MARTIN COUNTY
LOCAL MITIGATION STRATEGY
2025

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

RECORD OF CHANGES

This Record of Changes is used to record all published changes. All major changes will be electronically routed to plan holders within 90 days of the promulgation of the change. In addition, *SOG PL-001- Review and Maintenance of MCEMA Plans*, establishes a policy and procedures for the review and maintenance of all Emergency Management plans.

Table 1: Record of Changes

Change Number	*Notes*	*Date*	*Posted By*
1	The 2015 Plan was updated to reflect any changes in the County and/or jurisdictions/district's processes and procedures	10/08/2020	Sonji Hawkins
2	Added municipal resolutions	03/04/2021	Sonji Hawkins
3	Added municipal resolutions	06/09/2021	Sonji Hawkins
4	Added municipal resolution	10/13/2021	Sonji Hawkins
5	Added municipal resolution	11/16/2021	Sonji Hawkins
6	Updated the 2020 Plan and reflected changes in the County and updates in hazards, mitigation goals, and strategies.	TBD	Amy Heimberger Lopez

PROMULGATION STATEMENT

With this notice, we are pleased to promulgate the 2025 Martin County *Local Mitigation Strategy* (LMS). This is one of the many documents published by the Martin County Emergency Management Agency. The LMS is the basis for countywide hazards, vulnerabilities, and mitigation strategy activities. It is the intent of the LMS to provide a structure for identifying hazards and vulnerabilities, assist municipalities and the County in planning for those hazards and vulnerabilities, and mitigating those hazards through the use of local, state, and federal funding sources, making our county more resilient.

The Martin County Emergency Management Agency shall be responsible for coordinating the preparation and updating of the LMS through the work of the LMS Committee, and other sub-committees, and will ensure that this document is consistent with similar federal, state, and municipal plans. The 2025 LMS will become effective upon official adoption by the Martin County Board of County Commissioners (BOCC) and effective for municipalities upon their individual adoption.

John Duchock
LMS Committee Chair
Martin County Local Mitigation Strategy

Sally Waite
Director
Martin County Emergency Management Agency

HISTORICAL ADOPTION OF THE PLAN

Table 2: Historical Adoption of the Plan

FDEM Approval Date	*Jurisdiction*	*Date Adopted*	*Resolution Number*
10/08/2020	Martin County	11/17/2020	20-11.21
10/08/2020	City of Stuart	01/15/2021	09-2021
10/08/2020	Village of Indiantown	02/11/2021	008-2021
10/08/2020	Town of Sewall's Point	02/12/2021	899
10/08/2020	Town of Jupiter Island	04/15/2021	862
10/08/2020	Town of Ocean Breeze	10/11/2021	320-2021
10/08/2025	Martin County School District	10/19/2021	2021-006
12/10/2015	Martin County	12/01/2015	15-12.11
12/10/2015	Town of Ocean Breeze	12/14/2015	232-15
12/10/2015	Martin County School District	11/17/2015	15-001
12/10/2015	Town of Sewall's Point	01/26/2016	823
12/10/2015	City of Stuart	11/30/2015	110-2015
12/10/2015	Town of Jupiter Island	01/12/2015	766
12/09/2010	Martin County	11/09/2010	10-11.4
12/09/2010	City of Stuart	01/10/2011	03-2011

I. INTRODUCTION

This is a multi-jurisdictional hazard mitigation plan, and the planning effort has been conducted through the coordinated, cooperative effort of several local governments and community partners within Martin County. These local governments and agencies include Martin County, the City of Stuart, the Town of Jupiter Island, the Town of Sewall's Point, the Town of Ocean Breeze, the Village of Indiantown, Martin County School District, and public and private partners. All agencies have provided vulnerability and mitigation strategies to culminate the publication of this 2025 update of the *Martin County Local Hazard Mitigation Strategy*. Our current plan was approved by the State and Federal Emergency Management Agency (FEMA) approved Local Mitigation Strategy, which expires on December 9, 2025.

For this 2025 update, a review and update of the hazards was considered to include changes in the methodology of assessing the risk from each one, based on new information.

A final draft has been presented to the Local Mitigation Strategy (LMS) Committee for review and comment. Once all concerns have been addressed, a public comment and public presentation will be held. After two weeks of public comment, all concerns will be returned to the LMS Committee to be addressed.

This update has also been submitted to the Florida Division of Emergency Management (FDEM), who has the authority to review the document on behalf of the FEMA, for review in comparison to the requirements from the Local Mitigation Strategy (FDEM, 2023). Once notified that this draft adequately addresses all requirements of the 44 CFR §201.6 (Local Mitigation Plans), the final draft plan will be submitted to the governing bodies of the participating jurisdictions for final approval and adoption. Consistent with the normal practices of the participating jurisdictions, which conduct meetings in accordance with Florida's open meetings statutes, the public will have an opportunity to comment upon each jurisdiction's adoption of the plan during public meetings. In accordance with Federal practice, the participating local jurisdictions have one year from the date of State approval of the plan to complete the formal adoption.

Martin County has a State and FEMA approved LMS, which expires on December 9, 2025. This plan will continue to be updated in the future to ensure it addresses changing conditions in the participating jurisdictions, experiences with disasters that occur and any changes in the characteristics of the hazards that threaten the involved communities. This updating process and future editions of the local mitigation strategy will also be used to inform and involve the public, and other interested groups, to elicit their participation in making the community more resilient to the impacts of future disasters.

A. PURPOSE

In 2000, the FEMA's recognition of the growing costs of responding to and recovering from disasters materialized in the Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 created a new Pre-Disaster Mitigation (PDM) program aimed at reducing the cost of disasters as well as risk through comprehensive planning before disasters occur. DMA 2000 requires that all communities, tribes, and states have a FEMA-approved hazard mitigation plan consistent with the DMA 2000 requirements in place to retain eligibility for PDM project funds and post-disaster Hazard Mitigation Grant Program funds.

Florida is one of the most hazard prone states in the nation. The state is susceptible to several hazards including flooding, hurricanes, tornados, wildland fire, and severe thunderstorms, etc. In Florida, the goals of the PDM program are being achieved through the LMS process. The LMS is a pre-disaster mitigation planning initiative of the FDEM and is intended to reduce the disrupting effects of natural disasters on the economic and social fabric of the community. Pre-disaster mitigation is defined as "sustained action that reduces or eliminates long-term risk to people and property from hazards and their effects" as part of the FEMA's *National Mitigation Framework* (FEMA, 2016).

This definition generally distinguishes between actions that have a long-term impact from those that are more closely associated with preparedness for, immediate response to, and short-term recovery from a specific hazard event. The intent of the LMS is to focus on practices that have cumulative benefits over time and ensure that fewer of the state's residents and communities are victims of disasters. One of the most important elements is the idea that the resulting mitigation practices are instituted prior to the disaster occurring.

Mitigation practices can be applied to strengthen homes so that people and their belongings are better protected from hurricanes, tropical storms, and inland floods. Pre-disaster mitigation planning can be used to identify and protect at-risk critical facilities, such as hospitals and fire stations, so they can remain operational or reopen quicker after a hazard has occurred. Mitigation planning allows communities to consider the vulnerability of land that is currently undeveloped but may be developed in the future, as well as the risk to people and property on existing developed land. The consideration of the potential for damage to properties in vulnerable areas and the implementation of actions to reduce the impact can go a long way towards eliminating the disruption a disaster occurrence creates in the community.

The purpose of the Martin County LMS is to develop a unified approach among County and municipal governments for dealing with identified hazards and hazard management problems in the Martin County area. This strategy will serve as a framework to support the County and municipal governments in their ongoing efforts to reduce their vulnerabilities to impacts produced by natural, technological, and societal hazards to which southeast Florida is exposed. The strategy will also help establish funding priorities for currently proposed mitigation projects and eligibility for such disaster assistance funds as may be made available for disaster mitigation activities.

This LMS is intended to represent the following jurisdictions:

- Martin County
- City of Stuart
- Town of Jupiter Island
- Town of Ocean Breeze
- Town of Sewall's Point
- Village of Indiantown
- Martin County School District

This plan will be adopted by each of these jurisdictions and copies of the adopted resolutions will be a part of this plan. Adoption of this strategy will provide the following benefits to both County and municipal governmental entities:

- Compliance with Administrative Rules 27P-22, Florida Administrative Code (F.A.C.), requirements for local comprehensive emergency management plans to identify problem

areas and planning deficiencies relative to severe and repetitive weather phenomenon, and to identify pre- and post-disaster strategies for rectifying identified problems.
- Compliance with the FEMA's DMA 2000 and thus, eligibility for FEMA pre- and post-disaster funding programs.
- Credit from the National Flood Insurance Program's Community Rating System (CRS) Program for developing a Floodplain Management Program, which will help further reduce flood insurance premium rates for property owners.
- Access to FEMA's Flood Mitigation Assistance (FMA) Grant Program, which provides funding for pre-disaster mitigation projects and activities.
- Identification and prioritization of projects for funding under the State of Florida's Residential Construction Mitigation Program, to help reduce losses from properties subject to repetitive flooding damage.
- Eligibility for local governments funds from the Emergency Management Preparedness and Assistance (EMPA) Competitive Grant Program.

B. Authorities and References

§201.6(b)(3)	Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
P6 (A4)	The plan must document what existing plans, studies, reports, and technical information were reviewed and how they were incorporated, if appropriate, into the development/update of the plan.

- Title 44 Code of Federal Regulations, §201.6 – Local Mitigation Plans
- Chapter 215.559, Florida Statutes – Hurricane Loss Mitigation Program
- Chapter 252.34, Florida Statutes – Emergency Management; definitions
- Chapter 252.35(2), Florida Statutes – Emergency management powers; Division of Emergency Management
- Chapter 252.3655, Florida Statutes – Natural hazards interagency workgroup
- Chapter 27P-22.005, Florida Administrative Code – Local Mitigation Strategy

The following guidelines and reference documents assisted in the preparation of this document.

Table 3: Reference Documents

Document Type	*Document*	*How Incorporated into Plan*
	Federal	
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2001). *Understanding your risks: Identifying hazards and estimating losses* (FEMA 386-2).	Legacy resource used as guidance to support hazard profiling
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2002). *Getting started: Building support for mitigation planning* (FEMA 386-1).	Legacy resource used as guidance to support planning committee formation
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2003). *Bringing the plan to life* (FEMA 386-4).	Legacy resource used as guidance to support plan development and maintenance efforts

Document Type	*Document*	*How Incorporated into Plan*
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2003). *Developing the mitigation plan* (FEMA 386-3).	Legacy resource used as guidance to support mitigation action planning
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2005). *Integrating historic property and cultural resource considerations into hazard mitigation planning* (FEMA 386-6).	Used as general guidance for incorporating historical property and cultural protection
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2008). *Using the hazard mitigation plan to prepare successful mitigation projects* (FEMA 386-9).	Used as general guidance on existing plan integration for hazard mitigation
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2013b). *Local mitigation planning handbook.*	Used as general guidance for stakeholders and jurisdictions on mitigation ideas
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2015). *National fire incident reporting system 5.0: Complete reference guide.*	Used as a resource to support an understanding of reported NFIRS data
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA), Mitigation Framework Leadership Group. (2019). *National mitigation investment strategy.*	Used to ensure alignment with national strategies for advancing mitigation investment
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2022). *Local mitigation planning policy guide* (FP 206-21-0002).	Used as general guidance on the revised mitigation planning process
Technical Information	National Fire Protection Association (NFPA). (2019). *Standard on continuity, emergency, and crisis management* (NFPA 1600).	Used as a general guide to ensure a comprehensive planning process
Technical Information	U.S. Environmental Protection Agency (USEPA). (2018). *Storm smart cities: Integrating green infrastructure into local hazard mitigation planning* (EPA 903-K-18-001).	Outlines ways low-impact development and green infrastructure can support mitigation planning
State		
Technical Information	Florida Division of Emergency Management (2023) *LMS Update Manual.*	Used as general guidance to update the plan
Local, Regional		
Plan	Martin County Emergency Management, (2022). *Comprehensive Emergency Management Plan* (CEMP).	Used as guidance for Martin County preparedness, response, recovery and mitigation activities.
Study	City of Stuart (2024). *Resiliency Vulnerability Assessment.*	Used as reference for data regarding vulnerability for hazards.
Plan	Martin Metropolitan Planning Organization, (2022). *Vision Zero Plan.*	Used as reference for County profile and data for hazards.
Study	Martin County Public Works (2025). *Martin County Vulnerability Assessment.*	Used as reference for data regarding hazards.

Document Type	*Document*	*How Incorporated into Plan*
Report	Martin Metropolitan Planning Organization, (2023). *Community Characteristics.*	Used to gather data for the Planning Area section and hazards of this plan.

A full list of sources utilized to develop the content of this plan is available in *Attachment C: Sources*.

C. LMS Structure

The current LMS structure meets federal guidelines and criteria established in response to the Disaster Mitigation Act of 2000 and Title 44 Code of Federal Regulations. The LMS Structure consists of a Taskforce, Steering Committee, and LMS Subcommittees or Ad Hoc Committees. Figure 1 shows the LMS Taskforce organization, and each position is outlined in further detail below.

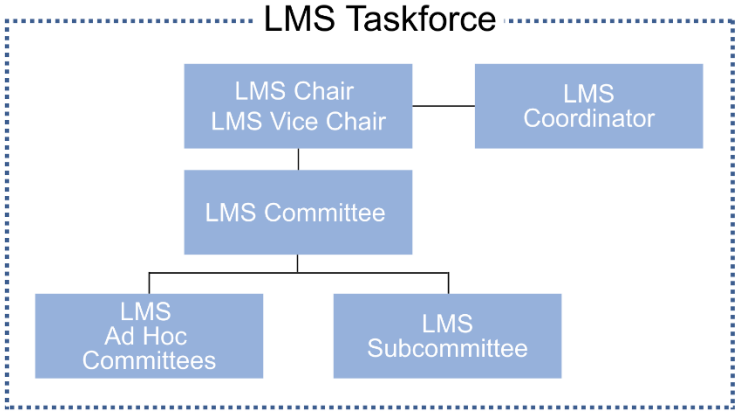


Figure 1: LMS Structure

LMS Coordinator

The LMS Coordinator is a staff member within the Martin County Emergency Management Agency and serves as the coordinator for all mitigation projects, committees, and planning. The LMS Coordinator's roles and responsibilities may include but not be limited to the following.

- Facilitates LMS Taskforce, Steering Committee, and Subcommittees.
- Supervises the revision and updates to the LMS every five years to include annual updates.
- Monitors changes in federal, state, and local laws relating to mitigation that may affect the county.
- Coordinates the Prioritized Project List (PPL) scoring and ranking.
- Interfaces with appropriate governmental, private, and non-profit organizations.
- Seeks opportunities to update plans, policies, regulations, and other directives to include hazard mitigation priorities.
- Encourages adoption of mitigation priorities within capital and operational budgets and grant applications.
- Shares relevant mitigation information to LMS Taskforce, Steering Committee, and Subcommittees.
- Explore opportunities for collaborative mitigation projects and initiatives.

LMS Taskforce

The LMS Taskforce represents a broad cross section of public and private sector organizations and individuals, including the general public, neighboring emergency management departments, and state coordinators. The LMS Taskforce serves as an umbrella organization for coordinating all mitigation programs and activities, supplies the staffing for all committees of the LMS, and is

the primary mechanism and forum for exchanging information and mobilizing the vast expertise and resources of the community.

The purpose of LMS Taskforce is to decrease the vulnerability of residents, governments, businesses and institutions in Martin County, Florida, to the future human, economic, and environmental costs of natural, technical, and societal disasters. LMS Taskforce will develop, monitor, and maintain a local strategy for hazard mitigation and post-disaster redevelopment which will be intended to accomplish this purpose.

LMS Steering Committee

The LMS Steering Committee serves as the policy development body for the LMS program. The role of the Committee is to advise and assist in the formulation, implementation, administration, and refinement of the Martin County LMS. The Committee shall represent the diverse interests found in Martin County.

LMS Taskforce is guided by a Steering Committee of not more than 11 primary members, consisting of designated representatives of the following:

- One representative from the government of Martin County and each participating municipality,
- One representative from the Martin County School District,
- One representative from a critical healthcare facility to represent healthcare agencies of Martin County,
- One representative from organizations and associations representing key community non-profit agencies of Martin County,
- One representative from organizations and associations representing key business, industry, and community interest groups of Martin County, and
- One interested individual from the general public appointed by a majority vote of the Steering Committee.

One representative and one alternate will be selected to represent each of the stakeholder groups listed above. Representatives are chosen annually during the final Committee meeting of the calendar year, and will be designated by formal resolution, appointment, or other action to serve as the official representative and spokesperson for the jurisdiction or organization regarding the activities and decisions of LMS Taskforce. The chair and vice chair (officers) of the Steering Committee are also considered to be chair and vice chair of the LMS Taskforce.

LMS Subcommittees or Ad Hoc Committees

The LMS Taskforce may designate ad hoc committees, as needed. Membership of the permanent subcommittees is unlimited and open to all interest jurisdictions, organizations, and individuals. Temporary subcommittees may be established at any time for special purposes by the chair of the Steering Committee, and their membership designated at that time. Membership in such subcommittees is not restricted.

D. The Planning Area

1. Geography

Martin County, Florida has 543.8 square miles of land area and is the 55th largest county in Florida by total area. Martin County, Florida is bordered by Glades County, Palm Beach County, Okeechobee County, Hendry County, and St. Lucie County. Martin County is one of Florida's 67 counties with an estimated population of 165,666 (as of July 1, 2024) according to the United State Census Bureau. It lies along the central eastern coast of Florida. Martin County has the following municipalities:

- City of Stuart
- Town of Jupiter Island
- Town of Ocean Breeze
- Town of Sewell's Point
- Village of Indiantown

Martin County also has six communities – Hobe Sound, Hutchinson Island, Jensen Beach, Palm City, Port Salerno, Rio, and Tequesta.

The barrier islands of Martin County are separated from the mainland by the Intracoastal Waterway along approximately 22 miles of shoreline. It is bounded on the north by St. Lucie County, on the east by the Atlantic Ocean, on the south by Palm Beach County, and on the west by Okeechobee County and Lake Okeechobee.

There are four physiographic regions in Martin County:

- The Kristen Jacobs Coral Aquatic Preserve
- The Atlantic coastal ridge along the coastline.
- Pine flatland throughout the eastern central and northwestern part of the County.
- Everglades in the southwestern part of the County.

The Kristin Jacobs Coral Aquatic Preserve - northernmost section of Florida's Coral Reef and runs 105 miles from the St. Lucie Inlet to the northern boundary of Biscayne National Park. The Martin County Atlantic coastal ridge consists of sand dunes formed when sea level was higher than it is today. The ridge consists of the Jensen Beach and Jonathan Dickinson sand hills, which are separated from each other by the St. Lucie estuary system. The Jonathan Dickinson sand hills reach an elevation of 86 feet above mean sea level, the highest elevation in Martin County. East of these sand hills, the Indian River separates the mainland from two barrier Islands, Hutchinson Island and Jupiter Island, which are separated by the St. Lucie Inlet. The soils along the Atlantic coastal ridge are generally well-drained sands. The vegetation in this area originally consisted of acid pine/scrub oak communities and coastal strand communities. The greatest urban development within the County has taken place along this coastal ridge.

Westward from the coastal ridge in the northern section of Martin County, there is a freshwater marsh system called the Savannas, and beyond this, the eastern Flatland community appears. Elevations throughout this part of the County are generally 20 to 30 feet above mean sea level. Plant communities in this area are generally referred to as "flatwoods" communities and consist of a mixture of slash pines and saw palmetto in the drier areas. In wetter areas, grass-like marshes, cypress stands, and hammocks have developed. There is a small strip of an Everglades sawgrass plant community along the shores of Lake Okeechobee in southwestern Martin County. The boundary between this Everglades plant community and the Eastern Flatland plant

community is sharply defined and based on elevation. Two small ridges, the Orlando and Green Ridges, separate drainage patterns in the eastern Flatland. The Orlando Ridge, which lies farther to the west, is higher and more defined than the Green Ridge.

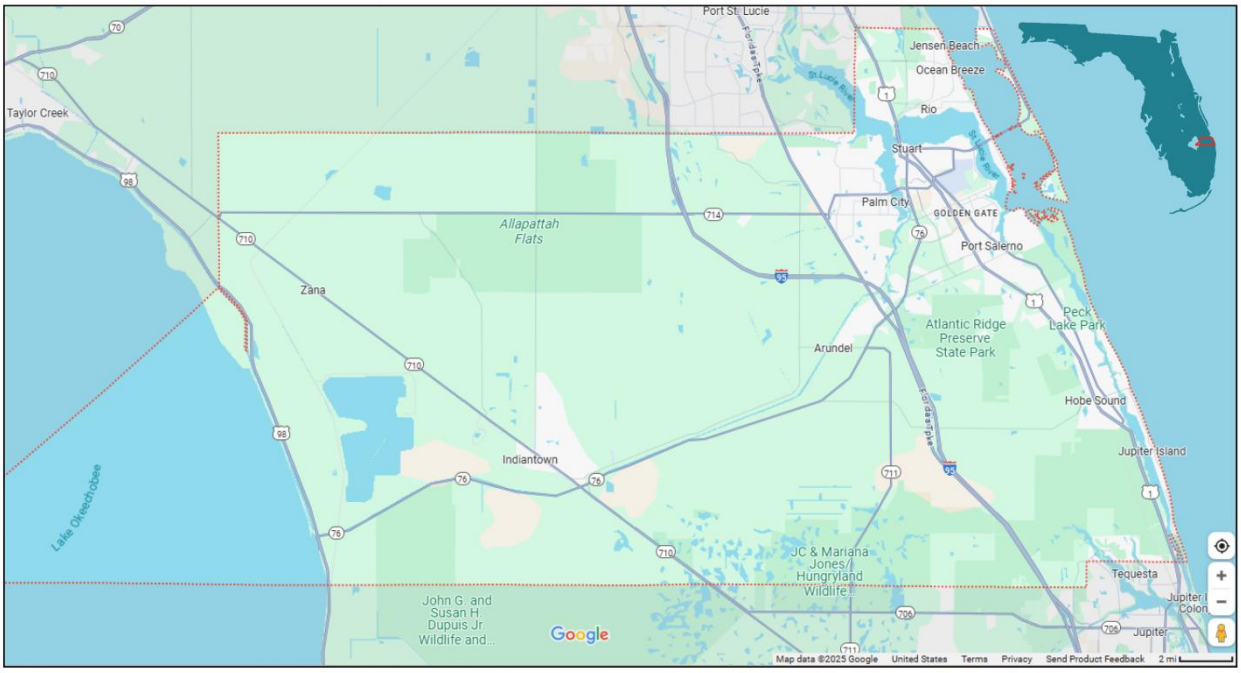


Figure 2: Map of Martin County
Source: Google Maps, 2025.

2. Climate

Martin County, Florida has a humid subtropical climate. Summers are hot and humid with temperatures reaching up to the mid-90s on some days. Winters are mild with temperatures rarely dropping below freezing, and snowfall is very rare. Rainfall is abundant in Martin County with an annual mean precipitation of 54.09 inches per year between 1901 and 2000. The county experiences thunderstorms and showers throughout the summer months as well as occasional hurricanes during hurricane season. Overall, Martin County has a pleasant climate that allows for plenty of outdoor activities year-round.

3. Demographics

The Treasure Coast has experienced tremendous growth since the 1950's, and this trend is expected to continue. *Table 4*. and *Figure3*. illustrate population growth in Martin County since 1950.

Table 4: Martin County Population

Year	*Population*	*Census or Estimate*	*Growth*
1950	7,807	Census	N/A
1960	16,932	Census	116%
1970	28,035	Census	65%
1980	64,014	Census	128%
1990	100,900	Census	57%

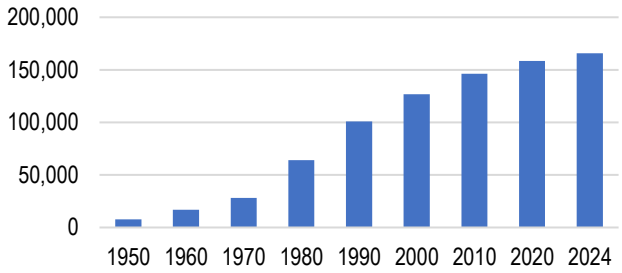


Figure 3: Martin County Population Growth

Year	Population	Census or Estimate	Growth
2000	126,731	Census	25%
2010	146,318	Census	15%
2020	158,431	Census	8%
2024	165,666	Estimate, July 1	4%

Source: U.S. Census Bureau data.

The U.S. Census Bureau tracks certain aspects of the population, including age and sex, race, housing, families and living arrangements, computer and internet use, education, health, economy, transportation, and income and poverty. The following table outlines a few of these and compares the numbers from the 2010 and the 2020 census to show changes; the remainder are outlined under the appropriate subheading of section *D. The Planning Area*.

Table 5: Martin County Demographics

Fact	2010	2020
Population per square mile	269.2	291.3
Persons under 5 years, percent	4.10%	3.90%
Persons under 18 years, percent	16.20%	15.90%
Persons 65 years and over, percent	31.50%	32.70%
Female persons, percent	50.60%	50.30%
White alone, percent	90.10%	89.60%
Black alone, percent	5.70%	5.60%
American Indian and Alaska Native alone, percent	1.00%	1.20%
Asian alone, percent	1.50%	1.60%
Native Hawaiian and Other Pacific Islander alone, percent	0.20%	0.20%
Two or More Races, percent	1.60%	1.80%
Hispanic or Latino, percent	14.20%	15.80%
White alone, not Hispanic or Latino, percent	77.70%	76.00%
Veterans	14,743	12,248
Foreign-born persons, percent	10.10%	11.20%

Source: U.S. Census Bureau, 2020, 2020

4. Economy and Housing

The economy of Martin County employs 68.8k people. The largest industries in Martin County are Health Care & Social Assistance, Retail Trade, and Construction; the highest paying industries are Utilities, Public Administration, and Information. The income inequality in Florida (measured using the Gini index) is 0.474, which is lower than the national average.

Table 6: Martin County Economy and Housing

Fact	2010	2020
Housing and Living Arrangements		
Housing Units	80,784	85,025
Owner-occupied housing unit rate	78.10%	80.10%
Median value of owner-occupied housing units	$255,000	$386,500
Median selected monthly owner costs – with a mortgage	$1,690	$2,110
Median selected monthly owner costs -without a mortgage	$594	$731
Median gross rent	$1,107	$1,499

Fact	*2010*	*2020*
Building Permits	723	646
Households	63,865	67,820
Persons per household	2.41	2.31
Living in the same house 1 year ago, percent of persons aged 1 year+	85.60%	89.70%
Language other than English spoken at home, percent of persons aged 5 years+	13.20%	15.30%
Households with a computer, percent	90.90%	96.10%
Households with a broadband Internet subscription, percent	83.60%	91.00%
Income and Poverty		
Median households' income (in 2018 and 2023 dollars)	$57,959	$80,701
Per capita income in past 12 months (in 2018 and 2023 dollars)	$40,389	$52,532
Persons in poverty, percent	10.70%	13.10%
Economy and Business		
In civilian labor force, total, percent of population age 16 years+	51.50%	52.50%
In civilian labor force, female, percent of population age 16 years+	47.70%	48.60%
Total accommodation and food services sales ($1,000)	312,689	608,979
Total retail sales ($1,000)	2,553,285	4,249,271
Total retail sales per capita	$17,157	$26,232
Total employer establishments	5,657	6,296
Total employment	58, 917	64,841
Total annual payroll ($1,000)	2,360,792	3,153,129
Total employment, percent change	4%	4.10%
Total non-employer establishments	17,112	19,285
All employer firms	17,326	5,185
Men-owned employer firms	9,157	3,157
Women-owned employer firms	5,824	1,041
Minority-owned employer firms	2,215	615
Nonminority-owned employer firms	14,501	4,059
Veteran-owned employer firms	1,927	284
Nonveteran-owned employer firms	14,457	4,338

Source: U.S. Census Bureau, 2020, 2020

5. Education

The Martin County School District covers the entirety of Martin County. They educate approximately 16,000 PK-12 students and it is fully accredited by Cognia, the accreditation organization for the Southern Association of Colleges and Schools Council on Accreditation and School Improvement. The following table outlines the schools in Martin County that the Martin County School District oversees.

Table 7: Martin County Schools

Elementary School	*Middle School*	*Alternative Education*
Bessey Creek	Dr. David L. Anderson	Environmental Studies Center
Citrus Grove	Hidden Oaks	Riverbend Academy
Crystal Lake	Indiantown	Spectrum Academy
Felix A Williams	Murray	Adult Education Centers
Hobe Sound	Stuart	Willoughby Learning Center
J.D. Parker		

Jensen Beach Palm City Pinewood Port Salerno SeaWind Warfield	*High School* Jensen Beach Martin County South Fork	*Charter Schools* Clark Advanced Learning Center Hope Center for Autism Indiantown High School Treasure Coast Classical Academy

Source: Martin County School District

Additionally, Martin County is home to the Indian River State College Massey Campus, and the Hobe Sound Bible College.

Table 8: Martin County Education

Fact	*2010*	*2020*
High school graduate or higher, percent of persons aged 25 years+	90.50%	92.70%
Bachelor's degree or higher, percent of persons aged 25 years+	33.00%	36.60%

Source: U.S. Census Bureau, 2020, 2020

6. Health

Martin County is home to a diverse population of residents who place great value on their health and wellbeing. The county has multiple hospitals and medical facilities, allowing residents easy access to healthcare services. The local hospitals provide a comprehensive range of services from general healthcare to specialized treatment, while the local medical facilities offer more flexible, specialized care for both acute and chronic conditions. Additionally, Martin County is close to several larger cities with even more advanced medical resources available, ensuring that a top-of-the-line health service is never too far away. In this way, Martin County has everything necessary for people to prioritize their health and receive the care they need when they need it most. The two hospitals Martin County is home to include:

- Cleveland Clinic Martin North Hospital
- Cleveland Clinic Martin South Hospital

In 2023, the patient to primary care physician ratio was 1,559 to 1, up from 1,533 to 1 the previous year.

Table 9: Martin County Health

Fact	*2010*	*2020*
With a disability, under age 65 years, percent	8.90%	7.40%
Persons without health insurance, under age 65 years, percent	16%	13.50%

Source: U.S. Census Bureau, 2020, 2020

Martin County is also home to several types of medical care facilities from hospitals to acute care, nursing homes, and specialty facilities. *Table I.D.5.b*. outlines the types of facilities and the number of beds that are available at each type. The data in this table is a point-in-time count as the facilities and bed counts constantly are changing. A full list of these facilities is maintained by Martin County Emergency Management, who reviews the *Comprehensive Emergency Management Plans* for a variety of them.

Table 10: Medical Facility Availability in Martin County

Type of Facility	*Number of Beds*
Acute Care	339

Type of Facility	*Number of Beds*
Adult Psychiatric	56
Adult Substance Abuse	0
Child and Adolescent Psychiatric	24
Hospital	504
Intensive Residential Treatment Facility	0
Neonatal Intensive Care Unit Level II	5
Neonatal Intensive Care Unit Level III	0
Nursing Home	795
Rehabilitation	80
Skilled Nursing Unit	0
Specialty	165

Source: Martin County Emergency Management Agency and Florida Department of Health Martin County

7. Transportation

Martin County has many modes of transportation including air, rail, land, and water. *Figure I.D.7.* shows a map of Martin County with these features. The main way to get around in Martin County is by land, whether it be in a privately owned vehicle, or on a MARTY bus fixed route and paratransit services. MARTY serves a ridership of 102,000 bus passengers and nearly 4,000 ADA paratransit passengers every year. The mean travel time to work was 25.5 minutes in 2010 and increased to 28 minutes by 2020, according to the U.S. Census Bureau.

In Martin County, roadways are be owned and maintained by various entities:

- Martin County: Martin County Public Works Department
- State: Florida Department of Transportation District 4
- Municipal: individual municipalities
- Private: private owners

The major roadways in Martin County include the following:

- Florida's Turnpike
- Interstate 95
- SE Federal Highway US 1
- SW Conners Highway US 441
- Dixie Highway & Ocean Boulevard CR A1A
- SW Martin Highway CR 714
- SW High Meadow Avenue CR 713
- Kanner Highway CR 76
- Pratt Whitney Road CR 711

There are two main railways that travel north and south through Martin County. These routes transport cargo and passengers with companies such as CSX, Amtrack, and Brightline, but do not have passenger stations or railyards in Martin County.

St Lucie Inlet (Intercoastal Waterway)

The mouth of the St. Lucie River is located on Florida's East Coast about 32 miles north of West Palm Beach and 68 miles south of Melbourne. The mouth of the St. Lucie River is situated at a major confluence of waterways connecting the Atlantic Ocean to several lagoon and estuarine

tidal systems, including the Indian River Lagoon to the north, St. Lucie River to the west, and Hobe Sound and the Atlantic Intracoastal Waterway to the south. The Intracoastal Waterway and the Indian River work their way in from the north, ending at the St. Lucie Inlet, while Mile 0 of the Okeechobee Waterway is situated right near the mouth of the St. Lucie River at flashing red buoy off the Intracoastal Waterway.

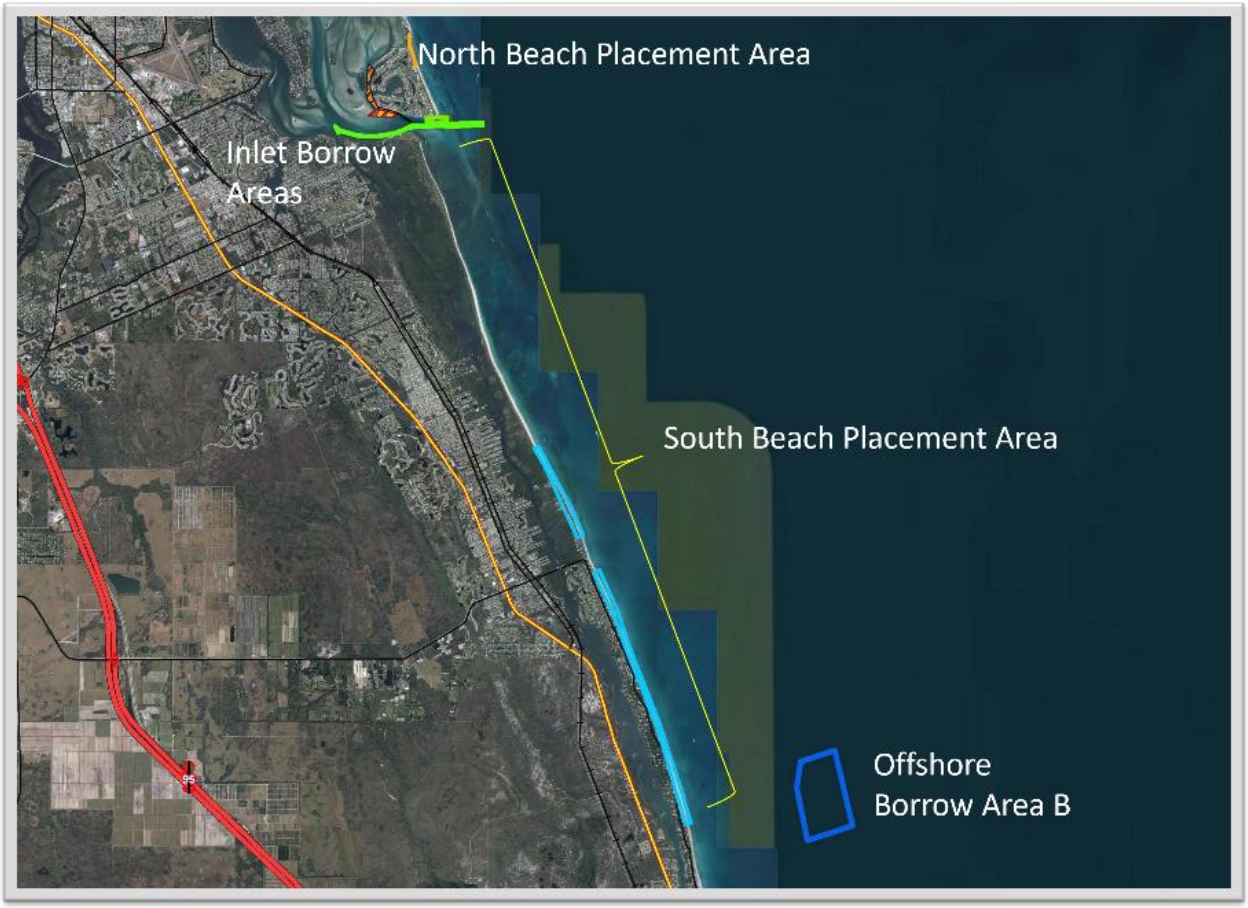


Figure 4 St. Lucie Inlet Placement Areas. Source: Martin County Public Works.

The inlet was originally opened in 1892 by local residents seeking navigable access to the Atlantic Ocean. The initial cut was 30 feet wide and five feet deep, however, after six years, the inlet had widened by 1,700 feet and had deepened to 6 to 7 feet. In 1922, the channel had grown to a width of 2,600 feet. It serves a vital role in Martin County's economy, ecosystems, and lifestyle of its residents. Commercial, sport, and recreational fishing define life in this community, and each relies on safe and dependable use of the inlet. St. Lucie Inlet is one of the widest in Florida, nearly a half mile (2,362 feet), making this shallow draft inlet vulnerable to elevated sea states. It became a federal project in 1913 through the Rivers and Harbors Act.

The St. Lucie Inlet Management plan was adopted by the state 1995, updated in 2016 and in 2023. It identified a preliminary bypass goal of 195,000 cy/yr. with 163,000 cy/yr. to the south and 36,000 cy/yr. to the north. Placement has been in the Hobe Sound National Wildlife Refuge, focusing on the area of Peck Lake and in the St. Lucie Inlet Preserve State Park along with bypassing to the beaches north of the Inlet at Bathtub Reef Park beach.

Of equal consequence is the health of the Indian River Lagoon, which depends on the natural flushing action provided by the healthy, open Inlet to remove storm water runoff and discharge from Lake Okeechobee.

Lake Okeechobee

Lake Okeechobee is Florida's largest lake and the second largest body of fresh water in the contiguous United States. The word Okeechobee comes from the Seminole Indian language "Oki" (water) and "Chubi" (big) and means "big water." Primary sources of lake water include rainfall (30%) and major tributaries, canals and runoff (70%). Evaporation accounts for 70% of water loss, with the remainder exiting through engineered outflows. High water levels are maintained from October through March (dry season), while low water levels are maintained from June through August.

Florida's government funded programs to build larger containment dikes around the lake and the "Okeechobee Waterway" as we know it today. The waterway was developed by digging two man-made canals—from the headwaters of the Caloosahatchee River on the Gulf Coast and from the St. Lucie River on the East Coast—to Lake Okeechobee.

Figure 5: Martin County roadway, rail, air, and waterway network
Source: Freight and Goods Movement Plan, Martin Metropolitan Planning Organization (MPO), 2020.

8. Utilities

Martin County Utilities is a regional water and wastewater utility that provides service to unincorporated Martin County, the Town of Sewall's Point, and Town of Ocean Breeze. Martin County Utilities also provides reuse (irrigation quality) water to local golf courses and residential subdivisions within the County. Utilities currently treats on average 9 million gallons of water a day from 35 surficial and 4 Floridan wells.

The Martin County water system is interconnected between the Tropical Farms and North County water plants. Water is treated at these plants is with a combination of lime softening and reverse osmosis. The treatment process for both water, wastewater, and irrigation quality (reuse) water meets all the requirements established by the federal, state, and local regulatory agencies.

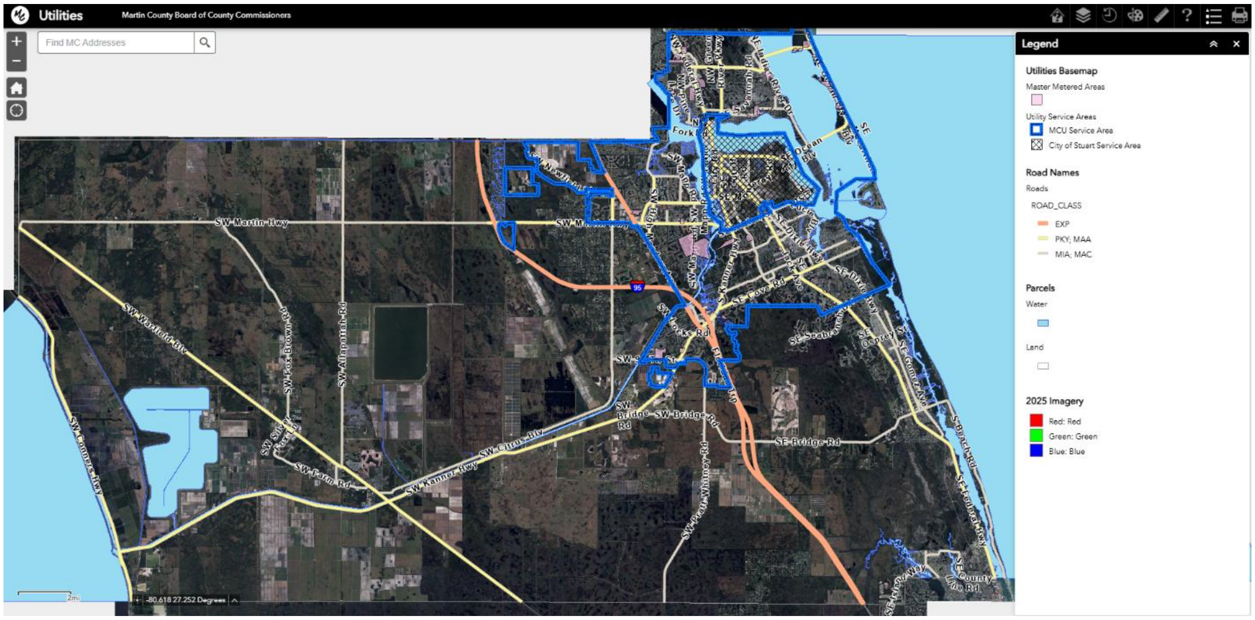


Figure 6: Martin County Utilities Map

Independently, the Town of Jupiter Island owns the South Martin Regional Utility providing water and wastewater treatment services to the Town of Jupiter Island, Hobe Sound, and unincorporated areas in Martin County outside of the Martin County service boundary. The City of Stuart and the Village of Indiantown also own and operate water and wastewater treatment plants to service their own municipal areas.

9. Media

Martin County is part of the Palm Beach Media Market. The local television channels that serve Martin County include WPTV (NBC Channel 5), WPBF (ABC Channel 25), WPEC (CBS Channel 12), and WFLX (FOX Channel 29). The County's own television network, MCTV, is the only television station located in Martin County. The local radio stations are outlined below.

Table 11: Radio Stations in Martin County

Station	Frequency	City	Type
WSTU	1450 AM	Stuart	News/Talk
WQCS *	88.9 FM	Fort Pierce	Public Radio
WCNO	89.9 FM	Palm City	Religious
WRMB	90.3 FM	Stuart	Religious
WWFR	91.7 FM	Stuart	Religious
WAVW	92.7 FM	Stuart	Country
WAYF	96.7 FM	Stuart	Christian Contemporary
LPFM	100.1 FM	Palm City	Religious
WMBX	102.3 FM	Jensen Beach	Urban Contemporary

Station	*Frequency*	*City*	*Type*
WIRK	103.1 FM	Indiantown	Country
WOLL	105.5 FM	Hobe Sound	Adult Contemporary

** Radio station located outside Martin County used for emergency notifications*
Source: www.radio-locater.com

10. Tourism and Attractions

Tourism is not only an important economic driver in Martin County; it is also deeply embedded in the community's identity, reflecting the area's rich history, natural beauty, and cultural vibrancy. Our destination is home to a diverse array of attractions, ranging from over 22 miles of pristine beaches and more than 100,000 acres of parks and conservation lands to a collection of unique museums, cultural sites, historic theatres, nature centers, and more. These assets are vital to both the local economy and the quality of life for residents and visitors alike.

The tourism industry employs more than 9,450 people in Martin County alone, representing about one in nine jobs. In 2023, travel generated over $60 million in state and local taxes, and overnight visitors spent more than $661.5 million in Martin County, significantly benefitting our local economy. Given the importance of tourism, it is crucial to consider how our attractions would be impacted by potential disasters, and to plan for their protection and swift recovery.

Martin County's natural attractions are among its most cherished assets, drawing visitors who seek to experience Florida's unspoiled landscapes and outdoor wonders. Places like Jonathan Dickinson State Park (famous for its scenic trails and waterways) and the Hobe Sound National Wildlife Refuge (which protects endangered species) are integral to the county's ecotourism appeal. Coastal gems such as The Nature Conservancy's Blowing Rocks Preserve, St. Lucie Inlet Preserve State Park, and Kristen Jacobs Coral Aquatic Preserve are beloved for their unique ecosystems and recreational opportunities. However, these natural sites are particularly vulnerable to disasters like hurricanes, storm surges, and wildfires, which could cause significant damage to habitats and wildlife, infrastructure, and visitor facilities.

Historic sites and cultural attractions are also cornerstones of Martin County's tourism offerings. The House of Refuge Museum at Gilbert's Bar is the oldest building in the county, dating back to 1876, and offers a glimpse into the area's maritime past. Downtown Stuart (recently voted the "Best Coastal Small Town" in America) is a cultural hub revered for its historic architecture and vibrant arts scene, thanks to attractions like the Lyric Theatre, the Stuart Heritage Museum, the Riverwalk, colorful galleries, public art installations, and more. Sites like the Elliott Museum (with its vast collection of rare automobiles and revolving exhibits), the Children's Museum of the Treasure Coast (which engages young minds through interactive displays), and the Road to Victory Military Museum (which honors American veterans) are all critical to preserving and showcasing the county's rich history and culture. These attractions, however, face risks from wind damage, flooding, and other disaster-related impacts, which could threaten both the physical structures and the valuable artifacts they house.

In addition to these historic and cultural sites, Martin County boasts a range of family-friendly attractions and recreational facilities that contribute to its appeal as a premier tourist destination. Sailfish Splash Waterpark, a favorite among families, and the nearby Sailfish Splash Golf Course, which offers year-round outdoor recreation, are key components of the county's leisure offerings. The Florida Oceanographic Coastal Center, the Hobe Sound Nature Center, and the Treasure Coast Wildlife Center provide educational experiences centered on marine and wildlife conservation, drawing visitors who are passionate about Florida's natural environment. These

attractions, while invaluable to tourism, are also not immune to the effects of disasters, which could disrupt operations and diminish their appeal to visitors.

The impact of a disaster on Martin County's tourism assets would extend beyond immediate physical damage, potentially leading to long-term challenges such as decreased visitor numbers, economic losses, and a slower recovery for local businesses. Tourism reaches far beyond our local lodging properties and short-term rental market, impacting other industries such as entertainment, retail, dining, transportation, and more. Protecting these attractions through effective mitigation strategies is essential to maintaining the resilience of the tourism industry and the broader community.

Table 12: Martin County Attractions

Natural	*Historic and Cultural*
• Jonathan Dickinson State Park • St. Lucie Inlet Preserve State Park • Seabranch Preserve State Park • Savannas Preserve State Park • Atlantic Ridge State Park • Halpatiokee Regional Park • Phipps Park and Campground • Indian Riverside Park • Langford Park • Sandsprit Park • Shepard Park • Timer Powers Park • Twin Rivers Park • Allapattah Flats Wildlife Management Area • Hobe Sound National Wildlife Refuge • Jensen Sea Turtle Beach • Stuart Beach • Hobe Sound Beach • Bathtub Reef Beach • Blowing Rocks Preserve	• House of Refuge Museum * • Elliott Museum • The Lyric Theatre * • The Barn Theatre • A.C.T. Studio Theatre • StarStruck Academy and Theatre • Stuart Heritage Museum • Jensen Beach History Museum • Road to Victory Miliary Museum • Children's Museum of the Treasure Coast • Mansion at Tuckahoe * • Mount Elizabeth Archaeological Site * • Court House Cultural Center * • The Palm Room Art Gallery and Martin Artisans Guild • Captain Henry Sewall's House • Georges Valentine Underwater Archaeological Preserve * • Trapper Nelson's Interpretive Site * • Seminole Inn * • Golden Gate Building * • The Olympia School * • New Monrovia One-Room Schoolhouse • Burn Brae Plantation – Krueger House * • Cypress Lodge * • Jupiter Island Gate House * • Stuart Welcome Arch *

Family-Friendly	*Agritourism*	*Notable Districts*
• Children's Museum of the Treasure Coast • Sailfish Splash Waterpark • Sailfish Sands Golf Course • Florida Oceanographic Coastal Center and Ocean EcoCenter • Treasure Coast Wildlife Center • U.S. Sailing Center	• Kai-Kai Farm • Seven Oaks Ranch • Rockin' H Ranch • Calusa Creek Ranch • Hobe Sound Farmer's Market • Palm City Farms • 710 U-Pick • Martin County Fairgrounds	• Historic Downtown Stuart • Port Salerno Waterfront District • Downtown Jensen Beach and the Artist Colony • The Creek District of Arts and Entertainment • Downtown Hobe Sound and the Hobe Sound Mural Project

• Port Mayaca Polo Club		

** Indicates Historic Place*

Source: Martin County Office of Tourism and Marketing and National Register of Historic Places

11. Jurisdictions

a. City of Stuart

The City of Stuart is the county's seat, was chartered in 1925 and is 6.25 square miles. The City has a population of 19,430 and increases with winter visitors each year. The City is comprised of a Mayor, Vice Mayor and three Commissioners. The major employers are the municipal government, Cleveland Clinic, and the airport.

b. Town of Jupiter Island

The Town was established in 1953 and is situated on a barrier island on the south end of Martin County. The Town consists of approximately 1,643 acres with nine miles of ocean frontage. The Town has a permanent population of 828 with a seasonal population of about 2,000. The Town's governmental body consist of a Town Commission/Manger, five elected Commissioners, Mayor, and Vice Mayor. Their government functions are Public Safety, Public Works, Building and Zoning, Finance and Administration, Beach Protection District, and the South Martin Regional Utility.

c. Town of Ocean Breeze

The Town formed its government in 1960 after being established in 1938 as a mobile home park. The Town is situated along the Indian River with a population of 301 on 0.2 square miles. The Town's council and boards consists of a Mayor, President, Vice President and four Council Members. The government functions are Building and Permitting, Planning and Zoning and Finance.

d. Town of Sewall's Point

The Town received its charter in 1957 and the first Town Hall was built in 1960. The town is situated between Indian River Lagoon and the St. Lucie River. Sewall's Point has a population of 2,064 and sits on 1.2 square miles which is on a peninsula bearing the same name. The Town's government body is composed of a Mayor, Vice Mayor, three Commissioners, Town Manager, and Town Clerk. Their governmental functions are Building, Public Works, and Police departments.

e. Village of Indiantown

The Village was incorporated December 2017, being the first municipality incorporated in over 40 years in Martin County. The Village is situated on 14 square miles in the western section of Martin County with a population of 6,755. The Village's government body consists of a Mayor, Vice Mayor, three council members, Village Manager, Village Clerk, and Village Attorney. Their governmental functions are Building, Planning and Development, Code Compliance, Parks and Recreation, and Water and Wastewater departments.

f. Martin County School District

Martin County School District is the second largest employer in Martin County with more than 3,200 district professionals that work together to provide a safe learning environment to approximately 16,000 students in 12 elementary schools, 5 middle schools, 3 comprehensive high schools, 3 special centers, 4 preschool centers and 2 adult education campuses. The District's administration includes a Superintendent, Deputy Superintendent and five Board Members. Each school has a principal or director with administrative support staff.

12. Social Vulnerability Indicators

Social vulnerability refers to the demographic and socioeconomic factors (such as poverty, lack of access to transportation, and crowded housing) that adversely affect communities that encounter hazards and other community-level stressors. These stressors can include natural or human-caused disasters (such as tornadoes or chemical spills) or disease outbreaks (such as COVID-19). The map below shows the socially vulnerable areas in Martin County, according to the Centers for Disease Control as of 2022.

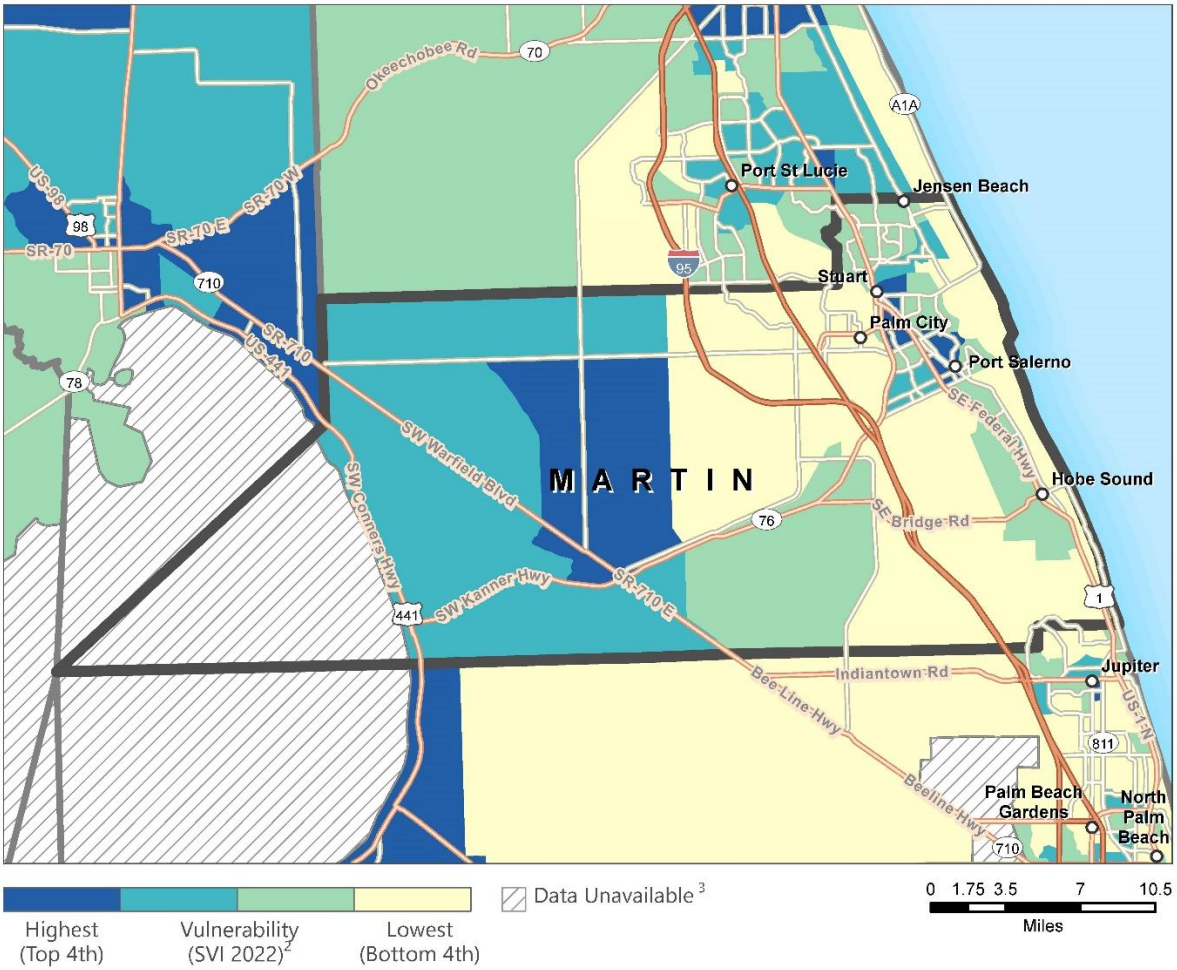


Figure 7: Overall Social Vulnerability in Martin County. Source: Centers for Disease Control and Prevention.

13. Asset Inventory / Critical Facilities

§201.6(c)(2)(ii)	[The risk assessment shall include a] description of the jurisdiction's vulnerability of the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.
§201.6(c)(2)(ii)(A)	The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas

Martin County's critical facilities list includes public safety, hospitals, and nursing facilities as well as county infrastructures that supports daily operations. Listed below are the types of facilities but the names are not listed per exemption allowed in the Florida Administrative Code 27P-22.005. A list of critical facilities is provided to the Florida Division of Emergency Management on an annual basis.

Table 13: Martin County Asset Inventory / Critical Facilities

Type	*Number of Facilities*
Hospitals	4
Fire Stations	15
Law Enforcement	7
Public Facilities	13
Nursing Homes/Adult Living Facilities	21
Schools	38
Utilities/Lift Stations	352
Airports	1
Public Safety	17
Parks/Community Centers	28
Historical Sites	23

14. Disaster Declarations

Martin County has experienced many federally declared disasters over the years. The earliest on record, according to FEMA, was in 1965 (the first disaster declaration was in 1953), but that does not mean that Martin County has not experienced disasters prior to this year. The table below outlines all the major disaster, emergency, and fire management assistance declarations that Martin County has experienced. The start and end dates refer to the declaration period, not the specific date it affected Martin County. The cost shown is based on the entire declaration, not the cost for Martin County.

Table 14: Martin County Federal Declarations

Declaration Number	*Event*	*Start Date*	*End Date*	*Cost*
DR-209	Hurricane Betsy (a.k.a. Billion Dollar Betsy)	9/14/1965	9/14/1965	$1.42 B
DR-526	Severe Winter Weather	1/31/1977	1/31/1977	Unknown
DR-851	Severe Freeze	12/23/1989	12/25/1989	Unknown
DR-982	Tornadoes, Flooding, High Winds & Tides, Freezing (a.k.a. Storm of the century)	3/12/1993	3/16/1993	$50 M
DR-1074	Severe Flooding	10/13/1995	11/20/1995	Unknown
DR-1223	Extreme Fire Hazard	5/25/1998	7/22/1998	$25 M
EM-3131	Hurricane Georges	9/25/1998	10/2/1998	$340 M
FM-2251	Okeechobee Fire Complex	4/13/1999	N/A	Unknown
EM-3139	FL-Fires 04/15/99	4/15/1999	5/25/1999	Unknown
DR-1300	Hurricane Floyd	9/13/1999	9/25/1999	$6 B
DR-1306	Hurricane Irene	10/14/1999	10/24/1999	$800 M
DR-1359	Severe Freeze	12/1/2000	1/25/2001	$179 M
FM-2354	Okeechobee Complex Fire	2/19/2001	N/A	Unknown
DR-1539	Tropical Storm Bonnie and Hurricane Charley	8/11/2004	8/30/2004	$14 B

Declaration Number	*Event*	*Start Date*	*End Date*	*Cost*
DR-1545	Hurricane Frances	9/3/2004	10/8/2004	$9 B
DR-1551	Hurricane Ivan	9/13/2004	11/17/2004	$18 B
DR-1561	Hurricane Jeanne	9/24/2004	11/17/2004	$8 B
EM-3220	Hurricane Katrina Evacuation	8/29/2005	10/1/2005	$3.8 M
DR-1609	Hurricane Wilma	10/23/2005	11/18/2005	$1.4 B
FM-2696	Okeechobee Fire Complex	5/29/2007	N/A	$637 K
DR-1785	Tropical Storm Fay	8/18/2008	9/12/2008	$116 M
FM-2819	Martin County Fire Complex	5/11/2009	N/A	$410 K
DR-4084	Hurricane Isaac	8/27/2012	8/29/2012	$21.4 M
DR-4283	Hurricane Matthew	10/3/2016	10/19/2016	$390 M
DR-4337	Hurricane Irma	9/4/2017	10/18/2017	$3.3 B
DR-4468	Hurricane Dorian	8/28/2019	9/9/2019	$77.8 M
DR-4486	COVID-19 Pandemic	1/20/2020	5/11/2023	$3.1 B*
EM-3533	Hurricane Isaias	7/31/2020	8/4/2020	$1.3 M
DR-4673	Hurricane Ian	9/23/2022	11/4/2022	$3.4 B
DR-4680	Hurricane Nicole	11/7/2022	11/30/2022	$93.8 M
DR-4834	Hurricane Milton	10/05/2024	11/02/2024	$802 M†

** Only in Florida. The COVID-19 pandemic estimated costs are much higher as each state received a declaration.*
† As of the writing of this plan, Hurricane Milton costs are still being calculated.
Source: FEMA

E. CAPABILITIES

§201.6(c)(4)(ii)	[This plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.
S1 (C1-a)	The plan must describe how resources of each participant the existing authorities, policies, programs, funding and are available to support the mitigation strategy. This must include a discussion of the existing building codes and land use and development ordinances or regulations. Capabilities may be described in a table or narrative.

1. Existing Policies, Programs, and Resources

Martin County itself and the municipalities therein have several capabilities that can support mitigation efforts including comprehensive plans, building codes, subdivision and land use ordinances, zoning ordinances, and floodplain regulations. The LMS Coordinator worked with the jurisdictional representatives to complete a "capabilities assessment". Representatives answered questions about the following plans, codes, and ordinances from the perspectives of their home jurisdictions that are currently existing and in place in each jurisdiction.

Comprehensive Plans

Comprehensive plans promote sound land use and regional cooperation among local governments to address planning issues. These plans serve as the official policy guide for influencing the location, type, and extent of future development by establishing the basic decision-

making and review processes on zoning matters, subdivision and land development, land uses, public facilities, and housing needs over time.

Building Codes

Building codes regulate construction standards for new construction and substantially renovated buildings. Standards can be adopted that require resistant or resilient building design practices to address hazard impacts common to a given community.

Subdivision and Land Use Development Ordinances

Subdivision and land development ordinances (SALDOs) are intended to regulate the development of housing, commercial, industrial or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Within these ordinances, guidelines on how land will be divided, the placement and size of roads and the location of infrastructure can reduce exposure of development to hazard events.

Zoning Ordinances

Zoning ordinances allow for local communities to regulate the use of land in order to protect the interests and safety of the general public. Zoning ordinances can address unique conditions or concerns within a given community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development, and/or require land development to consider specific hazard vulnerabilities.

National Flood Insurance Program (NFIP)

Participation and Floodplain Management Ordinances through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures located in the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas altogether. The National Flood Insurance Program (NFIP) establishes minimum ordinance requirements which must be met for that community to participate in the program. However, a community is permitted and encouraged to adopt standards which exceed NFIP requirements.

The following table summarizes the jurisdictional capabilities of Martin County and its jurisdictions, according to the completed surveys.

Table 15: Jurisdictional Policies, Programs, and Resources

Jurisdiction	*Comprehensive Plan*	*Building Codes*	*Subdivision or Land Use Ordinance*	*Zoning Ordinance*	*Participates in the NFIP*
Martin County	✓	✓	✓	✓	✓
City of Stuart	✓	✓	✓	✓	✓
Town of Jupiter Island	✓	✓	✓	✓	✓
Town of Ocean Breeze	✓	✓	✓	✓	✓
Town of Sewall's Point	✓	✓	✓	✓	✓
Village of Indiantown	✓	✓	✓	✓	✓
Martin County School District		N/A	N/A	N/A	N/A
Cleveland Clinic	✓	N/A	N/A	N/A	N/A

Source: Jurisdictional Representatives

2. Ability of Jurisdiction and Capabilities

S2 (C1-b)	The plan must describe the ability of each participant to expand on and improve the capabilities described in the plan (S1).

Representative members of the jurisdictions completed a self-assessment for their jurisdiction to serve as representative capabilities within the region to effectively implement hazard mitigation activities. As part of this process, jurisdictions were encouraged to consider barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. Results are shown under each category of capabilities.

Planning and Regulatory

Several planning activities and duties in Martin County may include (but may not be limited to) the following (numbers on the list correspond do answers on the table below).

(1) Promote planning,
(2) make land examinations and surveys,
(3) accept and use gifts and public or private grants for the performance of the commission's functions (i.e., planning activities),
(4) enact, adopt, amend, and execute a comprehensive plan,
(5) adopt zoning regulations to control street congestion; promote health, public safety, and general welfare; provide adequate light and air; promote the conservation of natural resources; prevent environmental pollution; properly manage growth and development; and promote or facilitate adequate transportation, water, sewage, schools, recreation, parks, and other public facilities,
(6) recommend subdivision regulations to the legislative body, and/or
(7) support the preservation of historic structures.

Table 16: Planning and Regulatory Capabilities Self-Assessment

PLANNING AND REGULATORY CAPABILITIES SELF-ASSESSMENT							
Jurisdiction	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Martin County	✓	✓		✓	✓	✓	✓
City of Stuart	✓			✓	✓	✓	✓
Town of Jupiter Island	✓			✓	✓	✓	✓
Town of Ocean Breeze	✓		✓	✓	✓	✓	
Town of Sewall's Point	✓			✓	✓	✓	✓
Village of Indiantown	✓		✓		✓	✓	✓
Martin County School District	✓						
Cleveland Clinic	✓		✓	✓			

Source: Jurisdictional Representatives

Administrative and Technical Capability

Administrative capability is described by an adequacy of departmental and personnel resources for the implementation of mitigation-related activities. Technical capability relates to an adequacy of knowledge and technical expertise of local government employees or the ability to contract outside resources for this expertise to effectively execute mitigation activities (numbers on the list correspond do answers on the table below).

(1) In-house planners with knowledge of land development/management practices
(2) Contracted planners with knowledge of local land development/management practices

(3) In-house engineers
(4) Contracted engineers with intimate local knowledge
(5) In-house building inspector(s)
(6) In-house planners with an understanding of local natural, technological, or societal hazards
(7) Contracted planners with an understanding of local natural, technological, or societal hazards
(8) Emergency manager
(9) Floodplain manager
(10) In-house land surveyor
(11) In-house GIS mappers

Table 17: Administrative and Technical Capabilities Self-Assessment

Jurisdiction	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*
Martin County	✓		✓	✓	✓	✓		✓	✓	✓	✓
City of Stuart	✓	✓	✓	✓	✓			✓			✓
Town of Jupiter Island	✓	✓	✓	✓	✓	✓	✓				
Town of Ocean Breeze		✓		✓	✓		✓				
Town of Sewall's Point				✓	✓		✓	✓	✓		
Village of Indiantown	✓	✓		✓							
Martin County School District	✓			✓		✓		✓			
Cleveland Clinic						✓		✓			

Source: Jurisdictional Representatives

Fiscal Capability

The decision and capacity to implement mitigation-related activities is often strongly dependent on the presence of local financial resources. While some mitigation actions are less costly than others, it is important that money is available locally to implement policies and projects. To assess fiscal capabilities, jurisdictions can employ or have the following (numbers on the list correspond do answers on the table below).

(1) Capital improvement funds for mitigation
(2) Public Works funds for mitigation
(3) In-house staff to manage mitigation grants
(4) Contracted staff to manage mitigation grants

Table 18: Fiscal Capabilities Self-Assessment

Jurisdiction	*(1)*	*(2)*	*(3)*	*(4)*
Martin County	✓	✓	✓	✓
City of Stuart				✓
Town of Jupiter Island	✓	✓		
Town of Ocean Breeze	✓	✓		
Town of Sewall's Point	✓			✓
Village of Indiantown	✓			✓
Martin County School District	✓			
Cleveland Clinic		✓	✓	

Source: Jurisdictional Representatives

Financial resources are particularly important if communities are trying to take advantage of state or federal mitigation grant funding opportunities that require local-match contributions. Federal programs which may provide financial support for mitigation activities include, but are not limited to:

- Community Development Block Grant (CDBG),
- Disaster Housing Program,
- Emergency Conservation Program,
- Emergency Management Performance Grants (EMPG),
- Emergency Watershed Protection Program,
- Hazard Mitigation Grant Program (HMGP),
- Flood Mitigation Assistance Program,
- Non-Insured Crop Disaster Assistance Program,
- Pre-Disaster Mitigation Program,
- Repetitive Flood Claims Program (RFC),
- Section 108 Loan Guarantee Programs,
- Severe Repetitive Loss (SRL) Program, and
- Weatherization Assistance Program.

State programs that may support mitigation include (but are not limited to):

- Florida Department of Commerce (job ready sites and CDBG funds for economic development),
- Florida Environmental Protection Agency (land and water conservation efforts),
- Florida Fish and Wildlife Conservation Commission (loans and capital improvements), and
- Florida Division of Emergency Management (funds to support emergency preparedness, response, and overall resilience).

Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard events. The adoption of hazard mitigation measures may be seen as an impediment to growth and economic development. In many cases, mitigation may not generate interest among local officials when compared with competing priorities. Therefore, the local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions.

The assessment included questions to gauge community receptiveness to several types of mitigation strategies. Although these actions may not appear on the current mitigation strategy, they provide a platform for discussion as the 2025-2030 cycle begins. The following table details the results.

Table 19: Self-Assessment: Example Mitigation Strategies

Sample Mitigation Strategy	*Very Willing*	*Willing*	*Neutral*	*Unwilling*	*Very Much Unwilling*
XYZ community guides development away from known hazard areas.	0%	75%	25%	0%	0%
XYZ community restricts public investments or capital improvements within hazard areas.	12.5%	62.5%	25%	0%	0%
XYZ community enforces local development standards (e.g., building codes, floodplain management ordinances, etc.) that go beyond minimum state or federal requirements.	12.5%	50%	37.5%	0%	0%

Sample Mitigation Strategy	*Very Willing*	*Willing*	*Neutral*	*Unwilling*	*Very Much Unwilling*
XYZ community offers financial incentives (e.g., through property tax) to individuals and businesses that employ resilient construction techniques (e.g., voluntary elevate structures, employ landscape designs that establish buffers, exceeding recommended building code standards, etc.)	0%	0%	50%	12.5%	37.5%
XYZ community offers financial incentives (e.g., through property tax credits) to individuals and businesses that employ green infrastructure techniques (e.g., pave sidewalks and driveways utilizing permeable materials, install drought tolerant plants to capture, clean, and filtrate rainwater, increase green space in urbanized areas, etc.).	0%	12.5%	37.5%	12.5%	37.5%

Source: Jurisdictional representatives

3. NFIP Jurisdictions

§ 201.6(c)(3)(ii)	[The mitigation strategy shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
P7 (A4)	For jurisdictions with structures for which National Flood Insurance Program (NFIP) coverage is available, regulatory flood mapping products are required to be incorporated, if applicable. Participants may use other jurisdiction-specific materials including non-regulatory flood mapping products, that improve upon NFOP regulatory flood mapping products.
S3 (C2-a)	The plan must describe how resources of each participant, the existing authorities, policies, programs, funding are available to support the mitigation strategy. This must include a discussion of existing building codes and land use and development ordinances or regulations. Capabilities may be described in a table or narrative.

The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. The NFIP is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community, floodplain, management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government.

If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

Each jurisdiction within the county is an active participant in the NFIP. In an effort to ensure continued compliance with the NFIP, each participating community will:

- Continue to enforce their adopted Floodplain Management Ordinance requirements, which include regulating all new development and substantial improvements in Special Flood Hazard Areas (SFHA).
- Continue to maintain all records pertaining to floodplain development, which shall be available for public inspection.
- Continue to notify the public when there are proposed changes to the floodplain ordinance or Flood Insurance Rate Maps.
- Maintain the map and Letter of Map Change repositories.
- Continue to promote Flood Insurance for all properties.
- Continue their Community Rating System outreach programs, as applicable.

Table 20: Jurisdictional Departments in Charge of Floodplain Management

Community Name	*Department*
Martin County	Public Works Department
Stuart	Development Department
Indiantown	Planning and Public Works Department
Jupiter Island	Building Planning and Zoning Department
Sewall's Point	Building and Public Works Department
Ocean Breeze	Building Department

Table 21: Communities Participating in the NFIP

Community Name	*Init FHBM Identified*	*Init FIRM Identified*	*Current Effective Map Date*	*Reg-Emer Date*	*Participating Community*
Indiantown	N/A	02/19/20	02/19/20	12/9/2020	YES
Jupiter Island	05/24/74	02/02/77	02/19/20	02/02/77	YES
Martin County	07/29/77	06/15/81	02/19/20	06/15/81	YES
Ocean Breeze	08/02/74	06/15/81	02/19/20	06/15/81	YES
Sewall's Point	03/15/74	08/15/78	02/19/20	08/15/78	YES
Stuart	05/24/74	08/15/78	02/19/20	08/15/78	YES

Source: FEMA National Flood Insurance Program

Table 22: Communities Participating in the Community Rating System

Community Name	*CRS Entry Date*	*Current Effective Date*	*Current Class*	*% Discount*
Jupiter Island	10/1/1995	04/01/23	6	20%
Martin County	10/1/1992	04/01/23	5	25%
Sewall's Point	10/1/1996	05/01/19	10	0%

Source: FEMA National Flood Insurance Program

The Martin County GIS team has developed the Martin County flood map that includes local street imaging, where residents can access the FEMA flood maps on the Martin County website by visiting the following link: https://geoweb.martin.fl.us/flood/. Residents can search their address and know if they are in a flood zone, and what type. For reference, a static map of the flood zones is provided in the *Flood* hazard profile.

4. Substantial Damage and Substantial Improvement

There are certain tasks related to substantial damage that must take plan post-disaster to remain in compliance with the National Flood Insurance Program (NFIP). Substantial damage under the NFIP is defined as "damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred."

Following an event, jurisdictions inspect affected structures within the floodplain to determine the extent of damage. If the damage equals or exceeds 50% of the pre-event market value, the structure is determined to be substantially damaged. Property owners are notified of the requirements to bring their structure into compliance with current floodplain standards before repair or reconstruction begins.

Each jurisdiction has its own ordinance that outlines steps to take after an event. Generally, the jurisdictions follow similar steps such as the following, with little variation.

- Conduct damage assessment.
- Determine if the structure exceeds the 50% substantial damage threshold.
- Notify the property owner of the determination and compliance requirements.
- Require that any repair or reconstruction go through the permitting process to ensure compliance with elevation and flood protection standards.
- Verify that all completed work meets floodplain regulations before issuing final approval or a certificate of occupancy.

5. Repetitive Loss and Severe Repetitive Loss

R 11 (B2-c)	The plan must address repetitively flooded NFIP-Insured structures by including estimated numbers and types (residential, commercial, institutional, etc.) of repetitive loss properties.

Reducing the losses associated with repetitive flood loss properties is a high priority nationally. This is reflected by the priority placed on repetitive loss properties in Federal grant applications. For this analysis, documented repetitive losses are restricted to the narrow FEMA definition and represent only those residential and commercial properties whose owners have made more than one claim on their flood insurance policies as recorded by the NFIP.

When buildings experience more than one loss due to flooding, they can become repetitive or severe repetitive loss properties. There are two accepted definitions of repetitive loss and severe repetitive loss: one from the Flood Mitigation Assistance (FMA) grant and the other from the National Flood Insurance Program (NFIP). The following table outlines the definitions.

Table 23: RL and SRL Definitions

Program	*Repetitive Loss*	*Severe Repetitive Loss*
Flood Mitigation Assistance (FMA) Grant	A Repetitive Loss (RL) property is a structure covered by a contract for flood insurance made available under the NFIP that: Has incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25% of the	(a) Is covered under a contract for flood insurance made available under the NFIP; and (b) Has incurred flood-related damage i. For which 4 or more separate claims payments (includes building and contents) have been made under flood

Program	*Repetitive Loss*	*Severe Repetitive Loss*
	market value of the time of each such flood event; At the time of the second incidence of flood related damage, the contract for flood insurance contains increased cost of compliance coverage.	insurance coverage with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claim's payments exceeding $20,000, or ii. For which at least 2 separate claims payments (includes only building) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.
National Flood Insurance Program (NFIP)	A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978.	A single-family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

According to Martin County Public Works, there are a total of 171 repetitive loss properties and 12 severe repetitive loss properties. The following table lists the types for each.

Table 24: RL and SRL Properties in Martin County

Type	*Repetitive Loss*	*Severe Repetitive Loss*
Residential	147	11
Commercial	2	0
Institutional	0	0
Other	22	1
TOTAL	**171**	**12**

II. THE PLANNING PROCESS

§201.6(c)(1)	Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.
P1 (A1-a)	The plan must document the planning process

A. PLANNING PROCESS[1]

Martin County Emergency Management was the lead organization in updating this plan. During the regular LMS meeting in July 2024, the Committee formed a Plan Update Subcommittee to ensure adequate representation from jurisdictions and community partners that would advise on plan updates and requirements. See *Section II.D. Jurisdictional Representation* for a list of subcommittee members.

The following table is a summary of the meetings the partners held for the development of the plan. Each meeting is described below in more detail. For agendas, presentation, advertisements, and minutes of these meetings, refer to *Attachment A: Planning Process Documentation.* In addition to the in-person and virtual meetings, the subcommittee and the LMS Coordinator maintained constant communications throughout the process via email and phone calls.

Table 25: Meetings Held for the Plan Update

Date	*Format*	*Purpose*
July 17, 2024	In-Person	• Review the plan update proposal and timeline • Review and approve the draft online public survey questions
September 18, 2024	Virtual	• Review current list of hazards and modify, add, and delete as needed to align with the 2023 Enhanced State Hazard Mitigation Plan • Discuss ranking method for hazards • Analyze and define list of critical facilities, include assets in Martin County • Review public survey input so far
October 16, 2024	In-Person	• Refine hazards to be included and excluded • Review hazard ranking methodology • Discuss critical infrastructure and assets list • Propose possible public meeting dates and locations • Review the survey for jurisdictional capabilities
December 18, 2024	In-Person	• Review draft of Introduction section • Excluded hazards review • Hazard ranking methodology • Jurisdictional public meetings • Discuss partners
February 19, 2025	In-Person	• Review current project scoring method • Discuss updated project scoring method • Review and update existing project list • Review new project information requirements

[1] EMAP Standard 4.2.1

Date	*Format*	*Purpose*
March 19, 2025	In-Person	• Review and approve *LMS Initiative Proposal Form* and *LMS Initiative Scoring sheet* • Review and update Goals and Objectives
August 20, 2025	In-Person	• Review and approve final draft of plan

Since 2016, the LMS Committee has met quarterly to discuss updates, projects, requirements, etc. The table below lists all the meetings held in Martin County. The Committee holds special meetings when applicants propose new projects to be added to the list and prioritized.

Table 26: LMS Meetings 2026 - 2025

Meeting Dates	*Quarterly*	*Special*
March 4, 2016		
December 15, 2016		
March 22, 2017		
January 18, 2018		
May 3, 2018		
June 21, 2019		
August 13, 2019		
October 9, 2019		
January 22, 2020		
October 28, 2020		
January 20, 2021	X	
April 9, 2021		X
April 21, 2021	X	
July 21, 2021	X	
October 12, 2021		X
October 20, 2021	X	
November 12, 2021		
January 19, 2022	X	
April 20, 2022	X	
June 29, 2022		X
July 20, 2022	X	
October 19, 2022	X	
January 18, 2023	X	
April 3, 2023		X
April 20, 2023	X	
July 12, 2023	X	
October 17, 2023		X
October 18, 2023	X	
January 17, 2024	X	
April 17, 2024	X	
July 17, 2024	X	
October 16, 2024	X	
February 19, 2025	X	
May 21, 2025	X	
June 25, 2025		X
August 20, 2025	X	

B. JURISDICTIONS, ROLES, AND REPRESENTATION

P2 (A1-b)	The plan must list the jurisdictions and their roles.
P3 (A1-b)	The plan must list a representative from each jurisdiction that will seek approval and how they participated in the planning process (at a minimum, it must identify the jurisdiction represented and the person's agency and title within the jurisdiction).

The jurisdictions seeking approval for the 2025 LMS plan are the following:

- Martin County
- City of Stuart
- Town of Jupiter Island
- Town of Ocean Breeze
- Town of Sewell's Point
- Village of Indiantown
- Martin County School District
- Cleveland Clinic

The LMS Plan Update Subcommittee tasked with the update of this plan has continued the planning process that was established in 1998. For the 2025 update, the Subcommittee has representatives from the following jurisdictions and agencies (where more than one name appears, there was a change in membership throughout the process).

Table 27: LMS Plan Update Subcommittee Members

Jurisdiction/Agency	*Type*	*Point of Contact, Title*
Stuart	City	Derek Ortado, Emergency Management Coordinator
Martin County	County	George Dzama, Deputy Director, Public Works Department Jim Gorton, Director, Public Works Department
MC School District	School District	Julie Sessa, Assistant Superintendent of HR Mark Cocco, Safety Manager
Cleveland Clinic	Private	Christina Proulx, Emergency Management Senior Manager
Martin County	Public	Keith Holman Jacqui May
Jupiter Island	Town	John Duchock, Assistant Town Manager
Ocean Breeze	Town	Terry O'Neil, Management Consultant Kevin Docherty, Town Council President
Sewall's Point	Town	Bob Daniels, Town Manager
Indiantown	Village	Patrick Nolan, Utilities and Public Works Director
Stuart/Martin Chamber of Commerce	Non-Profit	Patrick LaConte, Member

The following table lists how each jurisdiction participated; the members completed a variety of tasks throughout the process. In the last column, the table indicates how the stakeholder participated in the planning process. The numbers correspond to the following descriptions.

1. Member of the LMS Plan Update Subcommittee.
2. Attended at least one regular LMS Workgroup meeting during the planning update.
3. Provided information to MCEMA directly via email or phone conversation for the plan update.
4. Distributed the public survey.

5. Hosted a public meeting.
6. Attended a public meeting.

Table 28: Jurisdictional Participation in Martin County LMS Plan Update

Jurisdiction	*Participation Method*
Martin County	1, 2, 3, 4, 5, 6
City of Stuart	1, 2, 3
Town of Jupiter Island	1, 2, 3, 5, 6
Town of Ocean Breeze	1, 2, 3, 5
Town of Sewall's Point	1, 2, 3, 5
Village of Indiantown	1, 2, 3, 5
Martin County School District	3
Cleveland Clinic	2, 3

C. STAKEHOLDERS

§201.6(b)(2)	[Provide] an opportunity for neighboring communities, local, and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process.
P4 (A2)	The plan must provide documentation of an opportunity for stakeholders to be involved in the current planning process. Documentation of this opportunity must identify how each of the stakeholders were presented with this opportunity, as applicable.

In adopting the whole community approach to planning, the LMS Coordinator reached out to other stakeholders for input throughout Martin County. These agencies, organizations, and companies operate in Martin County and were provided a survey where they could give feedback about hazards and mitigation actions. The following lists the stakeholders and the asterisk (*) denotes the agencies or organizations who provided feedback. The detailed survey responses are included in *Attachment A: Planning Process Documentation*.

- American Red Cross Treasure Coast Chapter
- Audubon Martin County
- Business Development Board of Martin County*
- City of Stuart Police Department
- City of Stuart Fire Department
- Cleveland Clinic Martin Health*
- Economic Council of Martin County
- Everglades Foundation
- Florida Department of Health – Martin County*
- Florida Power and Light
- Guardians of Martin County
- Hobe Sound Chamber of Commerce*
- Indian River State College*
- Indiantown Chamber of Commerce
- Jensen Beach Chamber of Commerce
- Jonathan Dickinson State Park

- Martin County Fire Rescue*
- Martin County Sheriff's Office*
- Palm City Chamber of Commerce
- South Florida Water Management District
- Stuart/Martin Chamber of Commerce
- Town of Jupiter Island Public Safety Department*
- Town of Sewall's Point Police Department*
- United Way of Martin County*

Additionally, the LMS Coordinator received guidance and feedback from stakeholders who are external to Martin County. These include the following.

- Florida Division of Emergency Management provided guidance, training, and feedback on plan requirements and development.
- St. Lucie County Emergency Management provided feedback on hazards and mitigation actions that may affect our region. The Martin County LMS Chair attended the St. Lucie County LMS meeting in June 2024.

D. Public Involvement

§201.6(b)(1)	[Provide] an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.
P5 (A3)	The plan must document how the public had an opportunity to be involved in the current planning process and what that participation entailed, including how underserved communities and vulnerable populations within the planning area were provided an opportunity to be involved.

1. Online Public Survey

An online survey was designed to garner public input for the plan that addressed hazards and projects. The survey was made available on social media platforms, on the Martin County Emergency Management website, through the Martin County *County Connection* weekly publication (with a distribution list of approximately 3,000 contacts), at all Martin County Libraries, and shared at all public events. The survey opened to the public in August 2024 and closed in August 2025. A total of 114 responses were received. For results of the survey, refer to *Attachment B: Public Outreach*.

2. Jurisdictional Public Meetings

Various jurisdictions invited the LMS Coordinator to provide presentations to their commissions/councils and give information about the LMS plan update and promote the public survey. The following public meetings took place and the agendas and presentations can be found in *Attachment A: Planning Process Documentation*.

- Town of Jupiter Island: Beach Protection District Meeting, December 4, 2024, at 10:00 am. The meeting was attended by approximately 13 people and a recording is available for viewing online at the Town's website.
- Village of Indiantown: Council Meeting, January 23, 2025, at 6:30 pm. Approximately 23 people attended the meeting in person.
- Town of Ocean Breeze: Council Meeting, February 10, 2025, at 10:30 am. Approximately 17 people attended the meeting in person.

- Town of Sewall's Point: Commission Meeting, February 25, 2025, at 6:00 pm. Approximately 25 people attended the meeting in person.

3. LMS Committee Meetings

Throughout the planning process, the LMS Committee meetings were announced via the County website, and through social media postings from Martin County Emergency Management. The public was encouraged to attend the meetings and provide feedback on the following dates. No members of the public attended these meetings.

- October 16, 2024
- February 19, 2025
- May 21, 2025
- August 20, 2025

4. Emergency Management Website

The Martin County Emergency Management website was updated to display relevant LMS Plan update information in March 2025 and provided information on the current plan and a method to provide comment, the public survey link, and provided all the LMS Committee meeting dates, times, agendas, and meeting minutes. The current version of the plan was already available on the website prior to the update and no comments were received via email from the public.

In August 2025, the updated plan was posted on the website and available for public comment; the public was made aware through social media postings, announcements at the LMS Taskforce meetings, and through the *County Connection* newsletter.

5. Public Feedback Review and Integration

The LMS Subcommittee had the opportunity to review the results of the public survey. To integrate the survey feedback, several actions were taken.

- Invite respondents who expressed interest in attending a public meeting to the next LMS Committee Meeting in Ocean Breeze on August 20, 2025.
- Develop various low-to-no-cost projects for public education campaigns, as people are in favor of public education.
- Include information in each hazard profile about the public perception of each hazard.

For future consideration, when jurisdictions are formulating projects to be considered for the Prioritized Project List, they can refer to the survey and confirm that their constituents are in favor of the type of mitigation project they are proposing.

III. RISK ASSESSMENT

A. HAZARD IDENTIFICATION

§201.6(c)(2)(i)	[The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
R1 (B1-a)	The plan must include a description of all natural hazards that can affect the jurisdiction(s) in the planning area and their assets, such as dams, located outside of the planning area.

Martin County is vulnerable to a wide range of natural, technological, and societal-caused hazards that threaten life, property, and the environment. The initial identification of hazards for inclusion in the risk assessment was based on earlier versions of the Martin County LMS, as well as a review of the *2023 Enhanced State Hazard Mitigation Plan* and FEMA mitigation planning guidelines.

Each of the initially identified hazards were studied for their potential impact on Martin County as well as in terms of the availability of hazard mitigation strategies to reduce that impact. Best available data on historical occurrences, the geographical location and extent as well as the probability of future occurrences have been collected and reviewed as part of the hazard identification process.

During this review, it was determined that the following hazards from the previous 2020 LMS Plan needed to be reclassified or added:

- Beach Erosion: this hazard was reclassified as Shoreline Erosion to align with the Martin County *Vulnerability Analysis Plan*.
- Dam and Levee Failure: previously classified as a natural hazard, in this update it is moved to the technological hazard category.
- Harmful Algal Bloom: Lake Okeechobee is on the western border of Martin County and the county has various waterways and is on the coast and therefore is susceptible to Harmful Algal Bloom that can affect ecosystems, health, and economy in the county.
- Immigration Crisis: renamed to *Mass Migration* to accommodate any large influx of population for any reason.
- Invasive Species: added.
- Cyber Incidents: added as its own hazard profile; previously, it was included in the *Terrorism and Sabotage* profile, but as cyber incidents have become more prevalent, it was determined that this type of incident is different enough from its previous hazard inclusion.

All hazards are classified into one of three types of hazards.

- Natural: hazards that are naturally occurring phenomena relating to the earth and atmosphere.
- Technological: hazards arising from accidents, failures, or human activities involving technologies.
- Societal: hazards that refer to aspect of social life that negatively impact the community's wellbeing, health, or safety.

B. Omission of Hazards

R2 (B1-b)	The plan must provide rationale for the omission of any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area.

Earthquakes

The Florida *2023 Enhanced State Hazard Mitigation Plan* lists earthquakes as one of the natural hazards addressed in the plan. This plan describes the following for Martin County:

- Peak Ground Acceleration (2% probability of exceedance in 50 years) is 0.00.
- The ranking map lists Martin County at "No" probability of occurrence.
- The Federal Emergency Management Agency (FEMA) National Risk Index (NRI) map lists Martin County as "Very Low" risk.

Research conducted using the United States Geographic Survey (USGS) database indicates that there have been no historical occurrences of earthquakes with a magnitude of 2.5 or higher in Martin County or the surrounding regions since 2000.

Earthquakes pose little to no risk to Martin County and therefore are not included in the list of hazards for this plan update.

Sinkholes

The Florida *2023 Enhanced State Hazard Mitigation Plan* lists sinkholes as one of the natural hazards addressed in the plan. This plan describes the following for Martin County:

- Located in Zone 2, having permeable sand that varies in thickness from 20 to 200 feet. It mainly consists of small cover subsidence. Zone 2 cities include Fort Lauderdale, Port St. Lucie, and Orlando.
- The sinkhole susceptibility is "least favorable".
- This hazard is ranked at "No" probability of occurrence.

Sinkholes pose little to no risk to Martin County and therefore are not included in the list of hazards for this plan update. Sinkholes in Martin County are usually a sign of infrastructure failure with underground utilities such as drainage, water, and sewer.

Critical Infrastructure Disruption

The Critical Infrastructure Disruption hazard from the 2020 plan was reviewed by the Subcommittee and determined to be a cascading effect and not a hazard in and of itself. Therefore, this hazard has been removed but identified as a possible effect of other hazards and is noted throughout the hazard profiles where appropriate.

C. Calculating Risk

The Subcommittee updated the method by which risk is calculated for the hazards. This model is loosely based on the *2023 Enhanced State Hazard Mitigation Plan* to include frequency, probability, and magnitude. The Subcommittee provided additional measures for the calculation

to include onset, response time, impact area, and property impact as described below. The overall risk calculation formula is:

Risk = Threat x Vulnerability

Threat = Average (Frequency + Probability + Onset)

Example: *Frequency = 2 points*
Probability = 2 points
Onset = 3 point
Total = 6 points (average is 6/3)
Threat Score = 2.0 or Low threat (see Table 29)

Vulnerability = Average Magnitude (Response Time + Impact Area + Human Impact + Property Impact + Infrastructure Impact + Economic Impact + Environmental Impact)

Example: *Response Time = 4 points*
Impact Area = 4 points
Human Impact = 3 points
Property Impact = 3 point
Infrastructure Impact = 2 points
Economic Impact = 5 points
Environmental Impact = 3 points
Total = 24 points (average is 27/7)
Vulnerability Score = 3.4 or High Vulnerability (see table 30)

1. Definitions and Calculations

- **Risk**: the likelihood of a hazard occurring and causing damage, taking into account the threat, magnitude, and mitigation efforts
  - Threat: the potential of hazards causing damage to property or the environment, injury, or death to include frequency, probability, and onset
    - *Frequency:* average of occurrences (frequency) over the length of time of data availability, for example, 3 events over 10 years (3/10) would be 0.3 events per year and get the corresponding 3 points according to the chart below.
      - *High:* historically has occurred at least annually or more than once per year.
      - *Medium high:* historically happens between about every other year.
      - *Medium:* historical occurrences are approximately once every two to four years.
      - *Medium low:* rarely occurs.
      - *Low:* has never occurred.
    - *Probability*: closely related to frequency in that frequency provides a baseline for probability, however, there may be factors that could change and increase or decrease probability of a hazard in the future, such as climate change, mitigation actions, human error, etc.
      - *Highly likely to occur:* expectation is that the hazard will definitely occur during a year based on frequency and other factors as described above.

- *Likely:* the hazard is likely to occur in a year based on frequency and other factors.
- *May or may not occur*: this indicates about a 50/50 chance of a hazard occurring in a year based on frequency and other factors.
- *Unlikely*: the hazard is unlikely to occur in a year based on frequency and other factors.
- *Very unlikely*: So unlikely it can be assumed that it will not occur in a year.

▪ *Onset*: Average speed of onset may affect all other factors due to lack of warning or time to prepare for impact. The lead-time required protecting lives and property varies greatly with each event. For instance, a hurricane may develop so slowly that there is time to alert crews and pre-position equipment, but flash floods can occur with little warning.

- *No warning:* this hazard has no pre-indications of occurrence.
- *< 12 hours:* this hazard has up to 12 hours of advance notice of occurring.
- *12*-24 hours: this hazard has approximately 12-24 hours of advanced lead time of notification of occurrence.
- *1 day to 1 week:* this hazard has between one day and one week of advance warning of occurrence.
- *Over 1 week:* this hazard has over one week of advance notice of occurrence.

Table 29: Threat Calculation

Points	*Frequency*	*Probability*	*Onset*
5	0.76 – >1.0 High	Highly likely to occur in a year	No warning
4	0.51 – 0.75 Medium High	Likely to occur in a year	< 12 hrs.
3	0.26 - 0.50 Medium	May or may not occur in a year	12-24 hrs.
2	0.01 – 0.25 Low	Unlikely to occur in a year	1 day – 1 week
1	0.00 None	Very unlikely to occur in a year	Over 1 week

o Vulnerability: the exposure to the possibility of harm or damage based on the potential magnitude of a hazard

▪ *Magnitude*: the extent to which the hazard will inflict damage on the county, to include response time, impact area, human impact, property damage, infrastructure disruption, economic impacts, and environmental impacts

- Response Time: Average response duration is the "time on the ground" or the time-period of response to a hazard, or event, not including possible investigation time, and recovery. Transportation accidents may last a few hours whereas a tire fire may last a week or a flood several weeks. Duration, therefore, may not always be indicative of the degree of damage but it remains an important planning factor. For this purpose, “responders” refers to any traditional or non-traditional personnel assigned to the incident such as police, fire, medical, environmentalists, clean up contractors, scientists, etc.
  - *No response*: no traditional response is required for the hazard.
  - *Up to 1 day*: responders may handle response within one day of the occurrence of an incident.

  - *Up to 1 week*: responders may handle response within one week of the occurrence of an incident.
  - *Up to 1 month*: responders may handle response within one month of the occurrence of an incident.
  - *Over 1 month*: responders may be involved in response activities for over one month after the occurrence of an incident.
- Location: the geographical extent to which the hazard could impact the county.
  - *Localized:* only certain areas of vulnerability could be impacted.
  - *Limited:* only certain areas of identified vulnerability would be impacted but may extend outside of the expected areas.
  - *Moderate:* several parts of the County could be affected.
  - *Generalized:* many areas of the County could be affected.
  - *Widespread:* the majority if not all of the County is affected by the hazard event.
- Human Impact: This factor relates to the number of lives potentially lost to a particular hazard agent. This factor can vary between jurisdictions based on economic, geographic, and demographics of the particular populations. Therefore, some generalization need be inflected on this factor.
  - *None:* no illnesses or injuries are expected
  - *Minor:* minor illness or injuries are expected with limited impact on daily functioning and require minimal medical intervention.
  - *Moderate:* moderate illness or injuries are expected requiring medical intervention and may lead to temporary disability.
  - *Severe:* severe illness or injuries are expected and are life-threatening and may lead to significant impairment of bodily functions.
  - *Deaths:* deaths are possible or expected.
- Property Impact: This factor relates to the amount of total property potentially lost or damaged to a particular hazard agent within the impacted area. This factor can vary between jurisdictions based on economics, geographic amount owned, and demographics of the populations. Therefore, some generalization need be inflected on this factor. These estimations are based on the expected *Location.*
  - *<10%:* less than 10% of the property at risk could be affected in some way.
  - *10-25%: 10-25%* of the property at risk could be affected in some way.
  - *26-50%:* 26-50% of the property at risk could be affected in some way.
  - *51-75%:* 51-75% of the property at risk could be affected in some way.
  - *> 75%:* over 75% of the property at risk could be affected in some way.

- Infrastructure Impact: expected time of disruption to power, water, sewer, transportation, and cyber systems.
    - *< 1 day:* Infrastructure systems may be disrupted for up to one day.
    - *Up to 1 week:* Infrastructure systems may be disrupted for up to one week.
    - *Up to 2 weeks:* Infrastructure systems may be disrupted for up to two weeks.
    - *Up to 1 month:* Infrastructure systems may be disrupted for up to one month.
    - *> 1 month:* Infrastructure systems may be disrupted over one month.
- Economic Impact: damages caused to the economy as a result of the hazard.
    - *< 1 day:* minimal impact to the economy is expected and businesses may open within a day of the incident.
    - *Up to 1 week:* businesses and industries may be closed for up to one week and need minimal external assistance to reopen.
    - *Up to 2 weeks:* businesses and industries may be closed for up to two weeks and need some external assistance to reopen.
    - *Up to 1 month:* businesses and industries may be closed for up to two weeks and need external assistance to reopen.
    - *> 1 month:* severe economic impacts can be expected resulting in unemployment.
- Environmental Impact: damages caused to the environment in the affected area.
    - *Minimal:* damages caused require little to no intervention.
    - *Limited:* damages caused require some human intervention to return to normal healthy environment levels.
    - *Moderate:* damages caused require significant intervention to return to normal healthy environment levels
    - *Critical:* damages caused are expected to have a long-lasting effect on the environment such as habitat destruction, water and air pollution, and biodiversity loss.
    - *Severe:* damages caused are so catastrophic, it is expected that the impacted area will never return to pre-incident conditions.

Table 30: Magnitude Calculation

Points	*Response*	*Location*	*Human*	*Property*	*Infrastructure*	*Economy*	*Environment*
1	No response	Localized	None	< 10%	< 1 day	< 1 day	Minimal
2	Up to 1 day	Limited	Minor	10-25%	Up to 1 week	Up to 1 week	Limited
3	Up to 1 week	Moderate	Moderate	26-50%	Up to 2 weeks	Up to 2 weeks	Moderate
4	Up to 1 month	Generalized	Severe	51-75%	Up to 1 month	Up to 1 month	Critical
5	> 1 month	Widespread	Deaths	>75%	> 1 month	> 1 month	Severe

To assign a numerical value to each definition and calculate risk, the following tables outline the possible points for each one of the definitions and provide a description.

Table 31: Scoring Threat and Vulnerability

Threat Score	*Vulnerability Score*	*Designation*
1.0 – 1.7	1.0 – 1.7	Minimal
1.8 – 2.5	1.8 – 2.5	Low
2.6 – 3.3	2.6 – 3.3	Medium
3.4 – 4.1	3.4 – 4.1	High
4.2 – 5.0	4.2 – 5.0	Extreme

To calculate the risk, the threat and vulnerability designations are cross-referenced according to the table outlined below and assigned a risk value of extreme, severe, high, moderately high, moderate, moderately low, low, slight, and minimal risk.

Table 32: Calculating Risk

	Minimal Vulnerability	*Low Vulnerability*	*Medium Vulnerability*	*High Vulnerability*	*Extreme Vulnerability*
Extreme Threat	Moderate Risk	Moderately High Risk	High Risk	Severe Risk	Extreme Risk
High Threat	Moderately Low Risk	Moderate Risk	Moderately High Risk	High Risk	Severe Risk
Medium Threat	Low Risk	Moderately Low Risk	Moderate Risk	Moderately High Risk	High Risk
Low Threat	Slight Risk	Low Risk	Moderately Low Risk	Moderate Risk	Moderately High Risk
Minimal Threat	Minimal Risk	Slight Risk	Low Risk	Moderately Low Risk	Moderate Risk

The following table identifies each hazard and where they fall on the risk scale, according to its threat and vulnerability calculations.

Table 33: Hazard Risk Rankings

	Minimal Vulnerability	*Low Vulnerability*	*Medium Vulnerability*	*High Vulnerability*	*Extreme Vulnerability*
Extreme Threat	Hazardous Materials	Cyber Incidents Wildfires Invasive Sp. Transportation			
High Threat	Harmful Algal Blooms	Severe Th. Tornadoes Shoreline Eros.	Extreme Temperatures		
Medium Threat		Drought Civil Disturbance Wellfield Cont.	Flood		
Low Threat	Sea Level Rise	Terrorism and Sabotage		Tropical Cyclones	
Minimal Threat	Mass Migration Tsunamis		Epidemic/ Pandemic Dam Failure		Radiological Nuclear

Table 34: Hazard Risk Assessment

	THREAT					VULNERABILITY									RISK
Hazard	*Frequency*	*Probability*	*Onset*	*Score*	*Threat Designation*	*Response*	*Location*	*Human*	*Property*	*Infrastructure*	*Economy*	*Environment*	*Score*	*Vulnerability Designation*	*Risk Designation*
Drought	3	4	1	2.7	Medium	1	5	1	1	2	3	4	2.4	Low	Moderately Low
Epidemic/Pandemic	2	2	1	1.7	Minimal	5	5	5	1	1	5	1	3.3	Medium	Low Risk
Extreme Temperatures	5	4	1	3.3	High	3	5	5	1	1	1	2	2.6	Medium	Moderately High
Floods	3	3	2	2.7	Medium	3	2	3	3	3	3	2	2.7	Medium	Moderate
Harmful Algal Bloom	5	5	1	3.7	High	5	1	1	1	1	1	1	1.6	Minimal	Moderately Low
Invasive Species	5	5	3	4.3	Extreme	5	5	1	1	1	1	3	2.4	Low	Moderately High
Sea Level Rise	5	1	1	2.3	Low	1	1	1	1	1	1	2	1.1	Minimal	Slight
Severe Thunderstorms	5	4	2	3.7	High	2	5	3	1	1	1	1	2	Low	Moderate
Shoreline Erosion	5	5	1	3.7	High	3	1	1	1	2	2	4	2	Low	Moderate
Tropical Cyclones	3	3	1	2.3	Low	4	4	4	3	4	4	4	3.9	High	Moderate
Tornadoes	4	3	4	3.7	High	3	1	4	3	2	1	2	2.3	Low	Moderate
Tsunami	1	1	3	1.7	Minimal	1	1	1	1	1	1	1	1	Minimal	Minimal
Wildfire	5	5	5	5	Extreme	3	2	2	5	2	1	2	2.4	Low	Moderately High
Cyber Incidents	5	3	5	4.3	Extreme	4	1	1	1	4	4	1	2.3	Low	Moderately High
Dam Failure	1	1	1	1	Minimal	3	1	5	3	5	1	1	2.7	Medium	Low
Hazardous Materials	5	5	5	5	Extreme	2	1	2	1	1	1	2	1.4	Minimal	Moderate
Radiological/Nuclear	1	1	3	1.7	Minimal	5	3	3	4	5	5	5	4.3	Extreme	Moderate
Transportation System	5	5	5	5	Extreme	3	1	5	1	2	1	1	2	Low	Moderately High
Wellfield Contamination	2	1	5	2.7	Medium	4	1	1	1	4	1	3	2.1	Low	Moderately Low
Civil Disturbances	1	2	5	2.7	Medium	2	1	5	1	1	1	1	1.7	Low	Moderately Low
Mass Migration	1	1	1	1	Minimal	1	1	1	1	1	1	1	1	Minimal	Minimal
Terrorism and Sabotage	1	1	4	2	Low	3	1	5	1	2	1	3	2.3	Low	Low

Table 35: Hazard Designations by Threat, Vulnerability, and Risk

Hazard	*Threat Designation*
Hazardous Materials	Extreme Threat
Transportation System	Extreme Threat
Wildfire	Extreme Threat
Cyber Incidents	Extreme Threat
Invasive Species	Extreme Threat
Harmful Algal Bloom	High Threat
Severe Thunderstorms	High Threat
Shoreline Erosion	High Threat
Tornadoes	High Threat
Extreme Temperatures	High Threat
Civil Disturbances	Medium Threat
Drought	Medium Threat
Floods	Medium Threat
Wellfield Contamination	Medium Threat
Sea Level Rise	Low Threat
Tropical Cyclones	Low Threat
Terrorism and Sabotage	Low Threat
Epidemic/Pandemic	Minimal Threat
Radiological/Nuclear	Minimal Threat
Tsunami	Minimal Threat
Dam Failure	Minimal Threat
Mass Migration	Minimal Threat

Hazard	*Vulnerability Designation*
Radiological/Nuclear	Extreme Vulnerability
Tropical Cyclones	High Vulnerability
Epidemic/Pandemic	Medium Vulnerability
Floods	Medium Vulnerability
Dam Failure	Medium Vulnerability
Extreme Temperatures	Medium Vulnerability
Wildfire	Low Vulnerability
Invasive Species	Low Vulnerability
Drought	Low Vulnerability
Cyber Incidents	Low Vulnerability
Tornadoes	Low Vulnerability
Terrorism and Sabotage	Low Vulnerability
Wellfield Contamination	Low Vulnerability
Transportation System	Low Vulnerability
Severe Thunderstorms	Low Vulnerability
Shoreline Erosion	Low Vulnerability
Civil Disturbances	Low Vulnerability
Harmful Algal Bloom	Minimal Vulnerability
Hazardous Materials	Minimal Vulnerability
Sea Level Rise	Minimal Vulnerability
Tsunami	Minimal Vulnerability
Mass Migration	Minimal Vulnerability

Hazard	*Risk Designation*
Extreme Temperatures	Moderately High Risk
Invasive Species	Moderately High Risk
Wildfire	Moderately High Risk
Cyber Incidents	Moderately High Risk
Transportation System	Moderately High Risk
Floods	Moderate Risk
Severe Thunderstorms	Moderate Risk
Tropical Cyclones	Moderate Risk
Shoreline Erosion	Moderate Risk
Tornadoes	Moderate Risk
Hazardous Materials	Moderate Risk
Radiological/Nuclear	Moderate Risk
Drought	Moderately Low Risk
Harmful Algal Bloom	Moderately Low Risk
Wellfield Contamination	Moderately Low Risk
Civil Disturbances	Moderately Low Risk
Epidemic/Pandemic	Low Risk
Dam Failure	Low Risk
Terrorism and Sabotage	Low Risk
Sea Level Rise	Slight Risk
Tsunami	Minimal Risk
Mass Migration	Minimal Risk

D. HAZARD PROFILES

§201.6(c)(2)(i)	A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
§201.6(c)(2)(ii)	A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008, must also address NFIP-insured structures that have been repetitively damaged by floods.
§201.6(c)(2)(i)	A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
§201.6 (c)(2)(ii)(B)	An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.
§201.6(c)(2)(ii)(A)	The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.
§201.6(c)(2)(iii)	For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.
R3 (B1-b)	The plan must include information on location for each identified hazard.
R4 (B1-c)	The plan must provide the extent of the hazards that can affect the planning area.
R5 (B1-d)	The plan must include information on previous occurrences for each hazard that affects the planning area. At a minimum, this includes any state and federal major disaster declarations for the planning area since the last update.
R6 (B1-e)	The plan must include the probability of future events for the identified hazards that can affect the planning area.
R7 (B1-f)	For multi-jurisdictional plans, when hazard risks differ across the planning area and between participating jurisdictions, the plan must specify the unique and varied risk information for each applicable jurisdiction and their assets outside the planning area.
R8 (B2-b)	The plan must describe the potential impacts on each participating jurisdiction and its identified assets.
R9 (B2-a)	The plan must describe the overall vulnerability of each participant to the identified hazards.

Many different sections make up each hazard profile. The following defines what each of the sections consist of and how each section works together to provide an overall rating for each hazard.

- **Description**: Defines the hazard.
- **Possible causes**: Identifies potential elements that give rise to a phenomenon, or condition.
- **Extent**: The unit of measure of the hazard.
- **Historical occurrences**: Provides the timeline of hazards that have occurred. The data within this section includes updates to occurrences within the last five years and does not omit any previous occurrences. This way, the probability can be better calculated over a length of time. Historical occurrences are a factor in calculating probability and threat.
- **Probability**: Defines the likelihood of the hazard occurring or reoccurring. It is calculated based on historical occurrences. Probability is a factor in calculating threat.
- **Impacts and Vulnerabilities**: Defines the consequences or effects of each hazard on the assets identified. See *III.D.1. Complicating Variables* for a more detailed description of

impacts and cascading effects. Impacts are a factor in calculating vulnerability. Vulnerability describes which assets including structures, systems, and populations, within locations identified to be hazard prone, are at risk from the effects of the hazards. Vulnerability is a factor in calculating risk.
    - Response
    - Location
    - Human Impact
    - Property Impact
    - Infrastructure Impact
    - Economic Impact
    - Environmental Impact
- **Risk Assessment:** A scored list of contributing factors that make up threat and vulnerability calculations to get the overall risk of the hazard for Martin County.
- **Future Considerations:** A brief description on how land use change, population change, and long-term climate impacts can or has affected the impacts of the hazard. Long-term climate impact information is only included in natural hazard profiles.
- **Mitigation Measures**: Describes any known past, current, or future plans or mitigation projects that address the hazard.
- **Public Perspective**: Provides a brief overview of the results of the public survey conducted to update this plan as they relate to each hazard.

1. Complicating Variables

Direct, calculable consequences of disasters can include fatalities, injuries, and damages to humans, animals, or property. However, disasters do not end there; there are several indirect effects, tangible and intangible, associated with disasters. Some examples of these include loss of livelihood and income, loss of community and population, mental and psychosocial impacts, costs of rebuilding, repair or replacement, loss of inventory, wages and tax revenue, etc. All these also have a cost associated with them, but it is much more difficult to assign a specific dollar value and quantify accurately. For this analysis, the primary focus of loss estimates will be direct consequences of the given hazard.

Countless situations could occur that could result in a disruption to critical systems throughout Martin County. Loosely related variables can complicate some hazards; these are often considered cascading hazards. For example, high winds may cause sporadic damage throughout the county, but often do not become a significant countywide concern until a large number of residents are without power.

Cascading hazards in Martin County could include (but not be limited to) the following.

- Damage to infrastructure (i.e., roads, bridges, tunnels, pipes, utility poles, etc.) and residences following flooding.
- Flooding of downstream areas in the event of a dam failure.
- Increased upstream flooding caused by sea level rise impacts to high tides and rainfall occurring at the same time.
- Drinking water supply shortages and contamination following severe and prolonged drought conditions or floods.
- Power outages, ruptured gas lines, etc. following severe weather.
- Public health concerns following flooding conditions or power outages.
- Population displacement before, during, or after an event that may be temporary or permanent.

- Reduced tax base resulting from homes being destroyed by hurricanes, floods, or tornadoes.
- Droughts can lead to conditions that are favorable for wildfires.

The complicating variables related to each hazard are described within the profiles. The information presented is based on worst-case scenario events; a single event may not always reach all impacts described. However, it is important to understand that the impacts of hazards go beyond what is seen immediately after the event. The effects of one event can last months or even years, especially where public health, social, economic, environmental and infrastructure impacts are concerned.

2. Social Vulnerability

Age

Older adults are more likely to have medical problems that put them at an increased risk during a disaster. They might have chronic health problems, limited mobility, limited sight, hearing issues, or limited cognitive ability. Any of these health issues can limit their capacity to follow instructions. Older adults might also have reduced income, putting them at increased risk because of their limited resources. Some older adults are also isolated by their living situations or limited mass media use, making communication with this group difficult.

Young children are also more at risk, as they have yet to develop the resources, knowledge, or understanding to effectively cope with disaster, and they are more susceptible to injury and disease. Young children also are more vulnerable when they are separated from their parents or guardians, for example, at school or in daycare. Children are usually extremely vulnerable due to their high susceptibility to disease and post-disaster contamination. FEMA states that children are particularly vulnerable to post-disaster stress and anxiety and would require special and prolonged care. Also, having children that need to be cared for affects the ability of parents to resume their jobs/businesses in the recovery phase.

Health and Disability

Persons with a disability include those with a cognitive, physical, or sensory impairment that limits major life activities. People with physical impairments might include those with limited sight, hearing, or mobility or those who are dependent on electric power to operate medical equipment. For many people with medical conditions and disabilities, their ability to hear, understand, or respond to a warning is impaired. This group also includes those with access and functional needs, regardless of diagnosis or medical conditions (e.g., cancer).

The overall health of a person before a disaster can be indicative of how resilient the person will be to a disaster. Pre-existing conditions can be exacerbated by disaster conditions, stress, and access to medication. Poor mental health prior to a disaster is a significant risk factor for experiencing greater mental and physical declines and slower recovery post-disaster.

Homeowners vs. Rental Population

Understanding the percentage of renters in a community is essential as not owning a home makes this group extremely mobile and most likely to leave the County in the event of a major disaster.

Losing population following a catastrophic event can have severe impacts on the County's economy making it increasingly difficult to recover quickly.

Income and Class

A strong socio-economic status enables communities to quickly absorb and recover from losses whereas a weak one hampers their recovery and return to normalcy. Low-income and lack of enough affordable housing choices are two factors that can drastically limit our ability to recover quickly from a major disaster. Low-income households are most likely to suffer greater relative losses and face difficulty in finding enough shelter options after a disaster as the available housing stock becomes limited, uninhabitable, or too costly to afford.

The ability to prepare for and respond to a disaster and to reduce its impact on our lives largely depends on available resources. Research suggests that people who have more money, education, or power are better prepared, respond more quickly, and recover faster than those who have less. Wealthier and more powerful communities are better equipped to deal with disasters. They have more extensive and sophisticated infrastructure such as roads, health care facilities, communication networks, and emergency response equipment.

Race and Ethnicity

Ethnicity is based on a shared culture such as language, religion, or common norms and practices, rather than specific physical traits. Race is based on groupings of people with similar physical attributes. Race and ethnicity are different, but in practice these terms are often merged together. During the warning, evacuation, and response stages, race and ethnicity play a role in how individuals process and respond to information given to them. Minorities receive, interpret, and process warning information differently and are more likely to be impacted by a disaster.

Language and Literacy

Language and literacy vulnerabilities in disasters create barriers to life-saving information and resources, putting at-risk populations such as those with limited English proficiency and low literacy at greater risk. These vulnerabilities are compounded by inadequate communication systems, social stigma, and a lack of culturally appropriate disaster planning, leading to delayed responses, limited access to aid, and disproportionate harm for affected communities.

Violence

Violence in disasters, especially gender-based violence (GBV), significantly increases due to amplified stressors, disrupted social structures, and increased vulnerabilities for women and girls. This includes heightened risks of domestic violence, sexual assault, trafficking, and forced marriage, often driven by economic insecurity and the abuser's desire for power and control. Factors like displacement, lack of access to support services, and the difficulty of enforcing legal protections contribute to a more dangerous environment for survivors.

3. Future Considerations

There are several variables that could change the impact of the hazards and the vulnerability of the people and built environment, these are long-term climate impacts, future land use, ageing infrastructure, and population changes. The following is a general description of these future

considerations when it comes to the identified hazards, and they are described in more detail in each hazard profile.

Hazards and population have complex, mutually reinforcing relationships. As growth and density increase population, a hazard can both deter and attract migration. This can increase the vulnerability of an area and influence the health and resources provided to the area. Population growth concentrates people in vulnerable areas like cities and coastal zones, which magnify the impact of disasters. In addition, these areas are experiencing long-term impacts of climate, which is increasing the frequency and the intensity of many hazards, and thereby creating a cycle of rising risk for a growing population.

Changes in land use, such as urbanization and deforestation, increase the impact of natural hazards by creating more vulnerable infrastructure and communities, altering natural ecosystems, and exacerbating hazards like flooding, heat, and disease outbreaks. Specifically, increased development is replacing natural landscapes with impervious surfaces which increases runoff and flood severity, while deforestation can lead to soil erosion, habitat loss, and a greater risk of infectious diseases. Some of the impacts of changes in land use to allow further development in currently undeveloped or underdeveloped areas include the following.

- Urbanization and impervious surfaces: Replacing soil and vegetation with concrete and asphalt prevents rainwater from infiltrating the ground, causing it to run off more quickly and increasing the severity of floods that can exponentially increase property losses. It also causes nutrients to enter the waterway which impacts the water quality of the rivers and estuary.
- Loss of natural defenses: Natural landscapes like forests and wetlands can absorb excess water, but their removal reduces this natural flood defense capacity.
- Urban heat islands: The loss of trees and the prevalence of heat-absorbing surfaces in urban areas create "urban heat islands," which can lead to more severe heat risks.
- Soil erosion and degradation: Deforestation and other land-use changes can lead to soil erosion, which can contaminate rivers with substances like mercury, and nutrients.
- Increased natural disaster fatalities: Deforestation and urbanization are linked to higher fatalities from natural disasters, including floods and tropical cyclones.
- Increased exposure to zoonotic diseases: As humans encroach on wildlife habitats through land use changes like deforestation, it increases the potential for cross-species transmission of pathogens and the emergence of diseases like Ebola.
- More favorable breeding grounds for disease vectors: Clearing forests can create conditions that are more favorable for the breeding of disease-carrying insects like mosquitoes, increasing the risk of diseases such as malaria.
- Changes in infectious disease patterns: Altered environmental conditions can change the life cycles of disease vectors and pathogens, potentially leading to more frequent or severe outbreaks.

“Long-term climate impacts” is a divisive topic, and it has garnered substantial political attention in recent years. However, changes to the climate, regardless of the root cause, carry implications for risk and vulnerability to natural hazards. There is an important distinction between weather and climate. Weather refers to the atmospheric conditions of a geographical region over a short period, such as days or weeks. Climate, in contrast, refers to the atmospheric conditions of a geographic area over long periods, such as years or even decades.

According to the U.S. Global Change Research Program, there are weather and climate changes already observed in the United States.

- Since recordkeeping began in 1895, the average U.S. temperature has increased by 1.3°F to 1.9°F, with most of the increase happening since 1970. Also, the first decade of the 2000s was the warmest on record.
- The average precipitation across the U.S. has increased since 1900, with some areas experiencing higher than the national average and others lower. Heavy downpours are increasing, especially over the last 30 to 50 years.
- Drought events have increased in the West. Changes in precipitation and runoff, combined with changes in consumption and withdrawal, have reduced surface and groundwater supplies in many areas.
- Some types of severe weather events have experienced changes. Heat waves are more frequent and intense, and cold waves have become less frequent and intense overall.
- The intensity, frequency, and duration of North Atlantic hurricanes have increased since the early 1980s.

Climate change can have a significant impact on human health and the environment. The changes mentioned above can affect the environment by leading to changes in land use, ecosystems, infrastructure conditions, geography, and agricultural production. Extreme heat, poor air quality, reduced food and water supply and quality, changes in infectious agents, and population displacement can lead to public health concerns such as heat-related illnesses, cardiopulmonary illnesses, food, water, and vector-borne diseases and have consequences on mental health and stress.

The Fourth National Climate Assessment (NCA) defined the following major climate trends:

- wildfires and heat waves on the west coast,
- rising temperatures and increased severity and frequency of winter storms in the middle of the country,
- more rain and flooding in the Midwest and northeastern parts of the country, and
- an increase in sea levels in the mid-Atlantic with a rise in hurricane activity in the southeastern states.

The hazard profiles contain a narrative that identifies future climate considerations for all of the natural hazards considered by this risk assessment. Those sections are hazard-specific, but they serve as contextual extensions of the conversation. Climate change appears here as a sort of summary discussion.

DROUGHT

Description

Drought is a protracted period of deficient precipitation resulting in extensive damage to crops, and a consequential loss of yield. In fact, each year some part of the U.S. has severe or extreme drought. There are four basic approaches to measuring drought:

- Meteorological – basis of the degree of dryness and the duration of the dry period.
- Hydrological – associated with the effects of periods of precipitation shortfalls on surface or subsurface water supply.
- Agricultural – links carious characteristics of drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced groundwater or reservoir levels.
- Socioeconomic – associate the supply and demand of some economic good with elements of the other approaches.

Possible Causes

Precipitation falls in uneven patterns across the country; the amount of precipitation at a particular location varies from year to year, but over a period of years, the average amount is fairly constant. The amount of rain also varies with the seasons. Even if the total amount of rainfall for a year is about average, rainfall shortages can occur during a period when moisture is critically needed for plant growth. When little or no rain falls, soils can dry out and plants can die. When rainfall is less than normal for several weeks, months, or years the flow of streams and rivers declines, water levels in lakes and reservoirs fall, and the depth to water in wells increases. If dry weather persists and water-supply problems develop, the dry period can become a drought.

In Martin County, the primary sources of water are watershed areas, Lake Okeechobee, and the County's well fields that pull groundwater from shallower surficial aquifer and the deeper Floridian aquifer. Excess water flows into the St. Lucie River by way of the North and South Fork and to the east through the Indian River Lagoon.

Extent

The Palmer Drought Severity Index (PDSI) is a widely used measure of drought to track moisture conditions. The PDSI is defined as “an interval of time, generally in months or years in duration, during which the actual moisture supply at a given place rather consistently falls short of the climatically expected or climatically appropriate moisture supply”. The range of PDSI is from –4.0 (extremely dry) to +4.0 (excessively wet), with the central half (-0.5 to +0.5) representing the normal or near normal conditions. In the United States, the USDA, National Drought Mitigation Center at University of Nebraska-Lincoln, U.S. Department of Commerce, and NOAA developed another measurement of droughts named the U.S. Drought Monitor (USDM). The table below shows the two scales and how they compare.

Additionally, the Keetch-Byram Drought Index (KBMDI) is another method to measuring moisture and dryness of the soil. However, because this index is used in determining fire potential assessments. The description of this index is found in the *Wildfire* profile.

Table 36: USDM and PDSI Comparison

US Drought Monitor		*Palmer Drought Severity Index*	
N/A		> 4.0	Extreme moist spell
		3.0 to 3.99	Very moist spell
		2.0 to 2.99	Unusual moist spell
		1.0 to 1.99	Moist spell
		0.50 to 0.99	Incipient moist spell
		-0.49 to -0.49	Near normal
		-0.5 to -0.99	Incipient dry spell
D0	Abnormally dry	-1.0 to -1.99	Mild drought
D1	Moderate drought	-2.0 to -2.99	Moderate drought
D2	Severe drought	-3.0 to -3.99	Severe drought
D3	Extreme drought	< -4.0	Extreme Drought
D4	Exceptional drought	N/A	

Location

Droughts are a region-wide hazard that can affect Martin County and its jurisdictions equally. Droughts are widespread events that may extend to several states in varying degrees of severity. Within Martin County, the extent of a drought would be equal or very similar given the region's geography and environmental qualities. A drought can vary in severity throughout the year; what starts out as a mild drought can reach severe or extreme drought status and then return to a mild drought. This process could take weeks or even months and the effects could be felt even months after the drought conditions are over.

Historical Occurrences

In 2000 to 2001, Martin County experienced an exceptional drought with rainfall levels well below the mean rainfall amount. Lake Okeechobee experienced extremely low water levels during the drought requiring a project to ensure dependable intake capacity for lake levels as low as 6 ft for several cities (total cost was $2.1 million). Martin County Utilities put the C-44 Reservoir under water shortage orders during the drought due to infrastructure problems and water use permitting issues. During this drought, Martin County experienced D4 (exceptional drought) conditions from February to June of 2001.

In 2011, Martin County experienced another wave of D4 (exceptional drought) conditions in which a water shortage order was issued for landscape irrigation, golf courses, and the Lake Okeechobee Service Area (with requirements for 15% reduction in surface water withdrawals for all agricultural, nursery, and diversion and impoundment users.

The U.S. Drought Monitor, kept by the University of Nebraska-Lincoln, provides more detailed information about drought since 2000. The illustration below is a graphical representation of the time and severity of droughts presented in Martin County between 2000 and 2025 (for detailed information on the significance of the colors, see the *Extent* section). The occurrences described above only include those with D4 (exceptional drought) conditions, but as seen on this graph, D3 through D0 conditions are prevalent throughout the timeline.

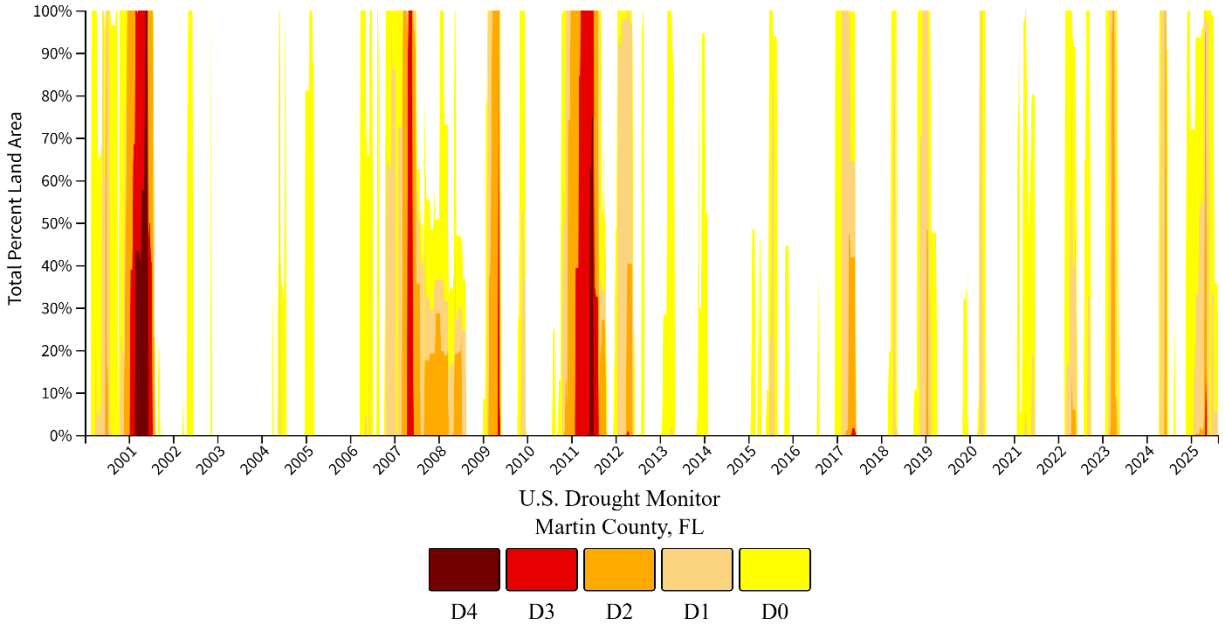


Figure 8: US Drought Monitor Data for Martin County 2001 - 2025

It is difficult to calculate exactly how many "drought events" there have been in Martin County because the way data is measured, calculated with a percentage of dryness each week. Based on available data, between January of 2000 to August of 2025, Martin County has been in some type of drought conditions (D0 to D4 conditions) for about 45% of the time (597 weeks out of 1337 weeks of available data).

There have been no federal declarations for drought conditions in Martin County.

Probability

Droughts can be long-lasting events from a few weeks to several months or years. Even though there may be several weeks in a year without drought conditions, the possibility of experiencing he very beginning or end of drought conditions at some point during a year are very high.

Impacts and Vulnerability

Response	The response for droughts is not the typical definition, where responders conduct activities and conclude within a specified timeframe. Typical response is conducted through the South Florida Water Management District (SFWMD) and local government entities to restrict water usage through proclamations and then through enforcement.
Impact Area	All of Martin County and its jurisdictions are at similar risk of drought. However, western areas of the county where there is more agricultural land may be more vulnerable.
Human Impact	Drought vulnerability has generally been linked to poverty and drought-related health outcomes have been associated with air quality. The

reliance on small or poorly maintained water distribution systems puts populations at increased risk of morbidity due to exposure to contaminated drinking water or issues resulting from reduced use of water resources for hygiene and food washing. Finally, children and the elderly are vulnerable to various drought-related health outcomes, such as air and waterborne diseases.

Property Impact

Structural damage: An extended period of overly dry conditions can worsen existing structural issues in investment properties, or potentially cause new ones. This is because prolonged dry conditions can cause soil to shrink and settle. As the ground dries out, it contracts, potentially worsening or causing cracks in foundations, walls, and driveways. Uneven floors, doors and windows out of alignment, and broken sewer pipes are other symptoms of damage to a building's foundation caused by drought.

Landscape deterioration: In regions experiencing severe drought conditions, water restrictions may limit water for residential use, or make water more expensive. This can make it harder to keep landscaping green. Brown lawns and dying trees and shrubs can impact a property's appearance, making it harder to attract potential buyers or renters and potentially hurting the property's value.

Increased fire hazards: Dead vegetation caused by lack of water can increase the risk of wildfire. In addition to the increased danger posed to residents and properties, real estate investments located in wildfire-prone regions may face higher insurance premiums to cover the increased risk.

Infrastructure Impact

During drought conditions that result in low water levels on rivers and other waterways, port and water-borne transportation operations may be limited due to a reduction in available routes.

Drought conditions can also impact pavement on roads and sidewalks causing them to crack.

When water supplies are depleted in drought, subsidence (the sinking of the ground) can occur as more groundwater is removed. This affects infrastructure, including roads, buildings, and water pipes, and can lead to the formation of sinkholes.

Economic Impact

The US Department of Agriculture keeps data about agriculture through the 5-year censuses; the following table outlines the number of farms in Martin County at every past census year since 1997 as well as the harvested cropland. See table below.

Economic impact to the community can include reduced farm revenue and increased prices for produce and other farm-related items. The data indicates that over the years there has been a steady increase in the number of farms and a fluctuation in the size, but the average harvested cropland per farm has declined. However, there can be no

correlation drawn between the occurrence of drought and the decrease of harvested acres. Therefore, the losses related to drought are $0.

Environmental Impact Prolonged periods of drought can spur wildfires, reduction in the water table, endangerment of wildlife, and loss of crops. Drought in Martin County is associated with increases in insect infestations, plant disease, and wind erosion.

Table 37: USDA Census of Agriculture Harvested Cropland and Farms

Census Year	*Farms*	*Land in Farms (acres)*	*Average Harvested Cropland Per Farm (acres)*	*Crop Total Sales*
1997	305	183,724	64,205	$145,043,000
2002	418	206,198	55,470	$305,395,000
2007	492	129,391	44,442	$158,508,000
2012	587	139,310	31,112	$112,614,000
2017	594	153,732	34,907	$102,840,000
2022	588	179,342	26,577	$120,986,000

Source: USDA Census

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 38: Drought Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	3	Medium	597 weeks of drought out of 1,337 of available data is equal to 0.44, medium frequency.
Probability	4	Likely to occur in a year	At least some form of drought is likely to occur throughout the year.
Onset	1	Over 1 week	Drought conditions are monitored daily, so indicators of these conditions are well in advance of an occurrence.
AVERAGE	**2.7**	**Medium Threat**	
Vulnerability Calculation			
Response	1	No response	No traditional response is expected for droughts.
Impact Area	5	Widespread	All areas of the County are vulnerable
Human	1	None	No health effects are expected.
Property	1	< 10%	Less than 10% of total properties would be affected.
Infrastructure	2	Up to 1 week	Any repairs to infrastructure are likely to take up to a week.
Economy	3	Up to 2 weeks	Impacts would be mainly in the agricultural sector, but with such long onset, many actions can be taken to mitigate the potential effects on farms.
Environment	4	Critical	Potential long-lasting effects to water and air quality.
AVERAGE	**2.1**	**Low Vulnerability**	
Risk Calculation			

MODERATELY LOW RISK	Based on the medium threat and the low vulnerability, this hazard is a moderately low risk to Martin County.

Future Considerations

The change in land use to allow additional growth in areas that are not currently developed, would allow for an increase in heat-absorbing surfaces, creating "urban heat islands," which can lead to more severe heat risks, putting more of the population at risk in those areas. As more development occurs, the county may consider code changes to offset the increase in impervious areas and encourage the use of more green infrastructure or low impact design.

Climate change increases the odds of worsening drought in many parts of the United States and the world. Regions such as the U.S. Southwest, where droughts are expected to get more frequent, intense, and longer lasting, are at particular risk. Warmer temperatures enhance evaporation, which reduces surface water and dries out soils and vegetation. This makes periods with low precipitation drier than they would be in cooler conditions.

Mitigation Measures

- Martin County passed a landscape watering ordinance implementing the South Florida Water Management District's (SFWMD) mandatory year-round Landscape Irrigation Conservation measures and the ordinance went into effect on June 12, 2022.
- The SFWMD's year-round Landscape Irrigation Conservation measures (Chapter 40E-24, Florida Administrative Code) are designed to ensure the efficient use of water in landscape irrigation to conserve water resources.
- In addition, as the county begins to implement its resilience plan, each watershed will be evaluated to determine whether green infrastructure and storage can be placed to provide more water storage within the watershed. This effort would provide for more green infrastructure to counter react to the increase in heat or urban island effects.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that the majority of the respondents (approximately 75%) were somewhat concerned, neutral, or concerned with drought events.

EPIDEMIC AND PANDEMIC

Description

According to the Centers for Disease Control and Prevention (CDC), there are three widely accepted levels of disease presence. This profile focuses on epidemics and pandemics.

- **Endemic**: The baseline level of a particular disease in the population of an area. This level is not necessarily the desired level but the observed level.
- **Epidemic**: An increase in the number of cases of a disease above the usual level in that population or area. Epidemics may result from an increase in the disease's virulence, the presence of a disease in a new outbreak, enhanced disease transmission, increased susceptibility among exposed persons, or increased exposure to the disease-causing agent. Note that while the term "epidemic" originally included infectious diseases, some non-infectious health conditions (such as obesity and opioid misuse) have reached epidemic status in the United States; these are not discussed in this profile.
- **Pandemic**: an epidemic disease that occurs over a wide geographic area (such as multiple countries or continents) and typically affects a significant proportion of the population.

It is important to distinguish seasonal flu from a pandemic flu. Influenza (flu) is a contagious respiratory illness caused by a fu A and B viruses that infect the human respiratory tract. Annual Flu epidemics occur among people worldwide. A flu pandemic is a global outbreak of a new flu A virus in people that is very different from current and recently circulation seasonal flu A viruses. This profile focuses on the pandemic flu.

Possible Causes

As demonstrated by influenza epidemics, under suitable circumstances, a new infection first appearing anywhere in the world could travel across entire continents within days or weeks. Due to the potential of complex health and medical conditions that can threaten the general population, Florida's vulnerability to an epidemic is continually being monitored. With millions of tourists arriving and departing the state annually, disease and disease exposure (airborne, vector, and ingestion) are constantly evaluated and analyzed.

Another potential threat to south Florida's population is food contamination. Frequent news stories document that E. coli and botulism breakouts throughout the country are not that uncommon. Most recently, millions of pounds of possibly contaminated beef from the Hudson packing plant were seized by the Department of Agriculture and destroyed.

Increasing population density and urban development is recognized by Martin County and its jurisdictions as the largest risk to epidemic outbreaks and transmission of diseases. Having a strong public health infrastructure and codes/regulations of response are imperative.

Extent

Epidemics and pandemics are measured by the number of individuals that present with symptoms of the virus and/or die from the virus.

Historical Occurrences

For many years, the 1918 Spanish Influenza outbreak was the worst-case pandemic on record. However, the Covid-19 pandemic of 2020 to 2023 competes with the 1918 incident in many ways. Notable epidemics and/or pandemics include the following.

- 1918-1920: H1H1 Spanish flu causing approximately 50 million deaths worldwide and about 675,000 in the US.
- 1957-1958: H2N2 Asian Flu spread worldwide claiming an estimated 1.1 million lives worldwide and approximately 116,000 in the US.
- 1968-1969: H3N2 Hong Kong Flu spread worldwide claiming an estimated 1 million lives and around 100,000 in the US.
- 1981: HIV/AIDS, 44.1 million people worldwide have died of AIDS since its discovery
- 2003: Severe Acute Respiratory Syndrome (SARS) spread from possibly bats, to cats, to humans in China and then 26 other countries, infecting 8,096 people with 774 deaths
- 2009-2010: H1N1 Swine Flu was first detected in the US and spread worldwide claiming up to 12,400 lives.
- 2014: Ebola epidemic had a big impact on western African countries claiming 11,325 lives (one in the US) according to the CDC.
- 2015-2016: Zika virus was present in Florida with 386 cases statewide, Martin County had one case. All cases were travel related.
- 2019-2023: COVID-19 spread worldwide claiming over 1 million lives; Martin County had 48,025 cases between 2020 and 2025 and 414 fatalities.

It is important to understand the baseline of communicable diseases in an area to identify if and when an endemic becomes an epidemic. The following table contains data from 2015 to 2023 from the Florida Health Charts Community Health Assessment Resource Tool Set regarding reportable diseases in Martin County. The table summarizes the annual data on notifiable conditions. (NOTE: if there were no reported instances during the period, the data is not included, these include Diphtheria, Hepatitis D, E, and G, Measles, Meningococcal Disease, Poliomyelitis, and Rubella).

Table 39: Notifiable Conditions in Martin County 2015 - 2023

Indicator	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	***Totals***
Campylobacteriosis *	47	50	50	35	42	15	41	55	51	**386**
Cryptosporidiosis *	10	3	8	6	4	4	3	9	4	**51**
Cyclosporiasis *	0	0	1	2	18	5	2	19	4	**51**
Giardiasis, Acute (Count)	9	5	4	14	21	2	11	7	9	**82**
Haemophilus Influenzae Invasive Disease *	1	1	4	0	2	0	0	1	2	**11**
Haemophilus Influenzae Invasive Disease (Aged 0-4 Years) *	0	0	2	0	0	0	0	1	0	**3**
Hepatitis A *	2	2	1	0	52	3	0	1	1	**62**
Hepatitis B, Acute *	7	1	7	3	2	3	3	2	4	**32**
Hepatitis B, Chronic *	33	21	27	23	19	13	13	19	23	**191**
Hepatitis B, Pregnant Women *	2	3	4	1	1	0	1	2	3	**17**
Hepatitis C, Acute *	8	3	4	10	10	12	14	14	9	**84**
Hepatitis C, Chronic (Including Perinatal) *	181	235	219	226	186	109	90	85	79	**1,410**
Deaths From Viral Hepatitis *	2	3	5	3	3	4	1	3	1	**25**

Indicator	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	***Totals***
AIDS Diagnoses *	8	6	2	8	7	2	4	4	4	**45**
HIV Diagnoses *	10	6	11	13	11	11	7	12	13	**94**
Deaths From HIV/AIDS *	0	5	2	1	0	2	4	1	3	**18**
Legionellosis *	4	2	2	4	3	3	4	5	4	**31**
Listeriosis *	0	0	1	1	1	1	0	1	0	**5**
Mumps (Count)	0	0	1	1	1	1	1	0	1	**6**
Pertussis *	0	0	2	1	5	7	1	0	0	**16**
Salmonellosis *	55	76	79	104	120	119	106	118	127	**904**
Shiga Toxin-Producing Escherichia coli (STEC) Infection *	0	0	4	7	12	5	10	14	13	**65**
Shigellosis *	20	3	5	13	40	1	8	12	10	**112**
Streptococcus pneumoniae Invasive Disease *	9	5	2	3	0	2	1	3	6	**31**
Streptococcus pneumoniae Invasive Disease (Aged 0-5 Years) *	1	2	0	0	0	1	1	1	1	**7**
Bacterial STDs *	434	398	414	459	462	459	425	428	490	**3,969**
Chlamydia *	357	334	343	357	351	364	322	308	355	**3,091**
Gonorrhea *	61	52	50	69	89	69	66	81	99	**636**
Syphilis, All Stages *	16	12	21	33	22	26	37	39	36	**242**
Syphilis, Early *	7	3	13	22	16	19	32	24	24	**160**
Syphilis, Infectious *	5	2	5	15	8	10	14	18	11	**88**
Tetanus (Count)	0	0	0	0	0	0	0	1	0	**1**
Tuberculosis Cases *	2	1	5	4	4	3	2	5	4	**30**
Varicella (Chickenpox) *	16	11	9	11	4	3	6	4	4	**68**
Vibriosis (excluding cholera) *	0	2	3	3	5	6	3	8	5	**35**

** Rate per 100,000 population*
Source: Florida Health Charts

There has been one federal declaration for pandemics in Martin County:

- DR-4486 for the COVID-19 Pandemic in 2020, costing $3.1 billion in Florida.

Probability

As a coastal community with beaches, Martin County has a large number of visitors. The seasonal residents tend to be older in age and therefore are more susceptible to viruses and diseases. The main issues lie with the visitors possibly carrying harmful pathogens. These pathogens could then affect all the public in service industry thus creating an outbreak.

There have been 9 occurrences of pandemics worldwide that have or could have affected Martin County between 1918 and 2025 (107 years). The frequency of the epidemics is calculated at 0.08, which is very low. Therefore, it is unlikely that it would occur in a year.

Impacts and Vulnerability

Response

It is expected that once a disease reaches a epidemic or pandemic stage, that first responders such as healthcare workers in all sectors would be tasked with a long length of a response lasting months or even years.

Location Epidemics and pandemics can affect the entire county and its jurisdictions equally. It could be assumed that densely populated areas and congregate populations, such as multi-unit residential complexes, nursing homes, detention facilities, may be more at risk due to the close contact of people to spread the disease. However, people travel to and from rural and urban areas for work, shopping, recreation, etc., putting even more isolated populations equally at risk.

Human Impact High-density, low-income communities or neighborhoods that have antiquated well and septic systems in older neighborhoods tend to be at higher risk for illnesses associated with epidemics.

Property Impact There is no anticipated damage to property caused by an epidemic or pandemic.

Infrastructure Impact There is little to no impact on infrastructure unless the event causes prolonged disruption in maintenance that can lead to issues.

Economic Impact Economic impacts of an epidemic or pandemic could be significant to include but not be limited to closure of businesses (temporarily or permanently), increase in cost of products, lack of availability of products, loss of tax revenue, reduced wages, unemployment, etc.

The COVID-19 pandemic funding obligations from the disaster declaration in Florida totaled about $2.9 billion, while individual and household programs expenses totaled about $178 million. However, this does not account for any assistance that was granted to businesses and individuals from private and non-profit sources.

Environmental Impact There is no anticipated damage to the environment caused by an epidemic or pandemic.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 40: Epidemic and Pandemic Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	2	Low	There have been 9 events in the las 107 years.
Probability	2	Unlikely	An epidemic or pandemic is unlikely to occur in a year.
Onset	1	Over 1 week	Typically, there is advance warning regarding increasing cases of a disease prior to becoming an epidemic or pandemic.
AVERAGE	**1.7**	**Minimal Threat**	
Vulnerability Calculation			

Category	*Points*	*Description*	*Determination Method*
Response	5	> 1 month	Responses to epidemics and pandemics can last several months to years.
Impact Area	5	Widespread	All the County will be affected by such event.
Human	5	Deaths	It is expected that an epidemic would cause deaths.
Property	1	< 10%	Little to no damage to property is expected.
Infrastructure	1	< 1 day	Little to no damage to infrastructure is expected.
Economy	5	< 1 month	Impacts from a pandemic could have economic impacts for up over a month.
Environment	1	Minimal	Little to no damage to the environment is expected.
AVERAGE	3.3	**Medium Vulnerability**	
Risk Calculation			
Low Risk			Based on the minimal threat and the medium vulnerability, this hazard is a low risk to Martin County.

Future Considerations

Population growth in Martin County could mean higher density of population, resulting and an increased level of risk for transmission of infectious diseases leading to an epidemic.

Future climate fluctuations may not seem like relevant discussions through the frame of public health crises, but there are subtle connections that one may not realize. Researchers and practitioners associated with the Harvard T. H. Chan School of Public Health note that people living in places with poor air quality can be at elevated risk from various diseases. While those professionals did not directly link pandemics, in this case the COVID-19 pandemic, with climate change, they pointed out that, “(m)any of the root causes of climate change also increase the risk of pandemics”. A loss of animal habitats through actions like deforestation can force animals to migrate. Migration into new areas brings those animals into contact with different animals and people, which can yield a sharing of germs. Further, large livestock operations can be a source of “spillover of infections from animals to people”.

Mitigation Measures

- The County has replaced antiquated septic and well systems in the Golden Gate, Booker Park, and Banner Lake neighborhoods and advances in community health programs have reduced the potential for future occurrence of epidemics.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that the majority of respondents, 61%, were not concerned, somewhat concerned, or neutral about the risk of epidemics and pandemics.

EXTREME TEMPERATURES

Description

Extreme heat is a period of abnormally hot and dangerous temperatures, with or without high humidities, that can result in negative impacts to people, animals, and infrastructure. In Martin County, extremely high temperatures are considered to be 95° F or higher, according to the National Weather Service in Melbourne. A heat wave is a period of abnormally and uncomfortably hot and unusually humid weather. Typically, a heat wave lasts two or more days.

When the temperature gets extremely high, the NWS could issue the following watches and warnings.

- Excessive Heat Watch: Conditions are favorable for an excessive heat event to meet or exceed local Excessive Heat Warning criteria in the next 24 to 72 hours.
- Excessive Heat Warning: Heat Index values are forecast to meet or exceed locally defined warning criteria for at least 2 days (daytime highs = 105-110° Fahrenheit).
- Heat Advisory: Heat Index values are forecast to meet locally defined advisory criteria for 1 to 2 days (daytime highs = 100-105° Fahrenheit).

Extreme cold is a period of abnormally cold and dangerous temperatures or wind chills that can result in negative impacts to people, animals, and infrastructure Wind chill is a measure of how cold people and animals feel when outside. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold.

When the temperature gets extremely low, the NWS could issue the following watches and warnings.

- Extreme Cold Watch: this product is issued when an extreme cold event is possible, but its occurrence, location, and/or timing is still uncertain.
- Extreme Cold Warning: This product is issued when dangerously cold air temperatures or wind chill values are expected or occurring. The criteria vary from place to place.

Possible Causes

Weather patterns throughout the year naturally cause temperatures to rise and fall in the summer and winter months due to the inclination of the Earth towards the sun. However, the extreme temperatures that have been experienced in the last decade are attributable to climate change.

Extent

Warm season weather conditions become hazardous when the associated heat is considered to be "excessive" relative to the human body's normal temperature of 98.6 degrees (F). This occurs when heat indices reach or exceed 99 degrees (F). At this point, heat may begin to build within the body. In situations when the humidity is very low, the heat index is approximately the same as the actual ambient temperature. Your body may quickly lose fluids as sweat (the body's natural cooling mechanism) readily evaporates; dehydration can rapidly occur. In situations when the humidity is very high, body sweat may be slower to evaporate and therefore excess heat cannot be efficiently removed causing a person to quickly overheat.

Table 41: Excessive Heat Threat Levels

Excessive Heat Threat Level	*Threat Level Descriptions*
Extreme	**"An Extreme Threat to Life and Property from Excessive Heat."** Highest heat index 118 degrees (F) or greater.
High	**"A High Threat to Life and Property from Excessive Heat."** Highest heat index between 113 - 117 degrees (F). Heat Index Values consistent with Excessive Heat Warning criteria.
Moderate	**"A Moderate Threat to Life and Property from Excessive Heat."** Highest heat index between 108 - 112 degrees (F). Heat Index Values consistent with Heat Advisory criteria.
Low	**"A Low Threat to Life and Property from Excessive Heat."** Highest heat index between 105 - 107 degrees (F).
Very Low	**" A Very Low Threat to Life and Property from Excessive Heat."** Highest heat index near 105 degrees (F) for July and August...OR...between 102 - 104 degrees (F) for June and September...OR...between 99 - 103 degrees (F) for May and October.
Non-Threatening	**" No Discernable Threat to Life and Property from Excessive Heat."** Warm season weather conditions are non-threatening.

Source: National Weather Service Melbourne.

Cold season weather conditions become hazardous when the associated cold is considered to be "excessive" according to local standards. Cold temperatures may support the occurrence of a freeze, low wind chills, freezing/frozen precipitation, and/or frost. Importantly, each of these hazards represent a considerable potential negative impact to central Floridians.

Table 42: Excessive Cold Threat Levels

Excessive Cold Threat Level	*Threat Level Descriptions*
Extreme	**"An Extreme Threat to Life and Property from Excessive Cold."** Near-record to historic freeze producing temperatures less than 24F…OR…a Wind Chill Warning in effect for dangerous wind chills below 12F…OR…a Winter Storm Warning in effect for significant winter precipitation with snow accumulations greater than 0.50", or sleet accumulation greater than 0.25", or ice accretion on trees/power lines greater than 0.25", or ANY ice accretion on roadways.
High	**"A High Threat to Life and Property from Excessive Cold."** Hard Freeze conditions with temperatures between 24F-27F for two or more hours…OR…a Wind Chill Warning in effect with lowest wind chills between 12F-20F…OR…a Winter Weather Advisory in effect for snow accumulation of 0.10" to 0.50", or sleet accumulation of 0.10" to 0.25", or ice accretion on trees/powerlines less than 0.25", or glaze of ice on bridges and overpasses.
Moderate	**"A Moderate Threat to Life and Property from Excessive Cold."** A Frost Advisory in effect with widespread frost coverage greater than 55% within a defined area…OR…freeze conditions with temperatures between 28F-32F for two or more hours…OR…a Wind Chill Advisory in effect with lowest wind chills between 21F-28F…OR…a Winter Weather Advisory in effect for snow accumulations less than 0.10", or sleet accumulations less than 0.10", AND no ice accumulation.
Low	**"A Low Threat to Life and Property from Excessive Cold."**

Excessive Cold Threat Level	*Threat Level Descriptions*
	Areas of frost with coverage 25%-54% within a defined area…OR…near freezing temperatures between 33F-35F…OR…Wind Chill Advisory in effect with lowest wind chills between 29F-35F…OR…flurries (very light snow) with no accumulation.
Very Low	**" A Very Low Threat to Life and Property from Excessive Cold."** Patchy frost with coverage less than 25% within a defined area…OR…temperatures between 36F-39F.
Non-Threatening	**" No Discernable Threat to Life and Property from Excessive Cold."** Cold season weather conditions are non-threatening.

Source: National Weather Service Melbourne.

Historical Occurrences

The record high temperature recorded in Stuart was 105°F on July 21, 1942. The record low temperature recorded in Martin County was 23°F on January 22, 1985.

The following graphic shows the temperatures for every day from 2019 to August of 2025; it indicates the observed temperature, normal temperature range, and record maximums and minimums. During this period, there have been 15 heat waves lasting 2 days or longer.

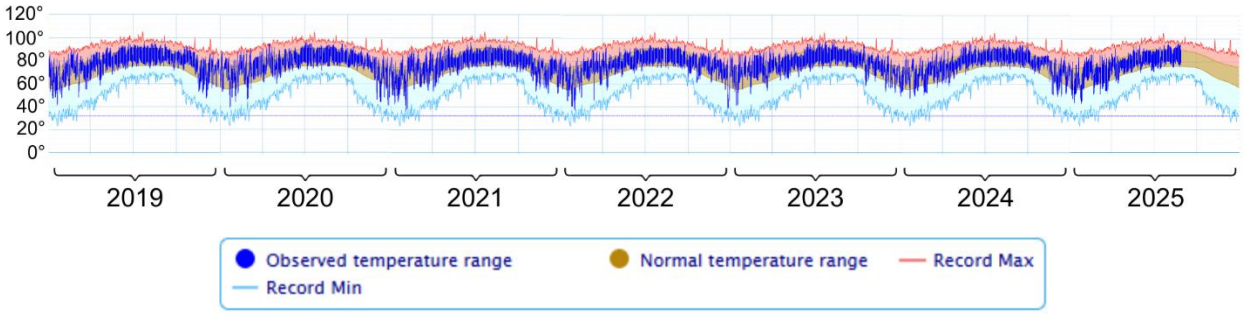


Figure 9: Daily Temperatures in Martin County 2019 - 2025

According to data from the National Weather Service Melbourne, there have been 203 days with extreme high temperatures of 95°F or higher since 1991 between 1991 and August of 2025. On average, Martin County experiences 5.9 days of extreme heat temperatures per year. In those years, there have been 45 heat waves, typically lasting 2 to 3 days, with the longest lasting 6 days. The month with the majority of extreme heat days have been in July with 68 days. The following are the months in order of most days with extreme heat: August: 56, June: 48, September: 23, May: 5, April and December: 2 each, and November: 1.

Table 43: Extreme Heat Temperatures in Martin County 1991 - 2025

Year	Date	Temp.	Heat Wave
1991	Aug 4	95	Heat Wave
	Aug 5	96	
	Aug 9	95	Heat Wave
	Aug 10	95	
	Aug 17	95	Heat Wave
	Aug 18	95	
	Aug 19	95	
	Aug 20	95	
	Aug 21	96	
1992	Jul 3	98	
	Jul 4	95	
	Jul 9	95	
	Sep 6	102	
1993	Jul 17	95	
	Jul 20	96	
	Jul 22	95	
	Jul 28	95	
	Aug 1	95	
	Aug 15	95	
	Aug 21	99	Heat Wave
	Aug 22	97	
	Sep 4	95	
	Sep 10	95	
	Sep 11	97	Heat Wave
	Sep 12	95	
1994	Jun 25	96	
1995	May 13	95	
	May 20	95	
	Jun 7	96	
	Jun 27	95	Heat Wave
	Jun 28	95	
	Jul 8	95	Heat Wave
	Jul 9	96	
	Jul 23	95	
	Aug 15	95	
	Aug 16	95	
	Aug 17	95	Heat Wave
	Aug 18	96	
	Aug 19	96	
	Aug 28	95	

Year	Date	Temp.	Heat Wave
1996	Jun 26	96	
	Jul 2	95	
	Jul 24	95	
	Aug 10	95	
	Aug 12	95	Heat Wave
	Aug 13	95	
	Aug 31	95	
	Sep 1	95	
	Sep 5	96	
	Sep 13	95	
	Sep 17	95	
	Sep 18	95	Heat Wave
	Sep 19	95	
1998	Jun 3	95	
	Jun 6	97	Heat Wave
	Jun 7	98	
	Jun 15	95	Heat Wave
	Jun 16	96	
	Jun 21	95	
	Jul 1	96	
	Jul 2	97	Heat Wave
	Jul 3	95	
	Jul 7	96	
	Jul 10	96	
	Sep 4	95	
	Sep 22	97	
	Nov 9	100	
1999	Jul 30	95	
	Sep 4	97	
	Sep 5	95	Heat Wave
	Sep 6	95	
2000	Jul 17	95	
	Jul 20	95	
	Aug 8	95	
2002	Dec 12	99	Heat Wave
	Dec 13	98	
2004	Jul 15	95	
2005	Jul 23	95	
	Sep 16	97	
	Sep 17	97	Heat Wave
2006	Jun 15	97	
	Jun 28	96	
	Aug 7	95	

Year	Date	Temp.	Heat Wave
2007	Jun 11	96	Heat Wave
	Jun 12	95	
	Jun 21	96	Heat Wave
	Jun 22	96	
	Jul 11	95	
	Jul 12	97	
	Jul 13	95	Heat Wave
	Jul 14	96	
	Jul 15	96	
	Jul 16	95	
	Jul 18	95	
	Jul 19	98	Heat Wave
	Jul 20	97	
	Aug 8	95	Heat Wave
	Aug 9	95	
	Aug 11	96	
	Aug 12	95	Heat Wave
	Aug 13	95	
2009	Jun 16	97	
	Jun 21	97	
	Jun 22	95	Heat Wave
	Jun 23	98	
	Jun 24	95	
	Jun 26	95	Heat Wave
	Jun 28	95	
2010	Jun 5	95	
	Jun 7	95	
	Jun 15	95	
	Jun 16	96	
	Jun 17	96	Heat Wave
	Jun 18	96	
	Jun 19	96	
	Jun 20	95	
	Jun 22	95	
	Jun 27	95	
	Jun 28	95	
	Jun 29	95	Heat Wave
	Jun 30	95	
	Jul 1	96	
	Jul 2	96	
	Jul 13	98	
	Jul 16	95	
	Jul 21	95	
	Jul 29	97	
	Jul 30	95	
	Jul 31	99	Heat Wave
	Aug 1	96	
	Aug 2	98	

Year	Date	Temp.	Heat Wave
2011	Jun 15	98	
	Aug 3	95	
	Aug 14	95	
	Aug 16	95	
	Aug 28	95	Heat Wave
	Aug 29	95	
	Sep 6	95	
2012	Aug 20	95	
2014	Jul 4	96	
	Aug 13	95	
2015	Jun 29	95	Heat Wave
	Jun 30	95	
	Jul 15	96	
	Jul 22	96	
	Jul 29	95	
	Aug 13	95	
2017	Jul 29	95	
	Aug 4	95	
2018	Jul 17	95	Heat Wave
	Jul 18	95	
	Jul 20	95	
	Jul 23	96	
	Jul 27	95	
	Sep 16	95	
2019	Jun 21	95	Heat Wave
	Jun 22	96	
	Jul 25	96	
	Aug 8	95	
	Aug 10	96	
	Aug 16	95	Heat Wave
	Aug 17	95	
	Sep 7	95	
2020	Apr 14	95	
	Apr 16	95	
	Jul 2	96	
	Jul 3	96	Heat Wave
	Jul 4	96	
	Jul 10	95	
	Jul 12	95	
	Jul 14	95	Heat Wave
	Jul 15	95	
	Sep 18	95	Heat Wave
	Sep 19	95	

Year	Date	Temp.	Heat Wave
2021	Jun 21	96	
2022	Jun 25	96	
	Aug 17	95	Heat Wave
	Aug 18	96	
2023	Jun 15	95	Heat Wave
	Jun 16	95	
	Jun 20	95	
	Jun 29	95	
	Jul 7	95	Heat Wave
	Jul 8	98	
	Jul 10	95	
	Jul 11	96	Heat Wave
	Jul 12	96	
	Jul 17	95	
	Jul 22	95	
	Jul 23	97	Heat Wave
	Jul 24	97	
	Aug 7	97	Heat Wave
	Aug 8	96	
	Aug 10	97	Heat Wave
	Aug 11	98	
2024	May 20	95	
	May 28	96	Heat Wave
	May 29	97	
	Jul 9	96	Heat Wave
	Jul 10	97	
	Aug 10	95	Heat Wave
	Aug 11	96	
	Aug 20	96	

Source: National Weather Service Melbourne.

According to the National Weather Service Melbourne, there have been 107 days with low temperatures of 40°F or lower between 1991 and August of 2025 – this does not factor wind chill. On average, Martin County experiences 3.1 days of extreme cold temperatures per year.

Table 44: Extreme Low Temperatures in Martin County 1991 - 2025

Year	Date	Temp	Year	Date	Temp	Year	Date	Temp	Year	Date	Temp
1991	Feb 16	34	**2000**	Jan 26	39	**2010**	Jan 4	39	**2012**	Jan 4	37
1992	Jan 16	39		Jan 27	35		Jan 5	36		Jan 15	38
	Jan 17	40		Dec 19	36		Jan 6	34		Dec 23	39
1993	Mar 14	38		Dec 20	36		Jan 7	35	**2014**	Jan 19	37
	Mar 15	38		Dec 29	33		Jan 8	39		Jan 20	37
	Dec 12	38	**2001**	Jan 4	34		Jan 10	32		Jan 23	40
1995	Jan 26	40		Jan 5	39		Jan 11	33	**2015**	Feb 20	36
	Feb 5	40		Jan 9	38		Jan 14	36	**2016**	Jan 24	38
	Feb 7	39		Jan 19	40		Jan 26	38		Jan 25	40
	Feb 9	29	**2002**	Jan 3	35		Feb 7	32	**2018**	Jan 4	37
	Dec 24	38		Jan 6	36		Feb 8	38		Jan 5	39
	Dec 25	33		Jan 7	36		Feb 17	32		Jan 18	35
	Dec 26	36		Jan 8	37		Feb 19	39		Jan 19	37
	Dec 27	40		Jan 9	37		Feb 28	37	**2020**	Jan 22	39
1996	Jan 8	37		Feb 27	40		Mar 1	36		Jan 23	40
	Jan 9	33	**2003**	Jan 24	34		Mar 4	36	**2021**	Feb 4	37
	Jan 13	40	**2005**	Jan 24	40		Mar 5	36		Feb 5	38
	Jan 14	39	**2006**	Feb 13	40		Dec 7	37		Feb 6	38
	Feb 5	31		Feb 14	39		Dec 8	36	**2022**	Jan 24	40
	Feb 14	39		Nov 22	39		Dec 9	40		Jan 25	40
	Feb 17	32	**2007**	Feb 17	40		Dec 14	31		Jan 26	40
	Feb 18	37	**2008**	Jan 3	36		Dec 15	30		Jan 30	38
	Mar 9	38		Jan 4	40		Dec 16	35		Jan 31	37
	Dec 20	39	**2009**	Jan 21	36		Dec 17	37		Dec 24	39
	Dec 21	38		Jan 22	37		Dec 27	35		Dec 25	38
1997	Jan 18	37		Feb 5	34		Dec 28	34		Dec 26	39
1999	Jan 6	39					Dec 29	36			
							Dec 30	40			

Source: National Weather Service Melbourne.

The month with the majority of extreme cold days have been in January with 53 days. The following are the months in order of most days with extreme cold: December: 25, February: 22, March: 6, and November: 1.

The year with the most high temperature days is 2010 with 23 days; the year with the most low temperature days is 2010 with 28 days, making 2010 the year with the most extreme temperature days since 1991.

There have been three federal declarations for extreme temperatures:

- DR-526 in 1977 with unknown damages
- DR-851 in 1989 with unknown damages
- DR-1359 in 2001 with unknown damages

Probability

The average amount of extreme heat days is 5.9 per year and the average amount of extreme cold days is 3.1 days per year, making the average amount of extreme temperature days per year approximately 9 days.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events. For purposes of this analysis, the scenario would be historical high and low temperatures with the most extreme impacts that have been experienced.

Response

Response actions for extreme temperatures have historically been the opening and operating of cold weather shelters during periods of extreme cold (40°F or less for 4 hours or more, overnight, including wind chill). This response lasts as long as temperatures meet the criteria. Martin County has not needed to respond to extreme heat but has a library system where residents can go and receive relief.

Location

Extreme temperatures, hot and cold, affect each jurisdiction within Martin County equally. Though the temperatures may vary slightly from day to day, the overall average of all the county's temperatures and susceptibility to extremes is very similar. Urban areas can experience the heat island effect; this effect occurs on the surface and in the atmosphere. Dry surfaces exposed to the sun such as pavement and roofs can reach temperatures of 50-90° hotter than the air, while more rural areas maintain surface temperatures similar to those of the air (EPA, n.d.).

Human Impact

- Heat-related illnesses
  - Sun burn: redness and pain. In severe cases, swelling of skin blisters, fever, headaches.
  - Heat cramps: painful spasms usually in muscles of legs and abdomen possible heavy sweating.
  - Heat exhaustion: heavy sweating weakness skin cold pale and clammy, normal body temperature possible fainting and sweating.
  - Heat stroke: high body temperature (106 F or higher) Hot dry skin. Rapid and strong pulse. Possible unconsciousness.
- Cold-related illnesses
  - Hypothermia: uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness, and apparent exhaustion.
  - Frostbite: damage to body tissue caused by that tissue being frozen. Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes, or the tip of the nose.

According to the Florida Department of Health, there have been a total of 3 heat-related deaths in Martin County between 2005 and 2023: 1 in 2006, 1 in 2007, and 1 in 2020. In the same period, there have been a total of 50 heat-related hospitalizations: 13 in 2017, 15 in 2019, 10 in 2021, and 12 in 2023.

Individuals and families with no central heating, may use items such as space heaters and opening ovens to keep the home warm, but these methods may cause life-threatening actions like home fires and carbon monoxide poisoning.

Buildings that do not have air conditioning may have internal temperatures greater than the outdoors which could increase the chance for heat exhaustion or heat stroke.

Property Impact Some of the effects extreme temperatures could have on structures are minor compared to other hazards.

Infrastructure Impact Effects on buildings and infrastructure could include broken pipes, cracks in roads or bridges due to expansion and contraction, and power outages. In addition to impacts on health, extreme temperatures can also cause damages to transportation infrastructure, agriculture, energy, and water resources.

Economic Impact Economic impact due to extreme temperature effects could be calculated in loss of crops, and illness and death of farm animals. However, no data is available to determine any losses due to such conditions.

Environmental Impact Prolonged cold temperatures and extreme cold temperatures can affect crops (fruit and vegetable farms, nurseries) and animals (domestic, wild, livestock). Prolonged periods of heat can lead to drought conditions also affecting crops and animals.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 45: Extreme Temperature Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	On average, Martin County has 9 days with extreme temperatures
Probability	4	Likely to occur in a year	Although average frequency is high, there are some years that have experienced no extreme temperature days.
Onset	1	Over 1 week	The National Weather Service provides weather information for over 1 week out.

Category	*Points*	*Description*	*Determination Method*
AVERAGE	**3.3**	**High Threat**	
Vulnerability Calculation			
Response	3	Up to 1 week	The average number of days a cold weather shelter is open is 2 days but could be longer based on historical data.
Location	5	Widespread	The majority if not all of the county is affected by the hazard event.
Human	5	Death	There have been recorded deaths in Martin County due to extreme temperatures.
Property	1	<10%	Extreme temperatures typically do not cause damage to property.
Infrastructure	1	<1 day	Infrastructure is not expected to be disrupted for more than one day.
Economy	1	<1 day	Economic impacts are not expected.
Environment	2	Limited	Damages caused to the environment could require some human intervention to return to normal health levels.
AVERAGE	2.6	**Medium Vulnerability**	
Risk Calculation			
Moderately High			Based on the high threat and the medium vulnerability, this hazard is a moderately high risk to Martin County.

Future Considerations

As extreme fluctuations occur with extreme heat or extreme cold over time, shelters or mobile units may be needed to help the population. Extreme cold is not impacted by increase in population or development, but extreme heat is similar to drought.

Most of the research surrounding climate change discusses a warming climate while also acknowledging more moisture in the air can result in harsher winters, as experienced in the Midwest and Northeast US. The National Climate Assessment recognizes that winter storms and their varying trends remain an active research area.

Mitigation Measures

Martin County and local non-profit partners provide shelters for people who need it during extreme cold events, mitigating the potential health risks for those exposed.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that 53% of respondents are concerned or very concerned about extreme temperatures.

FLOODS

Description

A flood is defined by the National Weather Service as any high flow, overflow, or inundation by water, which causes or threatens damage. There are several types of floods, such as:

- **River Flood**: Occurs when water levels rise over the top of riverbanks due to excessive rain from tropical systems making landfall, persistent thunderstorms over the same area for extended periods of time, combined rainfall and snowmelt, or an ice jam.
- **Coastal Flood**: The inundation of land areas along the coast causes by higher-than-average high tide and worsened by heavy rainfall and onshore winds (i.e., wind blowing landward from the ocean).
- **Storm Surge**: 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. Storm surge is extremely dangerous because it is capable of flooding large coastal areas.
- **Inland Flooding**: Occurs when moderate precipitation accumulates over several days, intense precipitation falls over a short period, or a river overflow because of an ice or debris jam, or dam or levee failure.
- **Flash Flood**: Caused by heavy or excessive rainfall in a short period of time, generally less than six hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through riverbeds, urban streets, or mountain canyons sweeping everything before them.
- **Compound Flooding**: an extreme flooding event caused by a combination of oceanographic, hydrological, and meteorological processes, such as storm surge, high tides, heavy rainfall, and riverine flooding occurring at the same time or in close succession. This combination can overwhelm drainage systems, leading to more severe and widespread impacts than would occur from a single flooding cause alone.

Possible Causes

According to FEMA, inundation may stem from:

- **Overflow of water**: This includes inland and tidal waters, such as rivers, streams, and even unusual surface water runoff.
- **Heavy rainfall**: Intense or prolonged rain can lead to flooding, particularly when the ground cannot absorb the water or when it overwhelms storm drainage systems.
- **Storm surge:** In coastal areas, storm surge from hurricanes or other storms is a significant cause of inundation.
- **Coastal erosion and waves**: In certain coastal zones, wave action and coastal erosion can cause inundation.
- **Mudflows**: These are liquid, flowing mud caused by flooding and are considered a source of inundation.
- **Dam or levee failure**: Flooding can also result from the failure of flood-control structures, such as levees and dams.

Martin County has several variations of flood hazards occur due to the different effects of severe thunderstorms, hurricanes, seasonal rains, and other weather-related conditions. For most of the County, the primary causes of flooding are hurricanes or tropical storms. However, the County's low-lying topography, combined with its subtropical climate, make it vulnerable to riverine as well

as storm-associated flooding. Flooding in Martin County results from one or a combination of both of the following meteorological events:

- Tidal surge associated with northeasters, hurricanes, and tropical storms.
- Overflow from ditches, canals, swales, streams, and wetlands associated with rain runoff.
- Increase frequency of flash flood events.
- Inland flooding occurring due to antecedent conditions from consecutive storm events.

Extent

Flooding is measured by the depth/amount of water that is accumulated in an area. Martin County also uses FEMA's Flood Insurance Rate Map (FIRM) for special flood hazard areas; the table below outlines the flood zone designation descriptions and the figure below identifies all the FEMA Flood Insurance Rate Maps (FIRMs) in Martin County.

Table 46: Flood Zone Designation Descriptions

Zone	*Description*
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

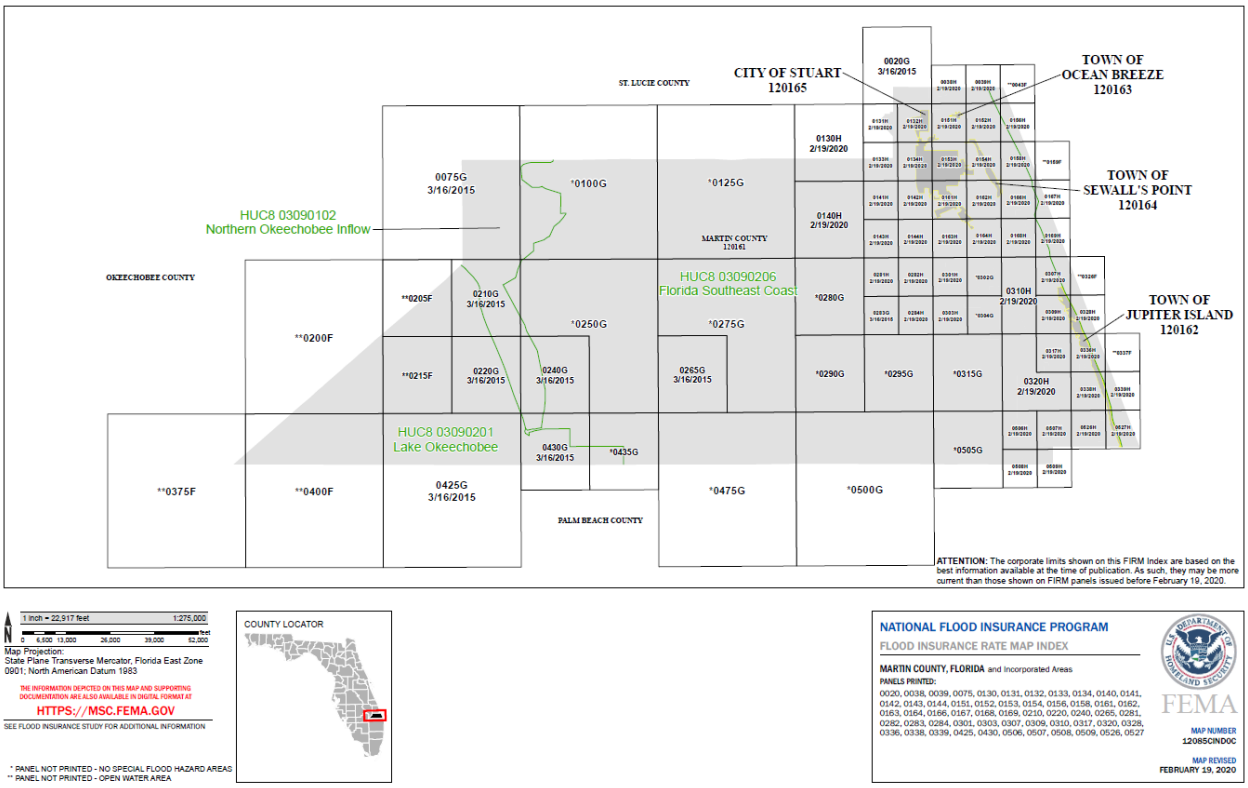


Figure 10: Martin County FIRM Map Index

Historical Occurrences

The National Centers for Environmental Information (NCEI) Storm Database has recorded 16 flooding events, half being floods and half being flash floods, in Martin County since 1998.

Table 47: Martin County Flood Events 1998 - 2025

Date	*Location*	*Event Type*	*Damage*	*Flood Cause*	*Event Description*
11/5/1998	Stuart	Flash Flood	Unknown		Heavy rain from Tropical Storm Mitch produced some flooding in eastern Martin County. Many roadways were covered with 10 inches of water and four houses flooded.
8/2/2001	Stuart	Flash Flood	$ 1,500,000		Rains associated with distant Tropical Storm Barry in the Gulf of Mexico produced flooding across much of Martin County. About 13 inches of rain fell in the area between midnight and late morning on August 2nd. The most serious flooding occurred in Stuart, Port Salerno, and Palm City. Over 300 homes received some water damage. Major damage was reported in 63 homes and 6 mobile homes.
9/4/2004	East Portion	Flash Flood	Unknown		From 4 to 8 inches of heavy rain from Hurricane Frances produced widespread flooding of roads, residences and businesses mainly in the coastal communities.

Date	*Location*	*Event Type*	*Damage*	*Flood Cause*	*Event Description*
8/14/2007	Hobe Sound	Flood	Unknown	Heavy Rain	Heavy rain over Martin County produced flooded roads in Palm City and near Stuart. Spotters reported four to six inches of rainfall from Indiantown to the coast.
8/19/2008	Jupiter Island	Flood	$ 20,000	Heavy Rain / Tropical System	On August 19th Tropical Storm Fay came on shore in southwest Florida moving north northeast toward Lake Okeechobee. By the early morning of August 20th Tropical Storm Fay had moved to southern Brevard County producing rainfall amounts ranging from 10 to 15 inches in Martin, Saint Lucie, Okeechobee, and Indian River counties. Okeechobee reported 69 homes damaged by flood waters and a total of $1.2 million. Indian River and St. Lucie counties reported a combined loss in citrus of $10 million. One indirect fatality occurred in Indian River County when a car hydroplaned and crashed.
8/27/2012	Hobe Sound	Flood	$ 15,000	Heavy Rain / Tropical System	Persistent heavy rainbands from Tropical Storm Isaac produced widespread urban and lowland flooding across much of the county. Rainfall from the morning of August 26 until the evening of August 27 averaged 5 to 10 inches, with isolated totals of 12 to 14 inches, most of which fell during the morning and afternoon of August 27. The most significant impacts occurred in and near Jensen Beach, Stuart, Palm City, and Port Salerno. Several roads became temporarily impassible due to standing water. Water entered one complex in Palm City, comprised of multiple businesses.
1/9/2014	Rio	Flood	$ 220,000	Heavy Rain	Radar-based rainfall estimates were between 6 and 12 inches across eastern-most Martin County, with most of the rain falling in a 6-hour or less period. The twenty-four-hour rain gage total at Stuart was 10.55 inches and 12.00 inches at Nettles Island, but with most of the rain falling in less than 6 hours. Flooding closed many roadways, stranding vehicles. Drainage canals and creeks overflowed. While high water surrounded many subdivisions, businesses and homes, water only entered one building, a Martin County High School, causing an estimated $220,000 in damage.

Date	*Location*	*Event Type*	*Damage*	*Flood Cause*	*Event Description*
2/28/2015	Jensen Beach	Flash Flood	$ 105,000	Heavy Rain	Reports indicated 5 to 11 inches of rain fell across northeastern Martin County, with most of the rain falling in a 6-hour or less period. The highest totals occurred within the southwestern portion of Stuart and in Palm City. ||Flooding closed many roadways, stranding over 100 vehicles. Drainage canals and creeks overflowed. While high water surrounded many subdivisions, businesses and homes, water was reported to have entered 7 homes in Palm City. Damage was estimated around $105,000 dollars.
10/6/2016	Jensen Beach	Flood	Unknown	Heavy Rain	Rainbands associated with Hurricane Matthew produced rainfall totals between 2.5 and 4 inches, resulting in areas of mostly minor urban and poor drainage flooding. Several roadways were impacted by significant ponding.
5/25/2020	Jupiter Island	Flood	Unknown	Heavy Rain	Numerous training thunderstorms produced heavy rainfall in coastal Martin County that resulted in 6-9 inches of rain, with isolated higher totals of 12-14 inches. The heavy rain fell in a 15–18-hour period from around sunrise through the late evening. The localized flooding and associated impacts all occurred in the 5–6-hour period from late afternoon into the evening after hours of continuous heavy rainfall. Stuart Police Department reported that Commerce Avenue was temporarily closed due to high water from Market Place south into Port Salerno. Martin County Fire Rescue reported flooding near the intersection of Mulberry Drive and Linda Road. Trained spotters in Hobe Sound reported numerous local roads were flooded with cars having difficulty passing through the standing water. FAA Control Tower personnel at the Stuart Witham Field Airport reported 2-3 inches of standing water on the runway.

Date	*Location*	*Event Type*	*Damage*	*Flood Cause*	*Event Description*
6/3/2020	Lighthouse Point	Flash Flood	$ 450,000	Heavy Rain	Widespread rain totals of 5-10 inches affected portions of Jensen Beach, Stuart, Palm City and Hobe Sound between the evening of June 2 and midafternoon on June 3. Excessive rain rates (6 inches in less than 4 hours) occurred within an area of saturated soils from Palm City to Hobe sound, with peak event total rainfall of 11 to 13 inches measured by a WeatherSTEM site and a SKYWARN spotter, respectively, both in Hobe Sound. Fourteen homes experienced minor damage consisting of several inches of water accumulation and 8 homes sustained major damage with waters levels up to or beyond electrical outlets. Numerous roadways throughout the area became impassable due to high water and were closed. Additionally, water poured into some homes in Stuart near Manatee Pocket, where heavy rain combined with the high tide, likely causing water levels to rise along a stream connected to the St. Lucie River.
6/5/2020	Salerno	Flash Flood	$ 250,000	Heavy Rain	Two to four inches of rain fell within two hours, across an area which received 7 to 13 inches of rain over the previous three days. With saturated soils and standing water remaining in many areas, flooding quickly developed. Flood waters entered several homes, mainly within Hobe Heights. Some homes may have experienced water intrusion two days earlier from the first period of flooding. Numerous roadways within Hobe Sound became impassable due to high levels of standing water.
9/6/2020	Marcy	Flood	Unknown	Heavy Rain	Persistent, heavy thunderstorms dropped between four and six inches of rain across far western Martin County between 1400 and 1700LST, as measured by two rain gauges. Roadways, drainage canals and low spots were flooded, and water entered into the bar area of the J&S Fish Camp.
10/1/2020	Gomez	Flash Flood	Unknown	Heavy Rain	Between 5 and 8 inches of rain fell during the early morning hours, within an area with a shallow water table due to previous heavy rainfall. Showers moved onshore or developed along the coast and trained over areas south of Port Salerno, impacting Hobe Sound most significantly, and in particular Hobe Heights. Rapid inundation occurred, with standing flood waters exceeding a depth of 3 feet in portions of Hobe Heights and surrounding neighborhoods,

Date	*Location*	*Event Type*	*Damage*	*Flood Cause*	*Event Description*
					where flood waters approached homes, overtopped culverts and creeks and caused dozens of roads to become fully or partially impassable. The flood waters were very slow to recede.
10/2/2020	Stuart	Flash Flood	Unknown	Heavy Rain	Training bands of heavy showers redeveloped across coastal areas of Martin County during the morning of October 2 and persisted into the early afternoon. Rain totals of 5 to 8 inches fell across the same area impacted by 6 to 10 inches only a day earlier. Many of the same areas which experienced flash flooding were again inundated with rapidly rising water, exceeding 3 feet in some areas. High water resulted in the closing of dozens of roadways. Flood waters approached many homes and intruded into several homes resulting in damage. Drainage canals and creeks overflowed and high water from the Savannas Preserve flowed into surrounding areas. The flood waters were very slow to recede.
9/27/2022	Palm City	Flood	Unknown	Heavy Rain / Tropical System	Heavy rain embedded within the outer bands ahead of Hurricane Ian produced widespread rainfall totals of 4 to 8 inches across Martin County, resulting in sporadic reports of street, urban, and poor drainage flooding. Several roadways were impacted by significant levels of standing water and many retention ponds reached capacity or overflowed. A 34-year-old man was discovered drowned in about 10 inches of water along the side of a road in Stuart where he was last known to be collecting work debris in preparation for the hurricane (indirect). Emergency management officials indicated minimal damage to residential and business structures.

There has only been one federal declaration directly related to flooding in Martin County.

- DR-1074 for severe flooding in 1995, with unknown damages.

Probability

There have been 16 flooding events in Martin County between 1998 and 2025 (27 years); there is roughly one flooding event every 1.7 years.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

Response to flooding will greatly depend on the severity of the flood and the location. There can be flooding in locations that does not affect infrastructure or properties and would not require a response.

In Martin County there have not been injuries or deaths resulting from floods, therefore, response efforts are mainly focused on roadway flood management and home protection.

Location

All communities within Martin County are highly vulnerable to flooding, but they are not all vulnerable for the same reasons. The barrier island communities (Jupiter Island and Sewall's Point) are obviously highly vulnerable to storm surge damage from hurricanes. The communities fronting on Martin County's estuaries and rivers also are highly vulnerable to flooding associated with high tides, extreme rainfall in a short period of time, hurricane winds and storm surge. Communities along the estuaries and rivers could receive flooding up to 5 feet under these conditions. Communities away from the water may be more vulnerable to flooding associated with rain rather than storm surge. Not all the areas within any given jurisdiction is equally vulnerable to flooding, but all jurisdictions have specific areas where flooding is a problem.

The map below indicates the most vulnerable areas that would experience flooding (areas along the coast, rivers and near Lake Okeechobee). A detailed map view is available on Martin County's website at https://geoweb.martin.fl.us/flood/.

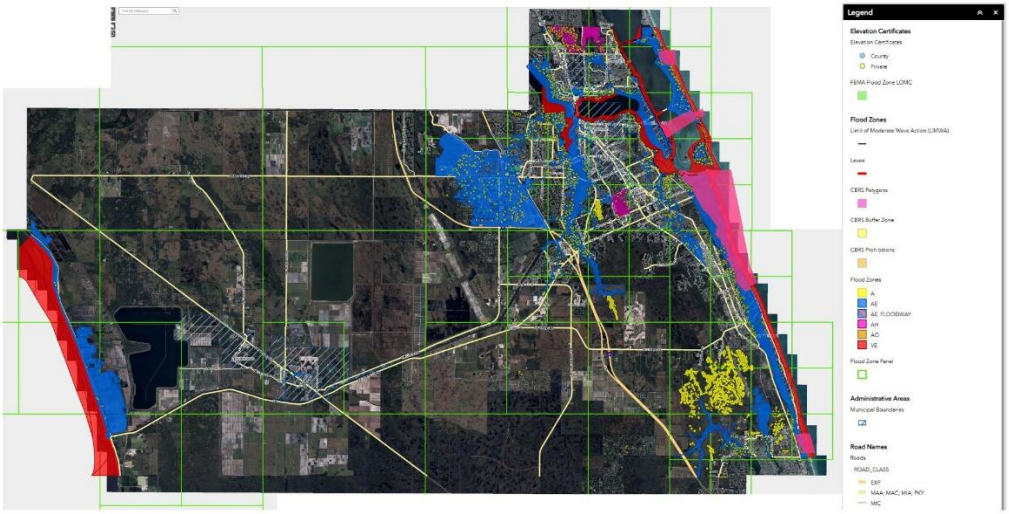


Figure 11: Martin County Flood Zones

Human Impact

From the events described in the Historical Occurrences section above, there have been no reported deaths or injuries in flooding events in Martin County.

However, this is not the only type of impact flooding can have on humans. The following are some examples of impacts that could be expected.

- Increased risk of mortality due to cardiovascular disease, respiratory disease, and mental disorders
- Exposure to pathogens and household and industrial chemicals
- Contaminated drinking water

Property Impact

Martin County has experienced property damages because of flooding. Depending on the location and severity, there may be some structures that are more vulnerable, and these are described in *Section I.E.5. RL and SRL Properties* in Martin County. In total, there are 183 repetitive and severe repetitive loss properties. However, there are many other buildings that experience the effects of flooding events that are not considered to be RL or SRL properties.

Impacts to properties may include:

- Compromised foundation: Water can erode the soil around your foundation, leading to cracks and leaks. If water levels are high, there is an increased chance the foundation can wash away, resulting in severe structural problems.
- Impact to walls, ceilings, and floors: Drywall can swell and break off, ceilings can potentially collapse, and floors can buckle due to the floodwater pressure.
- Damage to personal belongings: Floodwater typically destroys everything in its path, including appliances, electronics, and other home furnishings.
- Proliferation of mold and mildew: Mold and mildew can grow in flooded areas within 24 to 48 hours after the event which can lead to health problems. Other belongings are also at risk for mold and mildew growth.
- Impaired electrical systems: Floodwater affects electrical wiring, which can ultimately pose a fire hazard.
- Water supply contamination: Floodwater can spoil a home's water system, resulting in adverse health effects.
- Affected plumbing systems: Plumbing can go haywire because of floodwater, causing leaks. Flooding can therefore occur in other areas of a home.
- Decreased home values.

Infrastructure Impact

- Some systems depend on gravity to help water move through the pipes. Flat topography can make this a difficult approach that is further compromised by flooding that causes outfalls to be partially or completely submerged. This combination can greatly prolong a flooding event.
- Coastal flooding at outfalls may drive backflow into the system, causing upland flooding through street drains and drainage ditches. The prolonged presence of saltwater can damage stormwater infrastructure.
- Shoreline erosion may expose stormwater infrastructure to potential damage.

- Flooding may introduce debris that can clog storm drains, pipes, and outfalls.
- More frequent, higher, and longer-lasting high-water events may drive up already high groundwater levels in some coastal communities. This change may reduce the soil's ability to absorb stormwater, thus increasing runoff.
- Water from flooding can cause roads to be damaged or wash away, especially along coastal areas.

Economic Impact

It is nearly impossible to calculate the cost of flooding because there are so many factors to consider: insurance, property replacement, rebuilding of infrastructure, loss of revenue for businesses, etc.

FEMA has found that every $1 invested in mitigation efforts can save $6. Using this logic and considering the flooding projects that are proposed on the LMS Prioritized Project List amount to $92.8 million, flood mitigation projects could save up to $556.8 million in the future.

Environmental Impact

- Flooding can have a negative effect on wildlife, causing drowning, disease proliferation, and habitat destruction.
- Floodwater can alter the landscape, for instance, by eroding riverbanks and causing them to collapse.
- Floodwater can be contaminated with pollutants such as agricultural pesticides, industrial chemicals, debris, and sewage. If contaminated floodwater enters the ocean, it can affect water quality and disrupt delicate ecosystems, such as coral reefs.
- Floods are the leading cause of weather-related infectious disease outbreaks. Flooding events increase the chance of spreading waterborne diseases, such as hepatitis A and cholera.

Not all environmental impacts are negative:

- Floods can bring nutrients and essential components for life. Seasonal floods can renew ecosystems, providing life-giving waters in more ways than one. Floods transport vital nutrients, such as nitrogen, phosphorus, and organic material, to the surrounding land.
- Floods can replenish underground water sources. Floodwater gets absorbed into the ground then percolates through layers of soil and rock, eventually reaching underground aquifers.
- Small seasonal floods can be beneficial to native fish stocks and can help those fish outcompete invasive species that are not adapted to the river's cycles.
- Wetlands are an extremely important ecosystem; approximately 40 percent of the world's species rely on them. They filter water, mitigate flooding, and act as a carbon sink.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 48: Flood Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	3	Medium	Historical occurrences are approximately once every two to four years.
Probability	3	May or may not occur in a year	There's about a 50/50 chance that a flood will occur in a given year.
Onset	2	1 day to 1 week	Floods have between a day and a week of advance warning of occurrence.
AVERAGE	**2.7**	**Medium Threat**	
Vulnerability Calculation			
Response	3	Up to 1 week	Responders may handle response within one week of the occurrence of an incident
Location	2	Limited	Only certain areas of identified vulnerability would be impacted but may extend outside of the expected areas.
Human	3	Moderate	Moderate illness or injuries are expected requiring medical intervention and may lead to temporary disability.
Property	3	26-50%	26-50% of the property at risk could be affected in some way.
Infrastructure	3	Up to 2 weeks	Infrastructure systems may be disrupted for up to two weeks.
Economy	3	Up to 2 weeks	Businesses and industries may be closed for up to two weeks and need some external assistance to reopen.
Environment	2	Limited	Damages caused require some human intervention to return to normal healthy environment levels.
AVERAGE	**2.7**	**Medium Vulnerability**	
Risk Calculation			
Moderate Risk			Based on the medium threat and the medium vulnerability, this hazard is a moderate risk to Martin County.

Future Considerations

Rapid population growth has resulted in significant expansion of urban lands and rapid depletion of agricultural land, as well as floodplains, waterbodies, and wetlands, which have substantial impacts on flood dynamics. Additionally, urban and infrastructural growth are also associated with changes in hydrological and ecological systems, loss of drainage systems, and therefore, increased susceptibility of areas to floods.

The Intergovernmental Panel on Climate Change (IPCC) has found that climate change "has detectably influenced" several of the variables that contribute to floods, such as rainfall and sea level rise. In other words, while our warming world may not be the only or most direct cause of any given flood, it exacerbates many of the factors that increase flood risk. This leads to heavier precipitation, more frequent hurricanes, and higher seas.

Mitigation Measures

Martin County has contributed $75 million toward land acquisition that precipitated $169 million in land acquisition for Indian River Lagoon South Everglades restoration projects. Those acquisitions led to construction of the $550 million C-44 stormwater treatment area and reservoir. In addition, Martin County has invested $40 million in local stormwater treatment areas and septic to sewer conversions that have complemented $45 million in matching grant funds to provide nutrient reduction, flood control and water quality improvements to the St. Lucie River and Estuary. In total, Martin County has contributed well over $85 million in water quality related investment, which has been integral in over $600 million current total investment in our local watersheds. This progress is prompting even more advancement as momentum is building for future water quality projects.

Additionally, there are many flood mitigation projects on the Martin County Prioritized Project List; 17 projects directly relate to flooding. These are outlined in *Section IV.B.1. Mitigation Projects*.

In 1999, Martin County developed a Local Flood Mitigation Strategy to reduce the community's vulnerability to this hazard. During the development of the Martin County Local Flood Hazard Mitigation Strategy, exposure figures were established for the municipalities. This analysis was completed in 1999 and is based on NFIP-insured properties.

Martin County, as well as municipalities within the county, participates in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP). As participants in the CRS, the County and those municipalities take measures beyond the NFIP's minimum requirements to reduce flooding risks and enhance flood protection. Those measures include:

- Providing flood zone information to the public and publicizing the service annually.
- Providing public outreach by sharing flood information on the County's website and social media pages, through displays in public facilities such as libraries, the County Administration Center, and the Building Department, as well as public meetings and community events.
- Advising property owners of flood hazards and providing information about ways to reduce flood damage.
- Promoting the purchase of flood insurance.
- Maintaining floodplain management documents in County libraries and on County and municipal websites.
- Maintaining flood elevation certificates for new and substantially improved buildings, as well as elevation certificates and FIRMs from prior years.
- Requiring hazard disclosure information on recorded plats.
- Providing technical support to property owners to help them implement mitigation measures.
- Assisting property owners with elevating, retrofitting, reconstructing, or acquiring and demolishing flood-prone buildings through local assistance programs to reduce future flood risk.
- Preserving open space and natural floodplains through community planning that protects undeveloped land and supports natural absorption of floodwaters.
- Inspecting and maintaining public drainage systems, including ongoing capital improvement projects to improve drainage, and enforcing against illegal dumping in drainage systems.
- Maintaining a flood warning program.

The county has completed several projects to mitigate the observed impacts of tidal flooding. Infrastructure improvements and technology like backflow preventers, living shorelines, shore

hardening, and the elevation of structures and critical infrastructure are examples of our recent projects.

The county is currently investing in an Integrated Watershed Management Plan that includes the requirements of a comprehensive watershed management plan and a stormwater master plan, which will include existing and future land uses as well as sea level rise and rainfall projections. The goal is to have the plan adopted to include projects for the LMS and comply with the requirements of the CRS.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that flooding was the second highest concern of respondents after tropical cyclones with 78.08% of respondents indicating that they were concerned or very concerned. When asked what types of projects would help reduce vulnerabilities, the suggested projects that scored highest were all relating to flooding: water and sewer protection and flood control; also scoring somewhat high on the list were building elevations.

HARMFUL ALGAL BLOOM

Description

Harmful algal blooms (HAB) occur when colonies of algae, simple plants that live in the sea and freshwater, grow out of control and produce toxic or harmful effects on people, fish, shellfish, marine mammals and birds. Ranging from microscopic, single-celled organisms to large seaweeds, algae are simple plants that form the base of food webs. Sometimes, however, their roles are more sinister. Under the right conditions, algae may grow out of control — and a few of these "blooms" produce toxins that can kill living organisms. Other algae are nontoxic but eat up all of the oxygen in the water as they decay, clog the gills of fish and invertebrates, or smother corals and submerged aquatic vegetation. Still others discolor water, form huge, smelly piles on beaches or contaminate drinking water. Collectively, these events are called harmful algal blooms, and there are two types.

- **Blue-Green Algae**: Blue-green algae, or cyanobacteria, occur frequently in Florida's freshwater environments. Blue-green algae are microorganisms that function like plants in that they use light energy from the sun and nutrients acquired from the environment to help them grow.
- **Red Tide**: Red tide is one type of harmful algal bloom that is caused by high concentrations of toxic dinoflagellates, microscopic algae. In Florida and the Gulf of Mexico, the alga that causes most red tides is *Karenia brevis*, often abbreviated as *K. brevis*.

Possible Causes

HABs occur naturally, but human activities that disturb ecosystems play a role in their more frequent occurrence and intensity. Increased nutrient loadings and pollution, food web alterations, introduced species, water flow modifications and climate change all play a role.

Studies show that many algal species flourish when wind and water currents are favorable. In other cases, HABs may be linked to "overfeeding." This occurs when nutrients (mainly phosphorus and nitrogen) from sources such as lawns and agriculture flow into bays, rivers, and the sea, and build up at a rate that "overfeeds" the algae that exist normally in the environment. Some HABs appear in the aftermath of natural phenomena like sluggish water circulation, unusually high-water temperatures, and extreme weather events like hurricanes, floods, and drought.

Even though HAB is a natural phenomenon, unlike many of the natural disasters of the last several years, there is nothing natural about this. Harmful algal blooms are not a result of some natural cycle of these bacteria. These are a result of excess farm and industrial runoff, under treated sewage from lake communities, and the depletion of the flora and fauna that would normally consume or otherwise keep these blooms in check.

Extent

There is no established method to determine or measure the HABs. However, the Florida Department of Health issues notifications to the public based on certain criteria.

- ***Health Caution***: Criteria to issue a *Health Caution* is the presence of an algal bloom or when sampling results indicate the dominant species to be cyanobacteria.
- ***Health Alert***: Criteria to issue a *Health Alert* is the presence of cyanotoxin.
- ***Lift Alert*****:** A *Health Alert* is lifted once toxins are not detected according to the analyses obtained from DEP-coordinated resampling of the bloom or if 30 days have elapsed since the last sampling date. If one of the criteria has been met, the *Health Alert* can be rescinded at this time. A *Health Caution* can remain in effect if blooms are present or throughout the bloom "season".

Historical Occurrences

The following table outlines the Health Cautions and Health Alerts that the Florida Department of Health – Martin County has issued relating to HABs.

Table 49: Martin County Harmful Algal Bloom Notifications

Date Issued	*Type*	*Location*
January 3, 2022	Alert	Lake Okeechobee
April 8, 2022	Alert	Lake Okeechobee
June 3, 2022	Alert	Lake Okeechobee, C-44 Canal
** MISSING 2023 DATA	N/A	N/A
March 29, 2024	Alert	St. Lucie Canal
April 12, 2024	Alert	Lake Okeechobee, C-44 Canal
May 8, 2024	Caution	Lake Okeechobee
May 17, 2024	Alert	Lake Okeechobee
May 24, 2024	Alert	Lake Okeechobee, C-44 Canal
July 3, 2024	Alert	Lake Okeechobee
July 12, 2024	Alert	Lake Okeechobee
July 17, 2024	Alert	C-44 Canal
July 26, 2024	Alert	Lake Okeechobee
August 26, 2024	Alert	Lake Okeechobee
June 27, 2025	Alert	Lake Okeechobee
May 21, 2025	Caution	Lake Okeechobee, C-44 Canal

Source: Florida Department of Health https://www.floridahealth.gov/environmental-health/aquatic-toxins/where-are-habs.html

There have been no Red Tide notifications issued in Martin County since 2022, and no federal declarations for Harmful Algal Blooms.

Probability

Because harmful algal blooms (HABs) require warm temperatures and sunlight, HABs usually occur during the warmer parts of the year when water temperatures are higher, and the days are longer. However, HABs can occur year-round, especially in warmer climates like Florida.

Impacts and Vulnerability

Under the right conditions, algae may grow out of control — and a few of these "blooms" produce toxins that can kill fish, mammals and birds, and may cause human illness or even death in extreme cases. Other algae are nontoxic but eat up all of the oxygen in the water as they decay, clog the gills of fish and invertebrates, or smother corals and submerged aquatic vegetation. Still

others discolor water, form huge, smelly piles on beaches or contaminate drinking water. Collectively, these events are called harmful algal blooms, or HABs.

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events. For purposes of this analysis, the scenario would be a typical occurrence in Martin County as it is seen almost every year.

Response

Scientists, water department workers, and environmentalists work together for months to solve HAB problems that arise every year.

Location

Every U.S. coastal and Great Lakes state experiences HABs. These blooms are a national concern because they affect not only the health of people and marine ecosystems, but also the “health” of our economy, especially coastal communities dependent on the income of jobs generated through fishing and tourism. With climate change and increasing nutrient pollution potentially causing HABs to occur more often and in locations not previously affected, it's important for us to learn as much as we can about how and why they form and where they are, so that we can reduce their harmful effects.

Martin County is susceptible to HABS where there is freshwater and saltwater, mainly at Lake Okeechobee, and the coastal area and connecting canals. All jurisdictions are susceptible as they are all on or near the water.

Human Impact

Harmful algal blooms are caused by toxins that are dangerous to health. There are several ways that people (and pets) can be exposed to these compounds and are triggered by excess nutrients such as phosphorus and nitrogen. These nutrients, often from runoff, combined with warm temperatures, sunlight, and slow-moving water, promote the growth of various algae species that release these harmful compounds.

- Direct exposure to toxic algae: Drinking water can be a source of exposure to chemicals caused by nutrient pollution. Drinking, accidentally swallowing or swimming in water affected by a harmful algal bloom can cause rashes, stomach or liver illness, respiratory problems, or neurological affects.
- Nutrients: Nitrogen and Phosphorous are compounds found in fertilizer that often contaminate drinking water in agricultural areas. Infants who drink water too high in nitrogen and phosphorous can become seriously ill and even die. Symptoms include shortness of breath and blue-tinted skin, a condition known as blue baby syndrome.
- Byproducts of water treatment: Stormwater runoff carries nutrients directly into rivers, lakes and reservoirs which serve as sources of drinking water. When disinfectants used to treat drinking water react with toxic algae, harmful chemicals called dioxins can be created. These byproducts have been linked to reproductive and developmental health risks and even cancer.

Property Impact HABs don't affect the built environment, so no damage to property is expected.

Infrastructure Impact Toxins from harmful algal blooms (HABs) are increasingly contaminating sources waters, as well as the drinking water treatment facilities that the source waters supply. These treatment facilities face a difficult task of not only removing the toxins but doing so in a safe and cost-effective way. However, Martin County source supply is from shallow wells (surficial aquifer) and deep wells (Floridan Aquifer). No surface water is utilized, so HABs are not an issue for Martin County Utilities.

When HABs are discovered in stormwater management ponds and conveyance systems, potential wildlife and fish kills may occur which impact the stormwater infrastructure, which would trigger clean up.

Economic Impact It is still unclear what the actual harmful algal bloom damages have been to Martin County as there is not an agency or organization tracking this data. However, nutrient pollution can have diverse and far-reaching effects on the U.S. economy, impacting tourism, property values, commercial fishing, recreational businesses, and many other sectors that depend on clean water.

- Drinking water costs: Nitrates and algal blooms in drinking water sources can drastically increase treatment costs. It can also cost billions of dollars to clean up polluted water bodies. Every dollar spent on protecting sources of drinking water saves in water treatment costs.
- Tourism losses: The tourism industry loses close to $1 billion each year, mostly through losses in fishing and boating activities, because of water bodies that have been affected by nutrient pollution and harmful algal blooms. Airborne nutrient pollution can also affect visibility at popular outdoor destinations like national parks. This kind of pollution can also damage buildings and other structures, especially those made of marble and limestone.
- Commercial fishing and shellfish losses: Fishing and shellfish industries are hurt by harmful algal blooms that kill fish and contaminate shellfish. Annual losses to these industries from nutrient pollution are estimated to be in the tens of millions of dollars.
- Real estate losses: clean water can raise the value of a nearby home by up to 25 percent. Waterfront property values can decline because of the unpleasant sight and odor of algal blooms.

Environmental Impact Nutrient pollution fuels the growth of harmful algal blooms which devastate aquatic ecosystems.

- Direct exposure to algae: Harmful algal blooms sometimes create toxins that can kill fish and other animals. After being

consumed by small fish and shellfish, these toxins move up the food chain and hurt larger animals like sea lions, turtles, dolphins, birds, manatees, and fish. Even if algal blooms are not toxic, they can hurt aquatic life by blocking out sunlight and clogging fish gills.

- Dead zones or hypoxia: Nutrient pollution can create dead zones, areas in water with little or no oxygen where aquatic life cannot survive, also known as hypoxia. These areas are caused by algal blooms consuming oxygen as they die and decompose. Aquatic animals must leave the affected area or die. Young fish and seafloor dwellers like crabs and clams are most likely to die in hypoxic areas.
- Acid rain: Acid rain, caused by nutrient pollution in the air, damages lakes, streams, estuaries, forests and grasslands across the country.
- Air pollution: Airborne nitrogen compounds like nitrogen oxides contribute to the formation of other air pollutants such as ground-level ozone, a component of smog which can restrict visibility. Wind and weather can carry ozone many miles from urban to rural areas. Ozone pollution can damage trees and harm the appearance of vegetation and scenic areas.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 50: Harmful Algal Bloom Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	Multiple alerts are issued annually.
Probability	5	Will occur in a year	Based on current frequency, it can be assumed that the trend will continue.
Onset	1	Over 1 week	HAB can be forecasted based on a variety of factors well before the HAB becomes a problem.
AVERAGE	**3.7**	**High Threat**	
Vulnerability Calculation			
Response	5	> 1 month	Scientists, water department workers, and environmentalists work together for months to solve HAB problems that arise every year.
Location	1	Localized	Limited to Lake Okeechobee, waterways, and coastal areas.
Human	1	None	Because water quality is constantly tested, officials can issue warnings in time for the population to react and avoid harm.
Property	1	< 10%	HAB typically does not affect property.
Infrastructure	1	< 1 day	No impact to utilities.
Economy	1	< 1 day	It is possible that businesses could be affected due to the inability to utilize water; this could affect

			restaurants, hotels, tourism, and other types of business in the area.
Environment	1	Minimal	Damages caused require little to no intervention.
AVERAGE	1.6	Minimal Vulnerability	
Risk Calculation			
MODERATELY LOW RISK			Based on the high threat and the low vulnerability, this hazard is a moderately low risk to Martin County.

Future Considerations

Land development and freshwater discharges contribute to harmful algal blooms (HABs) by increasing nutrient pollution, altering water flow, and changing water temperatures. Excess nutrients like nitrogen and phosphorus from agricultural, urban, and residential runoff, combined with factors like deforestation and increased atmospheric carbon dioxide, create conditions favorable for HABs to thrive and worsen their impacts. Urban and agricultural development increases runoff containing fertilizers, septic waste, and other sources of nitrogen and phosphorus. These nutrients act as fertilizer for algae, causing them to overgrow.

The United States Environmental Protection Agency (EPA) acknowledges that climate change is leading to higher air temperatures which will correspond in raising water temperatures that, paired with increased stormwater runoff, result in favorable conditions for algal blooms. The EPA states that harmful algal blooms can occur more often, in more fresh or marine water bodies, and can be more intense with increasing temperatures of climate change.

Mitigation Measures

The Florida Department of Health Martin County conducts periodic testing of water sources around Martin County to ensure early detection and public warning.

Public Perspective

The online public survey conducted between August 2024 and August 2025, did not address this hazard, as it is a new one added for this update.

INVASIVE SPECIES

Description

Invasive species are plants, animals, or other living organisms that are non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

Non-native species are plants and animals living in areas where they do not naturally exist. "Non-native species" and "invasive species" cannot be used interchangeably. Many commonly grown fruits and vegetables are not native to the U.S. For example, tomatoes and hot peppers originated from South America, while lettuce was first grown by the Egyptians. Domestic cows are non-native to North America and were introduced as a food source and considered to be a beneficial organism in an agricultural setting.

There are many types of invasive species such as:

- Plants
  - Aquatics
  - Forbs and herbs
  - Grasses
  - Shrubs
  - Trees
  - Vines
- Insects
- Fungi and diseases
- Wildlife
  - Mollusks
  - Reptiles
  - Fish
  - Mammals
  - Amphibians
  - Birds
  - Crustaceans
  - Annelids

Possible Causes

Invasive species are spread primarily by human activities, often unintended. People, and goods transported, travel quickly around the world, and often carry uninvited species with them. Invasive species can be introduced to an area by ship ballast water, firewood, accidental release, and by people. Insects can be transported easily in wood, shipping palettes, and crates shipped across the globe. Ornamental plants can become invasive after escaping in the wild. Released unwanted pets are another way invasive species are spread.

Extent

The presence of invasive species is known from observation. The U.S. Forest Service measures invasive species by using remote sensing like satellite and drone imagery, ground surveys, or molecular techniques like DNA.

Historical Occurrences

According to the Florida Wildlife Federation, there are several invasive wildlife species in Florida. The following describes the types and their origins. There are many types of invasive species in Martin County, but the following describes the most common in Florida.

Originally introduced through the exotic pet trade, these massive **Burmese python** snakes have established a stronghold in the Everglades, where they have decimated native wildlife populations. Studies show that raccoons, opossums, and bobcats have declined by over 90% in areas with high python populations. Without natural predators to keep their numbers in check, these apex predators continue to threaten Florida's native species.

The highly destructive **feral hogs** root through the soil, damaging crops, wetlands, and native habitats. They compete with native wildlife for food, degrade water quality, and can carry diseases that threaten livestock and other animals. First introduced by Spanish explorers in the 1500s, their populations have exploded, causing widespread destruction across the state.

The **green iguana** is a growing nuisance. These large, herbivorous lizards damage gardens, devour native plants, and undermine infrastructure by digging burrows under sidewalks, seawalls, and roads. Their populations have surged due to Florida's warm climate, and without natural predators, they continue to spread.

The **Argentine black and white tegu** is one of Florida's most concerning invasive reptiles. These large lizards are voracious predators that eat bird eggs, small mammals, insects, and even native reptiles. They are particularly dangerous to ground-nesting species like gopher tortoises and burrowing owls. Highly adaptable, tegus can survive in a range of environments, including areas as far north as Central Florida.

One of the more unusual invasive species in Florida is the **Rhesus macaque**, a non-native monkey species that has established populations around Silver Springs State Park. These monkeys were introduced in the 1930s as part of a tourism attraction but quickly became a problem. In addition to competing with native wildlife, some individuals carry the herpes B virus, which can pose a risk to humans.

According to the Southwest Florida Water Management District, the **Hydrilla**, an invasive aquatic plant, thrives in Florida's water bodies due to its efficient photosynthesis process, allowing it to rapidly convert nutrients and carbon dioxide into growth. This advantage enables hydrilla to outcompete native species, forming dense mats on the water surface that block sunlight, deplete oxygen and disrupt ecosystems. These mats reduce biodiversity, create breeding grounds for mosquitoes and interfere with recreational activities like boating and fishing.

Old World climbing fern, a vine native to Africa, Asia and Australia, was first found in south Florida in the late 1950s. It forms dense mats that can kill trees, shrubs and plants, degrading wildlife habitats. The vine is flammable and can carry fire into normally fire-resistant wetland areas, causing fires to reach treetops and potentially kill even fire-tolerant trees. It is spreading northward from south Florida and has been detected and treated as far north as Hernando and Sumter counties. This invasive species poses a significant threat to the integrity of natural ecosystems, necessitating ongoing management efforts.

Cogongrass, a warm-season perennial grass, is considered one of the world's worst invasive plants. In the U.S., it is found in Virginia, North Carolina, South Carolina, Georgia, Florida,

Alabama, Mississippi, Louisiana, Texas and Oregon. Accidentally introduced near Mobile, Alabama, in 1912 via crate packing material, it was later intentionally brought from the Philippines to Mississippi as a forage crop in 1921 and replanted in Florida in the 1930s for forage and soil stabilization. Despite these efforts, it proved inadequate for forage and quickly became a widespread pest. Its aggressive growth outcompetes native vegetation, posing a significant threat to biodiversity and ecosystem health.

The **Melaleuca** tree drains wetlands and displaces native species, leading to reduced biodiversity and altered fire patterns.

Dense clusters of **Brazilian pepper trees** overwhelm native vegetation, disrupting habitats and creating unsuitable conditions for wildlife. These trees form dense thickets that block sunlight and water, hindering the growth of other plants.

Lionfish are a venomous, spiny fish with a native habitat range in the Pacific and Indian Oceans and are an invasive species that threaten local reef systems throughout the Caribbean and along the southeastern seaboard of the United States. They are popular with aquarium enthusiasts around the world, and it is likely these fish were introduced to the Atlantic via the aquarium trade or ballast tanks of transoceanic vessels. Lionfish are known to be highly territorial and can be found offshore or in estuaries. In Florida, lionfish have been found in all water depths, on hard bottom, mangrove, seagrass, coral, artificial reefs, oyster reefs, seawalls and other manmade structures.

Probability

An invasive species population of plants, animals, or microbes are always present in Martin County ecosystems, as they are highly difficult to manage. Therefore, the occurrence of invasive species in Martin County is highly likely at any given time.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response	Martin County has a “Report Invasive Plants and Animals” webpage, where residents can report invasive species for the County to be aware of and handle if necessary. There is no “response” in the traditional way as with other natural hazards, it is an ongoing task.
Location	All of Martin County and its jurisdictions are equally at risk of having some type of invasive species in their ecosystems.
Human Impact	Invasive species can negatively impact human health by infecting humans with new diseases, serving as vectors for existing diseases, or causing wounds through bites, stings, allergens, or other toxins.
Property Impact	Invasive terrestrial plant species can negatively impact property by causing structural damage, reducing property values, and creating expensive management costs. They can physically damage

homes and infrastructure, outcompete native plants to lower aesthetic value, clog waterways, and disrupt recreational use.

Infrastructure Impact As property is impact, so, too, is the infrastructure.

Economic Impact A 2021 study estimated that invasive species have cost North America $2 billion per year in the early 1960s to over $26 billion per year since 2010

Environmental Impact Invasive species can impact both the native species living within an ecosystem as well as the ecosystem itself. Native species populations can be directly affected through predation, herbivory, and disease. Indirectly, invasive species may cause native species declines due to resource competition and habitat alteration. For instance, plant invasions have been demonstrated to alter carbon and nitrogen cycles and fire regimes in invaded ecosystems.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it adds the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 51: Invasive Species Risk Calculation

INVASIVE SPECIES RISK CALCULATION			
Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	Historically has occurred at least annually or more than once per year.
Probability	5	Highly likely	Expectation is that the hazard will definitely occur during a year based on frequency and other factors as described above.
Onset	3	Unknown	It is mainly unknown when an invasive species will appear in an area, but other species can be tracked outside the County and provide information on if the species could be expected.
AVERAGE	**4.3**	**Extreme Threat**	
Vulnerability Calculation			
Response	5	>1 month	Response is ongoing
Location	5	Widespread	This hazard can be found anywhere in the county
Human	1	None	Minimal to no harm to humans is expected
Property	1	<10%	Less than 10% of property would be affected
Infrastructure	1	<1 day	Infrastructure would be minimally affected
Economy	1	<1 day	Minimal economic impacts are expected
Environment	3	Moderate	Damages caused could require significant intervention
AVERAGE	**2.4**	**Low Vulnerability**	
Risk Calculation			
Moderately High Risk			Based on the extreme threat and the low vulnerability, this hazard is a moderately high risk to Martin County.

Future Considerations

Invasive species and development are interconnected because human activities like trade, transportation, and land development facilitate the spread of non-native species, which in turn can cause economic harm, damage infrastructure, and threaten sustainable development goals. Development projects can also disrupt habitats, making them more vulnerable to invasions and creating a cycle where species can adapt to urban environments and then spread to surrounding natural areas.

Mitigation Measures

Martin County's Environmental Resources Division has several ongoing efforts to address invasive species locally:

- Drafting management plans for all environmentally sensitive lands with an emphasis on restoration of native habitats, including treatment of invasive vegetation and control of problematic exotic animals.
- Removal of invasive, exotic vegetation from conservation areas. Invasive, exotic species are plants and animals that have been brought to Florida from other parts of the world. These species, for a variety of reasons, outcompete native species. As a result, they have a negative ecological, environmental, and even economic impact.
- Working with other agencies and organizations to help solve environmental problems that do not stop at the borders of our conservation lands.

Other state and non-profit organizations promote the management of invasive species.

- The Florida Fish and Wildlife Conservation Commission (FWC) encourages removal and hosts annual python challenges to reduce their numbers.
- Hunting and trapping programs help manage feral hog populations, but their high reproduction rate has made eradication difficult.
- Homeowners are encouraged to remove iguanas from their properties, and professional removal efforts are increasing.
- FWC encourages the public to report sightings of the Argentine Tegu, and removal efforts are ongoing.
- Population monitoring of the Rhesus Macaques and public education on avoiding human-wildlife conflict.
- Effective management of the Hydrilla combines mechanical, chemical, and biological methods, with strategies tailored to hydrilla's growth patterns.
- Control methods for the Melaleuca Tree include physical removal, herbicides, and biological control agents like the Melaleuca snout beetle. These efforts are crucial to restoring natural habitats and preventing further ecological damage.
- Effective control methods for the Brazilian Peppertree involve mechanical removal, such as cutting and digging out the trees and the use of herbicides to prevent their regrowth.

Public Perspective

The Invasive Species hazard is a new hazard profile for this plan update. The public survey conducted did not include this as a hazard for feedback. However, several people mentioned in their comments that they were concerned with waterway health, ecosystem disruption or destruction, and loss of natural habitat and wildlife.

SEA LEVEL RISE

Description

Sea Level Rise is the change in sea level referring to a long-term increase in the average level of the world's oceans. Since 1870, global sea level has risen by about eight (8) inches. Nationally, sea level has risen 6.5 inches since 1950, and the rate of increase is accelerating with sea levels now rising by an average of 1 inch every 5 years (NOAA Tides and Currents). SFWMD has estimated approximately 0.19 inches per year in Martin County whereas specific gages indicate up to 1 inch per year dependent on the tide. As coastal populations increase, vulnerability of those populations to sea level rise increases as well.

Causes

Localized sea level rise is caused localized sea level rise is caused by vertical land motion (subsidence or uplift), changes in ocean currents, and local effects from global sea level rise. Causes for land motion include natural factors like post-glacial rebound and human activities such as groundwater, oil, and gas extraction. Ocean currents vary regionally and can cause sea levels to pile up in certain areas. Global climate change contributes to the local rise through thermal expansion and melting ice, but its effect is amplified or reduced by these local factors.

Extent

Sea level rising is primarily measured using tide stations and satellite laser altimeters.

Historical Occurrences

For the Sea Level Rise hazard, there is not a traditional list of occurrences with dates, rather it is a slow and steady increase over time. The global average sea level has risen 8–9 inches since 1880. In 2023, global average sea level set a record high—101.4 mm (3.99 inches) above 1993 levels. The rate of global sea level rise is accelerating; it has more than doubled from 0.06 inches per year throughout most of the twentieth century to 0.14 inches per year from 2006–2015.

In many locations along the U.S. coastline, the rate of local sea level rise is greater than the global average due to land processes like erosion, oil and groundwater pumping, and subsidence. Sea levels across Florida are as much as 8 inches higher than they were in 1950, and the rate of sea level rise is accelerating. For instance, sea levels around Virginia Key have risen by 8 inches since 1950, but they have been rising by 1 inch every 3 years over the past 10 years, based on tide gauge data. This acceleration in sea level rise is projected to continue. In the same area around Miami, sea levels increased 6 inches over the last 31 years, from 1985 to 2016, but they are expected to rise another 6 inches in half that time, over the next 15 years, according to the U.S. Army Corps of Engineers high scenario projections.

There have been no federal declarations for sea level rise in Martin County.

Probability

The figure below shows a prediction of what sea level rise would be in Martin County in the year 2100, based on the NOAA intermediate high projection. Based on historical data and trends in sea level rise, it is reasonable to assume that sea level rise will continue and accelerate.

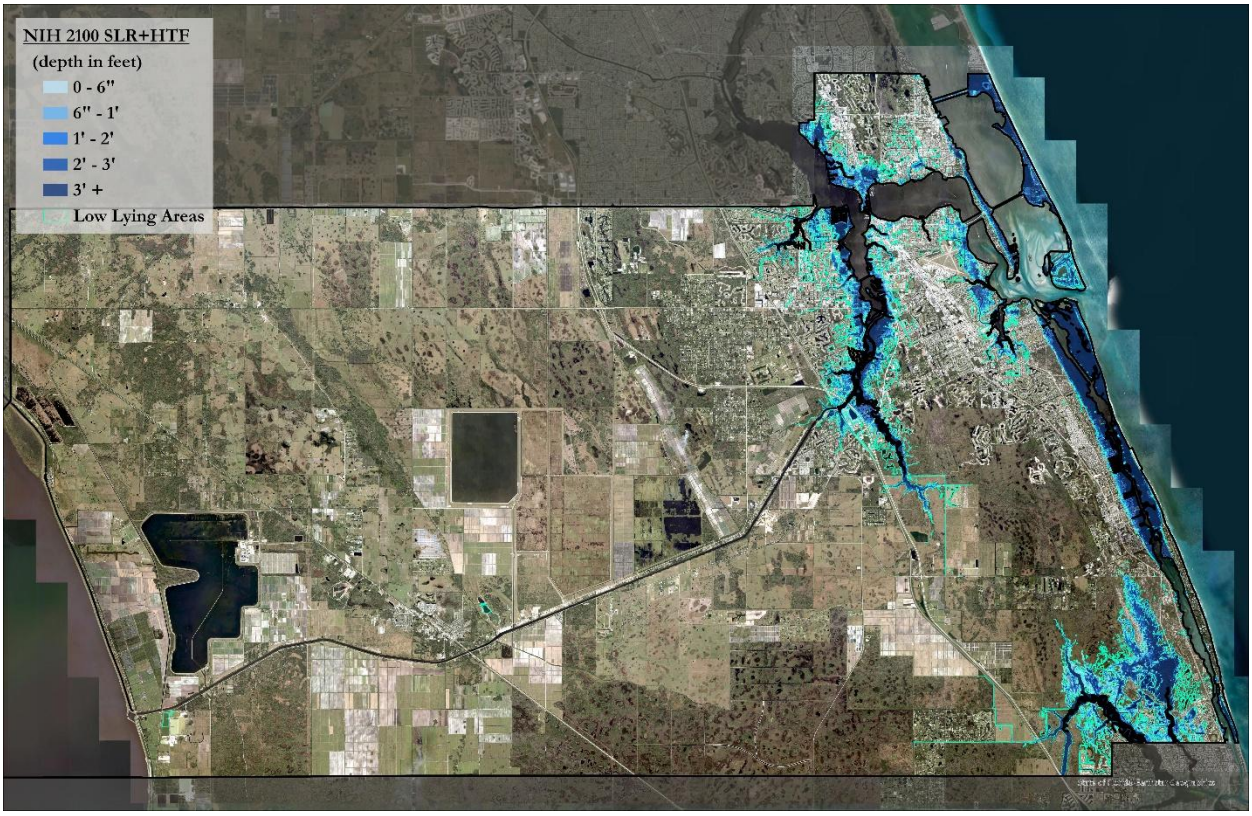


Figure 12: Year 2100 Sea Level Rise Plus High Tide Flooding
Source: Martin County Vulnerability Assessment, 2025.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

Because sea level rise is expected to be very gradual for the next several decades, a traditional "response" is not expected to occur.

As Martin County plans for new, replacement, or repaired infrastructure, design should include accounting for the infrastructure lifespan to offset future impacts. The county is preparing an adaptation plan to help respond to this threat.

Location

Martin County has many miles of ocean, estuarine and freshwater coastlines, and marsh habitats, as well as constructed infrastructure and natural uplands that are fundamentally at risk from climate change. Sea level rise would not affect all areas of the county equally; the areas impacted by sea level rise will be in the coastal areas of unincorporated Martin County, and in the coastal jurisdictions of Jupiter Island, Sewall's Point, Ocean Breeze, and Stuart.

Access to detailed Sea Level Rise vulnerability maps can be found on the Martin County Resilience website at www.martin.fl.us/Resilience.

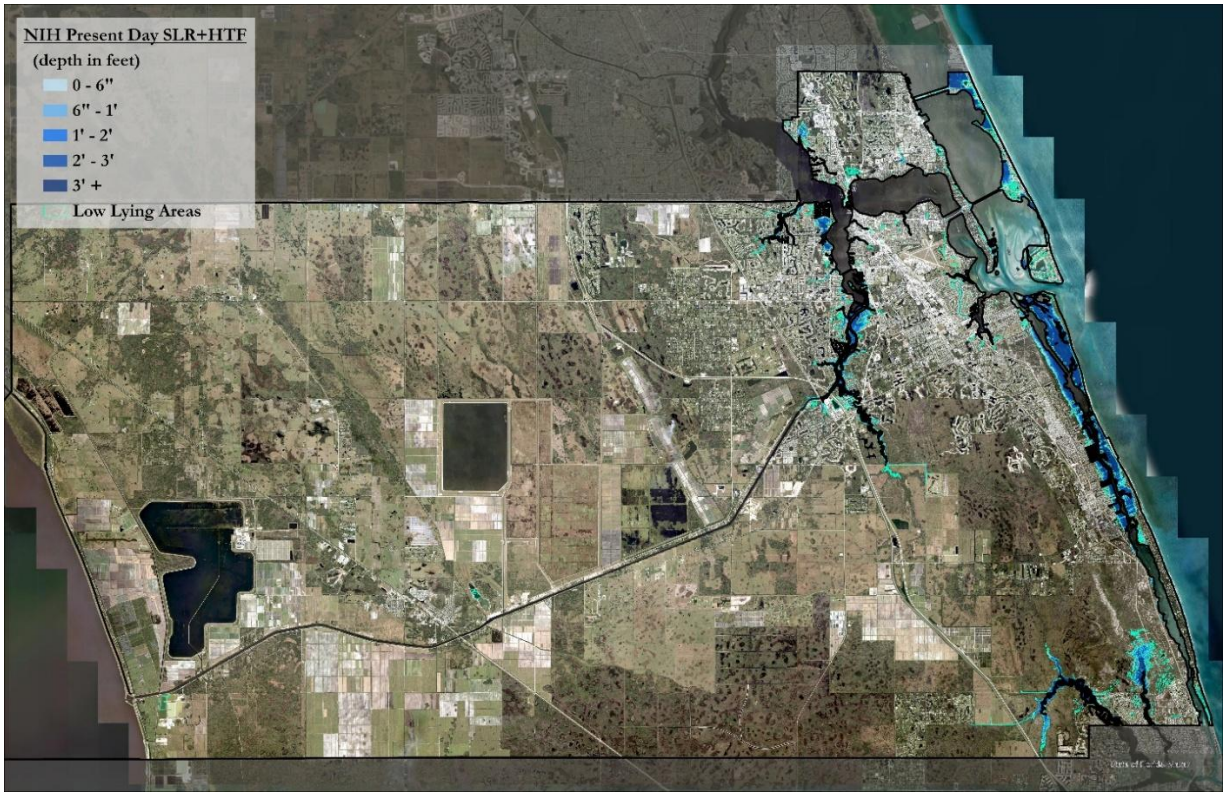


Figure 13: Present Day Sea Level Rise Plus High Tide Flooding
Source: Martin County Vulnerability Assessment, 2025.

Human Impact

Information on human impacts regarding health are not yet fully known. As the process of sea level rise is slow, there is sufficient time to mitigate any potential negative effects of the hazard. However, some studies list the following potential impacts on human health.

- Exposure to infectious disease such as waterborne pathogens due to disrupted infrastructure and threats to marine food safety.
- Exposure to contaminants from industrial development along coastlines.
- Exposure to vector-borne diseases due to expanded water-based habitat for vectors such as mosquitoes.
- Exposure to poor air quality from indoor mold growth.
- Mental health effects from the accumulation of incremental changes that over time can cause a significant impact such as stress from forced displacement, loss of cultural land, and economic hardship.

Property Impact

The majority of Martin County residents, and almost all of its built environment, is clustered near the inland shorelines and ocean. Sea Level Rise is likely to increase the number of homes and businesses that are found in the general floodplain and Special Flood Hazard

Areas. As a result, property owners can experience rising insurance rates, or perhaps the inability to get insurance at all, in response to these changes. It has also been speculated that 30-year mortgages will be increasingly difficult to obtain.

Access to property may be impacted as roads begin to flood during high tide events as well as compound impacts from storms during times of high tide events where stormwater is unable to discharge and low-lying areas begin to flood.

Infrastructure Impact

Future sea level rise will impact groundwater. The land will become saturated much more quickly and stormwater pipes may be unable to drain because they are submerged. Increasing numbers of coastal homes and infrastructure will flood more often as storm surge and extreme tides add to the rising sea level.

Both the built and natural environment in Florida are vulnerable to the impacts of stronger storms and accelerating sea level rise. More intense or more frequent rainstorms can increase the likelihood of flooding from a combination of rainfall, sea level rise and eventual increase in groundwater level.

Potential impacts from climate change include sanitary sewer infrastructure damage associated with flooding (e.g., damage to sewer pumps and infiltration of seawater into the sewer system) and low flow caused by periods of drought. Collection systems are compromised when flows are no longer sufficient to carry sewage to treatment plants.

Economic Impact

In 2040, about $21 million in annual revenues are vulnerable to disruption from SLR alone (no storm surge impacts), with average estimated inundation depths of less than 6 inches (using NOAA Intermediate High (NIH)). It is important to remember that this estimate does not account for precipitation, nor for the number of businesses that are likely to be located in the area two decades from now. In the next two decades, additional businesses will open in the area, meaning this estimate can be assumed to be a conservative estimate for impacts resulting from sunny-day, high-tide flooding.

By 2070, under the same scenario (NIH), inundation depths increase substantially to greater than one foot, primarily affecting the same businesses – again, without incorporating storm surge. Under the NOAA High scenario, this jumps to $100 million in vulnerable revenues and about 200 jobs, considering inundation only from SLR.

By 2100, the estimate of revenue impacts is $341 million at NOAA IH and $1.2 billion at NOAA High without storm surge – which jumps to $5 billion with storm surge, and more than 2,000 jobs.

Environmental Impact

Sea level along the Florida coast is projected to rise one to four feet in the next century. Rising sea levels will submerge existing wetlands and dry land, accelerate beach erosion and exacerbate coastal flooding.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 52: Sea Level Rise Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	Although very gradual, sea level rise occurs constantly throughout the year, often going unnoticed.
Probability	1	Very unlikely	Very unlikely to see impacts of sea level rise in a year.
Onset	1	>24 hours	There are several years of warning for this hazard.
AVERAGE	**2.3**	**Low Threat**	
Vulnerability Calculation			
Response	1	No response	No traditional response.
Location	1	Localized	Concentrated along coastal areas.
Human	1	None	No short-term effects to human health and wellbeing.
Property	1	< 10%	Less than or up to 10% of structures affected.
Infrastructure	1	< 1 day	Damage to infrastructure will not be seen for several years, allowing sufficient time to plan and mitigate.
Economy	1	< 1 day	Even with potential impacts in several years, no impacts currently.
Environment	2	Moderate	Main impacts of sea level rise will be seen in the environment.
AVERAGE	**1.1**	**Minimal Vulnerability**	
Risk Calculation			
Slight Risk			Based on the low threat and the minimal vulnerability, this hazard is a slight risk to Martin County.

Future Considerations

Increased development in the coastal areas of Martin County, would make the built environment susceptible to the effects of sea level rise, increasing the risk of population settled in the area.

Regional or local projects will be needed to adapt existing areas to meet future conditions. Existing residents within these areas will need to raise, adapt, or abandon their homes. Shoreline protection will be a main factor in protecting infrastructure.

From a report by the Florida Oceans and Coastal Council, over the past 20 years the rate of sea-level rise has been about 80% faster than the best estimate from the United Nations' Intergovernmental Panel on Climate Change. This is assumed to be due to the increasing contribution of water from melting ice reservoirs, due to the increasing temperature of the planet. It is recognized that climate change has and will continue to greatly affect sea-level rise.

Mitigation Measures

- Martin County has received grant funding from the Florida Department of Environmental Protection to perform targeted analyses required to develop a resiliency plan that

addresses the impacts of sea level rise. A Martin County Adaptation Plan is being developed.

- Targeted analysis for watershed adaptation is being conducted in an Integrated Watershed Management Plan to address rainfall, sea level rise, and water quality in one plan that will be accepted to propose projects for the LMS and meet CRS requirements.
- Martin County's strict growth management and conservation principles have resulted in a large percentage of publicly held, undeveloped land along and adjacent to many of these waterbodies. Additionally, the County's aggressive septic to sewer conversion program will minimize, and eventually eliminate, the risk to water quality associated with inundated septic systems.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that over 61% of respondents are concerned or very concerned about sea level rise.

SEVERE THUNDERSTORMS

Description

A severe thunderstorm is defined as a thunderstorm containing one or more of the following phenomena: hail US quarter size or greater, winds gusting in excess of 58 mph, and/or a tornado (NOAA, NWS, 2014). Severe thunderstorms include lightning, winds, heavy rainfall, hail, and tornadoes. Although **tornadoes** are one of the hazards of severe thunderstorms, this hazard is profiled separately.

Most individual **thunderstorms** only last several minutes; however, some can last several hours. There are several types of thunderstorms:

- Single Cell: uncommon, lasting 20-30 minutes and containing non-damaging hail, microbursts, and weak tornadoes.
- Multi Cell Storm: common, organized cluster of two or more single cells with each lasting approximately 20 minutes. Downbursts bay be of up to 80 mph and bring heavy rainfall, downbursts, hail, and weak tornadoes.
- Mesoscale Convective System (MCS): a well-organized system of thunderstorms that las up to 12 hours or more. Associated hazards include torrential rainfalls, derechos, and tornadoes.
- Squall Lines: storms arranged in a line that may extend up to 500 miles and be 10-20 miles wide; individual cells may last 30-60 minutes and produce significant rain after the storm and derechos.
- Supercell: a long-lived (greater than 1 hour) and highly organized storm feeding off an updraft (a rising current of air) that is tilted and rotating; most large and violent tornadoes come from supercells. Updrafts and downdrafts can be of more than 100 mph.

Lightning is a naturally occurring spark of electricity in the air between clouds, the air, or the ground. Air acts as an insulator between the cloud and the ground, but when the charge difference becomes significant enough, this insulating capacity breaks down, allowing the rapid discharge of electricity. This electrical discharge is known as lightning. Lighting can reach a significant distance from a storm, up to 25 miles. The National Severe Storms Laboratory (NSSL) found that 80% of the next lightning strikes in a storm are within two to three miles of each other in certain weather conditions in Florida, but more typically lightning strikes are about six miles from each other. While lightning is a common occurrence and can be seen in most thunderstorms, only about 20% of the lighting observed in a storm will strike the ground.

Severe **wind** includes non-tornadic, damaging winds from thunderstorms. There are six types of severe wind:

- Straight-line Wind: Straight-line wind is a term used to define any thunderstorm wind not associated with rotation, used mainly to differentiate from tornadic winds.
- Downburst: Downburst is the general term for all localized strong wind events caused by a strong downdraft within a thunderstorm.
- Macro burst: An outward burst of strong winds at or near the surface with a diameter larger than 2.5 miles that occurs when a strong downdraft reaches the surface.
- Microburst: A small, concentrated downburst that produces an outward burst of strong winds near the surface. Microbursts are small and short-lived, with a diameter of less than 2.5 miles and lasting only five to 10 minutes.

- Gust Front: The leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. It is characterized by a wind shift, temperature drop, and gusty winds ahead of a thunderstorm.
- Derecho: A widespread, long-lived windstorm associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts and downbursts. An event with wind speeds of at least 58 mph and a diameter of 240 miles is a derecho.

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 balls of ice; the drops of ice can move upwards and downwards within the draft and become larger. When the hailstone is heavy enough, it will fall to the ground (NSSL, n.d.).

Possible Causes

The Florida rainy season runs from May 15 to October 15; 55-70% of our annual rainfall typically falls during June through September. During the late spring and summer months, the tropical climate shifts north. When combined with the influence of the surrounding oceans and daily sea breezes, this leads to our thunderstorm season. The thunderstorm season is active when:

- the Bermuda High sets up,
- sea surface temperatures surpass 82°F offshore, not just along the coast,
- moisture aloft increases, and
- surface dew points increase into the 70s.

Hail forms when water droplets are carried upward into extremely cold areas of the atmosphere. Hailstones grow by colliding with super cooled water drops. Super cooled water will freeze on contact with ice crystals, frozen raindrops, or dust. Thunderstorms that have a strong updraft keep lifting hailstones up toward the top of the cloud where they continue to grow. The hail eventually falls when the updraft can no longer lift the weight of the hailstone. Hail cannot form without an extremely cold upper atmosphere (NSSL, 2018).

Lightning is an electrical current that start from the clouds. When the ground is hot, it heats the air above it; as the warm air rises, water vapor cools and forms into a cloud. When the warm air continues to rise, the cloud will grow. The top of the cloud has a temperature below freezing, which means water vapor turns to ice. As the water vapor freezes, the cloud becomes a thundercloud, and the frozen particles collide with each other creating an electric charge. Positively charged particles will rise to the upper part of the cloud, and the negatively charged particle will sink to the lower portion of the cloud. When the charges grow large enough, a spark or lightning will occur. This process may vary. Cloud-to-ground lightning occurs where the cloud is negatively charged, and the ground is positively charged, thus making a spark.

Extent

In 1986, Jonathan Webb, a member of the Tornado and Storm Research Organisation (TORRO) in England, developed the TORRO Hailstorm Intensity Scale as a way to measure and categorize hailstorms.

Table 53: TORRO Hailstorm Intensity Scale

Scale	*Intensity category*	*Typical hail diameter (mm)*	*Typical damage impacts*
H0	Hard hail	5	No damage
H1	Potentially damaging	5-15	Slight general damage to plants, crops
H2	Significant	10-20	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60	Bodywork of grounded aircraft dented; brick walls pitted
H7	Destructive	50-75	Severe roof damage, risk of serious injuries
H8	Destructive	60-90	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: The Tornado and Storm Research Organisation.

The Storm Prediction Center defines the risk of storms using several categories.

Table 54: Severe Thunderstorm Risk Categories

Level	*Label*	*Probability*	*Description*
N/A	Thunderstorms (no label)	No severe thunderstorms expected	Lightning and flooding threats exist with all thunderstorms
1	Marginal (MRGL)	Isolated severe thunderstorms possible	Limited in duration and/or coverage and/or intensity
2	Slight (SLGT)	Scattered severe storms possible	Short-lived and/or not widespread, isolated intense storms possible
3	Enhanced (ENH)	Numerous severe storms possible	More persistent and/or widespread, a few intense
4	Moderate (MDT)	Widespread severe storms likely	Long-lived, widespread, and intense
5	High (HIGH)	Widespread severe storms expected	Long-lived, very widespread, and particularly intense

Source: National Weather Service

Historical Occurrences

The following table outlines the historical records of thunderstorm hazards (hail, thunderstorm wind, lightning, and heavy rain). Tornadoes are excluded from this list; for a list of tornado events, refer to the *Tornadoes* hazard profile.

Table 55: Severe Thunderstorm Events in Martin County 1960 - 2025

Date	Event Type	Magnitude	Deaths	Injuries	Damages
5/28/1960	Thunderstorm Wind	N/A	0	0	$0
9/15/1961	Thunderstorm Wind	N/A	0	0	$0
6/18/1965	Thunderstorm Wind	N/A	0	0	$0
2/8/1971	Thunderstorm Wind	N/A	0	0	$0
11/5/1971	Thunderstorm Wind	N/A	0	0	$0
5/15/1974	Hail	1.75"	0	0	$0
3/3/1978	Thunderstorm Wind	52 mph	0	0	$0
5/2/1978	Hail	1"	0	0	$0
5/24/1979	Thunderstorm Wind	53 mph	0	0	$0
5/30/1983	Thunderstorm Wind	N/A	0	0	$0
4/15/1987	Thunderstorm Wind	75 mph	0	0	$0
7/12/1987	Thunderstorm Wind	55 mph	0	0	$0
4/5/1989	Hail	0.75"	0	0	$0
7/31/1991	Thunderstorm Wind	N/A	0	0	$0
3/13/1993	Thunderstorm Wind	N/A	0	0	$5,000
3/13/1993	Thunderstorm Wind	N/A	0	0	$5,000
6/9/1994	Thunderstorm Wind	N/A	0	0	$0
2/20/1995	Thunderstorm Wind	40 mph	1	0	$0
3/17/1995	Hail	0.88"	0	0	$5,000
7/2/1995	Thunderstorm Wind	N/A	0	0	$0
3/30/1996	Hail	1.75"	0	0	$0
5/13/1996	Hail	1.75"	0	0	$0
6/22/1996	Thunderstorm Wind	N/A	0	0	$0
5/3/1997	Hail	0.75"	0	0	$0
5/26/1997	Thunderstorm Wind	N/A	0	0	$0
7/1/1997	Hail	0.75"	0	0	$0
7/5/1997	Thunderstorm Wind	N/A	0	0	$0
7/11/1997	Lightning	N/A	0	1	$0
8/23/1997	Lightning	N/A	0	1	$0
2/2/1998	Thunderstorm Wind	53 mph	0	0	$0
3/1/1998	Hail	1"	0	0	$0
5/5/1998	Hail	1.25"	0	0	$0
5/5/1998	Hail	1"	0	0	$0
6/21/1998	Hail	1.75"	0	0	$0
4/27/1999	Hail	0.75"	0	0	$0
5/9/1999	Hail	0.75"	0	0	$0
5/9/1999	Hail	0.75"	0	0	$0
8/2/1999	Thunderstorm Wind	50 mph	0	0	$0
4/13/2000	Thunderstorm Wind	50 mph	0	0	$3,000
4/13/2000	Hail	0.88"	0	0	$0
5/15/2000	Hail	1"	0	0	$0
5/15/2000	Hail	1"	0	0	$0
3/29/2001	Thunderstorm Wind	50 mph	0	0	$0
3/26/2002	Hail	0.75"	0	0	$0
5/30/2002	Hail	1"	0	0	$0
5/30/2002	Thunderstorm Wind	50 mph	0	0	$0
3/12/2003	Hail	1"	0	0	$0

Date	*Event Type*	*Magnitude*	*Deaths*	*Injuries*	*Damages*
3/13/2003	Hail	1.75"	0	0	$0
3/16/2003	Thunderstorm Wind	50 mph	0	0	$1,000
3/18/2003	Thunderstorm Wind	50 mph	0	0	$2,000
7/29/2003	Hail	1.75"	0	0	$0
8/9/2003	Thunderstorm Wind	50 mph	0	0	$0
6/2/2004	Thunderstorm Wind	50 mph	0	0	$0
5/3/2005	Hail	1.75"	0	0	$0
5/25/2005	Hail	0.88"	0	0	$0
5/25/2005	Hail	1"	0	0	$0
5/25/2005	Hail	1.5"	0	0	$0
11/19/2005	Heavy Rain	6"	0	0	$0
5/6/2007	Hail	1"	0	0	$0
5/13/2007	Hail	1"	0	0	$0
6/29/2007	Lightning	N/A	0	0	$60,000
7/2/2007	Hail	0.75"	0	0	$0
3/6/2008	Hail	1"	0	0	$0
3/6/2008	Thunderstorm Wind	84 mph	0	0	$1,000,000
6/22/2008	Hail	1.75"	0	0	$0
6/23/2008	Hail	0.75"	0	0	$0
6/23/2008	Hail	0.75"	0	0	$0
6/26/2008	Heavy Rain	4"	0	0	$0
5/11/2009	Hail	1"	0	0	$0
7/18/2009	Hail	1"	0	0	$0
2/24/2010	Thunderstorm Wind	55 mph	0	0	$0
2/24/2010	Thunderstorm Wind	52 mph	0	0	$0
2/24/2010	Thunderstorm Wind	50 mph	0	0	$0
2/24/2010	Hail	1.5"	0	2	$0
2/24/2010	Hail	1"	0	0	$0
2/24/2010	Hail	0.75"	0	0	$0
3/11/2010	Hail	0.75"	0	0	$0
5/14/2011	Thunderstorm Wind	56mph	0	0	$0
5/14/2011	Hail	0.75"	0	0	$0
5/14/2011	Hail	0.75"	0	0	$0
5/14/2011	Thunderstorm Wind	54 mph	0	0	$0
6/14/2011	Thunderstorm Wind	52 mph	0	0	$0
6/15/2011	Hail	1.75 "	0	0	$0
6/15/2011	Thunderstorm Wind	50 mph	0	0	$0
12/10/2011	Heavy Rain	5"	0	0	$0
4/20/2012	Thunderstorm Wind	48 mph	0	0	$10,000
5/19/2012	Hail	1"	0	0	$0
5/19/2012	Hail	0.75"	0	0	$0
5/19/2012	Hail	1"	0	0	$0
4/15/2013	Thunderstorm Wind	52 mph	0	0	$0
4/15/2013	Thunderstorm Wind	52 mph	0	0	$0
5/11/2013	Hail	1"	0	0	$0
5/11/2013	Hail	0.88"	0	0	$0
5/11/2013	Hail	0.88"	0	0	$0
7/21/2013	Lightning	N/A	0	0	$500,000

Date	*Event Type*	*Magnitude*	*Deaths*	*Injuries*	*Damages*
1/9/2014	Thunderstorm Wind	70 mph	0	0	$150,000
4/20/2015	Hail	1"	0	0	$0
4/27/2015	Hail	1.75"	0	0	$0
9/16/2015	Heavy Rain	6"	0	0	$0
9/16/2015	Lightning	N/A	0	2	$0
3/25/2016	Lightning	N/A	1	0	$0
4/15/2016	Hail	0.75"	0	0	$0
4/15/2016	Hail	1.5"	0	0	$0
6/6/2016	Thunderstorm Wind	45 mph	0	0	$1,000
5/17/2017	Lightning	N/A	1	0	$0
5/31/2017	Thunderstorm Wind	43 mph	0	0	$1,000
7/8/2017	Lightning	N/A	0	3	$0
4/24/2018	Hail	1"	0	0	$0
4/24/2018	Hail	1.75"	0	0	$0
8/9/2018	Thunderstorm Wind	56 mph	0	0	$0
12/20/2018	Thunderstorm Wind	43 mph	0	0	$1,000
5/3/2019	Thunderstorm Wind	50 mph	0	0	$0
5/5/2019	Thunderstorm Wind	52 mph	0	0	$0
5/13/2019	Thunderstorm Wind	56 mph	0	0	$0
8/2/2019	Lightning	N/A	0	1	$0
8/15/2019	Thunderstorm Wind	52 mph	0	0	$0
4/20/2020	Thunderstorm Wind	52 mph	0	0	$0
4/20/2020	Thunderstorm Wind	50 mph	0	0	$0
4/20/2020	Hail	1"	0	0	$0
4/20/2020	Thunderstorm Wind	57 mph	0	0	$0
6/7/2020	Lightning	N/A	0	2	$0
10/1/2020	Heavy Rain	N/A	0	0	$0
4/11/2021	Thunderstorm Wind	63 mph	0	0	$0
4/11/2021	Thunderstorm Wind	67 mph	0	0	$0
4/11/2021	Thunderstorm Wind	55 mph	0	0	$0
4/11/2021	Thunderstorm Wind	62 mph	0	0	$0
4/11/2021	Thunderstorm Wind	60 mph	0	0	$0
4/11/2021	Thunderstorm Wind	60 mph	0	0	$0
4/11/2021	Thunderstorm Wind	59 mph	0	0	$0
4/11/2021	Thunderstorm Wind	60 mph	0	0	$0
4/11/2021	Hail	1.75"	0	0	$0
4/11/2021	Hail	1"	0	0	$0
8/13/2021	Heavy Rain	5"	0	0	$0
9/19/2021	Heavy Rain	5"	0	0	$0
4/18/2022	Hail	1.25"	0	0	$0
6/6/2022	Thunderstorm Wind	54 mph	0	0	$0
6/6/2022	Thunderstorm Wind	60 mph	0	0	$0
6/6/2022	Thunderstorm Wind	51 mph	0	0	$0
4/16/2023	Hail	1"	0	0	$0
4/26/2023	Thunderstorm Wind	74 mph	0	0	$0
5/19/2024	Hail	1.75"	0	0	$0
5/19/2024	Hail	1.5"	0	0	$0
5/19/2024	Hail	1"	0	0	$0

Date	*Event Type*	*Magnitude*	*Deaths*	*Injuries*	*Damages*
5/23/2025	Hail	2"	0	0	$0

Source: National Centers for Environmental Information Storm Events Database

Since 1960, there have been 64 hail events, 63 instances of thunderstorm wind, 10 notable lightning events, and 7 heavy rain events. Altogether, this accounts for 144 severe thunderstorm events in Martin County, not including tornadoes. On average, there are 2.2 severe thunderstorm events per year.

The Weather Channel reports that the State of Florida averages 24.7 lightning strikes per square mile per year. This would indicate that Martin County, with 555 square miles could average 13,708 lightning strikes per year, if the 70-100 days a year of severe thunderstorms in the State impact Martin County.

There has been one federal declaration for severe storms in Martin County:

- DR-982 in 1993 with an estimated loss of $50 million.

Probability

Regular thunderstorms are prevalent during the thunderstorm season, yet not all storms rise to the level of severe. However, given the data from the NCEI, there are more than 2 severe thunderstorms in Martin County on average per year, making this hazard likely to occur in a year.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

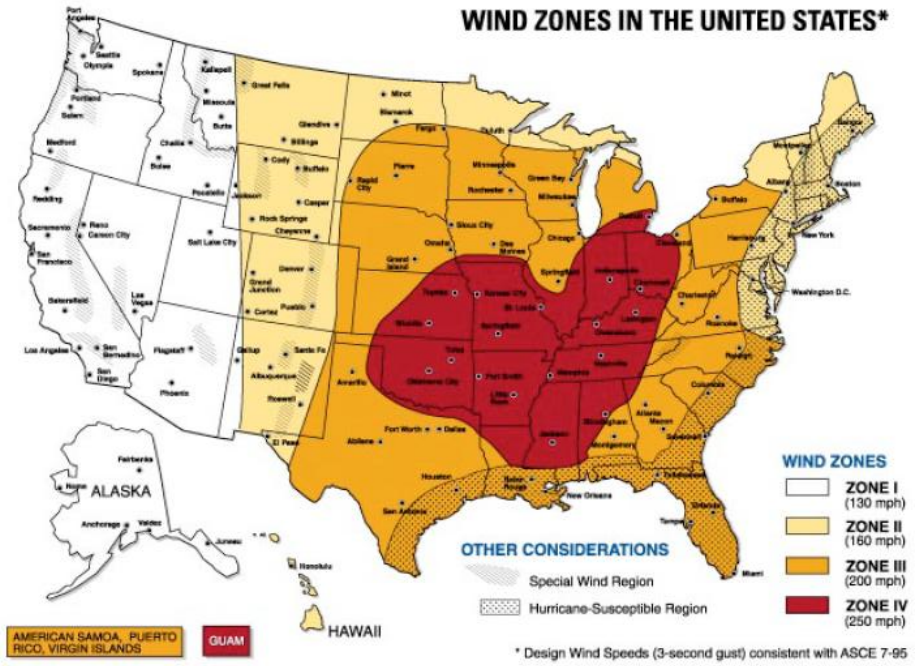
Response

The response to a severe thunderstorm could be up to a day. Typically, severe thunderstorms are fast-moving, short-lasting events, which allows responders to immediately survey and respond to damages. Actions would be limited to clearing debris from roads, restoring power, and tending to injuries from hail or wind damage.

Impact Area

Severe thunderstorms can affect all areas of Martin County, its jurisdictions, and the wider region equally. These events can last a few seconds (i.e., lightning), minutes (i.e., hailstorms), hours (i.e., thunderstorms), or even days (i.e., high winds). The wind is a commonplace phenomenon across the globe. Wind events can impact several jurisdictions simultaneously, with varying duration and severity.

FEMA's wind zone map classifies wind zones in the United States. As shown below, Martin County is located in zone III; buildings should be constructed to withstand three-second gusts of up to 200 miles per hour.



Human Impact Lightning, hail, and wind could cause injuries and possible death.

Property Impact Lightning may cause fires to structures while strong winds can cause damage to buildings. Hail can cause damage to personal property such as cars, boats, etc.

Infrastructure Impact Lightning may cause fires to structures while strong winds can cause damage to buildings due to flying debris.

Economic Impact The National Centers for Environmental Information Storm Events Database provides information on reported damages from each type of hazard associated with thunderstorms.

Thunderstorm wind	$1,170,000	available damages from 63 events
Hail	$5,000	available damages from 64 events
Lightning	$560,000	available damages from 10 events
Heavy Rain	N/A	available damages from 7 events

Environmental Impact Lightning is known to cause fires in open land or forests. Wind can cause damage to the vegetation in the form of fallen trees.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 56: Severe Thunderstorm Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	There are over 2 severe thunderstorms on average per year in Martin County.
Probability	4	Likely to occur in a year	It is likely that a severe thunderstorm would occur in a year.
Onset	2	1 day – 1 week	The National Weather Service issues outlooks several days in advance of a potential severe thunderstorm.
AVERAGE	**3.7**	**High Threat**	
Vulnerability Calculation			
Response	2	Up to 1 day	Responders may handle response within one day of the occurrence of the incident.
Impact Area	5	Widespread	The majority if not all of the county is affected by severe thunderstorms.
Human	3	Moderate	Although the hazards of a severe thunderstorm may and have led to deaths, the majority of the events have had no injuries reported.
Property	1	< 10%	Less than 10% of the property at risk would be affected in some way.
Infrastructure	1	< 1 day	Infrastructure systems may be disrupted for up to one day.
Economy	1	<1 day	Economic impact is minimal, and businesses are expected to open within one day.
Environment	1	Minimal	Damages caused require little to no intervention.
AVERAGE	**2**	**Low Vulnerability**	
Risk Calculation			
Moderate Risk			Based on the high threat and the low vulnerability, this hazard is a moderate risk to Martin County.

Future Considerations

The risk of severe thunderstorms from increased development and population changes in Martin County would not increase. The vulnerability of the increased number of properties and people living in the area would be equal to the current vulnerability, except that there would be more properties and people at risk.

Data on the impacts of climate change suggest that severe summer weather to include thunderstorms, may increase in intensity in the coming years, rendering loss estimates based on previous occurrences obsolete. As yet, there is no collectively agreed-upon manner of adjusting historical losses to forecast future damages accurately. Significantly, this data-supported conclusion aligns with the lived experience of local officials. Steering committee representatives frequently noted the impacts of summer weather as having changed in the past decade. Forecasts have often proved to be incorrect, as forecasted impacted areas will be spared while non-forecasted areas experience heavy downpours or strong winds. Local officials also noted the very small, “hyper-localized” impact areas from some downpours.

Mitigation Measures

There are no specific mitigation measures that Martin County focuses on for severe thunderstorms. However, past, current, and future mitigation measures for other hazards such as floods and tropical cyclones can apply to severe thunderstorms.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that about 42% of respondents were concerned or very concerned with severe thunderstorms.

SHORELINE EROSION

Description

Shoreline erosion is the wearing away of land and the removal of beach, dune, or shoreline sediments by wave action, tidal currents, wave currents, drainage, or high winds.

Possible Causes

Energy from wind, waves, tides, currents, and storms all generate impacts and spoil our barrier islands and shape the shoreline, beaches, intercoastal waterways, estuary, and streams. Naturally occurring erosion removes sand and deposits it offshore. Over time, waves return some of the sand to the beach. Storms with heavy surf and high winds can cause erosion to occur with increased intensity and frequency.

Extent

The unit of measurement is based on cubic feet or tons of mission soil in the affected areas.

The U.S. Geological Survey (USGS) uses a nationwide network of coastal observing cameras, or CoastCams, to monitor coastal conditions in near real-time and support research by the USGS and its partners into a variety of coastal processes and hazards. Martin County uses aerial photography, satellite imagery, structure-from-motion (SfM) photogrammetry, and lidar (laser-based surveying)—to measure coastal change along U.S. shorelines.

Historical Occurrences

- The 2004 Hurricane season was particularly active and included Hurricanes Frances and Jeanne, which made approximate landfall at Bathtub Beach and the House of Refuge, respectively, within a period of three weeks. Hurricane Frances made landfall within Bathtub Beach on September 5, 2004. Hurricane Jeanne made landfall approximately one mile north, at the House of Refuge, on September 25, 2004.
- For the period after the 2004 Hurricanes, from June 2005 to August 2011, the northern shoreline at monument stations R-35, R-36, and R-37 experienced significant erosion rates of 18, 9, and 6 feet/per year respectively. This shoreline erosion occurred despite the placement of over 168,800 CY of fill within the project shoreline during this period. Thus, the actual erosion was higher.
- In 2008, Tropical Storm Fay required emergency hauling of 3,426 Tons of sand to Bathtub Beach.
- In 2010, Tropical Storm Nicole passed by our coast causing high waves followed by the king tides and a Nor'Easter which required emergency hauling of 9,070 Tons of sand to Bathtub Beach.
- In 2012, Tropical Storm Isaac caused significant erosion to Bathtub Beach, requiring an initial emergency truck-haul more than 27,000 Tons of sand.
- In 2013, Bathtub Beach received additional emergency truck-hauls of approximately 3,000 Tons of sand for erosion from high surf.
- On December 9, 2014, Hutchinson Island Beach received several washouts because of erosion damage from a high surf event. Martin County immediately responded to Bathtub Beach by moving sand previously stockpiled at the beach to begin repairs and by hauling 1,500 Tons of sand to fill the breach in the dune/berm.

- In 2017, following the completion of the Bathtub Beach/Sailfish Point Nourishment Project Hurricane Irma made landfall in the Florida Keys and caused severe erosion on our coastline. An emergency truck-haul of 32,972 Tons of sand was taken to Bathtub Beach.
- Labor Day weekend of 2019 Hurricane Dorian sat off of our coast for days as a Cat 5 over the Bahamas. The wave action eroded Bathtub Beach causing an emergency truck-haul of 1,098 tons.
- Fall of 2020 had strong Nor'easters which coincided with the King tides requiring a truck haul of 61,421 Tons of sand to Bathtub Beach.
- In November of 2022, Hurricane Ian and Nicole made land fall north of Martin County in Tampa and Fort Pierce causing high waves and erosion at all of Martin County beaches. Martin County began a truck haul at numerous locations from R-25 to R-35 with the placement of 61,422 Tons of sand.
- In 2023, Martin County installed a seawall on the oceanside of Bathtub Beach as a preventative measure and to reduce the amount of emergency truck hauls performed in the future.
- In 2024, Martin County raised MacArthur Blvd to an elevation of 5ft and installed a seawall on the riverside of the road to reduce impacts from SLR coming from the river.

Probability

It is difficult to accurately predict the future occurrences of shoreline erosion; erosion can happen as a result of a large-scale storm or hurricane, or gradually over time, not necessarily being able to assign the erosion to one event. It can safely be assumed that at least the events that are known to cause erosion will have at least some erosion as a result, and minimal constant erosion from waves.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

Martin County monitors shoreline erosion especially when north easterners or major storms impact the area. Immediate response consists of sand placement in areas that have been eroded. If structural damage becomes plausible, then evacuation of the structure would occur.

Location

Vulnerable areas are located along the coastline and rivers. Martin County has 21 miles of beaches and 161 miles of shoreline to protect.

According to the 2025 Florida Department of Environmental Protection's *Critically Eroded Beaches in Florida* report, there are three critically eroded areas in Martin County, making up 18.4 miles of beach shoreline.

The northern 6.7 miles of Hutchinson Island (R1 – R40) are designated as critically eroded, threatening development and recreational areas. The northern 3.75 miles of this segment is part of an existing beach restoration project called the Federal Martin County Shore Protection

Project. From the south end of the Federal Martin County Shore Protection Project to monument R4.5, Martin County as a local option has a dune restoration project called the MacArthur Dune Restoration Project. This area includes the House of Refuge. From Monumber R34.5 to R40 is the Bathtub Beach/Sailfish Point Beach Fill Project.

Most of Jupiter Island (R45 – R111), south of the St. Lucie Inlet, is considered critically eroded for 11.5 miles. The northern half of this eroded area extends along St. Lucie Inlet Preserve State Park and Hobe Sound National Wildlife Refuge. The erosion along this shoreline segment threatens wildlife habitat, including the potential to break through Jupiter Island at Pecks Lake. Also threatened and already half destroyed is the Joseph Reed Mound archeological site which appears to have been constructed during the late archaic period (2250 B.C.E. – 1000 B.C.E.). The entire town of Jupiter Island is also within this long critically eroded area where development and recreational interests are threatened. Inlet sand bypass occurs along the beaches from R-45 to R-73 with Martin County projects and the Town of Jupiter Island has projects that exist from R-73 to R-111 and R-126 to R127.4.

South of Blowing Rocks Preserve is another critically eroded area (R126 – R127.4) extending 0.2 mile to the Palm Beach County line and threatening private development.

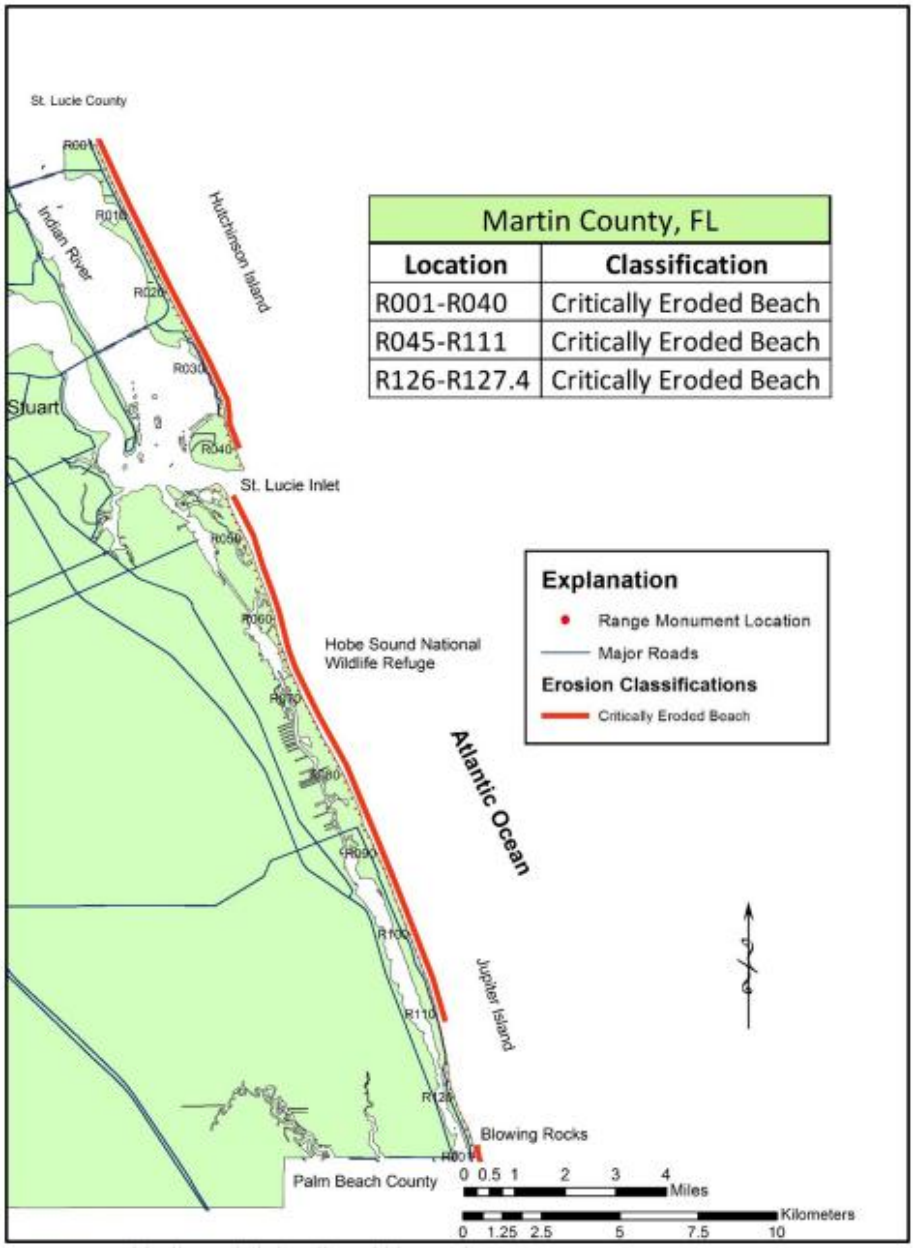


Figure 14: Critically Eroded Shoreline in Martin County

Human Impact

The human impact of shoreline erosion is mainly due to other impacts to property, infrastructure, the economy, and the environment. There is a reasonable expectation that shoreline erosion itself would not cause illness, injury, or death.

Property Impact

Because Martin County is a coastal community, shoreline erosion may affect people who live on the water of beaches and rivers. Properties may be at risk of increased flooding and collapsing into the ocean or waterways.

Infrastructure Impact

Shoreline erosion can impact infrastructure by undermining buildings and roads, damaging transportation networks, and threatening

essential services like water and power. This can lead to property damage, and significant economic strain from costly repairs or closures. Erosion can also impact coastal protection structures, such as seawalls, and vital areas like tourist attractions and cultural sites.

Economic Impact

Some possible economic impacts of shoreline erosion in Martin County could be:

- Direct property damage.
- Loss of tourism revenue.
- Damages to infrastructure such as roads, utilities, and power lines.
- Destruction of coastal habitats that provides protection during storms.
- Beach renourishment.

Environmental Impact

- Habitat loss and biodiversity decline causing impacts to wildlife and disruption of nesting grounds.
- Ecosystem degradation including loss of natural barriers, changes in water quality, and soil and water contamination.
- Saltwater intrusion and increased flooding and storm damage.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 57: Shoreline Erosion Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	Shoreline erosion, although minimal, can be constant and exacerbated by storm or king tide events.
Probability	5	Highly likely	Expectation is that the hazard will definitely occur during a year based on frequency and other factors as described above.
Onset	1	Over 1 week	This hazard has over one week of advance notice of occurrence.
AVERAGE	**3.7**	**High Threat**	
Vulnerability Calculation			
Response	3	Up to 1 week	Responders may handle response within one week of the occurrence of an incident
Location	1	Localized	only certain areas of vulnerability could be impacted.
Human	1	None	No illness or injury is expected
Property	1	<10%	Less than 10% of the property at risk could be affected in some way.
Infrastructure	2	Up to 1 week	Infrastructure systems may be disrupted for up to one week.
Economy	2	Up to 1 week	Businesses and industries may be closed for up to one week and need some external assistance to reopen.

Category	*Points*	*Description*	*Determination Method*
Environment	4	Critical	Damages caused are expected to have a long-lasting effect on the environment such as habitat destruction, water and air pollution, and biodiversity loss
AVERAGE	**2**	**Low Vulnerability**	
Risk Calculation			
Moderate Risk			Based on the high threat and the low vulnerability, this hazard is a Moderate risk to Martin County.

Future Considerations

Development and population growth in coastal areas can exacerbate shoreline erosion by disrupting natural sediment flow through construction and infrastructure like seawalls, while also contributing to the loss of natural barriers like dunes and vegetation. This human-caused acceleration can lead to significant property loss, damage to ecosystems, and the need for costly solutions like sand nourishment and building hard structures.

Climate change accelerates shoreline erosion through sea-level rise, more intense storms, and warmer oceans. Rising seas cause greater inundation, while stronger storms increase wave energy and storm surge, washing away sand and undermining natural barriers. This leads to smaller beaches, increased vulnerability of coastal infrastructure, and loss of ecosystems like wetlands, which are crucial for coastal protection.

Mitigation Measures

Martin County has a Coastal Management program that plans for, constructs, and maintains living shorelines, coral and artificial reefs, and beach nourishment.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that shoreline erosion is not as much as a concern to respondents; of the 20 hazards outlined, shoreline erosion ranked at number 15. It is possible that shoreline erosion is not as much of a concern for people who are not directly affected by it (i.e., living on the beach). When asked about beach nourishment as a mitigation project they would support, only 29.8% of respondents said they would support the measure.

TORNADOES

Description

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. It is generated by a thunderstorm or hurricane when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The most common type of tornado, the relatively weak and short-lived type, occurs in the warm season with June being the peak month. The strongest, most deadly tornadoes occur in the cool season, from December through April.

Florida's tornadoes usually occur in the Spring and Summer months. Summer season tornadoes (June-September) typically occur along strong sea breeze boundary collisions, as well as from tropical cyclones. Spring season tornadoes (February-May) can be more powerful and deadly as they are spawned from severe supercells along a squall line ahead of a cold front. These types of tornadoes are also possible in the fall and winter months (October-January). Florida tornado climatology shows us that strong to violent tornadoes are just as likely to occur after midnight as they are in the afternoon.

Possible Causes

Wind is caused by differences in atmospheric pressure; when there is a difference in pressure, air moves higher resulting in wind. See the *Severe Thunderstorms* and *Tropical Cyclones* profiles for further details.

Extent

The Fujita Scale was first developed in 1971 by Ted Fujita, a meteorologist at the University of Chicago in Illinois.

Table 58: Fujita Scale

Scale	*Intensity*	*Wind Speed*	*Type of Damage Done*
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.

Source: National Weather Service

Storm experts began using an enhanced version of the scale in 2007 that included more detailed descriptions of the damage. Unlike hurricanes, which are classified by measured wind speeds, tornado categories are based on wreckage after a tornado has struck, because the wind speeds are difficult to measure. After a tornado has passed, experts assess the damage, estimate wind speeds, and categorize tornadoes according to the Enhanced Fujita Scale, with ratings from EF-0 to EF-5.

Table 59: Enhanced Fujita Scale

Scale	*Wind Speed*	*Damages*
EF0	65 – 85 mph	The environment sustained minor damage: tree branches are broken, some shallow-rooted trees are uprooted, and some chimneys are damaged.
EF1	86 – 110 mph	The environment sustained moderate damage: mobile homes are tipped over, windows are broken, roof tiles may be blown off, and some tree trunks have snapped.
EF2	111 – 135 mph	The environment sustained considerable damage: mobile homes are destroyed, roofs are damaged, debris flies in the air, and large trees are snapped or uprooted.
EF3	136 – 165 mph	The environment sustained severe damage: roofs and walls are ripped off buildings, small buildings are destroyed, and most trees are uprooted.
EF4	166 – 200 mph	The environment sustained devastating damage: well-built homes are destroyed, buildings are lifted off their foundations, cars are blown away, and large debris flies in the air.
EF5	Over 200 mph	The environment sustained incredible damage: well-built homes are lifted from their foundations, reinforced concrete buildings are damaged, the bark is stripped from trees, and car-sized debris flies through the air.

Source: National Geographic

Both scales are outlined because Martin County tornado data exists prior to 2007 when the Fujita scale was used and after 2007, when the Enhanced Fujita scale was implemented.

Historical Occurrences

The following is a historical overview of tornados that affect Martin County.

Table 60: Tornadoes in Martin County 1956 - 2025

Date	*Scale*	*Deaths*	*Injuries*	*Damage*
8/27/1956	N/A	0	0	$0
10/19/1958	F3	0	0	$250,000
10/17/1959	N/A	0	0	$0
8/1/1963	N/A	0	0	$250
10/14/1964	F2	0	0	$2500
7/11/1968	N/A	0	0	$30
6/28/1970	F1	0	0	$25,000
10/1/1972	F0	0	0	$250
2/9/1973	F2	0	1	$250,000
5/15/1974	F1	0	1	$250,000
7/22/1974	F0	0	0	$25,000
7/6/1977	F0	0	0	$2,500
1/19/1978	F0	0	0	$25,000
1/24/1979	N/A	0	0	$250,000

Date	Scale	Deaths	Injuries	Damage
5/8/1979	F0	0	0	$2,500
5/24/1979	F1	0	0	$25,000
2/2/1981	F1	0	0	$2,500
6/25/1982	F0	0	0	$25,000
2/2/1983	F2	0	1	$250,000
8/28/1986	F0	0	0	$25,000
8/9/1989	F0	0	0	$25,000
3/3/1991	F0	0	0	$250
4/5/1993	F0	0	0	$50,000
3/16/2004	F0	0	0	$20,000
3/16/2004	F0	0	0	$10,000
8/24/2006	F0	0	0	$20,000
8/19/2008	EF0	0	0	$20,000
10/18/2011	EF0	0	0	$207,000
10/29/2011	EF0	0	0	$200,000
10/29/2011	EF0	0	0	$0
1/17/2016	EF1	0	0	$100,000
5/14/2018	EF0	0	0	$7,500
5/27/2018	EF0	0	0	$200
11/5/2019	EF0	0	0	$0
3/11/2022	EF0	0	0	$1,000
1/15/2024	EF0	0	0	$0
6/12/2024	EF1	0	0	$0
10/9/2024	EF0	0	0	$100,000
10/9/2024	EF1	0	1	$2,000,000
10/9/2024	EF2	0	0	$1,500,000
10/9/2024	EF0	0	0	$100,000
10/9/2024	EF2	0	0	$11,000,000
TOTALS		**0**	**4**	**$16,714,480**

Source: National Center for Environmental Information

According to the NCEI data, there have been 42 tornadoes in Martin County between 1956 and 2025, 0.6 tornadoes per year, or roughly, one every two years. The table below shows the number of tornadoes that have been registered by scale in Martin County and their percentage of the total.

Table 61: Tornadoes in Martin County by Intensity

F Scale	Number	% of Total	EF Scale	Number	% of Total
F0	13	31%	EF0	11	26%
F1	4	10%	EF1	3	7%
F2	3	7%	EF2	2	5%
F3	1	2%	EF3	0	0%
F4	0	0%	EF4	0	0%
F5	0	0%	EF5	0	0%
Unknown	5	12%			

The following is a description of tornadoes that have occurred in Martin County in the last five years, since the last update of this plan.

Table 62: Historical Tornadoes in Martin County

Date	*Location*	*Scale*	*Description*
11/5/2019	Waveland	EF0	Martin County Beach Patrol reported a waterspout offshore of Stuart Beach at 1620 LST. The beach was evacuated as the waterspout came onshore and became a short-lived tornado. Numerous reports were received from trained spotters and the public as the waterspout moved slightly inland. After moving onshore, a trained spotter relayed that the spout dissipated quickly near the Hutchinson Island Marriott at 1623 LST. No damage was reported.
3/11/2022	Rio St. Lucie	EF0	A brief, short-lived EF-0 tornado, with peak winds estimated at 60 to 65 mph, touched down in the Rio neighborhood at approximately 1624LST. Based on numerous video and eyewitness reports from trained spotters, the public, and local broadcast media, the tornado was nearly stationary as it produced minor damage along NE Railroad Street and NE Haven Lane. The tornado lifted at approximately 1625LST. Damage consisted of downed branches, downed fences, and backyard items tossed around.
1/15/2024	Palm City	EF0	The tornado touched down to the south and west of I-95 before crossing the interstate around 4:43 PM EST. The system moved to the north-northeast into Palm City, where numerous trees were felled on properties between I-95 and SW Martin Hwy. The circulation continued to the northeast in Stuart where numerous residents submitted videos of the tornado impacting portions of the Canopy Creek residential subdivision, though little in the way of damage was noted. Additional intermittent reports of downed |trees were reported along the path as it moved across Florida's Turnpike and into Stuart. The circulation eventually went on to produce a waterspout over the St. Lucie River that then pushed onshore and into the North River Shores subdivision before lifting and dissipating. The tornado produced minor damage here, including a few fallen trees |near the intersection of NW Pine Lake Dr and NW Fork Rd.
6/12/2024	Hobe Sound	EF1	The tornado touched down in a wooded area to the west of US-1 around 10:37 AM, very near the Island Mall shopping plaza. The system crossed US-1 where it continued to produce a swath of mainly vegetative damage, with numerous trees felled within the parking lot of a second shopping plaza. The circulation moved east toward A1A where additional damage to softwood and hardwood trees was noted in the vicinity of Hobe Sound Elementary School. The most notable damage was along Bridge Road just before where the road crosses the Indian River Lagoon. Here, a total of 20 to 25 large Ficus trees were toppled (uprooted) as a result of wind gusts that peaked between 85 to 95 mph. The tornado moved over the Indian River Lagoon and into Jupiter Island where more trees were felled from peak winds of 75 to 85 mph. Finally, the circulation moved into the Atlantic Ocean where it briefly became a waterspout before dissipating. The vast majority of damage related to this tornado was confined to vegetation, most notably hardwood and softwood trees. Only minor structural damage, including a home with torn shingles and a grocery store with limited roof damage, was noted during the survey.
10/9/2024	Indiantown	EF0	The tornado initially touched down in a wooded area in Martin County, to the south of the SW Martin Hwy and I-95 Interchange. Martin County Fire Rescue reported a tractor trailer was flipped by the tornado near mile marker 109. The circulation continued north along the interstate, downing

Date	Location	Scale	Description
			numerous trees along its path with estimated peak wind speeds of 75 to 85 mph. The tornado continued into St. Lucie County very near the intersection of the County Line Canal and Interstate 95 (near Mile Marker 114).
10/9/2024	Salerno	EF1	A tornado, embedded within one of Hurricane Milton's outer rainbands, touched down just south of US-1 where a camper home was tossed and its occupant was injured. The circulation moved across SE Federal Highway where it impacted portions of the Colonial Heights subdivision. Here, several mobile homes experienced significant damage to roofs and carports. A few experienced major damage when they were moved off their foundation. A continuous damage path was noted north into the New Monrovia subdivision, where numerous homes experienced moderate to major damage, and several manufactured homes experienced complete roof loss. The Murray Middle School also experienced roof and vegetative damage. Damage continued northward into Rocky Point, a large subdivision along the St. Lucie River. Several homes within the western half of the community experienced minor to moderate damage to roofs, soffits, and carports; however, a home on SE Dennis Way experienced total roof loss. The circulation then moved into the St. Lucie River and Intracoastal where it became a waterspout. Video from a resident along the Intracoastal indicates the waterspout dissipated before approaching the Jensen Beach Causeway.
10/9/2024	Indiantown	EF2	The tornado, which produced a large swath of EF-0 and EF-1 damage, and a small section of EF-2 damage, was one of several tornadoes to impact the area as Hurricane Milton's outer rainbands swept across the Treasure Coast. Based on radar dual polarimetric data, this tornado initially touched down in Palm Beach County. As it moved into rural Martin County, the system intersected a few homes south of SW Kanner Hwy. A large, newer construction home, experienced major damage when nearly all of its roof was torn back and tossed onto an adjacent home. Nearby metal storage structures were also significantly damaged, indicating EF-2 winds of 115 - 125 mph. The tornado continued northward through rural Martin County where sporadic damage to vegetation and residential structures was witnessed along Citrus Blvd, producing winds ranging from 85 to 105 mph (EF-0 to EF-1). The circulation damaged several industrial buildings, including the canopy of a gas station, near SW Martin Hwy and SW 42nd Ave. The tornado subsequently crossed Florida's Turnpike where it then entered several subdivisions before crossing into St. Lucie County, producing only minor (EF-0) damage given that most of the homes were concrete block structures.
10/9/2024	Hobe Sound	EF0	Using a combination of reports from Martin County Emergency Management and radar dual polarimetric data, the National Weather Service in Melbourne can confirm that a tornado moved northward out of Jupiter (Palm Beach County) and into far southern Martin County. This is associated with the Palm Beach Gardens tornado that was recorded by the National Weather Service Miami Office. Radar data suggests the circulation was weakening as it moved into Martin County before crossing I-95 around Mile Marker 91. A report from Florida Highway Patrol indicated the tornado produced tree damage and flipped a tractor trailer at this

Date	Location	Scale	Description
			location. The tornado subsequently moved into Jonathan Dickinson State Park where it believed to have lifted.
10/9/2024	Gomez	EF2	A tornado touched down in a wooded rural area in between I-95 and US-1 in eastern Martin County. Damage began in the Lost Lake subdivision before the tornado moved north into The Preserve, where vegetative damage was extensive and numerous concrete block homes experienced significant tile loss. The tornado moved north into the Mariner Sands community, where some of the most significant damage occurred along its nearly 6-mile-long path. Several wood-framed homes experienced total roof loss and partial wall collapse due to estimated winds of 110 to 120 mph. One resident who was trapped under his fallen roof was extracted and transported to a nearby hospital with minor injuries. The strong tornado then intersected the Manatee Creek subdivision where nearly 30 wood-framed homes experienced major damage in the form of roof loss and/or wall collapse from winds up to 120 mph. Finally, the circulation persisted into Rocky Point, where the eastern side of the subdivision experienced more sporadic damage in the roof of partial roof loss, soffit damage, and downed trees and power lines. Based on radar data, the tornado likely became a waterspout as it moved into the Intracoastal where it dissipated shortly thereafter.

Source: National Centers for Environmental Information

Probability

In Martin County, tornadoes occur about once every two years (although there can be years where several occur as a result of one storm, as it was the case in October of 2024 due to Hurricane Milton. Based on the historical data, it is most likely that Martin County would experience an EF0 or EF 1 tornado.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

Emergency services such as fire, law enforcement, and emergency medical services could be disrupted due to impassable roadways or damage to infrastructure.

Response could take anywhere from a few hours to several days or even up to a week.

Location

Because tornado hazards are not linked to geography or geology, it can be assumed Martin County and its jurisdictions would be equally at risk. However, some specific communities have a moderate to high vulnerability to this hazard due to the type of construction or numbers of mobile homes or manufactured housing units within their boundaries. These communities include Port Salerno, Indiantown, Hobe Sound, and Town of Ocean Breeze. These communities

continue to be more vulnerable due to the type of construction of structures in the areas.

Human Impact Tornadoes may cause injuries and deaths, especially during times when warnings may not be received, such as during night hours.

Property Impact Wind often results in damages to roofs and other home finishings (such as siding, etc.) as a result of flying debris from surrounding areas.

Infrastructure Impact Tornadoes could cause extended power outages, transportation system interruptions (air, rail, ground, and water) in the form of blocked roadways or facilities damage, potable water and sewer disruptions, communications damages. Depending on the severity and

Economic Impact The NCEI database estimates that tornadoes have caused approximately $16.7million in damages.

Environmental Impact Wind can cause damage to the vegetation in the form of fallen trees.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 63: Tornado Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	4	Medium High	Tornadoes occur 0.6 times per year on average in Martin County.
Probability	3	May or may not occur in a year	Martin County may have several years without a single tornado.
Onset	4	<12 hours	Tornadoes have less than 12 hours of warning. Watches are issued in advance.
AVERAGE	**3.7**	**High Threat**	
Vulnerability Calculation			
Response	3	Up to 1 week	Response to a typical tornado in Martin County could be a couple of days to a week.
Location	1	Localized	The location of tornadoes is highly localized to the path the tornado takes.
Human	4	Severe	Severe injuries are expected and are life threatening.
Property	3	26-50%	Highly depends on the construction of the properties impacted.
Infrastructure	2	Up to 1 week	Infrastructure systems may be disrupted for up to one week.
Economy	1	<1 day	Minimal impact to the economy is expected and businesses may open within a day of the incident.

Category	*Points*	*Description*	*Determination Method*
Environment	2	Limited	Damages caused require some human intervention to return to normal.
AVERAGE	2.3	Low Vulnerability	
Risk Calculation			
Moderate Risk			Based on the high threat and the low vulnerability, this hazard is a moderate risk to Martin County.

Future Considerations

Land development increases tornado disaster potential primarily by increasing the number and density of vulnerable structures and populations in harm's way, rather than by directly causing tornadoes. As more people and property are built in areas prone to tornadoes, more assets and lives are exposed to potential damage or loss.

A hotter atmosphere can hold more moisture, which increases atmospheric instability (which is necessary for storm systems that form tornadoes). Other elements, like wind shear, appear to decrease as a result of said instability. This push-and-pull factor within the data makes it difficult to accurately assess climate changes with respect to tornadoes. Further, tornadoes are too geographically small to be well-simulated by climate models. Put very generally, evidence suggests there will be a more favorable environment overall to severe weather (i.e., there will be more severe weather, including tornadoes).

Mitigation Measures

Martin County's building codes are strong, as they must adhere to the statewide Florida Building Code, which includes stringent requirements for hurricane resistance (also applicable to high winds of tornadoes), structural integrity, and energy efficiency. The codes are updated every three years to improve safety and incorporate new research or lessons learned from catastrophic events. Local enforcement in Martin County, including obtaining permits, is crucial to ensure compliance and avoid fines or forced demolition.

- Florida Building Code (FBC) compliance: Martin County must follow the FBC, which sets minimum safety and construction standards for all local governments in Florida.
- Hurricane resistance: Codes are particularly strict on wind and hurricane resistance, requiring features like impact-resistant windows, doors, and roofs.
- Structural integrity: The codes ensure structural safety, with updates often resulting from new engineering research.
- Permits and enforcement: A permit is required for most construction, renovation, or structural changes, and Martin County enforces these requirements to ensure safety and code adherence.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that over 51% of respondents are concerned or very concerned about tornadoes. Of note, the majority of survey takers completed this survey before the Hurricane Milton tornadoes in October of 2024; after these events, it may be safe to assume that the concern level has risen at least slightly.

TROPICAL CYCLONES

Description

The National Hurricane Center describes a tropical cyclone as a rotating, organized system of clouds and thunderstorms that originates over tropical or subtropical waters and has a closed low-level circulation. The following are the classifications of tropical cyclones:

- Tropical Depression – a cyclone with maximum sustained winds of 38 mph or less; these systems do not receive names.
- Tropical Storm – a cyclone with maximum sustained winds of 39 to 73 mph; at this point, the systems receive a name.
- Hurricane – a cyclone with maximum sustained winds of 74 mph or higher
- Major Hurricane – a cyclone with maximum sustained winds of 111 mph or higher (Category 3, 4 or 5).

The main hazards that are associated with tropical cyclones include:

- Extreme Winds: Very high winds are the main indicator of hurricane categories and are measured on the Saffir Simpson Hurricane Wind Scale.
- Storm Surge: Storm surge is the abnormal rise of water generated by a storm's winds. This hazard is historically the leading cause of hurricane related deaths in the United States. Storm surge and large battering waves can result in large loss of life and cause massive destruction along the coast.
- Tornadoes: Tornadoes can accompany landfalling tropical cyclones. These tornadoes typically occur in rain bands well away from the center of the storm (see the Tornadoes hazard profile for more information)
- Flooding: Flooding from heavy rains is the second leading cause of fatalities from landfalling tropical cyclones. Widespread torrential rains associated with these storms often cause flooding hundreds of miles inland. This flooding can persist for several days after a storm has dissipated.

Possible Causes

Hurricanes are essentially heat pumping mechanisms that transfer the sun's heat energy from the tropical to the temperate and polar regions which helps to maintain the global heat budget and sustain life. Hurricanes are formed from thunderstorms that form over tropical oceans with surface temperatures warmer than 81°F (26.5°C). The ambient heat in the sea's surface and moisture in the rising air column set up a low-pressure center and convective conditions that allow formation of self-sustaining circular wind patterns. Under the right conditions, these winds may continue to intensify until they reach hurricane strength. This heat and moisture from the warm ocean water are the energy source of a hurricane.

Extent

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based only on a hurricane's maximum sustained wind speed. This scale does not take into account other potentially deadly hazards such as storm surge, rainfall flooding, and tornadoes.

The Saffir-Simpson Hurricane Wind Scale estimates potential property damage. While all hurricanes produce life-threatening winds, hurricanes rated Category 3 and higher are known as

major hurricanes. Major hurricanes can cause devastating to catastrophic wind damage and significant loss of life simply due to the strength of their winds. Hurricanes of all categories can produce deadly storm surge, rain-induced floods, and tornadoes.

Table 64: Saffir Simpson Hurricane Wind Scale

Category	*Sustained Winds*	*Types of Damage*
Tropical Depression	Up to 38 mph	Winds can produce some damage
Tropical Storm	39-73 mph	Dangerous winds can produce some damage
1	74-95 mph	Very dangerous winds will produce some damage
2	96-110 mph	Extremely dangerous winds will cause extensive damage
3 (major)	111-129 mph	Devastating damage will occur
4 (major)	130-156 mph	Catastrophic damage will occur
5 (major)	156 mph or higher	Catastrophic damage will occur

Table X. Source: National Hurricane Center

Historical Occurrences

The following table outlines the tropical cyclone events in Martin County between 1988 and 2025. Storm surge events associated with the tropical cyclones only took place with some of the events and are not counted separately, but as a part of the event. None of these events have any recorded direct injuries or deaths in Martin County.

Table 65: Tropical Cyclones in Martin County 1988 - 2025

Date	*Event Type*	*Storm Name*	*Property Damage*	*Crop Damage*	*Storm Surge*
11/5/1998	Tropical Storm	Mitch	$0	$0	No
10/15/1999	Hurricane	Irene	$8,000,000	$0	No
9/4/2004	Hurricane	Frances	$1,000,000,000	$21,300,000	Yes
9/25/2004	Hurricane	Jeanne	$0	$0	Yes
10/24/2005	Tropical Storm	Wilma	$4,800,000	$21,000,000	No
8/19/2008	Tropical Storm	Fay	$0	$0	No
8/27/2012	Tropical Storm	Isaac	$0	$0	No
10/26/2012	Tropical Storm	Sandy	$0	$0	No
10/6/2016	Tropical Storm	Matthew	$175,000	$0	Yes
9/10/2017	Tropical Storm	Irma	$4,300,000	$0	Yes
9/2/2019	Tropical Depression	Dorian	$0	$0	Yes
8/2/2020	Tropical Storm	Isaias	$0	$0	No
11/8/2020	Tropical Storm	Eta	$0	$0	No
6/3/2022	Tropical Depression	PTC1	$0	$0	No
9/28/2022	Tropical Storm	Ian	$0	$0	Yes
11/9/2022	Tropical Storm	Nicole	$0	$0	Yes
9/26/2024	Tropical Storm	Helene	$250,000	$0	No
10/9/2024	Tropical Storm	Milton	$0	$0	No

Source: National Center for Environmental Information.

There have been 18 federal declarations for tropical cyclones in Martin County. Damages provided are for the entire declared area, not just Martin County

- DR-209 Hurricane Betsy with $1.42 billion in damages
- EM-3131 Hurricane Georges with $340 million in damages
- DR-1300 Hurricane Floyd with $6 billion in damages
- DR-1306 Hurricane Irene with $800 million in damages

- DR-1539 Tropical Storm Bonnie and Hurricane Charley with $14 billion in damages
- DR-1545 Hurricane Frances with $9 billion
- DR-1551 Hurricane Ivan with $18 billion in damages
- DR-1561 Hurricane Jeanne with $8 billion in damages
- DR-1609 Hurricane Wilma with $1.4 billion in damages
- DR-1785 Tropical Storm Fay with $116 million in damages
- DR-4084 Hurricane Isaac with $21.4 million in damages
- DR-4283 Hurricane Matthew with $390 million in damages
- DR-4337 Hurricane Irma with $3.3 billion in damages
- DR-4468 Hurricane Dorian with $77.8 million in damages
- EM-3533 Hurricane Isaias with $1.3 million in damages
- DR-4673 Hurricane Ian with $3.4 billion in damages
- DR-4680 Hurricane Nicole with $93.8 million in damages
- DR-4834 Hurricane Milton with $802 million in damages

Although Martin County may have received a federal declaration for a hurricane, the effects may have been lower in the area, such as a tropical storm or tropical depression, rather than a hurricane. According to the data, since 1998, Martin County has experienced:

- 2 tropical depressions (~11% of the total events)
- 13 tropical storms (~72% of the total events)
- 3 hurricanes (~17% of the total events)

Twelve of the 18 historical events in Martin County as outlined in Table 14: *Martin County Federal Declarations received declarations*. Altogether, whether with a declaration or not, there have been 24 tropical cyclones affect Martin County between 1965 and 2025. This means that there are 0.4 tropical cyclone events (all categories) per year, or roughly one event every 2.5 years.

Probability

There is nothing that can indicate when and where a tropical cyclone may make impacts. Martin County has had years with two separate events in the same year, and also several years between one event and another and the severity also fluctuates. Therefore, the designation for probability of tropical cyclones in Martin County is that it may or may not occur in a year, and the most likely event is a tropical storm.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

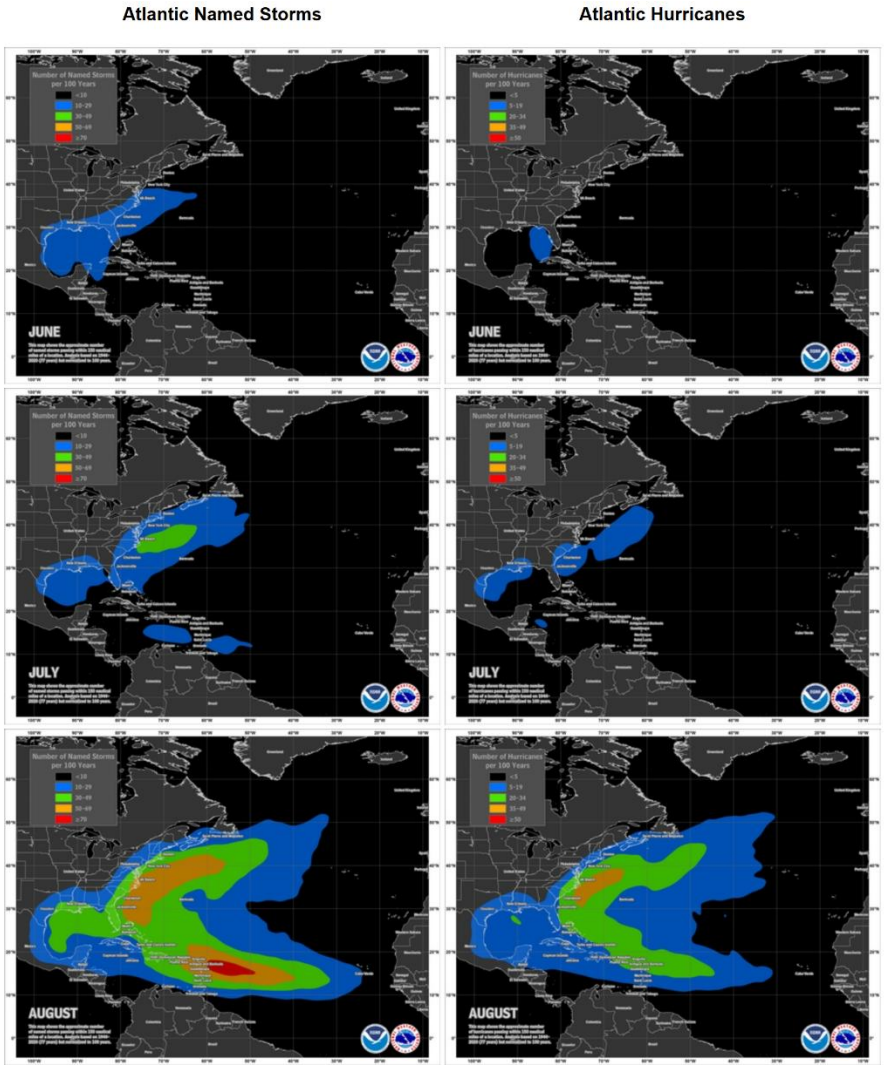
Response to a tropical cyclone is one of the largest operations in Martin County. When the Emergency Operations Center activates in anticipation of a tropical cyclone, all County staff, including emergency services such as fire, law enforcement, and medical, as well as private and non-profit partners mobilize quickly to prepare for and respond to the event.

The timeline for response depends on the impact and severity of the tropical cyclone, as noted previously, approximately 72% of tropical

cyclone events in Martin County are tropical storms, which could be responded to in roughly one week. However, historically, 17% of the events have been hurricanes, and response for the types of damage that a hurricane could inflict may easily take over a week, but probably not more than one month as the activities carried out after one month are typically associated with recovery actions.

Location

The following maps show where tropical cyclones (named storms and hurricanes) tend to occur during each month of the hurricane season. The data are shown as the number of named storms or hurricanes whose centers pass within 150 nautical miles of a point on the map during a 100-year period. For the Atlantic basin, the analyses are based on data from the 77-year period from 1944 to 2020 (starting at the beginning of the aircraft reconnaissance era) but normalized to 100 years.



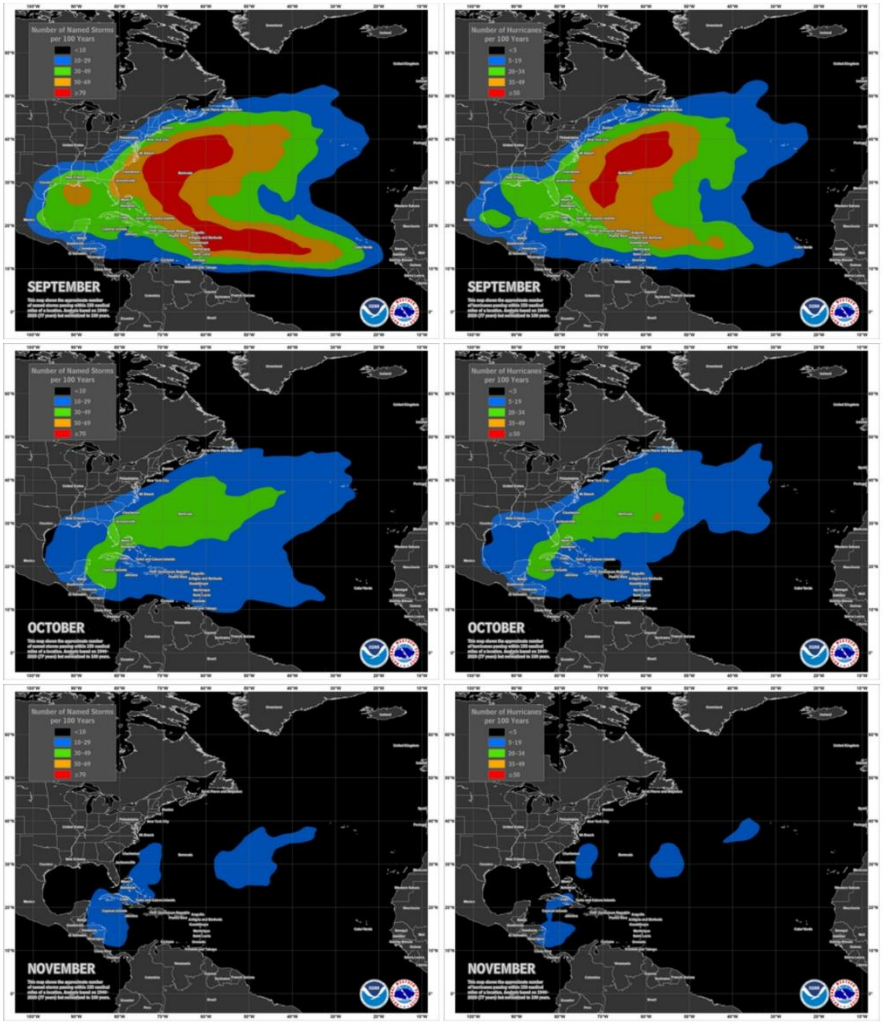


Figure 15: Tropical Cyclone Formation by Month Map

All communities within Martin County are highly vulnerable to hurricanes, but they are not all vulnerable for the same reasons. The barrier island communities (Jupiter Island and Sewall's Point) are obviously highly vulnerable to both wind and storm surge damage from hurricanes. The communities fronting on Martin County's estuaries and rivers also are highly vulnerable to flooding associated with hurricane winds and storm surge. Communities away from the water may be more vulnerable to wind damage from hurricanes.

Inland communities may have less hurricane vulnerability from coastal flooding but more hurricane vulnerability from wind damage due to their older or less substantial type of construction. Martin County's exposure to hurricanes is high, while the County's hazard history indicates that the probability of future occurrence is low to medium depending on the intensity of the storm.

Evacuation Zones in Martin County:

- Zone AB (red): includes the barrier islands and most low-lying areas along the coast. These areas are likely to be inundated by storm surge of up to 6 feet. The zones progress inland as you get further from the coast and higher in elevation.
- Zone CD (yellow): is likely to be inundated by storm surge of up to 13 feet.
- Zone E (blue): is likely to be inundated by storm surge of up to 16 feet.

Homes located in a low-lying or flood-prone inland area, may also experience flooding impacts that are often associated with a tropical storm or hurricane. In other words, a home may be located outside of a storm surge evacuation zone, yet still be susceptible to flooding because of a nearby stream or pond.

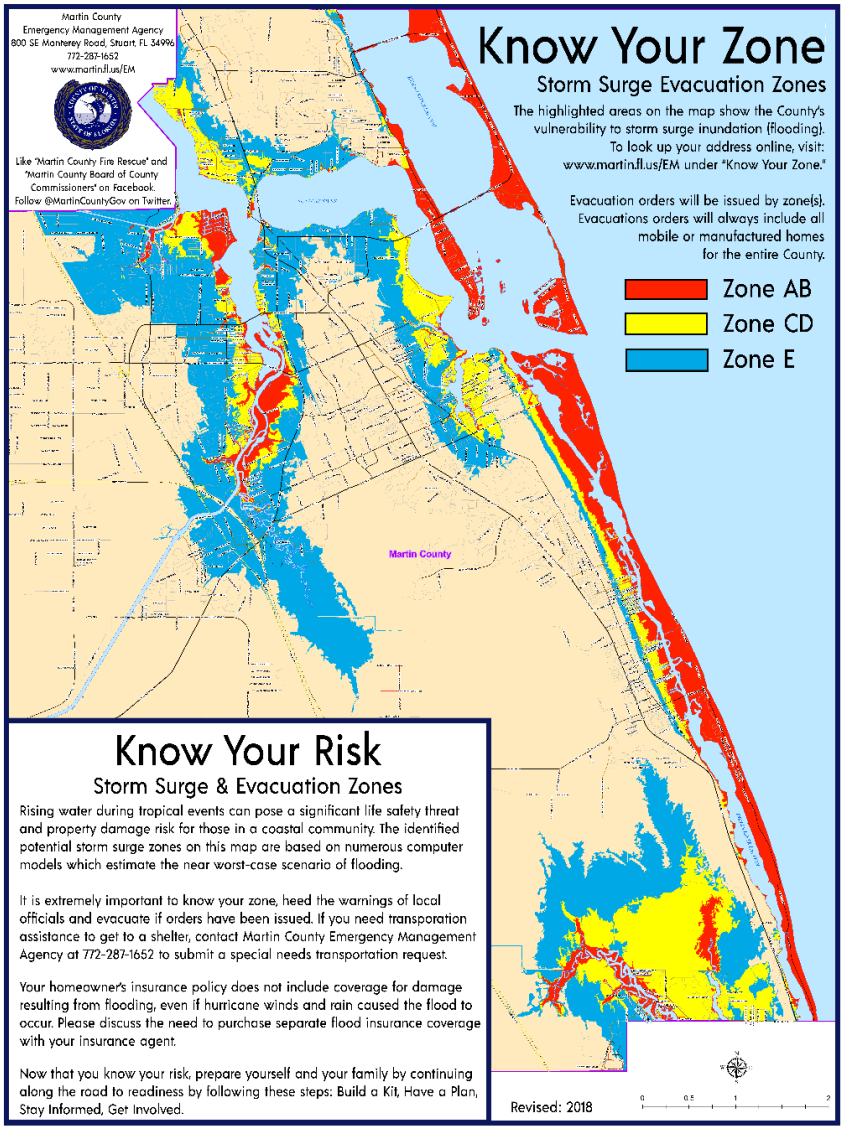


Figure 16: Martin County Storm Surge Zones

Human Impact

The Treasure Coast Regional Planning Council (TCRPC) has conducted evacuation studies for Martin County. The most recent data available is for 2025 and the following table shows the vulnerable population in each storm surge evacuation area.

Table 66: Vulnerable Population in Martin County by Zone

Structure Type	Zone AB	Zone CD	Zone E	Total
Site-built	14,406	17,152	40,435	71,993
Mobile/manufactured	265	229	1,146	1,640
Total	14,671	17,381	41,581	73,633

Source: Treasure Coast Regional Planning Council.

The total population of Martin County is approximately 165,666 people. According to the data, 73,633 people are living within a storm surge evacuation zone, or roughly 44% or Martin County's population.

Though trauma care and injuries are often the focus of hurricane recovery, the loss of medicines and prescriptions as a result of storm damage can have a serious, long-term impact on health. The loss of cold chains also threatens the supply of lifesaving medication like insulin. While storm deaths from injuries generally occur within days of landfall, deaths due to disease don't peak until one to two months later. In the aftermath of a storm, when water systems are compromised and homes are destroyed beyond repair, the risk of infectious outbreaks is dangerously high.

Hurricanes leave invisible scars, too. The emotional and psychological damages from living through disaster run deep. Survivors are at increased risk of developing post-traumatic stress disorder, depression, and anxiety — the most common mental health impacts of hurricanes. And sometimes these symptoms last a lifetime — especially when mental health services are limited and pushed to the wayside during times of crisis and emergency. Many hurricane survivors don't just lose access to medicines or hospitals; they also lose access to therapy.

Property Impact

- Category 1: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters.
- Category 2: Well-constructed frame homes could sustain major roof and siding damage.
- Category 3: Well-built framed homes may incur major damage or removal of roof decking and gable ends.
- Category 4: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls.
- Category 5: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Most of the area will be uninhabitable for weeks or months.

Infrastructure Impact

- Category 1: Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
- Category 2: Near-total power loss is expected with outages that could last from several days to weeks.
- Category 3: Electricity and water will be unavailable for several days to weeks after the storm passes.
- Category 4: Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
- Category 5: Power outages will last for weeks to possibly months.

Economic Impact

In Martin County, according to data from the NCEI Storm Event Database, Martin County has experienced over $1 billion in property damage and over $42 million in crop damage from tropical cyclones.

According to the Federal Emergency Management Agency (FEMA), 40% of companies do not reopen after a disaster, and another 25% fail within one year.

Environmental Impact

- Category 1: Large branches of trees will snap, and shallowly rooted trees may be toppled.
- Category 2: Many shallowly rooted trees will be snapped or uprooted and block numerous roads.
- Category 3: Many trees will be snapped or uprooted, blocking numerous roads.
- Category 4: Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas.
- Category 5: Fallen trees and power poles will isolate residential areas.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 67: Tropical Cyclone Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	3	Medium	Occurs on average once every 2.5 years
Probability	3	May or may not occur	A tropical cyclone event may or may not occur in a year
Onset	1	Over 1 week	The National Hurricane Center issues informational products that can provide up to a 5-7 day lead time.
AVERAGE	**2.3**	**Low Threat**	
Vulnerability Calculation			
Response	4	Up to one month	Response time could be up to one month for hurricane events

Category	*Points*	*Description*	*Determination Method*
Location	4	Generalized	Wind, flooding, and tornadoes can impact all areas of the county and storm surge only affects the coastal areas. Not all tropical cyclones have all hazards every time.
Human	4	Severe	Although no direct injuries or deaths have been recorded in Martin County, it is possible to have illnesses or injuries that can be life-threatening.
Property	3	26-50%	All property is vulnerable to the hazards of the tropical cyclones, however, many may remain undamaged.
Infrastructure	4	Up to 1 month	Infrastructure systems may be disrupted for up to one month.
Economy	4	Up to 1 month	Many businesses may not reopen after a disaster.
Environment	4	Critical	Damages caused can be expected to have a long-lasting effect on the environment.
AVERAGE	3.9	**High Vulnerability**	
Risk Calculation			
Moderate Risk			Based on the low threat and the high vulnerability, this hazard is a moderate risk to Martin County.

Future Considerations

Land development and hurricanes are interconnected through increased risk from development in coastal areas, reduced natural defenses from land clearing, and regulatory responses to hurricane impacts. Coastal development leads to greater property and infrastructure damage during storms because more assets are in harm's way and natural buffers like marshes and wetlands are lost, which exacerbates flooding and erosion.

According to the Center for Climate and Energy Solutions, climate change is worsening hurricane impacts in the United States by increasing the intensity and decreasing the speed at which they travel. Scientists are currently uncertain whether there will be a change in the number of hurricanes, but they are certain that the intensity and severity of hurricanes will continue to increase. These trends are resulting in hurricanes being far more costly in terms of both physical damage and loss of life.

Mitigation Measures

- Martin County Utilities and Solid Waste Department is in the process of installing wastewater lift station bypass pumps to replace portable generators.
- Martin County's building codes are strong, as they must adhere to the statewide Florida Building Code, which includes stringent requirements for hurricane resistance, structural integrity, and energy efficiency. The codes are updated every three years to improve safety and incorporate new research or lessons learned from catastrophic events. Local enforcement in Martin County, including obtaining permits, is crucial to ensure compliance and avoid fines or forced demolition.
    - Florida Building Code (FBC) compliance: Martin County must follow the FBC, which sets minimum safety and construction standards for all local governments in Florida.
    - Hurricane resistance: Codes are particularly strict on wind and hurricane resistance, requiring features like impact-resistant windows, doors, and roofs.

- Structural integrity: The codes ensure structural safety, with updates often resulting from new engineering research.
- Permits and enforcement: A permit is required for most construction, renovation, or structural changes, and Martin County enforces these requirements to ensure safety and code adherence.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that over 79% of respondents were either concerned or very concerned, with tropical cyclones being the hazard that people were most concerned with.

TSUNAMI

Description

A tsunami is a series of waves created when a body of water, such as in an ocean, is rapidly displaced. A tsunami has a much smaller amplitude (wave height) offshore, and a very long wavelength (often hundreds of kilometers long), which is why they generally pass unnoticed at sea, forming only a passing "hump" in the ocean.

Tsunami waves are unlike typical ocean waves generated by wind and storms. When tsunamis approach shore, they behave like a very fast-moving tide that extends far inland. Tsunamis are not like the typical wind-generated waves popular with surfers. Even "small" tsunamis are associated with extremely strong currents, capable of knocking someone off their feet. Because of complex interactions with the coast, tsunami waves can persist for many hours. As with many natural phenomena, tsunamis can range in size from micro-tsunamis detectable only by sensitive instruments on the ocean floor to mega-tsunamis that can affect the coastlines of entire oceans, as with the Indian Ocean tsunami of 2004.

Tsunamis have been historically referred to as tidal waves because as they approach land, they take on the characteristics of a violent onrushing tide rather than the sort of cresting waves that are formed by wind action upon the ocean. Since they are not actually related to tides, the term is considered misleading and its usage is discouraged by oceanographers.

There is another phenomenon often confused with tsunamis called rogue waves. There remains debate as to whether these waves are related to tsunamis. They are included in this section as the mitigation plans address the threat in the same relative manner. The characteristics are:

- Unpredictable nature
- Little is known about the formation
- May be caused by regularly spaced ocean swells that are magnified by currents or the atmosphere

Possible Causes

Tsunamis are caused by an underwater earthquake, landslide, or volcanic eruption that sends surges of water onto land.

Extent

DART (Deep-ocean Assessment and Reporting of Tsunami) systems were developed by NOAA for the early detection, measurement, and real-time reporting of tsunamis in the open ocean. The NWS's National Data Buoy Center operates and maintains the U.S. network of DART systems, which is part of a larger international network. The U.S. network is composed of 39 systems (as of 2016) strategically located throughout the Pacific and Atlantic Oceans, the Gulf of Mexico, and the Caribbean Sea.

Each system consists of a bottom pressure recorder (BPR) anchored on the ocean floor and a separately moored companion surface buoy. When a tsunami passes over a BPR, the instrument detects and records the changes in the overlying water pressure. An acoustic link transmits information from the BPR to the surface buoy, which then relays it via satellite to the warning centers where the information is incorporated into tsunami forecast models.

There is no tsunami forecast model for Martin County. However, the closest forecast is The Palm Beach, Florida Forecast Model Grids, which provide bathymetric data strictly for tsunami inundation modeling with the Method of Splitting Tsunami (MOST) model. MOST is a suite of numerical simulation codes capable of simulating three processes of tsunami evolution: generation, transoceanic propagation, and inundation of dry land.

Historical Occurrences

While no known tsunamis have ever affected the Florida Gulf Coast, a tsunami in that location is not impossible. Additionally, while tsunamis have historically affected the Caribbean many times, it is unlikely that those tsunamis will also affect Florida.

While it wasn't officially a "tsunami," a large rogue wave suddenly appeared along the coast in the Daytona area on July 7, 1992. The wave was reportedly about ten feet above normal waves and stretched 27 miles long, from Ormond Beach to New Smyrna Beach. There was one death, over 75 people injured, and damage to about 100 cars parked near the coastline. The best theory is that the wave was caused by winds from a storm front. Another rogue wave event took place in 1995 spanning from Tampa to Naples, FL.

There have been no recorded tsunamis in Martin County.

Probability

Because Florida is located in a seismically stable region, the probability that a major earthquake will create a tsunami with the potential to impact the Atlantic or Gulf coasts of Florida is extremely low, but it is not impossible. Underwater landslides can also cause a tsunami; however, this scenario is also unlikely for Florida.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response	It is impossible to calculate the response to a tsunami. The closest possible comparison would be a storm surge scenario.
Location	Not all areas of Martin County would be at risk from the effects of a tsunami. The communities at risk would be along the coastline and would include the City of Stuart, Town of Ocean Breeze, Town of Jupiter Island, and Town of Sewall's Point.
Human Impact	A tsunami as seen in other parts of the world that experience the phenomenon, can cause deaths and severe injuries. Additionally, health risks may arise from standing water left after the incident causing mold and affecting indoor air quality and exacerbating respiratory illnesses like asthma and pneumonia. If people lose their homes, they may become displaced or homeless, increasing stress, anxiety, and trauma.

Property Impact	Properties along the coast and rivers may experience flooding damages or be swept away.
Infrastructure Impact	Infrastructure issues could include power outages, damaged or washed-out roads and bridges, disruptions to ground and air travel, and damages to water and wastewater treatment plants.
Economic Impact	It is difficult to accurately estimate economic impact from a tsunami. The closest similar hazard would be storm surge, and Martin County has not seen any significant damages from storm surge in several years.
Environmental Impact	Coastal habitats such as mangroves and coral reefs could be destroyed, inland water would be contaminated with salt, debris, and sewage, and long-term effects like reduced soil fertility and salinization.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 68: Tsunami Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	1	None	There have been no tsunami events in Martin County.
Probability	1	Very unlikely	It is very unlikely that a tsunami would occur in a year.
Onset	3	12-24 hours	Notification time would be between 12 and 24 hours
AVERAGE	**1.7**	**Minimal Threat**	
Vulnerability Calculation			
Response	1	No response	For this profile, all vulnerability scores were calculated at the lowest possible ranking because the risk is so low, it is nearly impossible that a tsunami would occur, making the vulnerability the lowest.
Location	1	Localized	
Human	1	None	
Property	1	< 10%	
Infrastructure	1	< 1 day	
Economy	1	< 1 day	
Environment	1	Minimal	
AVERAGE	**1**	**Minimal Vulnerability**	
Risk Calculation			
Minimal Risk			Based on the XXX threat and the XXX vulnerability, this hazard is a XXX risk to Martin County.

Future Considerations

Land development in Martin County raises concerns for coastal areas due to increased vulnerability to sea-level rise and potential meteotsunamis, with major tsunami threats primarily originating from distant events like submarine landslides in the Atlantic or Caribbean, not local seismic activity. Coastal development can exacerbate the problem by eliminating natural flood

defenses, increasing the risk for communities built on barrier islands, and potentially causing uneven land subsidence that damages structures.

Mitigation Measures

A possible mitigation measure could be Martin County exploring the possibility of becoming a National Weather Service Tsunami Ready Community and participate in an update or have a study focused on Martin County to determine the possible threat.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that less than 18% of the respondents were either concerned or very concerned with tsunamis, with this hazard being the one people were least concerned with (40%) compared to all the other hazards.

WILDFIRES

Description

Wildfire is defined by the Federal Emergency Management Agency as a fire that burns out of control in a natural area, like a forest, grassland, or prairie. Wildfires occur in Florida every year and are part of the natural cycle of Florida's fire-adapted ecosystems. Many of these fires are quickly suppressed before they can damage or destroy property, homes, and lives. There are several types of fires:

- **Crown Fires**: burn trees up their entire length to the top. These are the most intense and dangerous wildland fires.
- **Ground Fires**: occur in deep accumulations of humus, peat and similar dead vegetation that become dry enough to burn. These fires move very slowly, but can become difficult to fully put out, or suppress.
- **Surface Fires**: burn only surface litter and duff. These are the easiest fires to put out and cause the least damage to the forest.

Possible Causes

According to data from the Florida Forest Service for 2021 to 2025, Martin County has experienced 115 wildfires due to the following causes.

- **Human-Caused** including unattended campfires, open burning, equipment or vehicle use, power generation, and misuse or lighters or matches by minors, accounting for 36% of the incidents.
- **Natural** referring to lightning, accounting for 59% of the incidents.
- **Undetermined**, meaning that the cause of the fire was not identified, destroyed, or under investigation, accounting for 5% of the incidents.

Extent

Wildfires are measured by the area (acreage) burnt. However, Keetch and Byram designed a drought index specifically for fire potential assessment. It is a number representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers. It is a continuous index, relating to the flammability of organic material in the ground.

Table 69: Keetch-Byram Drought Index

KBDI	*Description*
0 - 200	Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. Typical of spring dormant season following winter precipitation
200 - 400	Typical of late spring, early growing season. Lower litter and duff layers are drying and beginning to contribute to fire intensity
400 - 600	Typical of late summer, early fall. Lower litter and duff layers actively contribute to fire intensity and will burn actively
600 - 800	Often associated with more severe drought with increased wildfire occurrence. Intense, deep burning fires with significant downwind spotting can be expected. Live fuels can also be expected to burn actively at these levels.

The KBDI attempts to measure the amount of precipitation necessary to return the soil to full field capacity. It is a closed system ranging from 0 to 800 units and represents a moisture regime from 0 to 8 inches of water through the soil layer. At 8 inches of water, the KBDI assumes saturation. Zero is the point of no moisture deficiency and 800 is the maximum drought that is possible. At any point along the scale, the index number indicates the amount of net rainfall that is required to reduce the index to zero, or saturation.

The inputs for KBDI are weather station latitude, mean annual precipitation, maximum dry bulb temperature, and the last 24 hours of rainfall. Reduction in drought occurs only when rainfall exceeds 0.20 inch (called net rainfall). The computational steps involve reducing the drought index by the net rain amount and increasing the drought index by a drought factor.

Historical Occurrences

According to data from the Florida Fire Service, there have been 115 wildfires in Martin County between 2021 and 2025; 37 of these were one acre or less of area burnt and are not being considered for calculations as they were extinguished quickly, making the total number of wildfires 78 above one acre. The largest recorded in this timeframe is the Hungryland Complex fire in March of 2023, which burned 690 acres; its cause is unknown.

Table 70: Wildfires in Martin County 2021 - 2025

Date	*Incident Name*	*Cause Category*	*Specific Cause*	*Acres*
07/05/21	Bridge Road	Natural	Lightning	50.00
07/09/21	Southwest Minute Maid Road 13245	Natural	Lightning	3.00
01/03/22	Beach Rd	Human	Unknown	4.00
04/11/22	Mulch	Human	Unknown	2.00
04/13/22	Tommy Clements Lane	Natural	Lightning	70.00
04/19/22	SW Tommy Clements	Natural	Lightning	33.50
04/20/22	Allapattah	Natural	Lightning	15.00
04/20/22	Stone	Human	Unknown	2.00
04/28/22	Powerline Grade	Natural	Lightning	77.47
05/11/22	Willoughby	Human	Unknown	5.00
05/11/22	Cove Road	Natural	Lightning	25.20
05/15/22	Southeast Cove Road	Natural	Lightning	10.00
05/21/22	84th St	Natural	Lightning	3.00
05/22/22	Gun Club	Human	Unknown	13.00
06/24/22	Honeysuckle	Natural	Lightning	1.50
06/25/22	Citrus Blvd.	Natural	Lightning	14.00
08/03/22	Green River	Natural	Lightning	17.50
08/08/22	Fox Brown	Human	Other land clearing	85.00
08/17/22	Gate Twelve	Natural	Lightning	60.80
08/18/22	FourWInds	Natural	Lightning	27.00
08/18/22	Payson Park	Natural	Lightning	57.00
08/19/22	4507 Kanner	Natural	Lightning	3.00
08/24/22	Powerline Ave	Natural	Lightning	12.00
09/02/22	Outfitters	Natural	Lightning	7.00
09/12/22	69th Street	Natural	Lightning	2.00

Date	*Incident Name*	*Cause Category*	*Specific Cause*	*Acres*
01/19/23	Prison	Undetermined	Unknown	5.00
02/02/23	Plant Bamboo	Human	Field/agricultural burn	8.00
02/12/23	Catfish	Human	Origin destroyed	1.50
02/15/23	66th Street Fire	Human	Campfire	5.00
02/19/23	Hungryland 1	Human	Passenger vehicle/motorized RV	10.00
03/23/23	Hungryland Complex	Undetermined	Unknown	690.00
03/26/23	Redwing	Human	Electrical transmission/distribution systems	80.00
04/08/23	Amaryllis	Human	Other (remarks required)	3.00
04/15/23	Powerline Rd	Natural	Lightning	30.00
04/16/23	Bridge Road	Natural	Lightning	20.00
04/22/23	SW Fox Brown	Natural	Lightning	5.00
07/03/23	North Hungryland Canal	Natural	Lightning	2.00
07/06/23	Jail	Natural	Lightning	3.00
07/10/23	Citrus Australian pine	Natural	Lightning	2.00
07/19/23	U-Pick	Natural	Lightning	3.00
07/26/23	Bridge & Kanner	Natural	Lightning	25.70
08/28/23	FPL	Natural	Lightning	10.00
11/02/23	Cardamine (IB Payne)	Human	Hand pile/slash	2.00
01/22/24	Pasture Fire	Human	Passenger vehicle/motorized RV	10.00
02/27/24	Alapatta Rd 43)	Undetermined	Origin and/or cause not identified	151.00
03/25/24	US 1 (56)	Human	Origin and/or cause not identified	4.90
04/01/24	J.D.	Human	Escaped Prescribed Burn	139.10
04/08/24	Solar Citrus	Human	Solar utility system	20.00
04/09/24	Sweetbay Solar Panel	Human	OHV/ATV/motorcycle	10.00
04/18/24	Coca Cola Rd	Human	Escaped Prescribed Burn	11.30
04/27/24	Arundel	Human	Electrical transmission/distribution systems	2.00
04/28/24	Country Place	Natural	Lightning	6.50
04/29/24	Fox Brown Mulch	Human	Heavy equipment & implements	61.70
05/14/24	Runway	Natural	Lightning	15.00
05/15/24	Head Water	Natural	Lightning	3.20
05/15/24	Jupiter Town Road	Natural	Lightning	20.00
05/20/24	Shooting Range	Natural	Lightning	18.00
05/20/24	Pine	Natural	Lightning	13.00
05/29/24	Map Creek 2	Natural	Lightning	10.40
05/30/24	Pal Mar Fire	Natural	Lightning	10.00
05/30/24	84th	Natural	Lightning	229.20
06/10/24	Hungry	Natural	Lightning	1.50
06/18/24	FPL Dike	Human	Tractors/mowers/brush hogs	2.00
06/27/24	Martin South	Natural	Lightning	15.00
07/13/24	Dupuis Grade	Natural	Lightning	4.00
07/25/24	Bridge Rd West	Natural	Lightning	53.00
02/07/25	North Hungryland	Human	OHV/ATV/motorcycle	8.10
03/13/25	Allapatah	Human	Tractors/mowers/brush hogs	15.00
03/17/25	Conners	Natural	Lightning	11.40
03/27/25	Gator	Natural	Lightning	188.00

Date	*Incident Name*	*Cause Category*	*Specific Cause*	*Acres*
03/27/25	Medalist	Natural	Lightning	12.40
04/05/25	Mower	Human	Other small engine equipment	2.00
04/11/25	SW 95th Street	Human	Tractors/mowers/brush hogs	2.00
04/15/25	Busch	Natural	Lightning	47.80
05/01/25	Hungryland South	Human	Origin and/or cause not identified	61.09
07/22/25	Jenkins	Natural	Lightning	80.90
07/31/25	Water 16	Natural	Lightning	11.10
07/31/25	Hunter Lane	Natural	Lightning	8.60

Table x. Source: Florida Fire Service

In the 5 years of data, there have been 78 wildfires burning over 1 acre. On average, this means that Martin County experiences wildfires approximately 15 wildfires per year.

There have been federal declarations for wildfires in Martin County.

- FM-2251 Okeechobee Fire Complex in 1999 with unknown damages
- EM-3139 Florida Fires in 1999 with unknown damages
- FM-2354 Okeechobee Complex Fire in 2001 with $179 million in damages
- FM-22696 Okeechobee Fire Complex in 2007 with $116 million in damages
- FM-2819 Martin County Fire Complex in 2009 with $410 thousand in damages

Probability

Due to there being several wildfires per year in Martin County, the probability is that wildfires are very likely to occur in any given year. According to the US Forest Service Wildfire Risk to Communities page, Martin County has, on average, greater wildfire likelihood than 91% of counties in the US.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

Response to wildfire can be anywhere from a few hours to contain to several days or weeks, depending on the size of the acreage burnt. Martin County Fire Rescue is equipped to handle wildfires and brushfires and has the support of the Florida Fire Service, when requested.

Location

- **Low Wildfire Hazard -** Homes are built with concrete and appropriate non-flammable roofing materials. Short grass, low shrubs and light duff are present. The forest and heavy vegetation are not continuous throughout the community. Wildfires that do occur in these areas are less intense and easier to suppress because of the lower volume of fuel to feed and sustain the fire (Jupiter Island, Ocean breeze, Sewall's point, City of Stuart, Hutchinson Island, North River Shores, Lighthouse Point, Port Mayaca, Tropical Park).

- **Medium Wildfire Hazard -** Wildland vegetation is continuous throughout the community. Tall grass, medium shrubs, thick duff and ladder fuels are prominent in the area. Vegetation is less than 30 feet from homes. Homes are built with vinyl, plastic or other types of less fire-resistant materials. Access is limited and the concentration of fuel to feed fires causes more intense fire behavior. Fire suppression becomes more difficult and costly. (Jensen Beach (Savanna's Preserve State Park), Palm City (every year), Port Salerno (squatters/homeless wildfires), Rio (kids and arson wildfires), Coral Gardens, Golden Gate)
- **High Wildfire Hazard -** Dense, highly flammable vegetation surrounds the neighborhood and is within a few feet of homes. A thick layer of vegetation is present on the forest floor. Access to the neighborhood is limited to one entrance and/or on poorly maintained roads. Homes are rarely built with fire-resistant materials. Continuous, overgrown vegetation limits access and creates intense wildfire conditions. Fire suppression is challenging and requires more resources (engines, dozers, aircraft) and firefighters than normal. (Hobe sound (J.D. State Park), Indiantown (May 2009 major wildfires lost 2 homes in Indianwood), Port Mayaca (every year Dupuis Reserve), Sugar Hill (Maleluca), Gomez (Port Salerno).

The image below shows the wildlife likelihood in Martin County, according to the US Forest Services' Wildfire Risk website.

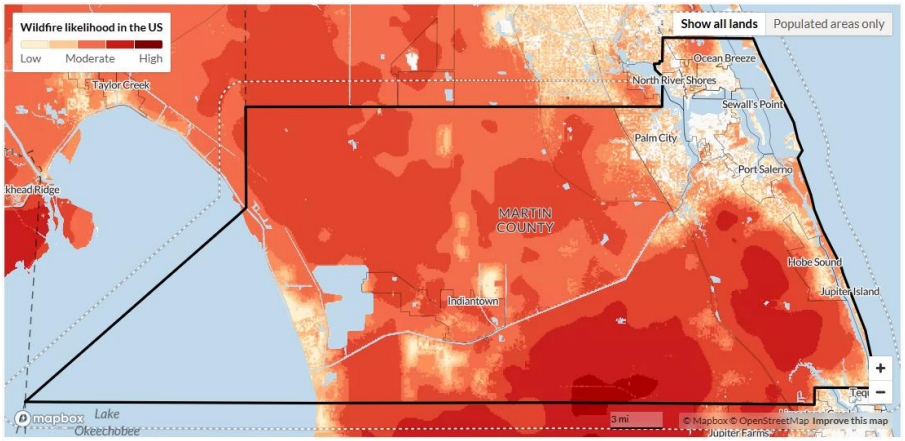


Figure 17: Wildfire Likelihood in Martin County

Human Impact

Although particle pollution is a principal public health threat from short- and longer-term exposure to wildfire smoke, it is important to keep in mind that wildfire smoke is a complex mixture that consists of other pollutants that have also been shown to lead to a variety of health effects.

- Irritation of the eyes
- Respiratory symptoms including coughing, phlegm, wheezing, and difficulty breathing.

- Respiratory effects including Bronchitis, reduced lung function, increased risk of asthma exacerbation and aggravation of other lung diseases, and increased risk of emergency room visits and hospital admissions.
- Cardiovascular effects including heart failure, heart attack, stroke, and increased risk of emergency room visits and hospital admissions.
- Increased risk of premature death

Property Impact

According to First Street, within the next 30 years, approximately 70% of all properties in Martin County will be at risk of being affected by wildfire.

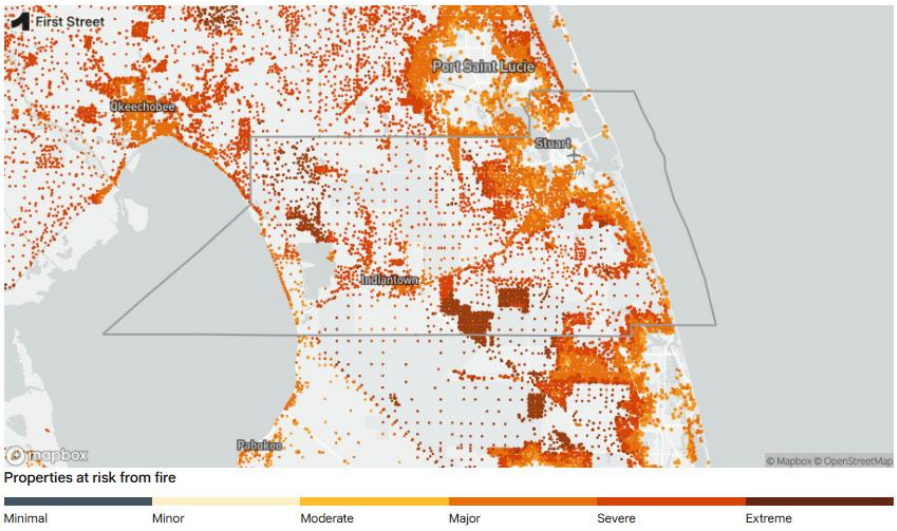


Figure 18: Properties at Risk of Wildfire in Next 30 Years

Infrastructure Impact

Wildfires can have short- and long-term effects on infrastructure such as:

- Power outages
- Air and ground transportation disruption
- Critical infrastructure damage
- Reduced water quality

Economic Impact

The fiscal effects can be considerable due to the disruption of infrastructure (i.e., roads, rails, and bridges) or loss of commercial and industrial facilities. A wildfire could also have a devastating effect on the timber and forest product industries.

According to federal declaration damage calculations, Martin County has been a part of wildfires that incurred over $295 million in damages.

Environmental Impact

Wildfires damage watersheds and leave areas prone to flooding for many years. Wildfires can occur at any time throughout the year, but the potential is always higher during periods with little or no rainfall, which make brush, grass, and trees dry and burn more efficiently.

Areas that are affected by wildfires are usually charred on the ground, causing all organic matter to die. Nutrients from the soil will be gone, and measures would be necessary to rehabilitate the area. Fires can contaminate the area when runoff from rain leads burnt materials into waterways. When a wildfire occurs, habitats vanish, and there is a lessened supply of food for those animals that survive.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 71: Wildfire Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	
Probability	5	Will occur	
Onset	5	No warning	Although weather can be an indicator of potential risk, there is no notice for when a wildfire actually ignites.
AVERAGE	**5**	**Extreme Threat**	
Vulnerability Calculation			
Response	3	Up to 1 week	Large wildfires can take several days to contain.
Location	2	Limited	While a large majority of the county is at risk, a wildfire would only affect a limited area when burning.
Human	2	Minor	Minor illness or injuries expected.
Property	5	> 75%	Over >75% of the property in the area of a wildfire would be at risk and/or affected.
Infrastructure	2	Up to 1 week	Infrastructure could be disrupted for up to one week
Economy	1	< 1 day	Although businesses may be directly affected, the overall Martin County Economy would likely not.
Environment	2	Limited	Damages caused require some human intervention to return to normal. Wildfires can be a naturally occurring phenomenon that does not require intervention after response.
AVERAGE	2.4	**Low Vulnerability**	
Risk Calculation			
Moderately High Risk			Based on the extreme threat and the low vulnerability, this hazard is a moderately high risk to Martin County.

Future Considerations

Land development and wildfires are connected as development in the wildland-urban interface (WUI) increases wildfire risk by placing more homes in fire-prone areas, which can lead to more human-caused ignitions and more costly damages. Conversely, land use planning, such as requiring fire-resistant building materials, creating defensible space, and using smart landscaping, can mitigate this risk.

Florida State University's Florida Climate Center has recognized that wildfire activity is intimately linked with temperature and precipitation patterns though research is still ongoing on the impact climate change has on wildfire occurrences.

Mitigation Measures

Firewise USA is program recognizing communities or neighborhoods that demonstrate the spirit, resolve and willingness to take responsibility as a partner in wildfire protection. There are two Firewise Communities in Martin County (Country Place & Indianwood). These communities are aware of their wildfire risk and take action to reduce the risk.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that 44% of people were concerned or very concerned about wildfires. Some commented on their concern regarding "sprawl and over development", which could put more structures and people at risk of wildfires, depending on their location.

CYBER INCIDENTS

Description

A cyber attack is any kind of malicious activity that attempts to collect, disrupt, deny, degrade, or destroy information system resources or the information itself. It is carried out in cyberspace (or through computer networks), targeting an enterprise's use of cyberspace. There are many different types of threats and attacks that can take place, the following are some of the most common.

- **Malware**: malicious software, including spyware, ransomware, viruses, and worms. Malware breaches a network through a vulnerability, typically when a user clicks a dangerous link or email attachment that then installs risky software. Once inside the system, malware can do the following:
    - Blocks access to key components of the network (ransomware)
    - Installs malware or additional harmful software.
    - Covertly obtains information by transmitting data from the hard drive (spyware)
    - Disrupts certain components and renders the system inoperable.

- **Phishing**: the practice of sending fraudulent communications that appear to come from a reputable source, usually through email. The goal is to steal sensitive data like credit card and login information or to install malware on the victim's machine. Phishing is an increasingly common cyberthreat.
- **Man-in-the-Middle**: Man-in-the-middle (MitM) attacks, also known as eavesdropping attacks, occur when attackers insert themselves into a two-party transaction. Once the attackers interrupt the traffic, they can filter and steal data.
- **Denial of Service**: floods systems, servers, or networks with traffic to exhaust resources and bandwidth. As a result, the system is unable to fulfill legitimate requests. Attackers can also use multiple compromised devices to launch this attack. This is known as a distributed-denial-of-service (DDoS).
- **Zero-day exploit**: hits after a network vulnerability is announced but before a patch or solution is implemented. Attackers target the disclosed vulnerability during this window of time.
- **DNS Tunneling**: DNS tunneling utilizes the DNS protocol to communicate non-DNS traffic over port 53. It sends HTTP and other protocol traffic over DNS. There are various, legitimate reasons to utilize DNS tunneling. However, there are also malicious reasons to use DNS Tunneling VPN services. They can be used to disguise outbound traffic as DNS, concealing data that is typically shared through an internet connection. For malicious use, DNS requests are manipulated to exfiltrate data from a compromised system to the attacker's infrastructure. It can also be used for command-and-control callbacks from the attacker's infrastructure to a compromised system.
- **SQL Injection**: A Structured Query Language (SQL) injection occurs when an attacker inserts malicious code into a server that uses SQL and forces the server to reveal information it normally would not. An attacker could carry out a SQL injection simply by submitting malicious code into a vulnerable website search box.
- **Ransomware**: a type of malicious software that is designed to extort money by blocking access to files or the computer system until the ransom is paid. Paying the ransom does not guarantee that the files will be recovered, or the system restored.
- **Social engineering**: a tactic that adversaries use to trick you into revealing sensitive information. Attackers can solicit a monetary payment or gain access to your confidential

data. Social engineering can be combined with any of the threats mentioned above to make you more likely to click on links, download malware, or trust a malicious source.

Possible Causes

There can be several causes of cyber incidents.

- **Technical Vulnerabilities** can include unpatched software, application vulnerabilities, weak or stolen credentials.
- **Human Factors** can include human error, malicious insiders, social engineering, and lack of security awareness.
- **Attacker Motivations** can include financial gain, espionage and business intelligence, cyber warfare, ideological and political motivations, or simply curiosity and ego.

Extent

There is no known method to measure a cyber incident.

Historical Occurrences

Research suggests that attacks occur every few seconds on internet-connected devices and over 600 million malicious signals daily on Microsoft's network alone, indicating a near constant threat environment.

Locally, in 2019, the City of Stuart's network was hit by ransomware and shut down the entire network for months. The City had to spend hundreds of thousands of dollars in new equipment and services.

In 2019 and 2020, the Town of Sewall's Point experienced an attack where the Town was locked out of the website and some files were compromised. The website was not linked to any internal computer systems or networks. An investigation determined it had been hacked, and the Town was locked out of the site. In 2020, some plugins were deleted or modified, and usernames and passwords changed. The IP Addresses responsible for the attacks came from the Philippines and Tunisia.

Probability

Cyber-attacks hit businesses every day. Former Cisco CEO John Chambers once said, "There are two types of companies: those that have been hacked, and those who don't yet know they have been hacked."

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response	Ransomware incidents can be extremely disruptive. The scale and scope will vary depending on the target organization. Smaller companies with high levels of preparedness can often recover within a few days. Larger companies that are less prepared should plan to be

down for weeks or even months. While the average attack disrupts for about 21 days, preparedness and response plans affect this duration.

Location All jurisdictions in Martin County are equally at risk of cyber incidents occurring. Any operations that are carried out on a computer, laptop, tablet, or mobile device, are at risk.

Human Impact Employees bear significant emotional and mental burdens during cyber incidents. IT teams and operational staff especially often work under extreme pressure, facing exhaustion, anxiety, and burnout from relentless crisis management. Senior managers frequently attend emergency meetings around the clock, leaving little time for rest and recovery. These intense periods significantly affect employees' mental health, leading to increased stress, sleep deprivation, and even long-term psychological trauma.

Customers often experience significant stress, fear, and anxiety when their personal information is compromised. Exposure of sensitive data such as personal addresses, financial details, and contact information can heighten risks of identity theft, fraud, and intrusive phishing scams, leading to profound anxiety and distress.

Significant financial losses due to disrupted operations can directly translate into workplace instability, job insecurity, and increased workloads as companies struggle to recover.

Property Impact Cyber incidents do not typically involve property impacts.

Infrastructure Impact Cyber incidents do not typically involve traditional infrastructure. However, as more systems and operations are moving online, the potential for targeting these systems and affecting operations increases.

Economic Impact In 2024, IBM reported that the average cost of a data breach reached $4.88 million, marking a 10% increase over last year and that the annual average cost of cybercrime will cross $23 trillion in 2027.

The City of Stuart spent hundreds of thousands of dollars recovering from the cyber incident in 2021.

Environmental Impact Cyber incidents do not typically involve environmental impacts.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 72: Cyber Incidents Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	Although the attacks may not be "successful" the threat is constant.
Probability	3	May or may not occur in a year	Constant threats take minimal effort to become successful attacks
Onset	5	No warning	Once a cyber-attack is successful, there is little to no warning to stop the effects.
AVERAGE	**4.3**	**Extreme Threat**	
Vulnerability Calculation			
Response	4	Up to 1 month	Average disruption is 21 days for ransomware
Location	1	Localized	Devices connected to the affected network will be impacted
Human	1	None	No injuries or deaths are expected
Property	1	<10%	No damage to property is expected
Infrastructure	4	Up to 1 month	Average disruption is 21 days for ransomware
Economy	4	Up to 1 month	Average disruption is 21 days for ransomware
Environment	1	Minimal	No damage to the environment is expected
AVERAGE	2.3	**Low Vulnerability**	
Risk Calculation			
Moderately High Risk			Based on the extreme threat and the low vulnerability, this hazard is a moderately high risk to Martin County.

Mitigation Measures

The Martin County Information Technology Services Department has recently created two positions that focus exclusively on cybersecurity in the county.

Public Perspective

The online public survey conducted between August 2024 and August 2025, did not explicitly ask for feedback about cyber incidents.

DAM AND LEVEE FAILURE

Description

A dam is a barrier constructed to hold back water and raise its level, the resulting reservoir being used in the generation of electricity or as a water supply. A levee is an embankment to prevent flooding or a continuous dike or ridge for confining the irrigation areas of land to be flooded.

Possible Causes

Dam failure or levee breaches can occur with little warning. Intense storms may produce a flood in a few hours or even minutes for upstream locations. Other failures and breaches can take much longer to occur, from days to weeks, as a result of debris jams or the accumulations of other hazards. Dam failures are most likely to happen for one of five reasons:

- Overtopping – caused by water spilling over the top of a dam.
- Foundation Defects – settlement and slop instability which causes about 30% of the failures.
- Cracking – caused by movements like the natural settling of a dam.
- Inadequate maintenance and upkeep
- Piping – when seepage through a dam is not properly filtered and soil particles continue to progress, and form sink holes.

Extent

A failure would be measured by the inundation area, which is the total flooded area that resulted from dam failure. The size of the inundation area depends on the size of the impoundment, the dam failure scenario being analyzed, the topography of the area, and the flow of water from the impoundment.

Historical Occurrences

In September 1928 the Great Okeechobee Hurricane, caused a 5-foot muck dike to crumble causing an unleashing store surge with the fury of a tide wave around the south and southeastern portions of Lake Okeechobee. Loss of life was approximately 2,500 people. This occurrence did not affect Martin County; it is described to show the potential for failure of the HHD.

There have been no federal declarations for dam or levee failure in Martin County,

Probability

There have been no occurrences of dam or levee failure in Martin County; for this reason and because the USACE conducts regular maintenance and inspections to prevent failures on the Herbert Hoover Dike and St. Lucie Lock and Dam, and that the risk for the C-44 Reservoir and the Martin Plant Cooling Water Reservoir are low or not rated for risk, it is very unlikely that an incident would occur.

Impacts and Vulnerability

The main hazard resulting from a dam or levee failure would be flooding. For more information on specific impacts from flooding, see the *Flood* hazard profile.

Response

Immediate response needs for a dam or levee failure or breech would relate to flooding, potentially requiring retrieving people and pets from affected areas.

Location

Flooding vulnerability to western Martin County and the intra-coastal waterways exists from the potential for a breach of the Herbert Hoover dike around Lake Okeechobee. The release of water from Lake Okeechobee may have an impact on the S-80 structure at St. Lucie Locks. The USACE have completed vulnerability assessments, but models do not adequately address flooding concerns in the Tropical Farms and St. Lucie Settlement areas.

According to the National Inventory of Dams, Martin County has four dams within the geographical area; details are outlined below.

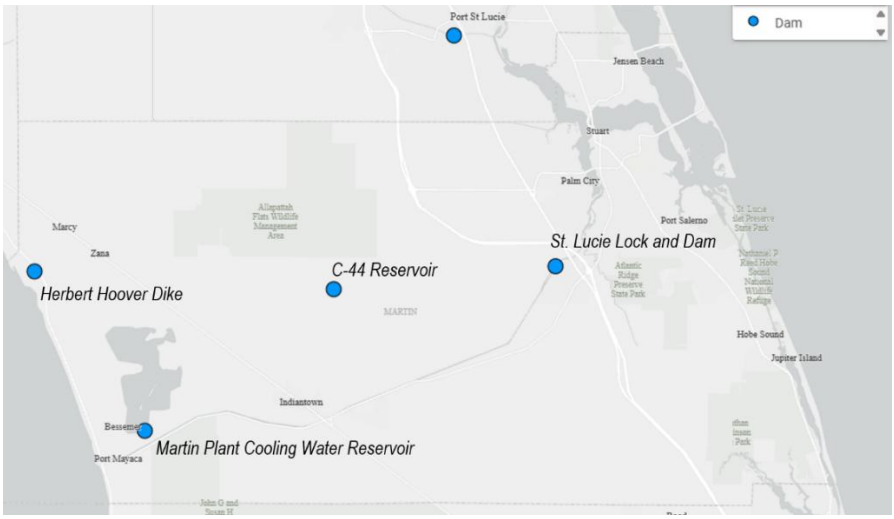


Figure 19 Dams in Martin County. Source: National Inventory of Dams.

Herbert Hoover Dike

- Type: Earth
- Year: 1965
- Height: 35 ft.
- Risk Assessment: Low
- Owner: USACE
- Hazard Potential Classification: High
- Emergency Action Plan: Yes
- Purpose: Flood risk reduction, irrigation, navigation, fish and wildlife pond, recreation, water supply

The HHD is a 143-mile earthen dam that surrounds Lake Okeechobee, the heart of the Kissimmee-Okeechobee-Everglades system. The project reduces impacts from flooding as a result of high lake levels for a large area of south Florida. The western portion of the County, which is in the immediate vicinity of the HHD, may be impacted by floodwaters. This area is unincorporated with a population of

approximately 500 residing along the length of CR 441 west of the L 64 and L 65 canals.

The U.S. Army Corps of Engineers (USACE), Jacksonville District, is responsible for the maintenance of the dike and has reported that areas of the dike are prone to water seepage and stability problems. Soil erosion, known as “piping,” can create large cavities in the dike, potentially resulting in a breach and flooding in the surrounding communities. The risk of a breach increases with an increased lake level of Lake Okeechobee.

Martin Plant Cooling Water Reservoir

- Type: Earth
- Year: 1981
- Height: 34 ft.
- Risk Assessment: N/A
- Owner: Florida Power and Light
- Hazard Potential Classification: High
- Emergency Action Plan: No
- Purpose: Other

The Martin Plant Cooling Water Reservoir in Florida is a crucial water resource infrastructure that serves the primary purpose of cooling industrial processes. Owned by a private entity, this reservoir is regulated and permitted by the state, ensuring compliance with environmental standards. With a capacity of 95,000 acre-feet and a surface area of 6,900 acres, this Earth dam structure supports the operations of the Martin Plant.

Located in Indiantown, Martin County, this reservoir is fed by the St. Lucie Canal-offstream, managed by the Jacksonville District of the US Army Corps of Engineers. With a maximum discharge of 6,000 cfs and a hazard potential rated as high, the reservoir's condition is deemed satisfactory as of the last inspection in 2014. The risk assessment for this site is moderate, highlighting the importance of ongoing risk management measures to ensure the safety and reliability of this vital water infrastructure.

C-44 Reservoir

- Type: Earth
- Year: 2021
- Height: 45 ft.
- Risk Assessment: Not rated
- Owner: South Florida Water Management District
- Hazard Potential Classification: High
- Emergency Action Plan: Yes
- Purpose: Other

The Indian River Lagoon, home to more than 3,000 species of plants and animals, is considered the most biologically diverse estuarine

system in the continental United States. The C-44 Reservoir and Stormwater Treatment Area is the first component of the multi-billion-dollar Indian River Lagoon-South (IRL-S) project, part of the Comprehensive Everglades Restoration Plan (CERP). The C-44 project includes the construction of a 3,400-acre reservoir, a pump station with a capacity to pump 1,100 cubic feet per second (cfs) of water, and 6,300 acres of STAs. the project will capture local runoff from the C-44 basin, reducing average annual total nutrient loads and improving salinity in the St. Lucie Estuary and the southern portion of the Indian River Lagoon by providing, in total, 60,500 acre-feet of new water storage (50,600 acre-feet in the reservoir and 9,900 acre-feet in the STAs) and 3,600 acres of new wetlands.

The C-44 STA levee system is located in Martin County, Florida east of Lake Okeechobee. The system is a stormwater treatment area comprised of 6 levee segments that are nearly 30 miles long and up to 7 feet high. Along with the project's water storage reservoir, the system was constructed to regulate the timing and improve the quality of water flowing from Lake Okeechobee and the C-44 Basin to sensitive ecosystems to the east. The U.S. Army Corps of Engineers (USACE) completed construction of the system in 2021 and turned it over to the South Florida Water Management District (SFWMD) who is responsible for operating and maintaining the system. Costs are shared between USACE and SFWMD. Surrounding land use is mostly agricultural, and there is residential and commercial development concentrated away from the system.

There is no immediate concern with the C-44 STA system. USACE risk assessments consider flooding frequency, the likelihood of the levee breaching or overtopping, and the resulting potential loss of lives and damage to homes, businesses, and the environment. Based on the most recent risk assessment of the system in 2021, USACE considers this system to have a very low risk. Water within the C-44 STA is managed at very shallow depths and is not expected to overtop the levees, even in an extreme storm event. If the levees were to breach, water would flow into project canals and the nearby C-44 canal and would cause little to no damage to the surrounding land.

St. Lucie Lock and Dam

- Type: N/A
- Year: 1950
- Height: 30 ft.
- Risk Assessment: Low
- Owner: USACE
- Hazard Potential Classification: Significant
- Emergency Action Plan: Yes
- Purpose: Flood risk reduction, irrigation, navigation, recreation

The St. Lucie Lock and Dam in Florida, owned and operated by the US Army Corps of Engineers, serves multiple purposes including flood risk

reduction, irrigation, navigation, and recreation along the St. Lucie Canal. Completed in 1950, this multi-arch dam stands at a structural height of 39 feet and has a hydraulic height of 33 feet. It has a storage capacity of 2,311 acre-feet and can discharge up to 25,600 cubic feet per second through its controlled spillway.

Despite its significant hazard potential, the dam is regularly inspected and monitored by the US Army Corps of Engineers to manage flood risks effectively. The Corps actively engages with local emergency managers and the public to raise awareness and preparedness for any dam-related emergencies. Risk management measures include prioritizing maintenance activities, updating emergency action plans, and ensuring the structural integrity of the dam to mitigate potential risks associated with extreme weather events and water levels.

If the S80 Water Control Structure/St. Lucie Locks fails, the surrounding area could become inundated with floodwater. The S80 Water Control Structure/St. Lucie Locks are located in the central portion of the county in proximity to the South Fork of the St. Lucie River. This area has not been fully evaluated for potential flood inundation and it is unclear how far the floodwaters may reach.

The National Levee Database shows several levee systems in Martin County. The map below illustrates their locations.

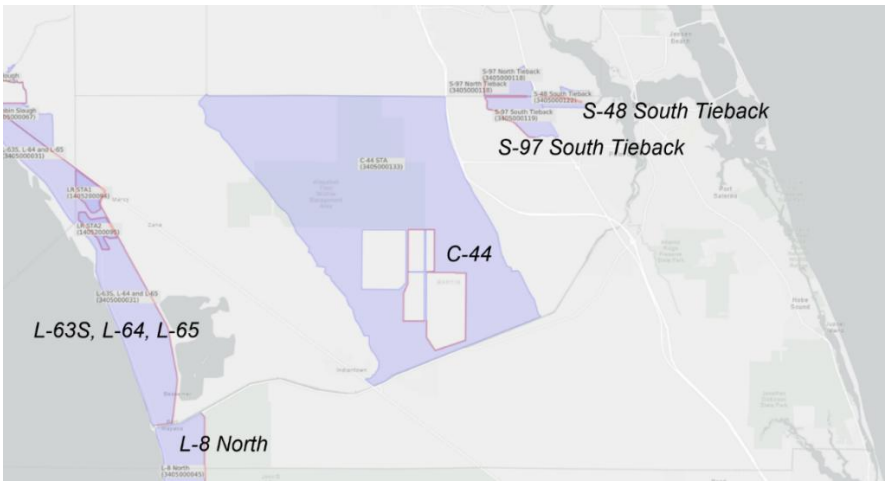


Figure 20 Levees in Martin County. Source: National Levee Database.

L-63S, L-64, and L-65

The L-63S, L-64, and L-65 levee system is located in Okeechobee and Martin Counties, Florida northeast of Lake Okeechobee. The system consists of three levee segments (L-63 South West, L-64 West, and L-65 West) which were constructed to reduce the occurrence of flooding from the north in the Lake Okeechobee watershed for the areas located near the lake. The levees range from 8 to 16 feet high and are approximately 21 miles combined length. The U.S. Army Corps of Engineers (USACE) competed construction of the system in 1973 and turned it over to the South Florida Water Management District

(SFWMD) who is responsible for operating and maintaining the levees, canals, and associated structural components. Land use in the leveed area is mostly agricultural, and there is residential and commercial development. The system provides benefits to more than 1,600 people that work or live behind the levee, with $104 million in property value.

The system reduces but does not eliminate the risk of loss of life or economic damages from flood events in the northeast Lake Okeechobee watershed. USACE risk assessments consider flooding frequency, the likelihood of the levee breaching or overtopping, and the resulting potential loss of lives and damage to homes, businesses, and the environment. Based on the most recent risk assessment of the system in 2018, USACE considers this levee to have a low risk. The primary threat to the system is seepage due to unwanted vegetation and animal burrows. Seepage is when the water on the flood side of the levee seeps through to the land side. Seepage can carry soil particles with it and if enough soil is moved through the levee, the levee may be weakened and breach. There is no immediate concern that the levee will breach. Water would be anticipated to overtop the levee in a storm that has a 1 in 500 chance of occurring in any given year. If the levee breaches or overtops, the range of flooding in portions of the leveed area could be up to 9 feet deep.

S-97 South Tieback

The S-97 South Tieback levee system is located in Martin County, Florida west of the city of Stuart. The system was constructed to reduce the occurrence of flooding within the St. Lucie River Basin. The levee is 6 feet high and 1 mile long, runs along the south side of a drainage canal known as C-23, and ties into a gated water control structure called S-97. The system was constructed by the U.S. Army Corps of Engineers (USACE) in 1964 and turned over to the South Florida Water Management District (SFWMD) who is responsible for operating and maintaining the levee, canal, and structure. The leveed area is mostly undeveloped and rural, with some agricultural and residential structures.

The S-97 South Tieback system reduces but does not eliminate the risk of loss of life or economic damages from flood events in the St. Lucie River Basin. USACE risk assessments consider flooding frequency, the likelihood of the levee breaching or overtopping, and the resulting potential loss of lives and damage to homes, businesses, and the environment. Based on the most recent risk assessment of the system in 2024, USACE considers this levee to have a low risk. The most likely threat to the system is seepage of the levee. Seepage is when the water on the flood side of the levee seeps through to the land side. Seepage can carry soil particles with it and if enough soil is moved through the levee, the levee may be weakened and breach. There is no immediate concern the levee will breach. Water would be anticipated to overtop the levee in a storm that has a 1 in 700 chance of occurring in any given year. If the levee breaches or overtops, the

depths of flooding in portions of the leveed area could be 2 to 6 feet deep.

S-48 South Tieback

The S-48 South Tieback levee system is located in Martin County, Florida west of the city of Stuart. The system was constructed to reduce the occurrence of flooding within the St. Lucie River Basin. The levee is 5 feet high and one-third mile long, runs along the south side of a drainage canal known as C-23, and ties into a water control structure called S-48. The system was constructed by the U.S. Army Corps of Engineers (USACE) in 1964 and turned over to the South Florida Water Management District (SFWMD) who is responsible for operating and maintaining the levee, canal, and structure. The leveed area is a densely populated residential area. The system provides benefits to almost 800 people that work or live behind the levee, with $75 million in property value.

The S-48 South Tieback system reduces but does not eliminate the risk of loss of life or economic damages from flood events in the St. Lucie River Basin. USACE risk assessments consider flooding frequency, the likelihood of the levee breaching or overtopping, and the resulting potential loss of lives and damage to homes, businesses, and the environment. Based on the most recent risk assessment of the system in 2018, USACE considers this levee to have a low risk. The most likely threat to the system is seepage due to unwanted vegetation. Seepage is when the water on the flood side of the levee seeps through to the land side. Seepage can carry soil particles with it and if enough soil is moved through the levee, the levee may be weakened and breach. There is no immediate concern the levee will breach. The risk associated with water overtopping the levee is relatively low. The system is performing as designed. Water would be anticipated to overtop the levee in a storm that has a 1 in 500 chance of occurring in any given year. If the levee breaches or overtops, the range of flooding in portions of the leveed area could be up to 6 feet deep.

L-8 North

The L-8 North levee system is located in both Martin and Palm Beach Counties, east of Lake Okeechobee. The system consists of two levee segments (L-8 North and L-8 North Tieback) which were constructed to reduce the occurrence of flooding from the L-8 Canal and from lands to the east in the Lake Okeechobee watershed for the areas located near the lake. The levees are approximately 8 feet high and 5 miles combined length. The system was constructed by the U.S. Army Corps of Engineers (USACE) in 1953 and turned over to the South Florida Water Management District (SFWMD) who is responsible for operating and maintaining the levees, canal, and associated components. Land use in the leveed area is mostly agricultural. There is residential and commercial development located away from the levee, closer to the lake. The system provides benefits to almost 200 people that work or live behind the levee, with approximately $2 million in property value.

The L-8 North system reduces but does not eliminate the risk of loss of life or economic damages from flood events in the east Lake Okeechobee watershed. USACE risk assessments consider flooding frequency, the likelihood of the levee breaching or overtopping, and the resulting potential loss of lives and damage to homes, businesses, and the environment. Based on the most recent risk assessment of L-8 North in 2018, USACE considers this levee to have a low risk. The primary threat to the system is culvert pipes and other encroachments in the levee. There is no immediate concern that the levee will breach. Water would be anticipated to overtop the levee in a storm that has a 1 in 500 chance of occurring in any given year. If the levee breaches or overtops, the range of flooding in portions of the leveed area could be up to 2 feet deep.

Human Impact

A possible dam or levee failure is typically known in advance, giving authorities sufficient time to enact protective measures to avoid injury, illness, and loss of life. However, if an event were to happen overnight and with little to no warning (although extremely rare), potential impacts could include injuries and death for people and pets who are in the immediate areas downstream.

Property Impact

Property near and around downstream areas of the dams and levees would be at most risk of damage or destruction, mainly from flooding effects.

Infrastructure Impact

Under normal circumstances, drainage is controlled and managed effectively by the South Florida Water Management District and Martin County Engineering Department. Drainage problems are created by long periods of unusually heavy rainfall, after which the operation of locks and lift stations are incapable of preventing floods in certain areas of the County. Conversely, during periods of drought, the lack of released water from reservoirs threatens east coast well fields with salt intrusion (Martin County CEMP, 2018).

Economic Impact

The National Levee Database estimates losses for each one of the levees, and the National Inventory of Dams estimates losses for the dams. The following are estimated losses for each structure described above.

- C-44: $5 million in property value, 408 buildings, 1,950 people, and 1,489 acres of farmland
- L-63S, L-64, and L-65: $100 million in property value, 1,372 buildings, 1,671 people, 621 acres of farmland
- S-97 South Tieback: $20 million in property value, 9 buildings, 712 people, 15.8 acres of farmland
- S-48 South Tieback: $74 million in property value, 294 buildings, 758 people, 0.4 acres of farmland
- L-8 North: $1 million in property value, 21 buildings, 167 people, 343 acres of farmland

- St. Lucie Lock and Dam: $18.8 million in economic cost, 1,598 people, no buildings identified
- Martin Plant Cooling Water Reservoir: no data
- Herbert Hoover Dike: no data, however, the HHD is protected by the L-63 South, L-64, and L-65 levees.

Environmental Impact Environmental impacts for dam or levee failure would most likely stem from flooding. Flooding can cause water pollution, erosion and sedimentation, habitat destruction, and changes in biodiversity.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Table 73: Dam and Levee Failure Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	1	None	There have been no occurrences of dam failures in Martin County.
Probability	1	Very unlikely	Based on past events, it is so unlikely that this event would occur that it can be assumed it will not occur in a year.
Onset	1	Over 1 week	These events typically have signs of potential failure well in advance of occurrence.
AVERAGE	**1**	**Minimal Threat**	
Vulnerability Calculation			
Response	3	Up to 1 week	Response could take up to one week if there are injuries or deaths.
Location	1	Localized	The area affected is localized to the surrounding areas downstream of the dams and levees.
Human	5	Deaths	Worst-case scenario could be severe injuries and death.
Property	3	26-50%	Total property impacted that is directly in the impact area.
Infrastructure	5	> 1 month	Repairs of failed dam and levee infrastructure would likely take more than one month.
Economy	1	< 1 day	Economic impacts are low
Environment	1	Minimal	Environmental impacts are minimal.
AVERAGE	**2.4**	**Medium Vulnerability**	
Risk Calculation			
Low Risk			Based on the minimal threat and the medium vulnerability, this hazard is a low risk to Martin County.

Future Considerations

Population growth increases dam failure risk by leading to more people and infrastructure being built in downstream inundation zones. This creates a higher potential for casualties and damages, especially given that many dams are aging and require extensive safety and maintenance efforts.

Mitigation Measures

Since 2001, the Corps has made a significant investment, over $870 million, in projects designed to reduce the risk of catastrophic failure of the aging structure. Actions taken include installing a partial cutoff wall along the southeast part of the dike, removing and replacing water control structures (culverts), and conducting a variety of studies and technical reviews to help ensure the safety of south Florida residents. Corps teams work daily on the dike, providing contractor oversight, quality assurance, inspections, and dike operations and maintenance. Much progress is also being made behind the scenes at the District, where a team of engineers, hydrologists, geologists, scientists, contract and real estate specialists, budget analysts, and many others, work to ensure the very best rehabilitation strategies are applied to the dike today and in the future.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that only 28% of respondents are concerned or very concerned about dam or levee failure.

HAZARDOUS MATERIALS

Description

A hazardous material may be defined as a substance or material which, because of its chemical, physical, or biological nature, poses a threat to life, health, or property if released from a confined setting. A release may occur by spilling, leaking, emitting toxic vapors, or any other process that enables the material to escape its container, enter the environment, and create a potential hazard. Several common hazardous materials include those that are explosive, flammable, or combustible, poisonous or radioactive. Related combustible hazardous materials include oxidizers and reactive materials, while toxins produced by etiological (biological) agents are types of poison that can cause disease.

A hazmat release while in transit is of great concern to the U. S. Department of Transportation. While most hazardous materials are stored and used at fixed sites, these materials are usually produced elsewhere and shipped to the fixed facility by rail car, truck, or onboard ships or barges. signs or placards denoting the hazard identify the vehicles carrying hazardous materials. However, the possibility of release is present at any time. Hazardous materials are constantly being moved in Florida on interstate highways, the rail system and on shipping lanes in rivers and tributaries.

The types of materials that can cause a hazmat release are wide-ranging and may include chlorine, sodium hydroxide, sulfuric acid, radioactive isotopes, anhydrous ammonia, gasoline and other hydrocarbons, as well as medical/biological waste from hospitals or clinics. Hazardous materials subject to reporting under the Emergency Planning and Community Right-to-Know Act (EPCRA) or Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) include these four groups:

- **Extremely Hazardous Substances (EHS)**: These are materials with acutely toxic properties that may do irreversible damage or cause death to people or harm the environment when released or used outside their intended use. Examples include ammonia, chlorine, and sulfuric acid.
- **Hazardous Substances:** These are any materials posing a threat to human health and/or the environment, or any substance designated by the Environmental Protection Agency (EPA) to be reported if a designated quantity of the substance is spilled into the waters of the United States or is otherwise released into the environment.
- **Hazardous Chemicals**: If present at a chemical facility in certain amounts, these substances require a Material Safety Data Sheet (MSDS) under the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard. Such substances are capable of producing fires and explosions or adverse health effects such as cancer, burns, or dermatitis.
- **Toxic Chemicals**: Chemicals or chemical categories that appear on the list because of their chronic or long-term toxicity.

Possible Causes

The hauling, storage, and use of hazardous materials play a vital role in the economy of our nation. These materials are stored and handled at fixed facilities and are transported over highway, railway, and water transportation systems, as well as pipelines.

Hazardous materials can be released as a secondary result of a natural disaster like an earthquake or flood. In either case, buildings or vehicles can release their hazardous materials inventories when structurally compromised or involved in traffic accidents.

Additional potential causes of hazardous material releases may include terrorist incident (see *Terrorism and Sabotage* hazard profile) and illegal drug labs or dumping. Illegal drug labs present a special concern because each must be treated as a chemical hazard site and decontaminated before the property can be used again. Illegal drug labs can be set up in homes, apartments, vacant buildings, shacks in the forest or even in a van parked on the street.

Extent

There is currently no method to determine the magnitude of hazardous materials incidents; the method used is to quantify incidents.

Historical Occurrences

The Florida Division of Emergency Management State Watch Office provided data for reported hazardous materials spills in Martin County from 2012 to August of 2025. The table below summarizes the data provided and shows the general types of locations that the incidents took place, along with the number of reported injuries, fatalities, and evacuations. Roadway and highway are separated as highway includes only incidents occurring on major highways such as I-95 and the Florida Turnpike.

Table 74: Hazardous Materials Incidents in Martin County 2012 - 2025

Incidents	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*	*2025**	***Total***
Aircraft	0	0	0	0	0	0	0	0	0	1	0	1	0	0	**2**
Facility	3	3	4	7	6	5	11	6	9	8	8	12	8	11	**101**
Highway	3	2	2	1	4	4	9	3	3	11	2	7	1	0	**52**
Pipeline	0	1	2	4	2	1	3	2	2	1	5	2	2	1	**28**
Railway	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
Residence	2	1	3	2	2	1	2	0	1	2	1	3	0	1	**21**
Roadway	1	3	1	2	6	9	4	12	8	2	7	3	1	0	**59**
Unknown	0	0	1	2	1	2	2	4	2	2	6	2	2	5	**31**
Waterway	6	6	9	8	11	22	24	21	27	9	13	15	4	1	**176**
Total	**15**	**16**	**22**	**26**	**32**	**44**	**55**	**48**	**53**	**36**	**42**	**45**	**18**	**19**	**471**
Fatalities	0	0	0	0	0	1	0	1	1	0	2	1	0	0	**6**
Injuries	1	1	0	1	4	0	5	4	2	3	1	1	0	1	**24**
Evacuations	0	0	1	3	2	1	5	1	3	1	5	5	2	6	**35**

** Data for 2025 is through August*
Source: FDEM State Watch Office

There have been 471 incidents over 13 years, indicating a high frequency, or roughly 36 incidents per year and averaging 2.5 evacuations per year, nearly 2 injuries per year, and one death approximately every two years.

Probability

Given the frequent occurrence of hazardous materials incidents, it is safe to assume that this hazard is very likely to occur within a given year.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

Response to a hazardous materials incident can vary greatly depending on the type of material, quantity, and location. Routine incidents could be completed within one or two hours, but more complex incidents might have a duration of several hours to days.

Location

Hazardous materials spills can occur in any location and jurisdiction in Martin County. Data from historical occurrences suggests that the majority of incidents occur in waterways, followed by facilities (such as gas stations or construction sites), roadways and highways are the next closest on the list.

The following lists the cities or towns in which the hazardous materials incidents were reported and the number of times they have had an incident between 2012 and 2025.

Canal Point	2	Port Mayaca	3
Hobe Sound	58	Port Salerno	4
I-95	22	Rio	1
Indiantown	45	Sewall's Point	1
Jensen Beach	36	Stuart	186
Jupiter Island	4	Turnpike	29
Palm City	54	Unknown	28

A large volume of hazardous materials is transported to and through the County by railroad and highway, air, water, and pipeline daily. Within Martin County, there are both public and private fixed facilities that produce or use hazardous materials.

U.S. Highway 1 is the main urban north-south route connecting the adjacent counties and serving the coastal area. The Florida Turnpike, a north-south toll route, and Interstate 95 bisect the County, running parallel to each other. Two railroads pass through Martin County, running north and south. The eastern railroad is serviced by Florida East Coast Railway, and the western railroad by the CSX Corporation. Within the County there are numerous public and private facilities that store hazardous materials and Extremely Hazardous Substances (EHS's). Under SARA Title III reporting there are fifty-two sites storing EHS's in the County. The number of facilities varies from year to year as new facilities come online and others permanently remove chemicals.

The Florida Gas Transmission Company owns and operates a line that transports natural gas through Martin County. There are three offshoots to meter stations owned by vendors: to Indiantown; to Tampa Electric/Peoples Gas at the I-95/Indiantown Road intersection; and to Florida Power and Light (FPL). A fuel oil pipeline also runs through the County to the FPL generating station in Indiantown from the Port of Palm Beach.

Human Impact

Exposure to hazardous materials can cause a wide range of acute and chronic health effects, from immediate skin irritation to long-term conditions like cancer and organ damage. The specific effects depend on the type of material, the dose, the duration, and the route of exposure (inhalation, ingestion, skin contact, or injection). The following are examples of acute and chronic health problems that could result from exposure to a hazardous material.

- Skin and eye irritation: Direct contact with corrosive materials can cause chemical burns, redness, and blisters.
- Respiratory issues: Inhaling fumes, dusts, or gases can cause coughing, shortness of breath, and irritation of the nose, throat, and lungs.
- Neurological symptoms: Headaches, dizziness, confusion, and drowsiness are common effects of exposure to certain volatile organic compounds and other toxic substances.
- Gastrointestinal distress: Ingestion or inhalation can cause nausea, vomiting, and diarrhea.
- Systemic toxicity: Severe exposures can cause immediate organ damage, seizures, collapse, or even death.
- Cancer: Many hazardous materials are known carcinogens that can increase the risk of various cancers, including lung, liver, kidney, and non-Hodgkin's lymphoma. Examples include asbestos, benzene, formaldehyde, and welding fumes.
- Organ damage: Cumulative exposure to toxic chemicals can lead to damage of major organs. For instance, liver and kidneys can be damaged by heavy metals like cadmium and solvents and lungs can experience permanent damage, asthma, or chronic bronchitis can result from exposure to substances like asbestos or silica dust.
- Neurological disorders: Exposure to certain heavy metals, pesticides, and solvents can lead to brain and nerve damage, causing tremors, memory loss, and cognitive decline.
- Reproductive issues: Some chemicals can cause infertility, birth defects, and developmental problems in children.
- Immune system damage: Some substances can reduce the body's ability to fight off infections.
- Sensitization: Repeated exposure can cause the body to develop an allergic reaction, such as a rash or breathing difficulty, which can worsen with further exposure.
- The severity of health effects depends on several factors:
- Toxicity of the substance: Some materials are more toxic than others.

- Dose: The amount of the substance a person is exposed to.
- Duration and frequency: The length and number of exposures.
- Route of exposure: Inhalation is often a major concern, as some materials can penetrate deep into the lungs. Some fat-soluble materials can be absorbed through the skin.
- Individual susceptibility: Factors such as genetics, age, general health, diet, and lifestyle habits (e.g., smoking) can influence an individual's reaction to hazardous materials.

Property Impact Typically, residential structures are not affected by hazardous materials incidents. In most cases, cleanup can be performed to return the property to pre-incident conditions. However, if the hazardous material is explosive, it may cause fires to structures where the materials is located.

Infrastructure Impact As noted in the historical locations of the incidents, the locations most affected include roadways or highways, and waterways. These could be closed for response and cleanup for hours to days.

Economic Impact No model is currently available to determine the potential loss associated with hazardous materials accidents in Martin County. However, some aspects to consider regarding the cost of an incident could be the following.

- Response fees of labor, including overtime, equipment operation, and contracting
- Cleanup and disposal costs of containment, removal, and proper disposal of the hazardous material
- Damage to property and natural resources including assessing and compensating for any injury or loss.
- Type of material involved; highly toxic or volatile substances are more expensive to handle and dispose of than less dangerous materials.
- Scale of the incident, quantity of material released, size of the contaminated area directly impacted.
- Location of the incident such as a sensitive environmental area, or a location that is difficult to access for responders.

Environmental Impact Impacts to the environment from hazardous materials incidents can include killing organisms in a lake or river, destroying animals and plants in a contaminated area, causing major reproductive complications in animals, or otherwise limit the ability of an ecosystem to survive. Certain hazardous substances also have the potential to explode or cause a fire, threatening both animals and human populations.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 75: Hazardous Materials Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	On average, there are 36 incidents per year.
Probability	5	Will occur	Based on historical data, incidents will occur in a year.
Onset	5	No warning	Responders learn about incidents after they have occurred.
AVERAGE	**5**	**Extreme Threat**	
Vulnerability Calculation			
Response	2	Up to 1 day	Response time can vary but typically does not take more than one day.
Location	1	Localized	Incidents are site specific
Human	2	Minor	Responders take precautions to avoid illness and injury to themselves and others.
Property	1	< 10%	Typically, only the property that is the site of the incident is affected, if at all.
Infrastructure	1	< 1 day	Roads, highways, or waterways may be closed temporarily.
Economy	1	<1 day	Economic impact is localized and not widespread.
Environment	2	Limited	Damages may require some human intervention.
AVERAGE	**1.4**	**Minimal Vulnerability**	
Risk Calculation			
Moderate Risk			Based on the extreme threat and the minimal vulnerability, this hazard is a moderate risk to Martin County.

Mitigation Measures

Martin County and its jurisdictions have various projects on the Prioritized Project List that address hazardous materials concerns. These include wastewater lift station bypass pumps, a reverse osmosis treatment plant generator, and several lift station generators.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicated that 57% of respondents were concerned or very concerned about hazardous materials incidents, mainly mentioning possible contamination of waterways and possible accidents from the transportation system.

RADIOLOGICAL AND NUCLEAR INCIDENTS

Description

While an actual release of radioactive material is extremely unlikely and the immediate threat to life extremely low, vulnerability to a nuclear plant disaster could consist of long-range health effects with temporary and permanent displacement of population from affected areas. The potential danger from an accident at a nuclear power plant is exposure to radiation. This exposure could come from the release of radioactive material from the plant into the environment, usually characterized by a plume (cloudlike) formation. The area the radioactive release may affect is determined by the amount released from the plant, wind direction and speed, and weather conditions (e.g., rain) that would quickly drive the radioactive material into the ground, hence causing increased deposition of radionuclides.

The St. Lucie Nuclear Power Plant is located 5.5 miles north of Stuart on Hutchinson Island in St. Lucie County. The facility contains two reactors and is owned and operated by the Florida Power & Light Corporation. This place the northeast quadrant of Martin County, the City of Stuart and Sewall's Point (Zone 7) within the 10-mile EPZ and the entire County 50-mile Ingestion Pathway Zone.

Possible Causes

Possible causes of nuclear power plant accidents and subsequential radiation release can be from equipment malfunctions such as failures in cooling systems, human errors, including operator mistakes or insufficient training and safety awareness, and external events, most notably severe natural disasters like earthquakes and tsunamis, but could also be from targeted attacks.

Extent

Specific coordinating procedures for response to a General Emergency at a nuclear power plant have been prepared in the form of Standard Operating Procedures. These include Emergency Classification Levels, which assist in notifying the public if a problem occurs at a plant. They are defined by four categories (Florida Department of Emergency Management, 2012):

- **Unusual Event**: The event poses no threat to plant employees, but emergency officials are notified. No action by the public is necessary. This is the least serious of the four levels.
- **Alert**: An event has occurred that could reduce the plant's level of safety, but back-up systems still work. Emergency agencies are notified and kept informed, but no action by the public is necessary.
- **Site Area Emergency**: The event involves major problems with the plant's safety and has progressed to the point that a release of some radioactivity into the air or water is possible but is not expected to exceed EPA's Protective Action Guidelines (PAGs). Thus, no action by the public is necessary.
- **General Emergency**: The event has caused a loss of safety systems. If such an event occurs, radiation could be released that would penetrate the site boundary. State and local authorities will take action to protect the residents living near the plant. The alert and notification system will be sounded. People in the affected areas could be advised to evacuate, or in some situations, to shelter in place. When the sirens are sounded, radio and television alerts will have site-specific information and instructions. This is the most serious of the four levels.

Historical Occurrences

Worldwide, there have been three major nuclear power plan incidents of note. All impacts and estimated losses described herein are from these three incidents, as the occurrence of catastrophic nuclear incidents is rare.

- **Three Mile Island** incident in Pennsylvania on March 28, 1979. The Three Mile Island Unit 2 reactor, near Middletown, partially melted down. A mechanical or electrical failure prevented the main feedwater pumps from sending water to the steam generators that remove heat from the reactor core. This caused the plant's turbine-generator and then the reactor itself to automatically shut down. This was the most serious accident in U.S. commercial nuclear power plant operating history, although its small radioactive releases had no detectable health effects on plant workers or the public.
- **Chernobyl** incident in Ukraine in April 1986. The Chernobyl accident in 1986 was the result of a flawed reactor #4 design that was operated with inadequately trained personnel. The Chernobyl disaster was a unique event and the only accident in the history of commercial nuclear power where radiation-related fatalities occurred. Some 350,000 people were evacuated as a result of the accident, but resettlement of areas from which people were relocated is ongoing.
- **Fukushima Daiichi** accident in Japan on March 11, 2011. Following a major earthquake, a 49-foot-high tsunami disabled the power supply and cooling of three Fukushima Daiichi reactors, causing a nuclear accident; all three cores largely melted in the first three days.

There have been no historical events related to radiological-nuclear accidents in Martin County.

Probability

Due to precautions and construction at the nuclear power plant in St. Lucie County, the probability of future occurrence of radiological accidents is low.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response	A nuclear incident response of the magnitude of the examples given for Three Mile Island, Chernobyl, and Fukushima, could be well over one month.
Location	The St. Lucie Nuclear Power Plant is located on Hutchinson Island about eight miles southeast of Ft. Pierce, the St. Lucie Nuclear Plant has been powering more than a million homes in south Florida for more than 45 years. Emergency Planning Zones (EPZs) have been designated for each power plant to enhance planning efforts for an emergency. An EPZ is comprised of two zones, the 10-mile plume exposure zone and the 50-mile ingestion exposure zone. Martin County is within the EPZ of the St. Lucie Nuclear Power Plant.

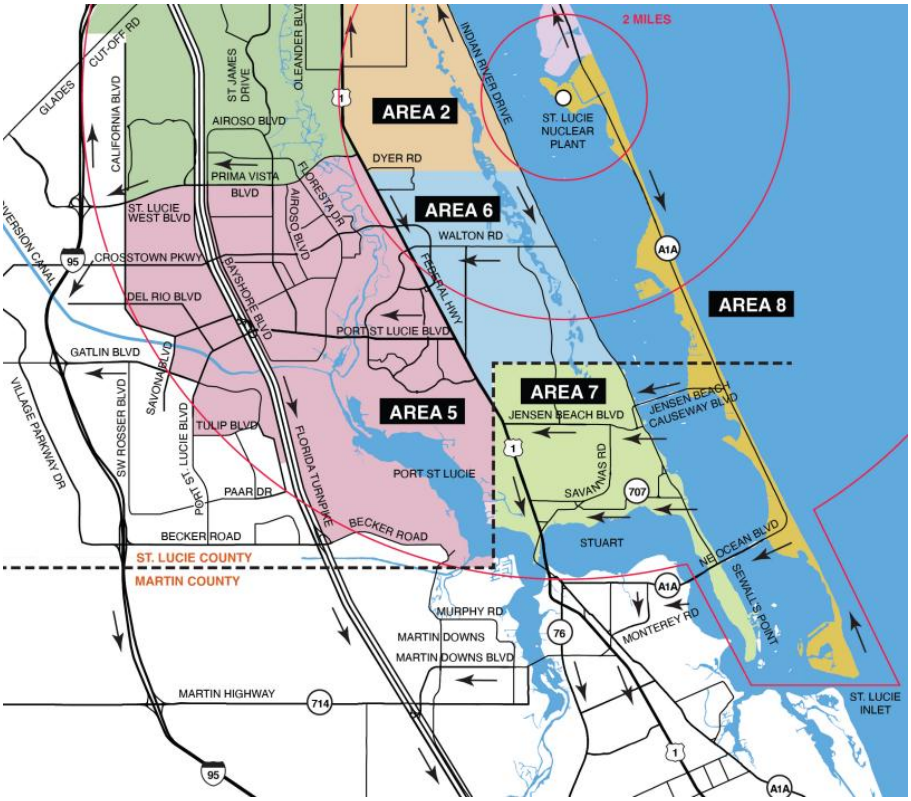


Figure 21: SLNPP Emergency Planning Zones

The St. Lucie Nuclear Power Plant has a network of sirens designed to alert residents in Martin and St. Lucie Counties within the 10-mile EPZ. In Martin County, there are 16 sirens that are regularly maintained and tested.

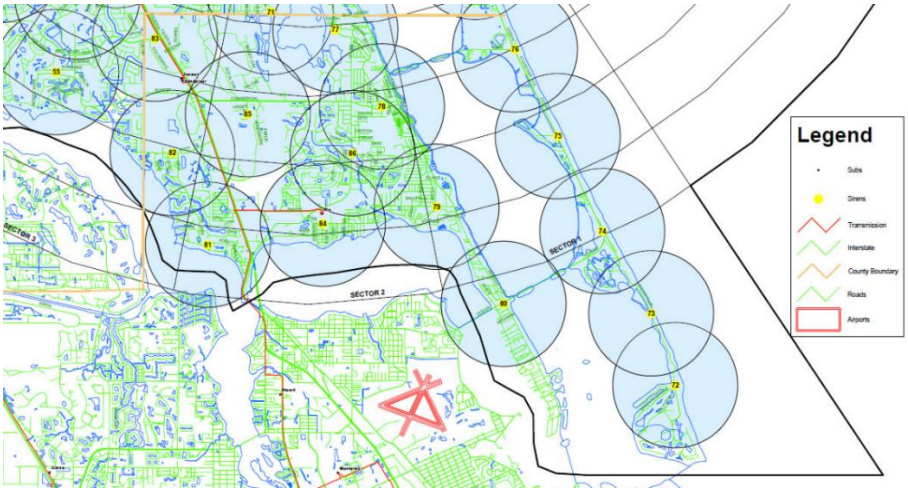


Figure 22: SLNPP Sirens

Human Impact

The casualties from Chernobyl included firefighters who attended the initial fires on the roof of the turbine building. All these were put out in a few hours, but radiation doses on the first day caused 28 deaths. The doses received by the firefighters and power plant workers were high

enough to result in acute radiation syndrome (ARS). Common ARS symptoms include gastrointestinal problems (e.g. nausea, vomiting), headaches, burns and fever. Whole body doses between 4000 mGy and 5000 mGv within a short time frame would kill 50% of those exposed, with 8000-10,000 mGy universally fatal. The doses received by the firefighters who died were estimated to range up to 20,000 mGy. The highest doses of radiation were received by about 1,000 emergency workers and onsite personnel during the first day of the accident.

The approximately 2 million people around Three Mile Island during the accident are estimated to have received an average radiation dose of only about 1 millirem above the usual background dose (exposure from a chest X ray is about 6 millirem).

The following graphic illustrates how a human can be exposed to radiation through environmental pathways.

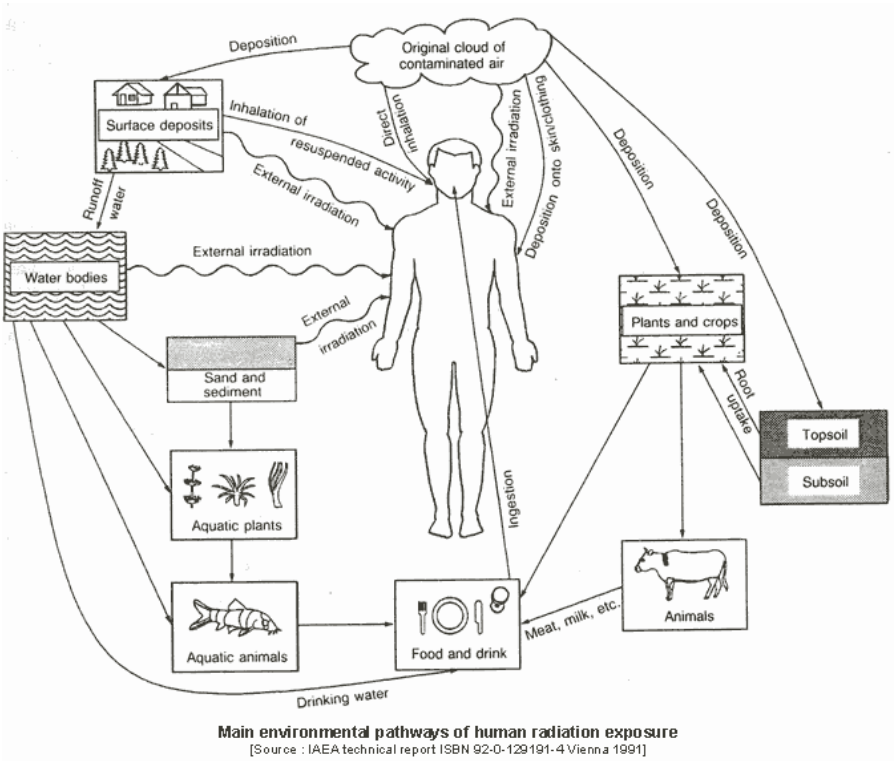


Figure 23: Human Radiation Exposure

Property Impact

The Chernobyl plant operators' town of Pripyat was evacuated in April (45,000 residents) and by May, some 116,000 people that had been living within a 30 km radius had been evacuated and later relocated. About 1000 of these returned unofficially to live within the contaminated zone. In the years following the accident, a further 220,000 people were resettled into less contaminated areas, and the initial 30 km

radius exclusion zone (2,800 km^2) was modified and extended to cover 4,300 km^2.

The Fukushima accident caused the evacuation of over 100,000 people from their homes as a preventative measure.

Infrastructure Impact The most notable effect on infrastructure would be widespread power outages from a nuclear power plant failure that could lead to other effects such as communications outages, surface and air transportation disruption, toxic releases from sewer treatment plants.

Economic Impact Nuclear incidents cause significant economic impacts, including plant destruction, cleanup and decommissioning costs, property loss, and a loss of agricultural and tourism industries. Immediate economic disruption often leads to a decline in per capita income and unemployment in affected regions, although these impacts may be temporary or short-lived in some cases. Long-term consequences can include reduced economic opportunities, potential out-migration, and increased uncertainty about future energy costs, which can hinder economic development in the area.

Environmental Impact In the Chernobyl incident, large areas of Belarus, Ukraine, Russia, and beyond were contaminated in varying degrees including long-lived radioactive waste and thermal pollution from cooling water. The graphic above in the *Human Impact* section also illustrates how the environment can be affected by radiation.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 76: Radiological and Nuclear Incidents Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	1	None	There have been no nuclear incidents in Martin County.
Probability	1	Very unlikely	It is very unlikely that there will be a nuclear incident in Martin County in a year.
Onset	3	12-24 hours	The onset could be anywhere from no warning to over a week; the median was selected.
AVERAGE	**1.7**	**Minimal Threat**	
Vulnerability Calculation			
Response	5	> 1 month	Response activities could be expected to last over one month.
Location	3	Moderate	Several parts of the County could be affected (mainly the 10-mile EPZ).
Human	3	Moderate	Moderate illness or injuries are expected.

Category	*Points*	*Description*	*Determination Method*
Property	4	51-75%	51-75% of the property at risk in the 10-mile EPZ may be affected.
Infrastructure	5	> 1 month	Infrastructure disruption could last over one month.
Economy	5	> 1 month	Economic disruption could last over one month.
Environment	5	Severe	Damages caused are catastrophic and the area would not be expected to return to pre-incident conditions.
AVERAGE	**4.3**	**Extreme Vulnerability**	
Risk Calculation			
Moderate Risk			Based on the minimal threat and the extreme vulnerability, this hazard is a moderate risk to Martin County.

Mitigation Measures

- The aftermath of the Three Mile Island incident brought about sweeping changes involving emergency response planning, reactor operator training, human factors engineering, radiation protection, and many other areas of nuclear power plant operations. It also caused the NRC to tighten and heighten its regulatory oversight. All of these changes significantly enhanced U.S. reactor safety.
- The St. Lucie Nuclear Power Plant conducts quarterly siren testing of all its outdoor sirens. 16 sirens cover the 10- mile EPZ in Martin County.
- Florida Power and Light is implementing a new redundant notification system for responders.
- Annually, Florida Power and Light with its partners in preparedness, such as Martin County, complete tables to and fully functional exercises to exercise existing plans for preparedness. Such exercises are evaluated by the Florida Bureau of Radiation Control, Federal Nuclear Regulatory Commission, Federal Emergency Management Agency, and Florida Division of Emergency Management to ensure Martin County's compliance and ability to respond to such emergencies.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicates that most respondents are concerned (level 4 of 5) about radiological or nuclear incidents. In comments, power outages were mentioned as an area of concern; this can be related to multiple hazards, including radiological and nuclear incidents.

TRANSPORTATION SYSTEM INCIDENTS

Description

Transportation accidents can result from air, rail, water, or road travel. It is unlikely that minor accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts, such as a hazardous materials release or a disruption to critical supply/access routes, especially along vital transportation corridors and at critical junctions. Traffic congestion, in certain circumstances, can also be hazardous.

The Federal Aviation Administration's (FAA) guideline on aircraft accident and incident notification, investigation, and reporting defines an aircraft accident as "an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and until all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. All aspects of the exceptions to substantial damage should be considered before making a final substantial damage determination that would classify the occurrence as an accident".

This profile focuses on major accidents in air, on roadways, railways, and waterways. According to F.S. § 627.737, a serious vehicular incident is considered one that results in significant and permanent loss of an important bodily function, permanent injury, and death.

See the *Hazardous Materials* profile for information on transportation accidents resulting in the release of chemicals or other hazardous materials.

Possible Causes

Air

- **Pilot error**: A variety of errors can be made by pilots, such as poor judgment, lack of experience, fatigue, or flying under the influence of substances. Inadequate preflight preparation and misjudging speed or distance are also contributing factors.
- **Air traffic control (ATC) errors**: Mistakes in communication or managing flight paths, altitudes, and runway usage by air traffic controllers can lead to collisions or takeoff accidents, as well inadequate staffing of ATCs.
- **Runway and landing incidents**: Crashes are statistically more likely to occur during takeoff and landing because the aircraft is at a lower altitude and more vulnerable.
- **Maintenance and human error**: Improper maintenance, equipment defects, or lack of proper repairs can contribute to accidents. A shortage of mechanics can increase the chance of errors being made during maintenance.

Railway

According to the Federal Railroad Administration (FRA), rail transportation accidents are generally one of three types:

- **Derailment:** An accident on a railway in which a train leaves the rails
- **Collision:** An accident in which a train strikes something, such as another train or highway motor vehicle
- **Other:** Accidents caused by other circumstances like obstructions on rails, fire, or explosion

Roadway

- **Human error** including distracted driving, speeding, driving under the influence, reckless or aggressive driving, drowsy driving, and inexperience.
- **Environmental and external factors** such as weather, poor road conditions, inadequate lighting, and wildlife.
- **Vehicle-related issues** such as defects and poor maintenance.

Waterway

- **Human error** such as inattention, excessive speed, alcohol and drug use, improper lookout, navigation rule violation and overloading.
- **Environmental factors** such as weather conditions and hazardous waters.
- **Vessel-related issues** such as equipment failure and poor maintenance.

Extent

The unit of measurement would be based on the number of occurrences.

Historical Occurrences

Air

According to the National Transportation Safety Board data, there have been 83 aircraft incidents in Martin County since 1964. However, many of them had minor or no injuries, so they are not being considered for this profile. The table below outlines the aircraft incidents in Stuart and Indiantown that have sustained serious injuries or fatalities. There have been a total of 23 incidents with these characteristics.

Table 77: Airway Incidents in Martin County 1964 - 2025

Event Date	*City*	*Fatalities*	*Serious Injuries*
1/9/1964	Stuart	2	0
5/12/1972	Indiantown	8	0
2/1/1974	Stuart	1	0
1/11/1976	Stuart	0	2
7/27/1976	Indiantown	1	0
6/19/1982	Stuart	0	1
1/27/1984	Stuart	1	2
2/26/1984	Indiantown	0	1
6/23/1984	Indiantown	1	0
6/15/1985	Stuart	2	0
2/18/1988	Stuart	3	0
7/4/1989	Stuart	1	1
12/28/1989	Stuart	0	1
5/23/1994	Indiantown	2	0
8/24/1996	Indiantown	2	0
1/24/1997	Indiantown	0	2
3/5/2000	Indiantown	0	1
2/13/2001	Stuart	2	0
2/4/2006	Stuart	3	0
3/13/2008	Indiantown	4	0
2/7/2014	Stuart	1	0
1/25/2018	Indiantown	0	1

11/1/2019	Stuart	1	0
	TOTAL	**75**	**12**

Source: NTSB

Railway

In Martin County, the Brightline train has had three accidents at railroad crossings since it's opening of the extension to Orlando from West Palm Beach traveling through Stuart in September of 2023.

- November 22, 2023, in Jensen Beach with no injuries
- January 29, 2024, in Jensen Beach with no injuries
- April 1, 2024, in Stuart with one fatality
- April 4, 2024, in Stuart with one serious injury
- June 3, 2024, in Stuart with one fatality
- February 23, 2025, in Jensen Beach with two serious injuries

Additionally, other commercial and passenger trains travel through Martin County from north to south. According to the National League of Cities data, there have been three incidents in Martin County since 2016.

- November 20, 2016, in Hobe Sound caused by a vehicle on the track; no injuries or deaths reported, costing approximately $12,265.
- May 20, 2022, in Ocean Breeze caused by rigging down or dragging; no injuries or deaths reported, costing approximately $69,860.
- May 18, 2022, in Jensen Breeze caused by irregular track alignment; no injuries or deaths reported, costing approximately $710,875.

Roadway

The Florida Highway Safety and Motor Vehicles Department tracks data on roadway accidents. The following is a breakdown of fatal crashes by year from when data is available beginning in 2017 and includes the number of fatal crashes and the number of fatalities and injuries from those fatal crashes.

Table 78: Fatal Crashes in Martin County 2017 - 2025

Year	*Fatal Crashes*	*Fatalities from Fatal Crashes*	*Injuries from Fatal Crashes*
2017	23	25	18
2018	22	23	23
2019	26	28	27
2020	22	23	15
2021	26	27	22
2022	32	38	22
2023	14	15	10
2024	19	19	15
2025	17	20	27
TOTAL	**201**	**218**	**179**

Source: FLHSMV

Waterway

- April 2018: A collision between two boats near Sandsprit Park killed a 76-year-old man and injured two others.
- October 2019: A boat crash resulted in the deaths of a woman and a 20-month-old girl.

- October 2022: A boat crashed into a channel marker on the St. Lucie River, causing at least one serious injury.
- March 2025: A boat explosion on the Intracoastal Waterway near Hobe Sound resulted in injuries to a woman and a 15-month-old child.
- March 2024: A 17-foot boat struck a pillar under the Palm City bridge, injuring a teen passenger.
- April 2025: A boat capsized approximately 29 miles off the St. Lucie Inlet, leading to the rescue of four people and the recovery of one deceased person. Five other passengers were missing, and the U.S. Coast Guard suspended the search.

Probability

Air Since 1964 (61 years), there have been a total of 23 air incidents with injuries or fatalities; one incident every 2.6 years on average. The probability of a major incident occurring in a year is unlikely.

Railway Since 2016 (9 years), there have been a total of 4 railway incidents with injuries or fatalities; one every 2.2 years on average. The probability of a major incident occurring in a year is unlikely.

Roadway Since 2017 (8 years), there have been a total of 201 roadway incidents with injuries or fatalities; roughly one per month on average. The probability of a major incident occurring in a year is highly likely.

Waterway Since 2018 (6 years), there have been a total of 6 waterway incidents with injuries or fatalities; one every year on average. The probability of a major incident occurring in a year is likely.

Altogether, there have been 234 major incidents in Martin County. The probability of a major incident occurring across any of the transportation systems, is highly likely to occur in a year.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response Typically, there is little to no warning time for transportation incidents of this kind.

Location Vulnerable jurisdictions to transportation system accidents are located along roadways, railways, waterways, and airports. For detailed information, see *Section I.D.7. Transportation*.

Additionally, the Martin County Metropolitan Planning Organization (MPO) published the *Community Characteristics Report* in December of 2023, where it outlines a study of roadways that have experienced the most crashes with fatalities and serious injuries in all jurisdictions of the County.

Human Impact

The following information shows the number of fatalities and serious injuries from incidents from each type of transportation sector, the majority of fatalities and injuries being in the roadways.

Type	Fatalities	Serious Injuries
Air	75	12
Railway	2	3
Roadway	218	179
Waterway	9	6
Total	**304**	**200**

Property Impact

Typically, residential structures are not affected by transportation system incidents. In most cases, cleanup can be performed to return the property to pre-incident conditions.

Infrastructure Impact

As noted in the historical locations of the incidents, the locations most affected include roadways or highways, and waterways. These could be closed for response and investigation for hours to days.

Economic Impact

There is little data on the actual cost of historical transportation system incidents in Martin County. However, costs for these types of events can include:

- first responder time and equipment
- loss or damage of the vehicle, vessel, rail car, or aircraft
- damages to the infrastructure such as roads, bridges, railways, and airports
- loss of cargo
- medical and funeral costs for affected individuals
- insurance deductibles
- damage to incident adjacent properties

Environmental Impact

It is possible that major accidents could cause environmental impacts, especially when the mode of transportation is carrying hazardous materials.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 79: Transportation System Incidents Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	5	High	There have been 234 incidents that qualify for this hazard profile in Martin County, with most data coming from the past 8 years.
Probability	5	Highly likely to occur in a year	On average, one transportation system accident can be expected every year.
Onset	5	No warning	Transportation System Incidents occur with little to no warning.
AVERAGE	**5**	**Extreme Threat**	
Vulnerability Calculation			
Response	3	Up to 1 week	Roadway incidents may be cleared in less than a day but larger incidents on railways, waterways, or the air, may take longer.
Location	1	Localized	Only certain areas are vulnerable to this hazard.
Human	5	Deaths	Severe injuries and deaths can be expected from this hazard.
Property	1	<10%	Property is not typically affected by these incidents
Infrastructure	2	Up to 1 week	Roadway incidents may be cleared in less than a day but larger incidents on railways, waterways, or the air, may take longer.
Economy	1	<1 week	Minimal impact to the economy is expected.
Environment	1	Minimal	Damages caused require little to no intervention.
AVERAGE	**1.7**	**Low Vulnerability**	
Risk Calculation			
Moderately High Risk			Based on the extreme threat and the low vulnerability, this hazard is a moderately high risk to Martin County.

Future Considerations

Due to increased growth, more population and structures would likely be impacted from transportation system incidents including air, rail, road, and water systems. As development increases, so do transportation systems, adding to the existing transportation infrastructure, thereby increasing the potential for incidents along these systems.

Mitigation Measures

Martin County has taken several steps to mitigate transportation system accidents. The County has developed a Safe Streets for All (SS4A) Action Plan, which identifies priority projects on county-maintained roads aimed at reducing traffic-related fatalities and serious injuries.

The Martin Metropolitan Planning Organization (MPO) has adopted the Vision Zero policy, a strategy committed to eliminating all traffic deaths and serious injuries. Through its Vision Zero Plan, the MPO analyzes crash data to identify high-risk areas and corridors, proposing targeted infrastructure and operational improvements to make Martin County's roadways safer for all users. The 2050 Long Range Transportation Plan (LRTP) further advances the Vision Zero policy by incorporating additional safety-focused projects scheduled for implementation over the next 25 years.

An example of this safety-driven approach is the SR-710 widening project, ranked as the MPO's top priority on its List of Project Priorities (LOPP). This project was prioritized due to the high number of fatal and serious injury crashes along the corridor. Thanks to the collaborative efforts of the Martin MPO and the Florida Department of Transportation (FDOT), construction funding for the project has been secured.

Lastly, beginning in 2025, the MPO has started to maintain a Safety Priority List, identifying projects eligible for funding through the Local Road Safety Program (LRSP), a reimbursable federal-aid initiative administered by FDOT. This program supports the County's Vision Zero objectives and promotes systematic, data-driven strategies to enhance roadway safety.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicates that respondents are split on their concern for transportation system incidents, with 51.75% reporting to be concerned or very concerned, ant the remainder being neutral, somewhat concerned, or not concerned. Some comments received included concern for pedestrian and cyclist safety on streets, speeding, low visibility at intersections due to vegetation, and airplane crashes due to living close to an airport.

WELLFIELD CONTAMINATION

Description

Wellfield contamination refers to the presence of pollutants or hazardous substances entering the groundwater aquifer that supplies our wells. This type of event is a source water issue, it affects the raw (untreated) water before it enters the water treatment plant and enters the distribution system.

Boil water notices, on the other hand, are issued when there is a potential issue within the distribution system, such as a main break, loss of pressure, or equipment failure that could allow contaminants to enter the potable drinking water lines. These notices are precautionary and are not typically related to wellfield contamination events.

Possible Causes

Public-supply-well vulnerability to contamination is not the same as groundwater vulnerability, but the two cannot be decoupled. Groundwater vulnerability is the tendency or likelihood for contaminants to reach a specified position in the groundwater system. Groundwater vulnerability depends on three factors: (1) the presence of manmade or natural contaminant sources, (2) the combination of chemical and physical processes in the subsurface that affect contaminant concentrations, and (3) the ease of water and contaminant movement to and through an aquifer, or its intrinsic susceptibility.

Public-supply-well vulnerability depends on all of the above factors (contaminant input, contaminant mobility and persistence, and intrinsic susceptibility) but is further affected by the location, design, construction, operation, and maintenance of the well. This is because groundwater vulnerability, and thus water quality, is not uniform throughout an aquifer, and wells "sample" only part of an aquifer. In other words, well location determines whether a particular contaminant source is in the capture zone for the well. Screen placement determines which chemical and physical processes in the aquifer will have influenced the water before it is pumped from the well and, therefore, which contaminants might be present in the water as it enters the well, and at what concentrations. Well depth and pumping rate determine how quickly water and contaminants can travel from the water table to the well, and from what distance. The interaction of a well with the surrounding aquifer determines whether the well intercepts water moving along preferential flow pathways, which can affect the relative importance of each of the other factors contributing to its vulnerability. Finally, the pumping schedule determines when poor quality water can migrate between aquifer units by way of wellbore flow, thereby influencing the mix of contaminated and uncontaminated water that enters the well at different points in time.

Extent

The unit of measurement for wellfield contaminations is based on the number of occurrences of contamination.

Historical Occurrences

According to the FDOH, since 2005, the Well Surveillance Program has surveyed over 19,000 sites and sampled nearly 48,000 wells. Over 4,400 of those wells had chemical concentrations

greater than state and/or federal drinking water standards, however data was not provided for each County.

Martin County does not have a history of wellfield contamination. The City of Stuart does have active PFAS monitoring for their wells. Per- and Polyfluoroalkyl Substances (PFAS) are a group of human-made chemicals found in many products that resist heat, oil, water, and stains, earning them the nickname "forever chemicals" due to their persistence in the environment and the human body.

Probability

Because of the almost non-existent history of wellfield contamination and the ordinances in place for wellfield protection, the probability of wellfield contamination is very unlikely.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

Immediate response efforts to a known contamination would be handled through investigation, source protection measures, and possible temporary shutdown of affected wells.

Location

Martin County operates two water plants: the North Water Treatment Plant in Jensen Beach and Tropical Farms Water Treatment Plant located off Kanner Highway, west of the Turnpike. Both plants utilize two distinct underground sources of water, the shallower surficial aquifer and the deeper Floridan aquifer, each requiring different treatment methods.

The Floridan Aquifer System is a major underground water source spanning across the southeastern US, including Florida, Alabama, Georgia, Mississippi, and South Carolina.

According to data from the FDOH. 9.3% of parcels in Martin County have private wells. The maps below show the distribution of parcels with public water and private wells. Private wells are located in unincorporated Martin County as well its jurisdictions.

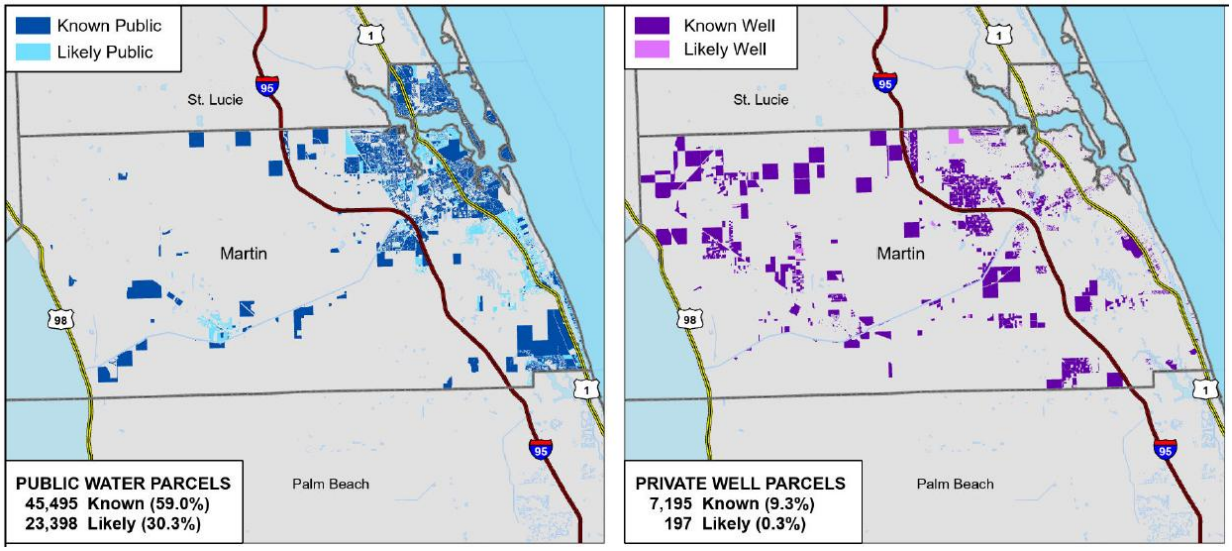


Figure 24: Map of Public Water and Public Well Parcels

Human Impact

Private wells can be contaminated by both naturally occurring sources and by human activities. The following are commonly found contaminants, their sources, and their possible human health impacts.

- Microorganisms such as bacteria, viruses, and parasites can cause infections.
- Nitrate and nitrite present in chemical fertilizers, human sewage, and animal waste and fertilizers, can cause “blue baby syndrome” in infants.
- Heavy metals can leach into drinking water from plumbing and service lines, and other industrial operations, causing acute or chronic toxicity, liver, kidneys, and intestinal damage, anemia, and cancer.
- Organic chemicals in household products and used widely in agriculture and industry can cause damage to kidneys, liver, circulatory system, nervous system, and reproductive system.
- Radionuclides are radioactive forms of elements such as uranium and radium and can cause toxic kidney effects and increase the risk of cancer.

Property Impact

Wellfield contamination can significantly impact property value through reduced market value, potential remediation costs, and loan/financing difficulties.

Infrastructure Impact

Wellfield contamination primarily impacts infrastructure by necessitating expensive remediation efforts, the development of alternative water sources, and, in some cases, causing physical damage to existing water and sewage systems.

Economic Impact

Wellfield contamination negatively impacts the economy through increased water treatment and healthcare costs, reduced labor

productivity, damage to industries like agriculture and tourism, and lower property values. These economic burdens arise from both direct costs, such as treating contaminated water and medical expenses, and indirect costs like lost income from sick workers and decreased output from affected businesses.

Environmental Impact

Wellfield contamination impacts the environment through groundwater degradation, soil and surface water pollutions, and potential harm to aquatic ecosystems. Contaminants can be drawn into the wellfield, migrate through the aquifer, and spread to streams and wetlands, causing long-term soil degradation and harm to plant and animal life.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 80: Wellfield Contamination Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	2	Low	This hazard has a very low frequency of occurrence
Probability	1	Very unlikely	This hazard is very unlikely
Onset	5	No warning	Testing will determine if wellfields are contaminated
AVERAGE	**2.7**	**Medium Threat**	
Vulnerability Calculation			
Response	4	Up to 1 month	Remediation may take several weeks
Location	1	Localized	Location limited to wellfield sites
Human	1	None	Detection makes early warning to implement measures
Property	1	<10%	Property is not typically affected, except for specific wellfield locations.
Infrastructure	4	Up to 1 month	Infrastructure may be affected up to a month
Economy	1	<1 day	Economic impact may be minimal
Environment	3	Moderate	May require significant intervention
AVERAGE	2.1	Low Vulnerability	
Risk Calculation			
Moderately Low Risk			Based on the medium threat and the low vulnerability, this hazard is a moderately low risk to Martin County.

Future Considerations

Greater numbers of homes, stores and businesses require greater quantities of water. Growing populations not only require more water, but they also lead to the discharge and runoff of greater quantities of waste and pollutants into streams, rivers, lakes, and groundwater.

Mitigation Measures

The two main activities of the Well Surveillance Program are well surveys and sampling. Surveys are typically requested by the Department of Environmental Protection (DEP) as part of their clean-up responsibilities. DOH personnel search for drinking water wells around areas of known or suspected contamination. These surveys help the DEP to manage and prioritize the clean-up of contaminated sites. Sites that pose the greatest risk to both drinking water and the environment are the first to be handled.

Martin County has a Wellfield Protection Ordinance that describes regulated areas, prohibited activities, requirements within protected areas, and provides information on protection on future wells.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicates that 53.51% of respondents are either concerned or very concerned about wellfield contamination. In comments, many indicated that they are worried about aquifer contamination, waterway health, and drinking water quality.

CIVIL DISTURBANCES

Description

The Florida Statutes defines civil disorder as a public disturbance involving acts of violence by an assemblage of three or more persons, which disturbance causes an immediate danger of, or results in, damage or injury to the property or person of any other individual within the United States (Chapter 790.29(2), F.S.). Civil disturbances, for this plan, encompass those acts that law enforcement does not consider routine. In this plan, civil disturbance will include the following topics.

- **Active Assailant**: "An active assailant is an armed person(s) who uses any type of weapon to inflict serious harm and/or deadly physical force on others in public and continues to do so while having access to additional victims. Examples of active assailant attacks include an active shooter incident, mass stabbings, explosives, vehicle-as-a-weapon, fire-as-a-weapon, and so forth. (These are also known as active shooter events, hostile incidents, mass violence attacks, rampage violence, spree killings, and so forth.)" (North Carolina Active Assailant and Active Shooter Work Group, 2017).
- **Bomb Threat**: An actual or rumored threat of a bomb. Most bomb threats that are called to an office or person are intended to disrupt normal business and activities and do not usually involve a bomb. Nonetheless, every bomb threat must be considered real until authorities investigate and determine it is safe (Ohio State University, n.d.).
- **Riots**: Group protests that become or have the potential to become violent. A riot is a violent offense against public order involving three or more people; it involves a gathering of persons for an illegal purpose. It is the most elementary form of collective violence, and it is also referred to as "social unrest". Riots can include such events as gang violence, coups, rebellions, and revolutions (Encyclopedia Britannica, 2018).

Possible Causes

Not all protests end in violence, the majority of protesting is peaceful. Violence is usually caused by the "crowd psychology," when in a crowd an individual is more likely to act like others, which means a few looking to engage violent behavior can sway a large group to act violently (Sarkis, 2011). If a terrorist is seeking self-glory, executing a preacher, priest, or rabbi will bring more attention that executing an average civilian. Houses of worship including churches and synagogues are more often than ever before, hiring security forces and/or training their members how to prepare for and survive an attack (Mauro, 2016).

Extent

There is no unit of measurement for the magnitude of a civil disturbance.

Historical Occurrences

In 2020 during the George Floyd protests, the City of Stuart experienced very large gatherings of people however, none turned violent. During the Trump protests the City of Stuart received threats and had minor altercations, but nothing to classify as a civil disturbance.

Probability

In Martin County, there have been no civil disturbances that meet the definition set forth in this profile. However, because Martin County and its jurisdictions do have locations that are typical targets for active assailants and bomb threats (such as schools, malls, government buildings, and large public event gatherings), the potential for this type of threat that could lead to an incident is possible. Additionally, there is a history of peaceful protests in Martin County, but any large gathering could have the potential of turning violent.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response

Civil disturbances in the form of active assailants, bomb threats, or riots typically last a few hours.

Location

All Martin County and its jurisdictions are at equal risk of civil disturbances. However, these acts may occur in areas that are more populated.

Active assailants can target any location or community asset; historically, there have been active assailants in malls, schools, universities, workplaces, government buildings, and places of worship. Bomb threat targets are no different. The location itself of the people inside could be the intended target. Typically, the event or incident is limited to a specific location or building. Riots are not typically location-targeted events and generally occur in the streets of a city or village; they can be localized to just one city block or spread in pockets nation-wide.

Human Impact

In extreme cases, acts of civil disturbance that become violent may cause severe injuries or deaths to people involved or bystanders.

Survivors of violence will most likely experience common stress reactions lasting several days to a few weeks. These reactions can include the following:

- **Emotional Reactions:** Shock, fear, grief, anger, guilt, shame, helplessness, numbness, sadness.
- **Cognitive Reactions:** Confusion, indecisiveness, worry, shortened attention span, trouble concentrating.
- **Physical Reactions:** Tension, fatigue, edginess, insomnia, body aches, easily startled, tachycardia, nausea, loss of appetite.
- **Interpersonal Reactions:** distrust, conflict, withdrawal, irritability, loss of intimacy, feeling abandoned.

Property Impact Property damage from civil disturbances can include broken windows, fire damage, damage to walls, etc. Damages to property are localized to the area where the incident is taking place.

Infrastructure Impact Infrastructure systems could become the target of civil disturbance acts, depending on the attacker's motivation.

Economic Impact Estimating the economic impact of a violent disturbance is a difficult task. Initial impact can be measured in immediate costs such as response to the event and closed businesses. The full economic impact would include long-term costs. A large-scale event could significantly affect industry and/or government and privately owned infrastructure.

Environmental Impact An incident involving wastewater, drinking water or chemical facilities could have long-term environmental effects. The potential losses due to these variables makes it difficult to quantify the cost of repair or replacement of infrastructure.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 81: Civil Disturbance Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	1	Low	Has never occurred
Probability	2	Unlikely	The hazard is unlikely to occur in a year based on frequency and other factors
Onset	5	No warning	This hazard may not have pre-indications of occurrence
AVERAGE	**2.3**	**Medium Threat**	
Vulnerability Calculation			
Response	2	Up to 1 day	Civil disturbances typically resolve within a few hours
Location	1	Localized	Only certain areas can be impacted at once
Human	5	Deaths	Civil disturbances have the potential to cause deaths
Property	1	< 10%	Due to the localized impact area, property would be locally impacted.
Infrastructure	1	< 1 day	Infrastructure systems may be disrupted for up to one day
Economy	1	< 1 day	Minimal impact to the economy is expected
Environment	1	Minimal	Damages require little to no intervention
AVERAGE	**1.7**	**Low Vulnerability**	
Risk Calculation			
Moderately Low Risk			Based on the XXX threat and the XXX vulnerability, this hazard is a XXX risk to Martin County.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicates that civil disturbance is low on the priority list for respondents, being ranked 16 from 20 hazards.

MASS MIGRATION

Description

According to the United Nation, mass migration refers to the migration of large groups of people from one geographical area to another. Mass migration is distinguished from individual or small-scale migration, and from seasonal migration, which may occur on a regular basis.

Causes

The Justice for Immigrants group has examined the root causes that drive people to migrate. Push and pull factors can be economic, environmental, social, and political. They can include some of the following.

Push	Pull
Prosecution, violence, and war	Safety and stability, freedom
Poor wages, lack of jobs	Higher wages, job prospects
Crop failure and famine, pollution, or natural disaster	Food availability, better environment
Limited opportunities, lack of services, family separation	Family reunification, better quality of life, availability of services

Extent

There is no measurement for the magnitude of mass migration.

Historical Occurrences

Reviewing the data on past immigration and mass population movements such as the Haitian influx and Cuban raft incidents of the 1980's indicates that illegal immigration has never reached a crisis state for the local authorities in Martin County. There is no recorded information relating to mass migration in Martin County.

Probability

As there have been no historical instances of mass migration in Martin County, it can be assumed that an event of this type is very unlikely to occur in a year.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response — It is impossible to quantify the response of a mass migration event. Mainly it would be up to law enforcement or community non-profit organizations to ensure people experiencing mass migration are taken care of.

Location — All Martin County and its jurisdictions are susceptible to mass migration. However, jurisdictions that are coastal such as Jupiter

	Island, Sewall's Point, Stuart, and Ocean Breeze, may be more susceptible to receiving migrants on their shores attempting to enter the country.
Human Impact	Human health and safety may be the top concern for people experiencing mass migration, depending on the root cause. Psychological hardship could be expected.
Property Impact	There is no expected impact to properties from mass migration.
Infrastructure Impact	There is no expected impact to infrastructure from mass migration.
Economic Impact	No data were available to determine the potential loss in Martin County due to mass migration.
Environmental Impact	There is no expected impact to the environment from mass migration.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 82: Mass Migration Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	1	None	Has not occurred in Martin County
Probability	1	Very unlikely	Very unlikely to occur based on historical occurrences
Onset	1	Over 1 week	May have over 1 week notice of an event
AVERAGE	**1**	**Minimal Risk**	
Vulnerability Calculation			
Response	1	No response	Unable to quantify response for mass migration
Location	1	Localized	Only certain areas could be impacted
Human	1	None	Little to no human impact expected
Property	1	< 10%	No damage to property expected
Infrastructure	1	< 1 day	No damage to infrastructure expected
Economy	1	< 1 day	No impact to economy expected
Environment	1	Minimal	No impact to the environment expected
AVERAGE	**1**	**Minimal Vulnerability**	
Risk Calculation			
Minimal Risk			Based on the minimal threat and the minimal vulnerability, this hazard is a minimal risk to Martin County.

Public Perspective

The online public survey conducted between August 2024 and August 2025, indicates that just under 50% of the respondents were either concerned or very concerned about this hazard.

TERRORISM AND SABOTAGE

This profile is intentionally generalized. The Martin County Emergency Management Agency and law enforcement agencies have identified several potential terrorist-related targets throughout the county and maintain files of such information separately from this document.

Description

Terrorism is a form of violence aimed at a public audience. The Federal Bureau of Investigation (FBI) defines terrorism as "the unlawful use of force or violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof in furtherance of political or social objections." More importantly, it is necessary to understand that the objective of terrorism is not destruction or death; it is the psychological impact on the targeted population and world opinion. Disruption to public services, economies, and social patterns, or a feeling of insecurity is the desired goal.

Terrorism can be categorized as either domestic or international. Domestic terrorism incidents are acts conceived of and carried out by U.S. citizens within the U.S. borders. Examples of domestic terrorism include environmental groups like the Animal Liberation Front (ALF), groups opposing abortion, animal rights groups opposing the fur trade, or the Oklahoma City bombing of the Murrah Building. International terrorism originates from groups based outside the U.S. and may be perpetrated against U.S. interests abroad or within the territorial boundaries of the U.S. Examples would be Al-Qaeda and sympathizer groups.

Terrorism is not always accomplished on a "grand scale," as is the case with international terrorists who are attempting to coerce the federal government. Such terrorism, while technically a hazard in Martin County, is more unlikely than what is known as "domestic terrorism." Domestic terrorism can involve disgruntled employees (in the case of large industrial plants), angry parents (at schools), upset citizens (at government facilities), etc. Domestic terrorists may often only intend to harm a single individual or a small group of individuals, but the threat of their actions can be highly disruptive.

There are a variety of methods to carry out a terrorist attack. CBRNe is a relatively new concept; it is short for Chemical, Biological, Radiological, Nuclear, and explosives. Before CBRN became common, the term NBC (Nuclear, Biological, Chemical) was used to identify these types of weapons, mainly in a military setting. The radiological threat became more relevant when terrorist groups expressed interest in CBRN weapons. The addition of 'e' for explosives is the latest extension of the acronym; it reflects a trend in counterterrorism, where professionals dealing with either CBRN or explosives are increasingly joining forces while operating under a single umbrella (IB Consultancy, n.d.).

- **(C) Chemical**: Chemical weapons are naturally occurring or human-made liquids, gasses, or solids that exhibit toxic effects on humans, animals, plants, or property upon exposure (Haddow, Bullock, & Coppola, 2014, p. 58).
- **(B) Biological:** Biological agents are either live organisms or the toxins produced by live organisms, either naturally occurring or genetically engineered, that can kill or incapacitate people, livestock, and crops; there are three types of biological agent categories, bacteria, viruses, and toxins (Haddow, Bullock, & Coppola, 2014, p. 59). Typical biological agents generally include anthrax, botulism, brucellosis, plague, smallpox, tularemia, and viral hemorrhagic fevers (CDC, n.d.).

- **(R) Radiological**: Radiological agents are those that cause harm by exposing victims to the damaging energy emitted by unstable radioactive materials; the most common sources of radiological materials are research laboratories, medical institutions, and hazardous waste containment facilities (Haddow, Bullock, & Coppola, 2014, p. 60).
- **(N) Nuclear**: Nuclear agents are those that cause great harm through the activation of a fission or fusion chain reaction; a nuclear blast is an explosion that emits intense light, heat, and damaging pressure and disperses radioactive debris over a widespread area, leading to the contamination of air, water, and ground surfaces for miles around (Haddow, Bullock, & Coppola, 2014, p. 60).
- **(E) Explosive or Enhanced Conventional Weapons or Enhanced Improvised Explosives:** Some agencies do not include the "E" in their classification and simply use "CBRN." Explosives are material containing an incredible amount of stored energy, after initiation or detonation it causes a rapid, sudden expansion. The dispersion of some of the CBRN materials may be based on the use of explosives (IB Consultancy, n.d.).

Possible Causes

There is no single cause of acts of violence; it is typically a non-rational, complicated, intertwined, series of reasons that have the outcome of violence. In his article Causes of Terrorism, Nick Grothaus lays out the most common causes cited by leaders in the field of counterterrorism. These categories may apply to other types of violence not related to terrorism.

- **Ethno-Nationalism**: The desire of a population to break away from a government or ruling power and create a state of their own.
- **Alienation/Discrimination**: Individuals or groups face discrimination leading to further feelings of isolation. These people may become jaded towards society and feel excluded.
- **Religion**: Religion as a part of terrorism has been mainly attributed to Islamic fundamentalism although other religions have also had involvement in terrorist activities. For example, Christian Fundamentalists target abortion clinics, the Aryan Nation and the Church of Christ, Christians target the Jews and minorities (Post, 2007, pp. 211-212).
- **Socio-Economic Status**: Individuals and groups may be driven by a sense of relative deprivation and lack of upward mobility within society.
- **Political Grievances**: A lack of political inclusiveness or grievances against a certain political order may cause individuals to join or create terrorist groups.

Extent

There is no method to measure a terrorist or sabotage incident.

Historical Occurrences

The U.S. population has largely been spared the impacts of international terrorism until recently. The devastation which occurred at the World Trade Center in New York City and the Alfred Murrah Building in Oklahoma City illustrates the need to plan for potential threats within our own communities. Domestically, the distribution of anthrax spores using the United States Postal System as a delivery mechanism caused concern nationwide for several weeks. The bomb detonated at the Atlanta Olympics in 1996 resulted in an investigation/manhunt that lasted years. Richard Reid (a.k.a., the shoe bomber) disrupted air travel and changed security measures in airports.

In Florida, in June of 2016, a gunman killed 49 people and injured 53 others at the Pulse Nightclub in Orlando. In December of 2019, a Saudi air force member opened fide at the Naval Air Station in Pensacola, killing three US soldiers; the US Department of Justice declared the attack an act of terrorism, citing the shooter's jihadis ideology.

There have been no incidents of terrorism or sabotage in Martin County.

Probability

Although not impossible, it is very unlikely that there would be a terrorist incident in Martin County.

Impacts and Vulnerability

To assess the potential vulnerability of this hazard, the following categories measure what could be a plausible worst-case scenario; the scenario considers the secondary and tertiary effects or cascading events.

Response Depending on the severity of the incident, a response to a terrorist incident could be up to a week.

Location Martin County and all its jurisdictions are at equal risk of terrorism and sabotage. Due to the high unpredictability of terrorist acts, any location could be a target of an attack. The extent of damages or impact from an attack is also unpredictable. Potential terrorist targets tend to be located in urban areas such as the Stuart. However, contrary to this, there is some evidence that terrorist organizations prefer rural safe houses from which to operate. The rural environment offers an environment for the terrorists that are more difficult to observe.

Human Impact Some individuals may experience severe stress symptoms following a violent incident. In general, individuals who lived through any type of terrorist attack could experience the following (Nation Center for PTSD, 2010).

- Intrusive Re-Experiencing: Terrifying memories, nightmares, and flashbacks.
- Extreme Emotional Numbing: Inability to feel emotions, feeling empty.
- Extreme Attempts to Avoid Disturbing Memories: Such as through substance abuse.
- Hyperarousal: Panic attacks, rage, extreme irritability, intense agitation, acting out with violence.
- Severe Anxiety: Debilitating worry, extreme helplessness, compulsions or obsessions.
- Severe Depression: Loss of ability to feel hope, pleasure, or interest; feeling worthless, suicidal ideations or intent.
- Dissociation: Fragmented thoughts, spaced out, unaware of surroundings, amnesia.

Specific injuries or illness from CBRNE terrorist attacks can vary. Effects of a radiological incident would produce injuries from heat, force

of the explosion, debris, and radiological dust. The health risks of exposure to radioactive material are dependent upon several factors: the amount of radiation received, known as the dose, and the length of time over which the dose is received. Radiation generally penetrates the body when exposed to beta particles and gamma rays. Beta particles can be a hazard to both bare skin and eyes by causing burns. If ingested or inhaled, damage to internal organs will occur. Gamma radiation travels several hundred feet in open air and penetrates most objects. Gamma rays penetrate tissue farther than do beta or alpha particles. Gamma rays can cause death.

Alpha particles do not damage living tissue when outside the body; however, when alpha emitting atoms are inhaled or swallowed, they especially are damaging because they transfer relatively large amounts of ionizing energy to living cells. Damage to internal organs will occur in these victims. Chemicals are usually introduced into the body by inhalation, absorption, ingestion, or inoculation. They can be rapidly acting and have immediate or delayed effects: miosis, rhinorrhea, respiratory distress, skin burn, eye irritation, upper airway injury, pulmonary problems, unconsciousness, circulation failure (Ramesh & Kumar, 2010). Biological injuries or illnesses will depend on the type of agent utilized in the attack.

Property Impact

Typically, residential homes are not the target of terrorism and sabotage but could result as collateral damage.

Infrastructure Impact

It can be assumed that any and all of Martin County's and its jurisdiction's critical assets could be potential targets of these types of incidents, depending on the motivation of the attack.

Some potential targets could include government facilities and/or personnel, stadiums, public meeting places, railroad facilities, dams, water and wastewater treatment facilities.

Economic Impact

A terrorist event would, at a minimum, cripple the region. The effects of a terrorist incident are not only monetary; they are often emotional and symbolic. The communities throughout the region are rural and small. Any mass loss of life would take an emotional toll on the affected and nearby communities. According to the Institute for Economics and Peace (2018), 75% of the economic impact of terrorism is attributed to deaths; the remainder is split into gross domestic product (GDP) loss (25%), property destruction (2%), and injuries (1%).

Globally, countries have incurred billions of dollars in costs from terrorism. The graph below shows the economic impact over the years. It is nearly impossible to calculate the costs of terrorism at a local level; therefore, planners will not attempt to estimate the cost of terrorism and intentional CBRNE incidents.

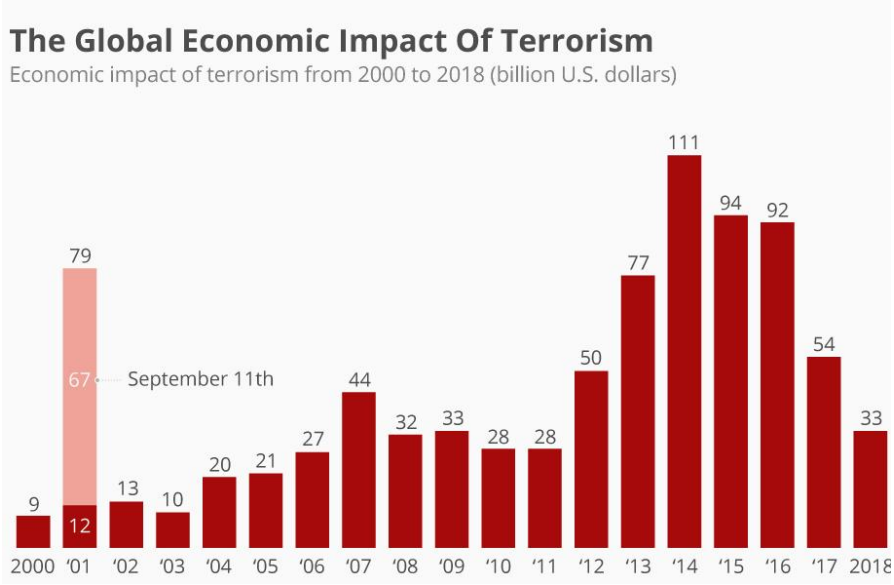


Figure 25: Global Impact of Terrorism

Environmental Impact Possible environmental impacts from CBRNE incidents could include chemical contamination of soil and water, ecosystem disruption, disease spread, radioactive contamination from nuclear fallout in soil, water, and vegetation, and pollutants in the air from explosives.

Risk Assessment

The following table gives points for each category based on research presented in this hazard profile. At the end, it averages the total points for all the categories, which forms the overall hazard ranking for the county (see *Section III.C. Calculating Risk* for description and calculations).

Table 83: Terrorism and Sabotage Risk Calculation

Category	*Points*	*Description*	*Determination Method*
Threat Calculation			
Frequency	1	None	There have been no terrorist incidents in Martin County
Probability	1	Very unlikely	Terrorist incident is very unlikely to occur in Martin County
Onset	4	< 12 hours	It is possible that events may occur with no warning, but some might present credible threats just before an occurrence
AVERAGE	**2**	**Low Threat**	
Vulnerability Calculation			
Response	3	Up to 1 week	Depending on the severity, response operations may take place for up to 1 week
Location	1	Localized	Only certain areas of vulnerability could be impacted
Human	5	Death	Deaths and severe injuries are a typical outcome of terrorist incidents
Property	1	< 10%	Less than 10% of the property could be affected.
Infrastructure	2	Up to 1 week	Infrastructure systems could be disrupted for up to one week

Category	*Points*	*Description*	*Determination Method*
Economy	1	< 1 day	Minimal impact to the economy is expected
Environment	3	Moderate	Damages caused could require significant intervention
AVERAGE	**2.3**	**Low Vulnerability**	
Risk Calculation			
Low Risk			Based on the low threat and the low vulnerability, this hazard is a low risk to Martin County.

IV. MITIGATION STRATEGY

§201.6(c)(3)	A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

According to FEMA, "the mitigation strategy is made up of three main required components: mitigation goals, mitigation actions, and action plan for implementation. These provide the framework to identify, prioritize, and implement actions to reduce risk to hazards." This section contains those items. It describes the updated goals and objectives for this mitigation plan; it outlines the action items (or projects) for each participating jurisdiction within Martin County; and each project identifies the agency responsible for completing it, as well as a general timeline for completion.

A. GOALS AND OBJECTIVES

§ 201.6(c)(3)(i)	A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
S4 (C3-a)	The plan must include goals to reduce the risk of the identified hazards.

The Martin County LMS Taskforce and LMS Plan Update Subcommittee identified the following goals and objectives. The goals and objectives were selected because of their ability to address community issues that were identified earlier in the mitigation planning process. Goals as defined by FEMA are general guidelines that explain what you want to achieve. They are usually broad policy statements and are long-term in nature.

Objectives as defined by FEMA are strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and measurable. The identified goals and objectives define the broad direction of the mitigation strategy and provide the focus for developing and adopting mitigation projects and activities for Martin County's LMS.

The following goals and objectives sustained minimal changes from the previous plan. Changes made were a result of a discussion of the LMS Plan Update Subcommittee to clarify goals and objectives and consolidate some to be better defined and remove redundancies. The following are the changes from the last plan update:

- **Objective 2.3**: "Prepare informational materials explaining the positive relationship between sustainable communities and disaster-resistant communities" was reworded to "Promote disaster-resilient communities through public education campaigns". This change was made to broaden the possible actions for public education, rather than to limit it to informational materials.
- **Objective 3.1**: "Create disaster-resistant businesses", was reworded to "Promote disaster-resilient communities through advanced preparation and response support"; this change gives way to incorporate the whole community rather than just a focus on businesses; additionally, the County's mitigation goal is not to "create" businesses but support them.
- **Objective 3.3**: "Streamline and expedite post-disaster permitting and access to resources" was added in response to effects from the Hurricane Milton tornadoes regarding permitting.

- **Objective 3.4:** "Evaluate codes, policies, ordinances, and regulations dealing with natural disasters" was added in response to effects from the Hurricane Milton tornadoes regarding codes, policies, ordinances, and regulations.
- **Goal 5**: "Adopt new technologies to protect and support the community" was added because of the opportunities that are arising in use of technology for mitigation measures.
- **Objective 5.1**: "Evaluate technologies that document and assess existing community vulnerabilities" was added as an objective to the new goal.
- **Objective 5.2**: "Develop and adopt technologies that address identifiable weaknesses in community resiliency" was added as an objective to the new goal.

The following is the updated list of the Martin County Local Mitigation Strategy goals and objectives.

Goal 1. Reduce the loss of life and property

Objective 1.1 Reduce flooding and/or wind damage.
Objective 1.2 Eliminate or retrofit repetitive loss properties.
Objective 1.3 Retrofit and/or construct new critical facilities.
Objective 1.4 Protect and restore areas susceptible to shoreline erosion.
Objective 1.5 Improve local roadways to ensure safe, efficient, evacuation.
Objective 1.6 Reduce the potential threat of fires, wildland, and structural.
Objective 1.7 Increase public awareness of hazards and their impacts.
Objective 1.8 Evaluate codes, policies, ordinances, and regulations dealing with natural hazards.
Objective 1.9 Reduce exposure to potential environmental hazards.

Goal 2. Achieve safe and fiscally sound, sustainable communities.

Objective 2.1 Integrate hazard reduction into local planning and development processes.
Objective 2.2 Enhance environmental quality and/or function of natural resource.
Objective 2.3 Promote disaster-resilient communities through public education campaigns.
Objective 2.4 Promote the implementation of cost-effective mitigation projects.
Objective 2.5 Enhance geographic information system (GIS) capabilities for use in hazard analysis.

Goal 3. Facilitate orderly recovery post-disaster.

Objective 3.1 Promote disaster-resilient communities through advanced preparation and response support.
Objective 3.2 Support the economic viability of the community following a disaster.
Objective 3.3 Streamline and expedite post-disaster permitting and access to resources.
Objective 3.4 Evaluate codes, policies, ordinances, and regulations dealing with natural disasters.

Goal 4. Optimize the effective use of all available resources.

Objective 4.1 Establish public/private partnerships.
Objective 4.2 Establish procedures that strengthen intergovernmental coordination, cooperation, and resource distribution.

Goal 5. Adopt new technologies to protect and support the community.

Objective 5.1 Evaluate technologies that document and assess existing community vulnerabilities.

Objective 5.2 Develop and adopt technologies that address identifiable weaknesses in community resiliency.

1. Changes in Priorities

U2 (E2-a)	The plan must describe how it was revised due to a change in priorities for each jurisdiction.

Throughout the planning process, the LMS Plan Update Subcommittee updated the goals and objectives outlined in this plan only slightly to clarify expected mitigation outcomes. The LMS Plan Update Subcommittee recognizes the role technology is playing in the environment we live and therefore one new goal was added regarding technology, as it is becoming a valuable tool to assist in collecting hazard data, analyzing trends, and implementing new mitigation strategies.

B. PROJECTS

1. Mitigation Projects

S6 (C4-b)	Each plan participant must identify one or more mitigation actions the participant(s) intends to implement for each hazard addressed in the risk assessment.
S8 (C5-b)	The action plan must identify who is responsible for administering each action, along with the action's potential funding sources and expected time frames for completion.

The following table lists all the Martin County mitigation projects. This includes projects that have been scored and ranked as well as a few that have not been prioritized (indicated with an "NR" on the table in the 'Prioritized Rank' column). All jurisdictions in Martin County benefit from at least one project if they do not have their own project in their jurisdictions. Additionally, these projects address all the hazards that are addressed in the risk assessment.

Martin County Local Mitigation Strategy | 2025

Table 84: Martin County Mitigation Projects

Prioritized Rank	*Score*	*Project Title*	*Project Description*	*Jurisdictions Benefitting*	*Responsible Agency/Department*	*Hazards Mitigated*	*Estimated Time of Completion*	*Estimated Total Project Cost*	*Estimated Federal Share*	*Estimated Local Share*	*Potential Funding Source*	*Status*
1	87	Wastewater Lift Station Bypass Pumps	The Utilities & Solid Waste Department of Martin County BOCC has relied on portable generators to power the main lift stations during power outages. The portable generators need to be connected to the electrical panel at the lift station. If the electrical panel gets damaged the generator will be rendered useless. Hazards that can cause damage to the electrical panel are hurricanes, flooding, tornadoes.	Martin County	Martin County Utilities and Solid Waste	Hazardous materials	< 2 years	$532,136.00	$399,102	$133,034	HMGP	New project added 6/25/2025
2	85	Transfer switch for Martin County Emergency Operations Center	The installation of a transfer switch at the Emergency Operations Center (EOC) is a critical infrastructure improvement that ensures seamless and immediate activation of backup power during outages. As the central hub for coordinating emergency response during disasters, the EOC must maintain continuous operation to protect lives, property, and critical services. Without a transfer switch, the transition to generator power can be delayed or prone to failure, jeopardizing essential response functions.	Martin County	Martin County Fire Rescue	Cyber incidents, terrorism and sabotage	< 2 years	$150,000	$112,500	$37,500	HMGP	New project added 6/25/2025
3	84	SW Lincoln Street Roadway & Drainage Reconstruction	The project is seeking to replace a failed, substandard residential street and drainage ditch, providing safe travel for residential, commercial, and emergency traffic.	Indiantown	Village of Indiantown Planning & Development	Flood	18 mos.	$850,000	$637,500	$212,500	FDOT	4/17/24 Funded by FDOT, keep on list until the project starts.
4	83.5	Martin County Fire Rescue Bay Door Hardening	Martin County Fire Rescue have identified 10 fire stations that currently have bay doors rated for 160 mile per hour winds, just above the minimum category 5 wind speed of 157 miles per hour. The Department is planning to harden the identified station bay doors with three (3) new four panel folding doors that are rated for 216 mile per hour winds. By replacing the current bay doors with new, higher wind rated bay doors will provide protection for fire apparatus in the station from flying debris for seven (7) stations.	Martin County	Martin County Fire Rescue	All hazards	12 mos.	$1,897,000	$1,422,750	$474,250	HMGP	6/30/25 - updated cost per Matt Resch
4	83.5	Martin County Natural Gas Generator	Martin County Fire Rescue have identified a problem that during a disaster when power is out at the identified stations, the generators are using diesel fuel from the same source that fire apparatus and other County vehicles utilizes, which depletes that fuel supply more rapidly during a disaster. The current diesel capacity is a 3–7-day limit before refueling is required. Martin County Fire Rescue is planning to replace the below fire stations diesel generators with new 200 KW natural gas generators. Having a natural gas generator provides a sole continuous source of underground fuel to power the station and natural gas lines are already underground in	Martin County	Martin County Fire Rescue	All hazards	6 mos.	$ 1,005,015	$753,761	$251,254	HMGP	4/17/24 Request update 7/16/24 Per Chris Kammel, no funding was secured and the project stalled; keep for future funding opportunities

Martin County Local Mitigation Strategy | 2025

Prioritized Rank	Score	Project Title	Project Description	Jurisdictions Benefitting	Responsible Agency/Department	Hazards Mitigated	Estimated Time of Completion	Estimated Total Project Cost	Estimated Federal Share	Estimated Local Share	Potential Funding Source	Status
			front of the station. The identified stations are Station 21, Station 22, Station 23, Station 30									
5	83	South Sewall's Point Road (SSPR) Improvements Phase 3	The improvements include stormwater storage and discharge and address sea level rise but will also add control structures to alleviate sedimentation at the outfalls into the Indian River Lagoon and reduce impacts from King High Tides/sea-level rise from backing up the Town's storm system along SSPR. The project will also minimize loss of life and property damage. The road will be constructed in 4 phases. Phase 1 is currently under construction utilizing HMGP, IRL Council and FDEP funds with construction completion in September 2021. As grant funds becomes available from local/state and federal programs, the Town will provide matches and will build the facilities. The current schedule is to build all 4 phases within the next 2-3 years.	Sewall's Point	Town of Sewall's Point Building & Public Works	Flood, sea level rise	24 mos.	$3,500,000	$2,625,000	$875,000	HMGP	4/17/24 Going back out to bid. 6/24/2025 - Under Construction
5	83	South Sewall's Point Road (SSPR) improvements Phase 4	The improvements include stormwater storage and discharge and address sea-level rise but will also add control structures to alleviate sedimentation at the outfalls into the Indian River Lagoon and reduce impacts from King High Tides/sea-level rise from backing up the Town's storm system along SSPR. The plans include pump stations for emergency back-up. The project will also minimize loss of life and property damage. The road will be constructed in 4 phases. Phase 1 is currently under construction utilizing HMGP, IRL Council and FDEP funds with construction completion in September 2021. As grant funds becomes available from local/state and federal programs, the Town will provide matches and will build the facilities. The current schedule is to build all 4 phases within the next 2-3 years.	Sewall's Point	Town of Sewall's Point Building & Public Works	Flood, sea level rise	24 mos.	$15,000,000	$11,250,000	$3,750,000	HMGP	4/17/24 Update costs 7/16/24 Cost update requested 6/24/25 - Cost updated
6	82.5	South Martin Regional Utility Reverse Osmosis Treatment Plant Generator	South Martin Regional Utility is planning to install a new 1,000 kW diesel generator with an integrated diesel storage tank providing enough fuel for 7 – 10 days of operation. Furthermore, by moving the Clearwell & Post Treatment Operations to the new RO Generator, we will also be extending the operation time of the HSP Generator to 7 – 10 days as well.	Jupiter Island	Town of Jupiter Island - South Martin Regional Utility	Hazardous materials	9 mos.	$1,052,889	$789,667	$263,222	HMGP	4/17/24 Request update 7/16/24 Requested update
7	81	Village of Indiantown Lift Station Generator	Adding a generator or any changes to make lift station facilities more hurricane resilient.	Indiantown	Village of Indiantown Public Works	Hazardous materials	9 mos.	$100,000	$75,000	$25,000	HMGP	

Martin County Local Mitigation Strategy | 2025

Prioritized Rank	*Score*	*Project Title*	*Project Description*	*Jurisdictions Benefitting*	*Responsible Agency/Department*	*Hazards Mitigated*	*Estimated Time of Completion*	*Estimated Total Project Cost*	*Estimated Federal Share*	*Estimated Local Share*	*Potential Funding Source*	*Status*
8	79	South Sewall's Point Road (SSPR) improvements Phase 2	The improvements include stormwater storage and discharge and address sea-level rise but will also add control structures to alleviate sedimentation at the outfalls into the Indian River Lagoon and reduce impacts from King High Tides/sea-level rise sea-level rise/high tides from backing up the Town's storm system along SSPR. The project will also minimize loss of life and property damage. The road will be constructed in 4 phases. Phase 1 is currently under construction utilizing HMGP, IRL Council and FDEP funds with construction completion in September 2021. As grant funds becomes available from local/state and federal programs, the Town will provide matches and will build the facilities. The current schedule is to build all 4 phases within the next 2-3 years.	Sewall's Point	Town of Sewall's Point Building & Public Works	Flood, sea level rise	24 mos.	$13,500,000	$10,125,000	$3,375,000	HMGP	4/17/24 Working on the design. 6/24/25 - Design/ permitting complete, bidding and grant review, updated cost
8	79	Cleveland Clinic (North Hospital) Retrofitting - South Tower Windows	The south tower windows on the second and third floors of the north hospital require a lift to secure shutters prior to a tropical storm or hurricane. Cleveland Clinic Martin Health does not own a lift and has run into issues securing the appropriate equipment in the past; endangering staff (with unsuitable equipment rentals) and threatening patient evacuation of the entire south tower (NICU, labor and delivery, pediatric patients). Installation of impact windows: eliminates the need for the hospital to rely on outside entities; mitigates risk to staff; allows for staff to focus on other critical emergency protective measures during storm/hurricane preparedness efforts; mitigates the risk for patient evacuations; mitigates partial-closures/inability to fully serve community needs during response/recovery efforts (post-storm) due to damages sustained to unsecured windows.	Stuart	Cleveland Clinic Martin Health Facilities	Tropical Cyclones, Severe Thunderstorms, Tornadoes	9 mos.	$840,000.00	$630,000	$210,000	HMGP	

Martin County Local Mitigation Strategy | 2025

Prioritized Rank	*Score*	*Project Title*	*Project Description*	*Jurisdictions Benefitting*	*Responsible Agency/Department*	*Hazards Mitigated*	*Estimated Time of Completion*	*Estimated Total Project Cost*	*Estimated Federal Share*	*Estimated Local Share*	*Potential Funding Source*	*Status*
8	79	Cleveland Clinic (South Hospital) Retrofitting – Second/Third Floor Windows	The windows on the second and third floors of the South Hospital do not have shutters (this includes roughly 100 patient windows); as the building design inhibits shutter installation. Hurricane winds forecasted to be greater than 120-mph trigger a hospital evacuation, threaten extensive recovery times and would cause a major patient surge in the North Hospital. As the likelihood continues to increase for our community to experience impacts from Major Hurricanes (categories 3-5), the threat level for the South Hospital also increases. In 2019, the hospital was evacuated in preparation for Major Hurricane Dorian because the forecasted winds exceeded the wind-rating of the current windows. Installation of impact windows: mitigates the risk for patient evacuations; mitigates partial-closures/inability to fully serve community needs during response/recovery efforts (post-storm) due to damages sustained to unsecured windows; mitigates patient surge in the North Hospital; and allows for staff to focus on other critical emergency protective measures during hurricane preparedness and recovery efforts.	Stuart	Cleveland Clinic Martin Health Facilities	Tropical Cyclones, Severe Thunderstorms, Tornadoes	9 mos.	$1,800,000.00	$1,350,000	$450,000	HMGP	
9	78	North Sewall's Point Road Drainage Improvements	This is a Martin County facility with improvements to access and house flood protection to residents located in the Town of Sewall's Point. The improvements include stormwater storage and discharge and address sea-level rise but will also add control structures to alleviate sedimentation at the outfalls into the Indian River Lagoon and reduce impacts from King High Tides/sea-level rise from backing up the Town's storm system along N. Sewall's Point Road. The plans include pump stations for emergency back-up. The project will also minimize loss of life and property damage. The project will be built with Martin County assistance and completed in 1 phase. The current schedule is to build within the next 5 years.	Sewall's Point	Town of Sewall's Point Building & Public Works	Flood, sea level rise	24 mos.	$31,950,000	$23,962,500	$7,987,500	HMGP	4/17/24 Joint project with the County 6/25/25 - Updated cost
10	77	City of Stuart Lift Station Generators	Portable backup generators for wastewater pumping stations are crucial to the wastewater system operations, especially in areas that tend to experience extreme weather conditions that lead to frequent power outages.	Stuart	City of Stuart Utilities and Engineering	Hazardous materials	9 mos.	$120,000	$90,000	$30,000	HMGP	4/17/24 Applied with HMGP Nicole

Martin County Local Mitigation Strategy | 2025

Prioritized Rank	*Score*	*Project Title*	*Project Description*	*Jurisdictions Benefitting*	*Responsible Agency/Department*	*Hazards Mitigated*	*Estimated Time of Completion*	*Estimated Total Project Cost*	*Estimated Federal Share*	*Estimated Local Share*	*Potential Funding Source*	*Status*
11	76.5	Palm City - Bessey Creek Retrofit	Martin County has identified the need for drainage improvements associated with the Bessey Creek draining area. The project will directly impact two private neighborhoods in the County and will benefit a wider area of hydrologically connect land outside of those subdivisions in the Palm City Farms community, and unincorporated area of Martin County	Martin County	Martin County Public Works	Flood	18 mos.	$8,350,000	$6,262,500	$2,087,500	HMGP	4/17/24 Made the cut on appropriations. Can start designing
12	76	Cleveland Clinic (South Hospital) Retrofitting/Infrastructure Protection - Cooling Towers	The cooling towers which serve the south hospital are currently unprotected and at risk for severe damage during major wind events (tropical storms/hurricanes/ tornados). If the cooling towers are damaged, the chiller plant is likely to become non-operational which would then disrupt cooling to the facility. Losing the ability to keep the hospital cool threatens patient lives (i.e., humidity in operating rooms; spread of infection; etc.) and risks emergency evacuation of the entire hospital. Installing a hardened structure around the cooling towers mitigates risk for loss of patient lives due to humidity/un-cooled facility; spread of infection/disease; hospital evacuation; hospital closure during vital community recovery efforts post-storm.	Stuart	Cleveland Clinic Martin Health Facilities	Tropical Cyclones, Severe Thunderstorms, Tornadoes	24 mos.	$250,000	$187,500	$62,500	HMGP	
12	76	S River Road (Phase 1, Part 4) Improvements	This project will enhance the existing South Sewall's Point Road Phase 1 project by intercepting, storing and treating runoff from South River Road before it flows to the Phase 1 project. This will enhance the existing Phase 1 project's benefit to sea level rise and sedimentation. The project will alleviate the recurring flooding in homes and properties on the east side of South River Road, as well as further protect South Sewall's Point Road which is an evacuation route. The proposed project will include a Stormwater Management Plan to provide 1,200-LF of an exfiltration system to provide 100% retention for this developed area of south Sewall's Point. The project Drainage Basin area is approximately 6.5 acres. The nutrient load reduction calculations are attached and denote 75% reduction in TSS, 60% reduction in TP and 55% reduction in TN.	Sewall's Point	Town of Sewall's Point	Flood, sea level rise	24 mos.	$2,500,000	$1,875,000	$625,000	HMGP	4/17/24 Applied for HMGP Nicole
13	75	NW Wright Blvd. Drainage & WQ Improvements	Drainage improvements to alleviate flooding on NW Wright Blvd. Extension of NW Dixie Hwy drainage system to route drainage to Haney Creek. Construct new STA / berm on north side of NW Wright Ave. in the Haney Creek Watershed Preservation Area.	Stuart	City of Stuart Public Works	Flood	24 mos.	$1,214,000	$910,500	$303,500	HMGP	

Martin County Local Mitigation Strategy | 2025

Prioritized Rank	*Score*	*Project Title*	*Project Description*	*Jurisdictions Benefitting*	*Responsible Agency/Department*	*Hazards Mitigated*	*Estimated Time of Completion*	*Estimated Total Project Cost*	*Estimated Federal Share*	*Estimated Local Share*	*Potential Funding Source*	*Status*
14	73	City of Stuart Public Dock Replacement	Replacement of 720 linear feet of floating dockage with fixed dock system that provides a safer and more effective community use to enable a larger number of people to utilize the Indian River Waterway. Courtesy Dock and boardwalk also strengthen links with Downtown Stuart and the larger public pedestrian system with alternative access by maritime transportation. ADA compliant.	Stuart	City of Stuart/Public Works	Transportation System Accidents	18 mos.	$1,200,000	$900,000	$300,000	HMGP	4/17/24 Applied for funding, but not enough
15	72	SE Merritt Way Roadway Improvements	The current road elevation makes it impacted during storm surge events and high tides. This brings water up onto and over the road that impacts vehicle movement and risks property flooding due to storm surge.	Martin County	Martin County Public Works	Flood, sea level rise	36 mos.	$1,500,000	$1,125,000	$375,000	HMGP	
16	70	East Fork Creek Retrofit	Design, permitting and installation of five (5) culverts within the East Fork Creek Tributary basin, and the construction of a lake and STA.	Martin County	Martin County Public Works	Flood	18 mos.	$1,000,000	$750,000	$250,000	HMGP	4/17/24 Constructed one of the STAs. Going out to bid for another STA. Replaced several culverts already.
16	70	Cleveland Clinic (Family Health Center) Retrofitting - Emergency Generator Quick Connect Switchboard and Transfer Switch	A generator quick-connect is needed to support the Family Health Center which serves the community as a secondary critical facility. Following an emergency/disaster (i.e., a hurricane) it is vital that this primary ambulatory/walk-in facility open immediately to the community, providing a treatment site for 'walking-wounded' outside of the hospitals post-storm. Retrofitting the facility's current equipment, to enable the quick and safe connection of a mobile generator, will allow for continued operations post-storm. This retrofit will mitigate prolonged utility failure; facility closure (facility does not have a generator); overwhelmed hospital operations (walking-wounded treated at Family Health Center and life-threating injuries treated at hospitals). For community response and recovery, it is vital that both the Family Health Center and hospitals continue daily operations.	Stuart	Cleveland Clinic Martin Health Facilities	All hazards	9 mos.	$125,000.00	$93,750	$31,250	HMGP	

Martin County Local Mitigation Strategy | 2025

Prioritized Rank	*Score*	*Project Title*	*Project Description*	*Jurisdictions Benefitting*	*Responsible Agency/Department*	*Hazards Mitigated*	*Estimated Time of Completion*	*Estimated Total Project Cost*	*Estimated Federal Share*	*Estimated Local Share*	*Potential Funding Source*	*Status*
17	69	Danforth Creek Hardening	Sections of Danforth Creek with banks that are seen as a risk of collapse during major storm events This would impact a large number of residents that rely on the creek to drain during rain events. Focus is on the Martin Highway/Martin Downs. A portion of the creek bank is at sea level. Drainage improvements and creek slope hardening to prevent/reduce erosion; would need design and permitting to be completed	Martin County	Martin County Public Works	Flood, sea level rise	12 mos.	$1,100,000	$825,000	$275,000	HMGP	4/17/24 This area is one of the major pinch points for damage. Update scope and cost. 7/16/24 Requested update
18	66.5	Ruhnke Street/Aster Lane Drainage Improvements	There is recurring roadway flooding at the intersection of SE Ruhnke Street and Aster Lane. Street Flooding in a residential neighborhood which includes as ALF (consider patient movement) and FDOH-Martin Count. Install underground infrastructure to convey stormwater for treatment per Stormwater Master Plan.	Stuart	City of Stuart Public Works	Flood	18 mos.	$650,000	$487,500	$162,500	HMGP	
19	66	Stuart Business Park Drainage Improvements	Reduce and relieve major flooding in the business park. Phase 1-Design and Planning and Phase 2-Permitting and Construction	Stuart	City of Stuart Public Works	Flood	36 mos.	$ 700,000	$525,000	$175,000	HMGP	
20	64	Sewell's Point Town Hall/Public Safety Complex Improvements	Raise and harden building structure, provide generator. The current schedule is to build within the next 2-3 years.	Sewall's Point	Town of Sewall's Point Building & Public Works	All hazards	9 mos.	$5,000,000	$3,750,000	$1,250,000	HMGP	6/25/25 - Updated cost
21	62	City of Stuart & Martin County Interconnect Relocation	Relocate potable water interconnect assembly between the City of Stuart and Martin County from an existing in-ground concrete vault (SE Indian St/SE Carnivale Ct.) to an above ground interconnect assembly located at SE Dixie Hwy/SE Aviation Way.	Stuart	City of Stuart Utilities and Engineering	Hazardous materials	12 mos.	$ 200,000	$150,000	$50,000	HMGP	
22	60.5	Uptown Drainage and Roadway Improvements	The Village currently owns and maintains a water main that is installed approximately 100ft west of the CSX Railroad tracks, from Fernwood Forest Drive, north to Martin Luther King Jr. Drive, approximately 9,500ft. This project will contribute to prevent excess flooding and standing water.	Indiantown	Village of Indiantown Public Works	Flood	18 mos.	$7,000,000	$5,250,000	$1,750,000	HMGP	4/17/24 Grant for design
23	56	SE Mango Place/SE Riverside Drive Drainage & WQ Improvements	Eliminate house and street flooding. Route drainage to new Dioswale and 2nd Generation Baffle box prior to discharge to the St. Lucie River.	Stuart	City of Stuart Public Works	Flood	6 mos.	$ 690,000	$517,500	$172,500	HMGP	
24	54	Martin County Facility Roof Mitigation	Convert older asphalt roofs at various parks in the county to metal roofing. The asphalt roof shingles are deteriorating and become weaker during storm events, requiring repair of what has been damaged. The metal roofs are more durable and provide extra protection to the building while reducing the need to repair after storm events. Hobe Sound Community Center; Eastridge Park bathrooms; Greenfield Par pavilions; Zues Park pavilions	Martin County	Martin County Parks and Recreation	Tropical Cyclones, Severe Thunderstorms, Tornadoes	6 mos.	$150,000	$112,500	$37,500	HMGP	

Martin County Local Mitigation Strategy | 2025

Prioritized Rank	*Score*	*Project Title*	*Project Description*	*Jurisdictions Benefitting*	*Responsible Agency/Department*	*Hazards Mitigated*	*Estimated Time of Completion*	*Estimated Total Project Cost*	*Estimated Federal Share*	*Estimated Local Share*	*Potential Funding Source*	*Status*
25	53.5	NW North River Drive Drainage Improvements	Install underground infrastructure to convey stormwater to the baffle box prior to discharging to the St. Lucie River. This is a high priority on the City's Stormwater Master Plan due to repetitive street and structure flooding.	Stuart	City of Stuart Public Works	Flood	36 mos.	$1,700,000	$1,275,000	$425,000	HMGP	
26	52	City of Stuart Emergency Response Communications System	Seeking to have a city-wide communication system to connect multi-departments during and after a major storm or disaster event.	Stuart	City of Stuart Utilities and Engineering	All hazards	24 mos.	$ 36,300	$27,225	$9,075	HMGP	
27	46	Martin County Parks Facility Hardening	Installation of impact glass to replace installing plywood shutters for hurricanes. These centers are used for daycares after storm events to allow for citizens to help restore their communities. The impact glass will reduce Category B expenses from FEMA, time and labor for plywood shutter installation and allow for a quicker transition while adding additional protection to the building. Cassidy Center, Hobe Sound Community Center, New Monrovia, Palm City Community Center, Rio Community Center	Martin County	Martin County Parks and Recreation	Tropical Cyclones, Severe Thunderstorms, Tornadoes	12 mos.	$84,904	$63,678	$21,226	HMGP	
28	42	St. Lucie Settlement - Phase II Home Elevations	The proposed mitigation measure is to elevate the homes proposed to prevent future water intrusion after a long history of flooding in our neighborhood. This would mitigate against ocean, tidal, and Lake Okeechobee releases. Phase 1 was 21 homes in this area, would seek Phase 2 to elevate 8 additional homes.	Martin County	Martin County Public Works	Flood	36 mos.	$1,600,000	$1,200,000	$400,000	HMGP FMA Elevate Florida	
29	41.5	Village of Indiantown - Village Hall Hardening	The project includes improvements to upgrade the facility to an Emergency Operations Center during emergency activation. The hardening shall reinforce the structure to withstand catastrophes. This will minimize exposure to current and future threats.	Indiantown	Village of Indiantown Public Works	All hazards	36 mos.	$600,000	$450,000	$150,000	HMGP	4/17/24 Partially funded
NR	NA	Public education campaign on hazards and personal mitigation actions.	The project is a comprehensive approach to educating the public on the hazards identified in the updated LMS to spread awareness and the personal mitigation actions they can achieve to reduce their vulnerability and increase their resilience. The strategies utilized will include using social media, public outreach opportunities, posting articles in the County Connection, speaking at HOAs, city, town, and village council meetings, schools, etc.	All jurisdictions	Martin County Emergency Management	All hazards	Annually throughout the plan cycle.	$0	$0	$0	NA	New
NR	NA	Public education campaign on business mitigation actions	The project is a comprehensive approach to educating businesses on the hazards and mitigation actions they can achieve to reduce their vulnerability and increase their resilience. The strategies utilized will include using social media, public outreach opportunities, posting articles in the County Connection, speaking at chambers of commerce, economic boards, etc.	All jurisdictions	Martin County Emergency Management	All hazards	Annually throughout the plan cycle.	$0	$0	$0	NA	New

2. Project Submittal Process

The following are the steps for approving a mitigation project and adding it to the *Martin County Local Mitigation Strategy Prioritized Project List.*

1. The applicant fills out the *Mitigation Initiative Proposal Form* completely in Microsoft Word.
2. The applicant fills out the *Initiative Scoring Worksheet* in Microsoft Excel.
3. The applicant emails the completed forms and appropriate backup documentation to the LMS Coordinator at mcema@martin.fl.us.
    a. Backup documentation may include maps, charts, analysis, data, costs details, etc., as appropriate to the project proposal.
    b. The *Mitigation Initiative Proposal Form* and the *Initiative Scoring Worksheet* shall be provided in their original format (i.e., Microsoft Word and Excel). All backup documentation will be provided in one organized document in PDF format.
    c. The file names will be as follows:
        i. Proposal Form_ Jurisdiction Name_Project Title_Date Submitted.docx
        ii. Scoring Worksheet_ Jurisdiction Name_Project Title_Date Submitted.xlsx
        iii. Backup Documentation_ Jurisdiction Name_Project Title_Date Submitted.pdf
4. The LMS Coordinator will collect the full application and inform the LMS Scoring Committee of new projects.
    a. If more information is needed, the LMS Coordinator will reach out to the applicant for additional information.
5. The LMS Coordinator will schedule a meeting with the LMS Scoring Subcommittee where the applicant will present their project proposal and the LMS Scoring Subommittee will determine the final scoring of the project or if more information is needed.
6. Once approved, the project is added to the Prioritized Project List and applicants can request a letter of support when applying for the identified project grant.

3. Project Prioritization

§ 201.6(c)(3)(iii)	[The mitigation strategy shall include] an action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects and their associated costs.
S7 (C5-a)	The plan must describe the criteria used for prioritizing the implementation of the actions. The criteria must include an emphasis on the extent to which benefits are maximized, in relation to the associated costs of the action.

The LMS Steering Committee has established a method to score and prioritize proposed mitigation projects. Applicants are given an opportunity to score their own projects according to the *Project Initiative Scoring Sheet* (shown below) prior to submitting their project(s). Twice a year, a Special Meeting is scheduled if there are any new projects proposed throughout the year. During the Special Meeting, the LMS Scoring Subcommittee, consisting of the primary representatives of the LMS Taskforce, receives project presentations from the applicants and have the opportunity to ask detailed questions about the project. The LMS Scoring Subcommittee then discusses if the score provided by the applicant is appropriate and make changes to increase or decrease points accordingly. At the end, the points are tallied, and a score is given. The highest possible score is 100, as the measured criteria is weighted. The measured criteria include the following and are all outlined on the *Project Initiative Scoring Sheet*:

- *Suitability* with 30%: includes addressing goals, elements of infrastructure, and area of benefit.
- *Risk Reduction* with 40%: includes community benefits, organization project priority, and population benefit.
- *Project Constraints* with 30%: includes repetitive damage mitigation, project funding availability, and timeline of implementation.

When the final score is calculated, the LMS Coordinator places it on the Prioritized Project List where appropriate for the project points. For example, if a project receives a 79.5, it is placed between the score above and below the given points (e.g., between 80.0 and 78 points) and all project priority rankings are adjusted accordingly (instead of the existing projects being ranked at number 1 and 2, they are now ranked 1 and 3, leaving priority 2 to the new project.

It is possible to have different projects with the same scores; in this case, the project is added, but the priority of the existing project does not change. For example, if a project receives a 79.5, and there is already an existing project with a 79.5 score, they will both be the same priority ranking.

Jurisdictions can submit projects for the addition to the mitigation strategy that are not ranked. These projects may include education campaigns or low to no cost projects that have been considered in the jurisdiction's budget. However, these projects can be added to the list to show progress of the mitigation actions when completed.

MARTIN COUNTY LOCAL MITIGATION STRATEGY
PROJECT INITIATIVE SCORING SHEET

Project Name: _____

Agency/Sponsor: _____

Applicant: _____ **Date:** _____

MEASURED CRITERIA	WEIGHT	POINTS	SCORE
SUITABILITY	30%	0	0
RISK REDUCTION	40%	0	0
PROJECT CONSTRAINTS	30%	0	0
		TOTAL	0

SUITABILITY			
Parameter	**Available Points**	**Scoring Criteria**	**Awarded Points**
Addresses Goals	40	Minimizes the loss of life	
	25	Minimizes property damage & repetitive loss	
	10	Minimizes economic disruption and ensures orderly, effective recovery/development	
Elements of Infrastructure	40	Primary Critical Facilities	
	30	Secondary Critical Facilities / Flooding	
	20	Public Convenience Facilities	
	10	Residential Structures	
Area Benefit	20	Supported in multiple plans and/or policies	
	15	Supported in a single plan or policy	
	10	Supported by local stakeholders	
	5	Supported by Isolated Organization/Resident	

RISK REDUCTION			
Parameter	**Available Points**	**Scoring Criteria**	**Awarded Points**
Community Benefits	40	Endorsed by multiple agencies	
	30	Endorsed by some agencies	
	20	Endorsed by local stakeholders	
	10	Endorsed by Isolated Organization/Resident	
Organization Project Priority	30	Officially Adopted Plan	
	15	Proposed plan - Not offically adopted	
	0	Not adopted in any plan	
Population Benefit	30	> 100,000	
	20	1,000 - 100,000	
	10	100 - 999	
	0	< 100	

Figure 26: Project Initiative Scoring Sheet, Page 1

PROJECT CONSTRAINTS			
Parameter	**Available Points**	**Scoring Criteria**	**Awarded Points**
Repetative Damage Mitigation	40	Addresses repetative damage occurances	
	20	Addresses damages that may have occurred	
	10	Addresses damages that may occur	
Project Funding Availability	30	Match Funding Encumbered	
	15	Match Funding Identified	
	0	No Match Funding Identified	
Timeline of Implementation	30	< 2 Years	
	20	2-3 Years	
	10	4-5 Years	
	0	> 5 years	

Updated 4/5/2023

Official Use Only	
LMS COMMITTEE REVIEW DATE:	_____
APPLICANT SCORE:	_____
LMS COMMITTEE FINAL SCORE:	_____

Explanation of Parameter	
Addresses Goals -	Magnitude of savings once project is completed
Elements of Infrastructure -	Types of critical facilities project administers
Area Benefit -	The amount of jurisdictions and organizations that support the project
Community Benefits -	Magnitude of the community effected by project risk reductions
Organization Project Priority -	Documented priority level of project within an organization
Population Benefit -	Population effected by the project
Repetative Damage Mitigation -	Level of historical damages that are addressed by the project
Project Funding Availability -	Funding availability of organization for project
Timeline of Implementation -	How soon the project can be constructed

Figure 27: Project Initiative Scoring Sheet, Page 2

4. Project Implementation

Each jurisdiction is responsible for implementing the mitigation projects outlined on the Project Prioritization List as their budget, resources, and capabilities allow. The Martin County LMS Coordinator provides information to the LMS Taskforce, of which all jurisdictions are apart, whenever there are funding opportunities from State or Federal sources.

5. Range of Projects

§ 201.6(c)(3)(ii)	[The mitigation strategy shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

S5 (C4-a)	The mitigation strategy must include an analysis of a comprehensive range of actions or projects that participants considered to specifically address vulnerabilities identified in the risk assessment.

Martin County has developed a comprehensive range of different types of possible projects. Each of the LMS projects can be divided into six broad categories.

1. **Education, Awareness, and Communication**: Actions to educate and inform citizens, officials, business owners, and property owners about the potential risk from hazards and ways to mitigate against them (e.g., providing mitigation education reading materials, outreach programs, etc.).
2. **Structural Retrofits and Additions**: Actions to modify and/or add to existing structures to mitigate against potential risks from hazards (e.g., storm shutters, back-up generators, etc.).
3. **Governmental Prevention**: Governmental actions that influence the way existing/future property and structures are built and developed to help bring forth mitigation goals (e.g. adopting a fire prevention ordinance, building codes that promote hazard mitigation, etc.).
4. **Technology**: Actions that require technological advancements to move mitigation goals forward (e.g., special GIS hazard layers, improved communication devices, etc.).
5. **Study, Research, and Updated Information**: Actions that develop new information on risks, vulnerability, etc. to help with mitigation goals (e.g., stormwater drainage efficiency study, survey on how much citizens know about hurricane evacuations, etc.).
6. **Infrastructure Improvements**: Actions that improve infrastructure before and after hazardous events (e.g., new stormwater drainage systems, fixing road wash-out areas, etc.).

6. Completed, Deleted, and Deferred Mitigation Initiatives

The Martin County LMS Taskforce members meet quarterly to discuss and review mitigation projects. The projects are updated to reflect the status as no change, pending, new, or other.

C. Progress in Local Mitigation Efforts

U3 (E2-b)	The plan must describe the status of all hazard mitigation actions in the previous plan by identifying whether they have been completed or not, for each jurisdiction.

Since the last update of this plan, Martin County and its jurisdictions have completed or started four mitigation projects on the Prioritized Project List and therefore have been removed from the list.

Table 85: Projects Removed from the Prioritized Project List

Rank	*Project Title*	*Project Description*	*Responsible Agency/Department*
1	City of Stuart - Fire Rescue Station #3	The City is seeking to build an additional fire station in response to the increased population within the city limit. The additional station will provide critical services and help alleviate the hardship on the current stations.	City of Stuart Fire Rescue

Rank	*Project Title*	*Project Description*	*Responsible Agency/Department*
2	Martin County Communications Tower	New communications tower with proposed location at Station 36 located at 18405 SE County Line Road., Jupiter FL 33469. An area in south Martin County, below Jonathan Dickinson State Park, has inadequate in building radio communications to manage first responder communications in the county. This project will provide increased coverage and redundancy in communications. This would also include relocating a tower to the old landfill on Bridge Road further enhancing communications for public safety.	Martin County ITS
16	NW Dixie Hwy Ditch Restoration	Drainage improvements to restore ditch flow line to outfall, to alleviate upstream flooding	City of Stuart/Public Works
20	Palm City Outfall Modifications	Multiple Stormwater facilities backup and lose handling capacities due to sea level rise during storm surge and king tide events. The goal is to install series of backflow preventers to maintain storage capacity within storm water treatment facilities. Sites identified in FDEP 2030 Resilient Coasts Program: Saltwater Intrusion to wetland.	Martin County Public Works

Martin County

Upon further investigation of the backflow preventer project, it was determined that backflow preventers alone would not be adequate to resolve the tidal flooding occurring in Palm City. The high tides occur during the rainy season which reduces the capacity for flood protection. When installing backflow preventers, other mitigation measures such as raising road, pump stations, or increasing upstream storage is needed since the backflow preventers would prevent drainage from occurring. This area will be undergoing a study which will evaluate flood protection, water quality, and sea level rise. The study will inform projects for the LMS list.

Martin County Information Technology Services completed the construction of a new communications tower at a fire station near Jonathan Dickinson State Park. The area had poor radio communications capability to manager first responder communications in the county. The project provided increased coverage and redundancy.

The 2020 plan listed several expected changes in development for Martin County. Since the last update of the plan, Martin County has completed the following projects.

- The Ripple project: construct new stormwater treatment areas with improved water quality.
- The Jensen Beach infill sewer project accomplished the goal of providing sewer infrastructure throughout Jensen Beach CRA area.
- The Rio water extension project was completed with the construction of 1300 linear feet of water pipe, delivering potable water to 32 properties.
- Properties on bridge road between Dixie Hwy. and Hercules Ave. in Hobe Sound will receive new water mains and electric utility undergrounding.
- Underground utilities were completed in Hobe Sound on Bridge Road.

- Mapp Road now features ¾ of a mile of new drainage structures, medians, on street parking, generous sidewalks, enhanced lighting and pedestrian crosswalks that will increase safety, walkability and community connection.
- Dixie Hwy underwent improvements such as construction of bike lanes, traffic calming, median sanctuaries and enhanced lighting that will increase the safety and walkability for residents.

Martin County continues to work on the identified goal in the 2025 LMS Plan - complete and adopt a Hazard Mitigation Plan as well as the below projects and initiatives to mitigate potential damage resulting from various hazards:

- Continued enhancements and hardening of critical infrastructure.
- MacArthur Boulevard Beach Erosion Control – Upland infrastructure/resilience project complete. In water modelling is underway to address beach erosion.
- Hobe Heights Outfall Drainage Improvements (status – awaiting FEMA EHP review for 28 months and counting).
- Mockingbird Lane (status – awaiting FEMA HMGP for 26 months and counting).
- Outfall Modifications, including capacity, elevation adjustments, and backflow prevention.
- Home elevations through HMGP, Elevate Florida, and substantial improvement doctrines.
- Creek Improvements: Capacity, hardening, water quality improvements.
- Septic to Sewer Conversion with the goal of 10,000 conversions in 10 years.
- Countywide Vulnerability Assessments.
- Stormwater modelling and Real time flood forecasting.

City of Stuart

The City has completed several mitigation projects. Many have been undertaken to eliminate home, yard, and street flooding along with improving public safety notification. Other mitigation efforts involve the City participating in mock drills with the County emergency management staff. Internally, City staff have developed a *Disaster Recovery Plan* based on the ESF structure, which focuses primarily on flooding and hurricane evacuation matters.

The City has an *Emergency Management Plan*, which is all-hazard. This plan includes procedures for response to all hazardous conditions, and including flooding, hurricanes, tornadoes, radiological incidents, terrorism incidents, and wild land fire incidents, and will include a Recovery Annex. The City annually conducts hurricane training exercises. The City also has updated the EOC Standard Operating Procedures and the *Emergency Action Plan*.

The City continues to improve its disaster response with technological advances and training for new staff. The City is maintaining an electronic messaging board system for communicating during events, consisting of two mobile trailer-mounted message boards.

All essential staff for the City of Stuart have received Florida DEM-provided COOP (Continuity of Operations Plan) initial training, and the City is pursuing implementation of a COOP. All essential staff for the City of Stuart, along with EOC staff have received the required FEMA/ICS training. The City's EOC Standard Operating Procedures and updated Emergency Management Plan follow the Incident Command System structure.

The City of Stuart Public Works Department has begun the construction of drainage improvements to restore dich flow line to outfall to alleviate upstream flooding on NW Dixie Highway. Additionally, the City of Stuart Fire Rescue began construction on an additional fire

station in response to the increased population within the city limit. The station will provide critical services and help alleviate the hardship on the current stations. These two projects were removed from the Prioritized Project List because they are under construction.

The mitigation initiatives for the City are:

- Continue mitigation projects to improve the City's storm resilience.
- Continued participation in the Martin County LMS Taskforce and Steering Committee.
- Maintain city trees year-round with dedicated bucket truck and operator.
- Continue implementation of Stormwater Master Plan to reduce structure, street and yard flooding.
- Participation in the Countywide mass notification system.
- Continue participation with County Emergency Management and partners in planning, preparedness, exercises, and mitigation efforts.
- Sailfish Ballfield Forcemain Replacement Phase I
- Sailfish Ballfield Forcemain Replacement Phase II
- Surficial Well #6 Replacement
- NW Poinsettia St. Watermain Improvements
- SW Flagler Ave Watermain Improvements
- City of Stuart Fire Station #3
- Shepard Park Boat Trailer Parking
- NW Dixie Hwy Sidewalk Extension (Westside)
- NW Dixie Hwy Sidewalk Extension (Eastside)
- S. Dixie Hwy & SE Florida St. Sidewalk Extension
- SE Mango Place Drainage Improvements
- SE Tressler Dr. Water Quality Improvements
- NW Dixie Ditch Improvements
- SE Illinois St. Water Quality Restoration Project
- SW Dyer Dr Drainage Improvements
- SE Lonita St. Drainage Improvements
- Sanitary Sewer Expansion within East Stuart / Palm Beach / Poppleton Basins
- City of Stuart Reverse Osmosis Water Treatment Plant
- Water Reclamation Plant Deep Injection Well Modification & Monitor Well Replacement
- Reverse Osmosis Concentrate Pipeline Project

Town of Jupiter Island

The Town has no comprehensive storm water plan. For the most part, storm water either percolates into the soil or sheet flows over land to swales, natural low areas, or watercourses. In a few instances where man-made structures such as roads and parking lots impeded or altered the natural sheet flow, the Town has addressed those drainage problems using swales.

The Town has a scheduled maintenance program to ensure that the swales and drainage facilities are operating adequately. The Town has reinforced the roof, installed hurricane impact glass doors and windows at The Public Safety Building. The Town has removed all overhead electric wires and installed a complete underground system. The Town has also re-nourished the beaches and improved drainage along Gomez Road. The Town has completed several beach restoration/recovery projects in response to hurricane impacts.

The mitigation initiatives for the Town are:

- Continue with improving the hardening of structures and internal operational improvements for emergency management.
- Continue participation with County Emergency Management and partners in planning, preparedness, exercises, and mitigation efforts.
- Continued participation in public outreach in disaster preparedness.
- Develop a Town-wide Comprehensive Vulnerability Assessment following the State statutory standards to incorporate sea level rise and complete an exposure and sensitivity analysis for Town-owned infrastructure.

Town of Ocean Breeze

The Town is home to the Environmental Studies Center, owned and operated by the Martin County School District. The Center is housed in the original Jensen Beach Elementary School, built in 1935. It now serves countywide environmental education programming. It's location within the Town and its proximity to the Indian River Lagoon make it an ideal gateway for Town environmental initiatives.

The Town coordinates closely with Martin County on roadway and drainage improvements for Indian River Drive. Indian River Drive (aka County Road 707) is classified as a Minor Arterial. As a key north-south roadway, the Drive generates traffic volume of more than 11,000 trips per day on average. Situated within the Town along its eastern border, it presents challenges for residents safely exiting onto the Drive. Traffic calming and pedestrian safety are paramount. The Town entered an interlocal agreement with Martin County for enhancing traffic calming, maintaining the storm water drainage system, and managing a bioswale in the Indian River Lagoon.

The Town coordinates closely with Martin County in providing disaster preparedness and recovery education to its residents. Since the Town of Ocean Breeze does not own public buildings, or provide infrastructure services, even the roads within the Town are either private or County maintained, mitigation projects may be limited. The increased volume of rail traffic with the advent of Brightline has greatly increased residents' concerns for crossing safety and noise mitigation. The Town does not own or maintain any utilities or public facilities.

Mitigation initiatives under consideration within the Town are:

- Traffic calming, pedestrian safety, and vehicle egress for Indian River Drive.
- West End Boulevard ingress-egress improvements for Jensen Beach Boulevard.
- FEC Railroad crossing enhancements.
- FEC Railroad noise mitigation enhancements.
- Water quality improvement projects in the Indian River Lagoon.
- Continued participation with the Emergency Management Agency and partners in planning, preparedness, exercises, and mitigation efforts.
- Coordinate emergency event notifications with Town citizens.
- Continue participation in public outreach in disaster preparedness.
- Coordinate post-event emergency relief efforts.
- Coordinating emergency access and debris removal agreements for the privately owned roads in Ocean Breeze Resort and Seawalk.

Town of Sewall's Point

The town has been working on improvements to include stormwater storage and discharge and addressing sea level rise on South Sewall's Point Road. Originally, this project was one large project, but the Town broke it down into four phases. Some phases have already completed design, permitting, bidding and grant review. One of the phases is already under construction.

For the project on North Sewall's Point Road, the Town partnered with Martin County to work on improvements.

Village of Indiantown

The Village of Indiantown is currently updating its Comprehensive Plan in which it identifies capital improvement initiatives:

- Stormwater improvements.
- Conducting a vulnerability assessment.
- Sustainable and resilient infrastructure development.
- Continue public outreach on preparedness and planning.
- Continue participation with County Emergency Management and partners in planning, preparedness, exercises, and mitigation efforts.

Martin County School District

All schools and buildings constructed post-2000 have been designed to meet windstorm requirements at the time of construction. When replacing a specific school or building the District has constructed those schools outside of flood prone areas or has placed replacement schools or buildings above flood stage levels.

Other mitigation efforts involve the District participating in mock drills with the County emergency management staff. Internally, District staff has developed a Disaster Recovery Plan based on the ESF structure, which focuses primarily on hurricane evacuation matters. The District also has an all-hazard Crisis Plan, which includes procedures for response to all hazardous conditions, and includes flooding, hurricanes, tornadoes, radiological incidents, terrorism incidents. All staff assigned to the EOC have received NIMS training as required by County Emergency Management.

In the past and recently, the District has installed shutters on several schools and/or support facilities and, emergency shelters to mitigate storm damage to the schools and protect occupants being used as shelters during an emergency. Additionally, newer schools have been designed to meet EHPA requirements to ensure proper levels of shelter capability for County and regional residents. The District continues to include mitigation strategies to all buildings and property when building, renovating or relocating facilities on District property. The mitigation initiatives for the School District:

- Hardening of facilities
- Provide for backup power systems or install switchgear to accommodate future connection of a standby generator.
- Continue to educate school administrators in disaster preparedness and emergency response.
- Continue participation with County Emergency Management and partners in planning, preparedness, exercises, and mitigation efforts.

V. PLAN MAINTENANCE

§201.6(c)(4)(i)	[The plan maintenance process shall include a] section describing the method and schedule of the monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
M2 (D2-a)	The plan must identify how, when, and by whom the plan will be tracked for implementation over its five-year cycle (monitoring).

A. MAINTENANCE AND MONITORING

The Martin County Emergency Management Agency LMS Coordinator has the primary responsibility of monitoring and supporting the plan. This effort may include technical and clerical support for the benefit of the LMS Committee. The LMS Coordinator will monitor the status of the LMS supported projects throughout the year and will assess the Plan against the Florida Division of Emergency Management established evaluation criteria to determine if any changes to the Plan are necessary. Additionally, all County jurisdictions, community partners, and agencies provide input and support in the development and maintenance of the LMS which is comprehensively updated every five years but maintained and updated as needed.

The revision of the plan is based on information from the previous plan (including goals and objectives), disasters that affected the County, and jurisdictional changes that cause for re-evaluation of mitigation efforts. Projects identified on the current list are reviewed and updated to reflect any changes (i.e., funding opportunities, completed, etc.). Also, after an event/incident, projects maybe re-prioritized to reflect changes due to damage, increased flooding, or other occurrences. For this update, Martin County as a whole (including all jurisdictions and district) reviewed plans, policies, procedures, and other authorities after the COVID-19 Pandemic, Hurricanes Nicole and Milton, and flooding events to determine if changes were needed.

To continuously receive feedback regarding changes in priorities, plans, funding opportunities, resources, policies, leadership, mitigation actions, disasters affecting the jurisdictions, etc., the LMS Coordinator may consider that at least one quarterly LMS Committee Meeting, this topic is addressed and documented for future integration into the updated plan. Other methods to gather this information could include an annual survey sent directly to the jurisdictions.

1. Update Schedule

M4 (D2-c)	The plan must identify how, when and by whom the plan will be reviewed and revised at least once every five years (updating.)

The Martin County *Local Mitigation Strategy* Plan is on a 5-year update cycle. The following is an outline of the planned schedule for the next update in 2030 and is subject to change. Annual jurisdictional updates are based on items outlined below.

Table 86: Proposed LMS Plan Update Schedule

Date	*Task*	*Responsible Party*
February, 2026	Martin County adopts the plan	Martin County
February, 2026	Q1 LMS Taskforce meeting	LMS Taskforce
May, 2026	Q2 LMS Taskforce meeting Annual project updates	LMS Taskforce All project applicants

Date	*Task*	*Responsible Party*
August, 2026	All jurisdictions adopt the plan	All jurisdictions
August, 2026	Q3 LMS Taskforce Meeting	LMS Taskforce
November, 2026	Q4 LMS Taskforce Meeting	LMS Taskforce
December, 2026	Annual jurisdictional updates	LMS Coordinator, all jurisdictions
February, 2027	Q1 LMS Taskforce meeting	LMS Taskforce
May, 2027	Q2 LMS Taskforce meeting Annual project updates	LMS Taskforce All project applicants
August, 2027	Q3 LMS Taskforce Meeting	LMS Taskforce
November, 2027	Q4 LMS Taskforce Meeting	LMS Taskforce
December, 2027	Annual jurisdictional updates	LMS Coordinator, all jurisdictions
February, 2028	Q1 LMS Taskforce meeting	LMS Taskforce
May, 2028	Q2 LMS Taskforce meeting Annual project updates	LMS Taskforce All project applicants
August, 2028	Q3 LMS Taskforce Meeting	LMS Taskforce
November, 2028	Q4 LMS Taskforce Meeting	LMS Taskforce
December, 2028	Annual jurisdictional updates	All jurisdictions
January, 2029	Begin formal plan update	LMS Coordinator, all jurisdictions, LMS Plan Update Subcommittee
February, 2029	Q1 LMS Taskforce meeting	LMS Taskforce
May, 2029	Q2 LMS Taskforce meeting Annual project updates	LMS Taskforce All project applicants
August, 2029	Q3 LMS Taskforce Meeting	LMS Taskforce
November, 2029	Q4 LMS Taskforce Meeting	LMS Taskforce
December, 2029	Annual jurisdictional updates	LMS Coordinator, all jurisdictions
February, 2030	Q1 LMS Taskforce meeting	LMS Taskforce
May, 2030	Q2 LMS Taskforce meeting Annual project updates	LMS Taskforce All project applicants
June, 2030	Provide draft update to FDEM	LMS Coordinator
August, 2030	Q3 LMS Taskforce Meeting	LMS Taskforce
November, 2030	Q4 LMS Taskforce Meeting	LMS Taskforce
November, 2030	Receive final plan approval	FDEM
December, 2030	Adopt the approved plan	All jurisdictions

B. EVALUATION

M3 (D2-b)	The plan must identify how, when, and by whom the plan will be assessed for effectiveness at achieving its stated purpose and goals (evaluating).

The Martin County LMS Taskforce shall continue to hold quarterly meetings to review the effectiveness of the LMS and update the local government LMS initiatives as necessary. In the event no potential changes have been identified in the monitoring period, or there is a lack of business to be discussed, the LMS Committee will hold at, at minimum, one annual meeting to review and evaluate the Plan against FDEM and Plan established evaluation criteria. The Martin County Emergency Management Agency LMS Coordinator shall be responsible for scheduling and noticing all meeting, and such notices shall be issued a minimum of 15 days in advance of the meeting date.

The participating local governments/agencies shall present new initiative projects they have identified at the quarterly meetings. These initiatives shall be evaluated, prioritized, and incorporated into the LMS at these meetings. Those mitigation initiatives which have been completed will be identified and moved to the COMPLETED list of the Project Initiatives List. Initiatives which have not been completed shall be re-evaluated for further consideration. The *Project Initiative Scoring Sheet* shall be used to evaluate each new initiative. In addition, following a disaster event, the lessons learned or applicable comments from any post-event interagency hazard mitigation reports shall be incorporated into the LMS.

An annual review will take place as outlined in *Section V.A.1. Update Schedule*. The evaluation criteria may include, but is not limited to:

- Are there any new changing laws, regulations, or policies that require changes to the LMS?
- Have any emergency or disaster declarations or significant events taken place that caused damage (e.g., public assistance, federal reimbursement, damage assessments, injuries, illnesses, deaths)?
- Do the goals and objectives of the LMS address current and expected conditions for Martin County?
- Has the nature, magnitude, or type of risks changed for the County?
- Are current resources appropriate for implementing the Plan?
- Are there implementation challenges, such as technical, political, legal, financial, or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Are the jurisdictions and other partners participating as originally planned?
- Are there recommendations or lessons-learned from any incident or event during the review period?

C. PLAN INTEGRATION

§201.6(c)(4)(ii)	[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.
U4 (E2-c)	The updated plan must explain how the jurisdiction(s) integrated information from the mitigation plan into other planning mechanisms, as a demonstration of progress in local hazard mitigation efforts. If information from the previous plan was not integrated into other planning mechanisms, this must be stated.
M5 (D3-a)	The plan must describe the community's process to integrate the plan's data, information, and hazard mitigation goals and actions into other planning mechanisms.

One of the methods to most effectively implement the LMS is to propose and implement initiatives that will further the goals and objectives in the LMS. Initiatives, when implemented, will serve to mitigate existing issues. Other current plans, when reviewed and updated will be compared to the initiatives and objectives of the LMS to ensure that all planning activities work toward the common goal. Some identified planning mechanisms that have been utilized in the past include (but have not been limited to) floodplain ordinances, county and municipal comprehensive plans and land development codes, as well as comprehensive emergency management plan. The Martin County Emergency Management Agency has oversight of the process for incorporating the LMS into other local government planning mechanisms. Some plans, such as the Comprehensive Emergency Management Plan (CEMP) and Continuity of Operations Plan (COOP), have

prescribed processes that provide the opportunity for integration of LMS goals and objectives at scheduled intervals. During these planning cycles, Martin County Emergency Management reviews the LMS for consistency and identifies opportunities to link the LMS to the revised plans. As an example, information collected for the LMS risk assessment will be used to update the CEMP.

As part of the planning integration process, Martin County Emergency Management staff also continuously seek plan-development opportunities that are not part of existing planning cycles but are relevant to the goals and objectives of the LMS. The process for linking the LMS is not only relevant to County planning projects, but also to all participating jurisdictions, includes identifying mitigation- related elements in the plans under development, and assuring that policies and initiatives in the LMS are considered and addressed. Strategic planning is an example of this, as the process includes looking at both short- and long-term needs and addressing gaps and initiatives through policy and budget.

The LMS Committee looks to implement the *Local Mitigation Strategy Plan* through other plans and programs including updates to the Comprehensive Emergency Management Plan (using the hazards/risk assessment), and comprehensive future land use plans of Martin County and municipalities. During the updating process, both documents can be revised to limit development in hazard areas, etc. These examples demonstrate that each participating jurisdiction is committed to incorporating mitigation principles and concepts into their normal operations and activities via their existing planning and programming processes.

1. Multi-Jurisdictional Plan Integration

M6 (D3-c)	A multi-jurisdictional plan must describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms.

Jurisdictions and partnering agencies have incorporated the LMS planning mechanisms in reviewing and updating their plans through information sharing and collaboration. The following process are used:

- As permitted under Section 163.3177(7)(h) & (I), Florida Statutes, local governments could incorporate an optional comprehensive plan element for public safety, or a hazard mitigation/post-disaster redevelopment plan.
- Integrating the LMS into local CEMPs.
- Making all communities CRS eligible.
- Assessing existing CRS programs to determine ways to strengthen and improve the local jurisdiction's CRS rating.
- Designing and implementing hazard mitigation programs.
- Monitor the existing building code, identify deficiencies, and recommend desired changes to strengthen the existing building code.
- The designing and bidding of all public building construction, whether it be new construction or renovation of older public structures, should be taken into consideration, incorporating hazard mitigation building practices, whenever financially feasible.
- Providing public education and training on hazard mitigation and how it saves dollars.
- Incorporate the private sector in mock drills and exercises to test the procedures developed to coordinate support between the County and business community before, during, and after a disaster.

- Assisting the private sector, prepare a business contingency handbook, and provide support in holding a training workshop for local business owners.
- Enhance communication and coordination among the County agencies and municipalities to increase capacity to implement mitigation activities.
- Complete and present annual reports on the status of the LMS program to all local elected bodies.
- Evaluate the vulnerability of all critical facilities in the County and jurisdictions.

D. Local Planning Mechanisms

M7 (D3-b)	The plan must identify the local planning mechanisms where hazard mitigation information/actions may be integrated. The identified list of planning mechanisms must be applicable to the plan participant(s) and not contradict the identified capabilities.

The following table identifies plans and policies within the community into which the information or objectives of the LMS can be incorporated.

Table 87: Local Planning Mechanisms

Jurisdiction	*Comprehensive Plan*	*Emergency Mgmt. Plans*	*Floodplain Ordinances*	*Participates in NFIP*	*Land Use Codes*	*Building Codes*	*Transportation Plans*	*Vulnerability Assessment Plan*
Martin County	✓	✓	✓	✓	✓	✓	✓	✓
City of Stuart	✓	✓		✓	✓	✓	✓	✓
Town of Jupiter Island	✓		✓	✓	✓	✓		
Town of Ocean Breeze	✓			✓	✓	✓		
Town of Sewall's Point	✓		✓	✓	✓	✓		✓
Village of Indiantown	✓			✓	✓	✓		

Sources: Jurisdictions and FEMA NFIP Data

E. Changes in Development

§201.6(c)(2)(ii)(C)	[The plan should describe vulnerability in terms of] providing a general discussion of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
R10 (B2-a)	For plan updates, the risk assessment must meet Element E1-a (Changes in Development)
U1 (E1-a)	The plan must describe changes in development that have occurred in hazard-prone areas and how they have increased or decreased the vulnerability of each jurisdiction since the previous plan was approved.

The review and approval of potential development projects are the responsibilities of several agencies that represent Martin County. The below chart details the jurisdictions and/district as well as their proposed/approved projects that supports the goals and objectives of the LMS.

Table 88: Changes in Development

Jurisdiction	*Summary of Development 2025-2030*
Martin County	• East Fork Creek phases 1 and 2 create 2 stormwater treatment areas that both clean the water and provide flood attenuation for the drainage basin. • S1 Canal capacity and water quality improvements will reduce the frequency and duration of flooding in the adjacent areas of Palm City Farms. • Installation of potable water in the Gomez/Pettway community to address nutrients in private well water. • Urban Tree Canopy study to identify heat sinks and areas that require plantings to reduce localized temperatures. • Develop updated countywide stormwater master plan. • Palm City North resilience project to raise the elevation of roads that are currently impacted by sea level rise.
Stuart	• Sailfish Ballfield Force main Replacement Phase III- In Design Phase • Veterans Memorial Park Amphitheatre Project-Construction Phase • Water Reclamation Plant Headworks Rehabilitation Project-Construction Phase • City of Stuart C-45 Lift Station Rehabilitation Project- Construction Phase • Downtown Undergrounding of Overhead Utilities Project – In Construction
Jupiter Island	• No development changes
Ocean Breeze	• No development changes
Sewall's Point	• Streets and Bridges (paving, bridges & seawalls and sidewalks) • Storm Water Systems (CAP/CMP pipe replacement, stormwater lake maintenance and swales maintenance) • Building maintenance and repair
Indiantown	• Drainage reconstruction for SW Lincoln Street. • Uptown drainage and roadway improvements west o the CSX railroad tracks. • Hardening of the Village Hall. • The Village is expecting a substantial increase in residential and commercial development over the next few years.
Martin County School District	• No development changes
Cleveland Clinic	• No development changes

F. COMMUNITY INVOLVEMENT

§201.6(c)(4)(iii)	[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.
M1 (D1-a)	The plan must describe how the participant(s) will continue to seek public participation after the plan has been approved and during the plan's implementation, monitoring, and evaluation.

To ensure continuous community involvement throughout the life of the plan, to include implementation, monitoring, and evaluation, the LMS Coordinator can employ various tactics to include but not be limited to the following.

- Include mitigation education in public outreach campaigns at in-person events throughout the County or via social media.

- Partner with other County Departments to ensure coordination of flooding mitigation related messaging at in-person events, on social media, and in County plans.
- Continue to invite the public to participate in the LMS Committee meetings throughout the year via public notices and social media posts.
- Maintain the Martin County Emergency Management Agency website up to date with the latest mitigation information for the public.
- Partner with municipalities to provide updates of the LMS plan at their regularly scheduled jurisdictional meetings.

VI. FORMAL ADOPTION

§ 201.6(c)(5)	[The mitigation strategy shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.
A1 (F1-a)	The jurisdiction must provide documentation of plan adoption, usually a resolution, by the governing body or other authority, to receive approval.
A2 (F2-a)	To receive approval, the participants must adopt the plan and provide documentation that the adoption has occurred.

The final step in the planning process will be the adoption of the plan by legislative bodies of Martin County and its municipalities. This section includes draft proposal acceptance of the LMS plan by the LMS Committee, which includes representatives from each jurisdiction, and the Martin County Board of Commissioners for submittal of the draft plan to the State of Florida Division of Emergency Management (FDEM) on or before February 1, 2026. All jurisdictions within will have the LMS adopted by August 1, 2026.

A. ADOPTION RESOLUTION

Martin County

The Resolution, by which the Martin County Board of County Commissioners formally adopts the updated Martin County *Local Mitigation Strategy* will be incorporated into this section following approval of the revised document by the Florida Division of Emergency Management and Federal Emergency Management Agency. In fulfillment of the requirements of 44 CFR 201.6(b)(1), Pursuant to Florida Statutes, the Resolution will be duly advertised and adopted during an advertised public meeting.

Participating Jurisdictions

Resolutions from the six participating Martin County jurisdictions formally adopting the updated Martin County *Local Mitigation Strategy* will be incorporated into this section following approval of the revised document by the Florida Division of Emergency Management and Federal Emergency Management Agency. Pursuant to Florida Statutes the resolutions will be duly advertised and adopted during an advertised public meeting.

B. MEETING MINUTES

Meeting minutes from Martin County, as well as the participating jurisdictions, formally adopting the updated Martin County *Local Mitigation Strategy* will be herein following approval of the revised document by the Florida Division of Emergency Management and Federal Emergency Management Agency.

VII. ATTACHMENTS

A. Planning Process Documentation

B. Public Outreach

C. Adoption Resolutions

D. Sources