CITRUS COUNTY LOCAL MITIGATION STRATEGY

2020 Update

ABSTRACT

Citrus County is vulnerable to large scale hazards and the Local Mitigation Strategy is based in the need to lessen the human, economic, and environmental costs of disasters resulting from these hazards.

Developed by the Citrus County Local Mitigation Strategy Working Group in Partnership with the Tampa Bay Regional Planning Council

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1.0 Introduction

1.1 Purpose of Local Mitigation Strategy

The Local Mitigation Strategy (LMS) presented here represents a plan to promote mitigation initiatives to improve resilience to hazards posing a threat to communities within Citrus County. Citrus County is vulnerable to large scale hazards and the Local Mitigation Strategy is based in the need to lessen the human, economic, and environmental costs of disasters resulting from these hazards. It will also be used as a tool to establish funding priorities for hazard mitigation activities for disaster assistance available following a major disaster.

In compliance with the requirements of the Disaster Mitigation Act (DMA) of 2000 the LMS includes documentation of the process used to develop and update the plan, including how it was prepared, who was involved, and how the public was involved. In accordance with FEMA guidance, the LMS includes a risk assessment that identifies the hazards that can affect the County and the incorporated communities of the City of Inverness and the City of Crystal River. The LMS also identifies goals and activities for mitigating hazards and provides a cycle for reviewing and updating the plan. The LMS enables local, State, and Federal agencies to better coordinate overall hazard reduction programs, grants, and policies.

The Local Mitigation Strategy's purpose will be achieved through the process of hazard mitigation. Hazard mitigation is any action taken to permanently reduce or eliminate long-term risks to people and their property from the effects of hazards. Natural hazards come in many forms: tornadoes, floods, hurricanes, severe storms, winter freezes, droughts, landslides, or dam failures resulting from natural disaster crises. Communities can take steps to prepare and implement mitigation techniques for almost any type of hazard that may threaten its citizens, businesses and institutions.

This LMS establishes an ongoing hazard mitigation planning program by identifying and assessing potential natural hazards that may pose a threat to life and property, evaluating local mitigation measures that should be undertaken, and outlining procedures for monitoring the implementation of mitigation strategies. The plan provides guidance to local officials and staff for local mitigation activities over the next five-year planning cycle. It encourages activities that are most effective and appropriate for mitigating the effects of all identified natural hazards. Adoption of this plan by Citrus County, the City of Crystal River and the City of Inverness will not only allow each local government to be eligible for disaster mitigation grant funds but also provide each local government with a thorough understanding of its vulnerabilities to various hazards and a blueprint to mitigating the damaging effects of those hazards.

Updating the LMS for adoption in 2020 involved a process whereby the vulnerability and risk to all identified natural and manmade hazards were assessed for the county and its two municipalities; plans, programs and projects to lessen the effects of disasters were identified. This risk analysis included four main components: hazard identification, profiling hazard events, asset inventory, and estimation of potential loss. The methodology and focus areas used to conduct this analysis are described in the Hazard Identification and Risk Assessment section of this plan. The Bureau of Economic and Business Research at the University of Florida projects that the population of Citrus County will grow to 170,200 by 2040[1]. A summary as it pertains to future land use and development trends can be found in Section 1.2.7, Development Trends.

[1] https://www.bebr.ufl.edu/population.

An updated Local Mitigation Strategy reduces the local government's required cost sharing ratio necessary for obtaining certain types of post-disaster grant funding, streamlines the receipt process for post-disaster state and federal funding through the pre-identification of mitigation initiatives, supporting more effective pre- and post-disaster decision making efforts, lessening each community's vulnerability to disasters by focusing limited financial resources to ranked initiatives.

1.2 Community Profile

1.2.1 Natural Features

Citrus County is located on the Gulf Coast of Florida and is bordered by Levy County to the north, Marion County on the northeast, Sumter County on the east, and Hernando County on the south (Figure 1). The Withlacoochee River forms the northern and eastern borders of the County, while the Gulf of Mexico forms the western border of the County. Established in 1887, Citrus County presently encompasses 773 square miles in area. This includes about 100 square miles of inland surface-water area[2]. The County is governed by an elected Board of County Commissioners. Likewise, the incorporated cities are governed by an elected City Council.

Figure 1: Citrus County Location

The Citrus County Comprehensive plan divides the County into three geographical regions for environmental and analytical purposes: 1) Coastal Area; 2) Central Ridge; and 3) Lakes and River Area.

The Coastal Area parallels the Gulf of Mexico, and the boundary may be described as following the west side of US-19 north from the Hernando County line to the Withlacoochee River. The Coastal Area is characterized by low, nearly level plains and contains unequal distributions of Gulf Coastal Lowlands and

[2] Citrus County Comprehensive Plan, Conservation Element, 2013.

Coastal Swamps. The coastline is highly unique and has significant natural resources in the form of bays, estuaries, marshes, and marine grass beds. There are a number of spring-fed coastal rivers, some of which include the Homosassa, Chassahowitzka, and Crystal Rivers. The communities of Homosassa, Chassahowitska, and the City of Crystal River are in the Coastal Area.

The Central Ridge is the largest of the three regions and is in the central portion of the County between US-19 and US-41. The region contains a large portion of the Brooksville Ridge, which can generally be described as a sandhill upland area. The Central Ridge is the most populous part of the County, and is also expected to grow given its ability to support urban growth. The communities in the Central Ridge include Citrus Springs, Beverly Hills, Citronelle, Holder, Lecanto, Homosassa Springs, Sugarmill Woods, Citrus Hills, Pine Ridge, Black Diamond Ranch, and the City of Inverness.

The Lakes and River Area is located in the northern and eastern portions of the County, generally north of CR-488 and east of US-41. The region consists primarily of the Tsala Apopka Plain, which comprises numerous lakes, ponds, and wetlands. Development occurring in this area in recent years has placed a great deal of pressure on the natural ecosystems. Open water exists on the west side of the lake chain, while marshes and swamps are common in the area between the lakes and the Withlacoochee River. The remaining lands, about 60 percent, are upland areas. Communities located in the Lakes and River Area include Apache Shores, Gospel Island, Floral City, Pineola, and the eastern portions of Citrus Springs and Hernando[3].

1.2.2 Temperatures and Climate

Citrus County is located at the northern edge of the "Savannah" or humid subtropical climatic regime, the climate that characterizes much of peninsular Florida. Data from the Inverness weather station and records from the National Oceanic and Atmospheric Administration for the years 1915 through 1985 reveal the following data concerning Citrus County's climate.

Most of the rainfall occurs in summer, between June and September. The mean annual temperature is approximately 71 degrees Fahrenheit, with the highest average monthly temperature of occurring in August at 82 degrees Fahrenheit and the lowest average monthly temperature of 60 degrees Fahrenheit occurring in January. Summer daily temperatures normally peak in the low to mid 90's and are cooled by frequent afternoon convectional showers. Winter months are typically mild and dry. Mean annual rainfall is approximately 56 inches. The least amount of rainfall occurs in the spring and fall, while about 60 percent of the rainfall occurs from May to September[4].

1.2.3 Political Boundaries

The City of Crystal River, located in the northwestern portion of the County, is one of two cities within the County. The City of Crystal River is an incorporated municipality and governed by a City Council. The City of Crystal River has a 2018 estimated population of 3,333 residents.

[3] Citrus County Comprehensive Plan, Future Land Use Element, 2018.
[4] Citrus County Comprehensive Plan, Future Land Use Element, 2018.

The City of Inverness is the second city in Citrus County and is the County Seat. Inverness is an incorporated municipality governed by a City Council. Located in the eastern-central portion of Citrus County, the City of Inverness has a population of 7,380[5].

1.2.4 Population

According to the Bureau of Economic and Business Research (BEBR) at the University of Florida the estimated 2018 population for the entire county was 145,721, up approximately 3.18% from the 2010 level of 130,918. The City of Crystal River saw the highest growth rate of 7.2 percent between 2010 and 2018.

	April 1, 2018 Estimate	Total Change 2010 - 2018	April 1, 2010 Census	Percent Change
Citrus County	145,721	4,485	141,236	3.18
Crystal River	3,333	225	3,108	7.24
Inverness	7,380	170	7,210	2.36
Unincorporated	135,008	4,090	130,918	3.12

Population Estimates from University of Florida, BEBR, 2018

According to the 2013-2017 American Community Survey 5-year estimates, the median household income was $40,574. This lags behind the statewide level of $50,883. 14.4 percent of the population is considered to be in poverty as compared to 14 percent statewide. The population of Citrus County is 93 percent white. Of a total population in the county, 3.1 percent of residents are Black or African American and 5.9 percent are Hispanic or Latino[6].

1.2.5 Transportation

Citrus County has five main traffic arteries: US19/98, US41, SR200, SR44, and CR486 (CCP, 2006). US19/98 provides north-south access through the western portion of the County, while US41 and SR 200 provide north-south access through the eastern portion of the County. SR44 and CR486 both provide east-west access across the central portion of the County.

The major railroad facility (CSX Transportation) in the County is used primarily to provide coal to the Florida Power facility. Other railway corridors have reverted to public use through "rails-to-trails" programs. Other than the Duke Energy Florida spur and the Florida Northern Railroad, no regular railroad traffic passes through the County.

There are five airports in the County: Inverness Airport (public), Crystal River Airport (public), Twelve Oaks (private), J.R. Stolport (private) and Post Oak Ranch (private). The nearest major commercial airport, Tampa International, is located 65 miles from Inverness.

The nearest deep-water port with docking facilities is the Port of Tampa, located 65 miles south of Inverness. The Port has a depth of 34 feet. Warehousing and stevedoring are both available. The Port of Jacksonville, located 140 miles from Inverness, has a depth of 38 feet with both warehousing and stevedoring available.

[5] Bureau of Economic and Business Research, University of Florida, Florida Estimates of Population 2018.
[6] U.S. Census, QuickFacts . https://www.census.gov/quickfacts/fact/table/fl,citruscountyflorida,US/PST045218

There are numerous commercial and recreational marina/docking facilities along the coastal waters of Citrus County. Recreational facilities account for 486 wet slips and 705 dry slips of these marinas.

1.2.6 Economy

The workforce for Citrus County is 40.9 percent of the County population age 16 or older, according to 2013-2017 U.S. Census estimates. According the U.S Census, the largest business sector was Healthcare and Social Assistance with 407 establishments and10,283 employees. The second largest business sector was Retail Trade with 444 establishments and 5,686 employees[7]. According to the Citrus County Chamber of Commerce, the largest employer is the Citrus County School Board with 2,300 employees. The largest private employers were the Citrus Memorial Hospital, the Seven Rivers Regional Medical Center, and Duke Energy[8]. The annual average unemployment rate for 2018 in Florida was 3.6 percent. In Citrus County the annual average unemployment rate for 2018 was 5.2 percent down from 8.6 percent in 2014[9].

1.2.7 Development Trends

As described in 1.2.4, Citrus County has seen a 3% increase in population since 2010. Residential development in Citrus County is concentrated within the central ridge area, with most of this area zoned either low or medium density residential. The central ridge of Citrus County is the largest and most populous region, largely because it has the fewest environmental and regulatory constraints, and is the most suitable for development. It is also expected that this area will experience the most growth in the future.

The County growth pattern can be described as sprawl. Citrus County is a rural county and, to date, the development has been piece-meal and scattered. The development of commercial centers-mostly strip malls-and services have followed the major roads of the County, including United States Route 19/98 (US 19), US 41, State Road 44 (SR 44), County Road 491 (CR491), and CR39. Due to this development, these County roads have experienced increased congestion while other major roads in the County have experienced diminished usefulness as transportation corridors.

Residential development has also been scattered as developments were built without consideration of a comprehensive plan. Prior to 1983, the provision of services to residential developments was at the discretion of the developer. Like many similar jurisdictions in the United States, the County had no guiding principle to which developers had to adhere, developing unrelated subdivisions with no cohesive plan tying them together. This led to a major problem for the County: unrecorded subdivisions. These developments were not consistent with surrounding development, the plats were not recorded, and many had no services (paved roads, water/sewer connections, proper drainage), and had no provisions for future improvements.

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[7] U.S. Census Bureau, 2016 County Business Patterns. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

[8] Citrus Chronicle, "Chamber Lists Top Employers of Citrus County", https://www.chronicleonline.com/news/local/chamber-lists-top-employers-of-citrus-county/article_4a0e6624-709f-11e8-acfe-031c783d88ec.html

[9] Florida Department of Economic Opportunity, Local Area Unemployment Statistics (LAUS) for Citrus County, http://www.floridajobs.org/workforce-statistics/data-center/statistical-programs/local-area-unemployment-statistics

Because of changes in zoning ordinances over the years, the County has several hundred unrecorded subdivisions of varying sizes. These subdivisions have been "grandfathered" into comprehensive plans and other County planning elements (CCP, 2006). Characteristics of these unrecorded subdivisions include minimal (or lack of) paved road surfaces, stormwater management appurtenances, and other civil site attributes. Such attributes cause difficulty for emergency vehicles and other equipment.

Citrus County has zoned 10,000 acres for mobile homes and recreational vehicles. Of this area, 58 acres are zoned specifically for recreational vehicles (RVs). Because of its location in Florida and the mild winters, people come to Citrus County and use RVs as seasonal residences. This practice should be taken into account when assessing the effects of natural hazards in the County.

In 2018 the Citrus County comprehensive plan was amended to allow institutional uses in the Coastal High Hazard Area (CHHA) west of US-19 if the site had direct access to a Principal Arterial Roadway. The same amendment also removed the prohibition for multi-family uses in the CHHA west of US-19 provided conditions are met as specified in the Land Development Code. This could result in future multifamily development to be located in the flood hazard area. As always, all future development proposals will be considered against the goals of the Comprehensive Plan and the regulations of the Land Development Code, both of which prioritize protection of the watershed and natural resource areas.

2.0 Planning Process

This section documents the process used to develop the strategy, how it was prepared, who was involved in the process, and how the public was involved.

2.1 Strategy Preparation and Organization

The Citrus County Department of Public Works entered into a professional services agreement with the Tampa Bay Regional Planning Council, to facilitate the 2020 update to the LMS. The planning process was conducted under the supervision of the Local Mitigation Strategy's Working Group ("LMS Working Group") and designated County staff.

Each jurisdiction in Citrus County has a liaison on the LMS Working Group who participates in the same manner as the other Working Group members. The LMS Working Group composition and member responsibilities are listed below. Meeting minutes, sign-in sheets and associated materials, are contained in Appendix C.

The municipal jurisdictions covered under this plan include the City of Crystal River and City of Inverness.

Jurisdictional Representatives include:

- City of Crystal River – Planning & Community Development Services, Director
- City of Inverness – Staff Assistant Community Development Department
- Citrus County – Director of Public Works

This process also adhered to guidelines of the National Flood Insurance Program's Community Rating System by including staff responsible for the following:

- Preventative Measures – Building Division Director, Citrus County and Director Planning and Zoning City of Crystal River
- Property Protection – Assistant Building Official, Citrus County and the Director Planning and Zoning City of Crystal River, City of Inverness Community Development Manager
- Natural Resource Protection – Water Resources Department Director, Citrus County and Crystal River Assistant City Manager
- Emergency Services - Emergency Management Coordinator, Division of Emergency Operations, Citrus County Sherriff's Office (serves all jurisdictions)
- Structural - Director of Public Works, Citrus County and Crystal River Director of Public Works
- Public Information – Director of Community Services, Citrus County and Crystal River Assistant City Manager

The Citrus County LMS Working Group members are listed in Table 2-1. The working group includes local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, as well as other interested parties. All members were notified by email of upcoming meetings.

Table 2-1 – Citrus County LMS Working Group

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2.2 Public Involvement

In compliance with DMA 2000 requirements, public participation was encouraged throughout the mitigation planning process. The public involvement component of all LMS updates included accessibility to duly advertised public meetings, participation in the mitigation planning process, and feedback on recommended strategies and the draft plan. Public involvement on the Citrus County Local Mitigation Strategy was accomplished in the following manner:

- All LMS Working Group meetings have been open public meetings and advertised in the local newspaper, as well as notices placed on the TBRPC website. A link to the TBRPC website was placed on the County website.

- Surveys were available at the Citrus County Hurricane Expo, however only 10 responses were provided. A completed survey is included in Appendix C for reference.
- A public workshop was held within 60 day of the first 5-year update planning meeting to seek input on the hazard.
- A public workshop was held to review the draft document prior to approval by the governing body.
- All members of the public and other interested parties that have attended the meetings and/or expressed an interest in the program have received copies of all information either in hard copy or via the internet.
- The final plan will be made available for public review and comment before the plan is adopted by all jurisdictions.

Appendix C includes public meeting notices, and LMS planning meeting webpages.

2.3 Coordination with other Agencies

Emails encouraging comments on the plan were sent to applicable agencies who are participants in the Local Mitigation Strategy Working Group.

The planning process included a review of goals, objectives and policies contained in county and municipal comprehensive plans. Also reviewed were the Citrus County Comprehensive Emergency Management Plan and the State of Florida Enhanced Hazard Mitigation Plan.

A wide range of agencies actively participated in the LMS update. The Florida Fire Services was heavily involved in the 2020 update of the Local Mitigation Strategy in an effort to integrate the Community Wildfire Protection Plan into the LMS. Additionally, the Tampa Bay Regional Planning Council provided subject matter expertise on incorporating considerations for disaster resiliency as part of the newly established Tampa Bay Regional Resiliency Coalition of which Citrus County is a member. Additionally, neighboring jurisdictions provided support and knowledge sharing facilitated by the Tampa Bay Regional Planning Council. All staff members from the six-county region who were responsible for coordinating the update of their jurisdiction's LMS were invited to quarterly meetings with the goal of improving consistency in mitigation plans.

2.4 Planning Process

The Citrus County LMS Working Group, represents all the local jurisdictions and key organizations participating in the planning process. The LMS Working Group is also responsible for reviewing the strategy's goals and objectives, revising them as necessary, reviewing the technical analysis and planning activities of the plan, approving proposed mitigation initiatives for incorporation into the plan, determining the priorities for implementation of those initiatives, and for removing or terminating initiatives that are no longer desirable for implementation.

Citrus County distributes information about each LMS meeting, which is open to the public, via the TBRPC website and e-mail lists of interested parties. The LMS Working Group has continued to meet, as directed in the by-laws (see Appendix C), to prepare updates to our documents, as well as provide updated information on our priority project list, funding and training opportunities.

Below is a summary of each meeting leading to the 2020 update. For each meeting, stakeholders were invited to participate in the LMS update via e-mail and meeting notices posted on the TBPRC website.

Meeting Date	Meeting Summary

May 16, 2019	Project Kickoff meeting to discuss Hazard Identification, Outreach Plan, and LMS project list.
June 17, 2019	Hazard descriptions, previous occurrences and extent. **This meeting was followed by a public workshop to seek input on the hazard identification and risk assessment.**
August 21, 2019	Hazard ranking and vulnerability assessment
October 9, 2019	Review of the Mitigation Strategy Goals and Objectives
November 13, 2019	Review of draft document **This meeting was followed by a public workshop to seek input on the draft document.**
January 2020	Review of final document, transmit to FDEM

2.5 Hazard Identification and Risk Estimation

Building upon the 2015 LMS Hazard Identification, an all-hazards approach to identify, classify, and quantify the risk and vulnerability of natural and manmade hazards that threaten all or portions of the community was used for the 2020 HIRA. Depending on the participating jurisdiction, a variety of information resources regarding hazard identification and risk estimation were available. Hazard specific data and maps were used, whenever applicable, and GIS-based analysis was conducted of hazard areas and the locations of critical facilities, infrastructure components, and other properties located within the defined hazard areas. The likelihood or probability that a hazard will impact an area, as well as the consequences of that impact to public health and safety, property, the economy, and the environment, were evaluated. This comparison of the consequences of an event with its probability of occurrence is a measure of the risk posed by that hazard to the community. The estimated relative risks of the different hazards it has identified were compared to highlight which hazards should be of greatest concern during the upcoming mitigation planning process.

Valuations and potential losses by hazard for every structure located within the county were determined and incorporated into each hazard. By analyzing valuation and potential losses for the county on a parcel by parcel level, the Working Group received a more complete picture of potential damage.

Estimating the relative risk of different hazards was followed by the assessment of the vulnerabilities in the likely areas of impact to the types of physical or operational agents potentially resulting from a hazard event.

2.6 Vulnerability Assessment

The method used required a methodical, qualitative examination of the vulnerabilities of all structures within the county to the impacts of future disasters. Hazards were ranked on an index based on the probability, impact, spatial extent, warning time, and duration. This process resulted in identification of specific vulnerabilities that can be addressed by targeted mitigation initiatives proposed and incorporated into this strategy. The LMS Working Group also reviewed past experiences with disasters to see if those events

highlighted the need for specific mitigation initiatives based on the type or location of damage they caused. The LMS Working Group was then asked to review and comment on the HIRA during the planning process.

2.7 Developing Hazard Mitigation Initiatives

A procedure for characterizing and justifying the mitigation initiative proposed by each participating jurisdiction for incorporation into this plan was established in the development of the initial strategy document. The vulnerability assessment enabled the LMS Working Group to highlight the most significant vulnerabilities and to assist in prioritizing subsequent efforts to formulate and characterize specific hazard mitigation initiatives to eliminate or minimize those vulnerabilities. Once the highest priorities were defined, the LMS Working Group participants identified specific mitigation initiatives for the plan to eliminate or minimize those vulnerabilities. This procedure involved describing the initiative, relating it to the goals and objectives established by the LMS Working Group, and ranking it based on its economic benefits and/or protection of public health and safety. A "benefit to cost" criterion was evaluated for each initiative to demonstrate whether it would indeed be worthwhile to implement when resources become available. Further, each proposed mitigation initiative was ranked for implementation in a consistent manner by each participating organization using a set of objective criteria.

2.8 Developing the Local Mitigation Action Plan

The LMS Working Group's review of this process included evaluating the initiative's cost-benefit, financing availability, repetitive damages corrected, geographic extent, essential services, economic effect or loss, and critical facilities. Mitigation initiatives currently in the plan were evaluated to determine if each is still valid or if its implementation should be a priority or deferred until a later time.

2.8.1 Integration with Existing Plans

The County Planning staff reviewed all of the elements of the 2015 LMS that were drafted by the WRPC which conducted research to determine the most current information and identify any new and updated materials to present to the LMS Working Group for consideration during the update process. They collected and analyzed a variety of existing plans, studies, reports, and technical documents. These were reviewed to compare the existing documents available in each jurisdiction and to formulate possible mitigation strategies to overcome any perceived gaps in capabilities. Based on their findings, much of the information used to update the four major steps has either not changed or presented only minor changes.

All information that has changed was presented to the LMS Working Group for their review, discussion and consideration in the form of a draft document showing those items recommended to be changed as being crossed out and the new information underlined. This enabled the Working Group and other interested persons to easily interpret the revised information. All comments and recommended changes were submitted to the Planning Staff for amendments to the Final Draft document for submittal.

The documents reviewed are listed below along with discussion of how they were incorporated into various parts of the Citrus County LMS. Each jurisdiction is responsible to review the LMS with their local plans and to provide updated information for use with the LMS re-writes as needed.

- Existing Citrus County Local Mitigation Strategy (2015). This was used as the basis for the updated 2020 LMS. As part of the planning process, the two incorporated communities of the City of Crystal River and the City of Inverness had been asked to review their section of the original plan, identify incorrect or outdated information, identify any hazard events

that had occurred since the adoption of the previous LMS, and identify any new mitigation measures that should be included in the updated LMS.

- Citrus County Comprehensive Plan (2005-2030). The Comprehensive Plan was used to garner the future direction of the County such as land development, proposed infrastructure, future land use, economic development, and conservation. The Comprehensive Plan was used to ensure that the goals and objectives in the LMS were consistent with other goals and objectives in the County.
- Citrus County Municipal Code of Ordinances. The ordinances were used to assess the capabilities of the County, City of Inverness and City of Crystal River. In addition, the codes were used to help determine some potential mitigation measures.
- Citrus County Land Development Code (LDC). The LDC includes information on stormwater management, wetland protection, and floodplain protection. The LDC was used to identify natural hazards and vulnerable areas. It was also used to assess the current capabilities of the County in regard to hazard mitigation and code enforcement and helped to identify potential mitigation measures to strengthen the County's capabilities to mitigate future hazard events.
- Comprehensive Emergency Management Plan (CEMP) (2019). The CEMP was used to help identify the pertinent hazards for the LMS risk assessment. In addition, the CEMP was used to assess the County's capabilities and available resources. Annex II of the CEMP on Hazard Mitigation describes how Citrus County and its municipalities work within the community on a normal day-to-day operation and what mitigation activities would be required during and after a disaster. The provisions of the revised LMS should be incorporated into this annex of the CEMP.
- City of Crystal River Comprehensive Plan (2011) The Comprehensive Plan was used to garner the future direction of the city and ensure that the goals of the Local Mitigation Strategy were consistent with the community's goals.
- Statewide Hazard Mitigation Strategy (2018). The Statewide Hazard Mitigation Strategy serves as a model for all Local Mitigation Strategies. The hazard identification was reformatted to align with the hazards identified in the SHMP to facilitate more consistency across the state. Additionally, language relating to climate variability was modeled after the state plan.
- Citrus County Community Wildfire Protection Plan (2015) The 2015 CWPP was a stand-alone document produced by the Florida Fire Service in partnership with Citrus County Fire Rescue. The 2020 LMS incorporates the requirements of the CWPP, so that a separate document is no longer needed, and ensure that the CWPP is updated regularly.

2.9 Approval of the Current Edition of the Strategy

At the end of the planning period, the prepared document was released to the community and for action by the elected governing bodies of the jurisdictions and organizations that participated in the planning process. By resolution, the governing body approves, endorses, or acts on its own component of the plan and addresses the implementation of mitigation initiatives its own representatives proposed. Resolutions for adopting the strategy document by each governing body can be found in Appendix D.

2.10 Implementation of Approved Mitigation Initiatives

Once incorporated into the Joint Unified Local Mitigation Strategy, the agency or organization proposing the initiative becomes responsible for its implementation. This includes developing a budget for the effort or making an application to state and federal agencies for financial support for implementation.

3.0 Hazard Identification and Risk Assessment

3.1 Overview

The hazard identification and risk assessment for Citrus County provides the factual basis for developing a mitigation strategy for the Unincorporated Citrus County, the City of Crystal River, and the City of Inverness. This section profiles the natural, human-caused, and technological hazards that could possibly affect the county. Each natural hazard profile includes a discussion of the geographic areas affected, the historical occurrences in the county, an impact analysis, the probability, and the vulnerability and loss estimation by jurisdiction and of critical facilities. Alternatively, the human-caused and technological hazards include similar topics of discussion, but not all aspects are able to be quantified. This is because of the limited data available and the imprecise nature of the human-caused and technological hazards.

Because of the extensive data available to determine vulnerability to natural hazards, the natural hazard profiles contain complete analyses. However, there is less data available to determine vulnerability to human-caused and technological hazards. Because of this, the human-caused and technological hazard profiles differ from the natural hazard profiles and may not contain complete vulnerability analyses.

3.1.2 2020 Update

The 2020 hazard identification was modeled after the risk assessment for the 2018 State of Florida Enhanced Hazard Mitigation Plan (SHMP). Each natural hazard that was identified in the SHMP was considered in the Citrus County risk assessment. The LMS working group also reviewed the technological and human-caused hazards identified in the SHMP.

In addition to the general body of literature on hazard vulnerability and hazard mitigation, the following reports and data specific to Citrus County:

- Declared Events
- NCDC
- Flood Insurance Rate Maps (FIRMs)
- Property appraisal data
- Comprehensive Emergency Management Plan (CEMP)

3.1.3 Identified Hazards

The list below shows the natural hazards that are profiled in this risk assessment.

- Flood
- Tropical Cyclones
- Severe Storms
- Wildfire
- Erosion
- Drought
- Extreme Heat
- Geological
- Winter Storm

- Seismic
- Tsunami

Seismic events and tsunamis were determined to be very low risk hazards for Citrus County. As such, a brief overview of these hazards was included, however, a vulnerability assessment was not performed. The LMS working group also reviewed the technological and human-caused hazards identified in the SHMP. Based on the previous LMS update, risk maps included in the SHMP, and previous occurrences throughout the state, the following technological and human-caused hazards will be included in the risk assessment:

- Hazardous Materials Incident
- Radiological Incident
- Cyber Incident

3.1.4 Hazard Profiles

The hazard profiles all follow the same outline, the sections and a short description of the intent of the section is listed in the table below.

Table 3-1 - Hazard Profile Description

Hazard Profile Section	Description
Description	This section includes a basic overview of the hazard, such as causes, various types of the hazard, the measurements of the hazard, advisories for the hazard and any other pertinent information. There are also statements about the overall frequency and magnitude determinations that were made regarding the hazard. Each hazard description includes a section titled "Potential Impacts of Climate Variability," where the potential impacts of climate change on that hazard are discussed. If there are no known potential impacts of climate change for a given hazard, there is a statement in place of the discussion.
Location	This section discusses the areas of the county that are likely to be impacted by the hazard. There may also be references to where the hazard has occurred in the past.
Extent	This section includes a description of the strength or magnitude of the hazard.
Previous Occurrences	This section updates the lists of significant occurrences to include data between 2014 and 2019. If there are significant occurrences before 2014, these will also be included. Where there number of hazard events is too numerous, a summary will be provided.
Probability	This section includes a description of the likelihood of the hazard occurring in the future. Where possible, annual probability is also determined by averaging the number of occurrences within a specified timeframe. There is also a statement about the determined overall probability of the hazard.
Summary of Impacts	This section lists impacts that are possible due to the hazard occurring in the county. They are categorized into impacts affecting: ▪ Public ▪ First Responders ▪ Continuity of Operations (including continued delivery of services) ▪ Property, Facilities, Infrastructure ▪ Environment ▪ Economic condition of the jurisdiction; and

	▪ Public Confidence in the Jurisdictions Governance These categories align with EMAP Standard requirements.
Hazard Priority Index	Based on the findings from the preceding sections each hazard is assigned a priority index score based on the methodology described below.
Vulnerability Analysis	This section includes a discussion of the overall vulnerability and an estimation of losses possible. It also includes the type and number of critical facilities located in risk areas when applicable. The vulnerability analysis includes the population in risk areas were applicable.

3.1.5 Methodology

In order to remain consist with neighboring jurisdictions and the state, the hazard description, extent, and summary of impacts were modeled after language used in the Statewide Hazard Mitigation Plan. The description of the summary of impacts was made more specific by identifying existing emergency management challenges. The extent for each hazard will include the most severe hazard event recorded in Citrus County.

Previous occurrences were updated using the National Centers for Environmental Information (NCEI) storm event database to include hazard event data from 2014 to 2019. Where there were too many events to list, a summary will be included, and major events will be described in more detail. Probability will be updated to include hazard events that occurred since the last five-year update.

Location of a hazard was determined by risk maps where available, however some hazards were found to affect all portions of the county equally.

Each hazard was assigned a score based on the categories of probability, impact, spatial extent, warning time, and duration. The point criteria are as listed below:

Table 3-2 – Priority Risk Index

PRI Category	Degree of Risk Level	Criteria	Score
Probability	Unlikely	<1% annual probability	1.0
	Possible	1 -10% annual probability	2.0
	Likely	10 -100% annual probability	3.0
	Highly Likely	100% annual probability	4.0
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1.0
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	2.0
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	3.0
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4.0

Spatial Extent	Negligible	<1% of area affected	1.0
	Small	1-10% of area affected	2.0
	Moderate	10 – 50% if area affected	3.0
	Large	Between 50 - 100% of area affected	4.0
Warning Time	More than 24 hours	Self-explanatory	1.0
	12 to 24 hours	Self-explanatory	2.0
	6 to 12 hours	Self-explanatory	3.0
	Less than 6 hours	Self-explanatory	4.0
Duration	Less than 6 hours	Self-explanatory	1.0
	Less than 24 hours	Self-explanatory	2.0
	Less than one week	Self-explanatory	3.0
	More than one week	Self-explanatory	4.0

Based on this hazard priority index, all of the evaluated hazards were ranked and categorized into high medium and low priority.

Table 3-3 – Hazard Priority Ranking

High Risk	Flood (3.0) Tropical Cyclone (3.0) Wildfire (3.0)
Moderate Risk	Severe Storms (2.8) Geological (2.8) Extreme Heat (2.6) Drought (2.6)
Low Risk	Winter Storms (2.4) Erosion (2.0) Seismic Events (2.0) Tsunami (1.8)

Each vulnerability assessment for natural hazards considered hazards to people, buildings and critical facilities. Where a hazard risk map is available the population, number of buildings and critical facilities. Current property appraiser data was used to determine the number of buildings, building value (improved value), and land value within each hazard area. Where crops and agriculture are considered vulnerable to a specific hazard, property appraiser data will be used to determine where agricultural uses are within a hazard area. Agricultural uses will be based on the Land Use Codes (LUC) designated by the Citrus County Property Appraiser. Where building characteristics are vulnerable to a certain hazard, property appraiser data will be used to identify vulnerable buildings. Describing vulnerability in terms of dollar losses provides the community and the State with a common framework with which to measure the effects of hazards on assets. However, the estimated dollar losses obtained through this process are extremely rough and should not be used for purposes other than mitigation planning.

The vulnerability assessment was completed for each jurisdiction. To determine which jurisdiction a parcel falls within, the millage district codes, as recorded in the property appraiser's database, were used. The millage districts of Citrus Springs (OOCS), Sugarmill Woods (OOSW), Homosassa Water District (OOWD), Beverly Hills (OOOB), Coastal Rivers (OOOO), Withlacoochee Basin (OOOX) were included in Unincorporated Citrus County. The City of Inverness and the City of Crystal River have their own unique millage codes.

To determine the population that is vulnerable to a hazard, the 2017 American Community Survey data was mapped at the Census Block Group level. The census data layer was then overlaid by the corresponding hazard risk map using the union function in ArcGIS map. Next the ratio of the at-risk Block Group acreage to the overall acreage was calculated. This ratio was then multiplied by the total Block Group population to determine the population vulnerable to the subject hazard. The population was then categorized into jurisdictions, using the city boundary layer maintained by Citrus County Geographic Information Systems (GIS) Division.

Critical Facilities were identified by the LMS Working Group. Critical facility addresses were reviewed and confirmed by jurisdiction staff, and then these addresses were geocoded. Like the vulnerability analysis for population, vulnerable critical facilities could only be identified for hazards where a widely accepted risk map is available. This will include flood hazards as determined by the FEMA FIRM map, tropical cyclone storm surge hazards as determined by the SLOSH storm surge map, Wildfire Urban Interface (WUI). Although no widely accepted sinkhole risk map exists, a risk map was developed for the purposes of this vulnerability assessment. The LMS Working Group identified the following facility types to be included in the critical facilities vulnerability analysis:

- Fire Stations
- Government Buildings
- Schools/Shelters
- Hospital and Health Care Facilities
- Electric Utilities
- Water/Wastewater
- Airports
- Power Substations
- Power Plants
- Gas Transmission

Locations for fire stations, government buildings, schools/shelters, hospitals and health care facilities and airports were provided by and reviewed by the LMS working group. Electric utilities, which included power plants and substations were derived from a combination of sources. Power plant locations were identified by the LMS working group. Substation locations were identified using the Homeland Infrastructure Foundation Electric Substation data set.[10] Wastewater utility locations were derived from the FDEP Wastewater Facility Regulation (WAFR) data set.[11] For the purposes of the critical facilities analysis active domestic wastewater facilities with a design capacity greater than 0.05 million gallons per day (MGD). were considered. Potable

[10] https://hifld-geoplatform.opendata.arcgis.com/datasets/electric-substations
[11] https://geodata.dep.state.fl.us/datasets/wastewater-facility-regulation-wafr-wastewater-facilities

water was derived using the FDEP Public Water Supply data set.[12] For the purpose of the critical facility analysis, potable water supply tanks with community public water supply tanks with a tank capacity of over 250,000 gallons.

3.2 Flood Hazard Profile

3.2.1 Description

Flooding generally refers to conditions of partial or complete inundation of normally dry land areas from the overflow of inland or tidal water and of surface water runoff from any source. Flood damage is proportional to the volume and the velocity of the water. High volumes of water can move heavy object and undermine roads and bridges. Flooding can occur as a result of precipitation upstream without any precipitation occurring near the flooded areas. Flooding can also facilitate other hazards such as health concerns and hazardous material events.

Based on frequency, floods are the most destructive category of natural hazards in the United States. The loss of life, property, crops, business facilities, utilities and transportation are major impacts of flooding. Economic losses from impacts to major transportation routes and modes, public health and other environmental hazards are key factors in long-term recovery. While many people underestimate the severity of floods, loss of life and property from flooding are real threats in Florida. According to NOAA, in Florida, 1 died from a flood in 2012, and 3 died in 2014, and 3 died in 2017.[13]

Floodplains are defined as any land areas susceptible to being inundated by water from any flooding source. Approximately 38% of Citrus County lies within the 100-year floodplain. The floodplain zones for Citrus County are shown in Figure 3-1 and described in Table 3-5. Citrus County, as well as the City of Crystal River and the City of Inverness, is affected by many weather systems which result in flooding. Areas along waterways, including lakes, rivers, streams and wetlands, are particularly susceptible to flooding due to heavy storms and rain or storm surge.

According to the Citrus County Flood Insurance Study, the Withlacoochee River flows in a northwesterly direction and forms the northern and eastern boundary of the County. The drainage area encompasses approximately 1,980 square miles. The Tsala Apopka Chain of Lakes spread out over approximately 24,000 acres. Three separate pools, Floral City, Inverness, and Hernando, are interconnected and also connect to the Withlacoochee River by canals or sloughs. The Crystal River flows in a northwesterly direction and is a spring-fed river with a relatively small drainage area.[14]

General flooding is caused by periods of intense rainfall causing ponding and sheet runoff in the low, poorly drained areas. The Withlacoochee River also exceeds its floodplain during high river stages. The Tsala Apopka Chain of Lakes is also known to flood during intense rainfall and high Withlacoochee River stages. Low-lying coastal areas are susceptible to flooding and storm surge caused by hurricanes, tropical storms and coastal storms. The northern and eastern portions of the County lie within the Withlacoochee River floodplain.

[12] https://www.arcgis.com/home/item.html?id=2e1d4985c1fb4ae187b9a4f1518c7379
[13] https://www.nws.noaa.gov/om/hazstats.shtml
[14] Flood Insurance Study, Citrus County, Florida and Unincorporated. FEMA. 2014.

Flash floods, as the name suggests, occur suddenly after a brief but intense downpour. They move fast and terminate quickly. Although the duration of these events is usually brief, the damages can be quite severe. Flash floods also result as a secondary effect from other types of disasters, including large wildfires and dam breaks. Wildfires remove vegetative cover and alter soil characteristics, increasing the quantity and velocity of stormwater runoff and dam breaks release large quantities of water into receiving drainage ways in a very short timeframe. Flash flooding occurred in Citrus County in June of 2003. No deaths or injuries were recorded. Table 3-4 lists some of the causes of flash floods and riverine floods.

Table 3-4 - Riverine Floods Versus Flash Floods - Causes

Causes of Flooding	**Causes of Flash Floods**
Low lying, relatively undisturbed topography	Hilly/mountainous areas
High season water tables	High velocity flows
Poor drainage	Short warning times
Excess paved surfaces	Steep slopes
Constrictions – filling	Narrow stream valleys
Obstructions – bridges	Parking lots & other impervious surfaces
Soil Characteristics	Improper drainage

Natural and Beneficial Functions of Floodplain

Flood plains are areas adjacent to rivers, ponds, lakes, and oceans that are periodically flooded at different points in time. Floodplains are hydrologically important, environmentally sensitive, and ecologically productive areas that perform many natural functions. They contain both cultural and natural resources that are of great value to society. Flooding occurs naturally along every river and coastal areas. Flood waters can carry nutrient-rich sediments which contribute to a fertile environment for vegetation. Floodplains are beneficial for wildlife by creating a variety of habitats for fish and other animals. In addition, floodplains are important because of storage and conveyance, protection of water quality, and recharge of groundwater.

Riverine Floodplains

Riverine systems such as the Withlacoochee vary in steepness, width, flow, sediment deposition, and erosion. These riverine floodplains typically flood during the spring, but are subject to periodic flooding due to excessive rainfall. The flooding brings erosion and deposition of soils and can determine considerably the shape of the floodplain, the depth and composition of soils, the type and density of vegetation, the presence and extent of wetlands, richness and diversity of wildlife, and the depth of groundwater. The major flood component of a riverine system is the flood way. Flood ways are defined as that area of the watercourse that is necessary to carry the base flood without increasing the water surface elevation more than one foot. Development is heavily regulated in flood way areas. Riverine systems are important habitats for a variety of fish, reptiles, vegetation, and fur-bearing wildlife. These systems provide feeding and breeding grounds for these species.

Coastal Floodplains

Marshes, near-shore ocean bottoms, beaches, bays, coastal dune lakes, tidal flats, and estuaries are all components that make up the coastal floodplain of Citrus County. Coastal beaches, dunes, banks, and tidal flats all play roles in protecting the land from destructive coastal storms, such as hurricanes. In coastal systems, aside from major storm events where waves may overrun large areas, inundation follows a largely

predictable tidal cycle. Coastal floodplains are recognized for their importance to estuarine and marine fisheries. Estuarine wetlands are important for breeding, nursery, and feeding grounds for marine fisheries and coastal floodplains are important to waterfowl and other wildlife. Shallow coastal areas such as estuaries, tidal flats and rivers, and beaches are significant for shellfish, reptiles, and other fin-fish. The water quality in these areas is affected by changes in sediments, salinity, nutrients, oxygen, temperature, and the addition of various pollutants. Rivers, creeks, and lakes that have an unimpeded connection to the sea provide breeding and feeding grounds for a variety of coastal marine life.

Potential Effects of Climate Variability on Flooding

Inland and Riverine Flooding

A warming climate could contribute to increase rainfall events leading to more frequent inland flooding. Evaporation increases as the atmosphere warms, which increases humidity, average rainfall, and the frequency of heavy rainstorms in many places—but contributes to drought in others.[15]

Coastal Flooding

A warmer atmosphere may influence three drivers of coastal flooding: rainfall intensity and frequency storm surge intensity, and sea level. Rising sea levels would raise the base for coastal floods and storm surge resulting in greater flood depths within existing flood hazard zones; as well as landward expansion of coastal and tidal rivers and stream floodplains and storm surge zones in areas with relatively flat topography. Rising sea levels could have a disproportionate effect along the Gulf coast shoreline because of its flat topography, regional land subsidence, extensive shoreline development, and vulnerability to major storms.[16] The boundaries of coastal flood zones will expand as a result of inundation.[17]

If frequency of higher intensity tropical cyclones increases (see *Tropical Cyclones Profile*) coastal communities will experience the storm surge flooding associated with those stronger storms more often (Category 4 and 5 hurricanes).[18] However, storm surge height is not solely determined by hurricane intensity. It also is a function of the size and speed of the storm, the geometry and bathymetry of the coast, and the process by which the storm develops prior to landfall.[19] The effects of climate change on tropical storm size (radius of maximum wind and outer radius) have not been studied thoroughly.

Sea Level Rise

Citrus County is vulnerable to sea level rise given its extensive shoreline and low elevation. The "relative sea level" that is measured by a tide gauge at a particular location, is a function of both changes in the elevation of the sea's surface due to changes in the volume of water in the ocean (eustatic sea level) and vertical movement of the land upon which the tide gauge sits due to subsidence or tectonic movement of the earth's

[15] https://www.epa.gov/sites/production/files/2016-08/documents/climate-change-fl.pdf
[16] https://www.ssec.wisc.edu/~kossin/articles/NCA_Coasts.pdf, page 141.
[17] https://www.ssec.wisc.edu/~kossin/articles/NCA_Coasts.pdf, page 16.
[18] https://www.ssec.wisc.edu/~kossin/articles/NCA_Coasts.pdf, page 11, page xxv - xxvi.
[19] https://www.ssec.wisc.edu/~kossin/articles/NCA_Coasts.pdf, page 29-30.

crust. Eustatic sea level rise experienced at any particular location results primarily from expansion of sea water volume as heat is transferred from the atmosphere to the oceans, and the melting of glaciers and polar ice sheets. Both of these drivers are expected to cause an increase in the rate at which sea level is rising.[20] Regional eustatic sea level rise may differ from global average eustatic sea level rise due to distance from melting glaciers, different rates of sea level volume expansion because of the salinity and temperature of regional surface waters, and the effects of wind and currents on heat transfer between the atmosphere and the oceans.[21]

Rising sea levels would result in gradual coastal inundation, the most immediate impact of which is increased height of high tides. Similarly, to regular tides, as sea levels rise, king tides will reach further inland and result in more severe damages to coastal communities.[22] In addition, rising sea levels may cause landward expansion of coastal flood zones. Through a combination of direct inundation and erosion, rising sea levels also cause recession of both beaches and coastal wetlands (see Coastal Erosion Profile). The increased weight that results from a greater volume of sea water pushes saltwater into coastal aquifers and can worsen saltwater intrusion caused by excessive ground water withdrawal. Rising sea levels also push saltwater further upstream in tidal rivers and streams, raise coastal ground water tables, and push saltwater further inland in soils at the margins of coastal wetlands causing wetland boundaries to expand where they are unimpeded.

3.2.2 Location

The historic, economic, and cultural development of Citrus County occurred mainly along coastal and riverine areas. Not surprisingly, these areas are also most susceptible to flood damages (see Figure 3-1). The adopted FEMA flood map shows the "Special Flood Hazard Area," this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities since many have maps available that show the extent of the base flood and likely depths that will be experienced. The base flood is often referred to as the "100-year flood". The FIRM map identifies areas with .2% chance of annual flooding and areas with a 1% chance of annual flooding. The county has identified more flood prone areas based on prior occurrences.

For example, in the City of Crystal River, the "historical" downtown area derives its significance from past generations of people who owned and worked at its cedar mills and "working waterfront" businesses. Many of the older commercial and residential structures do not comply with current floodplain requirements. Many of the historically significant buildings are modest cottages located in a portion of downtown known as "Michigantown" (lying in a particularly flood-prone area).

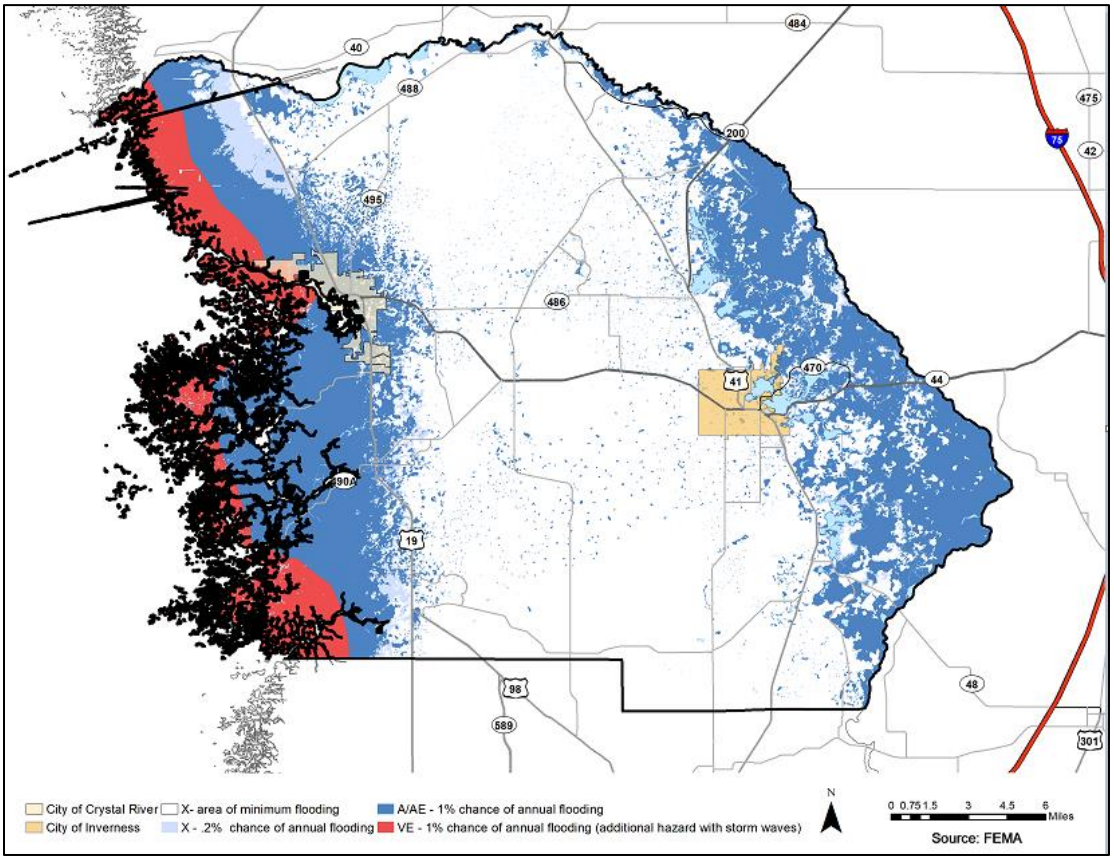
Another portion of the City of Crystal River, known as "Knight's Addition," located immediately east of US 19, is subject to flooding from heavy rains and, to a lesser degree, from coastal flooding. Other flood-prone regions of the County exhibit similar areas of historic, cultural, and religious significance.

Repetitive Loss Areas are another method of determining flood hazard areas. These are described and mapped in Section 3.2.6, Summary of Impacts. Review of repetitive loss locations serves as a rough indicator of flood hazard concern areas.

[20] https://scenarios.globalchange.gov/sites/default/files/NOAA_SLR_r3_0.pdf
[21] https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch5.html.
[22] https://www.epa.gov/cre/king-tides-and-climate-change

In October of 2018, FEMA issued preliminary flood map data to Citrus County. The preliminary data is presented as the best information available at this time and includes new or revised Flood Insurance Rate Maps (FIRMs), Flood Insurance Study (FIS) reports and FIRM Databases. The new maps are expected to be adopted in the fall of 2020. The preliminary maps would add 3,800 lots to the Special Flood Hazard Area and increases the highest base flood elevations up to 7 feet in some areas.[23]

Figure 3 -1 - Citrus County Flood Hazard Area



Dams/Levees

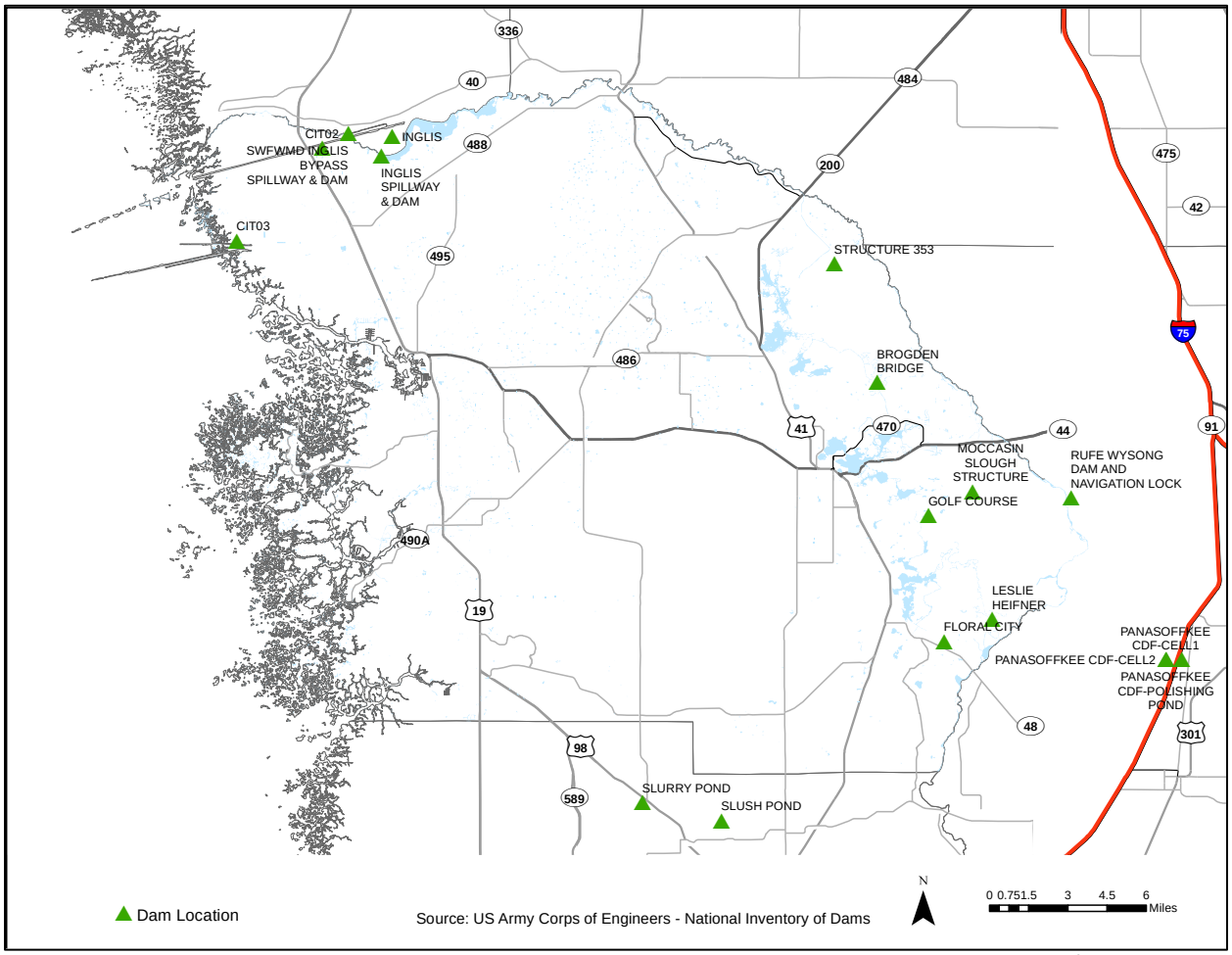
US Army Corps of Engineers maintains and updates the National Inventory of Dams, which are considered high potential loss facilities. According to the NID, there are 9 dams within Citrus County and one within 2 feet of Citrus County in Sumter County (See Figure 3-2). Most of these dams are less than 10 feet in height. Dams less than 25 feet in height are generally exempt from the Dams and Reservoirs Safety Act because, in most cases, their failure would not pose a serious threat to life, safety, or property.

[23] https://www.chronicleonline.com/news/local/flooding-in-the-future-new-federal-maps-put-more-homeowners/article_9b036d78-6846-11e9-a684-07843410879e.html

The Inglis Spillway Dam, on Lake Rousseau, was constructed in the 1960s as part of the Cross Florida Barge Canal system. The dam is owned by the Florida Department of Environmental Protection and operated by the Southwest Florida Water Management District.

A dam failure could be caused by one or more reasons, such as overtopping by flood events that exceed

Figure 3 – 2 – Citrus County Dam Locations



their capacity, structural material failures, settlement or cracking of both concrete or earthen/embankment dams or a failure to adequately maintain said dam. Sabotage is also a consideration. A failure has the potential to cause damages to infrastructure, private properties and the loss of life.

The extent of a dam failure can be measured in capacity and the amount of time it takes to reach critical flood depth after a failure event. The reservoir capacity of the Main Dam is 33,600 acre-feet. According to the 2012 Inglis Dam Emergency Action Plan, after a dam failure, it may take as little as 1.5 hours for flood depth to reach 1 foot above finished floor elevation of structures in vulnerable areas. Dam hazard is a term indicating the potential hazard to the downstream area resulting from failure or operational errors of the dam or facilities. The level of risk associated with dams is classified into three categories based on definitions from the US Army Corps of Engineers:

- Low: A dam where failure or operational error results in no probable loss of human life and low economic and/or environmental loss. Losses are principally limited to the owner's property.

- Significant: A dam where failure or operational error results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or affect other concerns. These dams are often located in predominantly rural or agricultural areas but could be located in areas with more dense populations and significant infrastructure.
- High: A dam where failure or operational error will probably cause loss of human life.

The Inglis Spillway Dam is the only dam in Citrus County with a "High hazard" designation, meaning that a failure would impact people and property downstream.

There is no history of dam failure in Citrus County. However, in 2002 a 40-foot crack was discovered. The crack was located 2,000 feet from the Inglis Dam in the bottom of the 3,600-acre Lake Rousseau. If the crack were to expand the Dam could be impacted resulting in cracks, leaks, or eventual failure. To that end an emergency action plan was created and adopted in February 2003.

The majority of the impacts from the Inglis Spillway Dam would be felt in Levy County, as the community of Inglis (year 2010 population was 1,325) is located approximately 2 miles downstream, and Yankeetown (year 2010 population was 502) is located approximately 2.25 miles downstream. However, a number of structures and roads in Citrus County could be impacted as well.

3.2.3 Extent

The extent of flooding can be measured in depth of water. Base flood elevations are the computed elevation to which floodwater is anticipated to rise during the base flood. Base Flood Elevations (BFEs) are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles. Citrus County's greatest BFE is approximately 19 feet in some areas. However, it is possible for these levels to be exceeded. The extent of flooding associated with a 1 percent annual probability of occurrence, the base flood, is used as the regulatory boundary by a number of government agencies. Also referred to as the "Special Flood Hazard Area," this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities since many have maps available that show the extent of the base flood and likely depths that will be experienced. The base flood is often referred to as the "100-year flood". Table 3-5 describes the magnitude of flooding associated with flood zones designations.

Table 3-5 – FEMA Flood Zone Designations[24]

Zone	Description
Low to Moderate Risk Areas	
C and X (unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as a base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.
B and X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
High Risk Areas	
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.

[24] https://www.fema.gov/flood-zones

AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1 – 30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.
High Risk Coastal Areas	
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
VE, V1 – 30	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
Undetermined Risk Areas	
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

3.2.4 Previous Occurrences

The Flood Insurance Study (FIS) reported previous flood events in this area in 1934, 1950, 1960, and 1974. Records were found for some of the major events and their impacts including:

1950 Hurricane Easy hit as a Category 3 after doing a loop in the Gulf of Mexico. Heavy flooding was reported after receiving nearly 40 inches of rain.

1960 Tropical Storm Donna struck Florida on September 11, 1960, and then moved north, eventually reaching New England. Donna was the only storm to produce hurricane force winds in Florida, the Mid-Atlantic States and New England. It was responsible for 50 deaths in the United States.

1964 Hurricane flooding occurred in September 1964 as a result of Hurricane Dora. Dora was the first hurricane recorded to move inland from the east over extreme northwestern Florida.

1974 In June 1974 an estimated 17.74 inches of rain resulting in severe flooding.

1993 Known as the "no name storm" that hit Citrus County on March 13, 1993, the storm produced hurricane force winds and tidal surges between 8 and12 feet. More than 3,100 Citrus homes were damaged; power lines, phone lines and trees were downed. The City of Crystal River's offices flooded, destroying important documents and the entire fleet of fire trucks. Businesses along Citrus Avenue and US19 were also flooded. The County received more than $1 million in Federal disaster relief to repair washed out roads and bridges and remove storm debris. Residents and business owners received about $20 million in grants or low interest loans.

1995 Tropical Storm Jerry moved onshore north of West Palm Beach and continued northwest across West Central Florida with the center of circulation moving off the Citrus County shoreline. Jerry remained stationary along the Citrus County shoreline through mid-afternoon of the 24th before heading northwest into the Northeast Gulf of Mexico by late afternoon with no further intensification. The strongest winds reported over West Central Florida from Jerry was a 45 knot wind gust in Sarasota. Minimal rainfall occurred with the center of Jerry as it moved northwest across the Florida peninsula; however, significant rainfall from extreme outer rain bands of Jerry occurred over coastal areas of West Central and Southwest Florida on the 24th and 25th. Rainfall totaled 10 to 15 inches. Storm tides averaged 1 to 1.5 feet above normal mean sea level in Citrus County after Jerry moved offshore during the 24th and 25th.

1996 Tropical Storm Josephine struck the coast of Florida in October and resulted in severe flooding and property damage that exceeded $2.9 million.

1998 The Withlacoochee River at Holder crested at 10.5 feet, 2.5 feet above the flood stage of 8 feet. Up to 200 homes in the Arrowhead subdivision were damaged by floodwaters near SR200 north of CR491. Flooding from intense rainfall occurred throughout January, February, March, and April resulting in over $3.625 million in property damages.

2003 Rainfall was reported as more that 28 inches in portions of Citrus County in June.

2004 Widespread heavy rain combined with saturated ground and swollen rivers following Hurricane Frances and Jeanne caused the Withlacoochee River at Holder (flood stage 8 feet) to reach an all-time high of 10.86 feet on September 30, 2004. At Dunnellon, the Withlacoochee River (flood stage 29 feet) reached 30.41 feet on September 27, 2004.

Table 3-6: Flood Events and Impacts, 2008-2018[25]

Location	Date	Property Damage	Impacts
Citrus (Zone)	8/21/2008		Widespread heavy rain of 6 to 9 inches occurred in Citrus County during Tropical Storm Fay in August 2008 but no major damage was reported.
Crystal River Airport	3/11/2010	2.00K	There were several road closures in Inverness, a few cars were stranded due to the high water near the intersection of South Apopka Avenue and US Highway 41, a wastewater lift station in Crystal River overflowed. Throughout the entire event, the Inverness Airport received 3.92 inches of rain. Other mesonet sites had 6.04 inches 3 miles northwest of Citrus Springs and 5.72 inches 1.6 miles north of Hernando. The cooperative station near Inverness received 5.56 inches of rain.

[25] http://www.ncdc.noaa.gov/stormevents/

Citrus (Zone)	3/31/2011		Photos taken by District engineers recorded flooding after a large storm event of 9.32 inches of rain. The storm event had a total rainfall of over 8 inches in many areas of the watershed. The peak intensity at the verification locations was 2.5 in/hr.
Lecanto	5/29/2012	108.00K	Tropical Storm Beryl produced an area of 5 to 8 inches of rain that caused flooding in an area bounded by Brooksville to Inverness to Homosassa Springs. One home in the 5600 block of South Hills Point had 31 inches of water in the home. Several other homes in the area had 8 – 14 inches of water in the home. Monetary damage listed in this report is a rough estimate.
Citrus (Zone)	6/25/2012	127.00K	In Citrus County, rainfall of over 9 inches fell across the county from Tropical Storm Debby, with the highest storm total rainfall reported at the CoCoRaHS site near Herrnando of 12.07 inches. The storm caused mostly minor damage, however, signifcant damage occurred with a tornado and several homes were flooded with 1 to 3 feet of water. The Kings Bay neighborhood had significant street flooding on the 25th and 26th. Additionally, several streets were flooded in Homosassa with up to 2 feet of water covering roadways on the 26th. Total individual assistance of $127K was paid out to 140 residents, including $112K in damage to housing.
Citrus (Zone)	6/6/2013		In Citrus County, tropical storm for winds were felt along the coast during the afternoon of the 6th. Storm total precipitation ranged from 2 inches to almost 6 inches across the county, with the CoCoRaHS site FL-CT-7 located 5.3 miles north-northeast of Crystal River measuring the highest total of 5.87 inches. Peak storm tide was estimated to be around 5 feet MLLW on the afternoon of the 6th. Subtracting the predicted astronomical tide, the highest storm surge was estimated to be around 3 to 4 feet MLLW late in the afternoon of the 6th.
Crystal River Airport	08/01/2015	25.00K	A weak area of low pressure developed along a stationary frontal boundary across north Florida. This allowed for waves of showers and thunderstorms to move across the area for a few days causing flooding throughout much of the Tampa Bay area. The heaviest rain fall on the morning of the 3rd with some portions of Hillsborough, Pinellas and Pasco Counties receiving 6 to 8 of rain. This event was exacerbated from the flooding and saturated soils from multiple heavy rain events that occurred on August 1 and again during the last week of July. The Citrus County sheriffs office reported 6 to 8 inches of standing water on South Ozello Trail and West Beachview Dr. in Crystal River. Citrus County Fire Rescue reported that southbound lanes of Highway 19 in Crystal River were briefly closed due to flooding.
Coastal Citrus	09/01/2016	102.00M	Hermine formed in the Florida Straits south of Key West on August 28th. It remained a very disorganized tropical depression for a few days before the environment around it gradually became more favorable and it became a tropical storm late in the day on the 30th. In Coastal Citrus County, the highest wind gust recorded was 47 knots late in the evening of the 2nd at the CWOP station 1 mile north of Beverly Hills. Storm total rainfall ranged from 3 to 7 inches, with the highest value recorded of 6.92 inches at the CWOP station 2 miles

			northeast of Chassahowitzka. Storm surge generally ranged from 4 to 6 feet above normal high tide. Damage in Citrus County was mostly caused by the storm surge. Damage was estimated at $102,000,000 with 743 properties with minor damage and 531 with major damage.
Coastal Citrus	01/22/2017	0.00K	A line of strong and fast-moving thunderstorms developed ahead of a cold front moving southeast through the Florida Peninsula. Breezy gradient winds were compounded by stronger thunderstorm wind gusts, some of which caused minor damage. Additionally, the persistent gradient winds caused minor coastal flooding. Water was reported to have risen up to US 19 in Crystal River, or about 2 feet above the high tide.
Coastal Citrus	10/10/2018	15.00K	Hurricane Michael developed as a tropical depression in the western Caribbean on October 7th and strengthened into a major hurricane as it moved north through the Gulf of Mexico before making landfall near Mexico Beach on October 10th. In Citrus County the maximum storm surge was estimated to be around 4 feet Mean Higher High Water (MHHW) during the afternoon of the 10th. This surge resulted in several road closures, and caused a car parked at a boat ramp for Fort Island Beach to be washed into the bay by the rising water.

3.2.5 Probability

Specific probability is difficult to determine; however, 100-year and 500-year estimates help provide a baseline understanding. It is likely that Florida will continue to be impacted by flooding due to any number of causes annually.

Based on historical occurrences, and because Citrus County, as well as the City of Crystal River and the City of Inverness, is affected by a large number of weather systems which result in flooding, the probability of flood events occurring in Citrus County, the City of Crystal River, and the City of Inverness is High. An analysis of flood reports from 2008 to 2018 in Citrus County, from the NCEI Storm Events Database indicates that the probability of a flood event in any given year is approximately 1. The probability of a flooding event affecting Citrus County, the City of Crystal River or the City of Inverness is Highly Likely, with an annual probability of 100%.

3.2.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, and public confidence caused by flooding are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River. The City of Crystal River would have more severe economic impacts due to the small geographic area of the coastal city and its reliance on water-related industries and coastal tourism.

Public

Flooding events could impact the public and result in injury or death. Injury or death during a flooding event could be caused by drowning, vehicle accidents, delayed emergency response and extended wait times due to obstructed roadways. Residents of flooded areas could become stranded on rooftops or trapped inside buildings or cars. Additionally, flooding could lead to public health concerns related to exposure to hazardous materials or wastewater.

Traffic is likely to be impacted by a flooding event as residents evacuate. Accidents may also occur from driving through flooded waters. Cars can be washed away when drivers attempt to drive through water that is deeper than expected.

Damage to property may also affect the public due to mold infestation. Residents in flood affected areas may have to replace damaged furniture, clothing, and other belongings.

First Responders

First responders could be seriously injured when responding to calls during flooding, especially when traversing flooded roadways. Dangerous rescue missions could include rescues from roofs, unstable buildings, and stranded cars. First responders may also be exposed to hazardous materials and wastewater. They may also encounter dangers during power outages including being electrocuted by live downed wires.

Continuity of Operations

Floodwaters may damage buildings, electrical systems, and paperwork making continued operations difficult or impossible. Floodwaters may hinder access to buildings (roads or sidewalks) preventing employees and the public from entering a building.

Property, Facilities, Infrastructure

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

Environment

Wastewater discharge during flooding events may cause environmental impacts. Flooding may cause damage to plant and animal habitats, and inundation of agricultural areas could destroy crops. Event generated debris could impact waterway navigation and submerged wetland habitats.

Economic Condition

Closure or delay of businesses because of flooded roads or water damage can lead to losses in revenue. Additionally, crop damage or loss caused by floodwater inundation could lead to declines in agricultural revenues.

Public Confidence

If floodwaters do not recede quickly, it appears as though the water utilities and government aren't able to manage water properly, which calls into question the capability of the government. If public or government offices must close because of restricted access due to floodwater, people may think the government isn't able to handle emergency events and lose confidence in their capabilities.

Flood Insurance

As part of Citrus County's participation in the NFIP, residents and businesses are eligible to obtain flood insurance policies. Within Citrus County there were 5, 581 flood insurance policies in effect as of September 30th, 2018. These policies have a total coverage of $1,037,025,400 with a total premium of $5,874,191.[26] This represents a decrease in the number of policies since the last LMS update in 2014, which was 5,848 with a total coverage of $1,427,155,000 with a total premium of $5,800,717.[27] To date, the NFIP has paid

[26] https://bsa.nfipstat.fema.gov/reports/1011.htm#FLT
[27] HUDEX Report, Policy and Loss Data by Community. https://nfipservices.floodsmart.gov/home/reports

$114,261,558 to residents and businesses in the county for 4,440 total losses. At the time of the last LMS update in 2014 the NFIP has paid $64,549,230 to residents and businesses in the county for 3,355 total losses.

Table 3-7 – Flood Insurance

	Policies In-force (9/30/2018)	Insurance In-force (9/30/2018)	Written Premium In-force (9/30/2018)	Total Losses (4/30/2019)	Total Payments (4/30/2019)
Unincorporated Citrus County	4,504	$798,708,600	$4,227,529	3,166	$78,610,878.32
Crystal River, City of	976	$212,516,700	$1,580,698	1,264	$35,543,317.50
Inverness, City of	101	$25,800,100	$65,964	10	$107,362.72
Total	5,581	$1,037,025,400	$5,874,191	4,440	$114,261,558.54

Citrus County joined the Community Rating System (CRS) in October 2001 and is currently a Class 5 Community.[28] The Class 5 rating allows Citrus County residents in the Special Flood Hazard Areas (SFHA – A and V zones) of the unincorporated areas to receive a 25 percent reduction in their flood insurance premiums. Moving up to a Class 1 rating provides a 45 percent reduction in flood insurance premiums. The City of Crystal River joined the CRS in 2016, and is currently a Class 7 community, resulting in a 15 percent reduction in flood insurance premiums. The City of Inverness does not participate in the CRS program at this time.

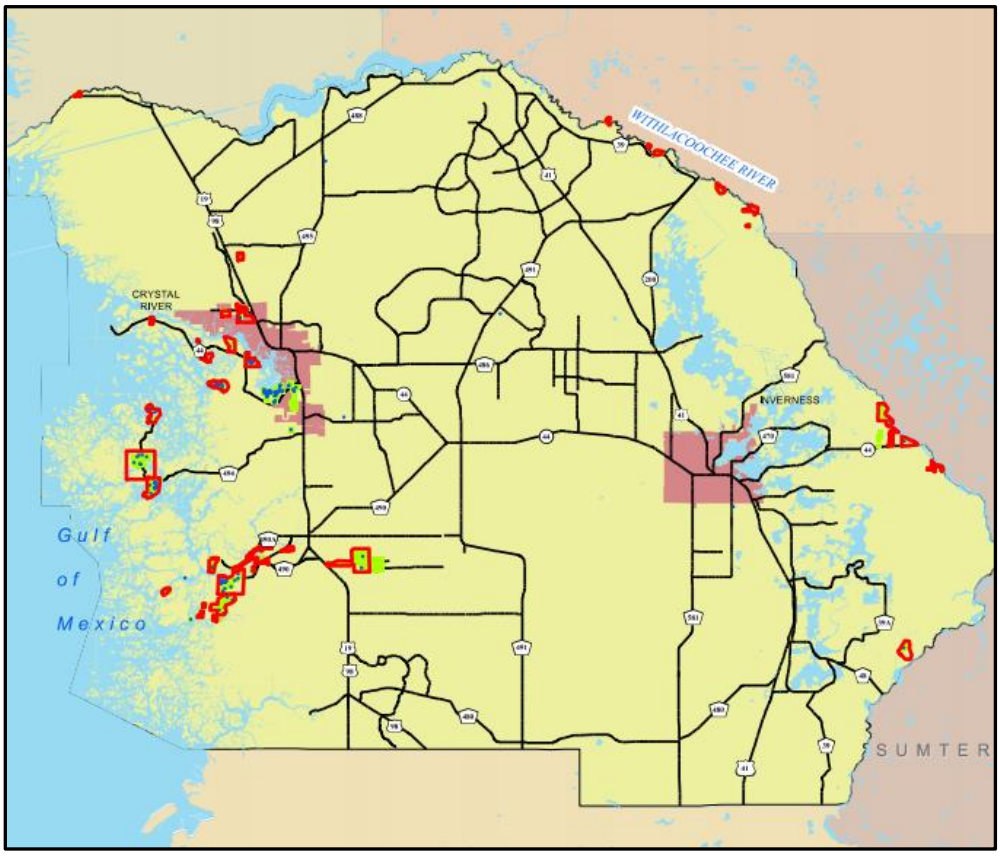
Repetitive Loss

A repetitive loss (RL) property is defined as a facility or structure that has experienced two or more insurance claims of $1,000 or more in any given 10-year period since 1978, under the National Flood Insurance Program. A RL property may or may not be currently insured by the NFIP. As of January 2018, there were 14,887 non-mitigated repetitive loss properties in the State of Florida.[29]

[28] April 2019 NFIP Flood Insurance Manual. https://www.fema.gov/media-library-data/1555526121163-7169ef09aba2f9a043c638064ec84025/app-f_crs_508_apr2019.pdf
[29] 2018 Statewide Mitigation Strategy.

Based on the most recent information available there are 192 such properties in Citrus County, including 185 residential properties and 7 commercial properties. To date the total building payments related to repetitive losses for in unincorporated Citrus is $10,204,052.08 and the total content payments are $3,696,932.

Figure 3-3 – Repetitive Loss Areas



According to data provided by FEMA dated 7/13/2019, there are an additional 112 repetitive loss properties located in the City of Crystal River. The data provided by FEMA did not indicate, the building type (residential, commercial, etc), however at the time of the 2015 there were 7 commercial repetitive loss properties. No repetitive loss properties have been identified in the City of Inverness.

Review of repetitive loss locations serves as a rough indicator of flood hazard concern areas. Unfortunately, use of these sites in this manner can lead to misdirected mitigation efforts. Repetitive loss properties are identified only if the owner has NFIP coverage. These repetitive loss locations do not reveal those areas where NFIP policyholders do not file claims, do not make the $1,000 threshold, or for those people who do not have flood insurance policies (because of income or lack of knowledge). For this reason, any study analyses will use this tool as a means to supplement flood assessments. Figure 3-3 shows areas identified by Citrus County to be repetitive loss areas. In 2006, the LMS Working Group prepared a Severe Repetitive Loss Properties Prioritization Worksheet (see Appendix B) to be used in the event that several applications for mitigation assistance are submitted at the same time. This worksheet was adopted by Resolution by all jurisdictions and is included in this update of the overall LMS document.

Hazard Ranking

The LMS Working Group determined flooding to be a high priority hazard in Citrus County. As described in the profile above, flooding events within the county are common events with an annual probability of approximately 1 flood per year. Flooding events may have a high range of impact, accounting for annual damages that exceed $102,000,000, as was the case after hurricane Hermine caused storm surge flooding in 2016. Table 3-8 outlines the hazard rankings for each of the hazard priority criteria related to flooding.

Table 3-8 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Likely	Critical	Moderate	6 to 12 hours	Less than 1 week	**3.0**
3.0	3.0	3.0	3.0	3.0	

3.2.7 Vulnerability Analysis

Based on the American Community Survey (ACS) data from 2017, there are almost 30,000 people living in the 100-year floodplain (zones A, AE, and VE). There are 1,624 residents living in the VE zone which is subject to the 1% annual chance of flood and hazards related to storm waves. There are an additional 4,276 residents in the moderate flood hazard area (shaded X).

Table 3-9 – Flood Zone Population

Flood Zone	**Total**
A	794
AE	25,085
VE	1,624
X	4,276
Total	**31,779**

Damages from these events can be expected in the magnitude of $102 million for property and $0 for crop damages annually. According to property appraiser data there are 21,859 buildings located in the 100-year floodplain with a total building value of $2.8 billion.

Table 3-10 - Distribution of Structures in Flood Hazard Areas

Jurisdiction	Number of Properties within the A, AE, V, and VE flood zones	Number of Buildings	Building Value (Improved Value)	Land Value
Citrus County (Unincorporated)	30,790	19,042	$ 2,243,079,861	$ 2,080,317,304
Crystal River	2,672	2,002	$ 343,074,318	$ 218,979,180
Inverness	1,037	815	$ 221,417,620	$ 102,555,790
Total	34,449	21,859	$2,807,571,799	$2,401,852,274

A portion of the Sabal Trail natural gas transmission line is located in the flood hazard area (A, AE, VE). The Crystal River Energy Complex, is also in the flood hazard area and is partially located within the coastal VE hazard area. There is an elevated potable water tank operated by Ozello Water Association (OWA) located in the SFHA. The Ozello Water Association has 2,054 connections according to the Citrus County Comprehensive Plan, however the OWA also purchases water from Citrus County Water Resources Department. Table 3-11 summarizes the other critical facilities that are in the flood hazard area.

Table 3-11 - Critical Facilities in Flood Hazard Areas

	Unincorporated Citrus County	City of Crystal River	City of Inverness	Total
Airports	0	1	0	1
Assisted Living Facilities	2	3	0	5
Electrical Utility Facility	4	0	0	4
Fire Station	1	1	0	2
Government Building	5	2	3	10
Health Care Center	0	2	0	2
Nursing Home	0	2	0	2
Schools & Shelters	3	3	0	6
Potable Water	1	0	0	1
Wastewater	3	1	0	4

3.3 Tropical Cyclone Hazard Profile

3.3.1 Description

Hurricanes and tropical storms, as well as tropical depressions, are all tropical cyclones defined by the National Weather Service's National Hurricane Center (NHC) as warm core, non-frontal, synoptic-scale cyclones. They originate over tropical or subtropical waters with deep, organized convection with a closed surface wind circulation around a well-defined center. Once they have formed, tropical cyclones maintain themselves by extracting heat energy from the ocean at high temperatures, releasing heat at low temperatures of the upper troposphere. Hurricanes and tropical storms bring heavy rainfalls, storm surge, and high winds, all of which can cause significant damage. These storms can last for several days and, therefore, have the potential to cause sustained flooding, high wind, and erosion conditions.

Storm surge is the abnormal rise in water level caused by the wind and pressure forces of a hurricane or tropical storm. Storm surge is a major component of nor'easter storms along the East Coast of the U.S. Because winds are moving from a north and/or eastward position, winds move across the ocean toward shore and form large waves. Storm surge produces most of the flood damage and drownings associated with storms that make landfall or that closely approach the coastline. Of the hurricane hazards, the storm surge is considered to be the most dangerous as nine out of ten hurricane-related deaths are caused by drowning.

Storm surge can be modeled by various techniques; one such technique is the use of the NWS's Sea, Lake and Overland Surges from Hurricanes (SLOSH) model. The model is used to predict storm surge heights based on hurricane category. Surge inundation areas are classified based on the category of hurricane that would cause flooding.

Tropical Cyclones can produce very strong and destructive winds that can persist for great distance in area and duration even after landfall. Hurricane force winds are extremely dangerous and can cause severe damage and debris. This debris, including signs, pieces of structures not properly secured, and shallow rooted trees, is often then carried by the high winds and can cause further damage.

Potential Effects of Climate Variability on Tropical Cyclones

A warmer atmosphere could influence two of the factors that affect the generation and strength of tropical cyclones: (1) increased thermal energy resulting from higher sea surface temperatures (SST), and (2) increased vertical wind shear. [30] These effects are likely to counteract each other to some degree. The exact role of increasing SST remains to be determined: tropical cyclone intensity, as measured by power dissipation indices[31] may increase directly as a function of SST, or intensity may be a function of the difference between SST in the cyclone development region and mean global tropical SST.[32] Vertical wind shear disturbs the structure of a tropical cyclone and, therefore, increased shear can lead to system weakening.[33] Tropical cyclone intensity is one of the principal determinants of storm surge height; thus, the net effects of climate change on tropical cyclone intensity will also affect the magnitude of coastal flooding associated with these storms. Tropical cyclone tracks and consequently, the number of systems that make landfall in Florida, could be influenced by atmospheric steering currents and climate phenomena such as the El Niño-Southern Oscillation, North Atlantic Oscillation, Atlantic Meridional Mode, and Madden-Julian Oscillation.[34] As stated in the flood hazard profile, higher rainfall intensity is likely as atmospheric moisture increases.[35]

3.3.2 Location

A map of the storm surge inundation areas for the county is shown in Figure 3-4. The maps indicate the areas of Citrus County that are subject to flood from storm surge from hurricanes or another severe storm event. It shows the worst-case scenario that would be generated by a storm making landfall in the county. It does not show the surge from any track, or from all tracks. It does show the worst possible case for each category of tropical storm or hurricane.

Although the entire County, including the City of Crystal River and the City of Inverness, may be affected by tropical storms and hurricanes, the City of Inverness is not vulnerable to coastal storm surge. From the SLOSH maps, it may be concluded that the VE zones would be inundated during a Category 1 storm. The SLOSH map indicates that a significant portion of the County, including the majority of the City of Crystal River, would be inundated in a Category 1 hurricane. As the category of the hurricane increases from a Category 1 to a Category 5, additional land area will become inundated.

[30] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3619316/;
[31] https://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf
[32] https://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf
[33] Grossman and Morgan (2011). Tropical cyclones, climate change, and scientific uncertainty: What do we know, what does it mean, and what should be done? Climatic Change, *547*
[34] Kossin et al. (2010). https://doi.org/10.1029/2006GL028836
[35] https://www.epa.gov/sites/production/files/2016-08/documents/climate-change-fl.pdf

3.3.3 Extent

Wind

Tropical storms have sustained winds average 39 to 73 mph. When sustained wind intensify to greater than 74 mph, the resulting storms are called hurricanes. Hurricanes are divided into five classes according to the Saffir-Simpson hurricane wind scale (See Table 3-12), which uses wind speed as the principal parameter to categorize storm damage potential. While the average tropical cyclone affecting Citrus County is a tropical storm, the extent is Category 3, as the worst tropical cyclone recorded was Category 3 Hurricane Donna in 1960.

Figure 3-4 – Tropical Cyclone Storm Surge Area

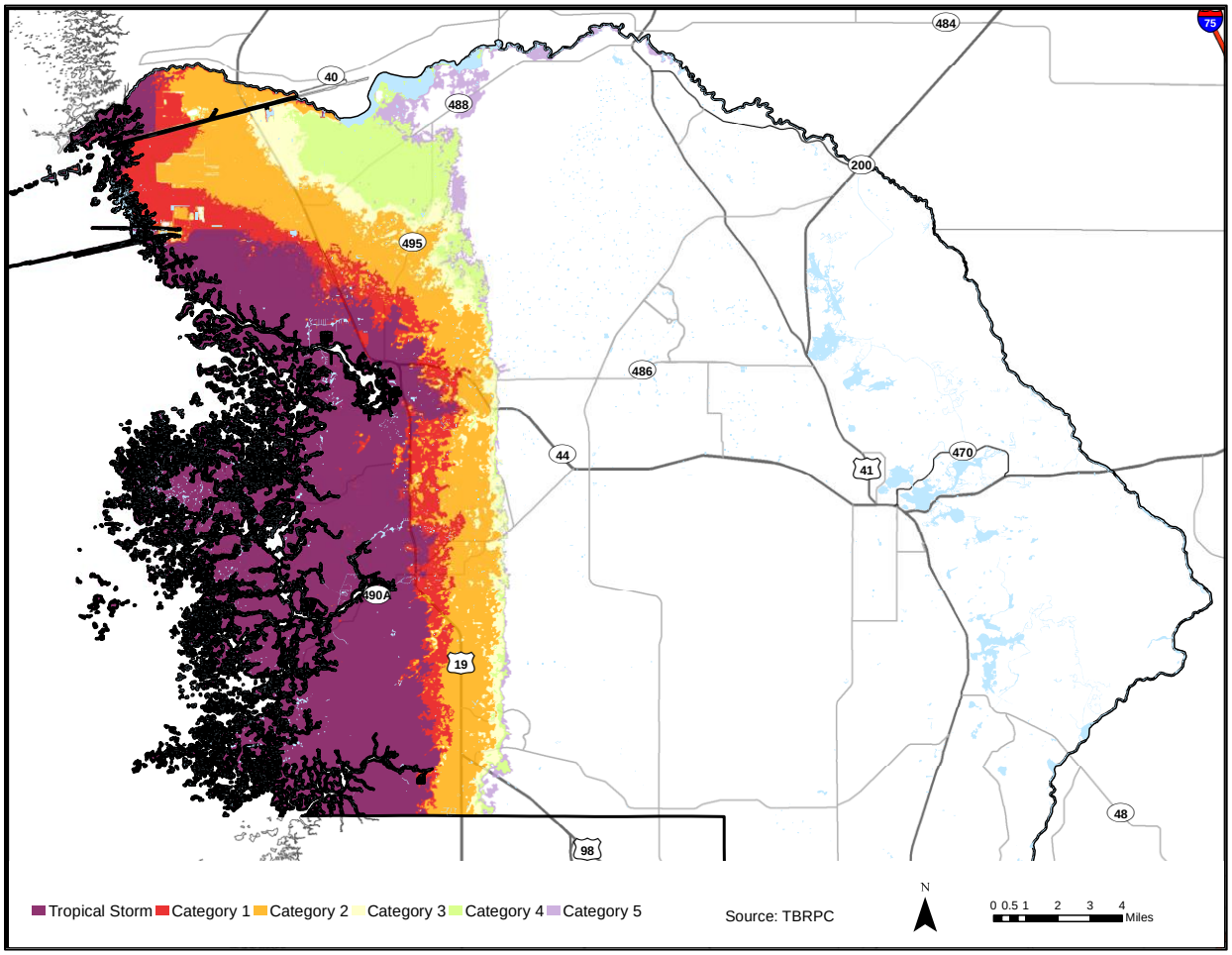


Table 3-12: Saffir-Simpson Wind Scale and Typical Damages[36]

Category	Sustained Wind Speeds (mph)	Typical Damage
Tropical Depression	<39	
Tropical Storm	39-73	
Hurricane 1	74-95	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
Hurricane 2	96-110	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
Hurricane 3	111-129	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
Hurricane 4	130-156	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
Hurricane 5	>156	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Storm Surge

Storm surge heights are dependent upon the configuration of the continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). In 2010, the National Hurricane Center separated storm surge from the Saffir-Simpson Hurricane Wind Scale because it did not accurately describe storm surge. For example, a Category 1 hurricane could have devastating storm surge, while a Category 5 hurricane could

[36] http://www.nhc.noaa.gov/aboutsshws.php

have minimal storm surge. Along most of the Atlantic coast of Florida, a narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water in close proximity to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. The Gulf Coast of Florida has a long, gently sloping shelf and shallow water depths, leading to higher surge but smaller waves. South Miami-Dade County is somewhat of an exception to these general rules due to Biscayne Bay, which has a wide shelf and shallow depth. In this instance, a hurricane has a larger area to "pile up" water in advance of its landfall. Nowhere is the threat of storm surge more prevalent than in the Apalachee Bay Region, where storm surge can reach several feet above ground.

The National Hurricane Center forecasts storm surge using the SLOSH model, which stands for Sea, Lake, and Overland Surges from Hurricanes. The model is accurate to within 20 percent. The inputs include the central pressure of a tropical cyclone, storm size, the forward motion, its track, and maximum sustained winds. Local topography, bay and river orientation, depth of the sea bottom, astronomical tides, as well as other physical features are taken into account in a predefined grid referred to as a "SLOSH basin." Overlapping basins are defined for the southern and eastern coastlines of the continental U.S.

The final output from the SLOSH model run will display the Maximum Envelope of Water, or MEOW, that occurred at each location. To allow for track or forecast uncertainties, usually several model runs with varying input parameters are generated to create a map of MOMs, or Maximum of Maximums. For hurricane evacuation studies, a family of storms with representative tracks for the region with varying intensity, eye diameter, and speed are modeled to produce worst-case water heights for any tropical cyclone occurrence. The results of these studies are typically generated from several thousand SLOSH runs.[37]

Tornadoes

Tornadoes are a significant threat during tropical cyclones and have been associated with the majority that have affected Florida. Tornadoes tend to develop on the leading northwest edge relative to the forward motion (or on the right-front quadrant) of hurricanes, within thunderstorms and rain bands away from the center. The majority of tornadoes that occur with hurricanes are relatively weak and short-lived. In recent years, much of the wind damage in hurricanes attributed to tornadoes has, in reality been the result of down bursts, which are strong downdrafts causing damaging winds on or near the ground.

Rainfall

Tropical Cyclones are capable of producing widespread and heavy rains, which can result in life-threatening and damaging floods. This flooding is actually the biggest threat from tropical cyclones for people who live inland. The rainfall can cause flash flooding and flooding on rivers and streams that can persist for several days after the storm. Rainfall amounts are related to the speed and size of tropical cyclones, not the intensity. This is because a slower moving and larger tropical cyclone has a longer and larger capacity to produce more rainfall.

Rip Currents

The strong winds associated with tropical cyclones can cause rip currents, which are a significant drowning threat to coastal residents and beach goers. Rip currents are channeled currents of water flowing away from

[37] http://www.nhc.noaa.gov/surge/slosh/php

shore and can easily pull strong swimmers into the open water. These rip currents can occur at large distances from the storm.[38]

The National Weather Service produces Rip Current Outlooks to alert beach goers to the risk of rip currents at a particular beach. There are three levels of outlooks:[39]

- Low Risk: The risk for rip currents is low; however, life-threatening rip currents often occur in the vicinity of jetties, reefs, and piers.
- Moderate Risk: Life threatening rip currents are possible in the surf zone.
- High Risk: Life threatening rip currents are likely in the surf zone.

3.3.4 Previous Occurrences

There have been 11 federal disaster declarations related to tropical cyclones in Citrus County.[40] A list of prior tropical cyclone occurrence has been compiled using the previous updates of the local mitigation strategy, the NCEI storm event data, and federal disaster declaration data.

1950 Hurricane Easy hit as a Category 3 after doing a loop in the Gulf of Mexico. Heavy flooding was reported after receiving nearly 40 inches of rain.

1960 Tropical Storm Donna struck Florida on September 11, 1960, and then moved north, eventually reaching New England. Donna was the only storm to produce hurricane force winds in Florida, the Mid-Atlantic States and New England. It was responsible for 50 deaths in the United States.

1964 Hurricane flooding occurred in September 1964 as a result of Hurricane Dora. Dora was the first hurricane recorded to move inland from the east over extreme northwestern Florida.

1993 Known as the "no name storm" that hit Citrus County on March 13, 1993, the storm produced hurricane force winds and tidal surges between 8 and12 feet. More than 3,100 Citrus homes were damaged; power lines, phone lines and trees were downed. The City of Crystal River's offices flooded, destroying important documents and the entire fleet of fire trucks. Businesses along Citrus Avenue and US19 were also flooded. The County received more than $1 million in Federal disaster relief to repair washed out roads and bridges and remove storm debris. Residents and business owners received about $20 million in grants or low interest loans.

1995 Tropical Storm Jerry moved onshore north of West Palm Beach and continued northwest across West Central Florida with the center of circulation moving off the Citrus County shoreline. Jerry remained stationary along the Citrus County shoreline through mid-afternoon of the 24th before heading northwest into the Northeast Gulf of Mexico by late afternoon with no further intensification. The strongest winds reported over West Central Florida from Jerry was a 45 knot wind gust in Sarasota. Minimal rainfall occurred with the center of Jerry as it moved northwest across the Florida peninsula; however, significant rainfall from extreme outer rain bands of Jerry occurred over coastal areas of West Central and Southwest Florida on the 24th

[38] Florida Statewide Mitigation Strategy, 2018.
[39] http://www/nws.noaa.gov/os/hurricane/resources/TropicalCyclones11.pdf
[40] https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties

and 25th. Rainfall totaled 10 to 15 inches. Storm tides averaged 1 to 1.5 feet above normal mean sea level in Citrus County after Jerry moved offshore during the 24th and 25th.

1996 Tropical Storm Josephine struck the coast of Florida in October and resulted in severe flooding and property damage that exceeded $2.9 million.

Table 3-13 - Tropical Cyclone Events and Impacts, 2008-2018[41]

Location	Date	Impacts
Citrus	8/21/2008	Widespread heavy rain of 6 to 9 inches occurred in Citrus County during Tropical Storm Fay in August 2008 but no major damage was reported.
Lecanto	5/29/2012	Tropical Storm Beryl produced an area of 5 to 8 inches of rain that caused flooding in an area bounded by Brooksville to Inverness to Homosassa Springs. One home in the 5600 block of South Hills Point had 31 inches of water in the home. Several other homes in the area had 8-14 inches of water in the home. Monetary damage listed in this report is a rough estimate.
Citrus (Zone)	6/25/2012	In Citrus County, rainfall of over 9 inches fell across the county from Tropical Storm Debby, with the highest storm total rainfall reported at the CoCoRaHS site near Hernando of 12.07 inches. The storm caused mostly minor damage, however, significant damage occurred with a tornado and several homes were flooded with 1 to 3 feet of water. The Kings Bay neighborhood had significant street flooding on the 25th and 26th. Additionally, several streets were flooded in Homosassa with up to 2 feet of water covering roadways on the 26th. The storm impacted 140 residents or a total of $127 thousand. Total individual assistance of $127K was paid out to 140 residents, including $112K in damage to housing.
Citrus (Zone)	6/6/2013	Tropical storm Andrea force winds were felt along the coast of Citrus county during the afternoon of the 6th. Storm total precipitation ranged from 2 inches to almost 6 inches across the county, with the CoCoRaHS site FL-CT-7 located 5.3 miles north-northeast of Crystal River measuring the highest total of 5.87 inches. Peak storm tide was estimated to be around 5 feet MLLW on the afternoon of the 6th. Subtracting the predicted astronomical tide, the highest storm surge was estimated to be around 3 to 4 feet MLLW late in the afternoon of the 6th.
Inland and Coastal Citrus (Zones)	06/06/2016	Tropical Storm Colin moved onshore in the Big Bend region of Florida with a minimum central pressure of 1000 mb. In Inland Citrus County, the peak wind measured was 36 knots from a home weather station in Beverly Hills (D1496). Rain totals generally ranged from 3-6 inches. The highest rainfall total was 6.44 inches at the CoCoRaHS site Crystal River 4.7 ESE. In Coastal Citrus County, tropical storm force winds ripped a metal roof and some screening off of the porch of a mobile home. The metal roof landed on a suspended cable line and had to be removed by county personnel. Radar rainfall estimates ranged from 2-5 inches
Coastal Citrus	09/01/2016	Hermine formed in the Florida Straits south of Key West on August 28th. In Coastal Citrus County, the highest wind gust recorded was 47 knots late in the evening of the 2nd at the CWOP station 1 mile north of Beverly Hills. Storm total rainfall ranged from 3 to 7 inches, with the

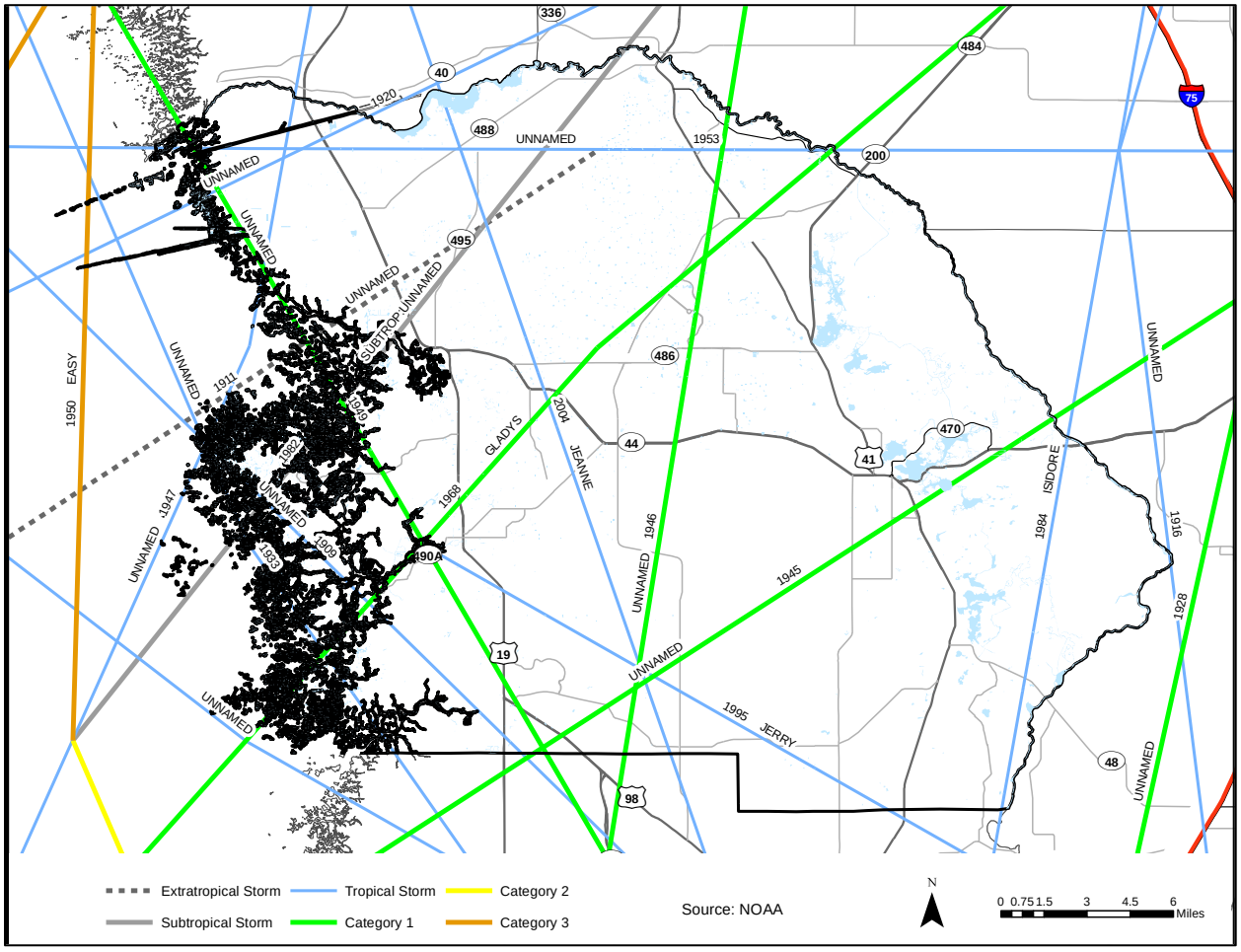
[41] http://www/ncdc.noaa.gov/stormevents

		highest value recorded of 6.92 inches at the CWOP station 2 miles northeast of Chassahowitzka. Storm surge generally ranged from 4 to 6 feet above normal high tide. Damage in Citrus County was mostly caused by the storm surge. Damage was estimated at $102,000,000, with 743 properties with minor damage and 531 with major damage.
Inland Citrus (Zone)	10/07/2016	Matthew developed into a tropical storm on September 28th as it was approaching the Windward Islands. A mesonet station near Beverly Hills measured a tropical storm force wind gust of 40 knots
Inland and Coastal Citrus	09/10/2017	Hurricane Irma made landfall on Marco Island as a Category 3 hurricane on the afternoon of the 10th and traveled north through southwest Florida through the morning of the 11th. In coastal portions of Citrus County, winds from Hurricane Irma were estimated to be around 40 to 60 knots based on surrounding observations. Rainfall was generally around 5 inches or greater. The wind knocked over numerous trees and power lines throughout the county. In inland portions of Citrus County, winds from Hurricane Irma were estimated to be around 40-60 knots, with the highest wind reported being a gust to 56 knots at the CWOP station D1496 in Beverly Hills. Rainfall was generally around 6 inches or greater, with the highest rain total being 18.65 inches at the CWOP station D1496 in Beverly Hills. The total damage from Hurricane Irma in Citrus County was estimated at $5.9 million in public assistance claims, including debris removal and emergency protective measures, roughly half of which was estimated to be for wind damage in coastal Citrus County.

The Figure 3-5 shows all the tracks of tropical cyclones that affected Citrus County from 1900 to 2016. The most recent impacts to Citrus County by a tropical cyclone were Hurricane Irma in 2017 and Hurricane Hermine in 2016. In coastal portions of Citrus County, winds from Hurricane Irma were estimated to be around 40 to 60 knots based on surrounding observations. Rainfall was generally around 5 inches or greater. The wind knocked over numerous trees and power lines throughout the county. In inland portions of Citrus County, winds from Hurricane Irma were estimated to be around 40-60 knots, with the highest wind reported being a gust to 56 knots at the CWOP station D1496 in Beverly Hills. Rainfall was generally around 6 inches or greater, with the highest rain total being 18.65 inches at the CWOP station D1496 in Beverly Hills.

In 2016 Hurricane Hermine formed in the Florida Straits south of Key West. Hurricane Hermine made landfall just east of St. Marks, Florida as a Category 1 Hurricane with a minimum central pressure of 982 mb, and maximum sustained winds estimated at 70 knots (80 MPH). In Coastal Citrus County, the highest wind gust recorded was 47 knots late in the evening of the 2nd at the CWOP station 1 mile north of Beverly Hills. Storm total rainfall ranged from 3 to 7 inches, with the highest value recorded of 6.92 inches at the CWOP station 2 miles northeast of Chassahowitzka. Storm surge generally ranged from 4 to 6 feet above normal high tide. Damage in Citrus County was mostly caused by the storm surge. Damage was estimated at $102,000,000, with 743 properties with minor damage and 531 with major damage.

Figure 3- 5 - Tropical Cyclone Historical Paths[42]



3.3.5 Probability

Since tropical cyclones are random in distribution, it is impossible to forecast whether Citrus County will experience a tropical cyclone. However, because of the high frequency of tropical cyclones that have affected Florida in the past, it is reasonable to assume that Citrus County will experiences tropical cyclones again in the future. The probability of a tropical storm event affecting Citrus County, the City of Crystal River or the City of Inverness is Likely, with an annual probability of 10 -100%.

According to data from the NCDC Storm Event Database, and data from 2008 to 2018, Citrus County experiences an average of 0.6 tropical storms and 0.2 hurricanes each year. The data also included injury

42 https://catalog.data.gov/dataset/tropical-cyclone-storm-segments-within-the-north-atlantic-ocean-and-eastern-pacific-o-1900-2016

and death information; however no deaths or injuries were reported related to tropical storms or hurricanes from 2008 to 2018.

Table 3-14 - NCDC Tropical Storms and Hurricanes, Citrus County, 2008-2018

Type of Storm	NCDC Report	Average Events per year	Injuries	Deaths
Tropical Storm	6	.6	0	0
Hurricane	2	.2	0	0
Total	8	.8	0	0

Another source of hurricane frequency prediction is the Forecast of Atlantic Seasonal Hurricane Activity, performed annually by the members of the Colorado State University Hurricane Forecast Team, including Dr. William Gray. According to the Landfall Strike Probability for the 2019 season, the probability for at least one major (category 3-4-5) hurricane landfall along the U.S. East Coast Including Peninsula Florida is 32%.[43]

3.3.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, and public confidence caused by storm surge and tropical cyclone winds are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River. The City of Crystal River would have more severe economic impacts, caused by storm surge, due to the fact that most of the city would be inundated after a Category 1 event. The city's economy is reliant on water-related industries and coastal tourism.

Evacuation

Citrus County and the City of Crystal River have a high vulnerability to hurricanes, including a Category 4 or Category 5 event, the impact of which would be catastrophic. The number of people affected by hurricanes and coastal storms is significant, and the economic and response costs could be so high that the local governments could not absorb them in order to facilitate recovery.

Table 3-15 identifies Citrus County's evacuation clearance times. This information was updated in 2017 as part of the Statewide Regional Evacuation Study conducted by the Regional Planning Councils.

Table 3-15 - Citrus County Evacuation Clearance Times for Base Scenarios

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Clearance Time to Shelter	19	24	21	25	20.5
In-County Clearance Time	23.5	28.5	34.5	47	55.5

[43] https://tropical.colostate.edu/media/sites/111/2019/07/2019-07.pdf

Clearance Time to Shelter - The time necessary to safely evacuate vulnerable residents and visitors to a "point of safety" within the county based on a specific hazard, behavioral assumptions and evacuation scenario. Calculated from the point in time when the evacuation order is given to the point in time when the last vehicle reaches a point of safety within the county. Key points to remember for clearance time to shelter include:

- All in-county trips reach their destination within the county outside of an evacuation zone A-E; and,
- This definition does not include any out of county trips.

In-County Clearance Time - The time required from the point an evacuation order is given until the last evacuee can either leave the evacuation zone or arrive at safe shelter within the county (which is not in an A-E evacuation zone). This does not include those evacuees leaving the county on their own. Key points to remember for in-county clearance time include:

- All in-county trips reach their destination within the county;
- All out of county trips exit the evacuation zone, but may still be located in the county and not left yet; and,
- This definition does not include out-of-county pass-through trips from adjacent counties, unless they evacuate through an evacuation zone.

Public

Members of the public could be impacted by car accidents during tropical cyclone events because of flood waters, high winds, panic, traffic jams and power outages. The public may also be impacted by slower emergency response, especially when ambulatory care is needed. Emergency response may be obstructed by blocked roads. Members of the public are at risk of death or injury resulting from drowning in flood waters, being hit or crushed by debris, and/or being stranded on rooftops. Exposure to hazardous materials could also impact the public and is possible during a tropical cyclone event. Illnesses could also be caused by contaminated water. Pets and other animals are at risk of death or injury as a result of the impacts mentioned above. Preparedness for a tropical cyclone events may cause stress for members of the public related to safety concerns for family members, fear of property damage, being forced to forfeit a pet, and loss of wages.

The public could also be impacted by damage to their property during a tropical cyclone event. Homes may be damaged and connections to power may be interrupted or destroyed. Mold damage caused by rainwater or flooding could need expensive mold remediation action. Additionally, the cost and labor to repair damaged homes and other structures could make homes unhabitable. If a property is uninsured these costs fall on the property owner. Residents who experience property damage during a tropical cyclone event may also have to pay out-of-pocket for hotel rooms or live in a shelter until damage is repaired or their home is replaced. Residents may also find their vehicles are damaged after a tropical cyclone event, including damage caused by storm debris or flood waters. Employees may lose wages due to obstructed roadways, damaged vehicles, or damage to their employer's facilities. Residents who evacuate will incur costs related to travel, hotel fees, loss of wages, and loss of perishable food that was purchased before evacuation.

Power outages may affect the public due to the cost of generators and gas to run the generators, and the risk of accidental fire or carbon monoxide poisoning. Power outages also increase safety concerns when traffic lights become inoperable.

First Responders

First responders are at risk of injury or death during and after a tropical cyclone event due to storm debris, unstable transportation infrastructure, unstable structures, and exposure to hazardous materials. First responders may also experience increased levels of stress caused by dangerous rescues, and the inability to assist during the storm event.

Continuity of Operations (including continued delivery of services)

Continuity of operations may be affected during a tropical cyclone event because of damage to businesses and structures. Utility failures such as electric or gas may prevent business from opening even if there is no damage. Utility failures may also impede or prevent government offices from continuing daily services. Continuity of Operations may also be impacted by severe damage and interruption to transportation systems and infrastructure like roads and bridges, communication systems, power, water, and wastewater.

Property, Facilities, Infrastructure

Impacts to property, facilities, and infrastructure may include damaged or destroyed property, such as homes and other buildings. Roofing is particularly susceptible to damage from high winds, while the first floor of many buildings is susceptible to severe damage from flooding. Costs associated with tropical cyclone hazards may include the cost of repairing damage to property such as buildings, the cost of replacing items damaged such as furniture on the first floor of a flooded home, and costs from crop damage or loss. Damage to transportation infrastructure may occur during a tropical cyclone event, like a road being washed out, a bridge collapsing, and/or closure of major transportation networks. If water and/or wastewater infrastructure is impacted, clean water may be inaccessible, and wastewater may be discharged or be difficult to manage. Damage to hazardous waste facilities could result in the release of hazardous materials.

Environment

Environmental impacts caused by tropical cyclone events may include beach and dune erosion, downed trees, and eroded riverbanks. Release of hazardous materials can contaminate or damage the environment. Additional impacts may include loss or damage to habitat for animals because of flooding or high winds, crop damage or loss, event generated marine debris impacting waterway navigation and submerged wetland habitats.

Economic Condition

The economic condition of the jurisdictions may be affected by damaged and destroyed business leading to long-term closures and possibly permanent closures. The City of Crystal River may be more impacted than unincorporated Citrus County or the City of Inverness due to the heavy reliance on water-based industries. Impacts may also include delayed re-opening of business because of utility issues, and road blockages. Crop damage or loss is another potential economic impact that may result from flooding and high winds. Businesses are likely to struggle due to absenteeism from work.

Public Confidence in the Jurisdiction's Governance

Public confidence in the jurisdiction's governance may be impacted if evacuations are not ordered in time or if shelters are not opened. Public confidence may also suffer if warnings are not communicated effectively or if the jurisdiction is communicating too frequently. Public confidence may also be eroded by over exaggeration of possible storm impacts, especially if the storm doesn't have expected impacts.

Hazard Ranking

The LMS Working Group determined tropical cyclones to be a high priority hazard in Citrus County. As described in the profile above, the impacts of tropical cyclones within the county are common with an annual probability of 10 -100%. Tropical cyclone events may have a high range of impact, accounting for annual damages that exceed $102,000,000, as was the case after hurricane Hermine caused storm surge flooding in 2016. The probable hazard magnitude for tropical cyclone is high because of the potential for catastrophic damage across a large special extent. Table 3-16 outlines the hazard rankings for each of the hazard priority criteria related to tropical cyclones.

Table 3-16 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Likely	Catastrophic	Large	More than 24 hours	Less than 1 week	**3.0**
3.0	4.0	4.0	1.0	3.0	

3.3.7 Vulnerability Analysis

Based on the American Community Survey (ACS) data from 2017, there are over 40,000 people living in the tropical cyclone storm surge area. Nearly all of the City of Crystal River is located within the storm surge risk area making its population of 3,059 is vulnerable to storm surge during a tropical cyclone event. The City of Inverness is not susceptible to storm surge. Table 3-17 shows the breakout of population located in the storm surge area by the tropical cyclone storm category.

Table 3-17 – Population in Storm Surge Area

Category	**Total**
Tropical Storm	11,448
1	5,789
2	12,554
3	3,371
4	4,219
5	3,601
Total	**40,982**

Citrus County is vulnerable to damage from hurricanes and tropical storms. Damages from these events combine storm surge, high winds, and inland flooding. Table 3-18 shows the number of properties that are vulnerable to a category 5 storm surge, as well as estimated dollar losses from a surge event.

Table 3-18 - Citrus County Values and Buildings Vulnerable to Storm Surge

Jurisdiction	**Number of Properties within Category 5 storm surge area**	**Number of Buildings**	**Building Value (Improved Value)**	**Land Value**
Citrus County (Unincorporated)	33,141	20,046	$ 2,078,766,752	$ 1,348,218,494
Crystal River	2,820	2,082	$ 348,301,750	$ 220,913,180
Total	35,961	22,128	$2,427,068,502	$1,569,131,674

The Ozello Water Associations' elevated tank is subject to tropical storm Bayfront Health 7 Rivers hospital is located within the category 2 storm surge area. A portion of the natural gas pipeline is in the storm surge hazard area, as well as the Crystal River Energy Complex. Table 3-19 identifies the other categories of critical facilities that are in the storm surge hazard area.

Table 3-19 - Critical facilities in Storm Surge Hazard Areas

	Unincorporated Citrus County	City of Crystal River	Total
Airports	1	1	2
Assisted Living Facilities	3	3	6
Electrical Utility Facility	7	1	8
Fire Station	2	1	3
Government Building	3	2	5
Health Care Center	1	1	2
Nursing Home	0	2	2
Schools & Shelters	4	3	7
Potable Water	1	0	1
Wastewater	1	1	2

3.4 Severe Storms

3.4.1 Description

Thunderstorms are forms of convection produced when warm moist air is overrun by dry cool air. As the warm air rises, thunderhead clouds (cumulonimbus) form and cause the strong winds, lightning, thunder, hail, and rain associated with these storms. Instability can be caused by surface heating or upper-tropospheric (-50,000 feet) divergence of air (rising air parcels can also result from airflows over mountainous areas). Generally, the former "air mass" thunderstorms form on warm-season afternoons and are not severe. The latter "dynamically-driven" thunderstorms generally form in association with a cold front or other regional-scaled atmospheric disturbance. These storms can become severe, thereby producing strong winds, frequent lightning, hail, downbursts, and even tornadoes.

Heavy rain from thunderstorms can lead to flash flooding. Strong winds, hail, and tornadoes are also dangers associated with some thunderstorms. Of the estimated 100,000 thunderstorms that occur each year in the U.S., only about 10 percent are classified as severe. The three key elements of a thunderstorm are wind, water, and lightning. The National Weather Service (NWS) considers a thunderstorm severe if it produces hail at least one inch in diameter, winds of 58 mph or stronger, or a tornado.[44]

Lightning

Lightning is defined as a sudden and violent discharge of electricity from within a thunderstorm due to a difference in electrical charges and represents a flow of electrical current from cloud-to-cloud or cloud-to-ground. Nationally, lightning causes extensive damage to buildings and structures, kills or injures people and livestock, starts untold numbers of forest fires and wildfires, and disrupts electromagnetic transmissions.

[44] 2018 Florida Statewide Hazard Mitigation Strategy.

Lightning is extremely dangerous during dry lightning storms because people remain outside due to the lack of precipitation; however, lightning is still present during the storm.

To the general public, lightning is often perceived as a minor hazard. However, Lightning-caused damage, injuries, and deaths establish lightning as a significant hazard associated with any thunderstorm in any area of the State. According to the U.S. National Weather Service, the highest death rates in the United States are in Florida.

Hail

Hail is frozen precipitation that can occur during a thunderstorm. Hail forms when raindrops freeze into balls of ice and usually range in size from ¼ inch in diameter to 4 ½ inches in diameter. Damage from hail increases with the size of the hail and can cause damage to vehicles, aircraft, and homes and can be fatal to people and livestock. However, Florida thunderstorms do not often include hail because the hailstones usually melt before they reach the ground because of the generally warm temperatures in the state.[45]

Straight-line winds

Severe Storms often include strong winds that are called "straight-line" winds and are different than the winds in tornadoes. These damaging winds exceed 50-60 mph and can reach up to 100 mph. Damage from these winds is more common than damage form tornadoes in the continental US. Straight line winds form as a result of outflow from a thunderstorm downdraft.[46]

Tornadoes

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. Tornado wind speed normally ranges from 65 mph to over 200 mph. The maximum winds in tornadoes are often confined to extremely small areas and vary tremendously over very short distances, even within the funnel itself. Additionally, these storms typically travel around 10 to 20 mph, but can move at more than 60 mph. Tornadoes can occur at any time of the year and at any time of day. Tornadoes develop under three scenarios: (1) along or ahead of a squall line ahead of an advancing cold front moving from the north; (2) in connection with thunderstorm squall lines during hot, humid weather; and (3) within a tropical cyclone.

The most common, and often the most dangerous, tornadoes come from a supercell thunderstorm. Non-supercell tornadoes form because of spinning air already near the ground, caused by wind shear. These include a gustnado, a whirl of debris with no condensation funnel; a landspout, a narrow condensation funnel that develops while the thunderstorm is still growing; and a waterspout, a landspout that occurs over water.

Florida has two tornado seasons, the spring and summer. The deadly spring season is from February through April, and is characterized by powerful tornadoes associated with squall lines. The summer tornado season runs from June until September and has the highest frequencies of storm generation, with usual intensities of EF0 or EF1 on the Enhanced Fujita Scale. This includes those tornadoes associated with land-falling tropical cyclones.

<u>Potential Effects of Climate Variability on Severe Storms and Tornadoes</u>

[45] http://www.nssl.noaa.gov/education/svrwx101/hail/
[46] http://www.nssl.noaa.gov/education/svrwx101/wind/

Higher temperatures and humidity may increase atmospheric instability associated with the generation of severe thunderstorms and tornadoes. However, vertical wind shear could also decrease, resulting in fewer or weaker severe thunderstorms and tornadoes.[47] However, decreases in vertical wind shear are most likely to occur when convective available potential energy (CAPE) is high in spring and summer months, which could result in more frequent severe storms. Furthermore, days with high CAPE are also likely to occur during times of the year with strong low-level wind shear, increasing the likelihood of the most severe storm events, including tornadoes. [48]

There has been an increase in the number of severe storm and tornado reports over the last 50 years. However, it is believed that this increase is attributed to the technology improvements that allow for better identification and reporting of such storms.

3.4.2 Location

Severe storm events can occur anywhere within the County, including the City of Crystal River and the City of Inverness. Figure 3-6 below shows the path of thunderstorm winds that impacted Citrus County between 1955 and 2017. As shown, severe storms can impact any portion of the county.

Another component of severe storms is hail. Although hail events are less frequent in Florida than other parts of the country due to the high temperatures, hail events have been recorded in nearly all areas of Citrus County. Figure 3-7 shows the location of severe hail events between 1955 and 2017. A hail storm with hail 2 inches in diameter was recorded in May of 2003.

[47] 1 Seneviratne et al. (2012). Changes in climate extremes and their impacts on the natural physical environment. In Field et al. (Eds.), Managing the risks of extreme events and disasters to advance climate change adaptation, p. 159. https://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf., pp. 151-155; National Oceanic and Atmospheric Administration (NOAA) (2013). Tornadoes, climate variability, and climate change. State of the science fact sheet. http://nrc.noaa.gov/sites/nrc/Documents/SoS%20Fact%20Sheets/SoS_%20Fact_Sheet_Tornado%20and%20Climat e_FINAL_Sept2017.pdf?ver=2017-12-05-115742-360., pp. 1-2. Diffenbaugh, et al. (2013). Robust increases in severe thunderstorm environments in response to greenhouse forcing. Proceedings of National Academy of Sciences. doi/10.1073/pnas. 1307758110., http://www.pnas.org/content/110/41/16361.full.

[48] Diffenbaugh et al. (2013), http://www.pnas.org/content/110/41/16361.full., p. 1.

Figure 3-6: Citrus County Severe Storms Wind Events (1955 – 2017)

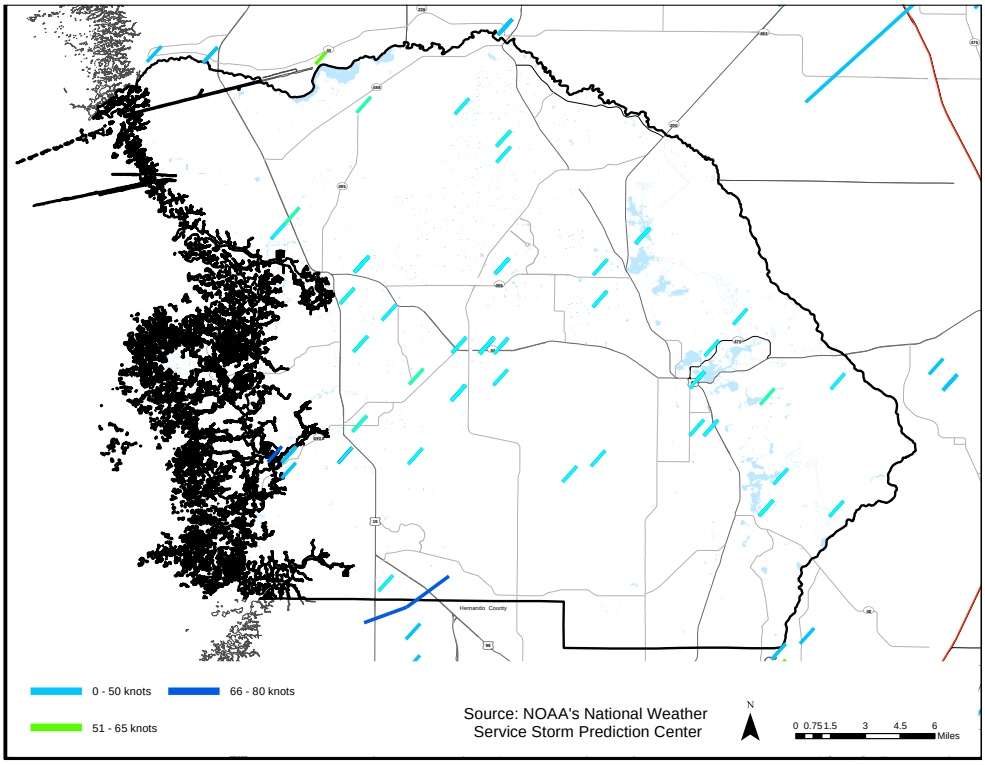
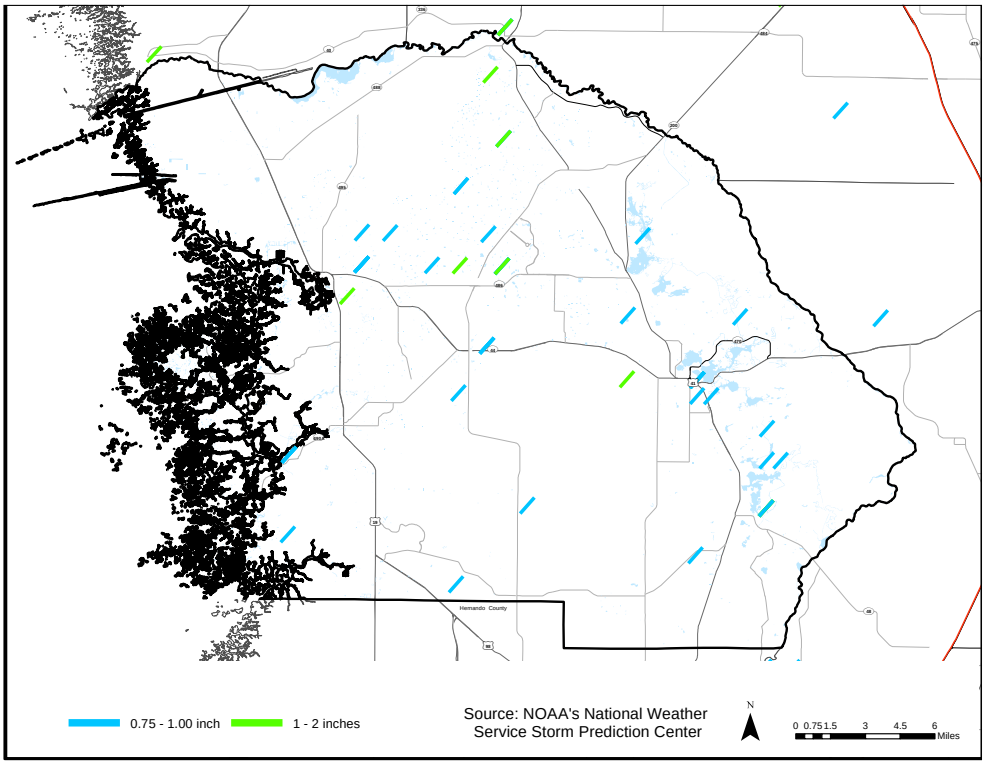
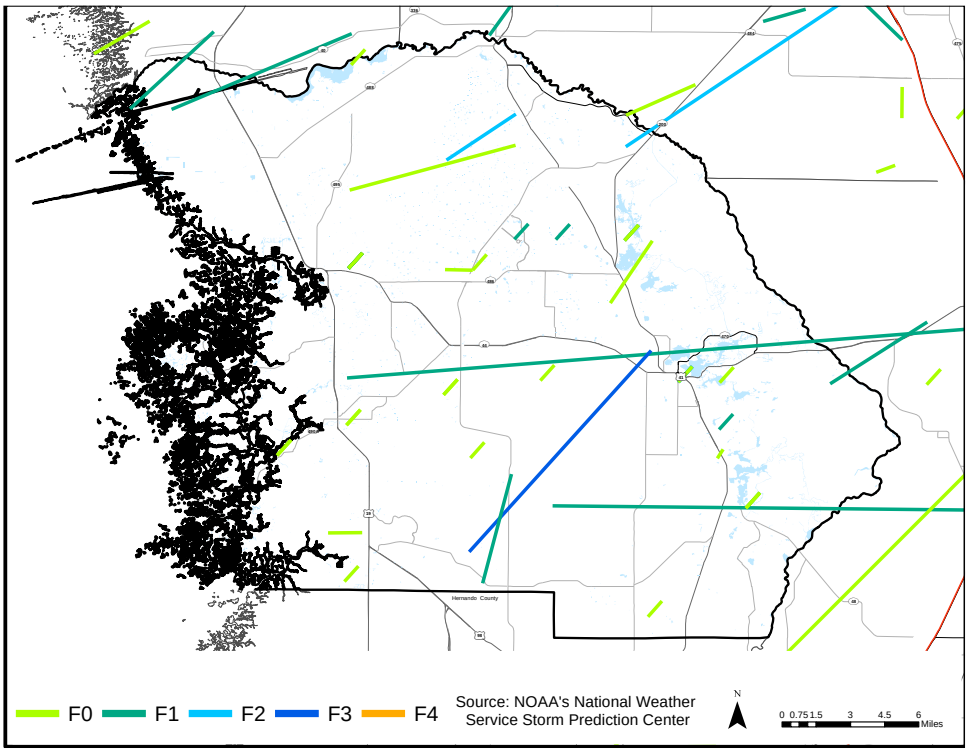


Figure 3-7 - Citrus County Hailstorms by Their Magnitude (1955 – 2017)



Like severe storms, tornadoes can also strike anywhere in the County, as well as the City of Inverness and the City of Crystal River. Tornadoes cannot be predicted and can vary in the path they take depending on weather patterns. More than one tornado can touch down in the County from the same storm system. Figure 3-8 shows the path of tornadoes in Citrus County that occurred between 1950 and 2017.

Figure 3-8: Citrus County Tornados and Their Magnitude (1950 – 2017)



3.4.3 Extent

The National Weather Service (NWS) considers a thunderstorm severe if it produces hail at least one inch in diameter, winds of 58 mph or stronger, or a tornado. According to NCEI storm event data, the highest recorded thunderstorm winds were 75 knots (86 mph). The largest hail recorded in the county was 2 inches in diameter. The most severe tornado recorded in Citrus County was an F3.

While there is no established index for lightning, a lightning strike is considered to be of minimum severity when it has limited impacts on infrastructure (ex. tree limbs) and major severity when it causes extensive damage (ex. Loss of life, fire, structural damage). The potential damages resulting from lightning strikes are primarily loss of life, business interruption, fire and minor structural damage. A false sense of security often leads people to believe that they are safe from a lightning strike because it may not appear to be near their location. However, lightning can strike 10 miles away from a rain column, which puts people that are still in clear weather at risk.

Tornadoes are measured by their intensity or their wind speed, and their area, using the Enhanced Fujita (EF) Scale. The scale ranges from EF 0, with minor damages from winds ranging 65-85 mph, to EF 5 with severe damages from winds in excess of 200 mph.

Table 3-20 - Enhanced Fujita Tornado Damage Scale[49]

EF Number	Estimated 3-second gust (mph)	Typical Damage
0 (Gale)	65 to 85 mph	Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; damaged sign boards.
1 (Weak)	86 to 110 mph	Surfaces peeled off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
2 (Strong)	111 to 200 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
3 (Severe)	136 to 165 mph	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
4 (Devastating)	166 to 200 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
5 (Incredible)	Over 200 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.

3.4.4 Previous Occurrences

There have been 5 federal disaster declarations related to severe storms and 1 federal disaster declaration for a tornado in Citrus County.[50] There have been 297 reports of thunderstorms (hail, lightning, thunderstorm wind, tornado) since 1950, when the National Weather Service began keeping track of these occurrences. Damages recorded for these events which caused $12.77 million dollars of property damages and $30.25 thousand dollars of crop damage. Not all damages or events are captured in the National Weather Service data so this is likely a more conservative dollar figure than actual damages. The most costly severe storm event occurred in 1993 when an F1 magnitude tornado caused $5 million of damage in Crystal River.

There have been 153 thunderstorm wind events, 23 lighting event, 48 tornados, and 73 hail events recorded in Citrus County according to the NCEI Storm Events Database. The likelihood and potential severity of thunderstorm/lightning/hail events can be assessed by reviewing the number and severity of thunderstorm events that have occurred in Citrus County's history. Of the 153 thunderstorm wind events, 90 did not have a recorded magnitude within the NCEI database. Of the remaining 63 recorded events, the recorded wind

[49] http://climatecenter.fsu.edu/topics/tornadoes
[50] https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties

speeds varied from 39 to 75 knots. Table 3-21 shows the distribution of events by recorded wind speed, where the maximum wind speeds for an average thunderstorm are in the range of 50 to 59 mph.

Table 3-21 – Frequency of Thunderstorm Wind Events

Wind Speed (knots)	Number of Events
Not Recorded	90
30-39	1
40-49	8
50-59	39
60-69	11
70-79	4
Total	153

3.4.5 Probability

Because of the high frequency of thunderstorms recorded in Citrus county in the past, it is reasonable to assume that Citrus County will experiences severe storms again in the future. The probability of a severe storm event affecting Citrus County, the City of Crystal River or the City of Inverness is Highly Likely, with an annual probability of at least 100%. Based on previous occurrences Citrus county is likely to experience at least two severe storm events per year.

Because severe storms can strike anywhere in the County, it is assumed that the probability is the same for Unincorporated Citrus County, the City of Crystal River, and the City of Inverness.

3.4.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by severe storms are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River.

Public

Impacts to the public during or after a severe storm event may include injury or death due to lightning strikes, dangerous hail, flying debris, or tornadoes. Residents who have inadequate shelter, including those that are in their car at the during a severe storm event are at increased risk of death or injury. Car accidents are also likely during severe storm events. Members of the public may experience survivors' guilt if their house wasn't damaged from a severe storm or tornado while their neighbors suffered property damage, injury, or death.

First Responders

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

Continuity of Operations (including continued delivery of services)

Thunderstorms often cause power outages from wind damage to power lines or lightning damage to power stations or other electrical infrastructure.

Property, Facilities, Infrastructure

Factors that contribute to the vulnerability from tornadoes are the abundance of pre-engineered structures located in Citrus County (including manufactured housing and metal buildings) and recreational vehicles.

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

Other utilities, including underground pipelines, may be impacted if not protected from exposure. Communications networks are vulnerable to severe weather conditions if not properly protected from exposure or severe natural forces. Most public safety communications systems within the County are protected from the elements and are secure from interruption during a severe storm. Commercial communications networks are also protected and, unless severely impacted, are expected to remain operational during most severe storms; however, the communication systems in the County, as well as the City of Crystal River and the City of Inverness went down twice during the 2004 hurricane season. The loss in communications also impacted the County's 911 Center.

Environment

Impacts to the environment during a severe storm event may result from strong winds, flooding, and tornadoes. There may also be severe damage to vegetation in localized areas from a tornado.

Economic Condition

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

Public Confidence

Power outages for extended periods may give the appearance that the jurisdictions do not know how to restore power.

Hazard Ranking

The LMS Working Group determined severe storms to be a high priority hazard in Citrus County. As described in the profile above, the impacts of severe storms within the county are common with an annual probability of approximately 2 storm events per year. Severe storm events may have a wide range of impacts, accounting for damages that exceed $5 million, as was the case in 1993 when an F1 tornado struck Crystal River. Table 3-22 outlines the hazard rankings for each of the hazard priority criteria related to severe storms.

Table 3-22 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	2.8
4.0	3.0	3.0	3.0	1.0	

3.4.7 Vulnerability Analysis

Population

Occupations that are generally performed outdoors would be the most susceptible to the dangers of lightning include: Landscapers, tree trimmers and mowers, roofers, residential and commercial construction employees, utility workers (cable, telephone, electricity), delivery drivers, lifeguards, farmers, emergency workers (law enforcement and emergency medical services), marine patrol, marine industry workers, painters, sanitation workers, foresters, and road construction crews. Based on American Community Survey data there 11.2% of the employed population of Citrus county is employed in agriculture or construction.

Table 3-23 - Severe Storms Vulnerable Workers[51]

	Number of Workers	Percent of employed population
Civilian employed population 16 years and over	45,294	100%
Agriculture	619	1.4%
Construction	4,454	9.8%

Property

Severe storms can occur anywhere in the County and depending on factors such as wind and weather patterns, all of the assets in the county, City of Crystal River or City of Inverness may be vulnerable. Tornados will not result in 100 percent countywide damages, but rather a path of damages that will vary based on the location of the structure in relation to the path of the tornado and based on the type, size, and construction of the structure. Lightning strikes may be more problematic for older electrical systems. As such, all assets within the county that include mobile homes and pre-2002 construction may be slightly more vulnerable to severe storm events. In 2002 the Florida Building Code superseded all local building codes, making construction requirements across the state more uniform. Table 3-24 shows the estimated dollar losses from a severe storm event.

Table 3-24 Severe Storms – Vulnerable Structures

Jurisdiction	Vulnerable Residential Structures (pre-2002 construction)	Vulnerable Commercial Structures (pre-2002 construction)	Number of Mobile Homes	Total Building Value (Mobile homes and pre-2002 construction)
Citrus County (Unincorporated)	54,592	2,576	15,695	$ 5,284,397,996
Crystal River	1,481	460	5	$288,254,086
Inverness	2,921	505	23	$421,593,092
Total	58,994	3,541	15,723	$5,994,245,174

Hailstorms associated with thunderstorms, are not limited to any particular area of the county, but may be associated with damage to roofs, skylights, windows, patio furniture and automobiles. If blizzard conditions were to occur, freezing conditions could be debilitating to the elder population living in older housing with no heating.

Critical Facilities

Severe storms can strike anywhere in the county; therefore, all of the critical facilities are equally vulnerable and at risk. However, severe storms do not always impact structures. Severe storm impacts to structures, including critical facilities, could include flooding, wind, tornadoes, hail, and lighting. Please refer to the Flood Hazard Profile for the 100- and 500-year floodplain vulnerability and loss estimations. Because of

[51] U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

the Florida Building Code, and the speed of most winds during severe storms, most structures do not sustain damage. This is because most buildings are built to withstand hurricane force winds and severe storms often do not have high wind speeds. Tornadoes, however, may cause damage to critical facilities. Hail is unlikely to cause damage to critical facilities. Lightning impacts on structures are minimal.

Several critical facilities in unincorporated Citrus County were built prior to 2002 including the several fire stations, the Lecanto Government Building, and the Citrus County Jail. Critical facilities built prior to 2002 in the City of Inverness includes the Fire Department, and the City of Inverness Public Works Department. Pre-2002 construction located in the City of Crystal River includes City Hall and the Crystal River Fire Station.

3.5 Wildfire

3.5.1 Description

A wildfire is an uncontrolled fire spreading through vegetative fuels, such as brush, marshes, grasslands, or field lands, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the area for miles around. Wildfires may also be called forest fires. For the purpose of this analysis, the term wildfire will be used. The causes of these fires include lightning, human carelessness, and arson. An Urban-Wildland Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

Urban/wildland interface areas can be classified into the following types:

The **mixed interface** contains structures that are scattered throughout rural areas. Usually, there are isolated homes surrounded by larger or smaller areas of land.

An **occluded interface** is characterized by isolated (either large or small) areas within an urban area. An example may be a city park surrounded by urban homes trying to preserve some contact with a natural setting.

A **class interface** is where homes, especially those crowded onto smaller lots in new subdivisions, press along the wildland vegetation along a broad front. Vast adjacent wildland areas can propagate a massive flame front during a wildfire, and numerous homes are put at risk by a single fire.

In response to increasing demand for more accurate and up-to-date wildfire risk information, the Southern Group of State Forester (SGSF) embarked on a wildfire risk assessment for the entire Southeastern Unites States. The goal of the Southern Wildfire Risk Assessment (SWRA) project was to provide a consistent, comparable set of scientific results to be used as a foundation for wildfire mitigation and prevention planning in the Southern states. The SWRA data has been in use since, and Florida has undertaken updates in recent years. Products from SWRA incorporated into this LMS include the Wildland Urban Interface, WUI Risk Index, and Burn Probability maps and data.

Potential Effects of Climate Variability on Wildfire

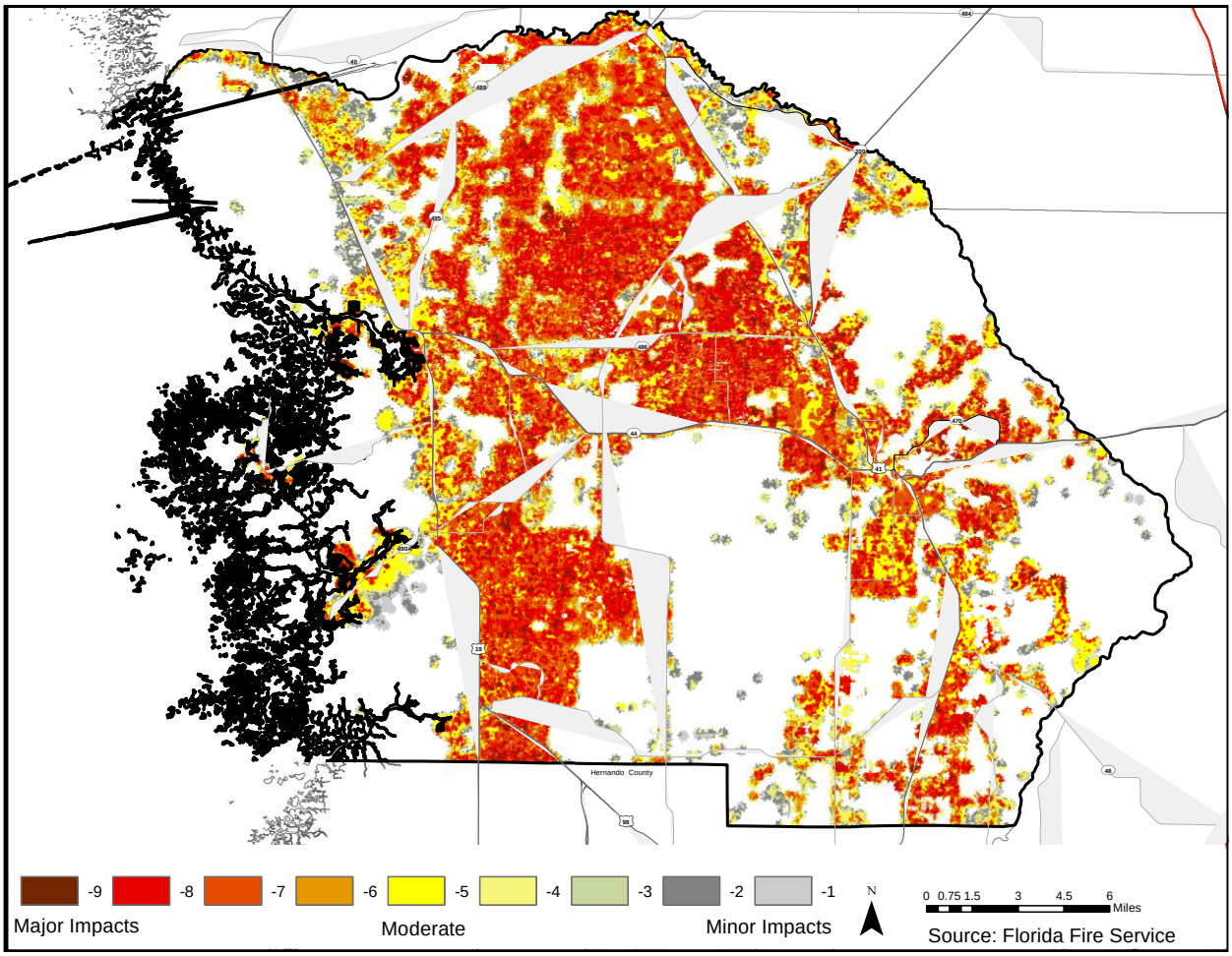
The increased frequency or intensity of extreme heat or drought events, due to the augmenting of existing fuel flammability, could affect wildfire behavior. Changes in vegetation types could also alter fuel mixtures. Reducing moisture of living vegetation, soils, and decomposing organic matter during drought or extreme heat events is associated with increased incidence of wildfires. Furthermore, changes over time in vegetation types could change the mixture and flammability of fuels. As these transitions occur, wildfire occurrences and severity could increase with the introduction of more flammable vegetation types or decrease with the

introduction of more fire-resistant species. As the flood hazard profile discussed that arid areas may become drier and moist areas to become wetter. Florida has weather patterns that lead to both dry and wet periods each year. Climate change may cause one or the other, or both to increase in occurrences and magnitude.

3.5.2 Location

The Wildland Urban Interface (WUI), Risk Index layer, is a rating of the potential impact of wildfire on people and their homes. The key input, WUI, reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the Wildland Urban Interface and rural areas is key information for defining potential wildfire impacts to people and homes. The range of values is from -1 to -9, with -1 representing the least negative impact and -9 representing the most negative impact. For example, areas with high housing density and high flame lengths are rated -9, while areas with low housing density and low flame lengths are rated -1.

Figure 3-9 - WUI Risk Index



The total WUI region representing a 1-mile boundary around all conservation lands and forest areas is 183 miles, and communities within these buffer areas have the greatest exposure to wildland fire threats. The US Forest Service, in coordination with the State's Forest Service, conducted a community at risk assessment that

identified a region or a community's exposure to wildland fire threats in the categories of low, medium, and high. This assessment was updated in 2017 and 2019 to reflect the county's communities at risk and their vulnerability ratings as are listed in the table below. Based on the 2017 update, Citrus County had 8 communities/regions rated at medium risk and 4 rated as high risk.

Table 3-25 - Citrus County Communities at Risk (CARs) as of 2017 DOF Review

Communities	**2004**	**2008**	**2015**	**2017**
Apache Shores	Low	Low	Low	Low
Arrowhead	Medium	Medium	Medium	Medium
Black Diamond			Low	Low
Beverly Hills	Medium	Low	Low	Low
Cardinal Area Lecanto (Added in 2019)				
Chassahowitzka	Medium	High	High	High
Citronelle	Medium	Medium	Medium	Medium
Citrus Springs	Medium	Medium	Medium	Medium
Crystal River	Medium	Medium	Medium	Medium
Derosa	Medium	High	High	High
Floral City	Low	Low	Low	Low
Hernando	Low	Low	Low	Low
Highlands	Low	Low	Low	Low
Holder	Medium	Low	Low	Low
Homosassa	Medium	Medium	Medium	Medium
Homosassa Springs	Medium	Medium	Medium	Medium
Inverness	Low	Low	Low	Low
Lecanto	Medium	Low	Low	Low
Oak Forest	Medium	Low	Low	Low
Pineola	Medium	Low	Medium	Medium
Red Level	High	High	High	High
Sugarmill Woods	Medium	Medium	Medium	Medium
Trails End	Low	Low	Low	Low
Yankeetown	Low	Medium	High	High

3.5.3 Extent

The worst wildfire recorded in recent history (March 15, 2000) consumed 600 acres of brush and timber along the U.S. Highway 19 corridor between Crystal River and County Road 488. Therefore the extent of wildfire is 600 acres. Extent can be determined by loss of property or threatened homes.

Fires can be rated based on their fire danger rating, which indicates the predominant fuel types and their capacity to ignite and burn. The table illustrates the fire rating used for various fuel types.

Table 3-26 – Fire Danger Rating Descriptions

Rating	Description
Low	Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely for a few hours after rain, but wood

	fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
Moderate	Fires can start from most accidental causes, but, with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur but is not persistent. Fires are not likely to become serious, and control is relatively easy.
High	All fine dead fuels ignite readily, and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly, and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
Very High	Fires start easily from all causes and immediately after ignition, spread rapidly, and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.

3.5.4 Previous Occurrences

During the previous LMS period from 2010 until the summer of 2015, Citrus County has experienced, on an annual average, moderate drought conditions with occasional brief periods of severe drought. 2015-2019 the County has experienced above-average rainfalls with the exception of 2017. Approximately 32% of the county's total acreage is wetlands, and the prolonged drought conditions have resulted in more loss of surface water and exposure of bottomlands. For the 2014-2019 time period, the county has experienced, on average, 41.8 wildland fires per year (Forest Service suppression actions only) based on the numbers provided by the Withlacoochee Forestry Center. With the exception of 2017, the number of acreages consumed since 2014 has steadily increased, as displayed in the table below. Between 2014 and 2019, excluding prescribed fire, lightning, and incendiary were the most prevalent causes of wildfires that consumed the largest number of acres. Potential risks of wildfire include destruction of land, property, and structures, as well as injuries and loss of life. Historically 2017 was a high Wildfire Occurrence year for the state of Florida. In January 2017, Citrus County experienced the Ash White Wildfire. The fire destroyed one outbuilding, threatened 20 Homes, 10 outbuildings, and almost led to the evacuation of the Bayfront Health Seven Rivers hospital. However, it was contained at 70 acres. The same year lightning struck a dry swamp resulting in the Cod Drive wildfire, threatening 12 homes, and was contained to 850 acres. Overall, from 2014 to 2019, impacts from wildfire included destruction of structures, and forested land only, with no recorded injuries or loss of life.

Table 3-27 - Citrus County Wildfire Occurrence Rate/Acres Burned Per Calendar Year

Year	#Fires	Acres Consumed
2014	19	88.7
2015	30	637.5
2016	49	774.3
2017	64	1,225.8
2018	36	527.1
2019	53	730.4

Figures provided by the Withlacoochee Forestry Center

3.5.5 Probability

The majority of the county fuel types are grass and shrub beneath timber overstory. These types of fuels are predominantly light fuel, which makes them more susceptible to vegetative drying during drought conditions and increases the probability of ignition. Of the county's 373,780 acres of drylands (which are typical of the major fuel type) 187,700 acres, nearly half of the lands are owned and managed by Federal, State, and County agencies. These agencies all conduct proactive fuel management programs, such as prescribed burning and mowing operations, to minimize the wildland fire hazards of the communities within the WUI areas. However, the prolonged drought conditions over the past several years have increasingly limited their ability to conduct prescribed burn operations. As a result, the fuel loads within these areas have increased as well as the ignition probability from both human and natural causes.

During the period of 2014-2019, Citrus County experienced an average of 41.8 wildfires per year, based on the Withlacoochee Forestry Center dataset.

3.5.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by wildfire are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River.

From 2014 to 2019, impacts from wildfire included the destruction of structures, and forested land only, with no recorded injuries or loss of life. Therefore, the impacts discussed in this section relate to possible future events. Often more devastating than the fire itself is the further impacts that develop from the wildfire event. Smoke and other emissions contain pollutants that can cause significant health problems. Short- term loss caused by a wildfire can include the destruction of timber, habitats for wildlife, scenic landscapes, and watersheds. With the destruction of watersheds the flooding vulnerability increases. Long-term effects include smaller timber harvests, reduced access to impacted recreational areas, and destruction of cultural and economic resources and community infrastructure. To those directly affected by the fire, the impact is significant. However, the economic impact would be extremely small.

There have been several areas identified by the Florida Department of Agriculture and Consumer Services Forest Service as potential problem areas. These areas include the Withlacoochee State Forest and the smoke-sensitive buffer areas along the major transportation routes. A significant number of people would be impacted by a wildfire, especially populations living or working in close proximity of the Withlacoochee State Forest, residents with asthma or other respiratory sensitivity, and very young and elderly residents. Wildfires and urban interface fires would have a great impact on the areas adjacent to the Withlacoochee State Forest, including the City of Crystal River and the City of Inverness. Figure 3-9 (WUI Risk Index) above shows areas that are susceptible to major impacts due to wildfire.

Public

Residents may experience injury or death during wildfires, possibly due to direct contact with fire, smoke inhalation, vehicle accidents due to decreased visibility because of smoke during evacuation.

First Responders

First, Responders may experience injury or death while suppressing wildfire (especially during high wind conditions), vehicle accidents due to decreased visibility, evacuation and rescue missions, or smoke inhalation.

Continuity of Operations

Continuity of Operations may be impacted during wildfire events leading to an inability to operate businesses if evacuations are ordered, leading to lost wages and revenue, Employee truancy (absenteeism) if employees are evacuated, or blocked transportation routes because of decreased visibility possibly affecting the delivery of services.

Property, Facilities, Infrastructure

Property, facilities, and infrastructure may experience damage or loss to personal structures or businesses, critical infrastructures such as schools, hospitals, government buildings, utilities, etc. or agricultural crops and timber, which leads to loss of income and revenue.

Environment

The environment may experience damage or loss to large forested areas and habitats.

Economic Condition

Impacts to economics conditions include closures of businesses in evacuation areas leading to lost wages and revenue, Employee absenteeism leading to forced business closure which results in lost wages and revenue, Damage or losses to agricultural crops and timber, which leads to loss of income and revenue, and a loss of tourism if wildfires are in popular tourist areas.

Public Confidence

Public Confidence in a Jurisdiction's Governance may be affected by a loss of confidence if evacuations not ordered, messaged, and coordinated effectively, or if many deaths resulted from wildfires from those that did not evacuate.

Hazard Ranking

The LMS Working Group determined wildfire to be a high priority hazard in Citrus County. As described in the profile above, wildfire events within the county are common events with an annual probability of approximately 41.8 wildfires per year. Wildfire events may have a high range of impact.

The probable hazard magnitude for wildfire is high because of the potential for injury or death and less than a 24-hour warning time before the event. The table outlines the hazard rankings for each of the hazard priority criteria related to wildfire.

Table 3-28 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Highly Likely	Minor	Moderate	Less than 6 hours	Less than 1 week	**3.0**
4.0	1.0	3.0	4.0	3.0	

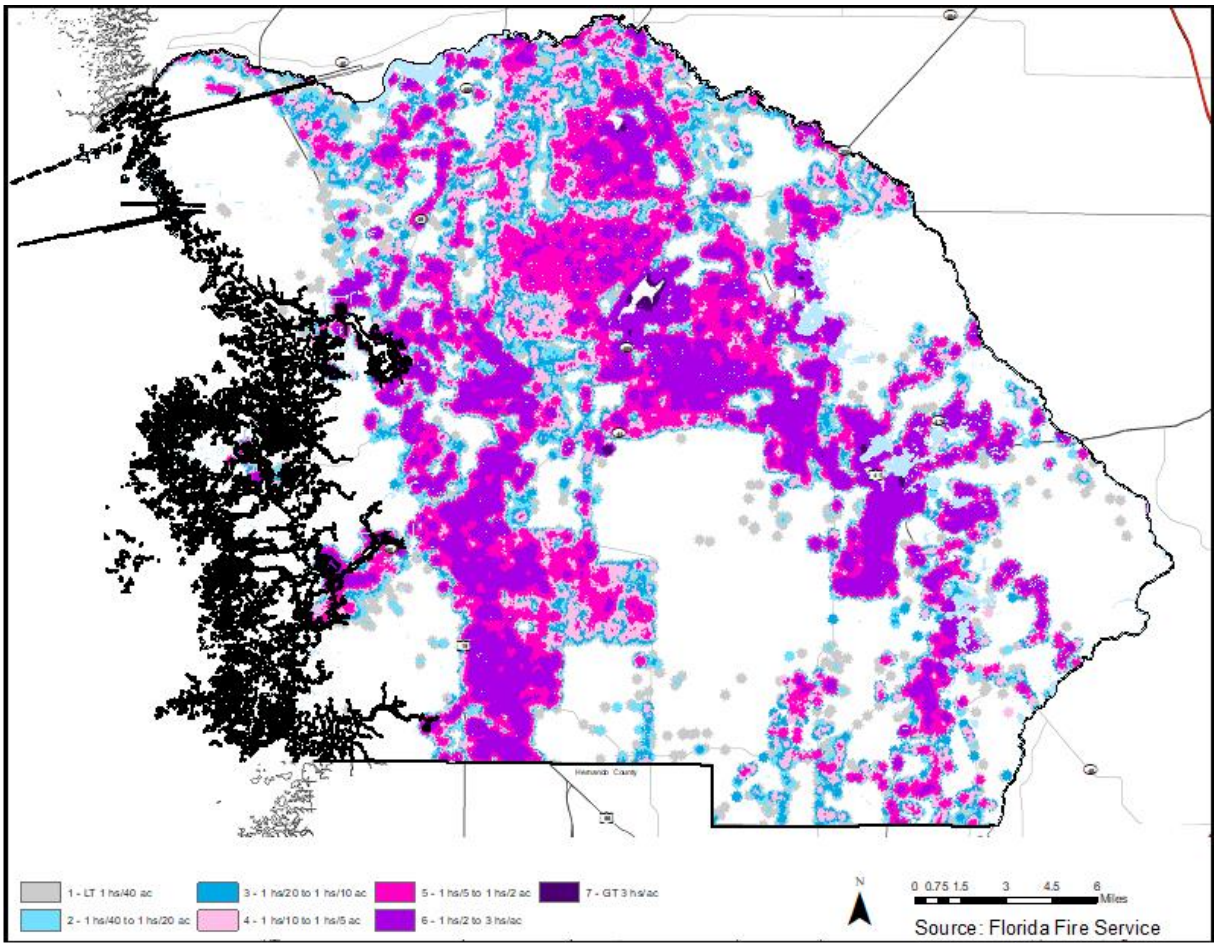
3.5.7 Vulnerability Analysis

WUI housing density is categorized based on the standard Federal Register and U.S. Forest Service SILVIS data set categories, long considered a de facto standard for depicting WUI. However, in the SWRA WUI data the number of housing density categories is extended to provide a better gradation of housing distribution to meet specific requirements for fire protection planning activities. While units of the actual data set are in houses per sq. km., the data is presented as the number of houses per acre to aid with interpretation and use by fire planners in the South.

In the past, conventional wildland urban interface data sets, such as USFS SILVIS, have been used to reflect these concerns. However, USFS SILVIS and other existing data sources do not provide the level of detail for defining population living in the wildland as needed by Southern state WUI specialists and local fire protection agencies.

The SWRA WUI dataset is derived using advanced modeling techniques based on the SWRA Where People Live (housing density) dataset and 2012 LandScan population count data available from the Department of Homeland Security, HSIP Freedom Data Set. WUI is simply a subset of the Where People Live dataset.

Figure 3-10 – Wildland Urban Interface (WUI) Density



The primary difference between the WPL and WUI is that populated areas surrounded by sufficient non-burnable areas (i.e. interior urban areas) are removed from the Where People Live data set, as these areas are not expected to be directly impacted by a wildfire. Simply put, the SWRA WUI is the SWRA WPL data with the urban core areas removed. Data is modeled at a 30-meter cell resolution, which is consistent with other SWRA layers. The following table shows the total population for each WUI area within the project area.[52] Based on this analysis provided by the Florida Fire Service, there are 137,950 people living in the WUI.

[52] Southern Wildfire Risk Assessment Summary Report. Citrus County. Generated October 4, 2019.

Table 3-29 WUI Population[53]

	Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
	LT 1hs/40ac	342	0.2 %	22,392	10.8 %
	1hs/40ac to 1hs/20ac	747	0.5 %	17,773	8.6 %
	1hs/20ac to 1hs/10ac	2,199	1.6 %	23,823	11.5 %
	1hs/10ac to 1hs/5ac	7,585	5.5 %	35,746	17.2 %
	1hs/5ac to 1hs/2ac	30,161	21.9 %	54,939	26.5 %
	1hs/2ac to 3hs/1ac	93,484	67.8 %	52,086	25.1 %
	GT 3hs/1ac	3,432	2.5 %	512	0.2 %
	Total	**137,950**	**100.0 %**	207,271	100.0 %

According to property appraiser data there are 76,312 buildings located in the WUI area with a total building value of $8.5 billion.

Table 3-30 - Distribution of Structures in the WUI

Jurisdiction	Number of Properties within the WUI	Number of Buildings	Building Value (Improved Value)	Land Value
Citrus County (Unincorporated)	132,210	70,535	$ 7,758,013,506	$ 3,102,559,621
Crystal River	2,790	2,061	$ 344,675,133	$ 218,246,680
Inverness	6,087	3,716	$ 487,483,686	$ 166,139,920
Total	141,087	76,312	$8,590,172,325	$3,486,946,221

Due to the large geospatial extent, many of the critical facilities are located within the Wildland Urban Interface. Table 3-30 summarizes the other critical facilities that are in the flood hazard area.

[53] Southern Wildfire Risk Assessment Summary Report. Citrus County. Generated October 4, 2019.

Table 3-30 - Critical Facilities in WUI

	Unincorporated Citrus County	City of Crystal River	City of Inverness	Total
Airports	2	1	0	3
Assisted Living Facilities	12	3	3	18
Electrical Utility Facility	32	0	1	33
Fire Station	11	1	1	13
Government Building	21	2	7	30
Health Care Center	0	2	2	4
Nursing Home	9	2	0	11
Schools & Shelters	17	3	2	22
Potable Water	9	0	1	10
Wastewater	5	0	0	8

3.6 Erosion

3.6.1 Description

Coastal erosion is the wearing away of land or the removal of beach or dune sediments by wave action, tidal currents, wave currents, or drainage. Waves generated by storms cause coastal erosion, which may take the form of long-term losses of sediment and rocks, or merely in the temporary redistribution of coastal sediments. The study of erosion and sediment redistribution is called "coastal morphodynamics," which can be described also as the dynamic interaction between the shoreline, seabed, and water.

The ability of waves to cause erosion depends on a number of factors, which include:

- Erodibility of the beach, cliff, or rocks;
- Power of the waves to cross the beach;
- Lowering of the beach or shore platform through wave action; and
- Near shore bathymetry.

For example, waves must be strong enough to remove material from the debris lobe for erosion to occur. Additionally, beaches can help dissipate wave energy on the foreshore and can provide a measure of protection to cliffs, rocks, and other harder formations, as well as any area upland.

Some erosion changes are slow, inexorable, and usually gradual. However, the changes on a beach can happen overnight, especially during a storm. Even without storms, sediment may be lost to longshore drift (the currents that parallel coastlines), or sediment may be pulled to deeper water and lost to the coastal system. Coastal erosion may also be caused by the construction and maintenance of navigation inlets. There are over 60 inlets across Florida, many of which have been artificially deepened to accommodate commercial and recreational vessels. Jetties are also installed to prevent sediment from filling in these inlets. A consequence of this practice is that the jetties and inlets interrupt the natural flow of sediment along the beach, leading to an accumulation of sediment in the inlet and at jetty on one side of the inlet, and a loss of sediment to beaches on the other side of the inlet.[54]

[54] 2018 Florida Statewide Mitigation Strategy.

Potential Effects of Climate Variability on Erosion

Both increased rates of global eustatic sea level rise and increased frequency of higher intensity hurricanes may affect coastal erosion. As described in Section 3.2 Flood Hazard Profile, continued atmospheric warming could increase rates of global eustatic sea level rise. In the absence of offsetting changes in natural sediment supply, sand beaches will erode more rapidly as the rate of sea level rise increases. If the frequency of higher intensity hurricanes does increase (see section 3.3 Tropical Cyclone Hazard Profile), events will occur more often when sand eroded from beaches is transported to depths from which it will not be moved back on shore by swell waves. More frequent category 4 and 5 hurricanes also would increase incidence of dune erosion and over wash where beach sediments are carried landward. These processes can damage structures, but where structures are not present, the over wash process can permit a beach and dune system to migrate landward.[55] Rising sea levels also threaten the survival of coastal wetlands when natural rates of sediment accretion and elevation increase are not fast enough to offset the rising sea.[56] However, wetlands also may be able to migrate landward with adequate sediment influx if there are no physical barriers to their movement.

3.6.2 Location

In Citrus county there is a 0.2-mile segment of critically eroded shoreline at Fort Island Beach Park, located near Crystal River. The critically eroded area is located in unincorporated Citrus County. There are no critically eroded areas identified within incorporated Crystal River or Inverness. The beach is nourished approximately every four years using sand from an upland source.[57] The spatial extent of coastal erosion is Negligible, with less than 1% of the area being affected.

3.6.3 Extent

Florida has 825 miles of sandy beach coastline fronting the Atlantic Ocean, the Gulf of Mexico, and the Straits of Florida. The beaches in Florida serve many critical purposes. For example, the beaches are home to several species of plants and animals that are dependent upon beaches, dunes, and near shore waters for all or part of their lives. In fact, there are over 30 rare species within the state that inhabit the beach and adjacent habitats. These species have adapted to living in the beach's harsh environment of salt spray, shifting and infertile sand, bright sunlight, and storms. Additionally, people visit Florida beaches at very high rates. Tourists and residents visit the beaches and coastal waters to relax, tan, swim, boat, fish, and dive.[58]

According to the Beach Management Funding Assistance Program (BMFA) within Florida Department of Environmental Protection (FDEP) (formerly the Beach Erosion Control Program), there are many stretches of

[55] 4 (Gutierrez et al. (2009). Ocean coasts. http://papers.risingsea.net/coastal-sensitivity-to-sea-level-rise-3-oceancoasts.html; In Titus et al. (Eds.), Coastal sensitivity to sea-level rise: A focus on the mid-Atlantic region. http://downloads.globalchange.gov/sap/sap4-1/sap4-1-final-report-all.pdf.).
[56] (Cahoon et al. (2009). Coastal wetland sustainability. http://papers.risingsea.net/coastal-sensitivity-to-sea-levelrise-4-wetland-accretion.html; In Titus et al. (eds.), Coastal sensitivity to sea-level rise: A focus on the mid-Atlantic region.).
[57] https://floridadep.gov/water/beaches-inlets-ports/documents/sbmp-big-bend-gulf-coast-region
[58] http://www.dep.state.fl.us/beaches/

shoreline that has been critically eroded. Critically eroded shoreline is defined as, "a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost. Critically eroded areas may also include peripheral segments or gaps between identified critically eroded areas which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects".

Therefore, critically eroded beaches are those in which there is a threat or loss of one of four specific interests: upland development, recreation, wildlife habitat, or important cultural resources. Non-critically eroded beaches are those in which there may be significant erosion conditions, but there is currently no public or private interest threatened.[59]

3.6.4 Previous Occurrences

DEP maintains a database of all the occurrences of erosion in the state with high quality reporting since the inception of the BMFA Program. There are constantly cases of beach erosion throughout the state, and the 2013 revision reflects agreement that each previous occurrence would not be listed in this section.

The disastrous hurricane seasons of 2004–2005 had a severe impact on the state in terms of erosion, and DEP has published a number of reports about the specific details of these events. Erosion is attributed to tropical storms, hurricanes, and the natural geomorphic changes caused by the pattern of littoral transport of sediments in the Big Bend Gulf Coast Region. The most erosive storms in recent years were Hurricane Agnes (1972), Hurricanes Elena and Kate (1985), a severe winter storm in March 1993, Tropical Storm Josephine (1996), Hurricane Gordon (2000), Tropical Storm Frances (2004), Tropical Storm Debby (2012), Tropical Storm Colin (2016) and Hurricane Hermine (2016)[60].

3.6.5 Probability

DEP maintains an active and on-going program to study this issue and mitigate damages as much as possible. The probability of erosion is high, especially in conjunction with hurricanes, winter storms, and coastal flooding, and considering the likelihood of future development in coastal areas. There is a very high probability that this hazard will continue to affect a small portion of Citrus county in the future. Coastal erosion has occurred in Florida since the start of such record keeping. Additionally, coastal flooding will continue to occur, whether it is due to tropical storms or sea level rise, or both. Development is not likely to affect Fort Island Beach Park as it is government owned and designated as Conservation and Recreation in the Future Land Use Element of the Comprehensive Plan. Because of the limited spatial extent of the coastal erosion risk area, the probability differs for the unincorporated areas of Citrus County and the incorporated areas of Crystal River and Inverness. The probability of coastal erosion affecting Citrus County is Likely, with an annual probability between 10 and 100%. The probability of coastal erosion affecting the City of Crystal River and the City of Inverness is Unlikely, with an annual probability of less than 1%.

3.6.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by erosion are generally the same for

[59] 2018 Florida Statewide Mitigation Strategy.
[60] https://floridadep.gov/sites/default/files/SBMP-BigBend.pdf

unincorporated Citrus County, the City of Inverness, and the City of Crystal River. The City of Crystal River may experience more severe impacts for all categories if erosion in Fort Island Park causes the city to be exposed to increased storm surge.

Public

The public would be minorly impacted by the closure of Fort Island Park after an erosive event. Residents and businesses in Crystal River could be exposed to increased storm surge due to erosion in Fort Island Park.

First Responders

Impacts to first responders due to erosion are unlikely to occur.

Continuity of Operations (including continued delivery of services)

No critical infrastructure is located in the area of critical erosion. Operation of the recreational facilities located in Fort Island Park may be hindered if erosion occurs. Government operations that rely on the boat ramp facilities may be obstructed if the boat ramp is damaged due to erosion.

Property, Facilities, Infrastructure

Structures in Fort Island Park may be damaged when coastal erosion damages the ground.

Environment

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

Economic Condition

The recreational facilities in Fort Island Park are owned by Citrus County and include parking, bathrooms, and concessions. The revenue loss from damage to these recreation facilities could impact the County.

Public Confidence in the Jurisdictions Governance

If damage from coastal erosion, such as damage to roads, is not quickly repaired, then the public may be frustrated by the jurisdiction's governance.

Hazard Ranking

The LMS Working Group determined coastal erosion to be a low priority hazard in Citrus County. As described in the profile above, the impacts of coastal within the county are geographically limited. Table 3-31 outlines the hazard rankings for each of the hazard priority criteria related to coastal erosion.

Table 3-31 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Likely	Minor	Negligible	More than 24 hours	More than 1 week	**2.0**
3.0	1.0	1.0	1.0	4.0	

3.6.7 Vulnerability Analysis

The risk area for coastal erosion is limited to a .2-mile portion of Fort Island Beach. There are no residents of Fort Island Beach Park. The portion of coastal Citrus county that is critically eroded is within Fort Island Beach Park which is owned by Citrus County Board of County Commissioners. According to the Citrus County

Property Appraiser, the land value of the 9.12-acre property is $705,060, and the improved value assigned by the Appraiser's office is $193,110. In the area in or around the critically eroded beach area, there are gazebos, concessions, bathroom facilities, boardwalks, paved parking areas, a boat ramp, and a fishing pier. These facilities could potentially be damaged or disrupted by a coastal erosion event.

The critically eroded area is located in unincorporated Citrus County, however most of the unincorporated area is not at risk of erosion. The incorporated areas of Crystal River and Inverness are not at risk of coastal erosion. However, if the protective dunes on Fort Island are eroded, portions of coastal unincorporated Citrus and Crystal River may experience increases in storm surge during tropical cyclone events.

3.7 Extreme Heat

3.7.1 Description

Extreme heat is defined as extended period where the temperature and relative humidity combine for a dangerous heat index.[61] Extreme heat events occur across the state each year. This hazard is focused on the effects to the human population, while drought focuses more on environmental interests.

Potential Effects of Climate Variability on Extreme Heat

Average global temperatures are expected to increase anywhere from 4 to 12 degrees Fahrenheit by the end of the 21st century.[62] Average global temperatures move in tandem with extreme temperatures, suggesting that in the future extreme heat events will become more frequent and last longer with an overall warming trend.

According to analysis of 360 U.S. cities and the combination of several climate model projections, Florida will likely see an increase in days when the heat index is above 105 degrees Fahrenheit by 2050. Cities in Florida that are expected to experience these extreme temperatures in 2050, more often than they do now include Fort Meyers, Naples, Punta Gorda, Miami, Lakeland, Tampa, Sarasota, Port St. Lucie, Orlando, Vero Beach, Ocala, Palm Bay, and Gainesville.[63] Based on their proximity to these cities, Citrus County, Crystal River, and Inverness will likely also see an increase in extreme heat days. While it is likely that cycles of cool periods and warm periods will continue in the future, it is believed that the overall long-term trend is projected to be an increase in the number of extreme heat events.

3.7.2 Location

Those areas of Citrus County lying inland and within the Brooksville Ridge and away from the moderating influence of the coastal, lakes and river regions, would be more vulnerable to heat. The Brooksville Ridge is generally described as the area bounded by County Road 495 and US 19 on the west and US 41 on the east. Extreme heat can occur anywhere within the County, including the City of Crystal River and the City of Inverness. The spatial extent of an extreme summer heat event is Large, with between 50 and 100% of the area being affected.

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[61] http://www.nws.noaa.gov/os/heat/index.shtml
[62] 5 (Karl et al. (Eds.). (2009). Global climate change impacts in the United States. https://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf
[63] 16 http://www.climatecentral.org/news/sizzling-summers-20515

3.7.3 Extent

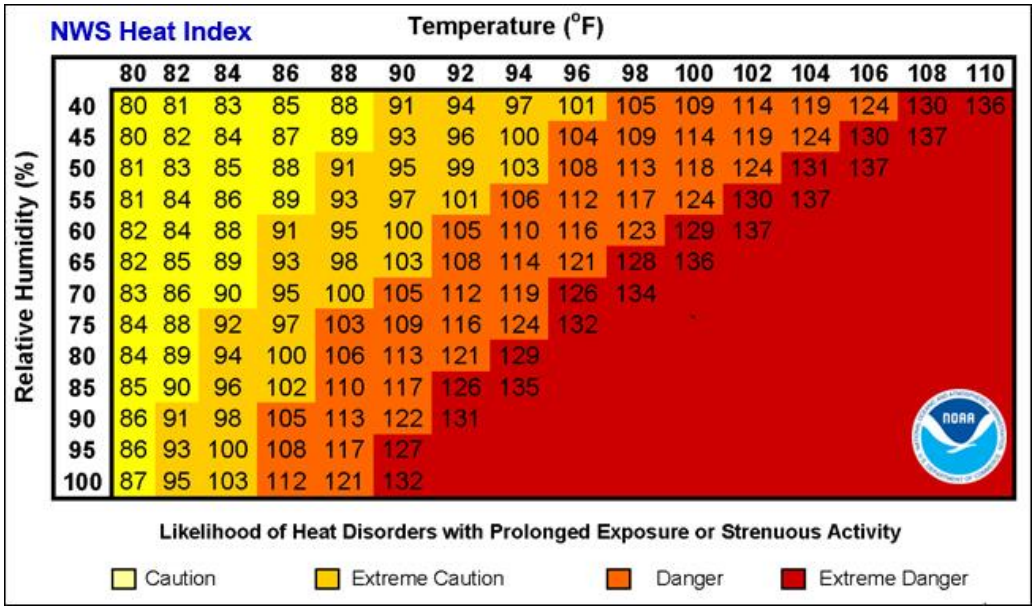
Heat Index

The Heat Index is a measure of how hot the temperature feels when humidity is factored in with the actual temperature. The Heat Index chart is below. The red area indicates extreme danger. The NWS will begin to issue alerts when the heat index is expected to exceed 105-110 degrees Fahrenheit for at least two consecutive days.[64]

Heat Related Illness

Extreme heat can cause death by making it difficult for a body to cool itself. Heat illnesses occur when the body temperature increases too quickly to cool itself or when too much fluid or salt is lost through dehydration or sweating. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat. Below are the different types of heat-related illnesses.[65]

Figure 3-11: Heat Index[66]



Heat Cramps

Heat Cramps are the first sign of a heat illness and can lead to more serious illnesses. Symptoms of heat cramps include muscular pains and spasms, usually in the legs or abdomen.

Heat Exhaustion

Heat exhaustion follows heat cramps if the body is not able to cool itself. Symptoms include heavy sweating; weakness; cool, pale, clammy skin; a fast and weak pulse; dizziness; nausea or vomiting; and fainting.

[64] http://www.nws.noaa.gov/os/heat/heat_index.shtml
[65] http://www.nws.noaa.gov/om/hazstats.shtml#
[66] https://www.weather.gov/safety/heat-index

Heat Stroke

Heat stroke usually occurs by ignoring the signs of heat exhaustion and is life-threatening. Signs of heat stroke include extremely high body temperature, red skin, changes in consciousness, rapid and weak pulse, rapid shallow breathing, confusion, vomiting, and seizures. This occurs because the body becomes overwhelmed by heat and begins to stop functioning. There are two types of heat stroke, classical and exertional. Classical heat stroke occurs when an individual is unable to maintain thermal equilibrium due to medication, injury, chronic illness, or age. Exertional heat stroke occurs when young and healthy individuals are engaged in strenuous activity in hot and humid weather.

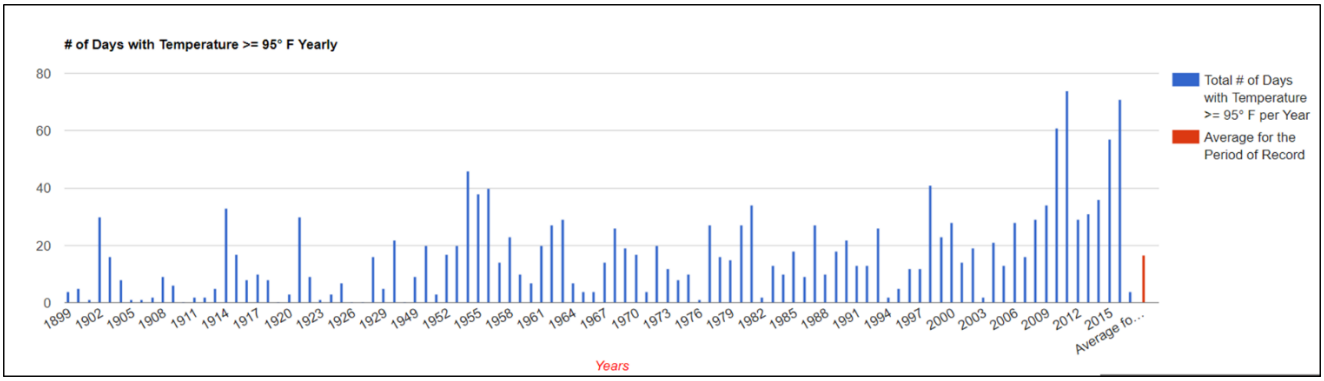
Additionally, other chronic illnesses may become exacerbated by heat-related illnesses. For example, those with cardiovascular disease and other heart conditions may not be able to tolerate the increased cardiac output associated with heat illnesses. People with mental health disorders and certain behavioral disorders, such as substance abuse, are at higher risk for morbidity and mortality during extreme heat events. Those with respiratory diseases and Type I and II diabetes are also at higher risk for morbidity and mortality with increased heat exposure.[67]

3.7.4 Previous Occurrences

Although the average summer temperature in Citrus County is 84°F, high heat episodes can occur year-round. The temperature usually peaks in July and August; however, the temperature has been known to soar to 100°F in May. The hazards associated with such events primarily affect very young or elderly residents.

Sustained episodes of high heat can result in illness and fatalities in susceptible populations. Given the demographic trends experienced in the county, this potential hazard is expected to increase. According to NOAA NCEI Storm Event Database no Excessive Heat events have been recorded in Citrus County. The Inverness 3 SE Weather station recorded an average of 16.62 days with temperatures at or above 95 degrees per year.

Figure 3-12 - Days with Temperature >=95 degrees F Yearly[68]



3.7.5 Probability

Because of the high frequency of days with temperatures over 95 degrees recorded in Citrus county in the past, it is reasonable to assume that Citrus County will experiences extreme heat days again in the future.

[67] http://flbrace.org/images/docs/heat-profile.pdf
[68] https://climatecenter.fsu.edu/climate-data-access-tools/climate-data-visualization

The probability of an extreme heat event affecting Citrus County, the City of Crystal River or the City of Inverness is Likely, with an annual probability between 10 and 100%. As described above, Citrus county is likely to experience on average 16.62 days of temperatures above 95 degrees.

3.7.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by extreme heat are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River.

Public

Public impacts during an extreme heat event may include injury or death from overexposure, especially to infants, children, the elderly, those who are overweight, those with chronic illnesses, those who take certain medications.

First Responders

First responders could be at risk of injury or death from exertion in extreme heat.

Continuity of Operations (including continued delivery of services)

Extreme heat is not likely to impact continuity of operations.

Property, Facilities, Infrastructure

Facilities may be affected by extreme heat events especially if they have less efficient cooling systems or systems that must run constantly to effectively cool a building.

Environment

Environmental impacts may include faster evaporation, damage to green spaces and agricultural lands, and the death of plants and animals.

Economic Condition

Economic impacts related to extreme heat may include loss of tourism due to the risk of negative health outcomes during summer months.

Public Confidence in the Jurisdictions Governance

If people become ill or die from exposure to extreme heat, the public may believe the government is not doing all that it can to help those in need, especially if a cooling shelters were not opened.

Hazard Ranking

The LMS Working Group determined extreme heat to be a moderate priority hazard in Citrus County. As described in the profile above, the annual probability of an extreme heat event is high, however the impacts are limited to the effects on people rather than buildings and infrastructure. Table 3-32 outlines the hazard rankings for each of the hazard priority criteria related to extreme heat.

Table 3-32 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Likely	Minor	Large	More than 24 hours	More than 1 week	**2.6**
3.0	1.0	4.0	1.0	4.0	

3.7.7 Vulnerability Analysis

The previous update of the LMS considered the effects of extreme heat on humans and the environment together. Based on updates to the Statewide Mitigation Strategy, this hazard has been revised to focus on the effects to the human population, while drought focuses more on environmental interests.

Population

Transient, low or fixed income and elderly populations are at the greatest risk from extreme heat. According to the 2017 America Community Survey, 17.4% of the population of Citrus County is below the poverty level. According to the ACS the median age is 55.9 with 16% of the population being over the age of 75.[69]

Property

In that extreme heat is a regional issue, the impacts from this hazard will generally affect the entire county in the same manner and would not result in structural damages; therefore, specific building counts are not available to assess the vulnerability of assets for this hazard.

Critical Facilities

Due to the broad geographic extent of an extreme heat event it is difficult to identify specific facilities that would be vulnerable. Extended periods of extreme heat could also affect the power grid due to high demand for air conditioners.

3.8 Drought

3.8.1 Description

Drought is a condition of climatic dryness severe enough to reduce soil moisture and water and snow levels below the minimum necessary for sustaining plant, animal, and economic systems. Drought is a complex physical and social process of widespread significance. It is not usually statewide phenomena as differing conditions in the State often make drought a regional issue. Despite all of the problems that droughts have caused, it is difficult to define and there is no universally accepted definition because drought, unlike floods, is not a distinct event. Drought are often the result of many complex factors such that it often has no well-defined start nor end and the impacts vary by affected sector, thus, often making definitions of drought specific to particular affected groups.

The most commonly used drought definitions are based on meteorological, agricultural, hydrological, and socioeconomic effects.[70]

- **Meteorological** drought is often defined by a period of substantially diminished precipitation duration and/or intensity. The commonly used definition of meteorological drought is an interval of time, generally on the order of months or years, during which the actual moisture supply at a given place consistently falls below the climatically appropriate moisture supply.
- **Agricultural** drought occurs when there is inadequate soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought usually occurs after or during meteorological drought,

[69] U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates
[70] https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx

but before hydrological drought and can also affect livestock and other dry-land agricultural operations.

- **Hydrological** drought refers to deficiencies in surface and subsurface water supplies. It is measured as streamflow, snowpack, and as lake, reservoir and groundwater levels. There is usually a delay between lack of rain or snow and less measurable water in streams, lakes, and reservoirs. Therefore, hydrological measurements tend to lag behind other drought indicators.
- **Socioeconomic** drought occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product.

Potential Effects of Climate Variability on Drought

Changes in rates of precipitation, evaporation, and transpiration, may affect the duration and severity of drought events. A warmer climate would impact the hydrological cycle by increasing rates of evaporation leading to a decrease in runoff rates associated with rainfall events. Moreover, increased rates of evapotranspiration would exacerbate current droughts as existing soil moisture and plant moisture would likewise increase moisture in the atmosphere potentially leading to more frequent rainfall events. Regional effects are expected to range widely and are difficult to predict.[71] It is widely believed that an overall warming trend may intensify and prolong droughts as they occur due to increased rates of evapotranspiration associated with higher temperatures.[72]

The Intergovernmental Panel on Climate Change forecasts with medium confidence both an increase in heavy rainfall periods as well as an increase in the duration of relatively dry periods for North America, particularly in the subtropics, such as Florida.[73] South Florida, in particular, may see increased dry and hot periods between heavy rainfall events, exacerbating the risk for drought.[74] However, there is significant

[71] (Walsh and Wuebbles (2013). Our changing climate. In, Draft national climate assessment, pp. 25-103. https://www.globalchange.gov/sites/globalchange/files/NCAJan11-2013-publicreviewdraft-chap2-climate.pdf); p. 113.).
[72] (Allen et al. (2012). Summary for policymakers. In Field et al. (Eds.), Managing the risks of extreme events and disasters to advance climate change adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, pp. 3-21., https://www.ipcc.ch/pdf/specialreports/srex/SREX_FD_SPM_final.pdf, p. 13).
[73] (Seneviratne et al. (2012). Changes in climate extremes and their impacts on the natural physical environment. https://www.ipcc.ch/pdf/special-reports/srex/SREX-Chap3_FINAL.pdf); In Field et al. (Eds.), Managing the risks of extreme events and disasters to advance climate change adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, pp. 109-230. https://www.ipcc.ch/pdf/specialreports/srex/SREX_FD_SPM_final.pdf, pp. 174-175.).
[74] (Karl et al. (Eds.) (2009). https://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf).

uncertainty associated with these projections given the numerous factors that contribute to climatic variability.[75]

As stated in the flood hazard profile, the expected global pattern is for arid areas to become drier, meaning that droughts may occur more frequently and be more severe.

3.8.2 Location

Droughts can occur anywhere within the County, including the City of Crystal River and the City of Inverness. The spatial extent of a drought event is Large, with between 50 and 100% of the area being affected.

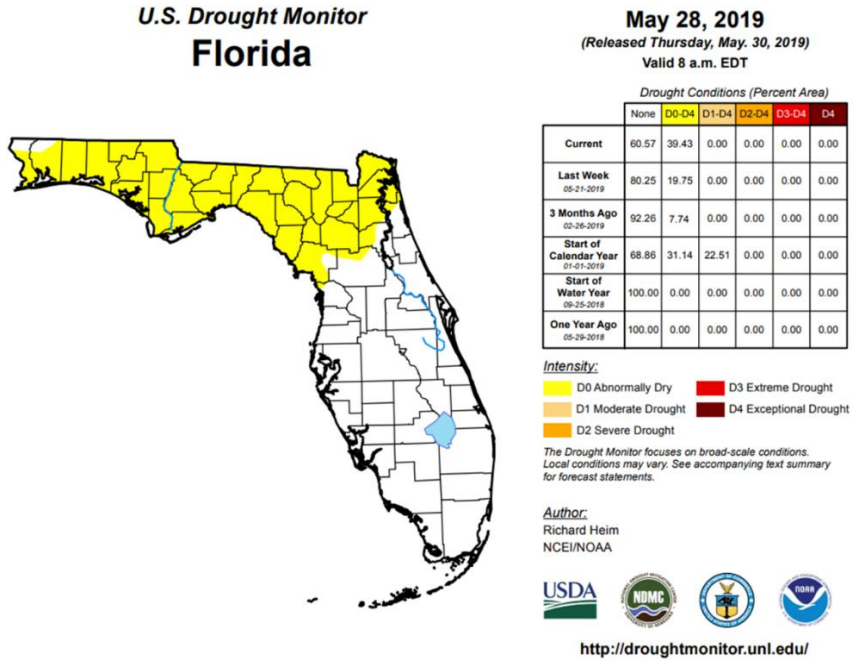
3.8.3 Extent

U.S. Drought Monitor Classification Scheme is a commonly used index that identifies general drought areas, labelling droughts by intensity, with D1 being the least intense and D4 being the most. One method to interpret drought is the Palmer Drought Severity Index (PDSI), which is based on the supply and demand concept of the water balance equation, taking into account more than just the precipitation deficit at specific locations.

The objective of the Palmer Drought Severity Index (PDSI), is to provide measurements of moisture conditions that are standardized so that comparisons using the index can be made between locations and between months.

The U.S. Drought Monitor map identifies areas of drought and labels them by intensity. D1 is the least intense level and D4 the most intense. Drought is defined as a moisture deficit bad enough to have social, environmental or economic effects.

Figure 3-13 - U.S. Drought Monitor Florida, May 2019



[75] (Seager et al. (2009). http://journals.ametsoc.org/doi/full/10.1175/2009JCLI2683.1).

D0 areas are not in drought, but are experiencing abnormally dry conditions that could turn into drought or are recovering from drought but are not yet back to normal. Drought Intensity categories are based on the original five key indicators along with several dozen other objective indicators, local condition reports and impact reports from more than 450 expert observers around the country, and drought impacts which subjectively support and validate the indicators used.

Table 3-33 – Drought Classification

			Ranges				
Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Object Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	**Going into drought:** short-term dryness slowing planting, growth of crops or pastures **Coming out of drought:** some lingering water deficits pastures or crops not fully recovered	1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing or imminent Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	Crop or pasture losses likely Water shortages common Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	Major crop/pasture losses Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

The drought severity classification table (Table 3-33) shows the ranges for each indicator for each dryness level. Because the ranges of the various indicators often don't coincide, the final drought category tends to be based on what the majority of the indicators show and on local observations. The analysts producing the map also weigh the indices according to how well they perform in various parts of the country and at different times of the year. Additional indicators are often needed in the West, where winter snowfall in the mountains has a strong bearing on water supplies. It is this combination of the best available data, local observations and experts' best judgment that makes the U.S. Drought Monitor more versatile than other drought indicators.

Short-term drought indicator blends focus on 1-3 month precipitation. Long-term blends focus on 6-60 months. Additional indices used, mainly during the growing season, include the USDA/NASS Topsoil Moisture, Keetch-Byram Drought Index (KBDI), and NOAA/NESDIS satellite Vegetation Health Indices. Indices used primarily

during the snow season and in the West include snow water content, river basin precipitation, and the Surface Water Supply Index (SWSI). Other indicators include groundwater levels, reservoir storage, and pasture/range conditions.[76] Figure 3-13 is an example of the U.S. Drought Monitor for Florida in May of 2019.

The worst period of drought in Citrus County was categorized as D4, therefore D4 Exceptional Drought is the extent of drought in Citrus County.

3.8.4 Previous Occurrences

From February 2000 through August of 2001, Citrus County experience Moderate (D1) to Exceptional (D4) drought conditions. From late November 2000 to early April 2001. From late November 2010 through mid-December 2010, all of Citrus County experienced Moderate Drought (D1) conditions.

Between 2010 and 2014, the US Drought Monitor estimated that Citrus County, Crystal River, and Inverness experienced 88 weeks of Abnormally Dry (D0) to Extreme Drought (D3) conditions. The months of March through May of 2011-2013 had the highest number of weeks with drought (D0-D3) conditions. In January 2011 and Spring 2012, Citrus County, Crystal River, and Inverness experienced 8, 7, and 9 weeks of Extreme drought (D3) conditions, respectively. From late March through mid-June of 2017, Citrus County experienced Moderate (D1) drought conditions.[77]

Because these periods of drought conditions were not prolonged, drought impacts were not measurable.

3.8.5 Probability

Historically, Citrus County has experienced periodic drought conditions; however, they were usually not of such a prolonged nature. Past climatic patterns of prolonged La Nina conditions within the Pacific region has resulted in the county's more dry local weather conditions and these conditions are expected to repeat. The probability of a drought event affecting Citrus County, the City of Crystal River or the City of Inverness is Likely, with an annual probability between 10 and 100%.

3.8.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by drought are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River.

Public

Drought impacts for the public may include a lack of water or water restrictions for personal use. Residents may also experience damage to property, such as grass and other vegetation dying from a lack of water. Lack of water or water restrictions may impact the public use of water and wastewater utilities; the public may have to restrict their showering time and other water use in the restroom, restrict their water usage for cooking and drinking, and restrict from watering their gardens or lawns.

[76] https://droughtmonitor.unl.edu/AboutUSDM/AbouttheData/DroughtClassification.aspx
[77] https://droughtmonitor.unl.edu/Data/Timeseries.aspx

First Responders

First responders may experience a lack of water to extinguish fires. Publicly owned property, such as green spaces, gardens, crops, etc. may be damaged from lack of water.

Continuity of Operations (including continued delivery of services)

Lack of water or water restrictions may impact the public use of water and wastewater utilities the public may have to restrict their showering time and other water use in the restroom, restrict their water usage for cooking and drinking, and restrict from watering their gardens or lawns

Property, Facilities, Infrastructure

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

Environment

Environmental impacts may include loss of vegetation and damage to forests from drought. In addition to straining water supplies and lowering lakes and rivers, the lack of rain could mean a more severe wildfire season that peaks in April and May, when temperatures rise and plants dry. Many of the county's smaller lake and pond resources as well as wetland areas may experience loss of surface waters and exposure of the bottom beds, the majority comprised of dead vegetative peat or muck layers. These areas were now exposed to increased human encroachment, lightning strike exposure and wildland fire occurrence rates.

Economic Condition

Economic impacts may include crop damage or loss from drought can severely impact farmers and the agricultural economy, which can in turn affect the economy of an area if it is dependent upon the sales of the crops. Employment loss may be a result of drought due to lower demand for services such as landscaping, lawn care, car wash, etc.

Public Confidence

The public may lose confidence in the jurisdiction's governance if there is not a plan in place to deal with lack of water or water restrictions.

Hazard Ranking

The LMS Working Group determined drought to be a moderate priority hazard in Citrus County. As described in the profile above, the annual probability of a drought event is Likely, however the impacts are limited and generally affect vegetation rather than buildings and infrastructure. Table 3-34 outlines the hazard rankings for each of the hazard priority criteria related to drought.

Table 3-34– Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Likely	Minor	Large	More than 24 hours	More than 1 week	**2.6**
3.0	1.0	4.0	1.0	4.0	

3.8.7 Vulnerability Analysis

Agricultural areas may be more vulnerable to drought. Unincorporated Citrus County, Crystal River, and Inverness have agricultural lands valued at $397M, $1M, and $3.3M, respectively (see Table 3-35 below).

Citrus County has approximately 62,870 acres of active farmland, primarily consisting of grazing lands located in the central southern and southeastern quadrants of the county.

Table 3-35 Agricultural Land Value and Acreage

Jurisdiction	Agricultural Acreage	Land Value
Citrus County (Unincorporated)	62,371	$397,661,605
Crystal River	99	$1,016,850
Inverness	400	$3,335,070
Total	62,870	$402,013,525

3.9 Geological

3.9.1 Description

This profile will discuss landslides and sinkholes. In the 2013 update, the SHMP combined sinkholes, landslides and earthquakes. For the 2018 update, Mitigate FL decided to keep landslides and sinkholes together and re-name the profile Geological Events, and create a new hazard named Seismic.

Landslides

The State of Florida has very low topographic relief, meaning that the state is flat. Because of this, landslides are not a significant natural hazard in Florida, and the same is true of Citrus County.[78] No landslides events have been recorded in Citrus County, and any risk or vulnerability to people, property, the environment, or operations would be low. As such, landslides will not be assessed further in this section.

Sinkholes

Sinkholes are landforms created when overburden subsides or collapses into fissures or cavities in underlying carbonate rocks. Florida is underlain by several thousand feet of carbonate rock, limestone, and dolostone, with a variably thick mixture of sands, clays, shells, and other near surface carbonate rock units, called overburden. Those several thousand feet of carbonate rocks are host to one of the world's most productive aquifers, the Floridian aquifer system. Erosional processes, physical and chemical, have created fissures and cavities within the rock. This has created Florida's karst topography, characterized by the presence of sinkholes, swallets, caves, submerged conduits, springs, and disappearing and reappearing streams. Sinkholes are unpredictable, as they can form rapidly, within minutes to hours, or slowly, within months to years.[79]

This profile will focus on the two common types of sinkholes in Florida, cover collapse sinkholes and cover subsidence sinkholes, because of their rate of formation and the risk they pose to human life and property.

Cover Collapse Sinkholes

[78] http://www.dep.state.fl.us/geology/geologictopics/hazards/landslides.htm
[79] Florida Department of Environmental Protection Florida Geological Survey. (2017). The favorability of Florida's geology to sinkhole formation. Page 4 – 7.

Cover-collapse sinkholes may develop quickly and cause significant damage. These sinkholes develop when the ceiling of an underground cavity can no longer support the overlying weight, resulting in an abrupt collapse of the overburden into the cavity, thereby forming a hole in the land surface.[80] This occurs because over time, surface drainage, erosion, and deposition of materials develop a shallow bowl-shaped depression beneath the surface of the ground.

Cover Subsidence Sinkholes

Cover-subsidence sinkholes develop more gradually, usually where the sediment is permeable and contains sand. The overburden slowly migrates down into the fissures and cavities in the underlying rock, which results in a depression in the land surface.[81]

Triggers

There are several triggers for sinkhole formation. For example, extended periods of drought can lead to sinkholes, especially if a heavy rain event occurs after an extended drought. Heavy rainfall can trigger sinkholes for several reasons. For example, heavy rainfall can add additional weight to overburden sediments above a cavity which could cause a failure of the cavity ceiling. Or heavy rainfall could collect in low lying areas adding to the weight and accelerating infiltration at that location, which could cause failure of a cavity ceilings. Additionally, heavy rainfall could saturate overburden sediments, making them soft, which could weaken the overburden sediments, causing failure of the cavity ceiling (sink report, 10). According to geologists, sinkholes can also be attributed to anthropogenic triggers, such as significant groundwater withdrawal; terraforming, which is the alteration of the earth's surface without realizing the area has thin overburden sediments; some stormwater management practices; heavy infrastructure over critical areas; and well drilling and development.[82]

Potential Effects of Climate Variability on Sinkholes

Incidences of sinkholes increase either after severe storm events with associated flooding and soil saturation or during extended periods of drought.[83] With the potential for more prolonged and more intense periods of drought as well as greater intensity and frequency of rainfall and inland flooding (see Sections 3.3.1, 3.3.3, and 3.3.5), it is likely that incidences of sinkholes will increase in the coming century in areas with karst geology or areas identified as favorable for sinkhole development.

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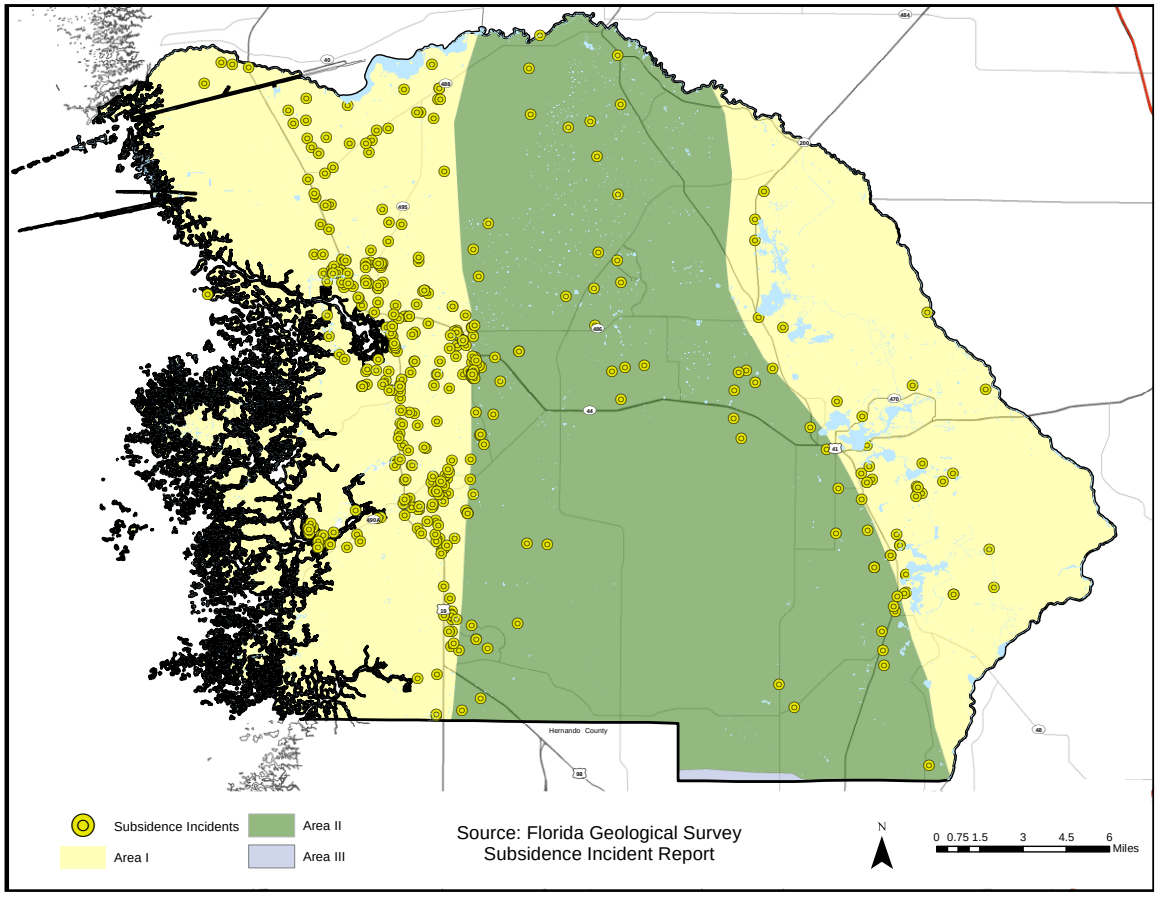
[80] Florida Department of Environmental Protection Florida Geological Survey. (2017). The favorability of Florida's geology to sinkhole formation. Page 5.
[81] Florida Department of Environmental Protection Florida Geological Survey. (2017). The favorability of Florida's geology to sinkhole formation. Page 4 – 7.
[82] Florida Department of Environmental Protection Florida Geological Survey. (2017). The favorability of Florida's geology to sinkhole formation. Page 11.
[83] Dragoni and Sukhija (2008) Climate change and groundwater: A short review. Geological Society, London, Special Publications, 288, 1-12; Hyatt and Jacobs (1996). Distribution and morphology of sinkholes triggered by flooding following Tropical Storm Alberto at Albany, Georgia, USA. Geomorphology, 17, 305-316.

3.9.2 Location

Eocene era Avon park limestone that underlies the county allows the possibility of sinkhole formation. Within the county proper, the highest rate of sinkhole occurrence appears to be along the US 19 Corridor and along the northwest border with Levy County.

Figure 3-14 – Subsidence Incidents and Sinkhole Types[84]



The south central and northeastern areas of the County have the lowest rate of occurrence. Anecdotal conversations relate that, historically, many sinkholes in the County served as dumping grounds. The Over time, these sinkholes became filled with debris, leaving their present whereabouts unknown. Figure 3-14 shows the distribution of reported sinkholes in Citrus County and the sinkhole area types.

Most of the county is located in Area I and II as defined by the Florida Geological Survey. Area I consists of bare or thinly covered limestone. Sinkholes are few, generally shallow and broad and develop gradually. Solution sinkholes dominate. Area II consists mainly of incohesive and permeable sand. Sinkholes are few, shallow, of small diameter and develop gradually. Cover-subsidence sinkholes dominate.

The spatial extent of a sinkhole event is Small, with between 1 and 10% of the area being affected.

[84] https://floridadep.gov/fgs/sinkholes/content/subsidence-incident-reports

3.9.3 Extent

The length and width details for sinkholes are used to determine the extent of the impacts. The following scale was used to rank the size of the sinkholes. All sinks ranging from:

- 1' to 19' = Small
- 20 to 39' = Medium
- 40' and larger = Large

Although the majority of reported sinkholes in Citrus County are small, the extent is 200 feet in width, as the largest recorded sinkhole in the county was 200 feet wide on August 5, 1988.

3.9.4 Previous Occurrences

The Subsidence Incident Reports database was started by the Florida Geological Survey (FGS) for scientific research purposes only. In the early 1980s, the database was moved to the newly formed and legislatively mandated Florida Sinkhole Research Institute (FSRI); however, in the early 1990s FSRI was eliminated and the database came back to the FGS. There was never a legal requirement that sinkhole occurrences or sinkhole insurance claims be entered into the database. Before being transferred to FSRI, the data collected came from citizens reporting sinkholes, cities, counties, and FDOT all voluntarily. FSRI did make an effort to increase the number of records entered into the database while it was under their tenure, but even those records were voluntary. Currently, a majority of the records come from the State Watch Office, which is the clearing house for emergency response calls involving man-made and natural disasters. The State Watch Office has a special reporting form that county, city and state dispatchers fill out (should they choose too) if a call comes in regarding a possible sinkhole occurrence. The second source is from citizens who either fill out and submit a Subsidence Incident Report form (via mail, email, fax) or by calling the FGS. The third source is via emergency situations where a swarm of sinkholes occurs and the FGS is called in by emergency officials to help survey the sinkhole hazard, such as after Tropical Storm Debby or the January 2010 frost/freeze event in the Plant City area. There are some records in the database that are associated with sinkhole insurance claims; however, those represent a small fraction of the total reports.

From 2014 to 2019, most of the reported sinkholes affected roads, requiring repair and temporary closure. In December of 2016, Citrus County Sherriff's office reported a sinkhole formed in the Inverness area partially under a septic tank damaging it releasing its contents. In July of 2015 Citrus County Fire Rescue responded to a sinkhole that opened in Pine Ridge. The hole opened as a result of well drilling taking place at an adjacent home. A utility truck fell into the hole.[85]

According to the Florida Department of Environmental Protection's Subsidence Incident Report Database, there have been 425 sinkholes reported in Citrus County between 1965 and May 2019. Based on the data acquired, the reported sinkholes are broken out to reveal that of the 425 sinks, 352 sinks fall within the small category, 27 are medium, and 11 are Large. The remaining 35 sinks could not be categorized due to insufficient dimensional data.[86]

[85] https://patch.com/florida/newportrichey/photos-possible-sinkhole-swallows-truck-florida
[86] https://floridadep.gov/fgs/sinkholes/content/subsidence-incident-reports

3.9.5 Probability

Sinkholes can be triggered by natural and anthropogenic factors, such as heavy rain after an extended drought and groundwater withdrawal or well drilling. This means that heavy rainfall or high levels of groundwater withdrawal can increase the probability of sinkholes in an area.

Additionally, as population increases, the potential for individuals to be negatively impacted by a sinkhole increases because more people will live in locations that are favorable for sinkhole development.[87]

Based on the information contained in the Subsidence Incident Reports database, there were 71 subsidence incidents reported between May of 2009 and May of 2019. This would mean that the county has a recurrence interval of approximately 7 sinkholes in any given years. The probability of a sinkhole event affecting Citrus County, the City of Crystal River or the City of Inverness is Highly Likely, with an annual probability of 100%.

3.9.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by sinkholes are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River.

Public

Impacts to the public include the possibility of falling or driving into a sinkhole. Members of the public are also at risk of injury or death from structural collapse caused by sinkholes.

First Responders

Impacts to the public include the possibility of falling or driving into a sinkhole. Members of the public are also at risk of injury or death from structural collapse caused by sinkholes.

Continuity of Operations (including continued delivery of services)

If a sinkhole affects structures or critical infrastructure, operations may be interrupted.

Property, Facilities, Infrastructure

Land subsidence or sinkholes would affect a very specific location, thereby affecting a limited number of people. In many cases, sinkholes can cause major structural damages while others are only impacted moderately. This may depend not only on the type of sinkhole, but also on the type of construction used. For example, a concrete block structure may show severe cracking of the blocks and mortar holding them together creating a situation where the integrity of the structure is at risk versus a frame structure may have the ability to somewhat flex with the shifting of the ground and have relatively little structural damage.

Environment

Sinkholes are part of the natural environment, but there may be damage to some natural spaces from a sinkhole, for example, a public park may be damaged and result in closure.

[87] Florida Department of Environmental Protection Florida Geological Survey. (2017). *The favorability of Florida's geology to sinkhole formation.* Page 4.

Economic Condition

Sinkhole damage repair can be very expensive, so a sinkhole may have a significant negative impact for the property owner. A sinkhole would likely not affect the economy of a community.

Public Confidence in the Jurisdictions Governance

If there is an increase in sinkhole occurrences and the government does not address the issue, the public may become concerned about what would happen if a sinkhole were to affect their property.

Hazard Ranking

The LMS Working Group determined geological events to be a high priority hazard in Citrus County. As described in the profile above, the annual probability of a geological event is Highly Likely, however the impacts are Limited as most sinkholes recorded in Citrus County are small. Table 23 outlines the hazard rankings for each of the hazard priority criteria related to geological events (sinkholes).

Table 3-36 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Highly Likely	Limited	Small	Less than 6 hours	Less than 24 hours	**2.8**
4.0	2.0	2.0	4.0	2.0	

3.9.7 Vulnerability Analysis

The Florida Department of Environmental Protection has developed a sinkhole favorability map that shows that portions of Citrus County are very geologically favorable to sinkholes.[88] The data shows the geologic favorability for the development of sinkholes and therefore is not useful to determine whether or not people, property or critical facilities are actually vulnerable. Furthermore, a loss estimation was not conducted because it would not have been useful for risk assessment purposes because of the imprecise method of identification of areas favorable for sinkhole development.

3.10 Winter Storm and Freeze

3.10.1Description

Severe winter weather includes extreme cold, snowfall, ice storms, winter storms, and/or strong winds, and affects every state in the continental United States. Areas where such weather is uncommon, such as Florida, may experience a greater impact on transportation, agriculture, and people from relatively small events compared to other states that experience winter weather more frequently.

While winter storms have not been recorded in Citrus County, freezing events are more common. Freeze occurs when overnight temperatures reach at least 32 degrees Fahrenheit. A Hard Freeze occurs when the temperature falls below 28 degrees Fahrenheit for four hours or more. While most vegetation can survive a frost, very little vegetation can survive a hard freeze and this is when the most damage to crops occurs.

[88] Florida Department of Environmental Protection Florida Geological Survey. (2017). *The favorability of Florida's geology to sinkhole formation.* Page 4.

Prolonged exposure to the freezing temperatures can cause frostbite or hypothermia and become life threatening. Infants and elderly people are most at risk. In areas, unaccustomed to winter weather, near freezing temperatures are considered extreme cold. During unexpected cold periods there are often issues with propane gas supplies, and electrical and natural gas systems are pushed to their limits to meet the record demands. Also, residents in Citrus County may have inadequate heating systems and insulation and turn to alternatives such as space heaters and wood fires that increase the likelihood of accidental house fires.

Potential Effects of Climate Variability on Winter Storms and Freezes

Climate change is not expected to increase occurrences or magnitude of winter storms and freezes in Citrus County. However, climate change does not mean that winter storms and freezes would not continue to occur in the county. Climate variability will continue to influence daily temperature variability so isolated and prolonged winter storms and freeze events are not unlikely.[89] Severe winter storms will not disappear. Specifically, isolated or prolonged winter freeze events will still occur.

3.10.2 Location

Freezing events can occur anywhere within the County, including the City of Crystal River and the City of Inverness. Based on historic occurrences winter storms are not likely to occur in Citrus County.

3.10.3 Extent

Although somewhat rare, winter storms and freezes can immobilize an entire region. Even areas like Lee County that normally experience mild winters can be greatly affected. All parts of Citrus County are considered to be equally likely to be impacted by extreme cold and freeze events. Previously recorded incidents of extreme cold or freeze resulted in up to $1M in crop losses. Table 3-37 lists the fruit temperatures at which freezing begins.

Table 3-37 - Fruit temperatures at which freezing begins[90]

	Temperature (°F)
Green oranges	28.5 to 29.5
Half-rip oranges, grapefruit and mandarins	28.0 to 29.0
Ripe oranges, grapefruit and mandarins	27.0to 28.0
Button lemons (up to 1/2-inch diameter)	29.5 to 30.5
Tree-ripe lemons	29.5 to 30.5
Green lemons (larger than ½-inch diameter)	28.5 to 29.5
Buds and blossoms	27.0

3.10.4 Previous Occurrences

Although there have been many events recorded in the NCDC records where Citrus County has been exposed to extreme cold and damaging freeze events, there are only a few events that record any losses. The first event occurred on December 20, 2000 and damaged approximately 100 acres of citrus crops with a value

[89] Ingram and Carter (2012). Southeast region technical report to the National Climate Assessment. http://gyr.fortlauderdale.gov/home/showdocument?id=3153

[90] https://citrusresearch.org/wp-content/uploads/frost_issue.pdf

of $1.0 million. The majority of the crop losses occurred in communities to the south of Citrus County where farms are more prevalent. On January 10th, February 26th, and December 14th, 2010, frost/freeze events caused crop losses valued at $730K, $100K, and $450K, respectively.

In 1990, Citrus County was included in Disaster Declaration FEMA-851-DR-FL for freezing weather. This declaration provided Disaster Unemployment Assistance only to 32 of the State's 67 counties from Marion County south to Monroe County.

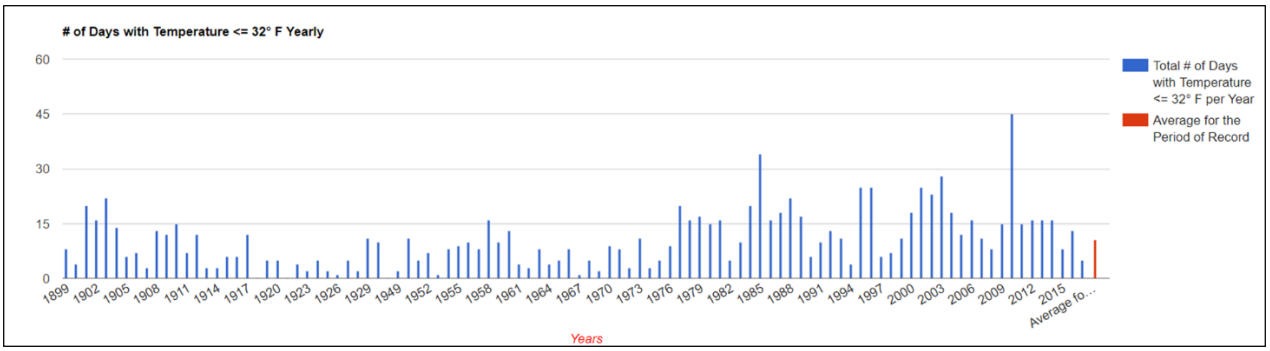
In December 2000 through January 2001, there were approximately 20 days where the temperature was in the 20's. From January 2009 through February 2009, there were approximately 10 days where the temperature was in the 20's or lower. In 2010, Citrus County experienced a greater number of days with very low temperatures. In January, February, and December of 2010, there were 33 days where the temperature was in the 20's or lower (8 of which were below 20 degrees). This type of extended event could have more extreme impacts within the elderly and homeless populations, although there is nothing on record to date.

There were 18 frost/freeze events in Citrus County from 2009 to 2014. During this period of time, there were no reported deaths, injuries, or property damage due to frost/freeze. There were no events recorded by the NCEI storm events database between 2014 and 2019.

3.10.5 Probability

Because of the moderate frequency of days with temperatures under 32 degrees recorded in Citrus county in the past, it is reasonable to assume that Citrus County will experiences winter storms or freezing events again in the future. The Inverness 3 SE Weather station recorded an average of 10.6 days with temperatures at or below 32 degrees per year.

Figure 3-15 - Days with Temperature <=32 degrees F Yearly [91]



The probability of a winter storm or freezing event affecting Citrus County, the City of Crystal River or the City of Inverness is Likely, with an annual probability between 10 and 100%.

3.10.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by winter storm and freeze events are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River.

[91] https://climatecenter.fsu.edu/climate-data-access-tools/climate-data-visualization

Public

In Citrus County, Crystal River and Inverness injury or death, as well as possible property damage from car accidents because of ice on roads and bridges may occur. There is also a risk of injury or death from exposure to cold weather, either because of being stranded outside, or inside without proper heating systems. Deaths and injuries have resulted from accidents including automobile collisions due to poor driving conditions. On cold days the electric heaters are turned up throughout the electrical system which can cause an equipment overload.

First Responders

First responders are increasingly at risk as they respond to traffic incidents and calls for medical attention if there is ice on the roads.

Continuity of Operations (including continued delivery of services)

Power outages caused by overloaded power grids may impact the ability of businesses to operate and impact the delivery of public services.

Property, Facilities, Infrastructure

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

Environment

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

Economic Condition

Loss or damage to crops because of freezes.

Public Confidence in the Jurisdictions Governance

Power outages may cause the public to believe that the government did not adequately prepare for the incident.

Hazard Ranking

The LMS Working Group determined winter storms and freezing events to be a low priority hazard in Citrus County. As described in the profile above, the annual probability of a winter storm event is Likely, however the impacts are Minor as no injuries, deaths, or building damages have been recorded related to winter storms or freezes. Property damage recorded in relation to this hazard is limited to crop loss. Table 3-38 outlines the hazard rankings for each of the hazard priority criteria related to winter storms and freezing events.

Table 3-38 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Likely	Minor	Large	More than 24 hours	Less than 1 week	**2.4**
3.0	1.0	4.0	1.0	3.0	

3.10.7 Vulnerability Analysis

Agricultural uses are most vulnerable to freezing events. As discussed in the drought vulnerability analysis (Section 3.8.7) unincorporated Citrus County, Crystal River, and Inverness have agricultural lands valued at $397M, $1M, and $3.3M, respectively (see Table 3-35). Citrus County has approximately 62,870 acres of active farmland, primarily consisting of grazing lands located in the central southern and southeastern quadrants of the county. Historic occurrences of freezing events have resulted in up to $1M of crop loss.

3.11 Seismic

A seismic event, or an earthquake, is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface that creates seismic waves. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, and tsunamis or indirectly cause flash floods or fires.

Although seismic events have been known to affect other portions of the state, no events have been recorded in Citrus County. According to the USGS, the expected frequency of damaging earthquake shaking is fewer than 2 occurrences over a period of 10,000 years.[92] Because of the low probability of seismic events, extent, location, and summary of impacts were not assessed for this hazard.

Hazard Ranking

The LMS Working Group determined seismic events to be a low priority hazard in Citrus County. As described in the profile above, the annual probability of a seismic event is Unlikely.

Table 3-39 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Unlikely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.0**
1.0	1.0	3.0	4.0	1.0	

Due to the low probability of occurrence a vulnerability assessment will not be conducted for this hazard. Should the probability of seismic events in Citrus County change in the future, the LMS Working Group will incorporate a full assessment of the hazard either at the required 5-year cycle review or post disaster.

3.12 Tsunami

Tsunamis are powerful waves created because of another non-meteorological, geologic in nature, hazard such as earthquakes, underwater landslides, volcanic eruptions, or other displacements of large amounts of water under the sea. As the waves travel towards land, they build up to higher heights as the depth of the

[92] https://earthquake.usgs.gov/hazards/learn/

ocean decreases and appear as walls of water or turbulent waves that resemble hurricane storm surge. The speed at which a tsunami travels depends on the ocean depth rather than the distance from the source of the wave. Deeper water generates greater speed, and the waves slow down when reaching shallow waters. Where the ocean is deep, tsunamis can travel at speeds up to 500 miles an hour. Tsunamis arrive on land with enormous force and recede with nearly equal force.[93]

Although tsunamis have been known to affect the Atlantic Coast of Florida, no events have been recorded on the Florida Gulf Coast. Since earthquakes cause most tsunamis and Florida is in a seismically stable region, there is a low probability that a tsunami will affect Florida. However, underwater landslides can also trigger tsunamis. Such landslides are unlikely, but not impossible.[94] Because of the low probability of tsunami, extent, location, and summary of impacts were not assessed for this hazard.

Hazard Ranking

The LMS Working Group determined tsunamis to be a low priority hazard in Citrus County. As described in the profile above, the annual probability of a tsunami is Unlikely.

Table 3-40 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Unlikely	Minor	Small	Less than 6 hours	Less than 6 hours	**1.8**
1.0	1.0	2.0	4.0	1.0	

Due to the low probability of occurrence a vulnerability assessment will not be conducted for this hazard. Should the probability of tsunami events in Citrus County change in the future, the LMS Working Group will incorporate a full assessment of the hazard either at the required 5-year cycle review or post disaster.

3.13 Hazardous Materials

3.13.1 Description

A hazardous material is any substance that poses a threat to humans, animals, or the environment. Hazardous Materials, commonly referred to as HazMat, refers generally to hazardous substances, petroleum, natural gas, synthetic gas, and acutely toxic chemicals. Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the EPA, OSHA, DOT, and the Nuclear Regulatory Commission (NRC).

The Occupational Safety and Health Administration (OSHA) further explains that HazMat is any substance or chemical which is a health hazard or physical hazard, including:

- chemicals which are carcinogens, toxic agents, irritants, corrosives, sensitizers;
- agents which act on the hematopoietic system;
- agents which damage the lungs, skin, eyes, or mucus membranes;
- chemicals which are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive or water-reactive; and

[93] 2018 Statewide Mitigation Strategy.
[94] http://dep.state.fl.us/geology/geologictopics/hazards/tsunamis.htm

- chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists, or smoke which may have any of the previously mentioned characteristics.

Hazardous materials typically fall into one of three categories: Biological Hazards, Chemical Hazards, or Radiological Hazards. All of these HazMats have both short-term and long-term effects based on the timing of detection and the response time to mitigate the effects of the hazard.[95]

Citrus County contains many companies that store, handle, process, or transfer hazardous materials. Any time a hazardous material is utilized in any manner there is a chance of a release, which could endanger human life or the environment. Companies that meet the following three criteria must report to the Environmental Protection Agency (EPA) for the Toxic Release Inventory (TRI):

- Is in a specific industry sector (e.g., manufacturing, mining, electric power generation)
- Employs 10 or more full-time equivalent employees
- Manufactures or processes more than 25,000 lbs. of a TRI-listed chemical or otherwise uses more than 10,000 lbs. of a listed chemical in a given year.

Also, the Emergency Planning and Community Right-To-Know Act (EPCRA), Section 302, requires facilities to notify the state/tribe emergency response commissions (SERCs/TERCs), and local emergency planning committees (LEPCs) of the presence of any "extremely hazardous substance" (the list of such substances is in 40 CFR Part 355, Appendices A and B) if it has such a substance in excess of the substance's threshold planning quantity, and directs the facility to appoint an emergency response coordinator.

3.13.2 Location

Hazardous material incidents can occur during the production, transportation, use, and storage of those hazardous materials and can happen anywhere within the Citrus County. As these materials are processed and stored, those in the immediate vicinity are at risk of toxic fumes, soil contamination, and water contamination. Even parts of the county that do not have production or storage facilities are at risk given that hazardous materials are routinely and frequently transported via roadways, railways, pipelines, and waterways, concluding that all areas of the state are potentially at risk.

3.13.3 Extent

Hazardous materials releases are usually isolated to a particular site. The people impacted from a hazardous material release could be limited to the specific area surrounding the release or could expand to a larger area, within 1 mile of the site depending on the chemical, location, and the necessary response to clean and remediate the site.

3.13.4 Previous Occurrences

The Toxic Release Inventory (TRI) tracks the management of certain toxic chemicals that may pose a threat to human health and the environment. U.S. facilities in different industry sectors must report annually how much of each chemical is released to the environment and/or managed through recycling, energy recovery and treatment. (A "release" of a chemical means that it is emitted to the air or water, or placed in some type of land disposal.) According to the TRI 821,434 pounds of toxic chemicals were released on-site in 2017. On-site disposal or other releases include emissions to the air, discharges to bodies of water, disposal at the facility to land, and disposal in underground injection wells. Six pounds of toxic chemicals were released

[95] https://www.ihmm.org/about-ihmm/what-are-hazardous-materials

off-site. All of the reported disposals and releases were associated with Duke Energy's Crystal River Power Plant.[96] Major hazardous material releases have not been recorded in Citrus County, but are likely based on the existing transportation infrastructure, the presence of hazardous material facilities, and the existence of a major natural gas pipeline. Table 3-41 lists previous occurrences of hazardous material incidences in Florida which are reflective of the risk that exist in Citrus County.

Table 3-41 – Hazardous Materials, Previous Occurrences[97]

Date	**Description**
December 15, 2009	Approximately 1,000 gallons of sodium hydroxide was released from a faulty gasket on a pipeline connected to an above ground storage tank at the liquid transfer facility in St. Marks, Florida. The product flowed to an adjacent tidal creek before ultimately releasing some of the product into the St. Marks River. A Unified Command was established between EPA, USCG, DEP, County EMA, DOI and the RP. Response efforts included stabilizing the leaking gasket, sampling the impacted water bodies, conducting water patrols to ensure endangered/threatened species did not enter the area (e.g., manatees, birds, and alligators), damming up the tidal creek and pumping out the majority of the contaminated water (ph12+) from the tidal creek. The contaminated water was transferred to a containment area and was properly treated and disposed of.
May 9, 2009	An east coast railway train consisting of 22 rail cars and 2 locomotives derailed in Palm Coast, Florida. One rail car containing hydrochloric acid (HCL) was breached, resulting in HCL being released into the environment. Response operations concentrated on providing air-monitoring support for worker safety, as well as ensuring the off-loading procedures were conducted in a safe manner.
May 31, 2011	The DEP's Bureau of Emergency Response reported a mercury spill in a residential house in Tampa, Florida. DEP personnel observed at least two ounces of visible mercury within the residence. Mercury vapor readings with windows open in two rooms were 43,000 ng/m3 and 47,000 ng/m3 respectively (Lumex readings). Based on the readings, DEP advised the owners and their children to relocate until the hazards could be mitigated. The source of mercury is unknown and was discovered during home renovation activities.
January 11, 2012	Exposure to an unknown substance on a forest service road overcame two nearby community members. The Lake County HazMat Team conducted field screening of material and identified formaldehyde as a constituent.

[96] United States Environmental Protection Agency. (2019). TRI Explorer (2017 Updated Dataset (released April 2019)) [Internet database]. Retrieved from https://enviro.epa.gov/triexplorer/, (October 02, 2019).
[97] 2018 Florida Statewide Hazard Mitigation Plan, page 334-335.

July 22, 2012	Kinder Morgan (Central Florida Pipeline) had an ongoing release of refined petroleum product from a 10 inch pipeline. Kinder Morgan shut off the pipeline and responded with state and local response agencies to locate the source and evaluate extent of impact. It was determined that the pipeline failed in a drainage ditch full of water. The ditch flows into a nearby creek which discharges into Tampa Bypass Canal and then into McKay Bay. Kinder Morgan estimated 750 barrels of refined product were released. About two miles of the creek, which includes ditches, creek, ponds, and wetlands were impacted.
January 28, 2014	A train derailment in McDavid, Florida resulted in railcars containing phosphoric acid submerging in Fletcher Creek. There were no reported injuries or fatalities. A total of four railcars with 96% concentration phosphoric acid were derailed, at least one was leaking into the creek. Each railcar contained 12,000 gallons.
September 23, 2016	A tanker truck containing 8,000 gallons of petroleum products overturned on Interstate 75 in North Port, Florida. Both shoulders of the interstate were affected as well as nearby wetlands. FDEP, Sarasota County HazMat, and Charlotte County Fire Rescue responded.
April 3, 2017	A collision between two trains resulted in the release of approximately 7,400 gallons of diesel fuel and 77 gallons of battery acid.
June 3, 2019	Hillsborough County firefighters and members of the Hazardous Incident Team responded to a chemical spill near the Florida State Fairgrounds after a forklift punctured a 55-gallon drum of hydrofluoric acid.[98]
June 6, 2019	A building on the campus of the University of South Florida was evacuated as a hazardous materials incident after eight people complained of dizziness. One of the eight people was transported to the hospital for treatment, the others were treated at the scene. Air quality tests returned no abnormal results.[99]

3.13.5 Probability

Reports of hazardous material spills and releases are increasingly commonplace. Thousands of new chemicals are developed each year and transported domestically and internationally creating the risk for accidents and spills.

Major chemicals spills can occur at any facility that produces, uses, or stores chemicals. These include chemical manifesting plants, laboratories, shipyards, railroad yards, warehouses, or chemical disposal areas. Illegal dumpsites can appear anywhere. Accidents involving the transportation of hazardous materials can occur at any time and severely impact the affected community. Recent evidence shows that hazardous materials incidents may be the most significant threat facing local jurisdictions.

[98] http://www.fox13news.com/news/local-news/chemical-spill-prompts-warning-to-fairgrounds-area
[99] https://www.abcactionnews.com/news/region-hillsborough/usf-building-evacuated-as-hazmat-incident

The probability of a hazardous materials event is Possible with an annual probability between 1 and 10%.

3.13.6 Summary of Impacts

The impact of a hazardous material event, based on previous events is Minor, with very few injuries, if any. Only minor property damage and minimal disruption of quality life is seen in prior occurrences. Temporary shutdown of critical facilities is possible. Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by hazardous material incidents are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River.

Public

The public may be affected during a hazardous materials incident which my result in loss of life or injury from contamination. Additionally, diseases may be exacerbated as a result of a hazardous materials incident.

First Responders

First responders may be affected during a hazardous materials incident which may result in loss of life or injury from contamination, explosions, cleanup and destruction. Hazardous material incidents may also expose first responders to diseases.

Continuity of Operations

Continuity of Operations may be impacted during a hazardous materials event due to lost material. For example, a hazardous materials incident involving gas could lead to shortages and price increases.

Property, Facilities, Infrastructure

Properties, facilities and infrastructure may be damaged due to excavation and removal of soil and water. Properties may be impacted because of an inability to rebuild in affected areas.

Transportation services could be closed or blocked due to the contaminant affecting roads, train tracks, airplane flight paths, bridges, and waterways.

Properties that are part of a hazardous waste site could be impacted if there is long term contamination.

Environment

The environment may be affected during a hazardous materials incident which may result in death or illness to pets or wildlife near the spill. There may also be damage to plants and wildlife during a hazardous materials incident. The environment may be impacted by airborne issues such as toxic fumes, gases or vapors caused by chemicals. Environmental impacts may also include water contamination, soil contamination, loss of critical or endangered species and/or pollution.

Economic Condition

The economic condition of a community could be impacted during a hazardous materials event, by business closures leading to lost revenue and wages, loss of tourism and income, loss of product, and the cost of cleanup and restoration.

Public Confidence in Jurisdiction's Governance

If the government doesn't communicate with the public, fear could ensue, leading to a fear of the government. If cleanup is slow, the public could believe the government doesn't know how to properly clean it up or that the accident was malicious.

Hazard Ranking

The LMS Working Group determined hazardous materials incidents to be a medium priority hazard in Citrus County. As described in the profile above, the annual probability of a tsunami is Possible. Typical hazardous materials incidences have minor impacts with very few injuries, if any and only minor property damage. Warning times for hazardous materials events would typically be less than 6 hours, and the duration of an event would likely be less than one week.

Table 3-42 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Possible	Minor	Negligible	Less than 6 hours	Less than one week	**2.2**
2.0	1.0	1.0	4.0	3.0	

3.13.7 Vulnerability Analysis

Major HazMat incidents can occur at any facility that produces, uses, or stores hazardous materials. These include chemical manifesting plants, laboratories, shipyards, railroad yards, warehouses, or chemical disposal areas. Illegal dumpsites can appear anywhere. Accidents involving the transportation of hazardous materials can occur at any time and severely impact the affected community. The entire county is vulnerable to HazMat Incidents.

A hazardous material release event that takes place at a fixed site can have a wide impact on people, buildings and critical facilities nearby. The level of impact from this release can vary greatly depending on the type of waste, the amount of contact an individual has with the chemical, and if there is an explosion or fire associated with the event.

A hazardous material release event can be particularly costly to clean up, especially when groundwater and soil have been contaminated. Contamination can travel outward from a spill and leave localities and even regions uninhabitable, especially when water and food stocks are impacted. These affected areas also become less attractive to tourists and the economy. Several facilities in Citrus County store, use, dispose, or have the capacity and infrastructure to handle hazardous materials on a regular basis. Hazardous materials are widely used at facilities such as hospitals, wastewater treatment plants, and farms.

3.14 Radiological Event

3.14.1 Description

Duke Energy Florida has maintained a long-standing effort to provide the community with accurate information regarding potential hazards at their facilities, specifically the Crystal River Energy Complex. This information includes outreach and planning efforts to ensure the complex remains a safe and responsible member of the community.

The Crystal River Energy Complex contained both coal and nuclear power generating units. However, in 2009, engineers discovered a separation of concrete, within the containment building that surrounds the nuclear reactor vessel. In 2011, additional delamination was discovered. On Feb. 5, 2013, Duke Energy announced its decision to retire the Crystal River Nuclear Plant, also known as CR3.

CR3 remains in a safe, stable condition and nuclear safety remains a top priority. Comprehensive emergency preparedness plans and full-time, round-the-clock security force remain in place.

On August 1, 2014, Duke Energy Florida filed a site certification application for a combined-cycle plant pursuant to Florida's Electrical Power Plant Siting Act. Duke Energy's new Citrus Combined Cycle Station started generating cleaner-burning, highly efficient energy in two phases. The first 820-megawatt power block started running Oct. 26, 2018, and the second 820-megawatt power block came online Nov. 24, 2018. Duke Energy broke ground on the new facility in March 2016 and held a ceremonial grand opening on April 4, 2019.[100]

In May 2019, Duke Energy announced a plan to decommission the Crystal River Nuclear Plant by 2027 instead of 2074. Decommissioning the nuclear plant is highly regulated and will involve removing, packaging and shipping radioactive materials, such as the reactor vessel, to a licensed facility and then demolishing buildings. Twenty-four-hour security, emergency response and radiological and environmental monitoring programs will continue during and after decommissioning. The plan is subject to approval by the U.S. Nuclear Regulatory Commission and the Florida Public Service Commission. If approved, decommissioning work will start in 2020.[101]

In 2015 the Nuclear Regulatory Commission granted Duke Energy Florida's request to alter the emergency preparedness plan for the Crystal River Unit 3 nuclear power plant in Crystal River, Fla., to reflect the plant's decommissioning status.

The changes come in the form of exemptions from certain requirements in NRC's regulations for operating nuclear power plants that may not be appropriate for a plant that has permanently ceased operations. Once the exemptions are implemented, state and local governments may rely on comprehensive emergency management ("all hazard") planning for off-site emergency response to events at Crystal River, rather than having a dedicated radiological emergency response plan approved by the Federal Emergency Management Agency. As a result, there will not be a 10-mile emergency planning zone identified in the license for Crystal River Unit 3. The plant will maintain an onsite emergency plan and response capabilities, including the continued notification of local government officials for an emergency declaration.[102]

3.14.2 Location

In the 2015 Local Mitigation Strategy update, the location of risk for radiological incidents was identified as a circumference of 5- and 10-mile emergency planning zones. However, in 2017 the Duke Energy Crystal River Nuclear Plant was moved from the REP program – Radiological Emergency Planning program to a PDEP – Permanently Defueled Emergency Plan. This dissolves the REP Program which eliminated the 10-mile emergency planning zone. According to FDEM, any hazardous material release associated with the Crystal River Nuclear plant would be nuclear waste and would not contaminate the surrounding area.[103]

[100] https://www.duke-energy.com/our-company/about-us/new-generation/natural-gas/citrus-natural-gas
[101] https://www.duke-energy.com/our-company/about-us/power-plants/crystal-river
[102] U.S. Nuclear Regulatory Commission Press Release #15-022. April 1, 2015.
[103] 2018 Florida Statewide Hazard

3.14.3 Extent

An emergency at the Crystal River Energy Complex could range from a minor to a major disaster.

3.14.4 Previous Occurrences

There is no history of incidents at the Crystal River Energy Complex.

3.14.5 Probability

Because of federal oversight, existing radiological emergency operations plans, and ongoing FEMA graded exercises and evaluations the probability of a radiological event is Unlikely with a less than 1% annual probability.

3.14.6 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by radiological event are greatest for the western portions of unincorporated Citrus County, and the City of Crystal River. The unincorporated portions of Citrus County would still be less impacted as many critical facilities are located in the central and eastern portions of the county allowing for better outcomes related to continuity of operations. The City of Inverness would see fewer impacts due to its location in the eastern portion of the county.

Public

Impacts to the public may include contamination or radiation poisoning.

Responders

First responders may be impacted by contamination or radiation poisoning. Additionally, special equipment will be needed to handle radioactive materials.

Continuity of Operations

Continuity of operations could be impacted an may include disruption of the power plant operations.

Property, Facilities, Infrastructure

A radiological event may require de-contamination of the facility and could potentially damage surrounding properties.

Environment

The environment may be impacted by a radiological event and may require de-contamination or closing of areas until the radiation dissipates on its own. Radiological events could affect animal species and habitats leading to decreased numbers.

Economic Condition

Disruption of a nuclear power plant would be costly to owners and consumers. There would be lost wages, lost revenue, and cost of recovery and remediation.

Public Confidence in Jurisdiction's Governance

Incident at a nuclear power plant would cause significant loss of public confidence in the jurisdiction, as panic would likely ensue.

Hazard Ranking

The LMS Working Group determined radiological incidents to be a low priority hazard in Citrus County generally due to the decommissioning status of the Crystal River Nuclear plant. As described in the profile

above, the annual probability of a radiological incident is Unlikely. The potential impact of a radiological impact is Minor with few injuries and only minor property damage. The spatial extent of a radiological event is Negligible with less than 1% of the county being affected. The warning time for a radiological incident is most likely to be less than 6 hours. The duration of a radiological incident could be more than one week.

Table 3-43 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Unlikely	Minor	Negligible	Less than 6 hours	More than one week	**2.2**
1.0	1.0	1.0	4.0	4.0	

3.14.7 Vulnerability Analysis

For nuclear power plant incidents, areas at risk are normally designated as (1) within the plume emergency planning zone (EPZ) of such facilities (i.e., jurisdiction located within a 10-mile radius of a nuclear power plant) or (2) within the ingestion emergency planning zone (IPZ) (i.e., jurisdictions within a 50-mile radius of a nuclear power plant). As noted above, the Crystal River Nuclear Plant has been decommissioned and the emergency planning zone is no longer applicable. As such determining an assessment of the vulnerable population, buildings and critical facilities within the risk area would be not be reflective of the current status of the nuclear plant.

3.15 Cyber Incident

3.15.1 Description

According to the Department of Homeland Security, a cyber incident is any attempted or successful access to, exfiltration of, manipulation of, or impairment to the integrity, confidentiality, security, or availability of data, an application, or an information system, without lawful authority.[104] Cyber incidents involve computers, networks, and information or services that affect daily operations and critical infrastructure.

A Cyber Incident differs from traditional hazards such as a flood, which makes it difficult to plan for, respond to, recover from, and mitigate against. For example, there is often a lack of physical presence or evidence of a cyber-incident, making it difficult to understand the scope of the incident. Furthermore, the scope will likely cross municipal jurisdictions because of the nature of cyber technology. There are also fewer resources for cyber incidents due to a lack of awareness and knowledge of the cyber threat.[105]

The duration of a cyberattack is dependent on the complexity of the attack, how widespread it is, how quickly the attack is detected, and the resources available to aid in restoring the system. One of the difficulties of malicious cyber activity is that it could come from virtually anyone, virtually anywhere. Table 3-44 summarizes common types of cybersecurity threats.

[104] https://fas.org/irp/offdocs/nspd/nspd-54.pdf
[105] FEMA. (2016). *Community Preparedness for Cyber Incidents MGT 384* (Version 1.1). Page 2.7 – 2.8

Table 3-44 - Types of Cyber Attacks[106]

Type of Attack	Description
Denial of Service	A method of attack from a single source that denies system access to legitimate users by overwhelming the target computer with messages and blocking legitimate traffic. It can prevent a system from being able to exchange data with other systems or use the Internet.
Distributed denial of Services	A variant of the denial-of-service attack that uses a coordinated attack from a distributed system of computers rather than from a single source. It often makes use of worms to spread to multiple computers that can then attack the target.
Exploit tools	Publicly available and sophisticated tools that intruders of various skill levels can use to determine vulnerabilities and gain entry into targeted systems.
Logic bombs	A form of sabotage in which a programmer inserts code that causes the program to perform a destructive action when some triggering event occurs, such as terminating the programmer's employment.
Phishing	The creation and use of e-mails and Web sites—designed to look like those of well-known legitimate businesses, financial institutions, and government agencies—in order to deceive Internet users into disclosing their personal data, such as bank and financial account information and passwords. The phishers then take that information and use it for criminal purposes, such as identity theft and fraud.
Sniffer	Synonymous with packet sniffer. A program that intercepts routed data and examines each packet in search of specified information, such as passwords transmitted in clear text.
Trojan horse	A computer program that conceals harmful code. A Trojan horse usually masquerades as a useful program that a user would wish to execute.
Virus	A program that infects computer files, usually executable programs, by inserting a copy of itself into the file. These copies are usually executed when the infected file is loaded into memory, allowing the virus to infect other files. Unlike the computer worm, a virus requires human involvement (usually unwitting) to propagate.
War dialing	Simple programs that dial consecutive telephone numbers looking for modems.
War Driving	A method of gaining entry into wireless computer networks using a laptop, antennas, and a wireless network adaptor that involves patrolling locations to gain unauthorized access.
Worm	An independent computer program that reproduces by copying itself from one system to another across a network. Unlike computer viruses, worms do not require human involvement to propagate.

3.15.2 Location & Extent

Because cyber incidents occur in "cyber space," there are not always geographic areas affected by cyber incidents. However, cyber incidents may cause physical disruptions in critical infrastructure, which could affect a jurisdiction or a power grid. It is important to note that power grids are vast, sometimes crossing state lines, meaning that a cyber incident at one facility at one location could cause disruptions at other locations hundreds of miles away.

3.15.3 Previous Occurrences

To date there have been no prior occurrences of cyber incidents in Citrus County, however public agencies in Florida have been targeted by cyber attacks.

[106] https://www.gao.gov/new.items/d05434.pdf

Undated and Widespread:

- A virus called "Sobig" infected the computer system at CSX Corp's Jacksonville, Florida headquarters. It shut down signaling, dispatching, and other systems and affected 23 states east of the Mississippi River.[107]
- A disgruntled employee of a contractor that supplied IT and control system technology for the sewage system in Maroochy Shire Queensland, Australia used his insider knowledge of the sewage system to issue commands. This led to 800,000 liters of raw sewage spilling into local parks, rivers, and the grounds of a hotel. The effects included marine life dying, water turning black, and a stench that was unbearable for the residents.[108]
- Melbourne, Australia's Metropolitan ambulance service conducted an upgrade that disabled the service's computer-aided dispatch system for 24 hours. This caused delayed response and duplicate responses.[109]
- The WannaCry ransomware infected computers in 99 countries. This malware encrypted files and demanded $300 in Bitcoins to unlock the files. Computers affected included banks, healthcare facilities, shipping companies, utility companies, etc.[110]

Table 3-45 - Cyber Incident Previous Occurrences

Date	Location	Description
2011	Orlando, Florida	City of Orlando was targeted by the hacktivist group Anonymous because non-profit workers were arrested for distributing food without permits (FEMA MGT, 384, 1-30)
2015	Panama City, Florida	An anonymous source leaked 11.5 million documents from a law firm in Panama City. The documents detailed financial and attorney-client information for more than 200,000 offshore entities. When reporters searched through the information, it was discovered that the law firm had been involved in illegal actions, including fraud and tax evasion.[111]
2016	Sarasota, Florida	A ransomware virus on the Sarasota City Hall computer systems encrypted 160,000 files and demanded $33 million in Bitcoins to unlock them. The IT staff quickly shut

[107] FEMA. (2016). *Community Preparedness for Cyber Incidents MGT 384* (Version 1.1). Page 2.32 – 2.33
[108] FEMA. (2016). *Community Preparedness for Cyber Incidents MGT 384* (Version 1.1). Page 2.41 – 2.42
[109] FEMA. (2016). *Community Preparedness for Cyber Incidents MGT 384* (Version 1.1). Page 2.42 – 2.43
[110] http://www.bbc.com/news/technology-39901382
[111] Bloomberg, J. (2016, April 21). Cybersecurity Lessons Learned From 'Panama Papers' Breach. Retrieved from Forbes website: https://www.forbes.com/sites/jasonbloomberg/2016/04/21/cybersecurity-lessons-learned-from-panama-papers-breach/#3a353ae2003f

		down the system, which saved the city from catastrophic data loss and financial costs, and the attack was contained within a few hours.[112]
2017	Florida	A cyber-attack on a server used to administer Florida Standard Assessments prevented students from testing. It also made clear that the student and employee information may not be safe. [113]
2018	Collier County, Florida	Collier County became a victim of a phishing scheme that netted foreign attackers $184,000 in taxpayer money, according to investigators. County funds in December 2018 were the target of what the Federal Bureau of Investigation identifies as a "Business Email Compromise," county and clerk of court's office officials said.[114]
2019	Riviera Beach, Florida	An email infected with ransomware shut down the city's network. Email, phones, police records, and city department websites were inaccessible and inoperable. The city council authorized the city insure to pay 65 bitcoins, valued at roughly $600,000 in the hopes of regaining data made inaccessible by the attack.[115]
2019	Naples, Florida	The City lost $700,000 in a spear phishing cyber-attack. Money was transferred to a fake bank account provided by the attacker who was posing as a representative from a construction firm that had been hired to do infrastructure work in the city's downtown.[116]

3.15.4 Probability

Based on the number of prior occurrences targeting local governments, there is a growing probability of future cyber incidents in Citrus County, the City of Crystal River and the City of Inverness. The probability of a cyber incident is Possible with an annual probability between 1% and 10%.

3.15.5 Summary of Impacts

Impacts to the public, first responders, continuity of operations, property, facilities, infrastructure, environment, economic condition, and public confidence caused by cyber incidents are generally the same for unincorporated Citrus County, the City of Inverness, and the City of Crystal River.

Public

Members of the public may be impacted by a cyber incident due to the release of sensitive information including bank accounts and social security numbers. The public may also suffer from a loss of wages if their employer is forced to close during a cyber incident.

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[112] Murdock, Z. (2017, July 28). The City of Sarasota, A Ransomware Attack, ISIS and the FBI. Herald-Tribune. Retrieved from http://www.heraldtribune.com/news/20170728/city-of-sarasota-ransomware-attack-isis-and-fbi

[113] http://www.fldoe.org/newsroom/latest-news/2010319-fdle-investigating-cyber-attacks-against-fsa-testing-system-.stml

[114] https://www.naplesnews.com/story/news/crime/2019/08/20/7-florida-municipalities-have-fallen-prey-cyber-attacks-ryuk-ransomware-phishing/2065063001/

[115] https://www.palmbeachpost.com/news/20190621/in-depth-how-riviera-beach-left-door-wide-open-for-hackers

[116] https://www.naplesnews.com/story/news/crime/2019/08/20/7-florida-municipalities-have-fallen-prey-cyber-attacks-ryuk-ransomware-phishing/2065063001/

First Responders

First responders may have to work long hours outside of regular work hours to stop and/or remediate a cyber incident. Additionally, first responders may not be able to respond properly if a cyber-attack targets emergency or public safety systems.

Continuity of Operations (including continued delivery of services)

Cyber incidents could take operations offline for any amount of time and/or make information inaccessible or distribute false information. An incident could interrupt public safety, etc. services or result in a loss of critical systems or data. Cyber incidents may result in a loss of productivity and may disable emergency or public safety systems.

Property, Facilities, Infrastructure

Cyber incidents could lead to damage of equipment related to the operation of infrastructure.

Environment

A cyber incident could cause a release of hazardous material, which could damage the environment.

Economic Condition

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

Public Confidence in the Jurisdictions Governance

Cyber incidents may result in the public losing confidence in the jurisdiction's ability to keep services operational and safe.

Hazard Ranking

The LMS Working Group determined cyber incidents to be a medium priority hazard in Citrus County. As described in the profile above, the probability of a cyber incident is Possible with an annual probability between 1% and 10%. The probable hazard impact for cyber incidents is minor, including no deaths or injuries recorded, and less than a 24-hour warning time before an event. Cyber Incidents can be costly as indicated in prior incidents cyber incidents can cost Table 3-46 outlines the hazard rankings for each of the hazard priority criteria related to cyber incidents.

Table 3-46 – Priority Risk Index

Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Possible	Minor	Large	Less than 6 hours	Less than 24 hours	**2.6**
2.0	1.0	4.0	4.0	2.0	

3.15.6 Vulnerability Analysis

Any agency that utilizes computers and the internet is vulnerable to cyber-incident. The local governments, utilities, hospitals, and schools are heavily reliant on technology for daily operations, including cell phones, handheld devices such as tablets, and computers. Critical facilities may become either uninhabitable or unusable as a result of a cyberattack if their infrastructure if reliant on technology for operations. Critical infrastructure systems are frequently tied to technology, oftentimes through virtual operations and

supervisory control and data acquisition (SCADA) systems. Cyber incidents could interrupt the operation of critical infrastructure, as well as traffic control, dispatch, utility, and response systems. Targeted cyberattacks can impact water or wastewater treatment facilities. The disruption of the virtual systems tied to this infrastructure could cause water pollution or contamination and subsequent environmental issues.

Cyberattacks can interfere with emergency response communication and activities. Given that many first responders rely on technology both at operations center and in the field, a cyberattack could impair the ability to communicate. For example, many agencies rely on technology to notify and route responders to the scene of the emergency.

4.0 Mitigation Strategy

4.1 Overview

The planning process allows Citrus County and the municipalities the opportunity to recognize the types of hazards facing Citrus County, determine the means to address these hazards, and join together to implement these means. Hazard mitigation planning allows the community to identify proactive mitigation strategies before such events occur. The importance of hazard mitigation planning must be placed in the context of policies, perceptions, and practices associated with hazards that impact the economic and physical wellbeing of Citrus County. After reviewing the results of the risk and vulnerability assessment the LMS Working Group developed goals and objectives for addressing hazard mitigation. The first major change from the previous update reflect a greater emphasis on wildfire as a hazard, with the addition of Goal 6. The second major addition is Goal 7 which was added to reflect the community's interest in being able to recover quickly when disasters occur.

4.2 Citrus County Goals and Objectives

The LMS Working Group developed seven specific goals and associated objectives to guide its work and focus the efforts and resources to reduce hazard related losses and damages in the future. The goals and objectives were designed to be multi- hazard and to address the needs of all of the jurisdictions.

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

1.1 Protection of populations and properties in Citrus County susceptible to economic or physical loss from disasters shall be consistent with the standards established in the Local Mitigation Strategy and the Comprehensive Plans of Citrus County, the City of Crystal River, and the City of Inverness.

1.2 Provide protection of critical facilities vital to disaster response, such as fire and police, and those vital to the continuous operations of the county, such as hospitals and health care facilities, water and sewer facilities, electrical and other utility, and transportation systems.

1.3 Citrus County and the City of Crystal River should continue to participate in the Community Rating System program established by FEMA and seek ways to reduce flood insurance premiums by increasing the County's rating.

1.4 Encourage the City of Inverness to actively participate in the Community Rating System program.

GOAL 2: Support a balance between government regulation/enforcement, and personal awareness/responsibility for hazard mitigation, by emphasizing education and training for property owners, families and individuals.

2.1 Develop and support disaster preparedness education and awareness programs, targeting specific benefits to homeowners, families, and individuals.

2.2 Develop and support disaster preparedness education and awareness programs, targeting specific benefits to public and private sectors.

2.3 Develop and support economic incentive programs for both public and private sectors promoting benefits of structural retrofitting.

GOAL 3: Prevent flood-related repetitive losses from natural disasters through regulation and education.

3.1 Develop and support public and private projects and programs to retrofit, relocate, or acquire properties susceptible to repetitive flooding.

3.2 Require systematic maintenance programs for stormwater management systems.

3.3 The County shall direct population concentrations away from known or predicted coastal high hazard areas (in the unincorporated area) through appropriate regulations in the Land Development Code.

3.4 Support economic viability of historic areas susceptible to flooding through encouragement of upgrading and elevating structures for greater resistance to flooding.

GOAL 4: Emphasize pre- and post-disaster planning to decrease vulnerability of existing and new construction to loss.

4.1 Discourage the location of nursing homes and hospital facilities in Category 1 coastal hurricane evacuation areas.

4.2 Promote and encourage changes to State law to require that hospitals and nursing homes have an approved emergency response plan and emergency power generation on site.

4.3 Use pre-storm planning to identify post-storm redevelopment options in vulnerable coastal areas, taking into consideration short- and long term environmental, economic, and structural issues.

4.4 Promote to elected officials, builders, and potential homeowners, the economic and safety benefits of designing mitigation features into new construction.

4.5 Identify vulnerable existing public and private critical facilities and encourage pre-disaster retrofit.

4.6 Offer and support incentives and education to encourage higher standards of protection to structures and facilities from hazards.

4.7 Collaborate with federal, state, and local stakeholders to ensure the accuracy of flood risk mapping in Citrus County.

4.8 Collection of flood data information and analysis and completion of a countywide database that incorporates a wider range of property data, topographical data, storm drainage data, rainfall data, building permit data, data on insurance, history of flooding, etc.

GOAL 5: Encourage public support and commitment to hazard mitigation, by communicating its benefits and justification in simple and understandable terms.

5.1 Develop and implement public information programs for hazard mitigation, emphasizing its direct benefits to citizens, including public officials and private businesses.

5.2 Identify and coordinate hazard mitigation public information programs and events such as contests and festivals with public and private partners.

5.3 Identify and seek multiple funding sources that will support hazard mitigation awareness and training programs.

Goal 6: Partner with the Florida Fire Services to prevent wildfires through public education and mitigation actions.

6.1 Pursue methodologies and technology that will enhance mitigation success

6.2 Continue to integrate mitigation practices through local plans, programs and policies.

6.3 Maintain an accurate record of wildfire risk, history, and mitigation activities through the county to guide future plans, programs, and mitigation activities.

6.4 Continue to monitor and maintain current risk assessment information in cooperation with local, state and federal entities.

6.5 Continue active communication between state and federal mitigation planners, acquiring and sharing technical assistance and training as needed throughout the county for updating, enhancing, or implementing local mitigation strategies and sharing best practices.

6.6 Assist in the integration of hazard mitigation concepts into other local planning efforts.

6.7 Support the efforts of the Florida Forest Service and other agencies to reduce wildfire risks throughout the county.

6.8 Coordinate and foster partnerships among local government agencies, land managers, and state agencies involved in wildfire mitigation activities - including fuel management, information and education activities designed to reduce wildfire risk – to improve local capabilities.

6.9 Develop and enforce land development regulations, and comprehensive plan amendments that reduce wildfire risk by providing planning, information, resources, and technical assistance from applicable local and state agencies.

6.10 Encourage at least two Communities at Risk to become Firewise communities by 2025.

Goal 7: Become a more disaster resilient community.

7.1 Develop plans and procedures that minimize impacts from power outages.

7.2 Evaluate the effectiveness of existing emergency power supplies to critical facilities and implement enhancements as needed to provide three to five days of functional operation

7.3 Continue developing and refining plans for the safe evacuation of residents exposed to natural and human caused hazards, to include alternative modes of transportation to be used following a disaster.

7.4 Provide wind protection measures to public buildings that will serve critical roles in response recovery activities.

7.5 Continue funding current hazard warning program.

7.6 Continue to develop health and safety emergency plans supporting county and municipal comprehensive emergency management plans.

7.7 Develop and Implement a Post Disaster Redevelopment Plan to be carried out through the appropriately adopted Post Disaster Ordinances following a major or catastrophic disaster.

7.8 Develop and implement disaster planning training for business owners through collaborative programs with appropriate government agencies and community organizations. Programs should include seminars and handout materials addressing needs relevant to businesses.

7.9 Local governments and businesses should develop and maintain Continuity of Operations (COOP) Plans which minimize the impact of business interruptions and protect vital records.

7.10 Develop local programs in concert with federal and state programs to respond to and recover from including the identification of suitable locations for temporary housing sites and responder staging sites.

Develop a plan to facilitate emergency operations with a mobile command post for first responders and shelter for emergency workers, first responders, and families for use during activation.

Develop programs to protect the region's water supply from contamination during natural and human caused hazard events.

4.3 Range of Mitigation Initiatives and Policies

The process of integrating the goals and objectives with the known hazards and vulnerabilities within Citrus County, the City of Crystal River and the City of Inverness was completed and reviewed for continued applicability in order to produce an updated series of specific mitigation actions relevant to protecting lives and properties in Citrus County. Incentives for implementing hazard mitigation initiatives are related to loss reduction, public welfare, or public safety. Disincentives are related to lack of funding, staff, or resources.

The mitigation alternatives are linked to the County's goals and objectives and address the hazards risk and vulnerabilities identified by the risk assessment. These initiatives apply to new and existing building structures as well as new and existing infrastructure. The following is a list of goals objectives, and policies from the comprehensive plans of Citrus County, the City of Crystal River, and the City of Inverness where hazard mitigation goals and actions are incorporated:

Citrus County Comprehensive Plan, Coastal, Lakes, River Management

Goal 4 - Preserve, protect, and enhance resources of the Coastal, Lakes, and River Areas and where appropriate, restrict development activities which would damage or destroy these resources, protect human life, and limit the public expenditure in areas subject to natural disasters.

Objective 4.9 - The County shall maintain or reduce hurricane evacuation times by requiring that new developments not degrade the existing evacuation Level of Service (LOS).

Policy 4.9.1 - Maintain and improve the County's Hurricane Evacuation sections of the Peacetime Emergency Plan and coordinate the integration of existing evacuation deficiencies into the regional and local evacuation plans.

Policy 4.9.2 - The Geographic Resources and Community Planning Division shall prepare periodic reports at least every seven years on the population at-risk for use in evacuation planning.

Policy 4.9.3 - The Hurricane Evacuation Level of Service Standard for Out of County evacuation is sixteen (16) hours for a Category 5 storm event.

Policy 4.9.4 - All roadway improvements along the County's evacuation network shall include practicable remedies for flooding problems.

Policy 4.9.5 - No new hurricane shelters shall be located within the Category 5 hurricane

evacuation area.

Policy 4.9.6 - The hurricane vulnerability zone consists of the evacuation areas, from the Tropical Storm through the Category 5 Hurricane Evacuation Zone, as identified in the Storm Tide Atlas in the *2010 Statewide Regional Evacuation Study, Withlacoochee Region (SRES)*.

Policy 4.9.7 - Development orders issued for developments of regional impact shall contain conditions which require mitigative measures for impacts on hurricane shelter capacity and hurricane evacuation times for developments which generate a number of evacuating vehicles greater than the evacuation traffic capacity on designated hurricane evacuation routes.

Policy 4.9.8 - All proposed Comprehensive Plan Amendments and new developments within the CHHA must meet the following criteria:

a. The adopted LOS for "out of county" hurricane evacuation is maintained for a category 5 storm event as measured on the Saffir-Simpson scale.
b. A 12 hour evacuation time to shelter is maintained for a category 5 storm event as measured on the Saffir-Simpson scale and shelter space reasonably expected to accommodate the residents of a development contemplated by the proposed comprehensive plan amendment is available; or
c. Appropriate mitigation is provided that will satisfy Policy 4.9.8 (a). or (b). Appropriate mitigation shall include, without limitation, payment of money, contribution of land, and construction of hurricane shelters and transportation facilities.
d. County shall enter into a binding contract with the developer detailing any required mitigation.
e. If the LOS for the host evacuees has not been established the LOS shall not exceed 16 hours for a category 5 event.

Policy 4.9.9 - Citrus County shall assess and adopt regulations in the hurricane vulnerable zone which: (1) limit new development in coastal areas and additional mobile home units; and/or (2) allow new development in coastal areas provided that mitigating measures are established which do not increase hurricane evacuation times; (3) promote land acquisition; and/or (4) establish a fee in lieu program and use those funds generated by fees to support future shelter development..

Policy 4.9.10 - The County shall utilize the American Red Cross (ARC) 4496 Standards for Hurricane Evacuation Shelter Selection, which includes standards for shelter location, capacity, inventory, and interior safety criteria during hurricane associated hazards.

Policy 4.9.1 - The County shall conduct evacuation traffic analysis using the planned distribution of the County's buildout population. To facilitate this task, the County will utilize a transportation network modeling system. Transportation network modeling shall also be utilized to monitor the impact of large residential projects and of ongoing development on hurricane evacuation times.

Policy 4.9.12 - In order to increase public awareness of hurricane hazards, the County shall provide emergency preparedness information and educational opportunities to the public.

Policy 4.9.13 - Lands within hurricane vulnerable areas, particularly low-lying and shoreline areas shall be targeted for public acquisition to protect the natural and beneficial functions of floodplains.

Policy 4.9.14 - The County should not improve or build public facilities which encourage

growth in the Coastal High Hazard Area, except for necessary public services for existing developments or resource based recreation facilities.

Policy 4.9.15 - A hurricane mitigation fund shall be established to provide the resources needed for hazard mitigation projects in the adopted Local Mitigation Strategy.

Policy 4.9.16 - The County shall consider the adoption of a shelter mitigation impact fee to provide funds for construction of the additional shelter capacity needed as a result of growth.

Policy 4.9.17 - All new mobile home parks and mobile home subdivisions shall be required to construct a hurricane shelter that meets ARC 4496 standards to shelter at least 70% of the residents of the subdivision. Such shelters shall not be located within the hurricane vulnerability zone. (per Policy 4.9.5) Alternatively, the developer may pay a fee to the shelter mitigation fund.

Policy 4.9.18 - The County shall require all new shelters meet the ARC 4496 Shelter Guidelines as outlined in Appendix A of the Comprehensive Plan.

Objective 4.10 - The County shall direct population concentrations away from the Coastal High-Hazard Area through appropriate regulations in the Land Development Code.

Policy 4.10.1 - The County shall continue to amend its building codes to reflect coastal hazard concerns and the amendments to the Southern Standard Building Code.

Policy 4.10.2 - New sanitary sewer facilities and on-site sewage systems in the Hurricane Surge Areas (vulnerability zone) and areas subject to freshwater flooding shall be flood proofed and equipped with back flow preventors, respectively.

Policy 4.10.3 - The Coastal High Hazard Area shall incorporate all lands and waters which lie within the Category 1 Hurricane Evacuation Zone. Such area is generally based upon the surge zone as depicted in the *2010 Statewide Regional Evacuation Study, Withlacoochee Region (SRES)*. The Coastal High Hazard Area boundary shall be shown on the Land Development Code Atlas.

Policy 4.10.5 - Population concentration shall be directed away from the Coastal High Hazard Area.

Policy 4.10.6 - The County shall relocate or replace infrastructure located in the Coastal High Hazard Areas to limit public losses from various events including, but not limited to, storm damage, hurricanes, severe flooding, abandonment of facilities and/ or structures, and tornadoes.

Policy 4.10.7 - Lands within hurricane vulnerable areas, particularly low-lying and shoreline areas subject to storm surge shall be targeted for public acquisition to protect the natural and beneficial functions of floodplains.

Policy 4.10.8 - The LDC shall contain additional disaster preparedness requirements for new developments whose residents might have limited mobility and/or demand specialized facilities.

Policy 4.10.9 - No new Institutional Occupancy uses (i.e., the use of a building or structure, or a portion thereof, in which care or supervision is provided to persons who are or are not capable of self-preservation without physical assistance or in which persons are detained for penal or correctional purposes or in which the liberty of the occupants is restricted,

including, but not limited to; hospitals, nursing homes (24-hour care for 6 or more people), psychiatric hospitals, jails, detention centers, reformatories, pre-release centers and other residential restrained or supervised care facilities) shall be allowed within the Coastal High Hazard Area unless the location has direct access to a Principal Arterial roadway. Existing facilities shall not expand beyond the density/intensity approved as of January 01, 2004 unless an overriding public need can be demonstrated and the site directly accesses a Principal Arterial roadway.

Policy 4.10.10 - New construction or expansion of R-4 residential occupancy uses, as defined by the latest edition of the Florida Building Code, are not allowed anywhere within the Coastal High Hazard Area unless the site has direct access to a Principal Arterial roadway:

Policy 4.10.10A. - New construction or expansion of R-2 residential occupancy uses, as defined by the latest edition of the Florida Building Code, are not allowed within the Coastal High Hazard Area unless all minimum standards of the LDC are met, the proposed development is compatible with surrounding development, the development's access, internal design, and general location do not impede the evacuation of its residents or neighbors, and the project does not negatively impact area evacuation clearance times:

Policy 4.10.10B. - New construction or expansion of the R-1 and R-3 residential occupancy uses, as defined by the latest edition of the Florida Building Code, are allowed within the Coastal High Hazard Area. Existing undeveloped subdivisions and groupings of lots are encouraged to cluster dwellings rather than develop typical lots and homesites in order to minimize the overall footprint of development. Such clustering shall not increase density.

Policy 4.10.11 - No new mobile home parks shall be developed within the Coastal High Hazard Area (CHHA) nor shall any existing mobile home park with the CHHA be expanded beyond the number of dwelling units approved as of January 01, 2004. Existing mobile home parks may continue and dwelling units may be maintained, repaired, or replaced as needed, appropriate, and consistent with all other provisions and ordinances. Any replacement unit shall be elevated in compliance with current regulations. No lot or parcel within the CHHA, which currently does not allow mobile homes, shall be permitted to change to allow mobile homes.

Policy 4.10.12 - The County shall limit the height of structures within the Coastal High Hazard Area. Residential structures shall be limited to no more than two stories above the base flood or finished floor elevation. Areas under elevated residential structures may be used only for parking of vehicles, limited dead storage, and access to the structure, not finished living area. Nonresidential structures shall be limited to four stories above finished grade. Industrial facilities, electric power generation and transmission facilities, mining operations, agricultural operations, dry boat storage at marinas, and Seven Rivers Community Hospital are exempt from this provision. Construction or expansion of exempted facilities shall require the assurance of compatibility with surrounding development and may require additional buffers, setbacks, and similar measures.

Policy 4.10.13 - Recreational Vehicle (RV) parks, campgrounds, resorts, motels, hotels, and similar temporary lodging facilities are commercial uses. Such uses shall not be allowed to convert to permanent residential uses. No increase in residential dwelling unit densities within the Coastal High Hazard Area shall be allowed.

Policy 4.11.8 - To ensure that the property rights of current residents of the CHHA are

protected, the County shall authorize redevelopment of up to the actual built density/intensity in existence on the property prior to the natural disaster notwithstanding the maximum permitted density/intensity adopted in the GFLUM and LDC Atlas. All such redevelopment shall meet current federal, state, and local construction and development review standards if feasible.

Citrus County Comprehensive Plan, Future Land Use Element

GOAL 17 - The Future Land Use Plan is intended to enhance the quality of life of the citizens of Citrus County through: provisions for adequate housing, services, and facilities; protection of the environment; creation of favorable economic conditions; and the elimination of incompatible land uses, **hazards**, and nuisances.

OBJECTIVE 17.1 - A unified County Land Development Code (LDC) which provides standards and procedures for the implementation and enforcement of the Comprehensive Plan shall be adopted within one year of the adoption of the Comprehensive Plan.

POLICY 17.1.1 - The County LDC shall contain development regulations and detailed provisions to implement the Comprehensive Plan, including at a minimum: subdivision regulations, tree protection, protection of open space, protection of potable water sources, regulation of areas subject to seasonal and periodic flooding, and provision for drainage and stormwater management, protection of environmentally sensitive lands, regulation of signs, and protection of natural and historic resources.

POLICY 17.1.6 - Performance standards shall be established in the County LDC providing for, but not limited to, drainage, flood protection, utilities, separation of uses and buffering, densities, parking, access, environmental and water resource protection, preservation of wetlands, open spaces, and convenient on-site traffic flow.

POLICY 17.3.13 - Recreational vehicles, tent campsites, and recreational resort cabins shall not be used as permanent or long-term residences. Recreational vehicles and park trailers shall not be occupied for more than 180 consecutive days; or for more than 45 consecutive days in areas of special flood hazard unless they comply with FEMA regulations and standards in the County LDC.

POLICY 17.3.23 - Mobile home parks shall be developed according to a comprehensive and detailed master plan, shall provide a minimum of 20 percent of the site as permanent open space and another 10 percent as recreation areas, and shall locate lots or homesites so as to maximize the number adjacent to common open space and recreation areas. No new mobile home parks, expansions of existing parks which are not vested, or redesignations of land to allow for mobile homes shall be allowed within the Coastal High Hazard Area (CHHA).

OBJECTIVE 17.4 - The County LDC shall contain provisions to protect residents from flooding using criteria established by the Federal Emergency Management Administration (FEMA).

POLICY 17.4.1 - All new construction shall be built in conformance with FEMA and the County's Flood Plain Standards as described in the County LDC.

POLICY 17.4.2 - Development orders shall not be issued for proposed construction which does not conform with the requirements and guidelines of the Flood Plain Standards.

POLICY 17.6.4 - The County LDC shall contain standards for the location of commercial development which:

- Protect the development from natural hazards
- Ensure adequate service from public utilities and other urban services
- Minimize environmental impacts
- Serve its intended market area
- Provide buffering from other land uses to minimize conflicts
- Provide adequate landscaping utilizing native plants and preserving existing on-site vegetation

POLICY 17.6.13 - Any RV occupied for temporary residency must be located in an approved RV park/campground or a mobile home park equipped with central water and sewer hookups if 20 or more RV sites are approved. RV Parks/campgrounds and mobile home parks with less than 20 RV sites may use approved pumpout stations. All RV parks/campgrounds within the Coastal High Hazard Area are required to have central water and sewer facilities.

POLICY 17.7.1 - Existing industrial parks on US-19 within the Coastal Zone shall be allowed to develop up to the designated acreage allowance in the Future Land Use Element provided standards for development are met as stated in the County LDC and all local, State, and Federal regulations are met for protection of the environment.

POLICY 17.9.2 - Runoff from streets and yards will be carefully controlled to prevent flooding in adjacent areas and pollution of water bodies.

OBJECTIVE 17.10 - Public and private transportation projects shall provide for disaster preparedness needs. The County shall assure that the amount of residential land allocated in the Coastal, Lakes, and Rivers Areas is coordinated with the County's and the Region's hurricane plans.

POLICY 17.10.1 - All Comprehensive Plan amendments and new developments proposed in the CHHA shall meet the evacuation criteria in Policy 4.9.8 of the CLRM Element.

POLICY 17.11.2 – All development in the Corridor Planning Zone and any development shall be subject to special review criteria as established by the LDC. This review shall take into consideration at a minimum, the following impacts:

- Traffic circulation including need for setbacks, access, and maintenance of established LOS
- Stormwater drainage and flood protection
- Provision of utilities
- Protection of jurisdiction and other unique natural features

City of Crystal River Comprehensive Plan, Future Land Use Element

OBJECTIVE 2.1 - Provide for reasonable use of property while protecting, conserving, and maintaining the natural resources and systems identified in this and other elements of this Plan.

POLICIES:

A) Continue to protect public potable water wells from potential contamination through the implementation of wellfield protection regulations that are in accordance with state statutes. B) Land use in wetlands will be limited to recreation, preservation or conservation, and low density residential development.

C) The City will continue to implement regulations for the protection of trees and environmentally sensitive lands consistent with policies in the Conservation Element.

D) The City will ensure that all proposed development and redevelopment is consistent with the Comprehensive Plan, and the implementing land development regulations.

E) Land development regulations shall continue to be implemented which ensure the compatibility of the proposed use with adjacent uses; regulations shall include provisions designed to mitigate incompatibility, such as setbacks, landscaped buffers, building orientation, scale, parking lot landscaping, or driveway location.

F) The administrative procedures for review of proposed development and redevelopment projects will include a checklist for determining consistency of the proposal with applicable resource protection requirements within the comprehensive plan and implementing land development regulations.

G) Land development regulations for properties located on or within 150 feet of the King's Bay, the Crystal River, and all navigable tributaries shall continue to provide standards for wetland preservation, prevention of erosion and siltation, building setbacks, building elevations to prevent or minimize flood damage, and impervious surface standards, consistent with best management practices for development within CHHA and 100-year floodplains.

H) The City will encourage the preservation of land areas which exhibit significant environmental, cultural, or historical characteristics through regulations that may include the Transfer of Development Rights (TDR) procedure, conservation subdivision regulations, clustering, land purchase arrangements, or other innovative methods for development.

I) The first floor of living space of any building constructed within the City must be at least one foot above the FEMA flood elevation.

J) The City shall maintain regulations governing new residential and commercial structures within the 100-year floodplain as part of the Land Development Code. These regulations shall prohibit the use of fill as a structural support on all future residential and commercial structures and require the use of non-supporting breakaway walls, open lattice-work, or mesh screening to be allowed below the base flood elevation.

OBJECTIVE 2.2: - The hurricane evacuation time shall be coordinated with the Coastal High Hazard Area and meet the requirements as provided in Policy 4.1 of Coastal Management Element.

POLICIES:

A) The City will continue to implement the adopted disaster plan which includes hurricane evacuation plans and coordination with Citrus County regarding shelters, evacuations, and emergency response.

B) Special care facilities, such as nursing homes and hospitals, shall not be located in the Coastal High Hazard Area, unless adequate provisions for safe and efficient evacuation and shelter are ensured.

C) The City shall coordinate with the Citrus County Sheriff's Emergency Management Office to keep the public informed as to shelter opportunities and locations.

OBJECTIVE 2.3: - The existing densities of recorded subdivisions in the coastal high hazard area

will be maintained at the densities not to exceed those in effect at the adoption of this Plan.

POLICIES:

A) The City will maintain future land use categories and land development regulations that ensure residential densities in the coastal high hazard area are consistent with the densities of the existing recorded subdivisions.

B) The City will not change the zoning by increasing the density for any parcel within the coastal high hazard area without an amendment to the Comprehensive Plan.

C) The City will maintain a bank of residential units added and subtracted from the Future Land Use Map based on amendments to the map. The residential unit bank will include amendments for properties already within the City limits and changes from conversion of land use for properties annexed from the county into the City. Any resulting net decrease in residential units from FLUM amendments will be used to provide residential uses within the Community Redevelopment Area of the City.

OBJECTIVE 2.4: Personal and property damage related to natural and man-made disasters will be mitigated or reduced by coordinating future land use map designations with strategies from the Local Mitigation Strategy.

POLICIES:

A) The City shall strictly enforce all appropriate federal floodplain management regulations to reduce the number of repetitive loss properties.

B) The City shall implement protective measures to protect critical public facilities within the Category 1, hurricane evacuation area as established by the Sea, Land, and Overland Surges from Hurricanes (SLOSH) computerized storm surge model. This measure may include protection of glass windows and doors on critical facilities.

C) The City shall seek to relocate the Crystal River Emergency Operations Center outside the 100-year floodplain.

D) To facilitate emergency operations, the City may create a mobile command post for first responders and shelter for emergency workers, first responders, and families for use during activation.

OBJECTIVE 2.6: The Crystal River Comprehensive Plan establishes a Future Land Use Map (FLUM) and land use categories to accommodate the projected population needs.

POLICIES:

A) A Future Land Use Map for the planning periods of 2016 and 2025 is adopted as part of the City of Crystal River Comprehensive Plan.
B) The following land use categories are adopted into the FLUM to implement the City of Crystal River Comprehensive Plan:

B-12: Coastal Low Density Residential (CLDR) land use category designates areas within the City which are predominantly uplands with some areas of minor disturbed wetlands which are suitable for residential development at an intensity of one unit per two (2) gross acres (.5 dwelling unit/acre) All development within the CLDR shall be connected to the City of Crystal River's water and sanitary sewer facilities.

B-12-1: The area within this category may be suitable for a maximum density of two and

one-half (2.5) dwelling units per gross acre provided the following provisions and performance standards are met:

1. . Any proposal for development within the "Coastal Low Density Residential" category, shall be reviewed pursuant to the procedures and criteria contained within the "Planned Unit Development" (PUD) zoning district or through a conservation subdivision process;
2. The minimum parcel size which shall be eligible for consideration for increased density shall be 20 gross acres possessing a common plan of development.

B-12-2: All development within the Coastal Low Density Residential Land use category shall adhere to the following requirements:

1. All development shall donate or reserve environmentally sensitive lands within the proposed development for preservation, conservation, or passive recreational purposes.
2. All development shall provide an inventory for endangered, threatened, special concern and commercially exploited species. Significant environmental or ecological features and wildlife habitat shall be protected. Mechanisms for protection of these resources include, but are not limited to, acquisition, conservation, easements, and density transfer. The City shall cooperate with state, regional, and agency programs intended for the acquisition of suitable lands for open space, recreation, preservation or conservation uses.
3. All development shall be required to comply with all other appropriate policies contained within this Comprehensive Plan with specific emphasis on the "Conservation Element", Coastal Management Element", "Transportation Element", "Sanitary Sewer Subelement", and "Drainage Subelement".
4. All development shall adhere to the location and building standards specified in the City of Crystal River Land Development Code for proposed development along the waterfront.
5. All development shall be clustered in order to protect significant environmental or cultural resources found on the site.
6. All developmental shall identify historical resources as known by the State Division of Historical Resources on all general site development plans. Identified significant historical shall be protected through the use of a conservation easement of the identified site.
7. All development shall adhere to the following standards for development:
    a. All proposed development shall be consistent with the federal flood hazard requirement.
    b. All proposed development containing 25 or more dwelling units shall formulate an emergency hurricane preparedness plan for that development prior to the issuance of the first site development permit. Said Hurricane Plan shall be reviewed by the Citrus County Director of Emergency Operations for consistency with the County Emergency Plan.
8. Within the "Coastal Low Density Residential" land use category, the development of multi-family units shall be prohibited within the Federal Emergency Management Agency designated velocity zone (V-zone).

B-13: Low Intensity Coastal and lakes land Use (CL). This land use category is intended for areas having environmental characteristics that are sensitive to development and therefore should be protected. Residential development in this district is limited to a maximum of one dwelling unit per 20 acres and one unit per 40 acres in the Federal Emergency Management

Agency's V-Zone.

B-13-1. Higher density development is permitted only if in accordance with the following provisions:

Option 1-- A minimum parcel size of 160 acres (smaller parcels may be combined to form a 160 acre parcel) with a common plan of development.

1. Gross density not to exceed 0.2 dwelling units per acre (one dwelling unit per five acres).
2. Connection to regional water and sewer facilities is required.
3. One hundred percent protection of wetlands must be assured.
4. Clustering of units to ensure the preservation of 80 percent of existing uplands for open space is required.
5. Stricter standards for stormwater and wildlife protection will be required.

Option 2 -- This option requires a minimum of 20 upland acres. Documentation of sufficient upland soils on site shall be provided by the applicant based on data from the Natural Resources Conservation Service (NRCS), water management district or other appropriate agency.

1. Planned development within this category may be permitted at a density not to exceed 0.1 dwelling units per acre (one dwelling unit per 10 acres) subject to the following special conditions:
2. Clustering of units to preserve 80 percent of the gross site area as permanent open space is required.
3. All projects proposed under this option shall provide a biological survey with elevations and appropriate calculations identifying upland acreages.

Additional Development: In either Option 1 or Option 2, the following land uses may be allowed provided the permitted use is compatible with the surrounding area, and standards for development are met as specified in the Crystal River Land Development Code (LDC).

1. Multifamily residences (in existing platted areas only or in lieu of clustering single family units at a density of one unit per lot of record and requiring the recombination of said lots. For example, a duplex requires two lots to be recombined into a single parcel, a quadruplex four lots, etc.)
2. Recreational uses
3. Public/Semi-Public, Institutional facilities
4. Home occupations
5. Communication towers
6. Utilities
7. Commercial uses that are water related, water dependent, or necessary for the support of the immediate population

All development must adhere to the standards for development contained in this Element, as well as any additional standards in the Land Development Code.

City of Crystal River Comprehensive Plan, Coastal Management Element

OBJECTIVE 2.4: Restrict overdevelopment within the Coastal Management Area through required conformance with the Future Land Use Plan and implementation of flood damage prevention regulations.

POLICIES:

A) Require that land development applications for proposed development within the Coastal Management Area address density limitations and performance standards established by the City's Comprehensive Plan and Land Development Code.

B) Require that land development applications, except for a single dwelling unit on an existing lot of record, within the Coastal Management Area be planned in a specific manner which is compatible with site characteristics through the use of the Planned Unit Development (PUD) zoning or conservation subdivision requirements.

C) Require the clustering of uses for land development projects located within the Coastal Management Area through implementation of Planned Unit Development (PUD) zoning requirements.

D) Prohibit the siting of new or the expansion of existing mobile home and/or recreational vehicle parks within Coastal Management Area.

E) Prohibit the siting of acute care medical facilities or any other facilities which house nonambulatory person within Coastal Management Area-1.

F) Prohibit the generation, storage or disposal of hazardous waste materials in excess of 100 kilograms per month, as defined and listed in 40 CFR 261, and as adopted in Chapter 17-30, F.A.C.

GOAL 4: Hurricane evacuation levels of service shall be adopted to provide for the safety of residents and visitors in the event of evacuations.

OBJECTIVE 4.1: The city shall maintain or reduce hurricane evacuation times by requiring that new developments not degrade the existing evacuation Level of Service (LOS).

POLICIES:

A) The Hurricane Evacuation Level of Service Standards is as follows:
   1. In-county sixteen (16) hours.
   2. Out of county forty-eight (48) hours for category 5 storm event.

B) No hurricane shelters shall be located within the Category 5 hurricane evacuation area.

C) The Coastal High-Hazard Area (CHHA) is defined as the area below the elevation of the category 1 storm surge line as established by a Sea, Lake, and Overland Surges from Hurricanes (SLOSH) computerized storm surge model. All proposed Comprehensive Plan Amendments and new developments within the CHHA must meet the following criteria:
   1. The adopted LOS for "out of county" hurricane evacuation is maintained for a category 5 storm event as measured on the Saffir-Simpson scale.
   2. A 12 hour evacuation time to shelter is maintained for a category 5 storm event as measured on the Saffir-Simpson scale and shelter space reasonably expected to accommodate the residents of a development contemplated by the proposed comprehensive plan amendment is available; or
   3. Appropriate mitigation is provided that will satisfy Policy C1. Or 2. Appropriate mitigation shall include, without limitation, payment of money, contribution of land, and construction of hurricane shelters and transportation facilities.
      a. City shall enter into a binding contract with the developer detailing with any required mitigation.

b. If the LOS for the host evacuees has not be established the LOS shall not exceed 16 hours for a category 5 event.

D) City shall assess and adopt regulations in the hurricane vulnerable zone which:
   1. limit new development in coastal areas and additional mobile home units; and/or
   2. allow new development in coastal areas provided that mitigating measures are established which do not increase hurricane evacuation times;
   3. promote land acquisition; and/or
   4. establish a fee in lieu program and use those funds generated by fees to support future shelter development.

OBJECTIVE 4.2: Shelter for Protection. The City of Crystal River shall designate hurricane evacuation shelters to protect the population evacuated from the Hurricane Vulnerability Zone

A) The City of Crystal River, in cooperation with Citrus County, other Coastal Cities and the American Red Cross, shall appropriate and adequate hurricane emergency shelter facilities to accommodate the population within the Hurricane Vulnerability Zone under a Category 3 storm.
B) New hurricane emergency shelter space shall not be located in the Hurricane Vulnerability Zone.

OBJECTIVE 4.3: Mitigation of Property Damage. The City shall minimize danger to life and property in the Hurricane Vulnerability Zone and Coastal High Hazard Area.

POLICIES:

A) If constructed, all public facilities in the Hurricane Vulnerability Zone shall be floodproof to ensure minimum damages from storms and hurricanes.
B) A new residential development of 25 units or more in the Hurricane Vulnerability Zone shall be required to provide continuing information to residents concerning hurricane evacuations and shelters.
C) A new residential development of 25 units or more in the Hurricane Vulnerability Zone shall be required to formulate an emergency hurricane preparedness plan for that development. Prior to the issuance of the first Site Development Permit, the plan shall be reviewed by the Citrus County Director of Emergency Operations for Consistency with the County Emergency Plan.
D) All development in the Hurricane Vulnerability Zone shall be consistent with the federal flood hazard requirements.
E) Establish a post-disaster management plan by 2014, which includes temporary measures to reduce impact upon hazard-prone areas.

OBJECTIVE 4.4: Post-Disaster Redevelopment. In order to reduce the exposure of human life and public/private property to natural hazards, a post-disaster redevelopment plan shall be consistent with the Citrus County Plan (when adopted).

POLICIES:

A) The City's post-disaster redevelopment plan shall be consistent with the Citrus County Plan (when adopted).
B) The post-disaster redevelopment plan shall outline reconstruction procedures and should include:
   - Recovery Task Force (appointed body);
   - Guidelines for determining feasibility of repairing and reconstruction damaged structures including standards to which reconstruction should be complete;
   - Post-disaster, timetable outlining recovery, redevelopment, relocation, and hazard mitigation priorities;

- Identification of those areas which have the highest potential for damage on past experiences and studies' and establish policies for evaluating the possibility of relocating or structurally modifying pubic infrastructure located in those areas;
- Identification of funding sources or funding mechanisms which may be needed to replace, repair, and/or relocate damaged public infrastructure; and
- Identification of the feasibility of public acquisition following a natural disaster. Acquisition should address areas adjacent to public holdings and those areas with a history of frequent storm impacts.

C) Immediate repair and cleanup actions needed to protect the public health and safety include repairs to potable water, wastewater, and power facilities; removal of debris; stabilization or removal of structures about to collapse; and minimal repairs to make dwellings habitable. These actions shall receive first priority in permitting decisions. Long-term redevelopment efforts activities shall be postponed until the Recovery Task Force has completed its duties. These actions shall receive first priority in permitting decisions. Long-term redevelopment efforts activities shall be postponed until the Recovery Task Force has completed its duties.

D) Structures which suffer repeated damage to pilings, foundations, or load-bearing walls shall be required to modify the structure to correct the reoccurring damage.

E) The recommendations of interagency hazard mitigation reports shall be considered for incorporation in the City's Comprehensive Plan.

OBJECTIVE 4.5: Conformance with ACOE and WRPC Hurricane Evacuation Studies. The City shall revise as necessary the Comprehensive Plan and related land development regulations to incorporate the final findings of the ACOE and WRPC Hurricane Evacuation Studies upon completion.

City of Inverness Comprehensive Plan, Future Land Use Element

POLICY 1.2.1.3: The City shall coordinate future land uses by encouraging the elimination or reduction of uses that are inconsistent with any interagency hazard mitigation report recommendations that the City deems appropriate.

POLICY 1.2.4.4: The City shall prohibit the location of land uses or activities which regularly use, handle, or store hazardous materials within the floodplain or defined wellfield protection areas.

GOAL 1.4: Ensure the safety of potential residents from flooding and other hazardous conditions

OBJECTIVE 1.4.1: Review new development for conformance with the Comprehensive Plan.

POLICY 1.4.1.1: The City shall continue to enforce local floodplain regulations in the Inverness Land Development Regulations through scrutinized building permit issuance in conformance with the requirements and guidelines of the floodplain ordinance.

OBJECTIVE 1.4.2: Control runoff from new streets and new developments to prevent flooding in adjacent areas and pollution of lakes by enforcing local stormwater drainage regulations

POLICY 1.4.2.1: The City shall require that new developments be designed to limit the post-development rate of stormwater discharge, volumes, and pollutant loads to amounts which are equal to, or less than those which existed prior to development in accordance with the Environmental Resource Permit Applicant's Handbook subsection 62-330.010(4), F.A.C. (effective Oct 2013), administered by SWFWMD.

POLICY 1.4.2.2: The City may require design modifications during site plan review, as necessary, to ensure no adverse impacts on water resources, unless it is proven that there is

no potential hazard.

POLICY 1.7.1.4: The City shall prohibit the location of new industrial activities which regularly use, handle, or store hazardous materials within the floodplain.

The following is a list of policies, ordinances, and regulations to guide these efforts and allow stable achievement of the hazard mitigation planning goals and objectives.

4.4 Mitigation Programs and Policies

4.4.1 Preventive Measures

Preventive measures are designed to minimize the potential development of new natural hazard problems and are intended to keep existing natural hazard problems from becoming worse. Preventive measures also include mitigation actions to alleviate those known areas of concern to ensure that the issue does not continue to remain an area of concern. They ensure that future land development projects do not increase local and/or regional natural hazard damage potentials. Once completed, participating members integrate the data and mitigation goals into their existing plans. Preventive measures are administered by local building, zoning, planning, and/or code enforcement officials and include the following plans for Citrus County, the City of Crystal River and City of Inverness:

- Comprehensive plans
- Land use planning/zoning efforts
- Subdivision and land development ordinances
- Capital improvement plans (CIP)
- Building codes
- Floodplain development regulations
- Stormwater management
- Operations and maintenance (O&M) procedures
- Subsurface investigation requirements
- Geographic Information Systems (GIS)
- Detailed plans and targeted studies
- Community Rating System programs
- Community Wildfire Protection Program guidance

4.4.2 Emergency Services

Emergency services measures protect people during and immediately following a natural hazard event. The County and municipalities have Emergency Operations Plans (EOP's) to formally document their emergency preparedness and response planning. The local EOP identifies standard operating procedures for various emergency management personnel and establishes the location and operating conditions of the Emergency Operations Center (EOC). As such, adopting and implementing the EOP is a critical first step in providing local emergency services measures in response to a natural hazard event.

Emergency services measures are implemented at the local, County, State, and/or Federal level, depending on the severity of the hazard event, and include the following actions:

- Hazard warning
- Hazard response
- Critical facilities protection
- Post-disaster recovery and mitigation

4.4.3 Property Protection

Property protection measures minimize an existing structure's vulnerability to a known hazard, rather than trying to modify or control the hazard itself. Property protection measures involve improvements to both public and privately owned property and must be coordinated (and often cost-shared) with the respective property owners. Some measures do not affect the appearance or use of the structure, which make them appropriate for historical sites or landmarks. Implementation of a property protection measure requires the purchase of a local building permit. As such, property protection measures include the following activities:

- Relocation/acquisition
- Elevation
- Floodproofing
- Insurance
- Brush/shrub removal
- Emergency response planning
- Windproofing

4.4.4 Structural Projects

Structural projects typically involve efforts to keep floodwaters and other natural hazards from impacting specific areas or structures. They are required to be designed by engineers and managed or maintained by the owner. From a flood hazard mitigation standpoint, these projects are designed to control flows and water surface elevations and to reduce the overall impacts of flooding. In some cases, due to costs and possible environmental implications, some structural projects may not provide full protection to individual properties. However, such projects as bridge and culvert modification are designed to protect numerous people and properties. Structural projects may include, but are not limited to the following type of hazard mitigation project.

- Dams/levees/floodwalls
- Bridge/culvert modifications
- Channel modifications/diversions
- Firebreaks
- Sinkhole abatement
- Emergency water source development
- Safe rooms and community shelters

4.4.5 Natural Resource Protection

Natural resource protection activities that are implemented as hazard mitigation measures can be multiple in scope, purpose, and outcome. The preservation and restoration of natural areas, environmentally sensitive resources, or the overall quality of locally significant features, play a significant role in reducing local and regional damages caused by natural hazard events. Natural resource protection activities are often implemented by park, recreation, or conservation agencies and organizations, but are not limited to these types of entities. Citrus County, as with all local governments, has the ability to develop and implement a natural resource protection program that will minimize the impacts of natural hazards while enhancing the local and regional environment. The Southwest Florida Water Management Agency has played a major role in the acquisition, preservation and restoration of the county's natural resources. Protection activities that can minimize the potential impacts of natural hazards include the following:

- Open space preservation
- Wetland protection
- Identification and implementation of Best Management Practices (BMPs)
- Water resources management planning
- River/stream corridor restoration

4.4.6 Public Information

Providing the public with accurate and relevant information is a key component of a successful hazard mitigation program. Public information activities advise residents, business owners, and local officials about natural hazards and ways they can protect themselves, their property, and their constituents from these hazards. Public information activities are directed at the entire county to include not only the citizens and the business owners, but visitors also. These programs are developed to motivate people to take precautionary steps on a pre-disaster basis, and to develop awareness. Citrus County's public information activities include the following:

Map information

- Education and Outreach programs
- Environmental education

4.5 Evaluation of Mitigation Alternatives

The review and assessment of the status of hazard mitigation in Citrus County was completed by the Local Mitigation Strategy Working Group and other interested parties. Based on the most current information available, the LMS Working Group identified those mitigation actions that have been completed, partially completed or otherwise no longer met the priorities of the community.

4.5.1 General Hazard Mitigation Alternatives

The following local resources provide guidelines, tools and codes as well as a designated source for funding to promote and achieve mitigation activities, thereby reducing the effects of future disasters in Citrus County. These mitigation alternatives are general in nature and apply to all identified hazards.

- **Comprehensive Plans and Land Development Codes** have been adopted by Citrus County and the incorporated cities. The Comprehensive Plans are developed over a long-range timeframe through land use and public infrastructure planning. Both the Comprehensive Plans and Land Development Codes regulate development by dividing the jurisdictions into zones or districts and establishing specific development criteria for each. As such, these development criteria include provisions for the area's known natural hazards. Vulnerable lands would be those associated with known hazards such as areas subject to flooding, dam failure, wildland fire and areas subject to land subsidence. Proper planning should include appropriate recommendations for the use of these known hazard areas, such as parks, greenways, wildlife refuges, and other open space uses protected from future development. Similarly, the Land Development Codes should include separate zones or districts with appropriate development criteria for these known hazard areas.

- **Land Development Codes**, including subdivision regulations, have been adopted by Citrus County and the incorporated cities. These codes regulate how land can be subdivided into individual lots and establish certain standards/criteria for the location and construction of buildings and associated infrastructure (i.e., roads, sidewalks, utility lines, stormwater management facilities, etc.). As such, Land Development Codes include jurisdiction-specific, hazard mitigation-related development criteria for the location and construction of buildings and other infrastructure in known hazard areas in an effort to avoid future damages and minimize existing problems. Examples of some hazard mitigation-related development criteria include watershed-specific stormwater management regulations, land use specific erosion and sedimentation control requirements, hazard specific building and infrastructure location limitations, and a requirement to incorporate various pre-defined, jurisdiction-specific hazard mitigation/prevention measures into all development plans. Along these same lines, the mandatory use of conservation subdivision design principles may also be employed to minimize/mitigate the potential impacts of natural hazards. Conservation subdivision design principles involve clustering homes/development in a proposed subdivision to

avoid known hazard areas (i.e., steep slopes, floodplains, etc.) and environmentally sensitive resources (i.e., wetlands, critical wildlife habitats, etc.), thereby developing the most appropriate land while permanently establishing a network of protected open spaces.

- **The Florida Building Code** regulates the construction, renovation, and alteration of new and existing structures by establishing minimum building standards and providing for routine inspections by a certified building code inspector. As such, the Florida Building Code includes specific standards for hazard-resistant construction. Examples of some hazard mitigation-related building standards include requiring the use of fireproof/resistant building materials, specifying particular construction practices to promote wind resistance, specifying the use of waterproof/resistant building materials and building elevation in known flood hazard areas, and requiring certain foundation and structure anchoring specifications in known floodwater velocity areas.

- **Geographic Information Systems (GIS)** applies computer technology to hazard mitigation planning by linking data to maps. Detailed property information, socioeconomic data, critical facilities inventoried, and hazard locations, among other relevant information, can be continuously updated to provide a complete assessment resource for mitigation planning and other planning studies. HAZUS-MH (Hazards U.S. Multi-Hazards) is the tool developed by FEMA to apply loss estimation models for Wind, Hurricanes, and Flooding within a GIS framework.

- **Capital Improvement Plans (CIP)** can recommend the allocation of funds for public acquisition of open space lands, capital expenditures for emergency service facilities, improvements to retrofit or relocate vulnerable critical facilities, and other capital improvements. The CIP is usually tied to a comprehensive plan and programs capital improvements over a five or six year period, with funding identified. The capital expenditure requirements of high priority projects within a hazard mitigation plan should be included in the CIP.

- **Emergency response planning** where in certain situations, implementation of physical property protection measures (i.e., relocation, elevation, or floodproofing) may not be technically or fiscally appropriate. This is most often the case for larger flood-prone business and industry buildings, where relocation is undesirable and retrofitting techniques may be too costly or not technically feasible. As such, alternatives to physical property protection measures must be explored. One alternative to implementing physical property protection measures is to develop an emergency response plan specific to the particular business or industry. An emergency response plan is a guidance document that identifies and describes specific emergency preparation and response procedures to be implemented on a pre- and post-disaster basis in order to minimize potential hazard impacts. As such, emergency response planning can serve to minimize potential impacts to both the structure and its contents/inventory. In this manner, emergency response planning for a particular business or industry would constitute a property protection measure.

- **Map information** provides many benefits by providing hazard information to inquirers. Residents and business owners who are aware of potential hazards can take steps to avoid future problems and/or reduce their exposure to flooding. Real estate agents and potential homebuyers can determine if a particular property is located in a known flood hazard area and whether flood insurance may be required by their lender. It is important to remember, however, that flood maps are not perfect; the older maps display only the larger flood-prone areas that have been studied. Some maps are based on data that are more than 20 years old. The Southwest Florida Water Management District is a Cooperating Technical Partner with FEMA. They have completed the detailed study of our 20 watersheds, which have result in the production of our Digital Flood Insurance Rate Maps (DFIRM's)

- **Education and Outreach programs** are the first step in the process of orienting property owners to property protection measures and assisting them in designing and implementing a project. These programs are designed to encourage people to seek out more information and take steps to protect themselves and their properties, and are particularly suitable for those hazards that lack specific mitigation measures such as extreme summer, lightning and tornadoes.

- Outreach projects can vary with the type of identified hazard and the audience you are trying to reach. Citrus County, as a participant in the Community Rating System, is required to provide outreach materials to our Repetitive Loss Areas. This outreach identifies the various techniques for flood mitigation as well as funding opportunities that may be of benefit to the owner(s).

- In addition, there is a coordinated annual outreach to the community at large with the Citrus County Sheriff's Office of Emergency Management. There are community oriented expo's, open house type events and a multi-hazard section of the locale newspaper that is printed annually.

- Each year, the County updates their list of local lenders, realtors and insurance agents. A mailing is sent annually advising them of the services provided by the County regarding flood zones, elevation certificates, Letters of Map Amendment, insurance requirements and continuing education opportunities for their specialty. The Citrus County website also contains this information as well as detailed updates during severe weather or other hazard events.

- Other approaches can include the following:

    - Mass mailings or newsletters to all residents
    - Notices directed to floodplain residents
    - Displays in public buildings or shopping malls
    - Newspaper articles and special sections
    - Radio and TV news releases and interview shows
    - Presentations at meetings or relevant local organizations
    - Floodproofing open houses
    - Website notices with hyperlinks to other sources of information

- **Hazard warning** to include a comprehensive disaster warning system ties a variety of systems into a network to advise the public of emergency situations. This system includes the Code Red Emergency System, the sirens located along the west coast communities, which can use either voice activated or canned messages, the use of live broadcasts from the EOC as well as special public information messages on local television and radio stations.

  The earlier and more accurate the warning, the greater the number of people who can implement protective measures. Multiple or redundant systems are most effective: if people do not hear one warning, they may still get the message from another part of the system. Depending on the circumstances, additional means of warning the public are done through the use of:

    - NOAA weather radio

- Mobile public address systems
- Telephone trees
- Internet weather related sites
- Municipal/county/state Internet sites
- Door-to-door contact
- Reverse 911/ Code Red
- Integrated Public Alert and Warning System (IPAWS)

- **Post disaster recovery and mitigation activities** will be used during the rehabilitation/reconstruction of our communities. In general, these actions will ensure that we build back better and stronger as well as ensure that all temporary facilities and uses provide for the protection of our citizens. Citrus County, as with all coastal communities in Florida are required to prepare a Post-Disaster Redevelopment Plan which will identify policies, operational strategies, and the responsibilities for implementation of this plan for decisional making. Elements of the plan include, but are not limited to, repair and replacement of housing, the resumption of local business and economic redevelopment.

- Critical facility protection including protection from floods, high winds. Critical facilities should be hardened to reduce the risk of significant injury, interruption of critical services, and to maximize the structural integrity.

  - The following mitigation alternatives are specific in nature to hazards of high vulnerability: flooding (flash floods, hurricane flooding and dam failure), wind (hurricanes and other severe storms), and wildfires and aid in the reduction of said vulnerabilities.

4.5.2 Flood Hazard Mitigation Alternatives

- **Floodplain development regulations** establish regulatory criteria for the construction and/or alteration of buildings and other development activities in the 100-year floodplain in an effort to minimize potential flood-related damages and ensure that new development does not exacerbate local flood hazards. Citrus County and the incorporated cities participate in the NFIP and must adopt and enforce local floodplain development regulations that meet or exceed minimum NFIP standards and requirements. Floodplain construction standards are also part of the Florida Building Code. NFIP floodplain development regulations prohibit obstruction of the regulatory floodway and require new buildings being constructed in the 100-year floodplain to be protected from damage to the base flood (i.e., 100-year or 1 % annual chance flood). NFIP floodplain development regulations are intended to prevent loss of life and property as well as economic and social hardships that result from flooding.
- **Stormwater management** involves the effective management of stormwater runoff from developed areas and can go a long way in minimizing local and regional drainage problems and associated flooding hazards. In addition, stormwater management practices that promote infiltration work towards the minimization of drought impacts by contributing to the base flow of local streams and watercourses. Stormwater management regulations, which are incorporated into the land development ordinances of Citrus County and the incorporated cities, require developers to construct on-site stormwater management facilities that will effectively collect, convey, and store surface

water runoff.

- **Operations and Maintenance (O&M) procedures** at the Inglis Main Dam and Bypass Channel Dam are fundamental to the prevention of a potential failure. Routine inspections and regular maintenance are the most critical measures that can be taken to prevent a dam failure.
- **Detailed plans and targeted studies** for areas of special consideration were reviewed. The County is partnering with the Southwest Florida Water Management District through their Cooperative Funding Initiative grant program to complete the detailed studies of our watersheds, which will result in the production of our DFIRM's.
- **Community Rating System (CRS) Program** crosses all six mitigation program elements. The CRS rewards communities for conducting a full range of flood mitigation programs that exceed the minimum NFIP requirements by awarding points to achieve a rating classification. Total points determine the class of a community. A high class means more savings to flood insurance holders and more recognition to the successes of the local floodplain management program. Citrus County is currently a Class 6 Community, which provides our citizens with a 20% premium discount on flood insurance policies for structures located in the A and V flood zones.
- **Relocation** or moving a building to higher ground is a sure way to minimize potential flooding impacts. Citrus County, Crystal River, and to a lesser extent Inverness, have areas subject to flash flooding, high velocity flows, deep water, or where the only safe approach is to remove the building, should consider relocation out of the floodplain and/or acquisition. Removing buildings from the floodplain is not only the most effective flood protection measure available, it is also a way to convert a problem area into a community asset and obtain environmental benefits. Relocation is preferred for large lots that include buildable areas outside the floodplain or where the owner already has a new flood-free lot available. Relocation can be expensive, however. While almost any building can be moved, the cost goes up for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. There are also a number of factors that affect the feasibility of relocation such as road width and grade, density of overhead utilities, and other related factors.
- **Acquisition** of buildings in a flood-prone area ensures that they will no longer be subject to damage. The major difference is that acquisition is undertaken by a government agency so the cost is not borne by the property owner, and the land is converted to a public use, such as a park. Acquisition, followed by demolition, is most appropriate for buildings that are difficult to move, such as larger, slab-on-grade foundation or masonry structures, and dilapidated structures that are not worth protecting. Benefit-cost should be assessed and other, less costly alternatives might also be investigated.
- **Elevation** of a flood-prone building above the base flood elevation is often the best on-site protection strategy. In Flood Zone 'A' or 'V', the building could be raised to allow water to run underneath it. Alternatively, in Flood Zone 'A' but not in Flood Zone 'V', it may be possible to use fill to elevate the site on which the building sits. This approach is much less expensive than relocation or acquisition, and tends to be less disruptive to a neighborhood. However, this is not a suitable solution within the Coastal areas. Elevation is required by local floodplain regulations, as well as by the Florida Building Code, for new and substantially improved buildings in a floodplain, and is commonly practiced in flood hazard areas nationwide.
- **NFIP flood insurance** has the advantage that, as long as the policy is in force, the property is covered and no human intervention is needed for the measure to work. Although most homeowners' insurance policies do not cover a property for flood damage, any owners can insure a building through the NFIP. A municipality must participate in the NFIP in order to make flood insurance available to its residents. The county and both the City of Crystal River and the City of Inverness participate in this program. Flood insurance may also be advisable for properties located in dam inundation areas and areas outside of regulated floodplains where flood damage may still occur due to drainage problems and/or heavy rain events. All FDIC insured lenders are required to protect

their investment by requiring the purchase of flood insurance for those properties located in Special Flood Hazard Areas. Through the creation of the position of Floodplain Manager, the County and Cities of Crystal River and Inverness will continue their participation with the NFIP. With this participation, continued compliance is ensured. Additional incentive comes when a greater score is earned for the CRS program with the NFIP participation. Also, in order to maintain NFIP compliance, Citrus County Floodplain Management, as well as the Cities of Crystal River and Inverness will continue activities related to:

  - Management of all development for properties located in the Special Flood Hazard Area
  - The coordination of Community Rating System activities that result in the reduction of flood insurance premiums within the County
  - The official community repository for all flood maps and Letters of Map Amendments
  - General assistance to the public, lenders, insurers and other professionals in obtaining copies of pertinent documents and flood zone research property specific
  - Coordination with local, State and FEMA business partners
  - Maintain elevation certificates on file for all new construction in the SFHAS or for substantial improvements to properties in the SFHA
  - Updated mapping provided to each municipality
  - Maintain records pertaining to LOMAS, and LOMRS, etc.
  - Continue to promote flood insurance to property owners.
  - Promote hazard flood mitigation to the public.
  - Continue drainage maintenance and drainage system improvement projects.
  - Encourage more drainage projects through-out the county in all LMS meetings

- **Dams, levees and floodwalls** are similar in that they control flooding by restricting floodwaters from reaching/inundating protected areas. Dams, levees and floodwalls are probably the best-known forms of structural flood control projects that have been implemented in the United States. It is important to note, however, that just like any other engineering feature, if the design capacity of a dam, levee and/or floodwall is exceeded; its functional utility becomes compromised. As such, dams, levees and floodwalls can give a false sense of security to the property owners that they protect.
- **Bridge/culvert modifications**, if undersized, at crossings of local streams and watercourses can result in floodwater backing up upstream of the structure causing significant flooding problems. Therefore, from a flood hazard mitigation standpoint, bridge/culvert modifications typically involve the replacement, enlargement, and/or removal of existing roadway bridges and culverts that are known to cause flooding problems. Replacing, enlarging, or removing these known problematic structures goes a long way in minimizing the County's flooding problems.
- **Open space preservation** is keeping known hazard areas free of development and in a natural condition, and is the best approach to minimizing or preventing potential flood damages. Preserving open space in an undeveloped floodplain not only prevents potential flood damage but also allows for the full realization of the floodplain's natural and beneficial functions. These natural and beneficial floodplain functions include floodwater storage/flood flow attenuation, surface water infiltration/groundwater recharge, removal/ filtering of pollutants and sediments from floodwater, habitat for flora and fauna, and recreational opportunities. Open space preservation is regulated by the adopted Comprehensive Plans and Land Development Codes.
- **Wetland protection** is needed in floodplains and low lying areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality and provide habitat for many species of fish, wildlife, and plants. As such, local wetland protection codes and programs are developed to address these gaps in the federal and state regulations.
- **River/stream corridor restoration and protection** are measures to help restore the natural and beneficial functions of riparian zones to manage floods and filter runoff.

- Best Management Practices (BMPs) are measures that reduce the volume of surface water runoff and associated non-point source pollutants from entering waterways. Non-point source pollutants are transported by surface water runoff and include lawn fertilizers, pesticides, farm chemicals, sediments, and oils from both pervious and impervious urban and rural areas. Non-point source pollutants not only affect the quality of our local water resources but also their ability to carry and store floodwaters. Eroded soil from farmlands and construction sites is typically deposited where streams and rivers slow down and lose energy, such as when they enter a lake or confluence with another stream. As such, sedimentation will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters. In addition, uncontrolled surface water runoff contributes to local and regional flooding problems. From a hazard mitigation perspective, the identification and implementation of BMPs is focused on structural and non-structural erosion and sedimentation control and stormwater management facilities. Many BMP measures (structural and/or nonstructural) can be implemented on a site to address specific site needs. Both erosion and sedimentation control and stormwater management BMPs can be incorporated into retention and detention basins, drainageways, and many other parts of new developments. Depending on local ordinances, specific BMPs and structural measures are already required on industrial sites, mined lands, construction sites, farms, forested areas, and high-use public lands.
  Other BMP guidelines are included in engineering and construction standards designed to ensure that structures are able to withstand various hazards such as erosion in Coastal areas.

4.5.3 Wind Mitigation Alternatives

Proper engineering and design of a structure increases its ability to withstand the lateral and uplift forces of wind. Building techniques that provide a continuous load path from the roof of the structure to the foundation are generally recommended.

The following are wind mitigation alternatives reviewed by the LMS Working Group.

- **Windproofing** is the modification of the design and construction of a building to resist damages from wind events, and can help to protect the building's occupants from broken glass and debris. Windproofing involves the consideration of aerodynamics, materials, and the use of external features such as storm shutters. These design considerations are required in the design and construction of a new structure and recommended to reinforce an existing structure. Mobile homes, which tend to be vulnerable to the effects of extreme wind events, can be better protected by improved anchoring to the foundation. Mobile homes are required by the Florida Building Code to be tied down to their pads in order to prevent them from being destroyed. Public facilities, critical infrastructure, and public infrastructure (such as signage and traffic signals) are required by the Florida Building Code to be windproofed in vulnerable areas. However, windproofing is not a viable mitigation technique to protect against tornadoes or extreme hurricanes.
- **Safe room/community shelter requirements** for new housing construction and existing mobile home parks, apartment complexes, and other planned residential communities can offer protection and reduce the risk to life. There are minimum design criteria to which these elements must be constructed as found in ARC 4496 and FEMA 320 Taking Shelter From The Storm.
- **Buried power lines** can offer uninterrupted power during and after severe wind events and storms. Burying power lines can significantly enhance a community's ability to recover in the aftermath of a disaster; however, they are more expensive to install and repair if there were a problem and may be more vulnerable to flooding in some locations. Encouraging back-up power sources in areas where burial is not feasible will enable the continuity of basic operations for businesses and facilities when there is a loss of power.

4.5.4 Fire Mitigation Alternatives

Following are mitigation alternatives to reduce the vulnerability from wildfires reviewed by the LMS Working

Group.

- **Urban forestry program** where a number of cities nationwide have participated in formal programs to protect and maintain urban forests, is especially helpful for the mitigation of wildfires.
- Firebreaks have been used by the State to limit the mobility of potential wildfires. Construction of a firebreak involves removing vegetation in a linear strip to significantly diminish the available fuel load. There may be locations in the County where construction of a firebreak may prove to be a feasible and prudent wildfire hazard mitigation measure, in particularly areas where there is rural development adjacent to forested areas or limited access. This type of development scenario is particularly susceptible to wildfire hazards.
- **Emergency water source development** is used to increase public water supply systems and the associated curbside hydrants for local firefighting needs. One solution for access to reliable water sources and the ability to efficiently pump water from those sources is the installation of dry hydrants at various bridge and culvert crossings of local streams and watercourses. Another solution would be the development of community well sites. Citrus County has, to date, installed 8 firefighting wells throughout areas of the community where no central water systems are available.
- **Prescription Burning.** The use of planned wildland fuels burning programs has been used by the state and Federal land management agencies as the best proven method to reduce hazardous wildland fuel accumulations. This process is routinely accomplished in coordination with the establishment of firebreaks and is conducted on state, federal and private lands where the accumulation of wildland fuels can pose a threat to neighboring communities. These are carefully planned operations that must meet specific weather conditions and are thoroughly coordinated with county or jurisdictional fire agencies.
- **Chopping and Mowing/ Vegetation Reduction.** Mitigation of the fuel component is one of the most efficient ways to reduce the risks of wildfire occurrence. Vegetation-fuel management through such things as tree and vegetation thinning or reducing the amount of herbaceous vegetation decreases the chances of fire propagation across the landscape by breaking-up the horizontal and vertical continuity of fuel. This reduces fireline intensity, significantly lowers the risk of structure loss, and creates a safer situation in which to deploy suppression resources.

From 2014 to 2019 the Florida Fire Service conducted wildfire mitigation projects on 26,470 acres of state land and 2,290 acres of private land.

Table 4-1 Wildfire Mitigation Project Totals (2014-2019)

Owner	Treatment Cost	Acres	Structures Protected	Structures Total Value
State Total	$318,024.38	26,470	2,270	$290,419,500
Private Total	$27,568.98	2,290	301	$32,843,300

4.5.5 Sinkhole Mitigation Alternatives

- Sinkhole abatement is the physical treatment of new and existing sinkholes in an effort to minimize potential damage to buildings, infrastructure and other surface features. Sinkhole treatment is usually a matter of abatement after the fact rather than prior mitigation. Sinkhole abatement involves filling the surface feature with a mixture of materials including concrete, soil, grout, synthetic filter fabrics, and various sizes of crushed stone. Since no two sinkholes are alike, abatement can vary significantly in the type and volume of materials that are used. Regardless of the size and nature of the sinkhole, however, certain precautions should be taken when dealing with structural sinkhole abatement. These precautions, which are designed to reduce safety concerns and mitigate

potential environmental impacts, include barricading the site to prevent personal injury, excavating the overlying soil to determine the appropriate abatement method and to expose a competent limestone ledge, and directing surface drainage away from the site to prevent a reoccurrence.

4.6 Evaluation and Prioritization of Mitigation Alternatives

The prior (2015) update of the local mitigation strategy utilized the STAPLEE method to rank projects by their priority. The LMS Working Group used a new ranking methodology based on the new interest on being able to recover quickly from a disaster (Goal 7). In evaluating the proposed mitigation alternatives, the LMS Working Group considered the importance of the goals and objectives that were previously identified. The costs were estimated based on best available data, including similar projects that have been completed in other communities, based on professional judgments. The cost estimates should only be used for a rough determination of the cost-effectiveness of the mitigation projects and should not be used to obtain services or grant funding. The benefits of each project were also considered.

In order to assess the importance of each project, the LMS Working Group considered several factors including the following:

- **Cost-Benefit** – A comparison of the estimated cost of the project (e.g. $10,000-$15,000) to the estimated number of people it would benefit (e.g. 8,000-10,000).
- **Financing Availability** – The extent to which resources are available to finance the cost of the measure including sources of potential grants and matching funds
- **Repetitive Damages Corrected** – The potential for a measure to reduce the frequency of repetitive damages at a facility. Past damages must have occurred and have been documented.
- **Geographic Extent** - The extent to which a measure benefits multiple communities, more than half of a community or less than half of the community
- **Essential Services** – The effect of a measure on essential services, such as life safety, human health, and the necessities of life.
- **Economic Effect or Loss** – A measure of economic effects avoided, including both property damage and economic losses suffered by businesses and residents
- **Critical Facilities** – The likelihood of the measure reducing vulnerabilities to critical facilities.

The LMS Working Group evaluated each of the proposed mitigation actions to assess level of impact using the project ranking matrix in Table 4-2.

The matrix enabled the Working Group to review each project against the criteria for ranking. For ease of understanding, each criteria poses a brief summary to aide in the review, and each project is weighed on a scale of 1 to 3 with the least favorable (low) shown as a 1, the medium favorable score of a 2 and the most favorable shown as 3.

The measure receiving the highest score would be ranked as high priority. In the event of ties, the mitigation measures perceived to have the greatest benefit/cost, impact the greatest number of people may be listed higher. The LMS Working Group reviewed the mitigation initiatives and prioritization score draft results during regular Working Group meetings. However, the score may change in the future as priorities in Citrus County change and as additional mitigation actions are added. This change is normal and healthy in the hazard mitigation process.

These mitigation actions include both those that are general in nature and those that are specific to high-vulnerability hazards. As such, depending on the availability of funding for various types of projects, applications for a project with a lesser score may be considered by the LMS Working Group. In 2006, the

LMS Working Group prepared a Severe Repetitive Loss Properties Prioritization Worksheet (see Appendix B) to be used in the event that several applications for mitigation assistance are submitted at the same time. This worksheet was adopted by Resolution by all jurisdictions and is included in this update of the overall LMS document.

Table 4-2 - Project Ranking

Parameter		Scoring Criteria
1	Cost-Benefit	**3 – Very:** Project benefits exceed project costs **2- Moderately** Project benefits equal project costs **1 – Somewhat** Project costs exceed project benefits
2	Financing Availability	**3 - Good:** Readily available through grants or other funding sources. **2 - Moderate:** Limited grant or matching funds available. **1 - Poor:** No funding sources or matching funds are identified.
3	Repetitive Damages Corrected	**3 - High:** Alleviates repetitive loss. Property must have been damaged in the past by a disaster event. **2 - Medium:** Repetitive loss may have occurred but was not documented. **1 - Low:** No effect on repetitive loss.
4	Geographic Extent	**3 - High:** Benefits all municipalities and the unincorporated area, directly or indirectly. **2 - Medium:** Benefits more than half, but not all of, the municipalities and/or the unincorporated area. **1 - Low:** Benefits less than half of the municipalities and/or the unincorporated area
5	Essential Services	**3 - High:** Needed for essential services. **2 - Medium:** Needed for other services. **1 - Low:** No significant implications.
6	Economic Effect or Loss	**3 - Minimal** economic loss (little effect during project). **2 - Moderate** economic loss (minimum disruption). **1 - Significant** economic loss (businesses closed, jobs affected, etc.).
7	Critical Facilities	**3 – High** very likely to reduce critical facility vulnerabilities **2 – Medium** moderately likely to reduce critical facility vulnerabilities **1 – Low:** Not likely to reduce critical facility vulnerabilities

4.7 Action Plan

The mitigation action plan (Table 4-5) is a listing of all the mitigation action items for Citrus County, the City of Crystal River, and the City of Inverness. The action items are organized within the following matrix, which lists all of the multi-hazard and hazard specific action items included in the mitigation plan. The Action Plan includes documentation of how each mitigation measure will be implemented, including the following information for each action item:

- Funding Sources,
- Timeframe,
- Responsible Agency, and
- Project Status

The action plan was updated to reflect changes in development, progress in local mitigation efforts and changes in priorities. As described in Section 1.2.7 Development Trends, new development is focused along major roadway. Growth over the last eight years has been limited with only a 3% population increase

between 2010 and 2018. As described in the wildfire hazards analysis, many new residential developments are susceptible to wildfire, due to their location in or near the Wildland Urban Interface (WUI). New development was factored into the updated action plan in several ways. As part of the vulnerability analysis the newest available property appraiser data was used to determine the number of buildings and properties at risk for each hazard.

Progress on local mitigation efforts is reflected in the updated action plan. Several projects have been removed from the list, as the jurisdictions have focuses more on acquisition, hardening and infrastructure projects. The plan has been revised to reflect changes in priorities since the plan was previously approved by amending the priority ranking to more closely reflect the community's priorities. The community has added projects that align with newly added goals related to wildfire mitigation and disaster resilience. After reviewing the results of the risk and vulnerability assessment the LMS Working Group developed goals and objectives for addressing hazard mitigation. The first major change from the previous update reflect a greater emphasis on wildfire as a hazard, with the addition of Goal 6. The second major addition is Goal 7 which was added to reflect the community's interest in being able to recover quickly when disasters occur. Table 4-3 shows how the projects in action plan address the seven goals in Section 4.2.

Table 4-3 – Mitigation Goals and Action Plan Projects

	Goal 1: Minimize future losses from all disasters by reducing the risk to people and property.	Goal 2: Support a balance between government regulation/ enforcement, and personal awareness/ responsibility for hazard mitigation, by emphasizing education and training for property owners, families and individuals.	GOAL 3: Prevent flood-related repetitive losses from natural disasters through regulation and education.	Goal 4: Emphasize pre- and post-disaster planning to decrease vulnerability of existing and new construction to loss	GOAL 5: Encourage public support and commitment to hazard mitigation, by communicating its benefits and justification in simple and understandable terms.	Goal 6: Partner with the Florida Fire Services to prevent wildfires through public education and mitigation actions.	Goal 7: Become a more disaster resilient community.
Priority 1: C.R. 490	X						
Priority 4: Wildfire Communities at Risk Assessment						X	
Priority 5: Coordinate with Region on Hazmat mitigation							X
Priority 7: Wildfire Mitigation						X	
Priority 8: Cyber Incident Training							X
Priority 10: Countywide Outreach		X	X		X		
Priority 11: Repetitive loss mitigation	X		X				
Priority 14: Relocate Crystal River City Hall				X			
Priority 16: Drones for aerial data collection				X			

4.7.1 Funding Sources

Potential funding sources have been identified for the mitigation actions. Many of the mitigation actions are eligible for funding from more than one source of funding. In these cases, a list of potential funding sources was included on the matrix. Most federal funding sources, such as FEMA will require a percentage (usually 25 percent of the total project costs) from a local source.

4.7.2 Time Frame

Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation. Short-term action items are activities which county agencies are capable of implementing with existing resources and authorities within one to two years. Long-term action items may require new or additional resources or authorities, and may take between one and five years to implement. Approximate timeframes for project implementation have been included in the Action Plan.

4.7.3 Facilitator and Responsible Agency

The facilitator is the department that will lead the project. This is especially important for projects with multiple responsible agencies. The facilitating departments include Citrus County Department of Public Works (CCPW), Citrus County Sherriff's Office (CCSO), Citrus County Systems Management (CCSM), Citrus County Clerk's Office (CCCO), Crystal River Public Works (CRPW), Crystal River Administration (CRAD), Citrus County Growth Management (CCGM), Citrus County Public Information Office (CCPIO), Citrus County School Board (CCSB) Florida Forest Services (FFS), Tampa Bay Regional Planning Council, (TBRPC) City of Inverness Public Works (CIPW), and Inverness Fire Department (IFD).

The responsible agencies are those with regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Responsible agencies may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

4.7.4 Project Status

A column has been included in the Action Plan to document the project status. A number of the mitigation actions have been completed, while others have been started, but not completed to date. The Action Plan may include details on funding that has been applied for or received; "on-going" for projects that are continuous such as educational programs; "in process" for projects that are currently being implemented; "completed" for projects that have been finished; or "dropped" for projects that are no longer applicable.

Table 4-4 Evaluation and Prioritization of Mitigation Actions

Action	Estimated Budget	Cost-Benefit	Financing Availability	Repetitive Damages Corrected	Geographic Extent	Essential Services	Economic Effect or Loss	Critical Facility	Total Score
Hourglass Subdivision Stormwater Retrofit	**$2,583,348.20**	**1**	**1**	**3**	**1**	**2**	**2**	**1**	**11**
Reduce the number of repetitive loss properties by reviewing the current FEMA NFIP Repetitive Loss List for Citrus County to identify the correct, updated address and exact location of each individual structure. Using the National Flood Mitigation Data Collection Tool, survey property owners to determine interest and eligibility to pursue mitigation measures and identify the most appropriate mitigation measure for each structure using the priority established. Implement mitigation measures on each individual structure using the established property to mitigation future damage as funding becomes available	$100,000.00	1	3	3	1	1	3	1	13
Opening Protection to be placed on windows and glass doors of critical facilities.	$160,000.00	3	2	1	3	3	3	3	18
Investigate, update and/or implement new location for the City Hall in the City of Crystal River	$15,000,000.00	1	2	1	1	3	3		11
Provide protection from increased infiltration into the sanitary sewer system during flood events through the installation of portable bypass pumps and portable generators at the lift stations.	$2,462,000.00	1	2	1	1	3	1	3	12
Install standby generators for fire stations 3, 5, 7, 9 13, 14, 18, 20, 24, City of Inverness fire station, and Inverness City Hall, for a total of 11 generators	$5,000,000.00	3	2	1	3	3	2	3	17
Convert hard copy storm damage records (including past damages and flood depth data) to a database	$150,000.00	1	2	2	1	1	3	1	11

Table 4-4 Evaluation and Prioritization of Mitigation Actions

Action	Estimated Budget	Cost-Benefit	Financing Availability	Repetitive Damages Corrected	Geographic Extent	Essential Services	Economic Effect or Loss	Critical Facility	Total Score
Hourglass Subdivision Stormwater Retrofit	**$2,583,348.20**	**1**	**1**	**3**	**1**	**2**	**2**	**1**	**11**
Generators and ancillary facilities to power the following Citrus County Schools: Ranking as follows: 1) Central Ridge Elementary (hurricane-hardened) 2) Citrus Springs Middle School 3)Withlacoochee Technical Institute 4) Hernando Elementary School 5) Pleasant Grove Elementary School 6) Citrus Springs Elementary School, 7) Floral City Elementary, 8) Inverness Primary School, 9) Rock Crusher Elementary	$850,000.00	3	2	1	3	3	1	3	16
Purchase or contract services for aerostat, drone or other unmanned aerial data collection.	$100,000.00	3	1	1	3	1	1	1	11
Take corrective actions to eliminate flooding along C.R. 490 and other impacted evacuation routes, as identified in engineering studies.	$4,375,000.00	3	3	2	3	3	3	3	20
Inverness Government Center (IGC) Building Generator	$80,000	3	2	1	3	3	3	3	18
Assessment of Communities at Risk (CAR) by the Florida Fire Service and Citrus County Fire	$100,000	3	3	1	3	3	3	2	18
Conduct prescribed burns, roller chopping, and mowing to mitigate wildfires	$65,000/year	2	3	1	3	3	3	2	17
Cyber Incident Training provided on a quarterly basis by the Citrus County Sheriff's office available to all city and County employees.	$2,000/year	3	1	1	3	3	3	3	17
Work with the region to investigate, monitor, and mitigate hazardous waste transportation issues to prevent movement of HazMat over critical evacuation routes during hazard events.	$100,000	2	3	1	3	3	3	3	18
County-wide Public Information and Outreach	$30,000	3	2	1	3	1	3	1	14

Table 4 – 5 - Citrus County Action Plan

Priority #	Action	Funding Sources	Time Frame	Project Facilitator	Responsible Agencies	Hazard Mitigated	Project Status	Cost
1	Take corrective actions to eliminate flooding along C.R. 490 and other impacted evacuation routes, as identified in engineering studies.	HMGP, Citrus County General Funds	3-4 Years	CCPW	Citrus County Department of Public Works (Engineering-Road Dept)	Flood	Phased project On going	$4,375,000
2	Opening Protection to be placed on windows and glass doors of critical facilities.	Hazard Mitigation Grant Program (HMGP) Flood Mitigation Assistance (FMA) Planning and Project Funds Citrus County General Funds	Grant in Process	CCPW	Citrus County Department of Public Works,	Flood	Lecanto Government Building is hardened, EOC is mitigated.	$160,000
3	Inverness Government Center (IGC) Building Generator	Local, Federal or Private Funding	3 – 5 years	CIPW	City of Inverness	All Hazards	Ongoing	$80,000
4	Assessment of Communities at Risk (CAR) by the Florida Fire Service and Citrus County Fire	State Funding	2 - 5 years	FFS	Florida Fire Service, Citrus County Fire Department	Wildfire	Ongoing	$100,000
5	Work with the region to investigate, monitor, and mitigate hazardous waste transportation issues to prevent movement of HazMat over critical evacuation routes during hazard events.	Federal Highway Administration (FHWA) Federal Transit Administration (FTA); HazMat grant	Annual	TBRPC	Tampa Bay Regional Planning Council	HazMat	Ongoing	$100,000
6	Install standby generators for fire stations 3, 5, 7, 9 13, 14, 18, 20, 24, City of Inverness fire station, and Inverness City Hall, for a total of 11 generators	Local, Federal or Private Funding. Project Funds, Inverness General Funds, Citrus County General Funds	3-5 Years	IFD	Fire Rescue City of Inverness	All Hazards	Ongoing	$250,000 (Fire Rescue) $250,000 (City of Inverness **$500,000 Total**
7	Conduct prescribed burns, roller chopping, and mowing to mitigate wildfires	State Funding	Annual	FFS	Florida Fire Service	Wildfire	Ongoing	$65,000/year
8	Cyber Incident Training provided on a quarterly basis by the Citrus County Sheriff's office available to all city and County employees.	Local, Federal or Private Funding	Ongoing	CCSO	Citrus County Sherriff's Office	Cyber Incident	Ongoing	$2,000/year

Table 4 – 5 - Citrus County Action Plan

Priority #	Action	Funding Sources	Time Frame	Project Facilitator	Responsible Agencies	Hazard Mitigated	Project Status	Cost
9	Generators and ancillary facilities to power the following Citrus County Schools: Ranking as follows: 1) Central Ridge Elementary (hurricane-hardened) 2) Citrus Springs Middle School 3)Withlacoochee Technical Institute 4) Hernando Elementary School 5) Pleasant Grove Elementary School 6) Citrus Springs Elementary School, 7) Floral City Elementary, 8) Inverness Primary School, 9) Rock Crusher Elementary	Citrus County General Funds	2-4 Years	CCSB	Citrus County School Board, Department of Public Works, Emergency Management	All Hazards	Ongoing	$850,000 Each
10	County-wide Public Information and Outreach	Local, Federal or Private Funding. Project Funds, Inverness General Funds, Citrus County General Funds, Crystal River General Funds	Ongoing	CCPIO	Emergency Management, Public Information Office, Community Partners	All Hazards	Ongoing	$30,000
11	Reduce the number of repetitive loss properties by reviewing the current FEMA NFIP Repetitive Loss List for Citrus County to identify the correct, updated address and exact location of each individual structure. Using the National Flood Mitigation Data Collection Tool, survey property owners to determine interest and eligibility to pursue mitigation measures and identify the most appropriate mitigation measure for each structure using the priority established. Implement mitigation measures	Community Development Block Grant (CDBG) Hazard Mitigation Grant Program (HMGP) Flood Mitigation Assistance (FMA) Project Funds Small Business Administration (SBA) U.S. Army Corps of Engineers Section 205	Reduction caused by Hurricane Hermine Currently being updated.	CCGM	Department of Planning and Development, City of Crystal River	Flood	Ongoing 19 properties were removed in 2016. Staffing needed to keep up with grants.	$100,000

Table 4 – 5 - Citrus County Action Plan

Priority #	Action	Funding Sources	Time Frame	Project Facilitator	Responsible Agencies	Hazard Mitigated	Project Status	Cost
	on each individual structure using the established property to mitigation future damage as funding becomes available							
12	Provide protection from increased infiltration into the sanitary sewer system during flood events through the installation of portable bypass pumps and portable generators at the lift stations.	Pre-Disaster Mitigation (PDM); Hazard Mitigation Grant Program (HMGP); Flood Mitigation Assistance (FMA) Project Funds; Crystal River General Funds	2 years	CRPW	City of Crystal River	Flood	In Progress	$2,462,000
13	Hourglass Subdivision Stormwater Retrofit	406 Preventative Mitigation	2 years	CCDPW	BOCC	Flood	Not completed	$2,583,348.20
14	Investigate, update and/or implement new location for the City Hall in the City of Crystal River	Pre-Disaster Mitigation (PDM); Hazard Mitigation Grant Program (HMGP); Crystal River General Funds	2 years	CRAD	City of Crystal River	All Hazards	Ongoing	$15,000,000
15	Convert hard copy storm damage records (including past damages and flood depth data) to a database	Pre-Disaster Mitigation (PDM); Hazard Mitigation Grant Program (HMGP) Flood Mitigation Assistance (FMA) Planning and Project Funds; Citrus County General Funds	1 – 2 years	CCCO	Records Management	Flood	Ongoing	$150,000
16	Purchase or contract services for aerostat, drone or other unmanned aerial data collection.	Local, Federal or Private Funding. Project Funds, Citrus County General Funds	2 years	CCSM	Emergency Management, Department of Systems Management, Engineering/Survey Section	All Hazards	On-Going	$100,000

Table 4-6 Completed, Deleted and Deferred Projects

Action	Funding Source	Timeline	Responsible Agencies	Status
Solid Waste Leachate Force Main	406 Preventative Mitigation and Enterprise generated	2 Years	BOCC	Completed
Investigate and implement protective measures necessary for Crystal River critical facilities in the Category 1 evacuation zone including: Fire Department, Ambulance Service, City Hall and Sheriff Satellite Station, schools, and library. Create a location/shelter for City of Crystal River emergency workers and their families during activation.	Pre-Disaster (PDM) Hazard Mitigation Grant Program (HMGP) Flood Mitigation Assistance (FMA) Project Funds Crystal River General Funds	1 year	City of Crystal River	Removed/Modified (City Hall was determined to be the highest priority - See Priority Action #14 in Table 4-5 and the city has begun a Civic Master Plan to prioritize areas for safer redevelopment)
Implement the findings from the City of Crystal River and Inverness Stormwater Management Plan	Flood Mitigation Assistance (FMA) Project Funds Crystal River General Funds Inverness General Funds SWFWMD	1 year	City of Crystal River, City of Inverness	Deferred (stormwater plans are currently being updated in partnership with SWFWMD individual projects have been moved to the Action Plan – Table 4-5)
Investigate and implement a new location for the EOC in the City of Crystal River	Pre-Disaster Mitigation (PDM); Hazard Mitigation Grant Program (HMGP); Flood Mitigation Assistance (FMA) Project Funds; Crystal River General Funds	2 years	City of Crystal River	Removed (The City has posted an RFP for a Civic Master Plan to prioritize areas for safer redevelopment)
Complete wellhead protection plan that includes the identification of private and public wellheads, upgrade of substandard wastewater systems to protect wells and wastewater systems from contamination and failure; and investigate the feasibility of connecting additional systems to the County's wastewater treatment system	Revolving Fund Loan Program for Wastewater Treatment Pollution Control Bond Program	3 years	Water Resources Department, Department of Development Services; Florida Department of Environmental Protection	Completed
Creation of an ongoing work schedule for data collection needed to create and update the GIS system as required. Survey work to tie section corners and other technical work to be used in the creation and ongoing update of data for the GIS database.	Emergency Management Performance Grant (EMPG) Emergency Management Preparedness and Assistance Trust Fund (EMPA) Citrus County General Funds; Florida Warning and Information Network; SWFWMD	3-5 years	Department of Planning and Development (GRCP)	Completed
Geographical Information Systems (GIS) technology should be used to: a) collect and maintain essential hazard data; b) facilitate data sharing among agencies	Emergency Management Performance Grant (EMPG); Emergency Management Preparedness and Assistance Trust Fund (EMPA); Community Development Block Grant (CDBG) Small Cities Program; Citrus County General Funds SWFWMD	2 years	Department of Planning and Development (GRCP)	Completed
Preventative action to ensure that aboveground propane tanks do not break loose during storm events. Develop CO-OP efforts with gas companies for older tanks, grandfathered under previous code requirements	Residential Construction Mitigation Program (RCMP)	2-3 years	Emergency Management, Department of Development Services, Fire Rescue/Hazmat	Completed
Develop community well sites for firefighting purposes. Eventually develop the capability to store potable water for emergencies.	Livable Communities Initiative Community Development Block Grant (COB G) Small Cities Program, Citrus County General Funds	2 years	Fire Rescue	Completed

Table 4-6 Completed, Deleted and Deferred Projects

Action	Funding Source	Timeline	Responsible Agencies	Status
Develop and implement a Post Disaster Recovery Plan for critical Government Operations.	Pre-Disaster Mitigation (PDM) Hazard Mitigation Grant Program (HMGP) Flood Mitigation Assistance (FMA) Planning Funds-Schools	2 years	Emergency Management, Department of Planning and Development	Ongoing (the PDRP was created and will be integrated with Comp Plan to meet the Peril of Flood Requirements)
Implement a Stormwater Utility Fee in the City of Crystal River to providing a funding source for future mitigation projects.	Crystal River General Funds Crystal River CIP	5 years	City of Crystal	Removed (Funding not available for Fee Study)
Develop Stormwater Management Plan for Riverhaven	Flood Mitigation Assistance (FMA), Planning and Project Funds; Community Development Block Grant (CDBG) Small Cities Program	1-2 years	Engineering, SWFWMD	Removed (SWFWMD watershed study will identify priority areas)
Develop Stormwater Management Plan for South Dunnellon	Flood Mitigation Assistance (FMA) Planning and Project Funds Community Development Block Grant (CDBG) Small Cities Program	1 -2 years	Engineering, SWFWMD	Removed (SWFWMD watershed study will identify priority areas)
Conduct a detailed inventory and prioritization of local environmental resources via the Comprehensive Plan or similar natural resources planning process.	Citrus County General Fund	Annual	Department of Planning and Development – GRCP	Completed
Backup generators for all buildings in County Maintenance Complex – 7 total individually sized, rated & priced on file.	EMPA, Citrus County General Funds, Department of Public Works	2 -3 years	Department of Public Works (Facilities Maintenance)	Completed
Mobile GIS data collection vehicle to aid in response & recovery; includes 360 degree high resolution digital camera & ground based LiDar for data collection;	EMPA, HMGP, Citrus County General Funds	2 years	Emergency Management, GIS, Engineering/Survey Section	Removed/Consolidated (the county will use contractor to collect data for GIS – see Priority Action #16 Table 4-5)

5.0 Plan Evaluation and Maintenance

5.1 Overview

This section documents Citrus County's road map for maintaining the LMS and instituting the long-term plan maintenance procedures into the everyday workings of the County government. A continuous cycle for monitoring, evaluating, and updating the plan; incorporating mitigation strategies into other, ongoing planning activities; methods for continued public involvement; and the continuation of the LMS Working Group are discussed below.

5.2 Monitoring, Evaluating, and Updating the LMS

Monitoring, evaluating, and updating the LMS are critical to maintaining the plans relevance. Effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. The Citrus County LMS Working Group will monitor and evaluate the progress of the implementation of the mitigation strategies and update the plan on a regular basis. The LMS Working Group's activities are as follows:

- Continue to meet quarterly to address all its responsibilities.
- Monitor the mitigation activities by reviewing reports from the agencies identified for implementation of the different mitigation actions.
- Request that the responsible agency or organization submit a report, which provides adequate information to assess the status of mitigation actions.
- Provide their feedback to the individual agencies.

Evaluation of the plan includes not only checking on whether or not mitigation actions are implemented but also assessing their degree of effectiveness. This is done through a review of the qualitative and quantitative benefits (or avoided losses) of the mitigation activities. These would then be compared to the goals and objectives that the LMS was intended to achieve.

The LMS Working Group also evaluated mitigation actions to see if they need to be modified or discontinued in light of new developments, including changes in laws or regulations from Federal, State, or local agencies; the addition of new funding sources; newly identified hazards or areas of vulnerability; changes in the Comprehensive Plan, demographic, or land use trends; or results from previous hazard events. The LMS Working Group documents progress annually and submits the required annual update information to the Division of Emergency Management in accordance with F.A.C. 27P-22.004.

The LMS is to be updated every 5 years, as required by the DMA 2000, or following a disaster. The updated LMS would account for any information, programs, map revisions, changes to the repetitive loss statistics, etc. in the County or special circumstances (post-disaster). Issues that come up during monitoring and evaluation, which require changes in mitigation strategies and actions, will be incorporated in the LMS at this stage. Barring any disasters, it is imperative that the Plan, in its entirety be updated to meet the mandatory 5-year review and update. This update should begin within 9 to 12 months prior to the expiration date depending on staff availability and to facilitate all required public meetings.

5.3 Implementation through Existing and On-going Programs

The LMS establishes a continuing planning program for the County and is referenced in the Coastal, Lakes, River Management Element of the Citrus County Comprehensive Plan. The last update of this portion of the Comprehensive Plan was in December of 2018. The LMS is also referenced in the Future Land Use Element of the City of Crystal River's Comprehensive Plan.

The LMS Working Group will present suggestions, ideas, concepts, philosophies, principles, and

recommendations to other regulating bodies, and make recommendations for the regulating bodies to take proactive actions to make changes directly to the development regulations that will better protect Citrus County against natural disasters.

The LMS Working Group will continue to be the County's leading policy group regarding mitigation issues and will continue to recommend and set examples of what the County should be doing to mitigate hazards, improve the sustainability of the built environment, and reduce the impact and vulnerability of natural disasters.

When the Citrus County Comprehensive Plan and Capital Improvements Plan are updated, the requirements of this mitigation plan will be incorporated into future amendments of these planning documents. In addition, the LMS Working Group will present the information for consideration to the regulating bodies in an attempt to incorporate the new data and philosophies into the already existing processes. For example, the hazard maps, hazard study data, or any other valid scientific data that support the need for change in the county's development codes and regulations will be forwarded to the appropriate departments for review and incorporation.

Both the City of Crystal River and the City of Inverness shall also incorporate the requirements of this mitigation plan into future amendments of their planning documents. The 2015 Peril of Flood Act compels municipalities and counties in Florida's coastal areas to adopt goals, objectives, policies, and strategies into the coastal management element of the local government's comprehensive plan related to flood risks to real property and the built environment. The process of updating the City of Crystal River and Citrus County comprehensive plans to meet the 2015 Peril of Flood Act will be an opportunity to incorporated the mitigation goals identified in the LMS into the comprehensive plans. In addition, as new information is presented, the jurisdictions shall amend their codes and regulations appropriately.

5.4 Continued Public Involvement

The LMS Working Group will continue to involve the public during the evaluation and update of the LMS throughout the 5-year implementation cycle. This will be accomplished by providing a copy of the plan to all appropriate agencies and making copies available for public display as requested. In addition, the County will solicit public involvement by the following:

- Annual public education activities, public workshops, and public hearings
- Public meetings to solicit feedback and to obtain public input for plan evaluation
- Public education via the County's website as a means of communication by providing information about mitigation initiatives, updates on the status of the mitigation measures, and recommended revisions to the mitigation plan

A permanent entity needs to be responsible for maintaining the LMS and for monitoring, evaluating, and updating it. The LMS Working Group (with representation from all participating municipalities) represents citizen, municipal, business, educational, volunteer, and county interests through a balanced membership.

The LMS Working Group oversees the LMS plan maintenance during the 5-year implementation timeframe. The LMS Working Group will continue to meet at least once a year to perform the following:

- Evaluate the effectiveness of previously implemented mitigation actions
- Explain why any actions are not completed
- Identify any actual or perceived changes in risk or vulnerability
- Submit all revisions for adoption by all jurisdictions

Prior to the end of each 5-year implementation, the LMS Working Group will oversee a major update to the plan that follows FEMA's planning guidance. The updated plan will be submitted to the Florida Division of Emergency Management and FEMA for approval.

Appendix A

Optional Rehousing Assistance Policy

Appendix A

I. OPTIONAL REHOUSING ASSISTANCE POLICY

(ORAP)

PURPOSE: To encourage greater participation in hazard mitigation activities by providing certain property owners with reasonable additional payments for housing, moving and relocation expenses.

INTENT: The Federal Emergency Management Agency, through the State of Florida provides funds for acquisitions of damaged structures; however, in some instances, offers to pay pre-disaster Fair Market Value for a structure are insufficient for owners to purchase a comparable home outside of the floodplain. In other instances, owners need temporary housing/relocation assistance while their homes are being elevated in place or otherwise retrofitted. It is Citrus County's intent to provide eligibility for rehousing payments through the adoption of this ORAP policy.

A. Relocation Assistance for Property Owners

Prior to execution of a contract for sale of the property to be acquired by the local government, the County shall:

Identify the average price of comparable housing in non-floodplain locations,
Include a listing of potential replacement properties,
Specify conditions under which an owner will be eligible.

1. Owner/occupants shall be notified of their eligibility for ORAP benefits prior to entering into a contract to acquire the property.

If applicable, rental and utility assistance shall be provided at a maximum of $800 per month, for a period not to exceed four (4) months. This will be established on a case-by-case basis with final approval determined by funding availability. This may apply to those participants that are relocating into an existing structure as well as those who are involved in new construction or rehabilitation projects.

Moving expenses shall be provided in accordance with Appendix 28, HUD Handbook 1378, Uniform Relocation Assistance and Real Property Acquisition Policies Act, (URA) Residential Moving Expense and Dislocation Allowance Payment Schedule.

Number of Rooms of Furniture (Occupant Owned Furniture)	
1	$ 550.00
	$ 700.00
	$ 875.00
	$1,050.00

$1,200.00

$1,350.00

$1,500.00

$1,650.00

Each additional room $ 200.00

If an owner/occupant does not own the furniture, the moving expense shall be $450.00 for the first room and $125.00 for each additional room.

In cases where the residential move is performed by the agency, $100.00 will be provided to the owner.

Payment is limited to $100.00 if either of the following conditions apply:

A person has minimal possessions and occupies a dormitory style room, or
A person's residential move is performed by an agency at no cost to the person.

If the project involves the moving of a mobile home from site, the costs included will be the actual cost of moving the structure, as well as a reasonable amount for packing and securing personal property for the move.

Funds provided for in this section shall not be dispersed until the owners/occupants have officially vacated the residence acquired by the local government and will be provided at the time of closing.

B. Replacement Housing Payment

The replacement housing payment is provided to pay the difference between the cost of suitable replacement housing located outside of the Special Flood Hazard Area and the amount that the seller is offered for the sale of their property.

Should the local government determine that there is an insufficient supply of existing suitable replacement housing available in the price range of the acquired property within the community, and that the replacement cost of suitable new construction is deemed necessary, documentation of this fact shall be provided using local market information as certified by the appraiser employed to prepare the acquisition appraisals. Prior to the payment of replacement cost for new construction, the findings and determinations provided by the certified appraiser shall be submitted to the Department of Community Affairs for review and approval.

Unless otherwise provided for in the URA, any such Replacement Housing Payment shall not exceed $22,500 nor can it exceed the difference between the cost of suitable existing housing or replacement cost for a new, suitable replacement unit and the pre- event Fair Market Value of the structure to be purchased. The lower of the two figures will take precedence. The certified appraiser employed to prepare the acquisition appraisal will determine replacement cost/new.

A Suitable Housing Unit is defined as being decent, safe, sanitary and appropriate to the size of the household.

The Replacement Housing Payment shall be made at the time of closing on the purchase of the replacement home. Any such payment shall be made in a manner that assures that the payment is invested in the replacement housing.

C. Relocation of a Structure

The property owner may retain ownership of the affected structure provided that it is relocated to an area outside of the Special Flood Hazard Area.

Moving assistance shall be provided as outlined in Relocation Assistance for Property Owners, 3. above.

The homeowner/contractor shall be liable for any damage(s) that may occur as a result of the structure being moved from the site. No grant funds, unless approved by the Department of Community Affairs, shall be used to repair the structure.

4. At a minimum, costs incurred for the disconnect and reconnection of utilities, dismantling and reassembling of the structure on the new site are considered eligible expenses under this mitigation activity.

The purchase price of the replacement dwelling shall be the sum of:

a) The cost of moving and restoring the dwelling to a condition comparable to that prior to the move; and
The cost of making the unit a decent, safe and sanitary replacement dwelling; and
The estimated current fair market value for residential use of the replacement site (appraisal not required), unless the claimant rented the displacement site and there is a reasonable opportunity for the claimant to rent a suitable replacement site; and
The retention value of the dwelling, if such retention value is reflected in the "acquisition cost" used when computing the replacement housing payment.

Structures in Manufactured Home Parks

Tenants of manufactured home parks either own the mobile unit and lease the pad, or they rent the unit and the pad. If the park owner is negotiating to sell the land, then eligible tenants may be eligible for URA assistance.

1. **Homepad Rental Assistance.** The tenant who owns the mobile unit and rents the pad is entitled to compensation for a reasonable out-of-pocket moving expense. Compensation assistance may not exceed $5,250.

2. **Replacement Housing Assistance.** If the tenant owns the mobile unit and rents the pad, and if the unit has been damaged and therefore will not be relocated, then the total housing payment shall consist of a payment for a dwelling and a payment for a site, each computed under the applicable policy.

3. **Moving a Manufactured Home.** If the tenant owns the mobile unit and rents the pad, and if the unit is to be relocated rather than sold, then the owner is not eligible for fixed moving expenses and dislocation allowance under Section 3.

However, they are eligible for actual moving costs and related expenses including, but not limited to, moving (including packing, securing and unpacking items of personal property) anchoring the unit on the new site, utility disconnect and hookup charges, and the costs of disassembling, moving and

reassembling any attached appurtenances such as porches, decks, skirting and awnings. In addition, the costs may include repairs and/or modifications to the replacement site, such as construction of a pad, drilling of a well or installation of a septic tank and a nonrefundable mobile home park entrance fee, to the extent that it does not exceed the fee at a comparable mobile home park or otherwise determined by the agency to be necessary.

Last Resort Housing

When deemed necessary to provide a comparable replacement dwelling in a timely and cost effective manner, project funds may be used for Last Resort Housing.

This may be initiated for such instances as: when the total cash assistance allowed under the URA is $22,500 or $5,250 is insufficient, additional or alternative assistance must be provided. Special measures such as the construction, rehabilitation or relocation of housing, the purchase of land and/or housing, removal of barriers to the handicapped may qualify for this additional assistance.

Date of Adoption: October 28, 2008
Effective Date: October 28, 2008

Appendix B
Project Prioritization

Appendix B

I. Mitigation Action Evaluation Worksheet

Use this worksheet to help evaluate and prioritize each mitigation action being considered by the planning team.

For each action, evaluate the potential benefits and/or likelihood of successful implementation for the criteria defined below.

Summary of Evaluation Criteria

Cost-Benefit – A comparison of the estimated cost of the project (e.g. $10,000-$15,000) to the estimated number of people it would benefit (e.g. 8,000-10,000).

Financing Availability – The extent to which resources are available to finance the cost of the measure including sources of potential grants and matching funds

Repetitive Damages Corrected – The potential for a measure to reduce the frequency of repetitive damages at a facility. Past damages must have occurred and have been documented.

Geographic Extent - The extent to which a measure benefits multiple communities, more than half of a community or less than half of the community

Essential Services – The effect of a measure on essential services, such as life safety, human health, and the necessities of life.

Economic Effect or Loss – A measure of economic effects avoided, including both property damage and economic losses suffered by businesses and residents

Critical Facilities – The likelihood of the measure reducing vulnerabilities to critical facilities.

Initiative Being Scored			
Agency			
Project Cost			
Project Description			
Parameter		**Scoring Criteria**	**Score**
1	Cost-Benefit	**3 – Very:** Project benefits exceed project costs **2- Moderately** Project benefits equal project costs **1 – Somewhat** Project costs exceed project benefits	
2	Financing Availability	**3 - Good:** Readily available through grants or other funding sources. **2 - Moderate:** Limited grant or matching funds available. **1 - Poor:** No funding sources or matching funds are identified.	
3	Repetitive Damages Corrected	**3 - High:** Alleviates repetitive loss. Property must have been damaged in the past by a disaster event. **2 - Medium:** Repetitive loss may have occurred but was not documented. **1 - Low:** No effect on repetitive loss.	
4	Geographic Extent	**3 - High:** Benefits all municipalities and the unincorporated area, directly or indirectly. **2 - Medium:** Benefits more than half, but not all of, the municipalities and/or the unincorporated area. **1 - Low:** Benefits less than half of the municipalities and/or the unincorporated area	
5	Essential Services	**3 - High:** Needed for essential services. **2 - Medium:** Needed for other services. **1 - Low:** No significant implications.	
6	Economic Effect or Loss	**3 - Minimal** economic loss (little effect during project). **2 - Moderate** economic loss (minimum disruption). **1 - Significant** economic loss (businesses closed, jobs affected, etc.).	
7	Critical Facilities	**3 – High** very likely to reduce critical facility vulnerabilities **2 – Medium** moderately likely to reduce critical facility vulnerabilities **1 – Low:** Not likely to reduce critical facility vulnerabilities	
		Total	
			21

II. Repetitive Loss Project Prioritization Worksheet

This worksheet will be used to identify projects that appear to have technical merit, meet the Project Priority List as found in the adopted Local Mitigation Strategy, and will be cost effective. The total project scores will be used to determine preliminary ranking of projects to be considered for funding potential and support of the Local Mitigation Strategy Working Group.

A repetitive loss property is defined as having had two (2) or more insured flood losses of $1,000 or more within a rolling ten (10) year period. A severe repetitive loss property is one that has had four (4) or more insured flood losses the total of which meets or exceeds the insured and/or the depreciated replacement cost value of the structure. Proof of current flood insurance is required.

Citrus County currently has approximately two hundred (200) repetitive loss properties identified by the National Flood Insurance Program; approximately twenty three (23) of which are identified as target repetitive loss properties. Each applicant will be required to submit a completed application together with a detailed, line item budget as well as all other required submittals as reflected in the application form.

Applicant Information:

Name: _____

Agency: _____

Address: _____

Telephone: _____

Project Information:

Project Name/Title: _____

Project Description: _____

_____

_____

Cost Effectiveness: Total:

Points are awarded based on a positive Benefit Cost Ratio (BCR). A preliminary BCR can be done by dividing the estimated value of the project benefits by the estimated project costs. All projects that call for State and/or Federal funding must be cost beneficial. Failure to prove that the project meets these criteria based on the preliminary BCR will not automatically exclude a project, but will require submittal of additional project information and detail to enable a full benefit cost analyses to be performed.

Criteria	Points	Score

BCR is 1.0 or greater	15	
BCR is less than 1.0	0	

Cost Effective Calculations:

Estimated Project Costs: $_____

Estimated Project Benefits: $_____

Estimated BCR: $_____

Description of benefits: _____

_____

Match Funding: **Total:_____**

Will the recipient provide matching funds for the project?

o Yes

o No

Criteria	Points	Score
Recipient will provide 50% match	15	
Recipient will provide 25% match	10	
Recipient will provide 12 ½% match	5	
Recipient will provide In Kind Match	2	
No match will be provided	0	

Repetitive Loss Property Ranking **Total:_____**

Criteria	Points	Score
Severe Repetitive Loss Property	20	
Repetitive Loss Property	15	
Primary Residence	10	
Secondary Residence	2	
Commercial Structure	10	
Substantially Damaged	5	

Project Timeline: **Total:** _____

The expected timeframe for implementation of the project.

Criteria	Points	Score
Less than one year	10	
More than one year	5	

Date Completed: _____

Scoring Completed By: _____

Signature: _____

Comments:

_____

_____

III. SCHOOL GENERATOR PRIORITY LIST

To: LMS Working Group

Date: December 4, 2014

From: Scott Wagner, Environmental/Safety Project Leader

Re: Generator Additions to LMS

Citrus County School Sites are used for emergency evacuation sites. To better serve the public during a crisis, Citrus County has determined that shelters require the need of an Emergency Generator that will operate all electrical systems at each site. Electrical evaluations and drawings are required to better establish each project cost. However, to plan for these units a budgetary figure of $400,000.00 for each site is being used.

Listed below are the sites numbered by priority. As this is an ever-changing process, please include this updated list of sites in the Local Mitigation Strategy document.

1. Central Ridge Elementary School (Generator runs emergency lights)

2. Citrus Springs Middle School

3. Withlacoochee Technical School (Generator runs emergency lights)

4. Hernando Elementary School

5. Pleasant Grove Elementary School

6. Citrus Springs Elementary school

7. Floral City Elementary School

8. Inverness Primary School

9. Rock Crusher Elementary School

Citrus High School, Forest Ridge and the Renaissance Center have been upgraded to provide an Alternative Power Source to operate all electrical systems at these sites.

Appendix C
Planning Process

Appendix C

I. LMS Working Group By Laws

CITRUS COUNTY

LOCAL MITIGATION STRATEGY COMMITTEE BY LAWS

ARTICLE I

Local Mitigation Strategy Committee Established

The Local Mitigation Strategy Committee is established to assist with the implementation of the Local Mitigation Strategy adopted by Citrus County, the City of Crystal River, and the City of Inverness. The office of the Committee shall be at the Citrus County Department of Development Services (or its successor), hereinafter referred to as the Department, where all official records shall be kept.

ARTICLE II

Election of Officers

Section 1. The Committee shall elect a Chair, and a Vice-Chair, with the Chair serving a maximum of two, one- year consecutive terms in office with a one year waiting period in between any consecutive two-year terms of office.

Section 2. Nominations shall be made from the floor at the annual organizational meeting and election of the officers shall follow immediately thereafter at that meeting.

Section 3. A candidate receiving a majority vote of the members present shall be declared elected and shall serve for one year or until a successor shall take office.

Section 4. Vacancies in any elected office shall be filled by regular election procedures as herein specified with terms to run until the next annual organizational meeting or until a successor shall take office.

ARTICLE III

Meetings

Section 1. Regular meetings shall be held periodically at least once a year.

Section 2. The Chair may call special meetings when such meetings are deemed necessary.

Section 3. A designated staff member will serve as Recording Secretary. The Recording Secretary shall keep the minutes and records of the Committee, and with the assistance of such staff as is available, shall prepare the agenda of regular meetings under the direction of the Chair; provide notice of all meetings to Committee members; arrange proper and legal notice of hearings; attend to correspondence of the Committee; and such other duties as are normally carried out by a Secretary.

Section 4. All meetings of the Committee shall be open to the public and subject to applicable Florida laws.

Section 5. "Robert's Rules of Order" shall govern the proceedings at the meetings of the Committee, with the exception that the Chair may make or second motions, and that the Chair SHALL vote on all matters before the Committee, or as otherwise herein provided.

ARTICLE IV

Voting

Section 1. Voting requirements: Decisions on motions shall be made by a simple majority vote. Section 2. Quorum: A minimum of four committee members are required to decide on any motion.

ARTICLE V

Amendments

These Bylaws may be amended by a majority of the voting membership of the Committee sitting at the time the rule change is considered and, only after the proposed change(s) has (have) been read and discussed at a previous regular meeting.

Date of Adoption: April 16, 2003

Revisions:

II. Email to Stakeholders

Cara W Serra

From: Cara W Serra
Sent: Friday, October 4, 2019 4:20 PM
Cc: Brian Ellis; Gina L. Eason; 'Randall S. Olney'
Subject: October LMS Planning Meeting
Attachments: Citrus 08212019 LMSWGMinutes.pdf; 2015 Mitigation Strategy.pdf

Good afternoon LMS Working Group,

Please see the attached minutes from the August meeting for review and approval at the October 9th meeting. On Wednesday we will review the "Mitigation Strategy" which includes mitigation goals, an action plan, and the project list. I'm attaching the 2015 Mitigation Strategy as a point of reference. You may be interested in reviewing the goal section to see if it still aligns with your work programs. I will present some proposed changes at the Wednesday meeting related to incorporation of the Community Wildfire Protection Plan, Resiliency Goals, and the Manmade Hazards (cyber incident, hazardous material, radiological) as well as the project list to be voted on by the group.

Draft chapters 1-3 are on the TBRPC website and are available for review. As a reminder the **November 13th** meeting will be an opportunity for the public to review the draft, so please review and provide comments before the November meeting with that in mind:

Chapter 1 Draft Intro
Chapter 2 Draft Planning Process
Chapter 3 Draft Hazard ID and Risk Assessment

Have a good weekend.

Cara W Serra
Comprehensive Resiliency Planner
Tampa Bay Regional Planning Council
4000 Gateway Centre Blvd, Pinellas Park, FL 33782
Email: cara@tbrpc.org
Phone: 28
Fax: 727-570-5118
Web: www.tbrpc.org
Convening the Region since 1962

III. Meeting Minutes and Sign in Sheets

Citrus County Local Mitigation Strategy Working Group

LMS Update

Friday, December 18, 2015, at 10:30 AM
Lecanto Government Center, 3600 W. Sovereign Path, Room 114
Lecanto, Florida

MINUTES

A brief meeting between the new board (Kimberly Corbin, Chair; Bretlee Jordan, Vice Chair), the new secretary (Jet Houser) and the LMS Liaison (Jim Faulkner) to discuss what was needed to respond to the December 1, 2015 annual request for update received from the Florida Division of Emergency Management; due by January 29, 2016. The annual update on information regarding the LMS plan and working group is required by Florida Administrative Code 27P-22.004 and includes the following:

- Current list of members of the LMS working group, identifying current chairperson and/or coordinator (and contact information, email, phone and mailing address)
- Current list of mitigation measures (also referred to as actions, initiatives or projects)
- Major changes (if applicable) to the local hazard assessment, critical facilities list, repetitive loss properties list or plan maps occurring in the past year.

LMS liaison, Jim Faulkner, advised the board members of the steps that must be taken; and drafts of the response letter, contact list and action plan/project list were presented for review by the secretary, Jet Houser. There are no major changes to the plan at this time.

Mr. Faulkner advised the board members that several meetings with the working group will need to be scheduled in 2016 to update the project list, which is to be completed annually. Mr. Faulkner said that it would take possibly three to five meetings in order to accomplish the update.

A draft of the Citrus County LMS Working Group contact list was updated and sent by Ms. Houser to the working group members for review. Upon finalization of the list, Ms. Houser will prepare the required materials for the Chair's review and signature, and transmit that information to the Florida Division of Emergency Management as required by the deadline.

At this time, no dates have been set for the LMS Working Group to meet.

Respectfully Submitted,
Jet Houser
LMS Secretary

Citrus County Local Mitigation Strategy Working Group

Tuesday, November 8, 2016, at 9:00 A.M.
Lecanto Government Building,
3600 W. Sovereign Path, Room 166
Lecanto FL 34461

MEETING MINUTES

I. Call to Order 9:00 AM

A. Welcome and Introductions — Chair Messersmith

Bob Messersmith asked those attending to introduce themselves to the group.

B. Public Input - None

C. Approve minutes of October 11, 2016

Minutes were approved by general consensus.

D. Staff announcements

Jim Faulkner updated the Group concerning mitigation grant funding being made available to Citrus County residents affected by Hurricane Hermine. FEMA has now deemed the County eligible to apply for mitigation funds. Private citizens can apply to the County through LMS Working Group. The first step is for the citizen to make the application, and then they must appear before the LMS at a hearing. The LMS must hear the applications and approve them. FEMA has not made a Notice of Funding Availability (NOFA) yet and that should come the first part of 2017. The Working Group will have 60 days to approve the applications and get them submitted.

II. Table 6-3 Citrus County Action Plan – Review

A. Action 9 - Water Resources Department, Department of Planning and Development; Florida Department of Environmental Protection are responsible agencies (Gary Loggins to present additional information concerning a company that helps rural communities update well head protection plans.)

Minutes approved by majority on March 3, 2017

Item 9 - Complete wellhead protection plan that includes the identification of private and public wellheads, upgrade of substandard wastewater systems to protect wells and wastewater systems from contamination and failure; and investigate the feasibility of connecting additional systems to the County's wastewater treatment system.

There was no additional input on this item.

B. Actions 17, 18, 24 (see below Item D.) - Emergency Management, GIS, Engineering/Survey Section

Item 17 - Develop Stormwater Management Plan for Riverhaven.

Item 18 - Develop Stormwater Management Plan for South Dunnellon.

There was no additional input on these items.

C. Actions 17, 18 – Engineering, Southwest Florida Water Management District (SWFWMD)

Item 17 - Develop Stormwater Management Plan for Riverhaven.

Item 18 - Develop Stormwater Management Plan for South Dunnellon.

There was no additional input on these items.

D. Action 19 – Tampa Bay Regional Planning Council (TBRPC)

Item 19 - Work with the region to investigate, monitor, and mitigate hazardous waste transportation issues to prevent movement of HazMat over critical evacuation routes during hazard events. Propose limitation on types and size of carriers during certain periods or events

Brady Smith with TBRPC said the Council took over this region last year from the defunct Withlacoochee Regional Planning Council. He is the Hurricane Preparedness/Hazard Mitigation Program Director for TBRPC. He serves on the LMS working groups for six counties. He said there were no additional changes to this item.

E. Action 20 - Records Management

Item 20 - Convert hard copy storm damage records (including past damages and flood depth data) to a database.

There was no additional input on this item.

F. Action 24 – GIS

Item 24 - Mobile GIS data collection vehicle to aid in response & recovery; includes 360 degree high resolution digital camera & ground based LiDar for data collection. (Jim Faulkner to present additional information concerning alternatives to Action 24 (refer to October 11, 2016 minutes)

Jim Faulkner suggested re-wording this items as follows:

Purchase or contract services for aerostat, drone, or other unmanned aerial data collection method for mapping to GIS.

G. Actions 6, 23 – School Board is responsible Agency (carry-over from last meeting)

Item 6 - Opening Protection to be placed on windows and glass doors of critical facilities.

Chuck Dixon said there was no funding currently available to continue with this project. Charlie Gatto agreed there is no current funding at this time but this item should be left on the list.

Item 23 - Generator Additions for Citrus County Schools -
Ranking as follows: 1) Central Ridge Elementary 2) Citrus Springs Middle School, 3) Withlacoochee Technical Institute, 4) Hernando Elementary School, 5) Pleasant Grove Elementary School, 6) Citrus Springs Elementary School, 7) Floral City Elementary, 8) Inverness Primary School, 9) Rock Crusher Elementary

There was no additional input on these items other than the change in wording discussed previously.

H. Action 14 – Additional research from Gary Loggins concerning water tanks (refer to October 11, 2016 minutes)

Item 14 - Develop community well sites for firefighting purposes. Eventually develop the capability to store potable water for emergencies.

Will Bryant has been working with Gary Loggins on different ways to properly sanitize what is commonly referred to as "water buffalos". Tanks that has been used for septage should never be used.

There was no additional input on this item.

IV. Additional Discussion

A. Funding availability for generators

Brady Smith said because Citrus County was affected by Hurricane Hermine, there could be funds made available for generators. The Action Plan would facilitate Citrus County in a Tier One category as a recipient of funds for the different projects on the Action Plan. There would be a County match of 75% / 25%. Jim Faulkner will coordinate with Facilities about applying for grants.

V. Next Meeting (Meeting Schedule) All

The next meeting will depend upon when the NOFA is announced. It will probably be January 2017. The Working Group will be advised. If the County does receive mitigation fund grant applications, it may be sooner. As of last week there had been 19 inquiries concerning this process.

The next steps are to compile the minutes of the 2016 meeting, update the Table 6-3 Action Plan, present update to BOCC and then to the State. An email will be sent out to the Group with the updated schedule and the group will have an opportunity to comment at that time.

VI. Adjournment – 9:17 AM

Citrus County, Florida Local Mitigation Strategy Working Group
LMS Meeting
Tuesday, November 8, 2016, at 9:00 P.M.
Lecanto Government Building, 3600 W. Sovereign Path, Room 166
Lecanto, Florida

SIGN - IN SHEET

NAME (PLEASE PRINT)	AFFILIATION	E-MAIL
Brady Smith	Tampa Bay Regional Planning Council	brady@tbrpc.org
Bd. Messersmith	CCC	
Tammy Harris	CC Housing Services	tammy.harris@citrusbocc.org
Jim Baird	C.C. Building	
Dorothy Pernu	Duke Energy	
Jim Faulkner	Citrus County	jim.faulkner@citrusbocc.com
Charlie Gatto	Citrus County DPW	
Ken Lindquist	Citrus County Realtors Assc.	DITC_Ken[illegible]@yahoo.com
Chuck Dixon	Citrus County Schools	
Will Bryant	FL DOH in Citrus	

Citrus County Local Mitigation Strategy Working Group

Wednesday, October 4, 2017, at 9:00 A.M.
Lecanto Government Building, 3600 W. Sovereign Path, Room 166
Lecanto FL 34461

MEETING MINUTES

Present: Chair Bob Messersmith, Vice Chair Bretlee Jordan, Scott Wagner, Eric Stokes, Mark Green, Jim Faulkner, Karla Grzeca, Tammy Harris, Chris Evan, Chuck Dixon, Carl Jones, Jackie Gorman, Debra Stack and Janine Newman.

I. Call to Order 9:00 AM – Meeting called to order by Chairman Bob Messersmith **Chairman Bob Messersmith determined that we had a quorum.**

A. Welcome and Introductions

Chair

B. Public Input – none

C. Approval of Minutes of April 28, 2017 Meeting

MOTION: By Jackie Gorman to approve the minutes of the April 28th meeting as presented. 2nd Bretlee Jordan

Motion to approve minutes of April 28, 2017 passed by majority vote.

D. Staff announcements - None

II. Table 6-3 Citrus County Action Plan - Updates

A. Emergency Management

Bretlee Jordan indicated the following updates to the plan:

- Remove Emergency Management as a Responsible Agency on #6
- Remove Emergency Management Performance Grant (EMPG) and Emergency Management Preparedness and Assistance Trust Fund (EMPA) as a Funding Source on items #10, #11, #22, #23 & #24. These grants are utilized for funding the Sheriff's Office.
- Change wording on item #24 to "Purchase or contract services for aerostat, drone or other unmanned aerial data collection." (Remove "method for mapping to GIS")

MOTION: By Bretlee Jordan to accept changes as indicated above.
2nd Jim Faulkner

Motion to accept changes as presented passed by majority vote.

MOTION: By Bretlee Jordan to mark item #15 as "complete" and remove from plan.
2nd Jim Faulkner

Motion to approve passed by majority vote.

It was agreed that Funding Source should be more general as not to limit funding opportunities in the future. Instead of indicated a specific grant it should be worded as: "**Local, Federal or Private Funding**".

MOTION: By Jackie Gorman to change wording of Funding Source as indicated above. 2nd Bretlee Jordan

Motion to approve passed by majority vote.

B. Department of Public Works, Facilities Management and Engineering Road Department
Larry Brock was unable to attend the meeting due to a scheduling conflict. However, he did sent an email indicating there were to new updates to report for items #22, #34 and #24.

No representative present for Facilities Management and Engineering Road Department.

C. School Board
Item #23 indicates that the Citrus Springs Middle School is hurricane hardened. Chris Evan indicated this is incorrect.

MOTION: By Scott Wagner to remove "(hurricane hardened)" from the Citrus Springs Middle School listing under Action. 2nd Jim Faulkner

Motion to approve passed by majority vote.

D. Water Resources Department
No representative present for Water Resources Department.

E. Department of Development Services
Mark Green indicated there were no updates to report.

III. Additional Discussion

Jackie Gorman, City of Crystal River, was in attendance. She indicated that Crystal River does not apply to item #6 and she asked that they be removed under Project Status.

MOTION: By Jackie Gorman to remove "No update at this time from City of Crystal River" from Project Status on item #6. 2nd Jim Faulkner

Motion to approve passed by majority vote.

Jim Faulkner indicated that Development Services has been changed to Growth Management and GIS has been changed to Department of Systems Management.

MOTION: By Jim Faulkner to change Development Services to Growth Management and change GIS to Department of Systems Management wherever referenced.
2nd Mark Green

Motion to approve passed by majority vote.

Item #13 was discussed in regards to developing a CO-OP effort with gas companies for older propane tanks. Carl Jones, Building Department, indicated this was not an effort that is being developed. Currently, any old tanks being replaced are then upgraded to meet current Code requirements. The group decided to revisit this item at a later date.

Please add Cities of Crystal River and Inverness to the agenda for the next meeting. Jackie Gorman will bring updates for Crystal River to the next meeting.

IV. Adjournment 9:48 a.m.

MOTION: By Jim Faulkner to adjourn meeting at 9:48 AM. 2nd Mark Green

Motion to approve passed by majority vote.

Citrus County Local Mitigation Strategy Working Group

Wednesday, May 30, 2018, at 9:00 A.M.
Lecanto Government Building, 3600 W. Sovereign Path, Room 166
Lecanto FL 34461

MEETING SIGN IN

Citrus County, Florida Local Mitigation Strategy Working Group
LMS Meeting
Wednesday, May 30, 2018 @ 9:00 AM
Lecanto Government Building, 3600 W. Sovereign Path, Room 166
Lecanto, Florida

SIGN - IN SHEET

NAME (PLEASE PRINT)	AFFILIATION	E-MAIL
Randall Olney	Citrus County	Randall.Olney@citrusbocc.com
Larry Brock	Citrus County	larry.brock@citrusbocc.com
Tammy Harris	Citrus County	tammy.harris@citrusbocc.com
Tobey Phillips	Citrus County	tobey.phillips@citrusbocc.com
Janine Newman	Citrus County	janine.newman@citrusbocc.com
Bretlee Jordan	CCSO EM	bjordan@sheriffcitrus.org
Chris Evan	CCSO EM	cevan@sheriffcitrus.org
Jackie Comm	CM Crystal River	[illegible]@crystalriverfl.us
Gary Loggins	Citrus Co. Utilities	gary.loggins@citrusbocc.com
Craig Stevens	Citrus County Fire Rescue	Craig.Stevens@CitrusCountyFire.com
Chuck Dixon	CC Schools	dixonc@citrus.k12.fl.us

Citrus County Local Mitigation Strategy Working Group
2020 LMS Update
Friday, April 12, 2019, at 10:00 AM.
Lecanto Government Center, 3600 W. Sovereign Path, Room 166
MEETING MINUTES

I. Call to Order

A. Welcome Introductions and Announcements **Bretlee Jordan**

Chair Jordan called the meeting to order at 10:05 AM. There is an attendance list attached to these minutes. A quorum was present.

II. Chair Jordan asked if anyone had any comments on the minutes.

Minutes of the prior LMS working group meeting were approved by majority.

III. Public Input –

None

III. Staff Announcements

A. Updates to LMS Group List
Randall Olney

Chair Jordan called for staff updates. Mr. Olney stated that Laura Borgesi's last day with the county was today. He also stated that the new city manager for the City of Crystal River, Ken Frink, will start on April 29th.

Ms. Eason stated that Robert Boschen, Grants Administrator, accepted a position elsewhere and will need to be removed from the LMS work group list.

B. LMS 5-year update process **Cara Woods Serra**
Timeline

Chair Jordan introduced the staff of the TBRPC, who have contracted with the county to update the Local Mitigation Strategy for 2020. Ms. Serra presented a proposed timeline. The timeline includes two optional public outreach meetings which would help with the CRS points earned under category 510. The first public meeting must be held within 60 days of the first planning meeting, most likely in May. Ms. Serra suggested another public meeting be held in November to give the public the opportunity to give feedback. These meetings are optional and TBRPC will work with Karla Grzeca, floodplain manager, to determine if these are needed to maintain the current score in section 510.

Ms. Serra stated the next meeting of the LMS work group will involve identifying the relevant hazards. TBRPC staff will submit the draft document in November of 2019 to the LMS work group for review. Ms. Serra hopes to submit the document to FDEM by late January or early February. FDEM requires that it be submitted to their office, along with the 2018 crosswalk, no later than six months prior to the expiration date.

Federal Requirements

Ms. Serra described the Federal requirements of the LMS update process. The planning process must be documented with narrative descriptions and can be supplemented by meeting minutes and sign in sheets. The plan must identify the jurisdictions wishing to participate in the process and who represented of each jurisdiction in the planning process. The plan must show that neighboring communities, local agencies involved in hazard mitigation, and agencies that have the authority to regulate development were given the opportunity to participate. It must also show how stakeholders were given the opportunity to participate.

Floodplain Management Plan Outreach (CRS)

Ms. Serra described the opportunities for points under the CRS 510 section which is floodplain management planning. A total of five planning meetings must be held for CRS credit. All jurisdictions hoping to get credit for CRS floodplain management planning must designate at least two staff members to be in the LMS work group and at least half of those staff must attend each of the LMS WG meetings. Ms. Serra indicated that since the City of Crystal River is not represented at today's meeting and they are a CRS community, it would be ideal to schedule another kickoff meeting in the very near future to get their involvement. Otherwise the City will not be able to meet the quorum requirement of the CRS and will not be able to use the LMS plan as their floodplain management plan for CRS.

Ms. Serra discussed the CRS outreach options. In addition to the two public meetings listed on the proposed timeline, there is an opportunity to earn up to 30 points for "other public information activities. These activities are good for five points each. This could include a website that explains the LMS process and lists meeting times and dates as well as the draft document when available. A public webcast, questionnaires, and outreach at other events will each count as five points if input is solicited from the public on the LMS. Ms. Serra stated that a survey could be passed out at the Hurricane Expo as an example of an activity.

Hazard Identification and Mitigation Projects

Ms. Serra discussed updating the hazards that were identified in the 2015 update. She recommends that the hazards be updated to align with those listed in the 2018 Statewide Hazard Mitigation Plan.

Finally, Ms. Serra reminded the group that mitigation projects will need to be submitted by each jurisdiction and the LMS work group will need to agree on a methodology for ranking the projects. In the last update the STAPLEE method was used. Ms. Serra showed a slide describing the SAFE-T method and a method used by Clay County. Ultimately the working group should decide what is most important to their community when prioritizing projects.

Ms. Serra described the next steps as getting feedback on whether the public meetings will be held, getting feedback on how County staff would like to rank their projects, and getting Crystal River involved in the planning process.

Chair Jordan stated that there needed to be another LMS Working Group meeting as soon as possible with representation from Crystal River. Several meeting dates were discussed, and a meeting date was set for May 15, 2019 at 9 AM. Ms. Eason stated that she will add that meeting date to the schedule and look for meeting space.

VII. Closing Comments **All**

Mr. Oliver stated that the current project list is out dated and should be completely overhauled.

VIII. Next Meeting **All**

The next LMS Working Group meeting is scheduled for Friday, May 15, 2019, 9:00 AM.

IX. Adjournment **All**

The meeting was adjourned at 10:40 AM.

Sign-In Sheet

Name	Organization	Email	Signature
Bretlee Jordan	CCSO EM	bjordan@sheriffcitrus.org	Bretlee
Tammy Harris	Homeless	tammy.harris@Citrusbocc.com	
Chuck Dixon	cc schools	dixonc@citrus.k12.fl.us	
CARLTON HALL	CITRUS COUNTY	CARLTON.HALL@CITRUSBOCC.COM	
Karla Grzeca	citrus Cty Bldg Div.	Karla.grzeca@citrusbcc.	
Debra Schramm	City of Inverness	Dschramm@inverness-fl.gov	
Craig Stevens	Citrus Fire	Craig.Stevens@CitrusCountyFire.com	
STEVE Bowler	WREC	SBOWLER@WREC.NET	
Glenn W. Bryant	FL DOH	glenn.Bryant@FLHealth.gov	
Randall Olney	Citrus County	Randall.Olney@citrusbocc.com	
Cara N Serra	TBRPC	cara@tbrpc.org	
Wren Krahl	TBRPC	wren@tbrpc.org	
Regina Eason.	Citrus County	gina.eason@citrusbocc.com	

Citrus County Local Mitigation Strategy Working Group

2020 LMS Update

Thursday, May 16, 2019, at 2:00 PM.
Lecanto Government Center, 3600 W. Sovereign Path, Room 280

MEETING MINUTES

I. Call to Order

A. Welcome Introductions and Announcements **Bretlee Jordan, Chair**

Chair Jordan called the meeting to order at 2:04 PM. There is an attendance list attached to these minutes. A quorum was present.

II. Overview of 5-year Update Process **Cara Woods Serra**

Timeline

Chair Jordan introduced Cara Woods Serra of the TBRPC, who will be the project manager for the update to the Local Mitigation Strategy for 2020. Ms. Serra described the overall project timeline, which would include 4 more meetings of the LMS Working Group. She stated a quorum is required for all participating jurisdictions. Per the professional services agreement, the first draft of the final document will be available for review by the LMS Work Group in November. The timeline estimates the final document will be submitted to FDEM by end of January of 2020, well before the six-month deadline in March of 2020.

Outreach Plan

Ms. Serra stated that there was an overview of the outreach plan included in the handout but she could discuss this further with Karla Grezca outside of this meeting since Ms. Grezca was not able to attend. Ms Serra explained that a public outreach meeting is not required but will get the participating jurisdictions points on the CRS program. The public outreach meeting cannot be the same meeting as the LMS working group meeting, but the LMS WG can be adjourned and a public meeting can be held immediately following. The group agreed to have a public outreach meeting after the next LMS WG meeting.

Susan Bungo, attending the meeting on behalf of Karla Grezca, stated that surveys were collected at the Hazards Expo held on May 12th. Ms. Serra stated that she would scan the surveys and send to Ms. Grezca for her records.

Hazards List

Ms. Serra went over the list of the recommended hazards. She indicated that the state is encouraging inclusion of Cyber Incidents. Mitigation for this hazard could include cyber security training. Chair Jordan stated that cyber security training is conducted by Citrus County and could be made available to staff at the City of Crystal River and City of Inverness. Chair Jordan stated that the Crystal River Nuclear plant is no longer active and any Hazards have been mitigated. Ms. Serra stated that the SHMP still identifies it as a hazard that needs to be evaluated. Chair Jordan will send Ms. Serra documentation of the Duke Energy Crystal River Nuclear Plant exemptions.

Critical Facilities

Ms. Serra went over the list of the kinds of critical facilities that were considered in the 2015 LMS. The 2015 plan did not go into detail about what was considered Hospital and Health Care facilities. Chair Jordan stated that he has a list of what Emergency Management considers healthcare facilities and will send that information to Ms. Serra. Randall Olney indicated that airports should be added to the list. Chair Jordan stated that fuel lines should be added. Craig Stevens added that the Fire Department has a list of fuel lines. Randy Oliver mentioned that some information may be a security risk. The LMS WG requested that public data for power and fuel lines and substation locations be used. Ms. Serra indicated that data will be pulled from Duke Energy, Sabal Trail utilities, Florida Gas transmission and Withlacoochee Electric based on what is publicly available.

Project List

Ms. Serra stated that the group needed to pick a ranking method for their project list. Chair Jordan stated that the project list was complete. Ms. Serra stated at the last meeting the group stated the list was so outdated that it should be started over. Gina Eason left to print copies of the most recent list for the group to view. The group discussed the projects on the list and where each dollar amount came from. Ms. Serra stated that the group needed to identify how the ranking for this list was done. She stated that the current plan uses the STAPLEE method to rank projects. At minimum a cost-benefit analysis must be part of the ranking. A worksheet was handed out that listed a proposed ranking criterion. The group asked what would be considered an acceptable cost-benefit analysis. CWS responded that for planning purposes it is the cost of the project compared to the number of people it benefits. When a grant application is submitted to FEMA then the FEMA cost-benefit formula will need to be used.

Randy Oliver asked why Hourglass Subdivision was so highly ranked. Mr. Olney stated that it mitigates repetitive loss properties. Mr. Oliver, refereeing to the second project on the list, asked if the number of repetitive loss properties mitigated will change because of the new FIRM map. Mr. Olney said he would look into it. Mr. Oliver stated that the most cost-effective project would be the number nine on the list (purchase or contract services for aerostat, drone or other unmanned aerial data collection) because of the low cost. Ms. Serra emphasized that the reason methods such as STAPLEE are used is it allows other priorities to be taken into consideration when ranking the projects outside of just the dollar amount and number of people affected. Ms. Serra asked if there was anything that should be removed or added to the criteria. The cost-benefit is the only requirement and anything else could be changed. Mr. Olney suggested the addition of a priority ranking for critical facilities. Jack Dumas asked about the community acceptability, stating it should not be a priority. Ms. Serra suggested that the community acceptability could be replaced with prioritization for critical facilities.

Ms. Serra gave on overview of what was needed from participating jurisdictions. She stated that repetitive loss data is needed. Citrus County has provided the data, and Inverness did not have repetitive loss properties in 2015. Debra Schramm indicated this was still the case. Ms. Serra state she will bring a list of prior occurrences and critical facilities to the next meeting for the group to review. A new version of the ranking will be sent by email. Participating jurisdictions are asked to bring completed worksheets to next meeting.

VIII. Next Meeting **All**

The next LMS Working Group meeting is scheduled for Monday, June 17, 2019, 2:00 PM. to be immediately followed by a public outreach meeting.

IX. Adjournment **All**

The meeting was adjourned at 3:05 PM.

Citrus County, Florida Local Mitigation Strategy Working Group
LMS Meeting
Thursday, May 16, 2019 2:00 PM
Lecanto Government Building, 3600 W. Sovereign Path, Room 166
Lecanto, Florida

SIGN - IN SHEET

NAME (PLEASE PRINT)	AFFILIATION	E-MAIL
Randall Olney	Citrus County Public Works	Randall.Olney@citrusbocc.com
Bretlee Jordan	CCSO EM	bjordan@sheriffcitrus.org
Cara W Sierra	TBRPC	cara@tbrpc.org
Craig Stevens	Citrus Fire	Craig.Stevens@citrusCountyFire.com
Tammy Harris	Lecanto	tammy.harris@citrusbocc.com
BRIAN HERRMANN	CRYSTAL RIVER	bherrmann@crystalriverfl.org
Jack Dumas	City of Crystal River	jdumas@crystalriverfl.org
Debra Schramm	City of Inverness	DSchramm@InvernessFL.gov
Stacy Bowler	WREC	SBowler@WREC.NET
CARLTON HALL	CITRUS COUNTY	CARLTON.HALL@CITRUSBOCC.com
Susan Burns	Building Division	susan.burns@citrusbocc.com
Tobey Phillips	BOCC	tobey_phillips
Regina Eason	BOCC	gina.eason@citrusbocc.com

Citrus County Local Mitigation Strategy Working Group

2020 LMS Update

Thursday, June 17, 2019, at 2:00 PM.
Lecanto Government Center, 3600 W. Sovereign Path, Room 280

MEETING MINUTES

I. Call to Order

B. Welcome Introductions and Announcements **Bretlee Jordan, Chair**

Chair Jordan called the meeting to order at 2:16 PM. There is an attendance list attached to these minutes. A quorum was present.

II. Chair Jordan asked if anyone had any comments on the minutes.

Minutes of the prior LMS working group meeting were approved by majority.

IV. Public Input –

None

II. 5-year Update **Cara Woods Serra**

Cara Woods Serra reminded the group that the projects should be scored according to the ranking sheet agreed upon at the last meeting. Chair Jordan asked if the ranking methodology could be changed at any time. Ms. Serra stated it is adopted in the plan so the way projects are ranked needs to be consistent with the methodology in the plan. Chair Jordan pointed out that the ranking methodology could be changed at the annual update.

<u>Critical Facilities</u>

Ms. Serra reviewed the types of critical facilities that were agreed upon at the last working group meeting. These included fire stations, government buildings, schools/shelters, hospital and health care facilities, utilities, water/wastewater, airports, power substations, power plants, and natural gas transmission lines. Ms. Serra showed a map of the evacuation routes, electrical transmission lines, power plants and hospitals. She provided a list to the attendees of all facilities except for the electrical and gas lines. She also showed a separate map of the natural gas lines. She said the map was from a public viewer, but was intended to only be viewed at the county scale. The map was not intended to be used for exact locations of natural gas pipelines, since that could pose a security risk. Ms. Serra recommended including the map as it appears in the public viewer. The group agreed that this was the best way to include natural gas pipelines. Carlton Hall stated that there have been some changes to the counties facilities. The State the supervisor of elections office has relocated to 1540 N. Meadowcrest Blvd. Their prior location at 120 N. Apopka Avenue is currently unoccupied. He also stated that the Fire Stations should include their

corresponding station numbers, and that he would add those. Tammy Harris noted a typo in the address for the Citrus County Community Services which should be at 2804 Mark Knighton Court.

Hazards

Ms. Serra showed a list of the federal disaster declarations for Citrus County. A FEMA infographic was shown that shows what months disasters occurred. Mr. Hall noted that the month of January was remarkably high. Ms. Serra stated that may be due to the 3 historic freezing events.

Ms. Serra showed a breakout of the hazards survey responses. There were 10 respondents. According to the survey results flooding, severe storms and hurricanes were the highest priority. Most respondents planned to rebuild after a disaster, but some said they would relocate. Respondents saw preparedness and education as more important than infrastructure projects. Brian Herrmann stated that 10 respondents was a very small sample. Ms. Serra said that the results of the survey did not need to be included if the group felt the sample was too small to be statistically significant, and instead could include one completed survey and describe how the survey was distributed.

Flood

Ms. Serra showed the effective flood map. She asked the group if they would like to include the preliminary flood maps. Chair Jordan asked if the group if that should be included before the new maps become effective. Randall Olney stated that the new maps should be included if they become effective in the fall.

Tropical Cyclone

Ms. Serra showed a list of the previous tropical cyclones that affected Citrus County. She also showed a map of the historical storm paths that have crossed Citrus County. Mr. Olney asked about the storm of 1993. Ms. Serra stated that it may not have been a tropical cyclone it may fall under severe storms. Mr. Olney stated that it caused a lot of flooding and was a significant event for the community. Mr. Jordan stated that he could forward some information about that storm.

Severe Storm

Ms. Serra described the hazard of severe storm, which according to the Florida Statewide Hazard Mitigation Plan, includes the three elements of wind, water and lightening.

Wildfire

Ms. Serra showed maps related to Wildfire Risk. She stated that the Florida Fire Service has expressed an interest in incorporating their community wildfire protection plan into the LMS. She stated that the FFS also has mitigation projects that can be added to the plan, but already have existing funding sources.

Erosion

Ms. Serra showed a map indicating the FDEP areas of critical erosion. According to FDEP the only area identified as critically eroded is Fort Island Beach Park in Crystal River.

Extreme Heat

Ms. Serra described the threat of Extreme Heat which is different than the threat of drought in that it focuses more on the impacts on humans. Mitigation, she stated, would be along the lines of extreme heat shelters or public education. She stated that the Inverness Weather Station recorded 16.62 days with temperatures at or above 95 degrees per year.

Drought

Ms. Serra stated that the hazard of drought focuses on agricultural effects. She showed the U.S. Drought Monitor map from May 28, 2109 which showed some abnormally dry conditions occurring in the northern part of the county.

Geological

Ms. Serra described geological hazards. According to the State Plan this hazard includes landslides and sinkholes. Because of the low probability of landslides, the analysis will focus on sinkholes. Ms. Serra showed a map of sinkhole areas and subsistence incidents.

Winter Storms and Freeze

Ms. Serra described the hazard of winter storms and freezes. She stated that there have been 3 federal disaster declarations for freezing weather in Citrus County. She added that the Inverness weather station recorded an average of 10.6 days with temperatures at or below 32 degrees per year.

Seismic Events

Ms. Serra showed a map from USGS showing the frequency of damaging earthquake shaking around the U.S. According to the map citrus county is expected to have fewer than two occurrences of damaging earthquake shaking per 10,000 years.

Tsunami

Ms. Serra stated that although Southeast Florida has some probability of tsunamis, no known tsunamis have ever affected the Florida Gulf Coast. Because of this mapping was not done for this hazard.

Next Steps

Ms. Serra proposed the next meeting date be in August. She asked the group how they preferred to review large documents like full chapters of the plan. Mr. Jordan stated that email would be fine. Mr. Olney added that the county email limited file sizes to 10 GB. He added that if possible, the files could be put online on the TBRPC website. Ms. Serra added that a website had been setup for this project and minutes and presentations will be uploaded there. She stated that she would upload chapters to that website as well as sending via email. Mr. Jordan asked if Ms. Serra could send out her presentation. She said she would.

VIII. Next Meeting **All**

The next LMS Working Group meeting is scheduled for Wednesday, August 21, 2019, 10:00 AM.

IX. Adjournment **All**

The meeting was adjourned at 2:52 PM, at which time a public workshop was opened.

6/ 19 Roster

Name	Organization	Email
Brettlee Jordan	CCU EM	bjordan@sheriffcitrus.org
Tammy Harris	Housing	tammy.harris@citrusbocc.com
Cara W Sarra	TBRPC	cara@tbrpc.org
CARLTON HALL	BOCC	CARLTON.HALL@CITRUSBOCC.COM
BRIAN HERRMANN	Cof CR	bherrmann@crystalriverfl.com
Randall Olney	BOCC	Randall.Olney@citrusbocc.com

Citrus County Local Mitigation Strategy Working Group

2020 LMS Update

Wednesday, August 21, 2019, at 10:00 AM.
Lecanto Government Center, 3600 W. Sovereign Path, Room 280

MEETING MINUTES

I. Call to Order

C. Welcome Introductions and Announcements **Tammy Harris, Vice Chair**

Vice Chair Harris called the meeting to order at 10:00 AM. There is an attendance list attached to these minutes. A quorum was present.

II. Vice Chair Harris asked if anyone had any comments on the minutes.

Minutes of the prior LMS working group meeting were approved by majority.

V. Public Input –

None

II. 5-year Update **Cara Woods Serra**

Cara Woods Serra went over the hazard ranking criteria and showed how the hazards were ranked. Flood, Tropical Cyclones, Severe Storms, and Geological hazards were determined to be high priority hazards. Extreme Heat and Drought were determined to be medium priority hazards. Erosion, Winter Storms, Seismic Events, and Tsunamis were determined to be low priority hazards. MS. Serra stated that wildfire has not been ranked yet as TBRPC staff would be working closely with the Florida Forest Service to complete the wildfire hazard assessment. Additionally, the Community Wildfire Protection Plan will be incorporated into the updated Local Mitigation Strategy. Ms. Serra showed the preliminary vulnerability assessment for all other natural hazards. Ms. Serra stated that next she would profile the manmade hazards. She stated that there was a recent cyber incident that cost the city of Riviera Beach in Florida was a good example of how much a cyber incident could cost a city. Vice Chair Harris stated that she had recently read about an even more costly incident in the state and would forward the information to Ms. Serra. Mr. Dixon asked for clarification on cyber incidents and how they were a problem for government. Ms. Serra stated that in the case of Riviera Beach, they could be virus that could make 911 records inaccessible.

Ms. Serra recommended that the update of the LMS include some language around climate variability. She suggested that this should be modeled after the state language, and similar to the state language each hazard overview should include some language about how that hazard could be exacerbated by climate variability.

Vice Chair Harris asked if there was any comments or discussion on this topic. Mr. Olney state that it seemed like a good idea. A motion was made by Mr. Olney and seconded by Mr. Dixon to include climate variability language as modeled by the state.

Ms. Serra state that she had received project rankings from the City of Inverness and Citrus County Public Works. She said she would send a reminder that projects needed to be ranked according to the rubric. She also stated that she would bring in the final list for review and approval by the working group at the next meeting. At the next meeting the group will also review the mitigation strategy portion of the update. She reminded the group that repetitive loss data is needed before the October meeting. Finally, Ms. Serra stated that two draft chapters are available for review and she would resend the link to where they are located on the TBRPC website as well as the project ranking rubric.

VIII. Next Meeting **All**

The next LMS Working Group meeting is scheduled for Wednesday, October 9, 2019, 10:00 AM. An additional meeting was also scheduled for November 13th at 10 AM.

IX. Adjournment **All**

The meeting was adjourned at 10:44 AM.

LMS Meeting Sign-In Sheet

August 21, 2019

Print Name	Organization	Signature
CHUCK DIXON	CITRUS CO SCHOOLS	
Brian Ellis	TBRPC	
Randall Olney	Citrus County Public Works	
Tammy Harris	CC Housing	
DALE COBURN	WREC	
STEVE LACHANCE	CITRUS COUNTY	
Carl L. Jones	Citrus BOCC	
CJ Reynolds	TBRPC	
Craig Stevens	Citrus County Fire	
BRIAN HERRMANN	CITY OF CRYSTAL RIVER	
Charlene Kuhn	Citrus BOCC	
Judith Tear	FL Forest Service	
Cara W Serra	TBRPC	

Citrus County Local Mitigation Strategy Working Group

2020 LMS Update

Wednesday, October 9, 2019, at 10:00 AM.
Lecanto Government Center, 3600 W. Sovereign Path, Room 280

MEETING MINUTES

I. Call to Order

D. Welcome Introductions and Announcements **Bretlee Jordan, Chair**

Chair Jordan called the meeting to order at 10:02 AM. There is an attendance list attached to these minutes. A quorum was present.

II. Chair Jordan asked if anyone had any comments on the minutes.

Minutes of the prior LMS working group meeting were approved by majority.

VI. Public Input –

None

IV. 5-year Update **Cara Woods Serra**

Cara Serra reminded the group that there were 3 chapters available online for editing and that these should be reviewed before the November 13th meeting, since that meeting will be a public workshop. Randall Olney said he had some edits on Chapter 1, no edits on chapter 2, and still needed time to review chapter 3. Bretlee Jordan had the following edits on Chapter 2, Table 2-1:

- Chair Jordan's correct title should be listed as emergency management coordinator instead of emergency management planner
- Toby Philips is no longer the Director of Community Services, the position is vacant
- Chris Evans is not a Lieutenant.

There was discussion regarding the position vacated by Toby Phillips which was the Director of Community Services. The group agreed that the position should stay in the table but should be listed as vacant.

Cara Serra explained the project ranking. She stated that the City of Inverness submitted a project to be added to the table for generators and they provided a scoring for this project. She stated that Randall Olney provided scoring for all of the Citrus County Public Works projects. No rankings were provided for the remaining projects on the 2019 action plan, so a score was assigned based on the new project ranking criteria. She asked the group to review the scores provided.

Cara Serra stated that some projects have been added based on the hazard identification. The first project added to the list because of the hazard list is the cyber incident training at $2000/year. The 2nd project added to the list is the Hazardous Materials coordination that the county already participated in through

the LEPC at $100,000. This was listed in the 2015 updated and is being added back to the list. The dollar amount is based on the amount listed in the 2015 update.

Cara Serra reviewed the newly added fire projects. In an effort to make the LMS also work as a CWPP, the fire mitigation projects have been added to the Action Plan. The budget for the mitigation projects was based on the dollar amount spent over the past 5-years on wildfire mitigation projects divided by 5.

Judith Tear asked if the dollar estimate for outreach included all outreach. Cara Serra said that it did and the number is based on another LMS plan and may need to be adjusted if the group feels it is way off.

Cara Serra stated that there were two versions of the Action plan printed out for the group. One is the 2019 action plan, that was submitted to the state and the other is the action plan based on the ranking we just reviewed. Some projects that ranked highly on the 2019 plan have moved down and the top project is now CR 490 improvements when it was Hourglass Subdivision in the previous action plan. Cara Serra reminded the group that this is the order in which FEMA will fund projects. The group did not object to the proposed Action Plan.

Judith Tear asked how the wildfire mitigation projects were assigned a score of 17. Ms. Serra explained that for the cost-benefit category the project was given a 2, meaning the project costs are about equal to the number of people who will benefit. For Financing Availability, the project was given a 3, because the funding is already available through state programs. For Repetitive Damages corrected the project was given a 1, since it would not affect repetitive loss properties. For Geographic Extent the project was given a 3 since it would benefit all municipalities and the unincorporated area directly. For Essential Services it was given a 3, because wildfire mitigation projects would make it easier to deliver essential services, especially fire rescue. For Economic Effect or Loss it was given a 3, as there is no economic effect associated with wildfire mitigation projects. For was Critical Facilities the project was given a 2.

Cara Serra referred to the goals handout with the current goals form the 2015 plan and some proposed changes. She proposed changes to goal 1.1 to add reference the City of Crystal River and City of Inverness comprehensive plans. She proposed goal 1.3 and 1.4 should be amended to take into account that the City of Crystal River is now a CRS community.

Cara Serra asked if goal 5.7 should be stated differently based on developing the new maps. Chair Jordan asked if the preliminary maps should be included in the LMS. Karla stated that the map will not be official until the end of next summer. Ms. Serra stated that there is new language explaining the prelim maps in chapter 3.

Judith Tear asked where the fire goals would be located. Cara Serra explained they were added as their own goals section at the end.

Cara Serra recommend eliminating goals 6.4 to keep all fire goals in one place. Ms. Serra reviewed the newly proposed fire goals under goal 7.

Cara Serra suggested that the language for goal 7 needed to be updated. Goal 7 will read “partner with the Florida Fire Services to prevent wildfires through public education and mitigation actions.

Cara Serra stated that FFS had hoped to add a goal related to Firewise communities. Judith Tear stated that she hoped to add two Firewise communities. Cara Serra asked if that would be by 2025. Judith Tear confirmed and added that any of the communities at risk could become Firewise communities. The goal was added to read "Encourage at least two Communities at Risk to become Firewise communities by 2025'.

Brian Herman asked about including goals related to post-disaster recovery based on the slow recovery in the panhandle after Michael. Chair Jordan commented that could look similar to a COOP. Judith Tear commented that especially businesses have a hard time recovering and may lose employees because of the higher paying FEMA jobs. The group discussed how jurisdictions should consider contractual relationships with recovery agencies including mutual aid agreements and identifying facilities for FEMA workers. Judith Tear added that there should be consideration of the public health effects related to water contamination. Cara Serra stated that she would look at other LMS documents and incorporate language related to recover into a new goal for the group to review at the next meeting.

VIII. Next Meeting **All**

The next LMS Working Group meeting is scheduled for Wednesday, November 13th at 10 AM.

IX. Adjournment **All**

The meeting was adjourned at 10:44 AM.

Citrus County, Florida Local Mitigation Strategy Working Group
LMS Meeting
Wednesday, October 9, 2019 @10:00 AM
Lecanto Government Building, 3600 W. Sovereign Path, Room 280
Lecanto, Florida

SIGN - IN SHEET

NAME (PLEASE PRINT)	AFFILIATION	E-MAIL
Brian Ellis	TBRPC	Brian@tbrpc.org
Cara Serra	TBRPC	Cara@tbrpc.org
Craig Stevens	Citrus Fire	Craig.Stevens@citrusCountyFire.com
Brett Jordan	CCSO EM	bjordan@sheriffcitrus.org
Will Bryant	Citrus DOH EPH	glenn.bryant@FLHealth.gov
Randall Olney	Citrus County DPW	Randall.Olney@citrusbocc.com
Steven Lachnicht	Citrus - Administration/GMS	Steven.Lachnicht@citrusbocc.com
Carlton Hall	Citrus County Facilities	Carlton.Hall@citrusBocc.com
Karla Grzeca	Citrus Cty Bocc Fld Mgmt	karla.grzeca@citrusbocc.com
Charlene Kuhns	Citrus County DMS	Charlene Kuhns@citrusbocc.com
Steve Bowler	WREC	SBowler@WREC.NET
Judith Tear	7FS	Judith.Tear@7FACS.gov
BRIAN HERRMANN	CRYSTAL RIVER	bherrmann@crystalriverFl.org

Citrus County Local Mitigation Strategy Working Group
2020 LMS Update
Wednesday, November 13, 2019, at 10:00 AM.
Lecanto Government Center, 3600 W. Sovereign Path, Room 280
MEETING MINUTES

I. Call to Order

E. Welcome Introductions and Announcements **Bretlee Jordan, Chair**

Chair Jordan called the meeting to order at 10:05 AM. There is an attendance list attached to these minutes. A quorum was present.

II. Minutes for the September meeting were not yet available for review. **Bretlee Jordan, Chair**

Cara Serra stated that the minutes were not completed at this time. She agreed to send the meeting minutes and sign-in to Chair Jordan for review as soon as possible.

VII. Public Input –

None

IV. Project Submittal **Charlene Kuhn**

Charlene Kuhn stated that she would be submitting an application for the FEMA Pre-Disaster Mitigation Grant opportunity for the hardening of the Lecanto Government Building. This project falls under "Opening Protection to be placed on windows and glass doors of critical facilities" on the Action Plan. The project cost will be $160,000. She requested a letter of support from the Local Mitigation Strategy Working Group. Chair Jordan asked if the group supported drafting a letter of support for this project application. A motion to provide a support letter was approved by majority.

V. 5-year Update **Cara Woods Serra**

Cara Serra presented on overview of the changes that were made during the 5-year update process. She stated that she will be working with Randall Olney to provide the draft by the end of November. Any comments on the draft chapters that are submitted by November 20th will be incorporated into the draft document. Any comments on the draft document could still be submitted before January to be included in the final document. In January the group will need to vote to transmit the final document to FDEM.

The first major change was the hazard list was updated to reflect the hazard list in the Statewide Hazard Mitigation Plan. The manmade hazards that the group wanted to include were cyber incidents, hazardous materials, and radiological events. A crosswalk was created between the recently adopted CEMP and the new LMS hazard list. A statement about climate variability was added to each natural hazard analysis following the state's model.

The hazards were also ranked using a new hazard ranking matrix. Flood, tropical cyclone and wildfire were the top priority hazards.

In an effort to improve the CRS score, the pubic outreach was increased for this update process. One public workshop was held within 60 days of the kickoff meeting. And a public workshop will be held after this meeting. Surveys were handed out at the hazards expo to get feedback on the hazards that were important to the community and the how the community thinks these should be addressed. Because very few surveys were turned in, the group decided to include one survey in the document instead of summarizing the results since the survey population was too small to be summarized. Judith Tear pointed out that the January meeting date was listed as 2019 instead of 2020.

Another new addition is a change to the project ranking matrix. New projects will now be scored based on the project prioritization matrix and will be added to the action plan based on the score.

In addition to serving as the floodplain management plan, the new LMS will also serve as the Community Wildfire Protection Plan (CWPP).

Charlene Kuhn asked where the figure for the Project #2 "Opening Protection to be place on windows and glass doors of critical facilities". Cara Serra said she believed it came from the prior Action Plan. Carlton Hall stated it would be closer to $150-$160K.

New goals were added to the mitigation strategy. Goal 7 was added to reflect the new focus on wildfire mitigation. Goal 8 was added based on the discussion at the October meeting about the importance of recovery after a storm. Craig Stevens stated that goal 8.11 should include essential personnel in addition to first responders as these staff will also need a place to stay if they need to work after a disaster event.

VIII. Next Meeting **All**

The next LMS Working Group meeting will take place in January of 2020, however a date was not set at this time.

IX. Adjournment **All**

The meeting was adjourned at 10:26 AM, at which time a public workshop was opened.

PLEASE SIGN IN

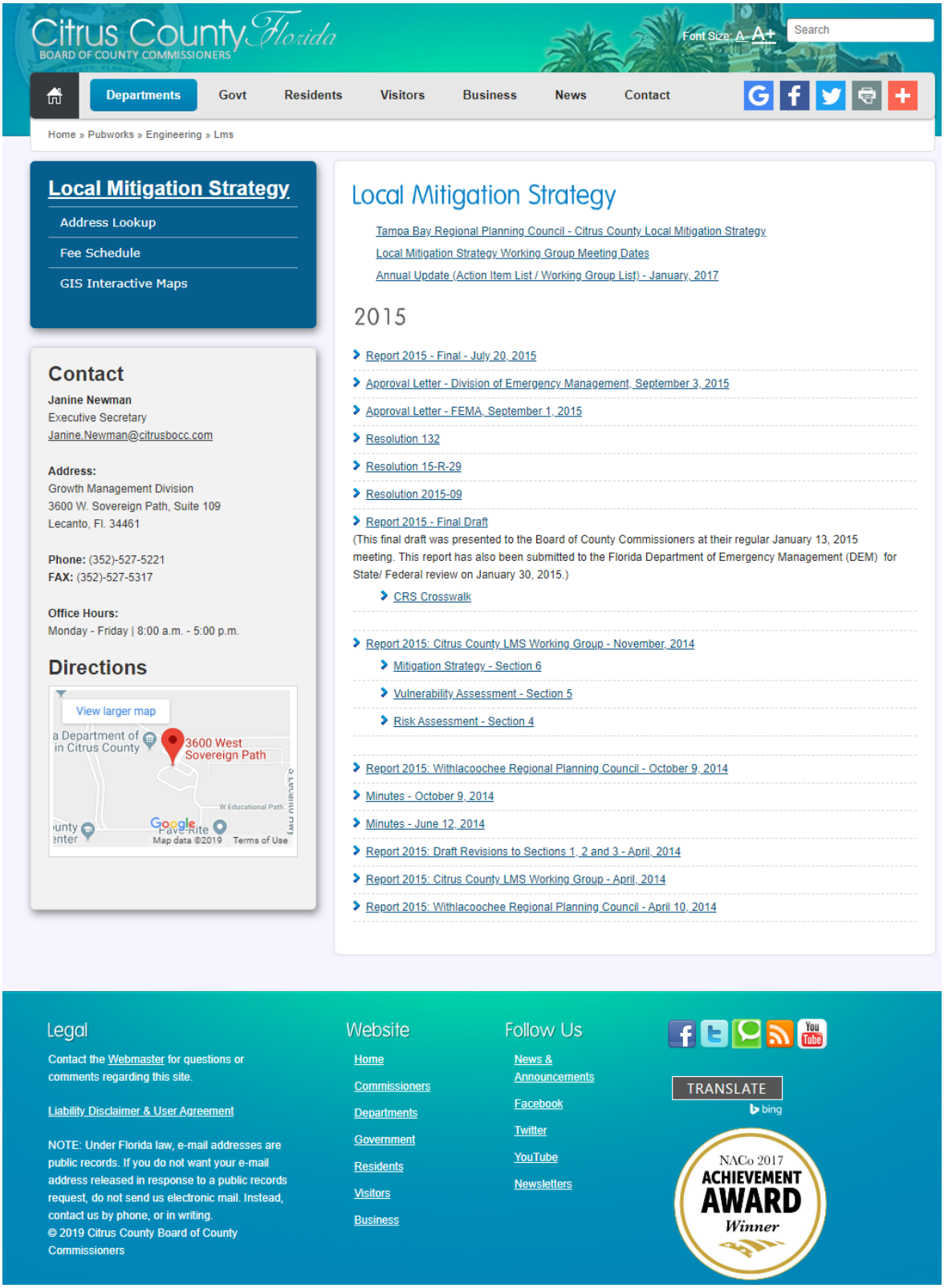
LMS Working Group Meeting

November 13, 2019

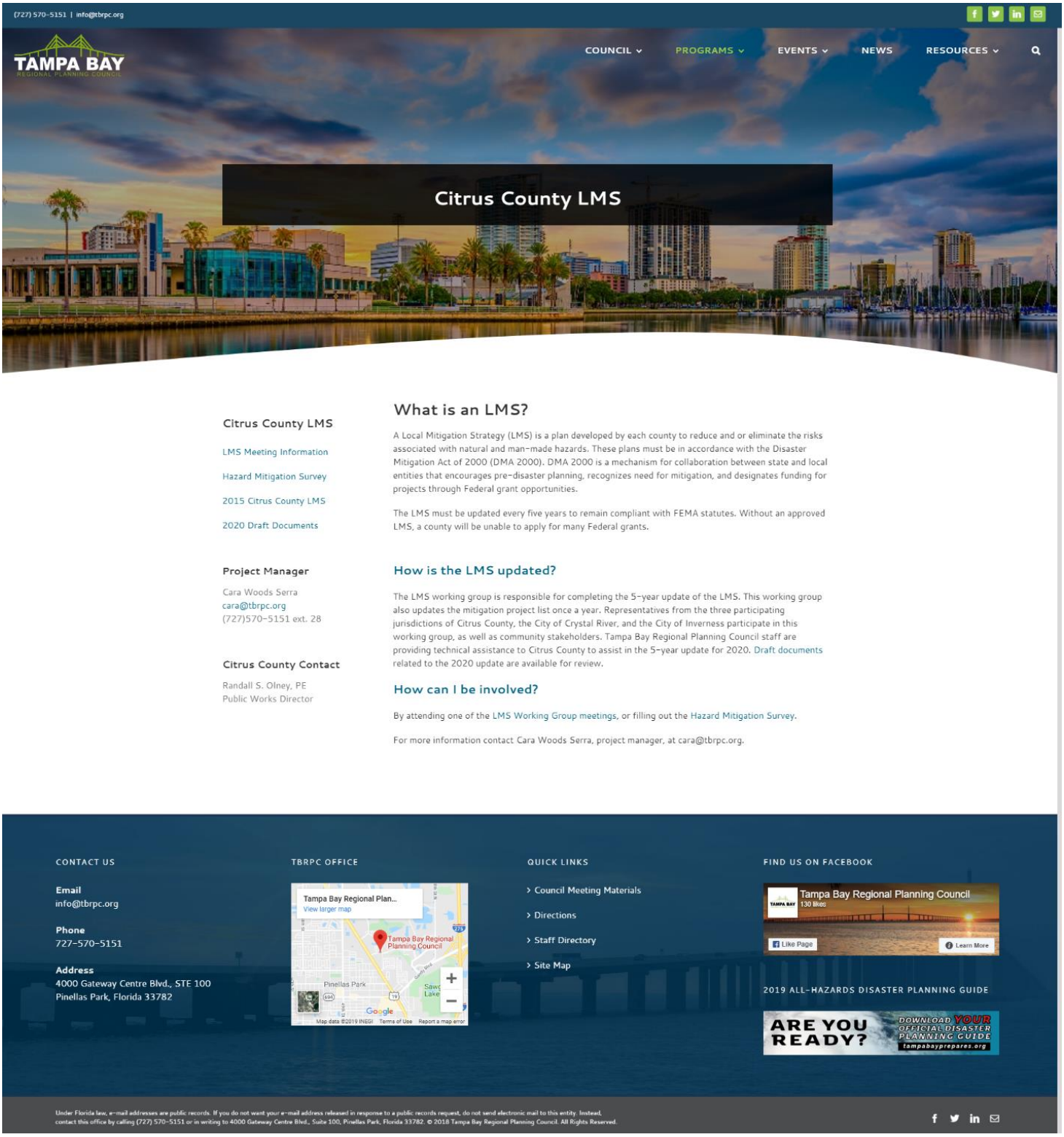
10:00 AM

Name	Agency/Jurisdiction/Team	Email
Judith Tear	775	Judith.Tear@FDACS.gov
Craig Stevens	Fire Rescue	Craig.Stevens@citrusCountyFire.com
Erica Dobrea	Citrus DMB	Erica.Dobrea@citrusbocc.com
Charlene Kuhn	Citrus DMB	Charlene.Kuhn@citrusbocc.com
Tammy Harris	CC Planning	tammy.harris@citrusbocc.com
Karla Grzeca	Citrus Cty Bldg Div./Acad	Karla.grzeca@citrusbocc.com
Brettlee Jordan	CCSO EM	bjordan@sheriffcitrus.org
Steve Bowler	WREC	SBowler@WREC.NET
CARLTON HALL	BOCC	CARLTON.HALL@CITRUSBOCC.COM
BRIAN HERRMANN	CRYSTAL RIVER	bherrmann@crystalriver.org
CHUCK DIXON	CITRUS SCHOOLS	dixonc@citrusschools.org
Carl L. Jones	Citrus Bldg Div	Carl.Jones@Citrus Bocc.com

IV. Citrus County Website with Link to TBRPC Website



V. TBRPC Website with LMS Meeting Info



VI. Sample Public Notice

Proof of Publication

from the

CITRUS COUNTY CHRONICLE

Crystal River, Citrus County, Florida

PUBLISHED DAILY

STATE OF FLORIDA
COUNTY OF CITRUS

Before the undersigned authority personally appeared

Theresa Holland and/or Mary Ann Naczi and/or Mishayla Coffas

Of the Citrus County Chronicle, a newspaper published daily at Crystal River, in Citrus County, Florida, that the attached copy of advertisement being a public notice in the matter of the

1201-0609 SUCRN NOTICE OF MEETING CITRUS COUNTY LOCAL HAZARD MITIGATION STRATEGY (LMS) WORKING GROUP & PUBLIC WORKSHOP The Citrus County Local Mitigation Strategy (LMS) Working Group has scheduled a meeting as follows: Date: Monday, June 17,

Court, was published in said newspaper in the issues of

June 9th, 2019,

Affiant further says that the Citrus County Chronicle is a Newspaper published at Crystal River in said Citrus County, Florida, and that the said newspaper has heretofore been continuously published in Citrus County, Marion County and Levy County, Florida, each week and has been entered as second class mail matter at the post office in Inverness in said Citrus County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he/she has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Mary Ann Naczi

The forgoing instrument was acknowledged before me

This 10th day of June, 2019

By: Theresa Holland and/or Mary Ann Naczi and/or Mishayla Coffas

who is personally known to me and who did take an oath.

Mishayla Coffas

Notary Public

Notary Public State of Florida
Mishayla Coffas
My Commission GG 280131
Expires 11/25/2022

1201-0609 SUCRN
NOTICE OF MEETING

CITRUS COUNTY
LOCAL HAZARD MITIGATION STRATEGY (LMS)
WORKING GROUP & PUBLIC WORKSHOP

The Citrus County Local Mitigation Strategy (LMS) Working Group has scheduled a meeting as follows:

Date: Monday, June 17, 2019 at 3:00 PM

Location: Lecanto Government Building - Room 280
3600 W Sovereign Path
Lecanto, Florida 34461

This meeting is open to the general public and all interested parties. Any person requiring reasonable accommodation at this meeting because of a disability or physical impairment should contact the County Administrator's Office, 3600 W Sovereign Path, Lecanto FL 34461, or call (352) 527-5210, at least two days before the meeting. If you are hearing or speech impaired, please dial 7-1-1.

The LMS Working Group will be immediately followed by a public workshop. Residents are invited to get more information on the hazards faced in Citrus County and encouraged to give input on updating our plan to address them.

For more information, contact Randall Oliver, P.E. at (352) 527-5477.

Published June 9, 2019

RECEIVED

JUN 12 2019

Citrus County Engineering

VII. CEMP Hazard Crosswalk

HAZARDS IDENTIFIED IN CEMP	CORRESPONDING LMS HAZARD ANALYSIS (WHERE APPLICABLE)	NOTES
Tropical Cyclones	Section 4.3, Tropical Cyclones	None
Severe Weather	Section 3.2, Severe Storms Section 3.3 Winter Storms	None
Environmental	Section 3.3, Flooding Section 3.3 Wildfire Section 3.5 Drought Section 5.5 Winter Storms/Freeze Section 4.5 Extreme Heat Section 3.5 Geological	None
Terrorism	NA	This hazard is evaluated in the CEMP. The LMS WG did not include this manmade hazard in the update of the LMS.
Mass Migration/Civil Disturbance	NA	This hazard is evaluated in the CEMP. The LMS WG did not include this manmade hazard in the update of the LMS.
Biological	NA	This hazard is evaluated in the CEMP. The LMS WG did not include this manmade hazard in the update of the LMS.
Technological	Section 5.6 Cyber Incident	None

VIII. Sample Survey

Please provide the zip code of your home.

34465

Please select the community in which you live.

___ City of Crystal River
___ City of Inverness
✓ Citrus County

Which options below best defines your role in the community? (select all that apply)

✓ Resident
___ Business Owner
___ Landowner
___ Local official
✓ I am employed in Citrus County
___ Other

Please rate each of the following hazards on a scale of 1 (high concern) to 3 (no concern) indicating the level of threat each presents to your neighborhood or home.

Flooding	(1)	2	3
Severe Thunderstorm/Winds/Tornado	(1)	2	3
Hurricane/Tropical Storm	(1)	2	3
Wildfire	1	2	(3)
Sinkhole	1	2	(3)
Extreme Heat	1	(2)	3
Transportation-related incident	1	(2)	3
Cyber Security Threat	1	2	(3)
Hazardous Materials	1	2	(3)

Please list any additional hazards that present a threat to your neighborhood or home.

Do you carry flood insurance in addition to your homeowner/renter policy?

___Yes
_✓_No

Did you know that most standard homeowner's insurance policies do not cover rising water (flooding) or minor subsidence (sinkhole)?

_✓_Yes
___No

If you are a homeowner and a disaster damages your home, which of the following option would be the most likely option you would pursue?

___Repair/rebuild in the same location to current building code standards.
_✓_Sell my home/property and relocate.
___Not sure
___Not applicable, I rent my current residence.

Are you aware that you would have to comply with current state/local codes, ordinances, and laws that would affect rebuilding and recovery in the wake of a disaster?

_✓_Yes
___No

Do you have a plan for disaster recovery in place?

_✓_Yes
___No
___I don't know

Do you know who to contact when you home/business get damaged to find out about disaster relief, if permits are required?

_✓_Yes
___No
___I don't know

A number of activities can help in reducing our community's risks from natural hazards. In general, these activities fall under the following general categories. Please tell us how important you think it is to pursue each of these for your community. Please circle the appropriate response below.

Infrastructure Projects - This involves construction of "bricks & mortar" infrastructure or building improvements to eliminate or reduce threats from a hazard or to mitigate their impact. Examples could include new culverts, stormproof windows, etc.

- Very Important
- Important
- Somewhat Important
- Not Important

Preparedness, Coordination and Response Actions – This involves planned activities that help prepare or respond to hazardous events through coordination between different community operations.

- Very Important
- Important
- Somewhat Important
- Not Important

Education and Awareness Programs – This involves improving overall awareness about hazard risks and resources to protect, prevent and mitigate.

- Very Important
- Important
- Somewhat Important
- Not Important

Please specify any additional recommendations that you might have for Citrus County to improve identification, prioritization, and implementation of hazard mitigation actions (i.e. retrofit infrastructure, upgrade building codes)

Appendix D

Hold for Adoption Resolution

Appendix D

I. Adoption Resolution