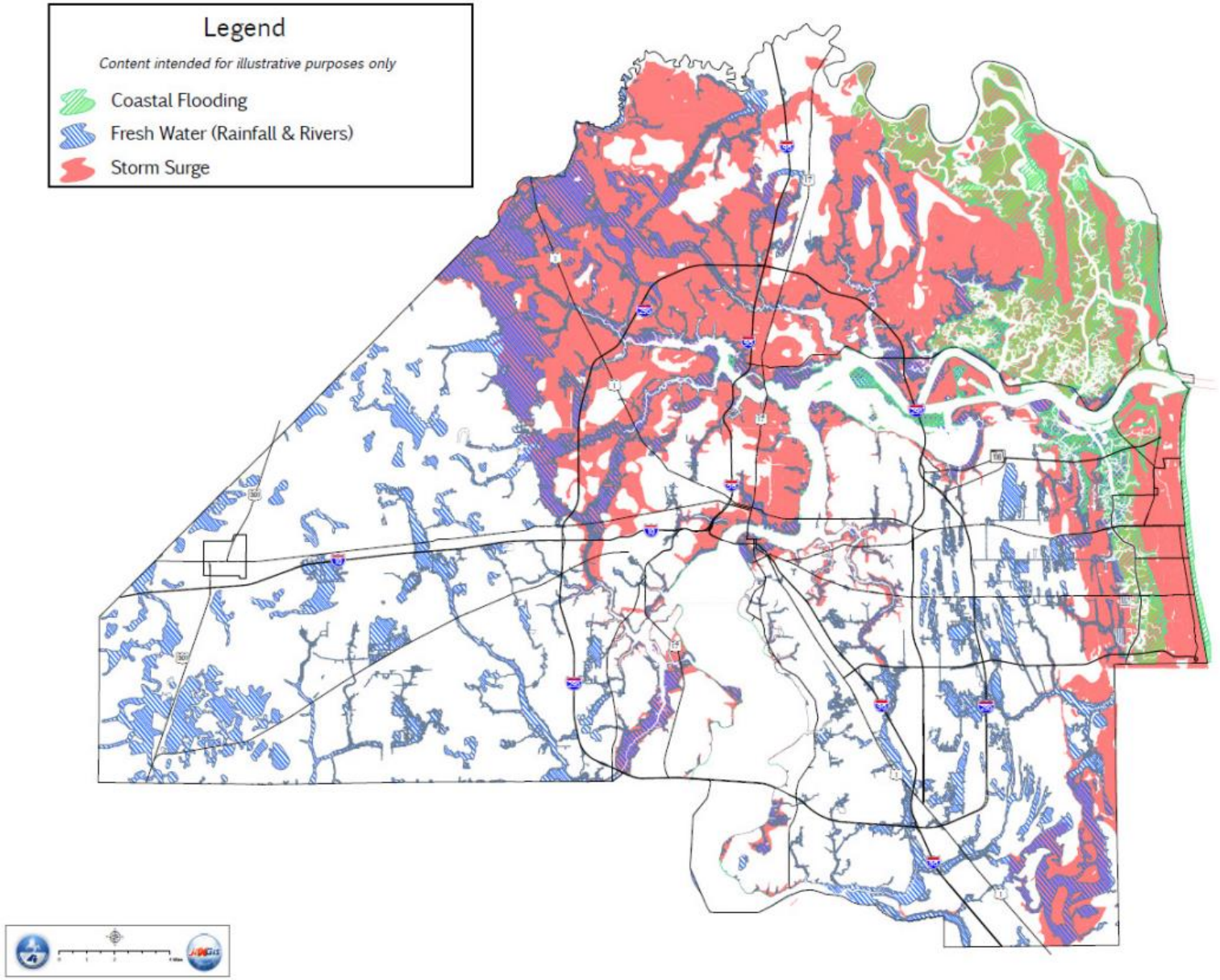
Public Confidence in Jurisdiction's Governance

- Victims of flooding rely upon the local government to coordinate recovery resources

<u>Potential Effects of Climate Change on Flooding</u>

Global climatological patterns give rise to periods of more frequent and severe hurricanes, therefore flooding due to hurricanes is expected to become more frequent and severe. Sea Level rise as a component of climate change could have drastic effects and potentially lead to areas becoming uninhabitable due to repeat total loss structures.

Map 35: Duval County Flood Prone Areas



Source: NOAA Slosh Modeling. FEMA FIRM data 2022 (1% annual chance of flooding). COJ Emergency Preparedness Division.

Vulnerability Analysis and Loss Estimation

The COJ has more than $3.5 million dollars' worth of residential property within the 100-year flood zones *(Source: COJ PPD).* Countywide, FEMA reports that there are currently over 30,00 flood insurance policies in force, covering $9.3 million dollars' worth of insured property according to their 2024 update; most of these properties are river and creek front properties *(Source: FEMA NFIP Insurance Report, Dec. 2024, https://nfipservices.floodsmart.gov//reports-flood-insurance-data).*

- ✓ 2008, Tropical Storm Fay resulted in an estimated $50 million in damages to public infrastructure *(Source: After Action Report; COJ EPD),* an estimated $100 million in business disruption (Source: First Coast Manufactures Council), and a Presidential Disaster Declaration [FEMA-1785-DR-FL] primarily from flood and wind exposure. Several flood prone homes along Wills Branch were spared serious flooding damage during Tropical Storm Fay in 2008 due to the successful dredging project.
- ✓ 2012, Tropical Storm Debby Disaster Declaration [FEMA-4068-DR-FL] generated another $1.9 million in debris management and public assistance claims *(Source: Florida Public Assistance records; 2015; Retrieved from: www.floridapa.org).*
- ✓ 2017, Hurricane Irma resulted in widespread flooding throughout Duval County due to storm surge, coastal flooding, and freshwater flooding from rainfall. Based on a report by the Florida Office of Insurance Regulation, as of November 14, 2018, Irma resulted in 37,279 insurance claims in Duval County. Less than 1% of those claims were for private flood (0.18%).
- ✓ 2022, Hurricane Nicole resulted in heavy localized flooding throughout Duval County due to storm surge, coastal flooding, and freshwater flooding from rainfall. Based on a report by the Florida Office of Insurance Regulation, as of June 16, 2023, Nicole resulted in 1,450 insurance claims in Duval County.
- ✓ 2024, Hurricane Helene 2017, Hurricane Irma resulted in widespread flooding throughout Duval County due to storm surge, coastal flooding, and freshwater flooding from rainfall. Based on a report by the Florida Office of Insurance Regulation, as of January 15, 2025, Helene resulted in 4,855 insurance claims in Duval County. Of those, 1,729 were closed without payment.

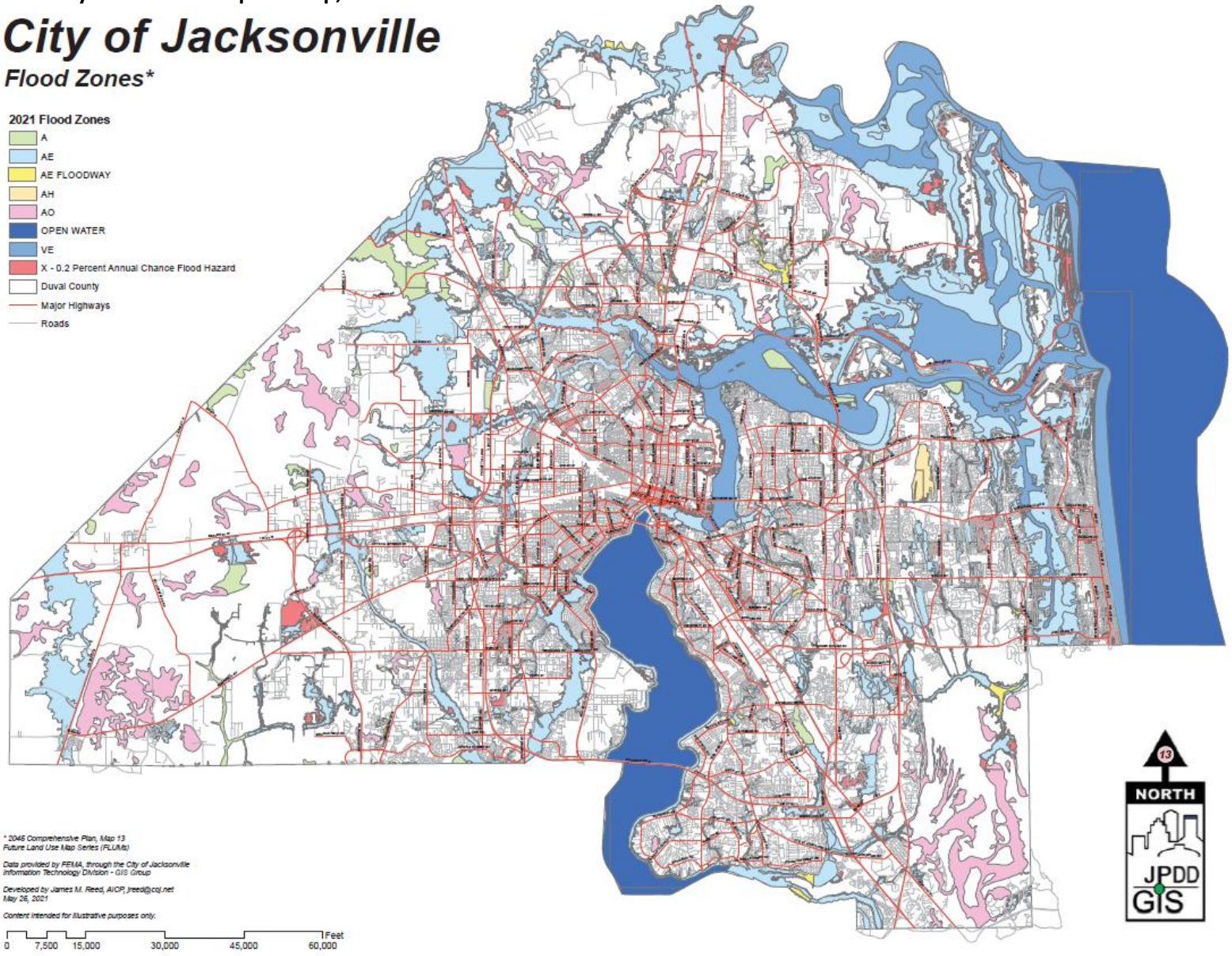
The County's flood prone properties along Wills Branch have benefitted from the maintenance of existing drainage improvements and ongoing initiative to educate property owners about flood mitigation alternatives for their property. Over 30 properties in Duval County have received assistance through the NFIP and FEMA Repetitive Loss grant programs for a variety of mitigation alternatives, like acquisition and demolition of structures, standard elevation, minor flood control, hardening of critical infrastructure, mitigation reconstruction, and code-plus construction. The probability of future flood damage to jurisdictions within Duval County is high, based on flood event probability summarized below:

Table 44: Duval County Flood Insurance Reports, 2024

CID	Jurisdiction	CRS Rating	Policies	Coverage in Force
120075B	COAB	6	2,337	$730,877,000
120076#	TOB	-	9	$2,862,000
120078B	COJB	6	5,749	$1,655,835,000
120077B	COJ	6	20,940	$6,544,559,400
120079B	CONB	7	1,100	$373,603,000
Duval County Totals			**36,031**	**$9,307,736,400**

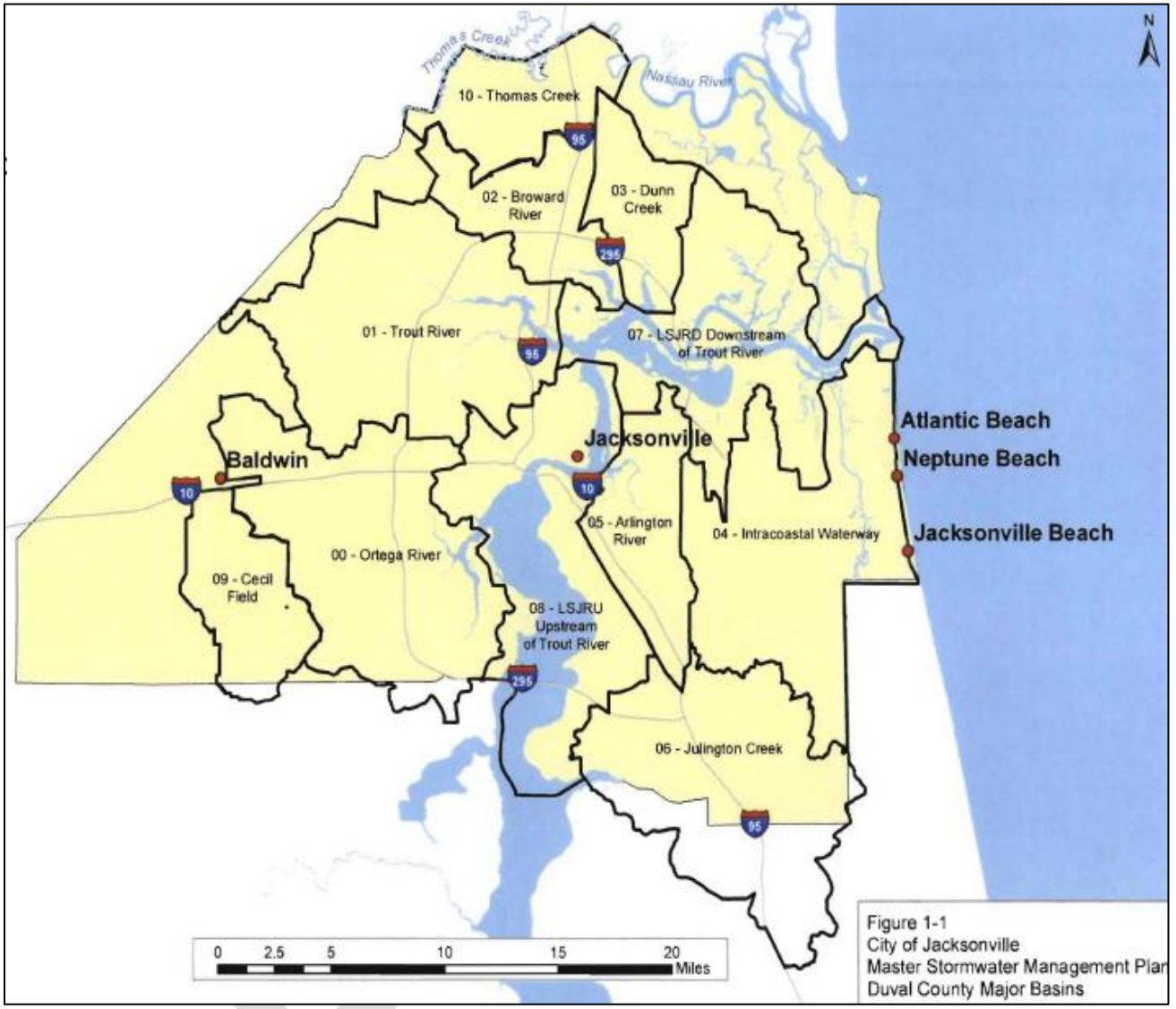
Source: FEMA NFIP Office of Floodplain Management, Latest Update from 2024, Source: https://nfipservices.floodsmart.gov/reports/FinancialLossesbyState.xlsx , Source: FEMA Policy & Claim Statistics for Flood Insurance, https://www.fema.gov/policy-claim-statistics-flood-insurance

Map 36: Duval County 100-Year Floodplain Map, 2021



Source: COJ Comp Plan (Map 13), Future Land Use Element (2021)

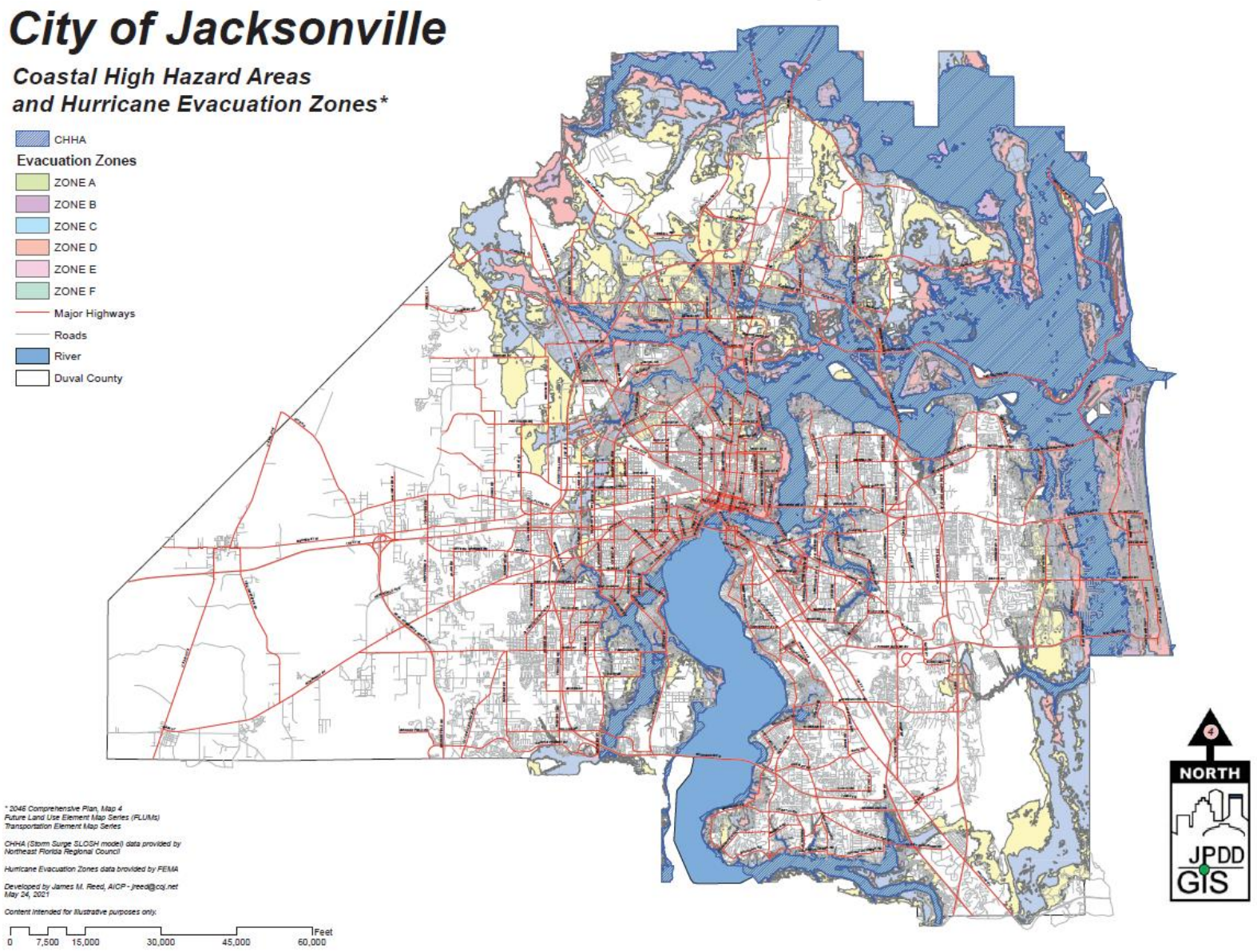
Map 37: Duval County Major Drainage Basins



Source: Master Stormwater Management Plan. City of Jacksonville PPD. 2014.

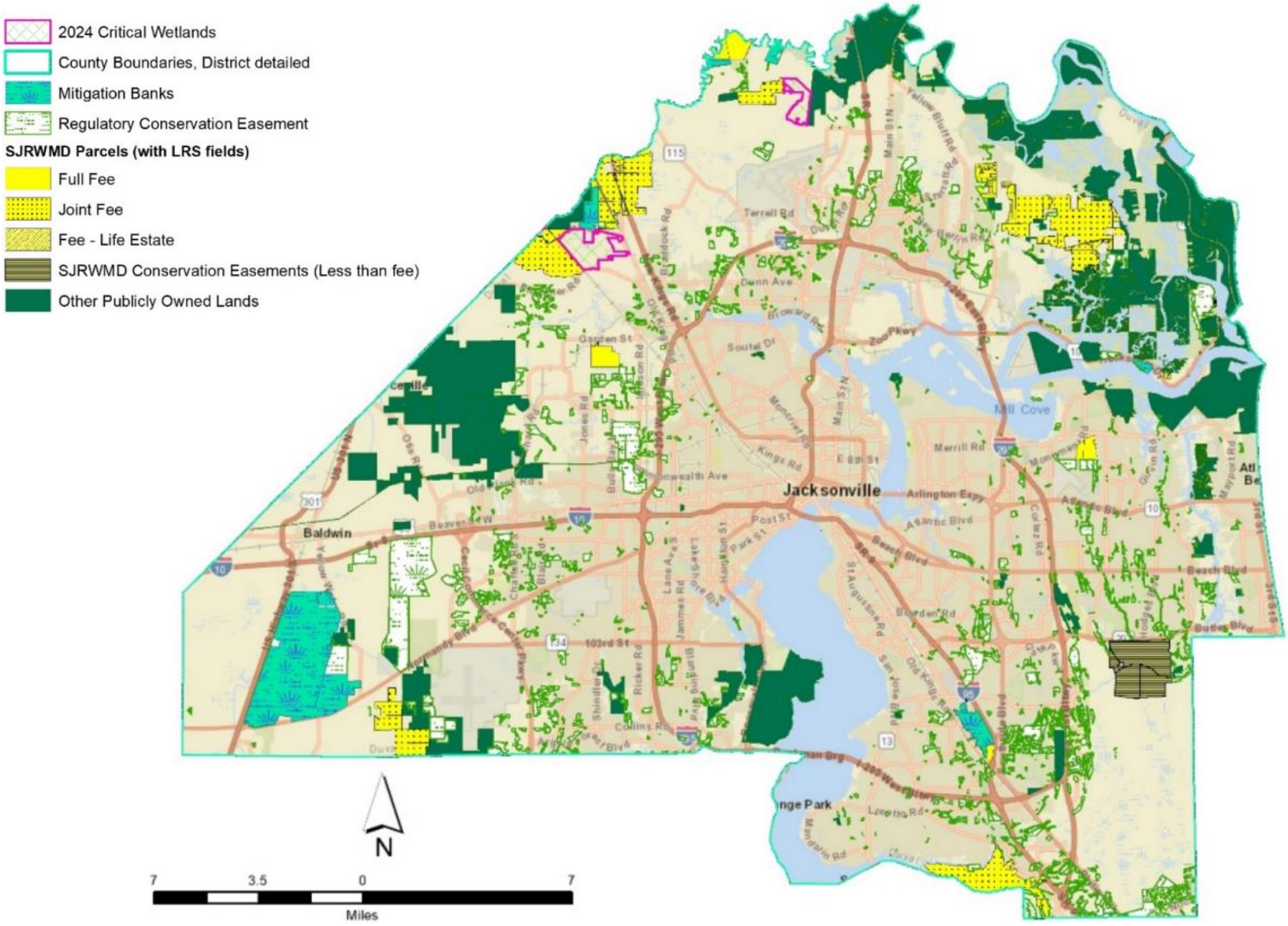
Florida House Bill 1359, enacted in 2006, re-established the definition of the CHHA to refer to the "area below the elevation of the category 1 storm surge line as established by a SLOSH computerized storm surge model" *(Source: Conservation Coastal Management Element, Map C-18, pg. 74; COJ 2030 COMP).*

Map 38: Duval County Coastal High Hazard Areas vs. Evacuation Zones (2021)



Source: COJ COMP Plan, Future Land Use Element, Updated June 2021

Map 39: Duval County Critical Wetlands & Land Acquisition Plan, 2024



Source: List of Critical Wetlands Section 373.036, Florida Statutes. St. Johns River Water Management District. 2023-2024. Retrieved from: https://www.sjrwmd.com/static/plans/2023-24_SJRWMD_List_of_Critical_Wetlands.pdf

9.

Infectious Disease

Hazard Profile

9. Infectious Disease (Human & Animal) Hazard Profile

<table>
<tr><th colspan="6">Human and Animal Disease</th></tr>
<tr><td colspan="5">Overview</td><td rowspan="4">High
19 / 30</td></tr>
<tr><td colspan="5">Infectious disease transmission is disease-specific, and it may be food or waterborne, it may be in the air or in the ground, and it may be spread through close human-to-human or animal-to–human contact. Diseases may be naturally occurring, or they may be intentionally released. Diseases spread through person-to-person contact have the potential to directly impact the city.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="3">Potential Magnitude</td></tr>
<tr><td rowspan="2">Very High
10 / 10</td><td rowspan="2">High
4 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Very High
5 / 5</td><td>Very Low
0 / 5</td><td>Very Low
0 / 5</td></tr>
</table>

Infectious Disease Description

Infectious disease transmission is disease-specific, may be food or waterborne, may be in the air or in the ground, and may be spread through human-to-human or animal-to–human contact. Diseases can be naturally occurring or intentionally released. Diseases spread through person-to-person close contact can directly impact the whole community. One possible secondary stressor of natural disasters is the alteration of ecosystems to become favorable to harboring pathogens for infectious diseases in animals and humans, as well as vectors of these pathogens. Humans and animals can become ill and possibly die from:

- **Mosquito-borne Diseases**; Eastern Equine Encephalomyelitis, Western Equine Encephalomyelitis, Saint Louis Encephalitis.
- **Bacterial Disease**: leptospirosis, anthrax, botulism.
- **Parasitic Disease**: cryptosporidiosis, giardiasis and hoof rot.

Ruminants and pigs are the most commonly disease affected food production animals and rodents are known to spread as many as 35 different diseases to humans worldwide. These diseases can be spread through direct contact with rodents as well as their feces, urine, or saliva. Being bitten by ticks, mites, or fleas that have been feeding on sick rodents can also spread diseases, where the disease extent is measured by the number of “reported cases” and “confirmed cases.”

Geographic Areas Affected by Infectious Disease

The primary habitats for Eastern Equine Encephalomyelitis viruses are swamps located in Florida. Viral mosquito born disease outbreaks are usually observed during periods of hot, rainy weather ideal for expansion of mosquito populations. Eastern Equine Encephalomyelitis endemic sources are lowlands, agricultural water, domestic water, industrial water, municipal water, recreational waters, as well as natural streams, rivers, and lakes. Saint Louis Encephalitis in humans is the leading cause of epidemic flavivirus encephalitis in the southeast U.S.

Communicable diseases associated with natural disasters are water-related communicable diseases, diseases associated with crowding, and vector borne diseases. The availability of safe water, sanitation facilities, the degree of crowding, underlying health status of the population, and the availability of healthcare services all interact to influence the risk for

in affected populations. Ticks are common in the city, specifically rural wooded areas and areas with tall standing grass. The most common diseases that come from ticks in Florida are Ehrlichiosis, Lyme disease, Rocky Mountain spotted fever, and other spotted fever infections.

Historical Occurrences of Infectious Disease

Some diseases may spread globally in waves and have historically affected Duval County, with an incident lasting up to a year or more. In this century, the following global diseases have been of concern: Influenza (H1N1), Influenza (H5N1), Seasonal Influenza, Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome Coronavirus (MERS-CoV), Ebola Hemorrhagic Fever, Enterovirus D68 (EV-D68) and Coronavirus 2019 (COVID-19).

A Tuberculosis outbreak was observed within Duval County in 2012, which is a mildly severe disease that appears on a scale of decades similar to other diseases. Additionally, an unprecedented COVID-19 response to mitigate the effects of the spread beyond the Emergency Executive Proclamation 2021-002 extended the Emergency Declaration through March 2021. The long-term effects of the COVID-19 global lockdowns and local stresses are still being documented as we return to 'the new normal'.

Probability of Future Occurrences of Infectious Disease

All disease strains have different morbidity and mortality rates. For example, the probability of the Influenza Virus affecting Duval County is near 100% because this virus is observed and studied each year within the County DOH Influenza Report, Annual Reports (2001-2023). Diseases transmitted by animals and insects can recur seasonally as they are tied to the proliferation of certain species. For instance, the populations of species of mosquito (Aedes Aegypti and Aedes Albopictus) were observed in 2018 as a vector for the Zika Virus *(Source: Transmission Methods; Center for Disease Control).* Due to increasingly globalized patterns of commerce and the presence of an international airport within the County, transmissible diseases in humans and animals may be transported into the county from people and imports.

Infectious Disease Impact Analysis

Forecasted impacts are determined by the threat, risk groups, transmission methods, incubation periods, treatment protocols, and treatment availability. Impacts from outbreaks can cause economic and social disruption due to travel bans, closing of schools and businesses, and event cancellations. Some general impacts that might be observed are as follows:

Public

- Concern throughout the affected community
- Direct physical harm caused by infectious diseases
- Unsanitary conditions may result from widespread illness

Responders

- Harm from symptoms of disease if there is contact with infected patients or animals
- Reduced quality of care for patients

Continuity of Operations, including continued delivery of services

- Widespread outbreaks may require workers to avoid places of work or the public, creating disruption of services
- Public transportation may become inaccessible due to quarantine or voluntary avoidance

Property, Facilities, Infrastructure

- Physical property will not likely be directly affected
- Healthcare facilities may be understaffed, requiring more space or field operations for extreme outbreaks

Environment

- Animals may become affected by certain diseases to which they are susceptible
- Large scale die-offs of livestock or wild animals may create a biological hazard

Economic Condition

- Tourism would be directly affected by disease outbreaks due to avoidance or quarantine
- Livestock and agriculture may suffer losses

Public Confidence in Jurisdiction's Governance

- Governments provide guidance and control of the spread of outbreak
- If healthcare facilities lack resources, are understaffed, or crowded, the public may look to the government to provide resources

Potential Effects of Climate Change on Infectious Disease

Certain impacts of climate change, such as mass migration from newly uninhabitable areas, are likely to create environments conducive to the spread of disease. Hotter temperatures and wetter conditions are also conducive to the proliferation of many insect species, including disease vectors such as mosquitos.

Vulnerability Analysis and Loss Estimation

The below statistics are taken from databases before COVID-19 and do not include death or infection rates after 2020, as those results would heavily impact the implications and results of the statistical analysis for annual averages over decades.

The Florida DOH receives reports of influenza associated pediatric deaths each season, where most deaths are reported in unvaccinated children. Influenza vaccination has been shown to reduce a child's risk of death from influenza by up to 60% *(Source: Vaccine Work, Effectiveness; Center for Disease Control).* Additionally, Influenza is five times more likely to cause severe illness in healthy pregnant women compared to women who are not pregnant. Pregnant women with certain underlying medical conditions, such as asthma or heart disease, are at even greater risk of severe complications due to influenza infection *(Source: Florida DOH; 2019).* Adults 65 years and older are at a higher risk for severe complications from influenza infection, including hospitalization and death. While influenza seasons vary in intensity, elderly populations bear the greatest burden of severe influenza disease complications. In Florida, an average 80% of seasonal pneumonia and influenza deaths occurred in adults aged 65 years and older between 2013-2020.

10.

Sea Level Rise

Hazard Profile

10. Sea Level Rise Hazard Profile

<table>
<tr><th colspan="5">Sea Level Rise</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">High
20 / 30</td></tr>
<tr><td colspan="4">Sea level rise is a result of earth’s climate changing. Even small amounts of sea level rise make rare floods more common by adding to tides and storm surge. Based on the National Climate Assessment, an intermediate sea level rise scenario projects 3.8 feet of rise in Duval County by 2100. As the impacts of Sea Level Rise are cumulative, the Frequency calculation was performed differently than other hazards. The score is cumulative, assuming minimal impacts by 2050 and at least moderate impacts by 2100.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="2">Potential Magnitude</td></tr>
<tr><td rowspan="2">High
8 / 10</td><td rowspan="2">Very High
5 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Very Low
1 / 5</td><td>Low
2 / 5</td><td>High
4 / 5</td></tr>
</table>

Sea Level Rise Description

According to the National Oceanic and Atmospheric Administration (NOAA), Global Sea Level refers to the average height of all the Earth's oceans. The surface of the ocean is not flat and the sea level is not rising at the same rate globally. Global Sea Level Rise refers to the increased observed average Global Sea Level Trend measured in “feet,” or “feet per year.”

According to NOAA Climante.gov, Sea level has risen 8–9 inches (21–24 centimeters) since 1880. In 2018, global sea level was 3.2 inches (81 mm) above the 1993 average. The rate of sea level rise is accelerating, and it has more than doubled from 0.06 inches (1.4 millimeters) per year throughout most of the twentieth century to 0.14 inches (3.6 millimeters) per year from 2006–2015. Global Sea Level could rise at least 12 inches (0.3 meters) above 2000 levels by 2100. *(Source: Climate Change Global Sea Level; Understanding Climate; NOAA).*

Geographic Areas Affected by Sea Level Rise

The effects of seal level rise can be predicted and displayed using computer modeling and GIS software. NOAA’s Climate Change Viewer tool was utilized to produce several maps depicting multiple scenarios of sea level rise, between the baseline with current levels. Coastal regions are most likely to be affected, but the reduction in sea ice at the poles does create conditions conducive to more frequent tropical storms and unpredictable precipitation and heat weather patterns.

Historical Occurrences of Sea Level Rise

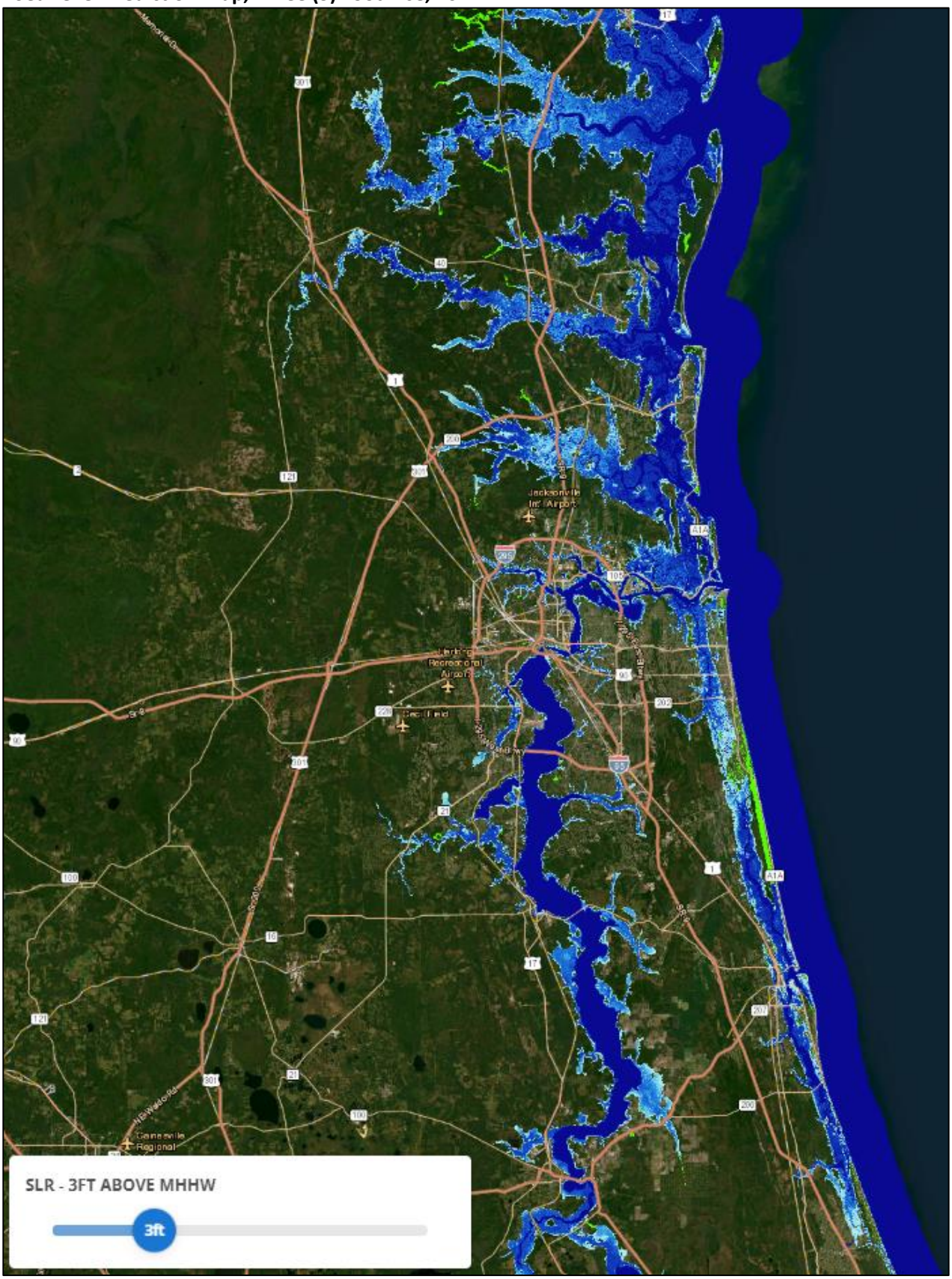
The oceans are absorbing more than 90% of the increased atmospheric heat associated with emissions from human activity. Major causes of Sea Level Rice include two main factors, Ice Melt and Thermal Expansion:

- **Ice Melt** is the melting of glaciers and continental ice masses, such as the Greenland ice sheet, which are linked to changes in atmospheric temperature, can contribute significant amounts of freshwater input to the Earth's oceans.
- **Thermal Expansion** is a steady increase in global atmospheric temperature creates an expansion of saline sea water (i.e., salt water) molecules (called thermal expansion), thereby increasing ocean volume.

Map 40: Current Mean Higher High Water Map (Baseline) - 2024

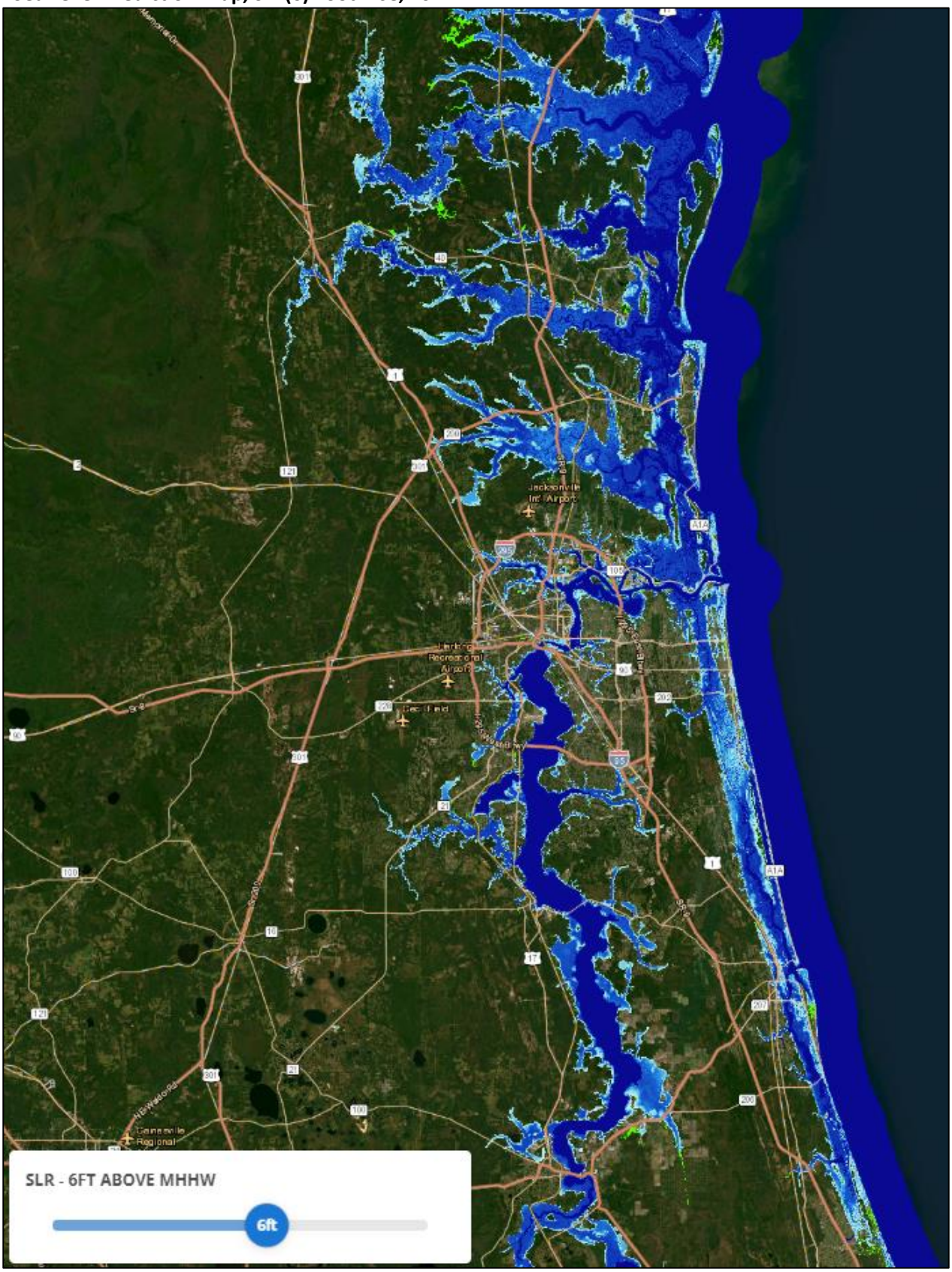
Source: NOAA Coastal Flood Exposure Mapper. NOAA Office for Coastal Management.
Retrieved July, 2024 from: https://coastal.climatecentral.org/map/

Map 41: Sea Level Prediction Map, Three (3) Foot Rise, 2024



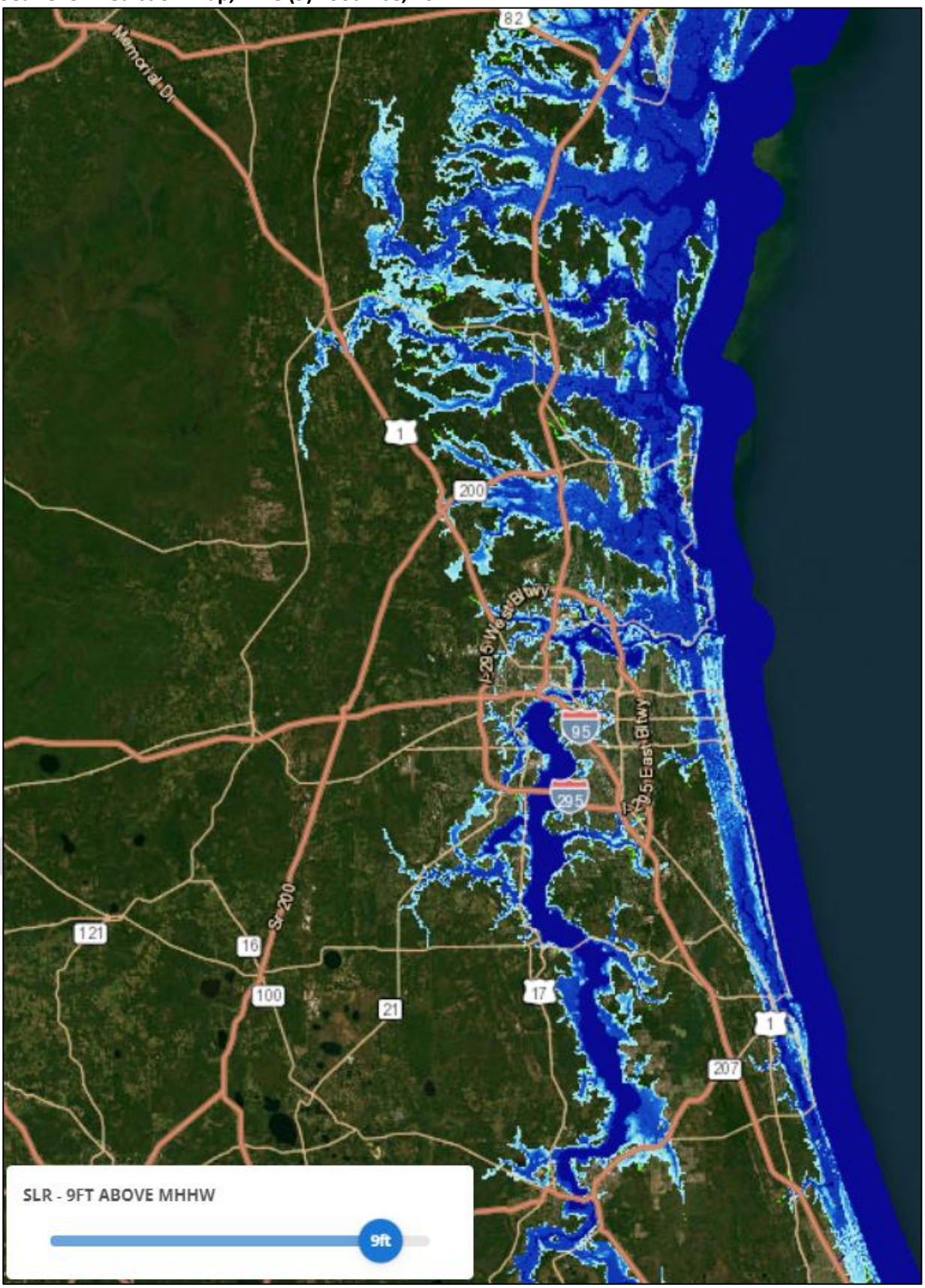
Source: NOAA Coastal Flood Exposure Mapper. NOAA Office for Coastal Management.
Retrieved July, 2024 from: https://coastal.climatecentral.org/map/

Map 42: Sea Level Prediction Map, Six (6) Foot Rise, 2024



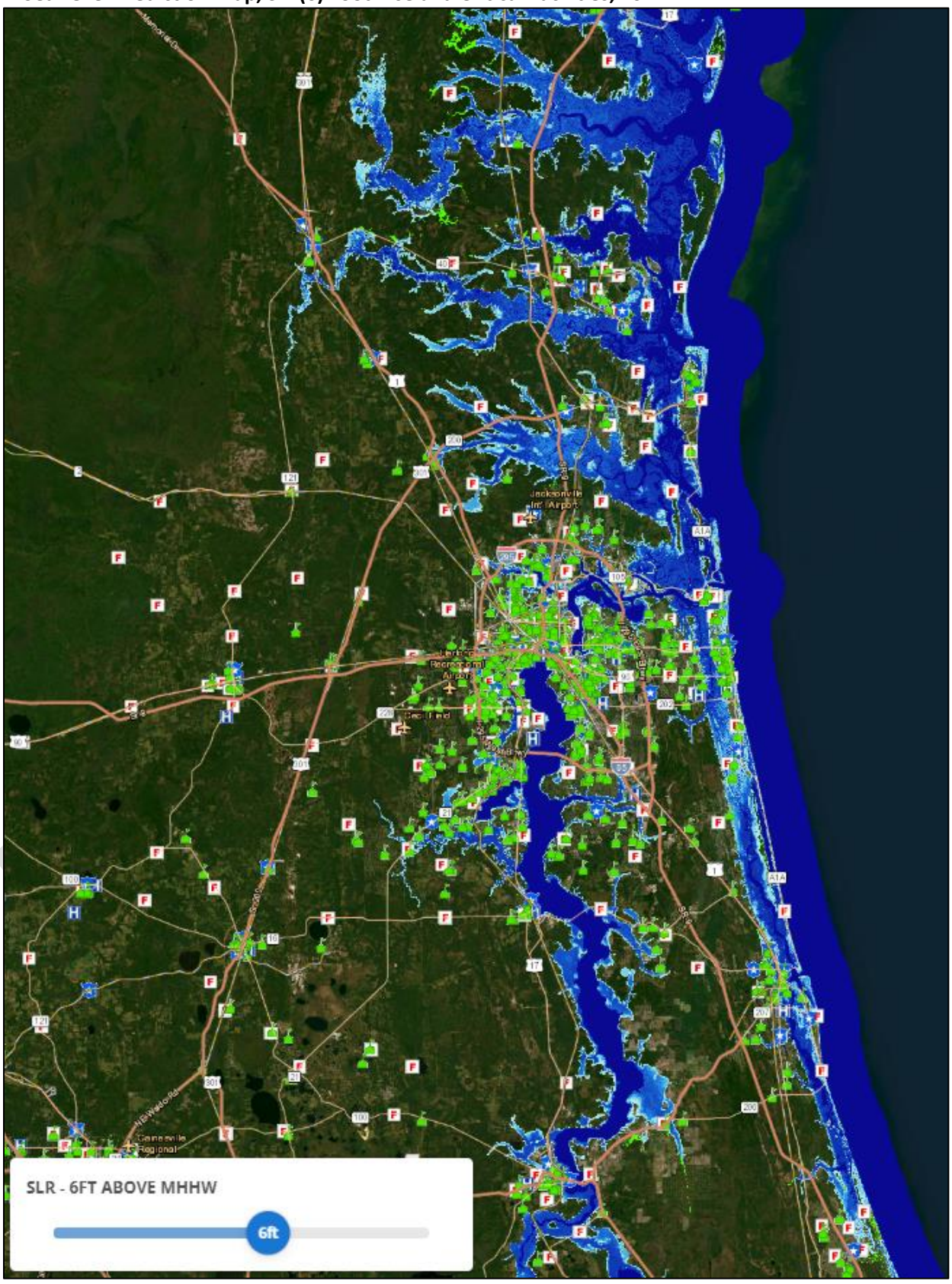
Source: NOAA Coastal Flood Exposure Mapper. NOAA Office for Coastal Management.
Retrieved July, 2024 from: https://coastal.climatecentral.org/map/

Map 43: Sea Level Prediction Map, Nine (9) Foot Rise, 2024



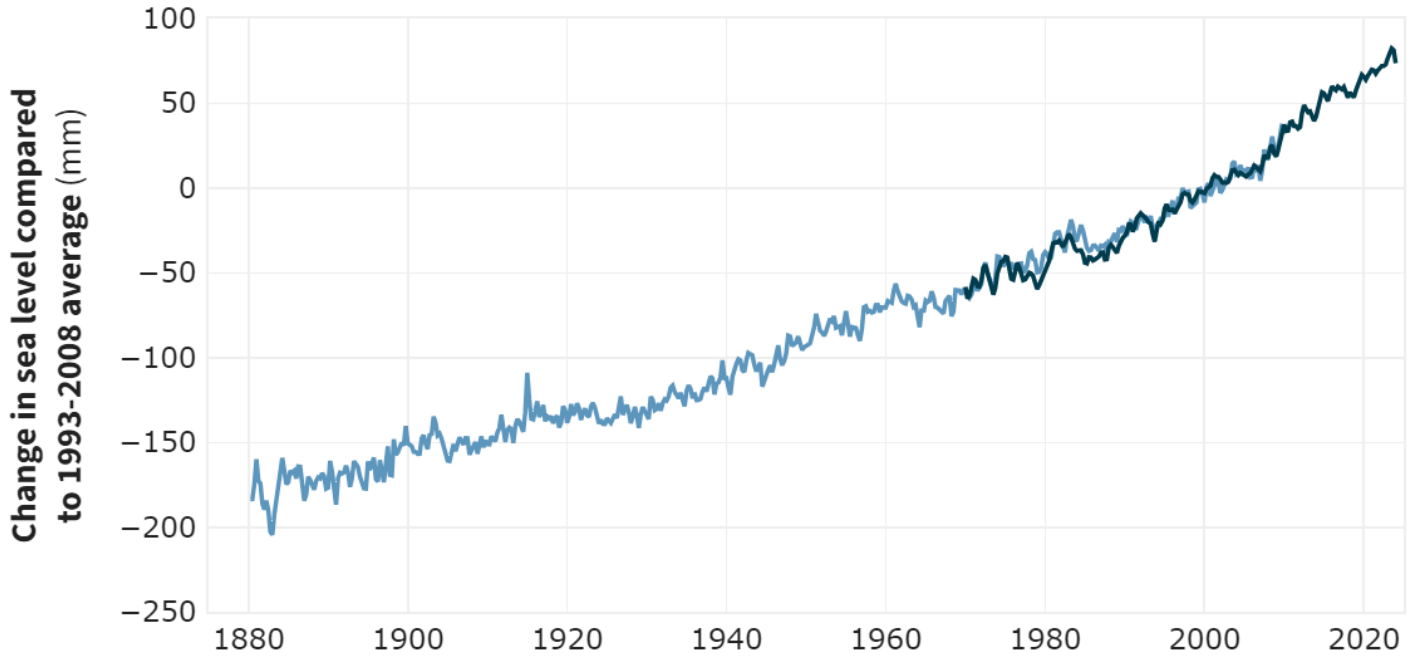
Source: NOAA Coastal Flood Exposure Mapper. NOAA Office for Coastal Management.
Retrieved July, 2024 from: https://coastal.climatecentral.org/map/

Map 44: Sea Level Prediction Map, Six (6) Foot Rise and Critical Facilities, 2024



Source: NOAA Coastal Flood Exposure Mapper. NOAA Office for Coastal Management.
Retrieved July, 2024 from: https://coastal.climatecentral.org/map/

Figure 16: Global Sea Level, 1880-2023



Source: Climate Change: Global Sea Level. NOAA. 2023. Author: Rebecca Lindsey.
Retrieved from: https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level

Probability of Future Occurrences of Sea Level Rise

With continued ocean and atmospheric warming, sea levels will rise for many centuries. Higher sea levels mean that storm surges push farther inland, which also means more frequent nuisance flooding. Disruptive and expensive, nuisance flooding is estimated to be from 300% to 900% more frequent within U.S. coastal communities than it was just 50 years ago. According to the Fourth National Climate Assessment from 2017, an intermediate sea level rise scenario projects 3.8 feet of rise in the COJ by 2100.

Climate Central has estimated the risk by combining local sea level rise projections with historic flood statistics from the NOAA water level station at Fernandina Beach, 26 miles from the center of Duval. Extreme values analysis indicates that the "100-year" flood height is 3.1 feet above local Mean Higher High Water (high tide line). According to NOAA's Office for Coastal Management, many predictive models do not take the increasing population numbers in low-lying coastal areas into consideration, which means projected risk could be higher than reported.

Analysis translates this to a 2% multi-year risk of at least one flood exceeding 4 feet from 2019 to 2030, a 21% risk by from 2019 to 2050, and a 100% risk by 2100. Under the Assessment's highest scenario, these chances increase to 3%, 71%, and 100% respectively, and a 100% risk of at least one flood exceeding 7 feet by 2100. This analysis does not account for future erosion, marsh migration, coastal development, coastal defense, or other dynamic factors that may affect exposure.

Sea Level Rise Impact Analysis

The NOAA Sea Level Rise Viewer tool allows for visualization of various inundation levels. Additionally, the NOAA Coastal Flood Exposure Map incorporates GIS data to illustrate the possible impacts of sea level rise on existing infrastructure, critical facilities, and vulnerable populations. Images captured from these visualization tools have been incorporated into the plan to give context to the preceding analysis and the figures estimated by Climate Central.

Through computer modeling and GIS software, it is possible to predict what some general impacts of sea level rise in terms of existing populations and infrastructure. These predictions, on Land Below 1-10 Ft, assume uniform rise and do not account for additional factors such as freshwater rainfall or storm surge, which would occur with increased baseline level.

Additionally, some general impacts may include the following:

Public

- May lose property
- May lose sandy beaches, dunes or mangroves, which could lead to storm surge flooding
- Some sandy beaches may have to close

Responders

- No direct impacts expected
- Water rescues during flooding events may increase over time

Continuity of Operations, including continued delivery of services

- Businesses, critical infrastructure, government buildings may have operations hindered if Sea Level Rise leads to damage to the structure
- Operations may be hindered if roads to the structures are damaged from Sea Level Rise
- Continuity of transportation network may be interrupted because of Sea Level Rise damage to roads

Property, Facilities, Infrastructure

- Structures may be damaged

Environment

- Coastal areas, marshes, mangroves, sandy beaches etc. may be damaged from Sea Level Rise which is a habitat for many species of plants and animals
- If large portions of coastal areas and dunes are covered over from Sea Level Rise the next storm could reach homes, businesses, and roads

Economic Condition

- Closure or delay of businesses because of Sea Level Rise or water damage, leads to loss in revenue
- Crop damage or loss leads to decline in agricultural revenues

Public Confidence in Jurisdiction's Governance

- If damage from Sea Level Rise, such as damage to roads, is not quickly repaired, then the public may be frustrated with the jurisdiction's governance

Potential Effects of Climate Change on Sea Level Rise

Tides normally rise and fall due to natural, chemical, and geological processes. Current scientific consensus predicts that a warming atmosphere will lead to imminent rising seawater levels, in comparison to the ancient processes that have shaped the planet over millions of years. NOAA reports that the rate of sea level rise is accelerating *(Source: Climate Change Global Sea Level; Understanding Climate; NOAA).*

Vulnerability Analysis and Loss Estimation

Impacts of sea level rise would directly affect low lying land by coastal, intercostal, rivers, tributaries and marshes. As sea levels increase, some marshes may migrate into neighboring low-lying areas, while other sections of marsh will change type or be lost to open water. Further impacts will displace populations as previously habitable areas are inundated or permanently flooded as part of the expanding shorelines. Migration will result in social and economic disruption from loss of business, real estate, roadways, and schools as infrastructure and natural environments are destroyed or become unusable. Findings from Surging Seas (www.SurgingSeas.org) are provided for informational purposes only and are provided "AS-IS."

Map 45: High Tide Flooding Areas in Downtown COJ, 2024

Source: NOAA Coastal Flood Exposure Mapper. NOAA Office for Coastal Management. Retrieved July, 2024 from: https://coastal.climatecentral.org/map/

Table 45: Duval County Coastal Flood Exposure: 1-6 Foot Rise

Elevation relative to local high tide line (Mean Higher High Water)							
Unit	**Affected People & Infrastructure**	**< 1ft**	**< 2ft**	**< 3ft**	**< 4ft**	**< 5ft**	**< 6ft**
Million $	Property value	$794	$1,409	$2,362	$3,791	$5,516	$7,334
Count	High social vulnerability	242	525	1,214	2,223	3,274	4,669
	Medium social vulnerability	991	2,011	3,591	6,000	9,232	12,975
	Low social vulnerability	3,034	5,069	8,016	12,199	17,294	22,342
	Population	4,267	7,604	12,821	20,422	29,800	39,986
	Caucasian	2,866	5,083	8,676	13,933	20,461	27,416
	Population of color	1,502	2,697	4,420	6,917	9,962	13,397
	African American	11,91	2,182	3,618	5,692	8,205	11,072
	Asian	165	279	441	682	989	1,316
	Hispanic	336	537	823	1,248	1,779	2,338
	Native American	89	142	215	314	430	554
	Homes	13,16	27,13	5,135	8,710	13,235	17,869
	Hospitals						1
	Schools			1	1	1	3
	Museums						1
	Houses of worship			2	4	10	15
	Government buildings			1	5	9	10
	Intermodal freight terminals			1	1	2	3
	Heliports	2	2	3	3	3	4
	Power plants						1
	Minor power plants						1
	Utility power plants						1
	FM radio transmitter sites				4	4	4
	Brownfields				2	2	2
	EPA listed sites	24	32	49	90	132	191
	ACRES sites				2	2	2
	Biennial Reporters						2
	Superfund (CERCLIS) sites				1	2	2
	NPDES sites	14	21	34	49	62	80
	OIL sites				1	4	5
	RADINFO sites	10	11	15	33	57	90
	RMP sites		1	1	2	2	5
	SSTS sites				1	1	1
	TRI sites				2	2	2
	TSCA sites						1

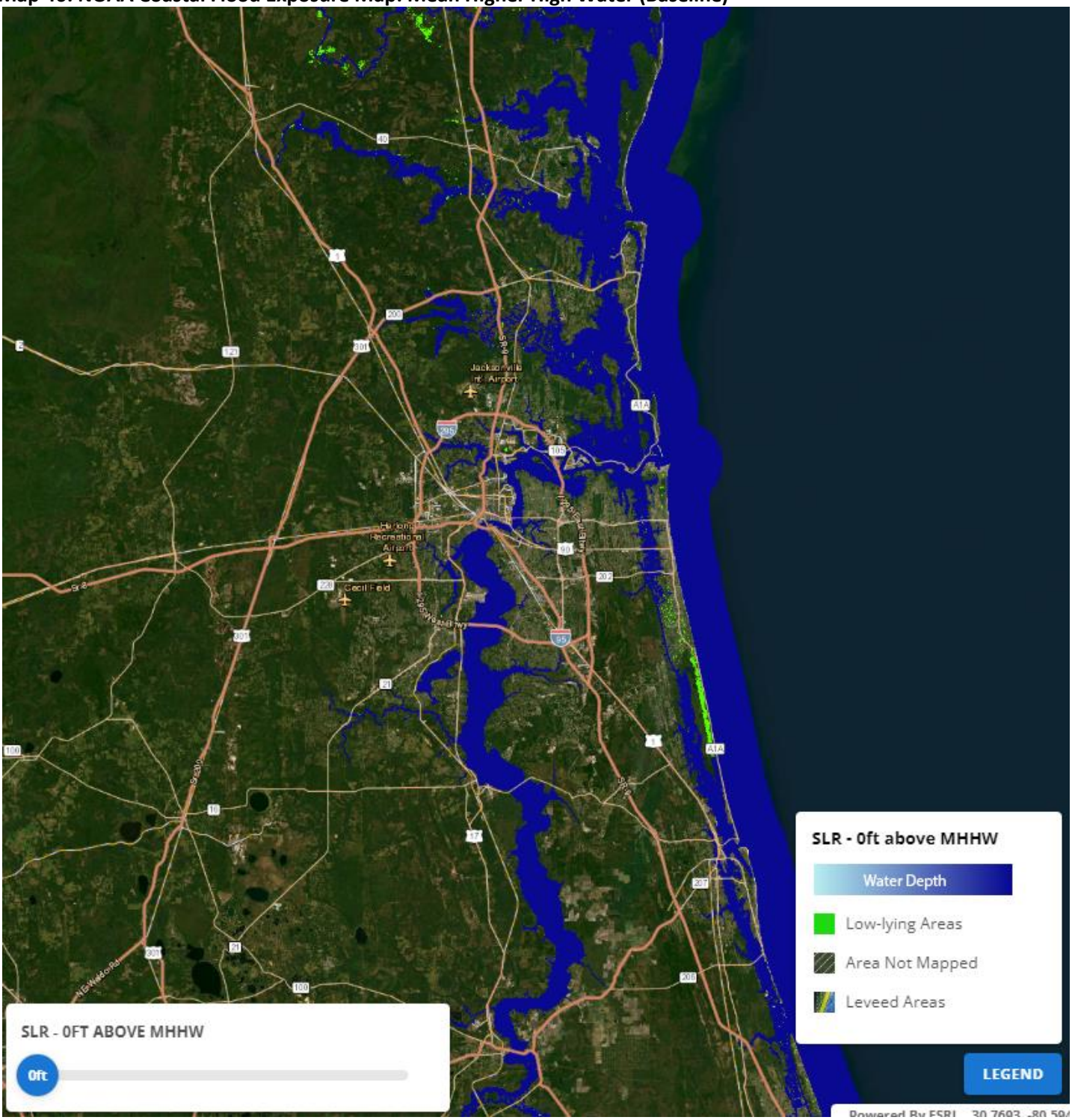
Elevation relative to local high tide line (Mean Higher High Water)							
Unit	**Affected People & Infrastructure**	**< 1ft**	**< 2ft**	**< 3ft**	**< 4ft**	**< 5ft**	**< 6ft**
Count	Hazardous materials facilities		1	1	6	9	14
	Extreme HAZMAT facilities		1	1	2	2	5
	Oil facilities				1	4	5
	Pesticide facilities				1	1	1
	Hazardous waste sites	10	11	15	34	59	92
	Major Hazardous Waste source					1	2
	Minor Hazardous Waste source	6	7	9	20	31	46
	Unspecified Hazardous Waste sites	4	4	6	13	25	40
	Wastewater sites	14	21	34	49	62	80
	Major wastewater sites		1	1	1	1	1
	Nonmajor wastewater sites	14	20	33	48	61	79
	Sewage plants		2	2	2	3	5
Miles	Roads	4	14	43	98	158	225
	County roads						1
	Federal roads	1	1	1	3	5	7
	Local roads	3	12	38	84	138	196
	Primary roads		1	1	1	1	2
	Secondary roads	1	2	4	13	19	27
	State roads	1	1	3	11	15	21
	Railroads			1	2	3	4
	Mainline rail					1	1
	Non-mainline rail				1	2	3
Acres	Land	7,728	11,772	16,239	21,081	26,379	32,044
	Protected land	3,017	4,358	5,881	7,286	8,581	9,763
	Federal protected land	64	90	128	176	216	249
	Local protected land	413	634	946	1,258	1,549	1,813
	State protected land	264	395	633	972	1,355	1,755
Percent	High social vulnerability	0.2%	0.4%	0.9%	1.7%	2.5%	3.6%
	Medium social vulnerability	0.3%	0.7%	1.2%	2.0%	3.0%	4.2%
	Low social vulnerability	0.8%	1.3%	2.1%	3.2%	4.5%	5.8%
	Property value	0.9%	1.6%	2.7%	4.3%	6.3%	8.4%
	Population	0.5%	0.9%	1.6%	2.5%	3.6%	4.9%
	Caucasian	0.6%	1.0%	1.7%	2.8%	4.0%	5.4%
	Population of color	0.5%	0.8%	1.3%	2.1%	3.0%	4.0%
	African American	0.5%	0.8%	1.4%	2.2%	3.1%	4.2%

Elevation relative to local high tide line (Mean Higher High Water)							
Unit	**Affected People & Infrastructure**	**< 1ft**	**< 2ft**	**< 3ft**	**< 4ft**	**< 5ft**	**< 6ft**
Percent	Asian	0.4%	0.7%	1.0%	1.6%	2.3%	3.1%
	Hispanic	0.5%	0.8%	1.3%	2.0%	2.8%	3.7%
	Native American	0.8%	1.4%	2.1%	3.0%	4.1%	5.3%
	Homes	0.4%	0.7%	1.4%	2.4%	3.6%	4.9%
	Hospitals						3.6%
	Schools			0.3%	0.3%	0.3%	0.9%
	Primary roads	0.2%	0.3%	0.3%	0.5%	0.6%	0.9%
	Secondary roads	0.3%	0.4%	1.0%	3.2%	4.7%	6.8%
	Museums						11.1%
	Houses of worship			0.2%	0.5%	1.2%	1.8%
	Government buildings			0.6%	2.8%	5.1%	5.6%
	Roads	0.1%	0.3%	0.9%	2.0%	3.2%	4.6%
	County roads	0.4%	0.4%	0.8%	1.2%	2.1%	4.1%
	Federal roads	0.2%	0.3%	0.4%	0.7%	1.2%	1.8%
	Local roads	0.1%	0.3%	0.9%	2.0%	3.2%	4.6%
	State roads	0.3%	0.5%	1.4%	4.7%	6.6%	9.2%
	Railroads	0.4%	0.9%	2.0%	5.0%	8.1%	11.6%
	Mainline rail	0.1%	0.4%	1.3%	1.8%	3.2%	4.6%
	Non-mainline rail	0.7%	1.5%	2.9%	8.8%	14.0%	20.0%
	Intermodal freight terminals			4.8%	4.8%	9.5%	14.3%
	Heliports	9.5%	9.5%	14.3%	14.3%	14.3%	19.0%
	Power plants						14.3%
	Utility power plants						20.0%
	Minor power plants						50.0%
	FM radio transmitter sites				21.1%	21.1%	21.1%
	Hazardous materials facilities		0.9%	0.9%	5.1%	7.7%	12.0%
	Oil facilities				7.7%	30.8%	38.5%
	Pesticide facilities				3.4%	3.4%	3.4%
	Extreme HAZMAT facilities		2.3%	2.3%	4.7%	4.7%	11.6%
	Hazardous Waste sites	0.7%	0.8%	1.0%	2.4%	4.1%	6.4%
	Unspecified Hazardous Waste sites	0.6%	0.6%	0.9%	2.0%	3.8%	6.1%
	Minor Hazardous Waste source	0.8%	1.0%	1.2%	2.7%	4.3%	6.3%
	Major Hazardous Waste source					10.0%	20.0%
	Brownfields				1.7%	1.7%	1.7%
	Wastewater sites	1.2%	1.8%	2.8%	4.1%	5.2%	6.7%

Elevation relative to local high tide line (Mean Higher High Water)							
Unit	**Affected People & Infrastructure**	**< 1ft**	**< 2ft**	**< 3ft**	**< 4ft**	**< 5ft**	**< 6ft**
Percent	Nonmajor wastewater sites	1.2%	1.7%	2.8%	4.0%	5.1%	6.6%
	Major wastewater sites		20.0%	20.0%	20.0%	20.0%	20.0%
	Sewage plants		7.7%	7.7%	7.7%	11.5%	19.2%
	EPA listed sites	0.8%	1.1%	1.7%	3.1%	4.5%	6.6%
	SSTS sites				3.4%	3.4%	3.4%
	ACRES sites				1.7%	1.7%	1.7%
	OIL sites				8.3%	33.3%	41.7%
	TRI sites				6.7%	6.7%	6.7%
	TSCA sites						20.0%
	RMP sites		2.3%	2.3%	4.7%	4.7%	11.6%
	Biennial Reporters						13.3%
	Superfund (CERCLIS) sites				2.9%	5.9%	5.9%
	RADINFO sites	0.7%	0.8%	1.1%	2.3%	4.1%	6.4%
	NPDES sites	1.2%	1.8%	2.8%	4.1%	5.2%	6.7%
	Land	1.7%	2.6%	3.6%	4.7%	5.8%	7.1%
	Protected land	5.0%	7.3%	9.8%	12.1%	14.3%	16.3%
	Federal protected land	10.3%	14.4%	20.6%	28.3%	34.8%	40.1%
	State protected land	1.4%	2.1%	3.4%	5.3%	7.4%	9.5%
	Local protected land	2.1%	3.3%	4.9%	6.5%	8.0%	9.3%

Source: SurgingSeas.org Risk Finder; https://riskfinder.climatecentral.org/county/duval-county.fl.us?comparisonType=county&forecastType=NOAA2017_int_p50&level=4&unit=ft&zillowPlaceType=postal-code

Map 46: NOAA Coastal Flood Exposure Map: Mean Higher High Water (Baseline)



Source: NOAA Coastal Flood Exposure Mapper, NOAA Office for Coastal Management. Retrieved August 9, 2024

11.

Cyber Attack

Hazard Profile

11. Cyber Attack Hazard Profile

<table>
<tr><th colspan="5">Cyber-Attack</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">Moderate

17 / 30</td></tr>
<tr><td colspan="4">A Cyber-attack threats are a real and increasingly common threat for Federal, State Local governments, as well as critical non-governmental entities. There are multiple types of attacks that seek to accomplish various goals ranging from financial gain to espionage that are dangerous and sophisticated. Data from the https://csis-prod.s3.amazonaws.com/s3fs-public/191122_Significant_Cyber_Events_List.pdf webpage was cross-referenced with local data to arrive at the figures incorporated into the LMS Vulnerability Assessment.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="2">Potential Magnitude</td></tr>
<tr><td rowspan="2">Very High
10 / 10</td><td rowspan="2">Very High
5 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Very Low
0 / 5</td><td>Low
2 / 5</td><td>Very Low
0 / 5</td></tr>
</table>

Cyber Attack Description

Cyber-attack threats have become more common, dangerous, and sophisticated for federal, state and local governments as well as critical non-governmental entities. A cyber-attack is an attempt to gain illegal access to a computer or system for the purpose of causing damage or stealing information. Cybersecurity threats come in three broad categories of intent:

- Financial Gain
- Disruption
- Espionage

Nearly every cyber threat falls into one of these three modes. In terms of attack techniques, malicious actors have an abundance of options. The extent of threat is measured in "attacks per year;" some types are able to be measured as "cost of damages or ransom." There are ten common types of cyber threats:

- **Malware**: Software that performs a malicious task on a target device or network, such as corrupting data or taking over a system.
- **Phishing**: An email-borne attack that involves tricking the email recipient into disclosing confidential information or downloading malware by clicking on a hyperlink in the message.
- **Spear Phishing**. A more sophisticated form of phishing where the attacker learns about the victim and impersonates someone he or she knows and trusts.
- **"Man in the Middle" (MitM) attack**: Where an attacker establishes a position between the sender and recipient of electronic messages and intercepts them, perhaps changing them in transit. The sender and recipient believe they are communicating directly with one another.
- **Trojans**: Named after the Trojan Horse of ancient Greek history, the Trojan is a type of malware that enters a target system looking like one thing, e.g., a standard piece of software, but then lets out the malicious code once inside the host system.
- **Ransomware**: An attack that involves encrypting data on the target system and demanding a ransom in exchange for letting the user have access to the data again.

- **Denial of Service attack or Distributed Denial of Service Attack (DDoS)**: Where an attacker takes over devices and uses them to invoke the functions of a target system, e.g., a website, causing it to crash from an overload of demand.
- **Attacks on IoT Devices**: IoT devices like industrial sensors are vulnerable to multiple types of cyber threats. These include hackers taking over the device to make it part of a DDoS attack and unauthorized access to data being collected by the device. Given their numbers, geographic distribution and frequently out-of-date operating systems, IoT devices are a prime target for malicious actors.
- **Data Breaches**: A data breach is a theft of data by a malicious actor. Motives for data breaches include crime, a desire to embarrass an institution, and espionage.
- **Malware on Mobile Apps**: Mobile devices are vulnerable to malware attacks just like other computing hardware. Attackers may embed malware in app downloads, mobile websites or phishing emails and text messages. Once compromised, a mobile device can give the malicious actor access to personal information, location data, or financial accounts *(Source: Cybersecurity; FEMA).*

Geographic Areas Affected by Cyber Attack

A cyber-attack could happen anywhere and to anyone with an electronic device connected to the internet. Cyber incidents may cause physical disruptions in critical infrastructure, which can affect a jurisdiction or a power grid.

Historical Occurrences of Cyber Attack

Below are examples of cyberattacks that may be relevant to local stakeholders *(Source: Significant Cyber Incidents; Center for Strategic and International Studies):*

- ✓ January 2010: Google announced a sophisticated attack had penetrated its networks, along with the networks of more than 30 other U.S. companies. The goal of the penetrations, which Google ascribed to China, was to collect technology, gain access to activist Gmail accounts and to Google's Gaea password management system.
- ✓ June 2011: Citibank reported that credit card data for 360,000 of its customers were ex-filtrated using a relatively simple manipulation of URLs.
- ✓ July 2012: NSA Director General Keith Alexander said that there had been a 17-fold increase in cyber incident at American infrastructure companies between 2009 and 2011.
- ✓ May 2013: DHS reports that the U.S. electrical grid is constantly being probed by multiple actors, including Iran.
- ✓ June 2013: The Federal Bureau of Investigation (FBI) charged five Ukrainian and Russian hackers with stealing over 160 million credit card numbers and causing hundreds of millions in losses.
- ✓ March 2014: Cybercriminals stole 40 million Target credit card numbers , with 70 million accounts compromised.
- ✓ October 2014: U.S. Postal Services was hacked, exposing employee names, addresses, Social Security numbers.
- ✓ April 2015: U.S. officials report that hackers gained access to White House networks and sensitive information, such as "real-time non-public details of the president's schedule," through the State Department's network, which has had continued trouble in ousting attackers.
- ✓ April 2017: Cybersecurity researchers revealed a growing cyber-espionage campaign originating in China and targeting construction, engineering, aerospace and telecom companies, as well as government agencies, in the U.S., Europe, and Japan.
- ✓ November 2017: Uber discloses that it paid hackers $100,000 to delete the stolen data of 57 million of its customers and drivers, including names, phone numbers, email addresses, and license plate numbers.
- ✓ March 2018: The FBI and DHS issued a joint technical alert to warn of Russian cyber-attacks against U.S. critical infrastructure. Targets included energy, nuclear, water, aviation, and manufacturing facilities.

- ✓ May 2019: An encrypting ransomware attack took the City of Baltimore's IT systems hostage, the attack froze thousands of government computers and disrupted everything from real estate sales to water bill payments. Even with the help of FBI, Secret Service and cybersecurity experts, the cost to the city is estimated $18 million *(Source: Baltimore Ransomware Attach to Cost City Millions of Dollars; CBS Local).*
- ✓ December 2019 – January 2020: Four cities in the U.S. were hit with ransomware infections. These cities, including New Orleans and Pensacola, Florida, all had essential government services sabotaged or halted. After the ransomware attack on New Orleans, the mayor was forced to declare a state of emergency. In Pensacola, the sanitation department lost email and telephone systems, internet servers and their online payment system.
- ✓ July 2024: A Microsoft Windows update issued by cybersecurity firm CrowdStrike caused a global IT outage that disrupted critical infrastructure around the world. The faulty software update affected approximately 8.5 million machines and cost Fortune 500 companies $5.4 billion.

Cybersecurity Insights and Recent Trends

The Cybersecurity and Infrastructure Security Agency was established on November 16, 2018, following the Cybersecurity and Infrastructure Security Agency Act of 2018. This agency leads the effort to enhance the security, resiliency, and reliability of the Nation's cybersecurity and communications infrastructure. Informed by U.S. cyber intelligence and real-world events, they continuously provide background information on cyber threats and the vulnerabilities they exploit, as well as a ready-made set of mitigation activities that non-federal partners can implement.

Recent advancements in cybersecurity efforts at the Federal level include the 2022 National Defense Strategy, the 2023 National Cybersecurity Strategy, and the 2024 Defense Industrial Base Cybersecurity Strategy. Through these operational agreements and strategic partnerships, various government agencies are actively working to build upon and improve the combination of policies, requirements, services, pilots, public/private collaboration, and interagency efforts to combat the complex and rapidly changing variables surrounding cyber threats.

In 2020, the Cybersecurity and Infrastructure Security Agency released a statement urging vigilance against cyber-attacks and encouraged better cybersecurity practices. Since COVID-19, the U.S. FBI reported a 300% increase in reported cybercrimes. According to a press release in 2022 by the DOD Cyber Crime Center, the Operations Enablement Directorate, and the U.S. Cyber Command engaged in an interagency partnership to enhance efforts supporting national security matters with nexus to cyber threat intelligence. Some recent trends and focus areas are related to:

COVID-19 Disinformation Activity, 2020: After the initial outbreak, disinformation campaigns appeared online. Information manipulation and fabrication about COVID-19's origin, scale, government response, and/or prevention and treatment surged as creators leveraged people's increased uncertainty.

Increased Geopolitical Tensions and Threats (Iranian Threat) 2020: Iran-U.S. tensions have the potential for retaliatory aggression against the U.S. and its global interests. Iran has exercised increasingly sophisticated capabilities to suppress social and political perspectives deemed dangerous to its regime and to target regional and international adversaries. Iran, its proxies, and sympathizers have a history of leveraging cyber and physical tactics to pursue national interests, both regionally and within the U.S.

Probability of Future Occurrences of Cyber Attack

Cybersecurity analysis experts at the International Institute of Business predict that cybercrime damages will cost exponentially more than the damage inflicted from natural disasters; they have the potential to be more profitable than the global trade of all major illegal drugs combined. Ransomware is the fastest growing type of cybercrime, where global ransomware damages cost was $5 billion in 2017, $8 billion in 2018, $11.5 billion in 2019, $20 billion in 2020 *(Source: Global Ransomware Damage Costs Predicted to Exceed $265 Billion by 2031; Cybercrime Magazine).*

Researchers from the Army Research Laboratories found that the number of cyber intrusions into a system can be predicted, particularly if analysts are already observing activities on an organization's computer network. The researchers were able to determine correlation between the number of successful intrusions and certain features observed for 41 different organizations. Several generalized linear models were developed to predict the number of successful cyber intrusions (or "intrusions") into an organization's computer network. The conclusion was that the number of network security policy violations was consistently predictive of the number of intrusions. Therefore, probability of future occurrences can be detected at an individual level according to specific organizations using various measurements *(Source: Statistical Models for the Number of Successful Cyber Intrusions; Leslie, Harang, et al.).*

Cyber Attack Impact Analysis:

The following are continuously updated to reflect new Insights as they are made available *(Source: Resources and Tools, Insights; CISA; 2024; Retrieved from: https://www.cisa.gov/insights).*

Public

- Release of sensitive information including bank accounts and social security numbers.
- Financial loss
    - Possible loss of wages if organization is forced to close.

Responders

- Long hours outside of regular work hours to stop or remediate the attack.
- Cyber-attacks may target emergency or public safety systems.

Continuity of Operations, including continued delivery of services

- Incident could take operations offline for any amount of time or make information inaccessible or distribute false information.
- Interrupt public safety services.
- Loss of productivity.
- Loss of critical systems or data.
- May disable emergency or public safety systems.

Property, Facilities, Infrastructure

- Incident could lead to damage of equipment for infrastructure.
- Organization may lose revenue and may have significant costs for remediation, legal fees, and public relations.
- Organization may lose customer confidence or may sustain damage to their reputation or to their market share.

Environment

- An incident could cause a release of some material, which could damage the environment.

Economic Condition

- Incidents cost millions of dollars to consumers and organizations, in the form of lost wages, lost revenue, recovery, and remediation costs.

Public Confidence in Jurisdiction's Governance

- Governments should institute measures to keep services operational and safe.
- Private organization: Loss of public or consumer confidence in an organization leading to loss of market share and possibly loss of future sales.

Potential effects of Climate Change on Cyber Attack

Climate change will not directly affect cyber-attacks. Social unrest may be increased because of climate change and political polarization, which can increase hostility between individuals and nations, leading to conflict.

Vulnerability Analysis and Loss Estimation

It is reasonable to assume that agencies in the city will continue to be vulnerable to cyber incidents. Any entity that utilizes computers and the internet for major utilities, transportation routes, or data storage is vulnerable to a cyber-incident. It is not possible to determine exact estimates for losses due to the varied nature and extent of cyberattacks. Previous ransomware attacks against local governments in the U.S have requested hundreds of thousands of dollars as ransom.

12.

Hazardous Materials

Hazard Profile

12. Hazardous Materials (HAZMAT) Profile

<table>
<tr><th colspan="5">Hazardous Materials (HAZMAT)</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">Moderate

18 / 30</td></tr>
<tr><td colspan="4">A hazardous material is any item or agent, biological, chemical, radiological, or physical, which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Based on the Frequency,. Data from the Emergency Response Specialist FDEP was cross-referenced with local data to arrive at the figures incorporated into the LMS Vulnerability Assessment.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="2">Potential Magnitude</td></tr>
<tr><td rowspan="2">Very High
10 / 10</td><td rowspan="2">Very High
5 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Very Low
1 / 5</td><td>Very Low
1 / 5</td><td>Low
2 / 5</td></tr>
</table>

Hazardous Materials Incident Description

Hazardous materials are primarily defined and regulated by laws and regulations administered by the U.S. Environmental Protection Agency (EPA), the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Department of Transportation (DOT), and the U.S. Nuclear Regulatory Commission:

- **Hazardous materials** are any item or agent, which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.
- **Hazardous waste** is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludge. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes.

Additionally, each has its own definition of a "Hazardous Material":

OSHA definition includes any substance or chemical which is a "health hazard" or "physical hazard," including: chemicals which are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents which act on the hematopoietic system; agents which damage the lungs, skin, eyes, or mucous membranes; chemicals which are combustible, explosive, flammable, oxidizers, pyrophores, unstable-reactive or water-reactive; and chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the previously mentioned characteristics *(Full definitions can be found at 29 Code of Federal Regulations (CFR) 1910.1200.).*

EPA incorporates the OSHA definition and adds any item or chemical which can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment. (40 CFR 355 contains a list of over 350 hazardous and extremely hazardous substances). The extent of these releases is measured using standard units of measurement related to the specific chemical (i.e., gallons for liquid releases).

DOT defines a hazardous material as any item or chemical which, when being transported or moved in commerce, is a risk to public safety or the environment, and is regulated as such under its Pipeline and Hazardous Materials Safety Administration regulations (49 CFR 100-199), which includes the Hazardous Materials Regulations (49 CFR 171-180). In addition, hazardous materials in transport are regulated by the International Maritime Dangerous Goods Code; Dangerous

Goods Regulations of the International Air Transport Association; Technical Instructions of the International Civil Aviation Organization; and U.S. Air Force Joint Manual, Preparing Hazardous Materials for Military Air Shipments.

Nuclear Regulatory Commission regulates materials that are considered hazardous because they produce ionizing radiation, which means those materials that produce alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. This includes "special nuclear material," by-product material, and radioactive substances. *(See 10 CFR 20; Source: https://www.ihmm.org/about-ihmm/what-are-hazardous-materials/).*

Resource Conservation and Recovery Act regulations establish basic hazardous waste management standards for persons who produce hazardous waste, called hazardous waste generators. These standards are found in title 40 of the CFR in part 262. The generator regulations ensure that hazardous waste is appropriately identified and handled safely to protect human health and the environment, while minimizing interference with daily business operations. The amount of hazardous waste generated per month determines how a generator is categorized and what regulations must be complied with. The extent of hazardous material release generators is defined below.

Very Small Quantity Generators generate 100 kilograms or less per month of hazardous waste or 1 kilogram or less per month of acutely hazardous waste. Requirements for Very Small Quantity Generators include:

- Must identify all the hazardous waste generated.
- May not accumulate more than 1,000 kilograms of hazardous waste at any time.
- Must ensure hazardous waste is delivered to a person / facility authorized to manage it.

Small Quantity Generators generate between 100 to 1,000 kilograms of hazardous waste per month. Major requirements for Small Quantity Generators include:

- May accumulate hazardous waste on-site for 180 days without a permit, or 270 days if shipping a distance greater than 200 miles.
- The quantity of hazardous on-site waste must never exceed 6,000 kilograms.
- Must comply with the hazardous waste manifest requirements at 40 CFR part 262, subpart B and the pre-transport requirements at 40 CFR sections 262.30 through 262.33.
- Must manage hazardous waste in tanks or containers subject to the requirements found at 40 CFR sections 262.16(b)(2) and (3).
- Must comply with the preparedness and prevention requirements at 40 CFR sections 262.16(b)(8) and (9), and the land disposal restriction requirements at 40 CFR part 268.
- There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. Small Quantity Generators do not required detailed, written contingency plans.

Large Quantity Generators generate 1,000+ kilograms per month of hazardous waste or more than 1 kilogram per month of acutely hazardous waste. Major requirements for Large Quantity Generators include:

- May only accumulate waste on-site for 90 days. Certain exceptions apply.
- Do not have a limit on the amount of hazardous waste accumulated on-site.
- Hazardous waste generated must be managed in tanks, containers, drip pads or containment buildings subject to the requirements found at 40 CFR sections 262.17(a)(1)-(4) and, specifically for drip pads and containment buildings, 40 CFR part 265, subparts W and DD, respectively.
- Must comply with the hazardous waste manifest requirements at 40 CFR part 262 subpart B and the pre-transport requirements at 40 CFR sections 262.30 through 262.33.
- Must comply with the preparedness, prevention and emergency procedure requirements at 40 CFR part 262 subpart M and the land disposal restriction requirements at 40 CFR part 268.
- Must submit a biennial hazardous waste report.
- See 40 CFR part 262 for a complete description of the Large Quantity Generators regulations.

Additionally, most states are authorized to implement the Resource Conservation and Recovery Act program that allows states to set independent limits to the quantity of waste allowed within their state; not limited at the federal level. The differences in hazardous waste generator categories for each state can be viewed in the EPA Hazardous Waste Generators table; (Table Noting Which States Have Hazardous Waste Generator Categories that are the Same as the Federal Categories and Which Have Different Categories, EPA. https://19january2017snapshot.epa.gov/hwgenerators/table-noting-which-states-have-hazardous-waste-generator-categories-are-same-federal_.html).

Geographic Areas Affected by HAZMAT Incidents

Hazardous material incidents can occur during the production, transportation, use, and storage of those hazardous materials and can happen anywhere within the State of Florida. As these materials are processed and stored, those in the immediate vicinity may be at risk of toxic fumes, soil contamination, and water contamination. Roadways, railways, pipelines, and waterways are potentially at risk. Additionally, all properties within 2,000 feet of I-95, I-10, I-295, the St. Johns River, and the JAXPORT facilities are frequently in the proximity of Hazardous Materials that are in transit. Additionally, there are hundreds of facilities scattered throughout the city that contain moderate to large quantities of various classes of hazardous materials.

The most vulnerable population to hazardous material accidents are residents in the downtown area, reaching as far north as the Trout River due to the dense network of rail lines. This area of the County is characterized by older homes with a highly dense low-income population. About one third of the recorded river spills have also taken place in the St. Johns River near downtown. There is an interstate/rail corridor which traverses the City from north to south along its entire length where many residential properties lie within the 2,000-foot danger zone. The weather condition at the time of the HAZMAT accident can heavily impact plumes depending on wind speed and precipitation.

Historical Occurrences of HAZMAT Incidents

Between 2017 and 2019, a 3-year period, Duval County reported 866 HAZMAT incidents that required some type of cleanup crews. In compliance with §403.077, F.S. and the public interest, the DEP has made all Notices of Pollution that it has received publicly available online. Excerpts from these notices are summarized below, as presented by the reporting entity. Therefore, the COJ or DEP are not responsible for the accuracy of any information submitted by other agencies.

Table 46: HAZMAT Incidents over 200 Gallons Reported to FDEP, 2017-2023

Date	Location	Pollutant	Volume
3/09/2017	9774 Florida Mining Boulevard	Acid/ Solvent	300 gallons
4/03/2017	Atlantic Ocean at the Jetties	Diesel Fuel	500 gallons
4/13/2017	Herschel Street	Fertilizer	250 gallons
4/22/2017	4801 Reid Street	Roundup	300 gallons
5/26/2017	I-10 WB Mile Marker 341	Gasoline	700 gallons
6/22/2017	I-75 near Mile Marker 399	Diesel Fuel	200 gallons
6/28/2017	2051 Lane Avenue	Glacial Acetic Acid	200 gallons
7/17/2017	205 E U.S. 90	Diesel Fuel	800 gallons
8/12/2017	1281 Newell Road	Diesel Fuel	400 gallons
8/28/2017	I-295 NB Exit 52	Diesel Fuel	250 gallons
8/30/2017	7500 Centurion Pkwy. North	Transformer Oil	470 gallons
10/10/2017	3750 CR-220	Diesel Fuel	500 gallons

Date	Location	Pollutant	Volume
10/11/2017	5222 Treat Road	Number 6 Fuel Oil	465 gallons
10/14/2017	6850 Energy Center Drive	Sodium Hypochlorite	85,000 gallons
1/15/2018	22796 NW CR 200 A	Hydraulic Oil	400 gallons
1/19/2018	8580 Die Hard Lane	Gasoline/ Used Oil	700 gallons
3/07/2018	I-295 SB Mile Marker 52	Diesel Fuel	200 gallons
3/26/2018	703 N. State Street	Diesel Fuel	800 gallons
4/06/2018	I-75 NB Mile Marker 399	Diesel/ Milk	200 gallons
4/21/2018	624 Hannah Street	Oil	400 gallons
5/12/2018	733 Shaw Street	Transformer Oil	1500 gallons
5/16/2018	3581 St Johns Avenue	Heating Oil	250 gallons
5/16/2018	14770 Old St Augustine Road	Sodium Hypochlorite	7,000 gallons
6/15/2018	103rd Street	Used Oil	225 gallons
8/05/2018	I-75 Mile Marker 396S	Diesel Fuel	200 gallons
8/22/2018	St Johns River at Blount Island Pier 30	Motor Oil	2,700 gallons
9/07/2018	2400 Palm Valley Road	Non-PCB Transformer Oil	400 gallons
9/21/2018	4263 Losco Road	Asphalt Sealant	200 gallons
10/9/2018	I-95 Mile Marker 353N	Jet A Fuel	8,000 gallons
10/26/2018	6500 Roosevelt Blvd. (FRCSE)	Lube Oil	90 gallons
11/01/2018	893 FL-19	Diesel Fuel	3,700 gallons
12/10/2018	2027 Rental Car Lane	Motor Oil	400 gallons
1/15/2019	7075 W 12th Street	Used Motor Oil	200 gallons
1/20/2019	Main St. - CSX Train Tracks	Denatured Alcohol	60,000 gallons
2/05/2019	St. Johns River across from Fort Caroline	Abandoned Container	250 gallons
2/15/2019	4377 Heckscher Drive	Non-PCB Transformer Fluid	250 gallons
4/25/2019	10 Van Dyke Road	Polymer Water mix	1,000 gallons
5/03/2019	St. Johns River @ NAS Jax Runway 10	Jet Fuel	200 gallons
5/18/2019	1151 Talleyrand Avenue	Asphalt Flux	24,000 gallons
7/16/2019	220 Davis Pond Boulevard	Sodium Hypochlorite	400 gallons
7/20/2019	Ortega Forest Drive and Ivanhoe Road	Diesel Fuel	200 gallons
7/28/2019	NAS Mayport Building 2078	Gasoline	200 gallons
9/06/2019	2500 Zoo Parkway	Diesel Fuel	550 gallons
9/17/2019	I-75 Mile Marker 414S	Diesel Fuel	200 gallons
10/27/2019	NW 16th Blvd. and 43rd Street	Gasoline	3,000 gallons
11/12/2019	6235 Greenland Road	Used Oil	2,900 gallons

Date	Location	Pollutant	Volume
11/18/2019	601 Crestwood Street	Alpha-Pinene	400 gallons
11/26/2019	NW 13th St. at NW 74th Place	Diesel Fuel	1,500 gallons
12/03/2019	4378 Ocean St #3 @ Safe Harbor Mayport	Diesel Fuel	1,800 gallons
8/21/2020	5420 118th St.	Chemical Spill (Caustic Soda)	200 gallons
7/30/2021	Naval Station, Mayport	Oil	1,000 gallons
9/25/2022	FEC Railway Bowden Yard	Diesel Fuel	700 gallons
12/26/2022	CSX Transportation, Inc. Moncrief Yard	Diesel Fuel	200 gallons
3/24/2023	CSX Transportation, Inc. Moncrief Yard	Diesel Fuel	910 gallons
4/17/2023	BAE Systems Jacksonville Ship Repair	Treated Effluent	1,000 gallons

Source: Florida Department of Environmental Protection.
Retrieved July 2024 from: https://prodenv.dep.state.fl.us/DepPNP/reports/viewIncidentDetails?/

Probability of Future Occurrences of HAZMAT Incidents

The probability of a HAZMAT incident is perceived to be high, and planning must be done in advance because this type of hazard occurs without warning. The COJ has a deep-water Port of Entry and functions as the state's foremost transportation and commercial center. The city is a hub of regional marine, rail, and road networks and has an international airport that is one of the busiest in Florida. Due to these extensive transportation networks, HAZMAT spills can occur any time and does impact the whole community.

Additionally, the continued development of the county resulting in more sprawl, less environmental buffers, increased dement to meet the needs of the increasing population, and limited ability to improve the existing infrastructure capacity may result in more accidents, capacities to facilitate public services to be insufficient, and increasing opportunities for human error. HAZMAT incidents are impossible to foresee because of the unpredictable nature of man-made hazards. Therefore, preparedness is the key preventing accidents from snowballing into severe stresses with long-term effects on the whole community. Accidents happen and cannot be entirely prevented, so the focus for reducing the risk to life and property is to improve the personnel and resources available for those immediately responding to an extremely rate and dangerous accident. This can be in the training of employees handling hazardous materials and those responsible for responding to incidents requiring multi-jurisdictional collaboration.

HAZMAT Incident Impact Analysis

Public

- Loss of life or injury from contamination.
- Diseases may be exacerbated.

Responders

- Loss of life or injury from contamination, explosions, cleanup, and destruction.
- Diseases.
- Cleanup and destruction at waste sites and incident sites.

Continuity of Operations, including continued delivery of services

- Lost material, such as gas, is unusable and could lead to shortages and price increases.
- HAZMAT releases may directly damage facilities or result in evacuations

Property, Facilities, Infrastructure

- Damage due to excavation and removal of soil and water.
- Inability to rebuild in affected areas.
- Services could be closed or blocked due to the contaminant.
- Roads
- Trains
- Airplanes
- Bridges
- Waterways
- Long term contamination at hazardous waste sites.

Environment

- Death or illness to pets or wildlife near the spill.
- Damage to plants and wildlife.
- Airborne issues such as toxic fumes, gases, or vapors caused by chemicals.
- Water contamination.
- Soil contamination.
- Loss of critical or endangered species.
- Pollution.

Economic Condition

- Business closures may lead to lost revenue and wages.
- Loss of tourism and income.
- Loss of product.
- Cost of cleanup and restoration.

Public Confidence in Jurisdiction's Governance

- Governments should have COMPs to deal with HAZMAT incidents

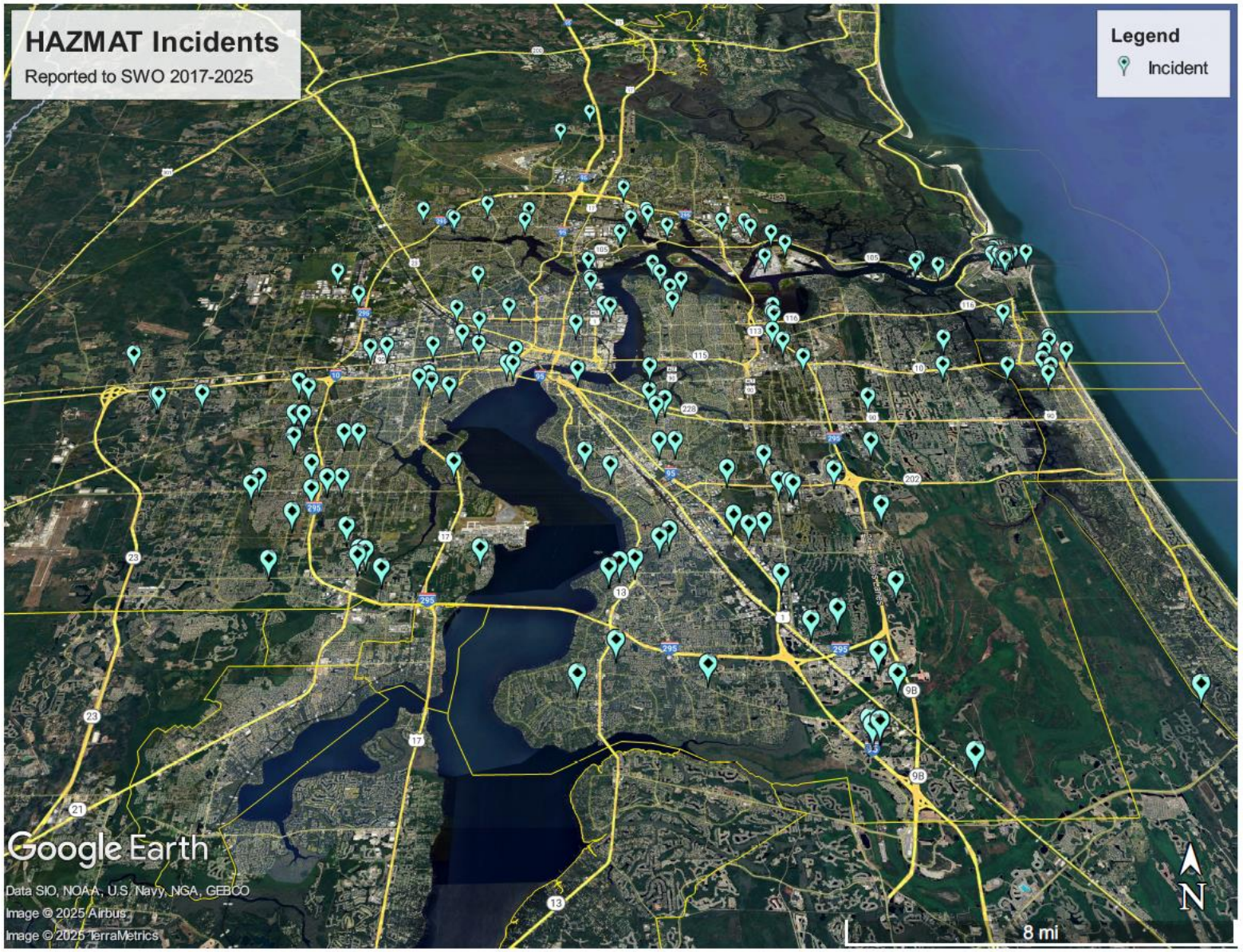
Potential Effects of Climate Change on HAZMAT Incidents

Some chemicals react and undergo changes as their temperature increases, so they are stored in containers that regulate their pressure, temperature, and keep them stable. However, when chemicals are release to heat after a spill, it can start a reaction that is not safe for the surrounding environment. In addition, materials with greater volatility may produce higher levels of dangerous vapors at elevated temperatures *(Source: Fire Engineering, 2010, HAZMAT Summer Incidents).*

Vulnerability Analysis and Loss Estimation

Major HAZMAT incidents can occur at any facility that produces, uses, or stores hazardous materials. These include chemical manifesting plants, laboratories, shipyards, railroad yards, warehouses, and chemical disposal areas. To some extent, all of Duval County is vulnerable to HAZMAT Incidents due to direct damages, economic damages, or additional force account labor costs for personnel required to respond to the incident. Estimates for losses range from thousands of dollars for smaller incidents to millions of dollars, similar to a large quantity generator creating a major release event.

Map 47: Duval County HAZMAT Incidents Reported to FDEP via SWO, 2017 - 2025



Source: Florida Department of Environmental Protection, https://prodenv.dep.state.fl.us/DepPNP/reports/viewIncidentDetails?/

13.

Critical Infrastructure Disruption

Hazard Profile

13. Critical Infrastructure Disruption Hazard Profile

<table>
<tr><th colspan="5">Critical Infrastructure Disruption</th></tr>
<tr><td colspan="4">Overview</td><td rowspan="4">High

20 / 30</td></tr>
<tr><td colspan="4">Critical infrastructure describes the physical and cyber systems and assets that are so vital to the U.S. that their incapacity or destruction would have a debilitating impact on our physical or economic security or public health or safety. Data from the https://teammicrotech.com/most-damaging-jacksonville-hurricanes-and-tropical-storms/ was cross-referenced with local data to arrive at the figures incorporated into the LMS Vulnerability Assessment.</td></tr>
<tr><td>Frequency</td><td>Probability</td><td colspan="2">Potential Magnitude</td></tr>
<tr><td rowspan="2">Very High
10 / 10</td><td rowspan="2">Very High
5 / 5</td><td>Injuries/Deaths</td><td>Infrastructure</td><td>Environment</td></tr>
<tr><td>Low
2 / 5</td><td>Low
2 / 5</td><td>Very Low
1 / 5</td></tr>
</table>

Critical Infrastructure Disruption Description

Critical infrastructure is the physical and cyber system assets that are so vital to the U.S. that their incapacitation or destruction would be debilitating to the whole community's physical security and economic safety. There are 16 critical infrastructure sectors whose assets, systems, and networks are considered vital to the U.S. *(Source: Critical Infrastructure Security and Resilience; Cybersecurity and Infrastructure Security Agency; Retrieved from https://www.cisa.gov/topics/critical-infrastructure-security-and-resilience).*

1. **Chemical**: Composed of several hundred thousand U.S. chemical facilities in a complex; global supply chain converts various raw materials into more than 70,000 diverse products that are essential to modern life. Based on the product produced, the sector can be divided into five main segments, each of which has distinct characteristics, growth dynamics, markets, new developments, and issues: basic chemicals, specialty chemicals, agricultural chemicals, pharmaceuticals, and consumer products.
2. **Commercial Facilities**: Includes a diverse range of sites that draw large crowds of people for shopping, business, entertainment, or lodging. Facilities within the sector operate on the principle of open public access, meaning that the public can move freely without the deterrent of highly visible security barriers.
3. **Communications**: Is an integral component of the U.S. economy, underlying the operations of all businesses, public safety organizations, and government. Presidential Policy Directive 21 identifies the Communications Sector as critical because it provides an "enabling function" across all critical infrastructure.
4. **Critical Manufacturing**: Is crucial to the economic prosperity and continuity of the U.S. A direct attack on or disruption of certain elements of the manufacturing industry could disrupt essential functions at the national level and across multiple critical infrastructure sectors.
5. **Dams**: Delivers critical water retention and control services in the U.S., including hydroelectric power generation, municipal and industrial water supplies, agricultural irrigation, sediment and flood control, river navigation for inland bulk shipping, industrial waste management, and recreation.
6. **Defense Industrial Base**: Is the worldwide industrial complex that enables research and development, as well as design, production, delivery, and maintenance of military weapons systems, subsystems, and components or

parts, to meet U.S. military requirements.

7. **Emergency Services**: Is a community of millions of highly skilled, trained personnel, along with the physical and cyber resources that provide a wide range of prevention, preparedness, response, and recovery services during both day-to-day operations and incident response.
8. **Energy Infrastructure**: Fuels the economy of the 21st century. Without a stable energy supply, health and welfare are threatened, and the U.S. economy cannot function.
9. **Financial Services**: Represents a vital component of our nation's critical infrastructure. Large-scale power outages, recent natural disasters, and an increase in the number and sophistication of cyberattacks demonstrate the wide range of potential risks facing the sector.
10. **Food and Agriculture**: Is almost entirely under private ownership and is composed of an estimated 2.1 million farms, 935,000 restaurants, and more than 200,000 registered food manufacturing, processing, and storage facilities. This sector accounts for roughly one-fifth of the nation's economic activity.
11. **Government Facilities**: Includes a wide variety of buildings, located in the U.S. and overseas, that are owned or leased by federal, state, local, and tribal governments.
12. **Healthcare and Public Health**: Protects all sectors of the economy from hazards such as terrorism, infectious disease outbreaks, and natural disasters.
13. **Information Technology**: Is central to the nation's security, economy, and public health and safety as businesses, governments, academia, and private citizens are increasingly dependent upon Information Technology Sector functions.
14. **Nuclear Reactors, Materials, and Waste**: From the power reactors that provide electricity to millions of Americans, to the medical isotopes used to treat cancer patients, the Nuclear Reactors, Materials, and Waste Sector covers most aspects of America's civilian nuclear infrastructure.
15. **Transportation**: DHS and DOT are designated as the Co-Sector-Specific Agencies for the Transportation Systems Sector. COJ's network of interstates and major highways attracts many supply chain logistics companies to the city.
16. **Water Wastewater System**: Safe drinking water is a prerequisite for protecting public health and all human activity. Properly treated wastewater is vital for preventing disease and protecting the environment. Thus, ensuring the supply of drinking water and wastewater treatment and service is essential to modern life and the Nation's economy.

Geographic Areas Affected by Critical Infrastructure Disruption

Critical infrastructure is located throughout the County, with large clusters in densely populated areas and may transcend boundaries requiring bilateral, regional, and international collaboration such as capacity building and mutual assistance.

Historical Occurrences of Critical Infrastructure Disruption

To date, most disruptions have occurred during tropical cyclone events in the form of notable power outages.

Probability of Future Occurrences of Critical Infrastructure Disruption

Critical infrastructure may be disrupted by natural and man-made hazards and is often a secondary stressor contingent on the impacts of a primary hazard. Therefore, critical infrastructure disruptions are viewed as an inevitability that requires planning, training, multi-agency coordination, and investment to conduct needed repairs, address maintenance issues, or expand existing infrastructure to meet increased demand. Some of the most critical infrastructure that would disrupt the whole community if incapacitated for extended periods of time are the Buckman Bridge, the Jacksonville Airport, the Acosta railroad bridge, the Port of Jacksonville, the Mayport Naval Station, the Jacksonville Naval Air Station, and the Buckman Waste Water Treatment Facility. Mitigation measures to protect, reinforce, and sustain critical infrastructure from the impacts of know hazards is the best way to prevent future occurrences of critical infrastructure disruptions.

Critical Infrastructure Disruption Impact Analysis

Public

- Critical infrastructure failures impact those living within the hazard area
- Roadways may be obstructed or inaccessible to the public, challenging transportation requirements

Responders

- Critical infrastructure failure may cause roadways to be closed.
- Communications system failure would impact the responders' ability to communicate their status or identify areas that require response.

Continuity of Operations, including continued delivery of services

- Disrupt communications systems
- Disrupt operations of the facility that is being blocked
- COJ EPD maintains a Continuity of Operations Plan. In the event of Infrastructure failure that affects the City's operations, the EPD will enact the plans appropriately to the situation. To date, there have been few or no major incidents that have shut down state, county, or municipal governmental operations. While expectation is minimal, this threat may impact EPD's ability to implement their plans based on the hazard's potential to cause power outages and transportation difficulties.
- Computer and network and other communication access may be impacted due to power outages. Delivery of services will be disrupted due to critical infrastructure failure. Transit systems may face closures due to public safety concerns due to inability to operate transportation vehicles such as trains and buses. The ability to deliver food, drinking water, and services will be impacted locally, regionally, and statewide due to problems with accessibility and transport abilities.

Property, Facilities, Infrastructure

- Potential damage to infrastructure and public transportation programs
- Shutting down affected highways, railways, and airports
- Roads and bridges may be impacted, and water/sewer systems may be damaged, leading to sanitation and waste collection issue. Homes and businesses may be destroyed if situated close to the failure point.

Environment

- The impacts on the environment of critical infrastructure would vary based on the event and impacts. Failure of wastewater plants would result in spreading pollution and hazardous materials throughout the environment including large bodies of water. Ecosystems and natural habitats may be destroyed, causing migration.

Economic Condition

- Blocked roads could lead to an inability for businesses to open or employees to get to work, causing economic impacts.

Public Confidence in Jurisdiction's Governance

- Tourists may be impacted

Critical infrastructure failure would have a direct and considerable fiscal impact on the local government, even after some of the costs have been paid through federal disaster declarations. Additionally, infrastructure failure in every sector can impact businesses operations that will continue to lose revenue until operability is restored. One possible impact can be the property values within the footprint of an incident where power lines are not buried and susceptible to disruption during severe weather events. Critical infrastructure failure would have a direct impact on the state's ability to provide governance, maintain order, and ensure the continuity of public services. Direct, immediate, and effective actions must be taken to maintain public confidence.

Potential Effects of Climate Change on Critical Infrastructure Disruption

Extreme weather events are the main cause of power outages and are a constant hazard to the nation's energy system. Equipment and infrastructure used in the production, generation, transmission, and distribution of energy resources are constantly exposed to the elements. High winds threaten damage to power lines, flooding can undermine the foundations of energy infrastructure, and water inundation can undermine energy facilities located along rivers. When energy assets fail, power outages can become prolonged widespread energy disruptions *(Source: Energy Supply and Use; Retrieved from www.Climate.gov).*

Vulnerability Analysis and Loss Estimation

Due to its large amount of critical infrastructure, the County is susceptible to impacts from all natural and man-made hazards. Loss estimates are included in each hazard profile that incorporates damage to critical infrastructure. Losses may be incurred from physical damage, economic damage, loss of use, and labor costs of response personnel.

An exceptional intermodal infrastructure makes Duval County a choice location for businesses dependent on logistics and access to the supply chain. Access to three major freeways, three railways (CSX, Norfolk Southern and Florida East Coast), an international airport, and a deep-water port with three marine terminals makes COJ a transportation hub. Efficient utilities and state-of-the-art telecommunication infrastructure make Duval County attractive to many businesses. As part of the progressive Better Jacksonville Plan, the COJ has invested more than $1.5 billion on roadway infrastructure throughout the city. JTA has invested approximately $80 million and the Florida DOT has invested more than $484 million in current roadway projects *(Source: Better Jacksonville Plan; COJ)*. Significant investments into critical infrastructure have been beneficial to the local economy; any disruption or loss to critical infrastructure would similarly have widespread financial impacts and create roadblocks along the supply chain.

14.

Terrorism and Targeted Violence

Hazard Profile

14. Terrorism and Targeted Violence Hazard Profile

Terrorism/Targeted Violence

Overview

International terrorism: Violent, criminal acts committed by individuals or groups who are inspired by, or associated with, designated foreign terrorist organizations or nations.

Domestic terrorism: Violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature.

Targeted Violence: Many of the perpetrators of targeted attacks do not appear to fit the definition of terrorists because they lack a clear ideological motive. They may often be responding to a perceived grievance, whether domestic, workplace, or of some other nature. This targeted violence is a persistent problem. Targeted violence includes include mass attacks.

Data from the https://www.fbi.gov/investigate/terrorism was cross-referenced with local data to arrive at the figures incorporated into the LMS Vulnerability Assessment.

Moderate

14 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
Moderate 6 / 10	Low 2 / 5	Low 2 / 5	Low 2 / 5	Low 2 / 5

Active Shooter

Overview

An Active Shooter is an individual actively engaged in killing or attempting to kill people in a confined and populated area; in most cases, active shooters use firearms. Data from the https://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data/ was cross-referenced with local data to arrive at the figures incorporated into the LMS Vulnerability Assessment

Moderate

18 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
Very High 10 / 10	Very High 5 / 5	Low 2 / 5	Very Low 1 / 5	Very Low 0 / 5

Biological

Overview

Biological warfare agents are bacteria and viruses that infect humans, animals, and crops resulting in an incapacitating or fatal disease, or crop destruction. Data from the https://www.medscape.com/viewarticle/452339_1 was cross-referenced with local data to arrive at the figures incorporated into the LMS Vulnerability Assessment.

Moderate

18 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
High 8 / 10	Very High 5 / 5	Moderate 3 / 5	Very Low 1 / 5	Very Low 1 / 5

Chemical

Overview

Chemical agents are extremely toxic synthetic chemicals that can be dispersed as a gas, liquid or aerosol or as agents adsorbed to particles to become a powder. Data from the https://www.webmd.com/a-to-z-guides/features/biological-chemical-terror-history#1 was cross-referenced with local data to arrive at the figures incorporated into the LMS Vulnerability Assessment.

Low

8 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
Low 2 / 10	High 4 / 5	Very Low 0 / 5	Very Low 1 / 5	Very Low 1 / 5

Improvised Explosive Device

Overview

A conventional explosive device, or IED, may be used to cause massive local destruction or to disperse chemical, biological, or radiological agents.

High

22 / 30

Frequency	Probability	Potential Magnitude		
		Injuries/Deaths	Infrastructure	Environment
Very High 10 / 10	Very High 5 / 5	Moderate 3 / 5	Low 2 / 5	Very Low 1 / 5

Terrorism and Targeted Violence Description

Agencies such as the FBI, the DOD and the Department of State have each defined terrorism with constant themes. One theme includes involving pre-meditation terrorist acts which are motivated by political or social agendas because terrorists generally target non-combatants or civilians and are generally sub-national or clandestine groups. The configuration of terrorist groups is generally dependent on one's environment, relationship with the state, motivation, and goals.

- **International terrorism**: Violent, criminal acts committed by individuals or groups who are inspired by, or associated with, designated foreign terrorist organizations or nations, such as state sponsored.
- **Domestic terrorism**: Violent, criminal acts committed by individuals or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature.

Our Nation faces a threat from domestic terrorism, including targeted violent attacks on houses of worship, schools, workplaces, festivals, and shopping spaces. Many of the perpetrators of these targeted violent attacks do not appear to fit the definition of terrorist because they lack a clear ideological motive or group association. Therefore, they are often responding to a perceived personal grievance of some king; a persistent problem and of grave concern. Targeted violence includes mass attacks and hate crimes, but gang-related shootings are not typically included in statistics to track and account for 'mass attacks' as defined by the DHS. The extent of damage from these incidents are typically measured by the count of injured or deceased victims *(Source: Investigate Terrorism; FBI).*

The following could be considered types of Mass Attacks:

- Active shooter: Individuals using firearms to cause mass casualties.
- Biological: The intentional release of toxic biological agents to harm and terrorize civilians.
- Chemical: The deliberate release of chemicals that could poison people, animals, plants, or the environment.
- Bombing Improvised Explosive Device (IED): Individuals using homemade devices to cause mass casualties.

Active Shooter: An Active Shooter is an individual actively engaged in killing or attempting to kill people in a confined and populated area. They use firearms, attack anyone who comes across their path indiscriminately, and the incidents evolve quickly. Typically, the immediate deployment of law enforcement is required to stop the shooting and mitigate harm to the surviving victims to prevent further casualties. Active shooter attacks are often over within 10 to 15 minutes, before law enforcement arrives on the scene, it is important for the public to be prepared both mentally and physically to deal with an active shooter situation themselves *(Source: Active Shooter Booklet; DHS).* DHS defines certain characteristics of an active shooter as the following:

- Active shooters are likely to engage more than one target. They may target particular individuals, or they may be intent on killing as many randomly chosen people as possible.
- Active Shooters often go to locations with high concentrations of people, such as schools, theaters, shopping centers, or other places of business.
- Active shooters often, but not always, are suicidal and may attempt suicide by police. Escape from the police is usually not a priority of an active shooter. Most active shooters do not attempt to hide their identity.

Biological: Biological warfare agents are bacteria and viruses that infect humans, animals, and crops resulting in severe damage or complete destruction. Oftentimes, the bacteria or virus is weaponized to affect a broader segment of humans, animals, or crops than the normal pathogen. In a biological terror event, healthcare facilities will be inundated with victims. The arrival of one or more victims with an odd presentation may be the initial indication that an act of terrorism has occurred; symptoms may not appear for days to weeks after exposure. Biologic agents may be dispersed by several techniques including contaminated water and aerosol sprays. Biological terrorists can also intentionally infect individuals and place them on airplanes, buses, or events that will disperse the virus quickly *(Source: Biological, Chemical, and Radiation Terrorism Review; National Center for Biotechnology Information; National Library of Medicine. Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK493217/).*

The CDC has identified 30 organisms that might be weaponized and has grouped them into categories A, B, and C. Classification is based on ease of dissemination, morbidity and mortality, panic potential, and public health requirements.

Category A: Highest priority diseases that pose a risk to national security are easily transmitted, have high morbidity and mortality, would have a major public health impact and cause panic, and require special public health preparedness. Category A. Biological Diseases are:

- Anthrax (Bacillus Anthracis)
- Botulism (Clostridium Botulinum Toxin)
- The plague (Yersinia Pestis)
- Smallpox (Variola Major)
- Tularemia (Francisella Tularensis)
- Hemorrhagic fever
- Ebola Virus

Category B: Moderate priority diseases with lower morbidity and mortality and more difficult to disseminate.

Category C: High priority diseases that have the potential to cause significant morbidity and mortality and are emerging pathogens that could be engineered for mass dispersion.

Chemical: Chemical agents are extremely toxic synthetic chemicals that can be dispersed as a gas, liquid, aerosol or as a powder with either lethal or incapacitating effects on humans. Thousands of toxic substances are known, but only some of them are considered as chemical warfare agents based on their characteristics, high toxicity, undetectable to human senses, and speed of action after dissemination; these factors are the basis for being listed as scheduled chemicals in the Chemical Weapons Convention. According to the Chemical Weapons Convention, chemical weapons are defined as toxic chemicals and their precursors, munitions and devices, and any equipment specifically designed for use directly in connection with such weapons *(Source: National Center for Biotechnology Information, National Library of Medicine).*

Scientists often categorize hazardous chemicals by the type of chemical or by the effects a chemical would have on people exposed to it. The categories and types used by the Centers for Disease Control and Prevention are as follows:

- Anticoagulants – cause uncontrolled bleeding
- Biotoxins – come from plants or animals
- Blister Agents – blister the eyes, skin, or throat and lungs
- Blood Agents – absorbed into the blood
- Caustics – burn on contact
- Choking, Lung and Pulmonary Agents
- Incapacitating Agents – alter consciousness or thinking
- Metallic Poisons
- Nerve Agents – prevent the nervous system from functioning properly
- Organic Solvents – damage living tissue by dissolving fats and oils
- Tear gas and riot control agents
- Toxic Alcohols
- Vomiting Agents

Bombing: A conventional explosive device or improvised explosive devices is the easiest to obtain and use of all weapons, which may be used to cause massive local destruction or used to disperse chemical, biological, or radiological agents. Improvised explosive devices are among the world's oldest types of weapons used in attacks deliberately targeting concentrations of people to achieve the maximum effect of lethality, terror, and societal disruption. The components are readily available, as are detailed instructions to construct such a device; bombings occur globally hundreds of times per month. Large, powerful devices can be outfitted with timed or remotely triggered detonators and can be designed to be activated by pressure, movement, light, or radio transmission. Explosive materials can be employed covertly with little signature and may not be readily detectable. Secondary explosive devices may also be used as weapons against responders

and the public in coincident acts as multiple targets can be attacked at the same time *(Source: Managing the Emergency Consequences of Terrorist Incidents; UN Office for Disarmament Affairs, IEDs – A Growing Threat; FEMA).*

Geographic Areas Affected by Terrorism and Targeted violence

It is almost impossible to predict where and when an attack could occur. Generally speaking, densely populated areas or high-profile locations are targeted to cause the most damage as possible where the assailants use weapons to attack crowds, as well as target less protected public spaces. Attackers intend to cause as much damage as possible, kill high-profile target individuals, use the attacks to intimidate, and in some cases use makeshift weapons that are hard to detect.

Historical Occurrences of Terrorism and Targeted Violence

According to the U.S. Secret Service, 173 mass attacks were carried out by 180 attackers in public or semi-public locations between January 2016 and December 2020. In total, 513 people were killed and 1,234 people were injured. In the past 7 years, the U.S. had the two deadliest mass attacks in modern history, including a 2017 shooting at an outdoor concert in Las Vegas that killed 58 and injured 869. The number of attacks between 2016 to 2020 are as follows; 2016 had 30 mass attacks, 2017 had 38 mass attacks, 2018 had 31 mass attacks, 2019 had 34 mass attacks, and 2020 had 40 mass attacks.

i. Bombing Attacks: Previous occurrences of bomb incidents in Florida between 2001 and July 2024**.**

Table 47: Bomb related incidents in the State of Florida, 2001-2023

Year	Information
2001	Richard Reid unsuccessfully attempted to blow up an American Airlines Paris-to-Miami flight by placing explosives in his shoes.
2006	In Sanibel, Florida, a small bomb was found in a parking lot located among three restaurants. Authorities said the eight inch-by two inch-by three-inch bomb was connected to a cell phone. It was rigged so that if the phone was called, the device would explode. The Lee County bomb squad responded to the scene and dismantled the device. Two other restaurants and a nearby road were closed for about four hours.
2010	The FBI investigated a pipe bomb found at the scene of the May 10, 2010, attack at the Islamic Center of Northeast Florida (ICNEF) in Jacksonville, Florida. There were 60 people in the building at the time of the attack.
2011	The FBI arrested three Pakistani Americans, including father and son imams from South Florida mosques, charging them with providing financing and other material support to the Pakistani Taliban.
2012	Sami Osmakac, an American citizen born in the former Yugoslavia who is a Florida resident, was charged with plotting a terrorist spree around Tampa, including bombing nightclubs, destroying bridges, and shooting police officers in the name of radical Islam.

Source: Timeline of Homeland Security Events and Milestones. Homeland Security Digital Library. September 2024. Retrieved from: https://www.hsdl.org/c/timeline/?timeline=any&timeline-category=any

ii. Biological Attacks:

The anthrax attacks of 2001 increased concerns that "weapons grade" biological agents can be obtained and disseminated by terrorists. To assist in planning for future attacks, bioterrorist attack scenarios have been envisioned that involve the use of aerosol-delivery technologies to large civilian populations by air, inside buildings, or in mass transit systems. However, there is relatively little unclassified data which biodefense planners can base their understanding of the potential consequences of a large-scale bioterrorist attack. A 1970 World Health Organization (WHO) study estimated that 50 kg of Bacillus anthracis released over an urban population of 5 million would sicken 250,000 and kill 100,000 people *(Source: History of Vaccines, Biological Weapons, Bioterrorism, and Vaccines; Potential for Aerosol Dissemination for Biological Weapons: Lessons from Biological Control of Insects, Medscape).*

Iii. Active Shooter Incidents: Previous occurrences of active shooters in Florida between 1982 and 2023.

Table 48: State of Florida Active Shooter Events, 1982-2023

Incident	Location	Date	Deaths	Injuries	Location Type	Age
Sandestin Golf and Beach Resort	Miramar Beach	9/21/2023	1	1	Open Space	21
Dollar General	Jacksonville	8/26/2023	3	-	Commerce	21
Various Locations	Orlando	12/14/2022	-	2	Commerce	19
Broward County Transit Bus	Ft. Lauderdale	3/17/2022	2	2	Government	34
Players Sports Bar and Grill	Ft. Lauderdale	2/6/2022	-	4	Commerce	-
La Palace Nightclub	Orlando	9/10/2021	-	4	Open Space	29
Residential	Lakeland	9/5/2021	4	1	Residence	33
La Cerveceria de Barrio Restaurant	Miami Beach	8/24/2021	1	-	Commerce	22
Publix Grocery Store	Palm Beach	6/10/2021	2	-	Commerce	55
Next Generations All Gas	Williston	9/5/2020	-	6	Open Space	-
Multiple Locations	Tampa	7/30/2020	-	5	Open Space	31
Giuseppe's Pizzeria	Sebastian	6/19/2020	1	.	Commerce	56-
Pensacola Naval Base	Pensacola	12/6/2019	3	8	Military	-
SunTrust Bank	Sebring	1/23/2019	5	-	Workplace	21
Jacksonville Landing	Jacksonville	8/26/2018	4	11	Other	30
Marjory Stoneman Douglas HS	Parkland	2/14/2018	17	17	School	19
Florida Awning Manufacturer	Orlando	6/5/2017	5	-	Workplace	45
Fort Lauderdale Airport	Ft. Lauderdale	1/6/2017	5	6	Airport	26
Orlando, Pulse Nightclub	Orlando	06/12/2016	50	53	Night Club	-
Hialeah Apartment	Hialeah	7/26/2013	7	-	Other	42
Hotel	Tampa	12/30/1999	5	3	Workplace	36
Fort Lauderdale Revenge	Ft. Lauderdale	2/9/1996	6	1	Workplace	41
GMAC Massacre	Jacksonville	6/18/1990	10	4	Other	42
Shopping Centers	Palm Bay	4/23/1987	6	14	Other	59
Welding Shop	Miami	8/20/1982	8	3	Other	51

Source: Active Shooter Incidents in the United States in 2023. FBI.
Retrieved from: https://www.fbi.gov/file-repository/2023-active-shooter-report-062124.pdf/view
Source: Active Shooter Incidents in the United States in 2022. FBI.
Retrieved from: https://www.fbi.gov/file-repository/active-shooter-incidents-in-the-us-2022-042623.pdf;
Source: Active Shooter Incidents in the United States in 2021. FBI.
Retrieved from: https://www.fbi.gov/file-repository/active-shooter-incidents-in-the-us-2021-052422.pdf/view
Source: Active Shooter Incidents in the United States in 2020. FBI.
Retrieved from: https://www.fbi.gov/file-repository/active-shooter-incidents-in-the-us-2020-070121.pdf/view
Source: Active Shooter Incidents in the United States from 2000-2018. FBI.
Retrieved from: https://www.fbi.gov/file-repository/active-shooter-incidents-2000-2018.pdf/
Source: US Mass Shootings, 1982-2024: Data from Mother Jones' Investigation. Mother Jones.
Retrieved from: https://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data/

Probability of Future Occurrences of Terrorism/Targeted Violence

The probability of some kind of mass attack is perceived to be high, and planning must be done in advance because this type of hazard occurs without warning. The Florida Division of Law Enforcement (FDLE) provides the state with critical intelligence and serves as a preventative measure for the state. The COJ has a deep-water Port of Entry and functions as the state's foremost transportation and commercial center. The city is a hub of regional marine, rail, and road networks and has one of the busiest international airports in Florida. Due to these large potential targets, potential terrorism and targeted violence does impact the whole community.

Additionally, continued development and an increasing population make Duval County a target. Domestic and international terrorism can't always be foreseen due to complicating factors such as chosen target, crimes of opportunity, and motive. Complete prevention and comprehensive mitigation are impossible when you don't know the who, where, when, why, or how. Therefore, preparedness is the key to reducing secondary stresses on the whole community, as well as social trauma. Terrorism cannot be entirely prevented at the local level, so the primary focus for reducing the risk to life and property is to improve the personnel and resources available for those immediately responding to an extremely rare and dangerous event. This can be done through increased training of special response teams, communication with state and federal agencies to improve security, and preparing for incidents requiring multi-jurisdictional collaboration.

Terrorism and Targeted Violence Impact Analysis

Public

- Civilians are a target for attacks and are at risk.
- Exposure to Hazardous Materials could affect the nearby population and first responders.
- Lack of clean running water can cause unsanitary conditions and dehydration.

Responders

- First responders are at risk of PTSD and other health issues following a violent attack.
- First Responders could be a target for second wave attacks and are at risk during rescue operations.
- Exposure to Hazardous Materials is a possibility and could affect the nearby population and first responders.
- Lack of communication and disruption of critical services can delay emergency response times.

Continuity of Operations, including continued delivery of services

- The economy can decline following an attack and could cause lost revenue to a community.
- Airports in surrounding areas may close causing delays, leaving travelers stranded.
- Streets blocked with debris or closed due to proximity can cause street congestion and slow down response times and evacuation routes.
- Bridges could be closed causing issues evacuating and responding.
- Train disruptions can cause delays and stranded passengers.
- Communication grid overload.
- Damage to phone lines can cause disruption of emergency services.
- Loss of Internet can affect numerous industries and emergency response.

Environment

- Exposure to Hazardous Materials is a possibility and could impact the environment and wildlife.
- Could contaminate the food and water sources.
- Damage to green spaces.

Economic Condition

- Prolonged loss of revenue could cause businesses to close and the economy to suffer.
- Loss of wages could affect citizens' ability to buy necessities and could affect the economy.
- The economy (business, personal, and government) could be affected if banks are closed or not able to access the Internet.

Property, Facilities, Infrastructure

- Bridges could be destroyed or damaged causing issues evacuating a community.
- Train tracks could be damaged or destroyed causing further delays in passengers and cargo being transported.
- Cars in the vicinity could be damaged or destroyed.
- Roads can be damaged or destroyed causing prolonged delays and reduced access for evacuation.
- Damage to buildings can include:
    - Collapse, broken windows and fire.
- Damage or destruction of government buildings could delay necessary services for the community.
- Damage or destruction to critical infrastructure such as places of travel, banks, and utilities could cause stress and hardship within the community.
- Outages can be widespread.
- Damage to power grid can prolong outages.

Public Confidence in Jurisdiction's Governance

- Governments should ensure transparency and communication with the public.
- Evacuation timeframe
- Response timeframe
- Recovery timeframe
- Not stopping an attack could lead to a loss of respect or confidence.

Potential Effects of Climate Change on Terrorism and Targeted Violence

There are no anticipated direct effects from climate change to Terrorist/ Targeted Violence attacks directly. Climate Change may lead to social unrest due to geographic or sociopolitical tensions, resulting in hostile actions between individuals or nations. Indirect effects leading to terrorism and targeted violence may be expected in such a scenario.

Vulnerability, Probability and Risk for Terrorism/Targeted Violence

Any community is potentially vulnerable to terrorism attacks. Duval County's potential vulnerable locations:

- Military Bases: 4
- Airports: 7 (1 International)
- Stadium: Maximum Capacity 67,164
- The Port of Jacksonville: 1
- Jacksonville Cruise Terminal: 1
- Abortion Medical Clinic: 4
- Animal Testing Sites: 1 (Acuvue, Johnson & Johnson)
- Schools: 205

The County is known for its many special events that attract local and out-of-state attendance.

Section IV

Mitigation Initiatives

SECTION IV- MITIGATION INITIATIVES

The LMS Advisory Group, also known as Duval Prepares, is the group that ensures maintenance of effective projects and programs already accepted and operational in the whole community. The SEPPC is the body that ratifies and accepts the recommendations of the LMS Advisory Group.

A. Project Selection

Mitigation initiatives that were identified as a product of the LMS reflect the unique balance of the community's vision, goals and objectives with the risks and vulnerabilities posed by the hazards that threaten it. Potential projects and programs will be based on an all-hazards approach, and will specifically consider: all natural, technological and societal hazards; vulnerable population and property, environmental and economic resources, and a comprehensive risk analysis based on frequency, probability, exposure, and potential impacts.

Development of highly detailed analyses of potential new initiatives requires substantial resources. New projects and programs identified and listed will be evaluated and prioritized based on the information available. Generally, initiatives and projects will document the following:

- Why the project is needed;
- How it would effectively reduce disaster damages or save lives (technical merit);
- Anticipated cost-effectiveness (benefit – cost analysis);
- Degree of acceptability to the public and regulatory agencies if implemented.

Prioritization will involve an in-depth assessment of a project's ability to meet specific criteria defined by a Prioritization Point Scale. This point scale determines the greatest opportunity to reduce loss and allow for strategic resource allocation.

B. Prioritization Criteria and Process

The point system will serve as an objective ranking process for mitigation projects and programs for the LMS and may be revised or adopted as defined in the Evaluation and Enhancement Procedures of the Strategy. Potential mitigation initiatives will be prioritized based on a point scale value of the following general criteria:

- Urgency and Severity
- Cost vs. Benefit Justification
- Effectiveness
- Overall Risk Reduction
- Legal authority
- Availability of funds
- Conformity to local mitigation goals and objectives

First, a high priority will be given to projects that immediately mitigate loss of life and property damage. Then, initiatives are prioritized that facilitate a faster recovery without compromising the goals and principles of this strategy. Lastly, initiatives that address long-term redevelopment are prioritized. Examples of project rankings developed during previous funding cycles are available upon request from the EPD. These may be used for historical documentation purposes or as a reference during future opportunities for project ranking.

C. Project Monitoring Process

Prior to each quarterly meeting of the LMS Advisory Committee, Duval Prepares, participants are invited to provide updates for ongoing mitigation initiative projects and propose additional projects for inclusion in the LMS. Proposed projects will be reviewed and recommended for adoption by the LMS Advisory Committee. The LMS Working Group, SEPPC is responsible for making the formal motion to adopt projects. The LMS project list is maintained by the COJ EPD separately from the LMS document, which is updated on a 5-year cycle. The project list will be updated quarterly with any changes to progress or project status. New projects will be added when adopted. Projects that are completed, deferred, or deleted will be transferred to the appropriate lists, which are included as appendices into this plan.

Table 49: Sample Project Grading Rubric

Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Max Points	10	10	10	10	10	10	10	10	10	10	10	10	10	10	130
Project # 1															
Project # 2															
Project # 2															

Table 50: Mitigation Initiatives Prioritization Point Scale

Categories	Max Score	Scoring Instructions
1. Consistency With Existing Comprehensive Growth Management Plan Is the project or initiative consistent with or incorporated in the existing Comprehensive Growth Management Plan?	10	If "yes" then award 10 points; if "no" award 0 points. If project or initiative is consistent with recommended changes proposed but not yet adopted to the Comprehensive Growth Management Plan, award 5 points.
2. Consistency With Existing Emergency Management Plan or Other Functional Plan Developed by an Official Local Governmental Entity Has this project or initiative already been proposed as a management initiative or structural improvement in any emergency proposed or adopted by County or local jurisdictions?	10	If the project or initiative has been proposed but not officially adopted, award 5 points. If the project has been adopted, award 10 points.
3. Consistency with Structured Programs and Processes Does the project or initiative meet criteria or guidelines within its hazard area, which will provide program credits to the community or citizens? An example is the CRS, which will reduce flood insurance rates for property owners.	10	Award 10 points for those measures providing program credits.
4. Project's Potential to Provide Economic Benefits Does the project or initiative provide an economic benefit to the community?	10	Award 10 points for those measures providing an economic benefit.
5. Community Benefit Does the project reduce loss to or significantly benefit a large portion of a community as a whole? How many people are directly and indirectly affected?	10	Award 10 points for those projects that benefit all of the community. Award lesser point scores for those projects which are area or group specific: Benefit 80% of the community = 8 pts. Benefit 60% of the community = 6 pts. Benefit 40% of the community = 4 pts. Benefit 20% of the community = 2 pts. Benefit 10% or less of the community = 1 pt.
6. Community Exposure Does the project mitigate a frequently occurring problem or a problem to which a community is particularly vulnerable, or a hazard that is a high level of risk as identified in the LMS HIVA?	10	Award up to 10 points for those projects that mitigate a hazard risk to which the community has a high exposure based on the vulnerability analysis. Reduce the points awarded as the risk or frequency of events for which this project or initiative mitigates declines. Multi-Hazards = 2 pts. High-risk hazards-region-wide impact = 8 pts. High-risk hazards-localized impact = 6 pts. Medium risk hazards-region-wide or non-specific location = 4 pts. Low risk hazards-non-site specific = 2 pts

Categories	Max Score	Scoring Instructions
7. Cost Effectiveness What is the cost effectiveness of the initiative or project, based on conducting a preliminary analysis using a representative sample or BCA software 3.0 or later of the technical feasibility and benefits versus costs? Please include damage and impact costs from both Presidentially Declared and non-declared events.	10	A total of 10 points will be awarded in this category based on the following: Benefit/cost ratio = 1.0 or greater = 10 pts. Benefit/cost ratio = <1.0 = 0 pts.
8. Effective Project Useful Life How long will the community continue to receive the benefits of a particular mitigation project or initiative?	10	Award 10 pts.to projects with a useful life greater than 40 yr. Award 8 pts.to projects with a useful life between 20-39 yrs. Award 6 pts.to projects with a useful life between 10-19 yrs. Award 4 pts.to projects with a useful life between 5-9 years. Award 2 pts.to projects with a useful life between 1-4 years. Award 0 points to projects with a useful life equal to 0.
9. Public Support Can public support for this project be documented?	10	Award 10 points to projects that have solicited public input.
10. Sponsorship and Funding Availability Does this project have an active sponsor that will take responsibility for its management and implementation?	10	Award 10 points if there is an identified sponsor and the sponsor has 100% matching funds committed to the project / initiative. Award 8 pts. If sponsor matches 50percent to 100percent. Award 5 points if there is an identified sponsor for the proposed project or initiative, but no funding match from sponsor; 0 points if no sponsor.
11. Environmentally Sound Does the project impact environmental or historical resources?	10	Award up to 10 points to projects / initiatives that have no negative impact on environmental or historical resources, considering appropriate mitigation measures that may be applied. Award 5 points for projects that have a medium impact on those resources; award 0 points for projects or initiatives that have a high impact.
12. Consistency with LMS Goals and Objectives	10	A total of 10 points will be awarded in this category based on projects or initiatives that: Meet 5 or more goals/objectives = 10 pts. Meet 4 or more goals/objectives = 8 pts. Meet 3 or more goals/objectives = 6 pts. Meet 2 goals/objectives = 4 pts. Meet 1 goal/objective = 2 pts. Meet no goals/objectives = 0 pts.
14. Post Disaster Funding Does the project/initiative have urgency due to official declaration of disaster and availability of post-disaster funding?	BONUS (10)	A total of 10 points will be awarded if the project has been approved for a post-disaster funding priority of 1. Award 7 points if the project has a post-disaster funding priority of 2, 5 points if a priority of 3.
TOTAL POINTS (120)	**130**	**Category 14 is a 10-point bonus**

D. 2025 Mitigation Initiative Prioritization Results

The LMS Advisory Committee, Duval Prepares, members generated more than 150 different potential mitigation projects organized into 7 categories of land use, construction, critical facilities, economic diversification, transportation, natural environment and community resources. Each of the potential initiatives is included so that all jurisdictions in the COJ have a standard base of projects to apply towards when funding becomes available. This process is a whole-group consensus-driven exercise. Projects are listed in numeric order, and not in a standing ranked score for each potential initiative.

The LMS Advisory Committee recognizes that there is an administrative process associated with determining and maintaining a prioritization score for each individual project. The scope of work, costs, and other components of projects may change slightly over time as new needs are identified within the community. As such, the prioritization of a proposed mitigation project will take place when funding becomes available through pre-or post-disaster resources and funding is desired for a particular project or group of projects. Due to the wide variety of funding sources available for these projects, it is not feasible to provide an overall standing ranking to each particular project. Particular projects or project types may better meet the guidelines of various funding sources and will be ranked objectively from amongst a specific group of projects that are selected for submission, only if prioritization is required. When required, prioritization will take place according to the Prioritization Point Scale for Mitigation Initiatives. A copy of the mitigation project submission form is attached, to reflect the information requested about projects recommended for inclusion in the LMS.

Please note: As the LMS is updated on a five-year cycle, and project lists are updated quarterly, a current list of mitigation initiative projects is maintained separately by the EPD and is available upon request.

Duval County LMS Project Submission Form

Duval County Local Mitigation Strategy

Project Submission Form

General Information Required

1. Name, address and phone for contact regarding proposed project:

Name: _____

Address: _____

_____

Phone #: (_____) _____

Organization: _____

Project Name: _____

2. Description of the proposed project:

3. Explanation of need for proposed project and overall risk reduction summary:

4. Relation to goals, objectives and policies in the LMS or consistency with existing emergency management plan or other functional plan of a local government entity:

5. Hazard that proposed project will mitigate against and the project's effective useful life:

6. Estimated cost of proposed project. Has cost-benefit ratio been established? Please describe how this was determined:

7. Source of funding for proposed project:

8. Estimated percentage of population benefited from proposed project. Is there public support for the project? Please describe how this was determined:

9. Estimated percentage of jurisdiction benefited from proposed project or project's potential to provide economic benefits:

10. Estimated amount of time to implement proposed project:

11. Party responsible for implementing proposed project:

12. Potential environmental impacts of proposed project:

13. Additional comments or information not inquired for above:

Please return project information to:

Emergency Preparedness Division,

Jacksonville Fire and Rescue Department

515 North Julia St., Suite 400, Jacksonville, FL 32202

Hazard Abbreviation Key:

ACC

CA	Cyber Attack
CBRNE	Chemical, Biological, Radiological, Nuclear, and Explosives
CID	Critical Infrastructure Disruption
D	Drought
ED	Environmental Degradation, Coastal Erosion, Saltwater Intrusion
EH	Extreme Heat
F	Flooding
FT	Freezing Temperature
HAZMAT	Hazardous Materials
ID	Infectious Disease-Human-Animal
SLR	Sea Level Rise
SS	Tropical Cyclone Storm Surge
SW	Severe Weather Thunderstorms Tornadoes Hall
T	Tornado
TTV	Terrorism Targeted Violence Active Shooter Bombing Bio-Chem-Attacks
W	Tropical Cyclone Wind
WF	Wildfire
WS	Winter Storm

Table 51: Duval County LMS Project List

See https://www.jaxready.com/Mitigation/Local-Mitigation-Strategy for current list of Mitigation Initiatives

Duval County Completed, Deleted, and Deferred Projects Summary

Progress toward the completion of Mitigation Current Initiatives has been made in the following areas:

Hurricane risk shelter capacity increased in the COJ to offset the hurricane flood, storm surge, and wind hazard vulnerability. More than 12,000 hurricane risk shelter spaces have been added since 2007 in the COJ to offset a hurricane shelter capacity deficit as recorded by the State of Florida DEM. Through FEMA post-disaster funding in the HMGP, CDBG funds and other COJ and DCPS funding sources, DCPS has hardened new construction, and retrofitted existing schools outside of established evacuation zones, to increase COJ's resiliency in disaster in sheltering our most vulnerable citizens. New shelter partners are emerging with one shelter construction project at the Florida State College at Jacksonville (FSCJ) and the construction of a COJ Parks and Recreation Department Center, the Legends, in an area of COJ with a high percentage of vulnerable population. The COJ has adequate shelter capacity.

Critical infrastructure through JRPD Fire Stations and COJ, and COJB, successfully shuttered critical buildings to minimize hazards from wind. JEA continues to make progress in burying underground electrical lines, where feasible. Through mitigation grant funding, the JFRD has successfully funded the wind retrofitting of all fire stations in the City, and installed emergency generators at every fire station in the City.

Stormwater Improvements have been commissioned at COJB, COAB, CONB, JEA, and TOB, to improve stormwater runoff conditions and minimize drainage issues from flooding and storm surge hazards. More than 95% of the COAB's drainage system has been replaced through effective use of HMGP Tier I funding after the disaster declarations of Tropical Storm Fay in 2008 and Tropical Storm Debby in 2012.

Over nearly two decades, COJ has successfully worked with the FDEM, the FEMA and the NFIP to mitigate flooding hazards through the acquisition, elevation or relocation mitigation alternative. Utilizing such programs as the FMA Program , Repetitive Flood Claims (RFC) and SRL, COJ has completed numerous projects across different mitigation alternatives, including standard elevations, minor flood control, acquisition and demolition of structures and one code-plus fire station mitigation project.

Previously approved projects by the SEPPC that have been "Deferred" are permitted to be re-incorporated into the main project list upon request. As the LMS is updated on a 5-year cycle and project lists are updated quarterly, the living list of mitigation initiative projects is maintained separately by the COJ EPD and available upon request. See Appendix E: Completed Project List, Appendix F: Deferred Project List, and Appendix G: Deleted Project List for a comprehensive list.

Section V

Funding Sources

SECTION V - FUNDING SOURCES

The Potential Funding Sources below can be used for hazard mitigation projects. This section includes the name of the grant, sponsoring agency, type of assistance available, and any eligibility requirements. The below list will be amended as new and updated information becomes available for State and Federal agencies that provide funds for local programs that may be used to support implementation of the LMS Goals and Objectives. The following list outlines the detailed table, which is not exhaustive. Therefore, more existing opportunities may be included with each scheduled update of the LMS. Communities in Duval County should be able to apply for many of the below funding opportunities:

1. Beach Management Funding Assistance (BMFA) Program
2. Florida Coastal Management Program
3. FDEM - EMPA Competitive Grant Program
4. Florida Forever
5. Florida League of Cities online resource book
6. Florida Fish and Wildlife Conservation Commission
7. Florida Inland Navigation District; Waterway Assistance Program & Cooperative Assistance Program (CAP)
8. FDEP; Florida Communities Trust
9. Flood Mitigation Assistance Program (FMA)
10. Assistance to Firefighters Grant Program
11. Hospital Preparedness Program
12. FEMA National Flood Insurance Program (NFIP)
13. Hazard Mitigation Grant Program (HMGP)
14. Pre-Disaster Mitigation Program (PDM)
15. FEMA's Homeland Security Grant Program
16. Homeland Security Preparedness (Non-Disaster) Grants and other federal grants
17. Federal grant programs
18. Beta.SAM.gov; Formally called the Catalog of Federal Domestic Assistance
19. Partners for Fish & Wildlife program
20. Economic Development Administration
21. Economic Adjustment Assistance Program
22. Federal Transit Administration (FTA) Grant Programs
23. FTA Urbanized Area Formula Program (5307)
24. HUD Community Development Block Grant (CDBG) Entitlement Program
25. U.S. Bureau of Land Management (BLM)
26. BLM; Land and Water Conservation Fund
27. HUD Community Development Block Grant Disaster Recovery Program (CDBG-DR)
28. HUD HOME Investment Partnerships Program
29. Partners for Fish and Wildlife program
30. Tax Incentives for Preserving Historic Properties
31. Payments in Lieu of Taxes
32. USACE Aquatic Ecosystem Restoration
33. USACE Flood Plain Management Services
34. USACE Emergency Streambank and Shoreline Protection
35. Natural Resources Conservation Service; Emergency Watershed Protection Program
36. Natural Resources Conservation Service, Watershed and Flood Prevention Operations Programs
37. Natural Resources Conservation Service; Watershed Rehabilitation
38. U.S. Department of Agriculture's Rural Development
39. U.S. Department of Agriculture's Water & Waste Disposal Loan/Grant Program
40. Rivers, Trails and Conservation Assistance Program
41. Citizen Corps
42. Firehouse Subs
43. FDEP Clean Water State Revolving Fund (CWSRF) Program

Table 52: Potential Mitigation Funding Sources

Funding Source	Purpose	Contact	Application Cycle
1. Beach Management Funding Assistance (BMFA) Program	The Beach Management Funding Assistance Program (BMFA) works in concert with local sponsors to achieve protection, preservation, restoration and nourishment of the sandy beaches fronting the Atlantic Ocean, the Gulf of Mexico and the Straits of Florida, and for the management of inlets to replicate the natural drift of sand interrupted by improved, modified or altered inlets. State funding is requested annually through a local government funding request application process. The BMFA is tasked with executing funding assistance agreements for eligible feasibility, design, construction and monitoring tasks once appropriations are made by the Legislature.	Northeast District 8800 Baymeadows Way W. Suite 100 Jacksonville, Florida 32256 (904) 256-1700	Annually
2. Florida Coastal Management Program	The Florida Coastal Management Program makes funds available as pass-through grants to state agencies, water management districts and local coastal governments for priority projects that protect coastal resources and communities. In some cases, public colleges and universities, regional planning councils, national estuary programs and nonprofit groups may be eligible for grants in partnership with eligible applicants.	DEP 3900 Commonwealth Blvd. Tallahassee, Florida 32399 (850) 245-2094	Annually
3. FDEM - EMPA Competitive Grant Program	This Competitive Grant Program provides several grant programs that fund counties to implement and administer county emergency management programs including management and administration, training and operations.	FDEM 2555 Shumard Oak Blvd Tallahassee, Florida 32399 (850) 815-4000	Varies by grant
4. Florida Forever	Florida Forever is a conservation and recreation lands acquisition program. This blueprint for conserving natural resources and renewing commitment to conserve the state's natural and cultural heritage. Florida Forever replaces Preservation 2000 (P2000), the largest public land acquisition program of its kind in the U.S. With approximately 10 million acres managed for conservation in Florida, more than 2.5 million acres were purchased under the Florida Forever and P2000 programs.	Division of State Lands MS 100 Tallahassee, FL 32399 (850)-245-2555	Bi-annually in April and October
5. Florida League of Cities online resource book	Florida League of Cities, Inc., Financial and Technical Assistance for Florida Municipalities contain information on grants, loans, technical assistance and other resources available to Florida municipalities.	Carol Westmoreland (800) 342-8112	Varies by grant
6. Florida Fish and Wildlife Conservation Commission	Various projects and grants available to restore and protect wildlife management area including coastal habitats. Grants also available for boating infrastructure and abandoned vessel removal.	Shannon Wright, Regional Director 1239 SW 10th St. Ocala, FL 34471 (352) 732-1225	Based on available funding.

Funding Source	Purpose	Contact	Application Cycle
7. Florida Inland Navigation District; Waterway Assistance Program & Cooperative Assistance Program (CAP)	Waterway Assistance Program and CAP are grant programs established for the purpose of financially cooperating with local governments to alleviate problems associated with the Atlantic ICW and associated district waterways within the district. The district provides up to 75% for public navigation projects, while all other project categories are eligible for up to 50% funding assistance. Annually the District allocates approximately $10-$14 million dollars for the program.	Florida Inland Navigation District 1314 Marcinski Rd. Jupiter, Florida 33477 (561) 627-3386	Varies by grant
8. FDEP; Florida Communities Trust	This trust assists communities in protecting important natural resources, providing recreational opportunities and preserving Florida's traditional working waterfronts through the competitive criteria in the Parks and Open Space Florida Forever Grant Program and the Stan Mayfield Working Waterfronts Florida Forever Grant Program. These local land acquisition grant programs provide funding to local governments and eligible nonprofit organizations to acquire land for parks, open space, greenways and projects supporting Florida's seafood harvesting and aquaculture industries. The source of funding for the trust comes from Florida Forever proceeds.	Linda Reeves, Manager (850) 245-2501	Varies by grant
9. Flood Mitigation; Assistance Program (FMA)	The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended with the goal of reducing or eliminating claims under the NFIP. FMA provides funding to states, territories, federally recognized tribes and local communities for projects and planning that reduces or eliminates long-term risk of flood damage to structures insured under the NFIP. FMA funding is also available for management costs.	FEMA Regional Office 3003 Chamblee Tucker Rd. Atlanta, GA 30341 (770) 220-5200	See Funding Opportunity Announcement on www.grants.gov
10. Assistance to Firefighters Grant Program	This page contains links to the Assistance to Firefighters Grants programs: Assistance to Firefighters Grants, Fire Prevention & Safety, and Staffing for Adequate Fire and Emergency Response. The intended audiences are AFG stakeholders, which include but are not limited to, award recipients and the communities they serve.	See website for assistance	Closed
11. Hospital Preparedness Program	Provides leadership and funding through grants and cooperative agreements to States, territories, and eligible municipalities to improve surge capacity and enhance community and hospital preparedness for public health emergencies	U.S. HHS Assistant Secretary Preparedness & Response 200 Independence Ave., S.W. Rm 638G Washington, D.C. 20201	Varies by grant

Funding Source	Purpose	Contact	Application Cycle
12. FEMA National Flood Insurance Program (NFIP)	The NFIP aims to reduce the impact of flooding on private and public structures. It does so by providing affordable insurance to property owners, renters and businesses and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improved structures. Overall, the program reduces the socio-economic impact of disasters by promoting the purchase and retention of general risk insurance, but also of flood insurance, specifically.	The NFIP Help Center (can answer general inquiries about flood insurance) (800) 427-4661	
13. Hazard Mitigation Grant Program (HMGP)	FEMA offers a variety of disaster assistance programs with different eligibility requirements. HMGP provides funds to states, tribes, and local communities after a disaster declaration to protect public or private property through various mitigation measures. Hazard mitigation includes long-term efforts to reduce the impact of future events. HMGP have the primary responsibility for prioritizing, selecting, and administering state and local hazard mitigation projects. Although individuals may not apply directly to the state for assistance, local governments may sponsor an application on their behalf.	FEMA Regional Office 3003 Chamblee Tucker Rd. Atlanta, GA 30341 (770) 220-5200	See Funding Opportunity Announcement on www.grants.gov
14. Pre-Disaster Mitigation Program (PDM)	This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. Mitigation planning is a key process used to break the cycle of disaster damage, reconstruction, and repeated damage. PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis.	FEMA Regional Office 3003 Chamblee Tucker Rd. Atlanta, GA 30341 (770) 220-5200	See Funding Opportunity Announcement on www.grants.gov
15. FEMA's Homeland Security Grant Program	The Homeland Security Grant Program plays an important role in the implementation of the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient nation. The Homeland Security Grant Program is comprised of three grant programs: State Homeland Security Program, Urban Area Security Initiative and Operation Stone Garden. Together, these grant programs fund a range of preparedness activities, including planning, organization, equipment purchase, training, exercises, and management and administration across all core capabilities and mission areas.	FEMA, U.S. DHS 500 C St. SW, Washington, DC 20472 (202) 646-2500	Varies by grant
16. Homeland Security Preparedness (Non-Disaster) Grants and other federal grants	DHS distributes grant funds to enhance the ability of regional authorities to prepare, prevent and respond to terrorist attacks and other disasters. Localities use grants for planning, equipment, training and exercise needs.	Visit https://www.dhs.gov/how-do-i/find-and-apply-grants for contact information	Varies by grant
17. Federal grant programs	There are many types of organizations generally eligible to apply for funding opportunities including but not limited to state, county, city or township and Special district governments.	Varies by agency	Varies by grant

Funding Source	Purpose	Contact	Application Cycle
18. Beta.SAM.gov; Formally called the Catalog of Federal Domestic Assistance	The Catalog of Federal Domestic Assistance is a compendium of assistance programs offered by various U.S. government agencies to the American public. Many of the U.S. federal government's 72 agencies and departments offer grants, loans, scholarships, property, counseling, and other kinds of assistance within the U.S. Recipients include individuals, state and local governments (including the District of Columbia), federally recognized Native American tribal governments, companies, and non-profit organizations.	(866) 606-8220	Varies by grant
19. Partners for Fish & Wildlife program	One of the primary roles of the U.S. Fish and Wildlife Service is managing federal funds and distributing them to projects that offer the greatest benefits to wildlife and habitats. Every year, more than half of the Service's annual budget in the Southeast Region is reserved for grants for broad conservation objectives.	All grant opportunities are posted on Grants.gov.	Varies by grant
20. Economic Development Administration	EDA's role in disaster recovery is to facilitate the timely and effective delivery of federal economic development assistance to support long-term community economic recovery planning and project implementation, redevelopment and resiliency. EDA is uniquely positioned to coordinate regional disaster recovery efforts in partnership with its extensive network of Economic Development Districts (EDDs), University Centers, institutions of higher education and other partners in designated impact areas.	401 W Peachtree St., NW Ste. 1820 Atlanta, GA 30308 (404) 730-3023	Applications will be accepted on an ongoing basis until the publication of a new PWEAA NOFO.
21. Economic Adjustment Assistance Program	The program provides a wide range of technical, planning, and public works and infrastructure assistance in regions experiencing adverse economic changes that may occur suddenly or over time. These adverse economic impacts may result from a steep decline in manufacturing employment following a plant closure, changing trade patterns, catastrophic natural disaster, a military base closure, or environmental changes and regulations.	H. Philip Paradice, Jr., Regional Director 401 W Peachtree St, Ste 1820 Atlanta, GA 30308 (404) 730-3002 hparadice@eda.gov	Annually
22. Federal Transit Administration (FTA) Grant Programs	The FTA provides financial and technical assistance to local public transit systems, including buses, subways, light rail, commuter rail, trolleys and ferries. FTA also oversees safety measures and helps develop next-generation technology research.	FTA Region 4 Office 230 Peachtree, NW Suite 1400 Atlanta, GA 30303 (404) 865-5600	Varies by grant
23. FTA Urbanized Area Formula Program (5307)	The Urbanized Area Formula Funding Program (49 U.S.C. 5307) makes federal resources available to urbanized areas and to governors for transit capital and operating assistance in urbanized areas and for transportation-related planning. An urbanized area is an incorporated area with a population of 50,000 or more that is designated as such by the U.S. Department of Commerce, Bureau of the Census.	FTA Region 4 Office 230 Peachtree, NW Suite 800 Atlanta, GA 30303 (404) 865-5600	Funds are available the year appropriated plus 5 years.

Funding Source	Purpose	Contact	Application Cycle
24. HUD Community Development Block Grant (CDBG) Entitlement Program	The CDBG Entitlement Program provides annual grants on a formula basis to entitled cities and counties to develop viable urban communities by providing decent housing and a suitable living environment, and by expanding economic opportunities, principally for low- and moderate-income persons. The program is authorized under Title 1 of the Housing and Community Development Act of 1974, Public Law 93-383, as amended; 42 U.S.C.-5301 et seq.	HUD Jacksonville Field Office 400 W Bay St. #1015, Jacksonville, FL 32202 (904) 232-1777	Annually
25. U.S. Bureau of Land Management (BLM)	The BLM may purchase or acquire land and interests in land, including access easements, conservation easements, mineral rights, and water rights, if funding is available, acquisition is supported in a land use plan, and there are no title defects, hazardous materials, or other mitigating local issues.	Eastern States State Office 20 M St. SE, Suite 950 Washington, DC 20003 (202) 912-7700	
26. BLM; Land and Water Conservation Fund	The Land and Water Conservation Fund Federal program supports the protection of federal public lands and waters – including national parks, forests, wildlife refuges, and recreation areas – and voluntary conservation on private land. Land and Water Conservation Fund investments secure public access, improve recreational opportunities, and preserve ecosystem benefits for local communities.	Eastern States State Office 20 M St. SE, Suite 950 Washington, DC 20003 (202) 912-7700	
27. HUD Community Development Block Grant Disaster Recovery Program; (CDBG-DR)	HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations. In response to Presidentially declared disasters, Congress may appropriate additional funding for the CDBG-DR grants to rebuild the affected areas and provide crucial seed money to start the recovery process. Since CDBG-DR assistance may fund a broad range of recovery activities, HUD can help communities and neighborhoods that otherwise might not recover due to limited resources.	HUD COJ Field Office 400 W Bay St. #1015, Jacksonville, FL 32202 (904) 232-1777	Post-Disaster
28. HUD HOME Investment Partnerships Program	HOME provides formula grants to States and localities that communities use - often in partnership with local nonprofit groups - to fund a wide range of activities including building, buying, and/or rehabilitating affordable housing for rent or homeownership or providing direct rental assistance to low-income people. This is the largest Federal block grant to state and local governments designed exclusively to create affordable housing for low-income households.	HUD COJ Field Office 400 W Bay St #1015, Jacksonville, FL 32202 (904) 232-1777	Annually
29. Partners for Fish and Wildlife program	Restores, improves, and protects fish and wildlife habitat on private lands through alliances between the U.S. Fish and Wildlife Service, other organizations, and individuals, while leaving the land in private ownership.	U.S. Fish and Wildlife Service 1875 Century Blvd. Atlanta, Georgia 30345 (404) 679-7138	

Funding Source	Purpose	Contact	Application Cycle
30. Tax Incentives for Preserving Historic Properties	The Federal Historic Preservation Tax Incentives program encourages private sector investment in the rehabilitation and re-use of historic buildings.	Division of Historical Resources 500 South Bronough St. Room 305 Tallahassee, FL 32399-0250 (850) 245-6300	
31. Payments in Lieu of Taxes	Payments help local governments carry out such vital services as firefighting and police protection, construction of public schools and roads, and search-and-rescue operations. The payments are made annually for tax-exempt federal lands administered by the Bureau of Land Management (BLM), the National Park Service, the U.S. Fish and Wildlife Service, the U.S. Forest Service, and for Federal water projects and some military installations. Payments in Lieu of Taxes are one of the ways the Federal Government can fulfill its role of supporting local communities.		
32. USACE Aquatic Ecosystem Restoration	The Corps of Engineers can carry out aquatic ecosystem restoration and protection projects. Such projects generally include manipulation of the hydrology in and along bodies of water, including wetlands and riparian areas. A project is adopted for construction only after a detailed investigation determines that the project will improve the quality of the environment and is in the best interest of the public.	Section 206 project requests should be directed to: (309) 794-5704 customeroutreach@usace.army.mil	
33. USACE Flood Plain Management Services	Under the authority provided by Section 206 of the 1960 Flood Control Act (PL 86-645), as amended, the Corps of Engineers can provide the full range of technical services and planning guidance that is needed to support effective flood plain management. General technical assistance efforts under this program includes determining site-specific data on obstructions to flood flows, flood formation, and timing; flood depths, stages or floodwater velocities; the extent, duration, and frequency of flooding; information on natural and cultural flood plain resources; and flood loss potentials before and after the use of flood plain management measures. Types of studies have been conducted under the FPMS program include flood plain delineation and hazard, dam failure analyses, hurricane evacuation, flood warning, floodway, flood damage reduction, stormwater management, flood proofing, and inventories of flood prone structures.	Brian Balukonis, Flood Risk Management Program Manager (978) 318-8643.	
34. USACE Emergency Streambank and Shoreline Protection	The Corps of Engineers is authorized to construct bank protection works to protect vital public facilities that are being threatened by streambank and shore erosion. Some examples of the types of infrastructure that are eligible for protection are public buildings, roads, sewerage treatment plants, public utilities, non-profit schools and hospitals, bridges, etc. Private property, infrastructure and facilities, or vacant lands are NOT eligible for protection under this authority. In addition, the erosion protection must be more cost effective than relocating the facility.	U.S. Army Corps of Engineers, Nashville District 110 9th Ave. South Room A405 Nashville, TN 37203 (615) 736-7865 CELRN-Customer-Outreach@usace.army.mil	

Funding Source	Purpose	Contact	Application Cycle
35. Natural Resources Conservation Service; Emergency Watershed Protection Program	The program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences. The Emergency Watershed Protection is an emergency recovery program. All projects undertaken, with the exception of the purchase of floodplain easements, must have a project sponsor.	Fred Reaves, National Emergency Watershed Protection Program Manager (202) 690-0793.	Annually
36. Natural Resources Conservation Service; Watershed and Flood Prevention Operations Programs	This program provides for cooperation between the Federal government and the states and their political subdivisions to work together to prevent erosion; floodwater and sediment damage; to further the conservation development, use and disposal of water; and to further the conservation and proper use of land in authorized watersheds.	Kevin Farmer @wdc.usda.gov (202) 720-3413.	Annually
37. Natural Resources Conservation Service; Watershed Rehabilitation	The Watershed Rehabilitation Program helps project sponsors rehabilitate aging dams that are reaching the end of their 50-year design lives. This rehabilitation addresses critical public health and safety concerns. Since 1948, the Natural Resources Conservation Service has assisted local sponsors in constructing more than 11,800 dams.	jesse.wilson@wdc.usda.gov (202) 720-0189	
38. U.S. Department of Agriculture's; Rural Development	The Section 504 Home Repair program provides loans to very-low-income homeowners to repair improve or modernize their homes or grants to elderly very-low-income homeowners to remove health and safety hazards.	Director, Daryl L. Cooper Single Family Housing (352) 338-3436 daryl.cooper@fl.usda.gov	Applications are accepted through local RD office year-round
39. U.S. Department of Agriculture's Water & Waste Disposal Loan/Grant Program	The Water & Waste Disposal Loan & Grant Program provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and stormwater drainage to households and businesses in eligible rural areas.	Philip Leary, 4440 NW 25th Place Gainesville, FL 32606 (352) 338-3400	Applications are accepted through local RD office year-round

Funding Source	Purpose	Contact	Application Cycle
40. Rivers, Trails and Conservation Assistance Program	The National Park Service Rivers, Trails, and Conservation Assistance program supports community-led natural resource conservation and outdoor recreation projects across the nation. A national network of conservation and recreation planning professional partners with community groups, nonprofits, tribes, and state and local governments to design trails and parks, conserve and improve access to rivers, protect special places, and create recreation opportunities.	Deirdre Hewitt, Program Manager ser_rtca@nps.gov	Varies by Grant Program
41. Citizen Corps	The mission of Citizen Corps is to harness the power of every individual through education, training, and volunteer service to make communities safer, stronger, and better prepared to respond to the threats of terrorism, crime, public health issues, and disasters of all kinds through: 1. Preparing the public for local risks with targeted outreach 2. Engaging voluntary organizations to help augment resources for public safety, preparedness and response capabilities 3. Integrating the whole community and integrates nontraditional resources to ensure disaster preparedness.		Available all year
42. Firehouse Subs	Firehouse Subs Public Safety Foundation is dedicated to improving the life-saving capabilities of first responders and public safety organizations in communities served by Firehouse Subs by providing funding, resources and support.	Firehouse Subs Public Safety Foundation, Inc. 12735 Gran Bay Pkwy, Ste 150, Jacksonville, Florida, 32258 (904) 886-8300	Varies
43. FDEP Clean Water State Revolving Fund (CWSRF) Program	The CWSRF program provides low-interest loans for planning, designing and constructing water pollution control facilities under Chapter 62-503, F.A.C. The department receives requests for funding throughout the year for wastewater, stormwater, and certain energy and other types of projects. The information gathered in the request is used to establish project priorities for listing projects in order of priority for funding at the beginning of each fiscal year and each quarter, thereafter, as funds are available.	3900 Commonwealth Blvd MS 3505 Tallahassee, FL 32399 (850) 245-2835 SRF_Reporting@dep.state.fl.us	

Section VI

Appendix

Appendix A: 2025 LMS Update Schedule

Critical Milestones

Table A: LMS Critical Update Milestones

Critical Plan Update Milestones		
Date	**2025 LMS Update Activity**	**Participation**
July 12, 2023	Regional THIRA/SPR is completed.	UAWG working group and 16 subject matter expert groups.
December 2023	Regional THIRA/SPR is validated by FEMA.	FEMA/ EPD
January 23, 2024	LMS Working Group (SEPPC) meets for an update on the LMS review process.	LMS Working Group
March 6, 2024	LMS Advisory Group meets for a maintenance update and assigns roles within the Risk Assessment Subcommittee	LMS Advisory Group
August 12, 2024	Update regarding LMS revision efforts. Validated the hazards identified in the 2020 LMS to carry forward into the 2025 LMS. Review of other potential hazards to incorporate. Identified preliminary methods to solicit public feedback.	LMS Risk Assessment Subcommittee
October 24, 2024	LMS Working Group (SEPPC) was briefed on recent revisions to the hazard tables based on updated risk assessments. Confirmed plan review process and timeline. Highlighted the top hazards of concern and explained how these considerations were validated using updated research. The current draft of the LMS (officially Draft #1) was provided to the SEPPC and a method to provide comments was provided.	LMS Working Group
November 19, 2024	Review of LMS Guiding Principles, Goals, Objectives, Policies Ordinances, Programs, Updates to NFIP Participation and information.	LMS Risk Assessment Subcommittee
December 17, 2024	Validation of LMS Guiding Principles, Goals, Objectives, Policies Ordinances, Programs.	LMS Advisory Group
February 20, 2025	Presentation of updated LMS for 2025 Cycle, incorporating all revisions proposed by Advisory Group & Risk Assessment Subcommittee.	LMS Working Group

Timeline Narrative for LMS Update Process, Inception to Current

The requirements of the Disaster Mitigation Act of 2000 imposed significant plan revisions many of which concerned the need to better integrate mitigation policy into other local land-use related plans. Consistent with the established evaluation and revision procedures, the Advisory Committee updated plans. These planning efforts included expanding the list of people and organizations invited to participate, expanding the list of participants actively encouraged to participate, and revising portions of the LMS that did not meet requirements set by the Disaster Mitigation Act of 2000.

On March 27, 2003, the Advisory Committee met to review the requirements of the Disaster Mitigation Act of 2000 and discuss any necessary revisions to the LMS. In addition, they reviewed and updated the goals. The Regional Council then began drafting the necessary revisions. The Committee met again on July 17, 2003, September 18, 2003, and January 9, 2004, to review and update the hazards analysis, the maps of the vulnerable areas and the projects list. In each case, the necessary revisions were made by the Regional Council staff and presented at the next meeting of the Committee. All of these meetings were public meetings and noticed on a public notice board in each municipal City Hall as standard procedure. Unfortunately, public attendance was usually low at these meetings but increased through additional efforts as described in section C below. At the meeting on February 16, 2004, the final draft was reviewed, approved and forwarded for state and FEMA review. On July 16, 2004, the Committee received a letter with the joint state/FEMA final comments.

The revisions were made by Council staff and the revised plan was placed on both the Council and Duval Prepares websites to facilitate public input and to allow Council members a final comment period without the need for a general meeting over very minor change. No comments were received, and the corrected final draft was again forwarded to the state and FEMA for review. The Committee continued to use this approach in conjunction with planning and informational workshops to gain public input.

A final copy of the LMS was presented to all participating jurisdictions to the COJ City Council, COAB City Commission, TOB Town Council, COJB City Council, and the CONB City Council for their approval and adoption. There have been no changes to the jurisdictions participating in this process.

The LMS was subsequently reapproved in 2010 after a process of review and validation by the Duval Prepares Advisory Committee and public hearings regarding the update process. The 2010 LMS was subsequently approved by the City of Council of COJ, the City Commissions of the COAB, COJB, CONB, and the TOB. There were no changes to the jurisdictions and the hazards were evaluated to be at the same level of risk as in the 2005 LMS update. As a new directive from FEMA, extensive mapping of the vulnerabilities of the county to its major hazards and the impacts to its building values was incorporated into the LMS.

In January 2014, the Duval Prepares partners kicked off the planning cycle for the five-year update of the 2015 LMS. Concurrently, the LMS Working Group membership received notification from the Director of Emergency Preparedness for the COJ that the mitigation planning update process is in progress, inclusive of an HIVA. All members and stakeholders were invited to participate in the process to (1) identify and confirm the hazard identification and the supporting vulnerability analysis and to (2) participate and support the decision-making process and adoption of projects for the 2015 update, while reporting on the status of completed, deferred, or deleted projects.

To ensure the development of a functional document that will facilitate hazard mitigation activities in Duval County , the LMS Advisory Committee members who are subject matter experts, and representatives of the jurisdictions within the COJ, conducted an all-county HIVA which considered natural and man-made/technological hazards, and their impacts, which could be reduced or eliminated through mitigation. This assessment built upon the initial LMS adopted in 1998 and ratified in the subsequent 2005 and 2010 updates. This comprehensive process provides a pre-disaster analysis for post-disaster planning and recovery by identifying all local hazards and hazard areas, defining all areas of vulnerability - both geographic and demographic - and assessing the capacity of the community to mitigate the effects of those hazards. In addition, this assessment addresses the probability of occurrence of each hazard.

Duval Prepares, the LMS Advisory Committee, affirmed the hazards listed below as priorities for the 2015 LMS Update. One new hazard, “Adaptation to Climate Change”, was identified in the findings in scientific literature, the State of Florida Enhanced Hazard Mitigation Plan which addresses this issue, and forthcoming work in the resilience arena.

In 2020, plan updates followed the guidelines established during previous update cycles of the plans and relied heavily on the guidance of the Risk Assessment Subcommittee. The revision focused heavily on aligning the goals and objectives to the shifting political and cultural environment that resulted from recent hurricane seasons in Florida. The HIVA was expanded to incorporate and formally include technological and manmade hazards such as critical infrastructure disruption, hazardous material incidents, terrorism and targeted violence, and cyberattacks. Climate change was incorporated as a factor of the risk assessment and each individual hazard was evaluated with regard to the potential effects of climate change. The previous “Adaptation to Climate Change” hazard was subsequently analyzed in the context of individual hazards rather than a standalone hazard. Sea Level Rise was added as a natural hazard to allow for dedicated analysis of this facet of climate change. Subject matter experts within law enforcement and homeland security were consulted regarding the hazard and vulnerability analysis for technological and man-made hazards.

The most recent five-year update of the LMS for the 2025 cycle emphasized the need to provide better access to source material and datasets used to develop the plan goals and objectives and to conduct the hazard analysis. The plan was updated with a table that provides direct references to the language transcribed from local plans and ordinances, with both hyperlinks to the original documents and direct excerpts from those documents. The 2025 update considered the findings and determinations of the Resilient Jacksonville strategy, published by the Jacksonville Office of Resilience in 2023, and the first Threat Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) formally conducted by the Jacksonville Metropolitan Statistical Area in 2023. Both of these documents provided critical subject matter expertise that contributed towards validating the risk assessment component of the LMS.

Resilient Jacksonville provides a roadmap for adapting to a changing climate, accommodating a growing population, guiding new urban development, and planning for uncertain shocks and stressors. The Strategy builds on many recent efforts in the wake of Hurricanes Matthew and Irma and leverages local expertise with science-based assessments to identify specific, implementable actions and prioritize investments that will strengthen the city’s resilience. The THIRA/SPR drew upon sixteen groups of subject matter experts to evaluate not only the risk attributed to natural, man-made, and technological hazards, but also assessed the capabilities of local agencies to prepare and respond appropriately. Future updates of the LMS will be strategically aligned with the THIRA/SPR in order to reduce duplication of effort and efficiently utilize planning local resources.

Appendix B: Adaptation Action Area (AAA) Working Group Findings

Pursuant to Section 163.3177(6)(g)(10) Florida Statutes, the City has adopted an AAA designation that is based on a medium range impact of a two-foot rise in sea level by 2060. The AAA is a policy tool that facilitates consideration of the potential for impacts related to sea level rise, designates vulnerable areas, and prioritizes adaptation strategies as deemed appropriate. An AAA Working Group has been established to review existing City programs and policies in relation to the AAA and to determine the need and appropriate timing for additional and financially feasible responses to the effects of coastal flooding within the AAA.

2030 COMP Plan – Conservation and Coastal Management Element

Objective 11.5

The City has established an AAA and shall consider appropriate responses to address current and future risks related to the associated impacts of sea-level-rise.

Policy 11.5.1

The COJ shall recognize the CHHA identified in Map C-18 as also encompassing the AAA for those low-lying coastal zones that may experience coastal flooding due to extreme high tides and storm surge and are vulnerable to the impacts of rising sea level. (§163.3177(6)(g)(10), F.S.) Land within the AAA is subject to potential high tide inundation under a horizon 2060 two-foot sea level rise scenario.

Policy 11.5.2

The City shall consider the implications of the AAA when reviewing changes to the use, intensity, and density of land lying within the AAA.

Policy 11.5.3

The City shall recognize existing regulations, programs, and policies that overlap with the AAA and that are currently in place to limit public investment and address appropriate development, and redevelopment practices related to flooding. These regulations, programs, and policies include but are not limited to the floodplain management ordinance, CHHA policies, the LMS, and the PDRP and shall only be applied in cases where such regulation would otherwise apply to a development or redevelopment project.

Policy 11.5.4

The COJ shall create a working group to review existing programs and policies in relation to the AAA to determine the need and appropriate timing for additional and financially feasible responses to the effects of coastal flooding within the AAA. The working group shall be established within one year of the effective date of this policy.

AAA Working Group Goal

Evaluate the City's existing programs and policies in relation to the AAA to determine the need and timing, if appropriate, for additional and financially feasible responses to the effects of coastal flooding within the AAA.

AAA Working Group Scope

TASK 1: Identify the Impacts of Coastal Flooding within the AAA

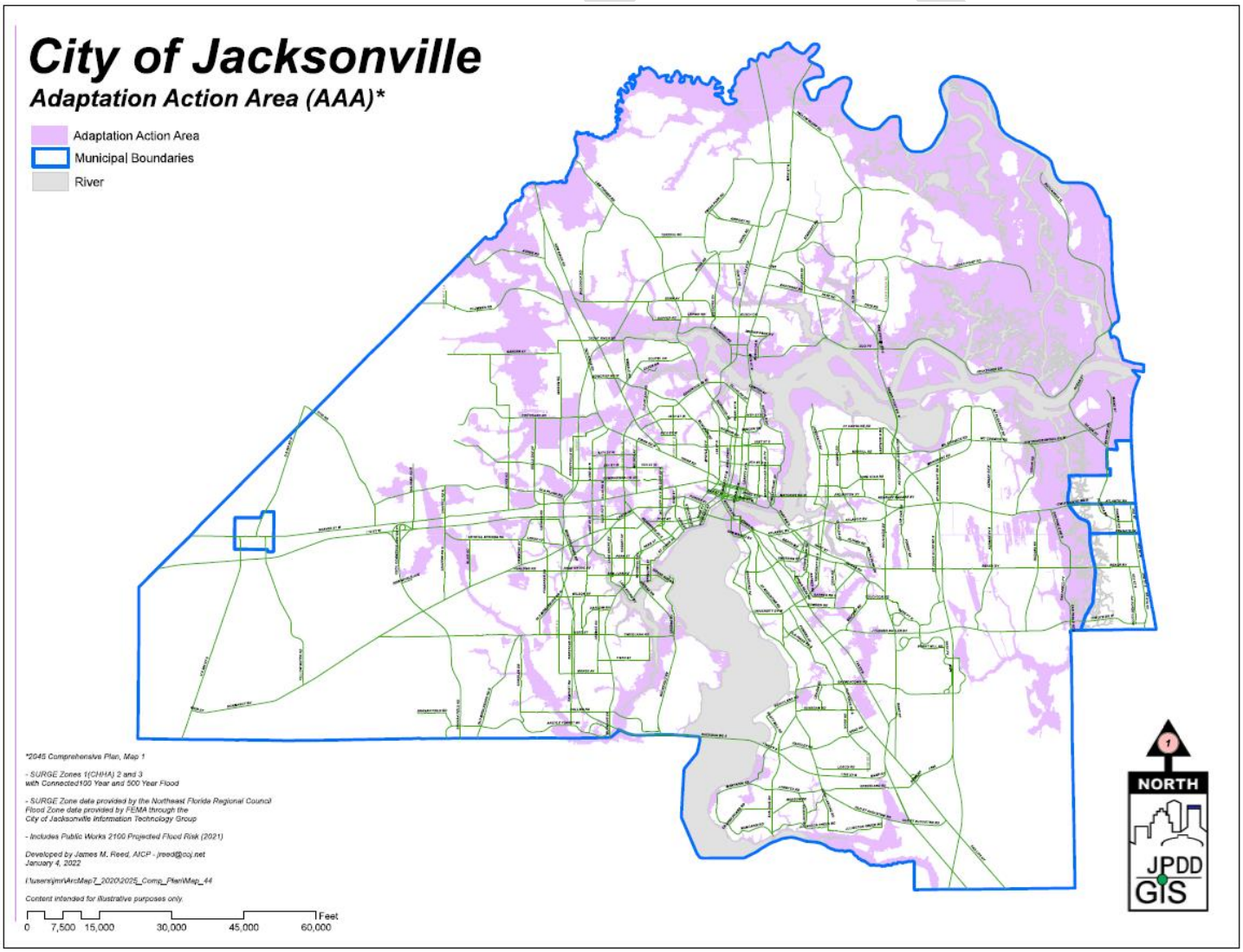
- Define the condition of, and affects resulting from, coastal flooding within the AAA.
    - At a minimum, considerations should include population, critical infrastructure, natural resources, and economic impact.

TASK 2: Evaluate the City's Existing Programs and Policies

- Examine the strengths, weaknesses, and opportunities of the City's existing policies and regulations in relation to the AAA.
    - The review may include, but is not limited to, drainage regulations and infrastructure, flood zone regulations, land use policies, and zoning regulations.

TASK 3: Recommendations

Based on the findings of Task 2, recommend policy and regulatory changes deemed necessary and appropriate to protect private and public investment within the AAA.



Appendix C: Jacksonville Regional THIRA/SPR

THIRA/ SPR Overview, Relationship to Mitigation Planning

Hazard Mitigation Plans and the Threat and Hazard Identification and Risk Assessment (THIRA)/Stakeholder Preparedness Review (SPR) are both critical tools for improving resilience. Both processes assess risks and capabilities for managing risks and potential impacts. While mitigation plans and THIRA/SPRs have distinct purposes, requirements, and outcomes, they share some similar elements.

The Threat and Hazard Identification and Risk Assessment (THIRA) is a three-step risk assessment process that helps communities understand their risks and what they need to do to address those risks by answering the following questions:

- What threats and hazards can affect our community?
- If they occurred, what impacts would those threats and hazards have on our community?
- Based on those impacts, what capabilities should our community have?

The outputs form this process lay the foundation for determining a community's capability gaps as part of the Stakeholder Preparedness Review.

The Stakeholder Preparedness Review (SPR) is a self-assessment of a jurisdiction's current capability levels against the targets identified in the Threat and Hazard Identification and Risk Assessment (THIRA). Using the targets from the THIRA, jurisdictions identify their current capability and how that capability changed over the last year, including capabilities lost, sustained, and built.

Jurisdictions also identify capability gaps related to planning, organization, equipment, training, and exercises, and indicate their intended approaches to address those gaps while also maintaining their current capabilities. In addition, jurisdictions identify how FEMA preparedness grants helped to build or sustain capabilities.

Jacksonville THIRA/SPR Outcomes

THIRA Step 1: Identify Threats and Hazards

Based on experience, forecasting, subject matter expertise, and other available resources, develop list of threats/hazards that could affect the region. When deciding threats/hazards to include in the THIRA, consider only those that challenge at least one core capability more than any other incident. THIRA is not intended to include less challenging threats/hazards

> **Completed:** Based on 46 survey responses from across the region, top threats and hazards identified based on likelihood, impact, and resilience, and validated by regional stakeholders.

THIRA Step 2: Give Threats and Hazards Context

Describe threats/hazards identified in Step 1, showing how they may affect the region and create challenges in performing core capabilities. Identify impacts threat/hazard may have on region. When identifying threats/hazards consider the threats/hazards most reasonably likely to affect the community, and challenges at least one of the 32 core capabilities more than any other threats/hazards.

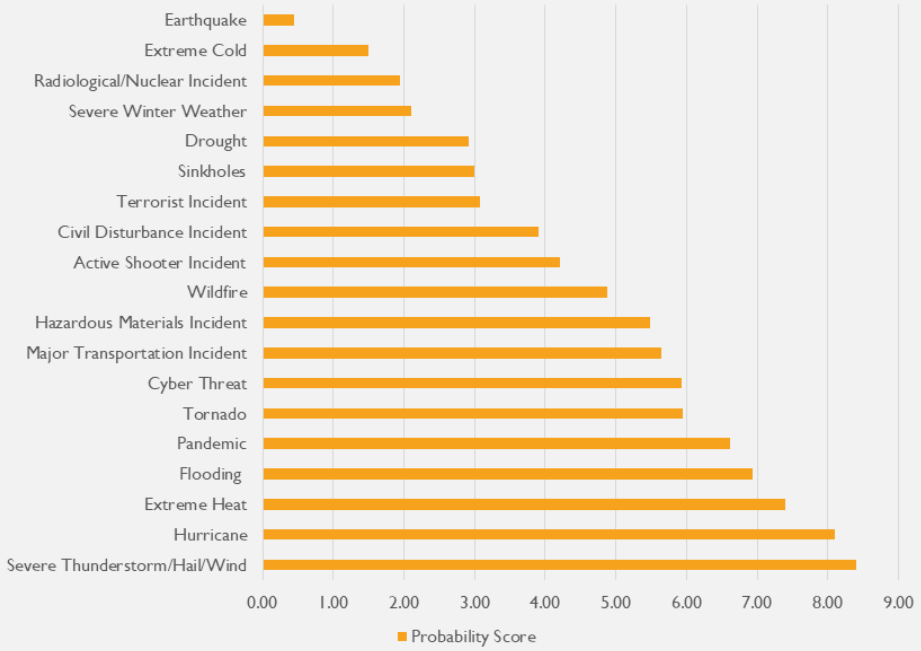
> **Completed:** Top threats and hazards organized into four scenarios:
>
> - Category 5 Hurricane with Flooding and Tornadoes
> - Influenza Pandemic
> - Port-Based Hazardous Materials Incident
> - Cyber/ Radiological Terrorism Incident with Communication Jamming

Using modeling, document review, and research, standardized impacts identified for each scenario and applied to capability targets. Impacts, along with discussion and validation of stakeholders, assisted in identifying scenario that most challenges each capability target and associated core capabilities.

THIRA Step 1 Risk Assessment Scores:

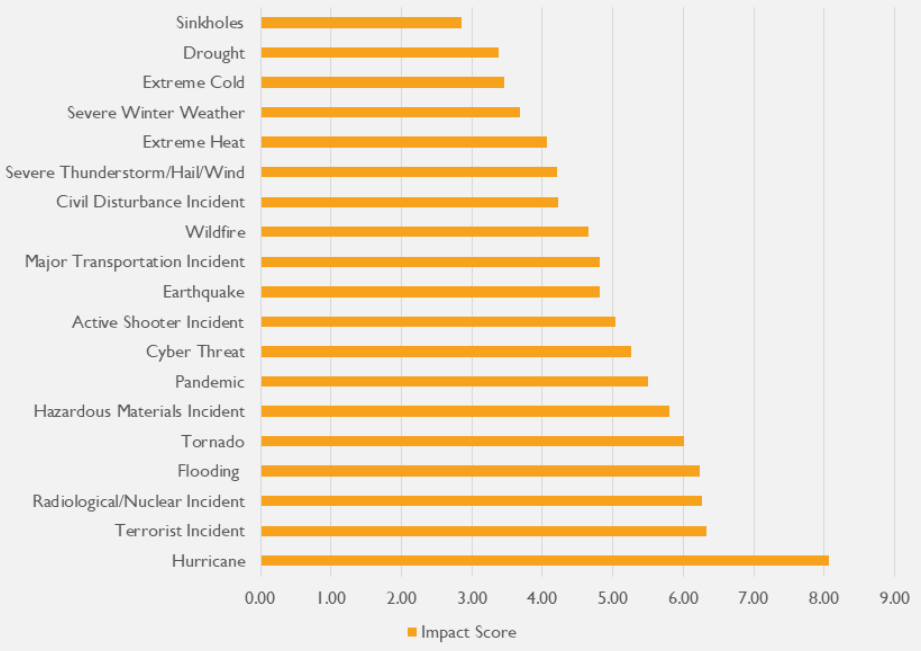
LIKELIHOOD/PROBABILITY RESULTS

Threat/Hazard	Score
Severe Thunderstorm/Hail/Wind	8.41
Hurricane	8.11
Extreme Heat	7.40
Flooding	6.93
Pandemic	6.62
Tornado	5.94
Cyber Threat	5.93
Major Transportation Incident	5.64
Hazardous Materials Incident	5.49
Wildfire	4.87
Active Shooter Incident	4.20
Civil Disturbance Incident	3.90
Terrorist Incident	3.08
Sinkholes	3.00
Drought	2.93
Severe Winter Weather	2.10
Radiological/Nuclear Incident	1.95
Extreme Cold	1.50
Earthquake	0.45



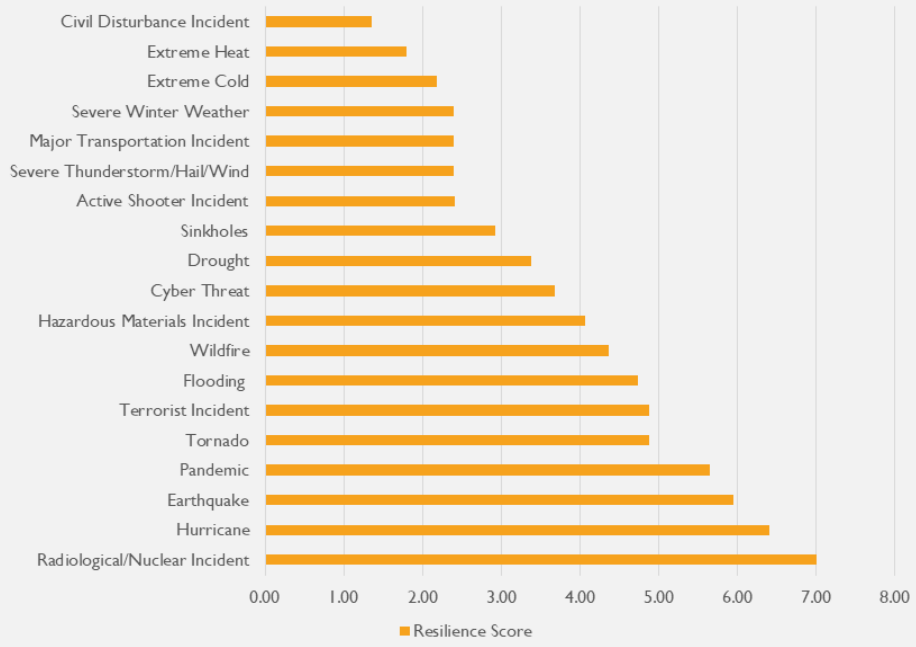
IMPACT/CONSEQUENCE RESULTS

Threat/Hazard	Score
Hurricane	8.08
Terrorist Incident	6.33
Radiological/Nuclear	6.26
Flooding	6.24
Tornado	6.02
Hazardous Materials Incident	5.80
Pandemic	5.49
Cyber Threat	5.27
Active Shooter Incident	5.04
Earthquake	4.82
Major Transportation Incident	4.81
Wildfire	4.66
Civil Disturbance Incident	4.23
Severe Thunderstorm/Hail/Wind	4.20
Extreme Heat	4.06
Severe Winter Weather	3.68
Extreme Cold	3.46
Drought	3.38
Sinkholes	2.85



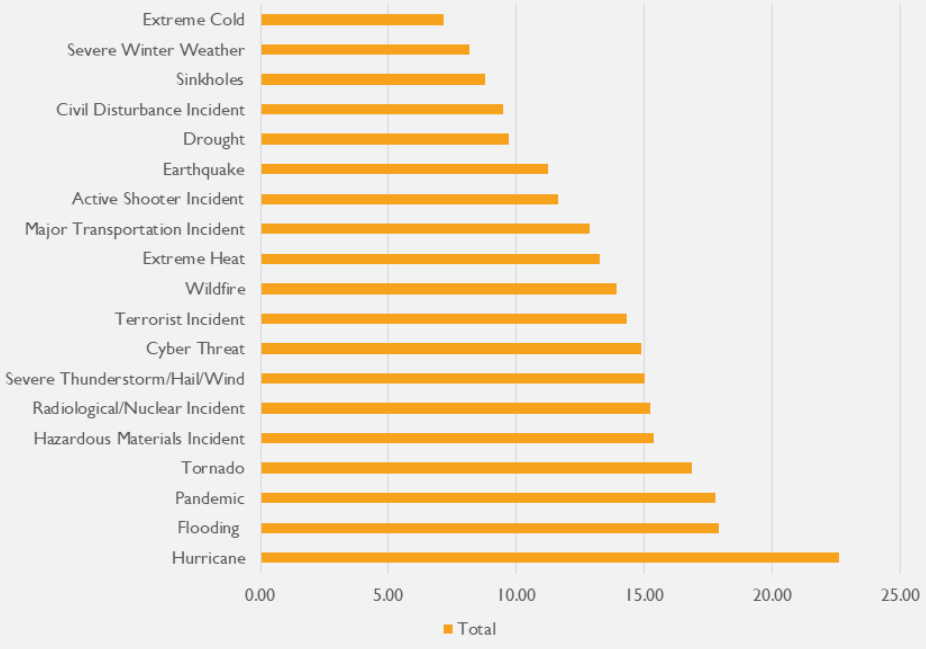
RESILIENCE RESULTS

Threat/Hazard	Score
Radiological/Nuclear Incident	7.01
Hurricane	6.41
Earthquake	5.95
Pandemic	5.65
Tornado	4.89
Terrorist Incident	4.89
Flooding	4.73
Wildfire	4.36
Hazardous Materials Incident	4.07
Cyber Threat	3.68
Drought	3.38
Sinkholes	2.93
Active Shooter Incident	2.40
Severe Winter Weather	2.40
Severe Thunderstorm/Hail/Wind	2.40
Major Transportation Incident	2.40
Extreme Cold	2.18
Extreme Heat	1.80
Civil Disturbance Incident	1.35



COMBINED/TOTAL RESULTS

Threat/Hazard	Score
Hurricane	22.59
Flooding	17.91
Pandemic	17.76
Tornado	16.85
Hazardous Materials Incident	15.35
Radiological/Nuclear Incident	15.23
Severe Thunderstorm/Hail/Wind	15.01
Cyber Threat	14.88
Terrorist Incident	14.29
Wildfire	13.89
Extreme Heat	13.25
Major Transportation Incident	12.85
Active Shooter Incident	11.64
Earthquake	11.22
Drought	9.68
Civil Disturbance Incident	9.48
Sinkholes	8.78
Severe Winter Weather	8.18
Extreme Cold	7.14



THIRA Step 3: Establish Capability Targets

Using impacts described in Step 2, determine level of capability the region plans to achieve over time in order to manage threats and hazards. Using standardized language, create capability targets for each core capability based on desired level of capability by identifying impacts, objectives, and timeframe metrics.

> **Completed:** A second survey, focused on identifying timeframes for each of FEMA's identified capability targets, generated 33 responses. Applicable responses averaged and applied to capability targets. A total of 15 Discipline Specific Focus Group Meetings were held including cybersecurity, law enforcement, fatality management, natural/cultural resources, community outreach, public health/healthcare, critical infrastructure, fusion/intel, fire services, hazmat, and emergency management.

SPR Step 1: Assess Capabilities

Based on language from capability targets set in THIRA Step 3, identify region's current capability and how capability was built, sustained, and/or lost over the last year. Provide additional context to explain reported data and sources.

SPR Step 2: Identify Capability Gaps and Intended Approaches to Address Them

Determine causes of capability gap between the capability target and current capability identified in SPR Step 1. Describe actions and investments needed to close capability gap or sustain capability.

SPR Step 3: Describe the Impacts of Funding Sources

Identify how relevant funding sources helped to build or sustain the capabilities assessed by the capability targets. Describe how capabilities were used in a real-world incident over the past year.

> **Completed:** During the 15 Discipline Specific Focus Group Meetings, for all 39 capability targets, participants discussed:
>
> - Current capabilities and how those capabilities were built, sustained, and/or lost
> - Gaps and what is needed to close those gaps

Stakeholder Preparedness Review (SPR) Step 1-3 findings are not included in this Appendix as they are not relevant to the Local Mitigation Strategy.

Appendix D: Duval Prepares Roster

Table D.1: LMS Advisory Committee (Duval Prepares) Roster of Participants

Contact information of Duval Prepares members has been removed from the LMS due to privacy concerns.

Information is available on a need-to-know basis and is designated "For Official Use Only (FOUO)."

Table D.2: LMS Planning Support Staff, 2025 Revision

Present and former Emergency Preparedness Division staff members listed in Table A.5.2: LMS Planning Support Staff, 2025 Revision are credited for their work in updating the LMS Plan on behalf of Duval County.

Appendix E: Completed Projects List

Table E: Mitigation Initiatives List, Completed Projects

Appendix F: Deferred Project List

Table F: Mitigation Initiative List, Deferred Projects

Appendix G: Deleted Projects List

Table G: Mitigation Initiative List, Deleted Projects

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