

## **VIII. VULNERABILITY ASSESSMENT**

### **A. DEFINING VULNERABILITY ASSESSMENT**

A vulnerability assessment is the process of estimating disaster potential in terms of what is susceptible to damage. Typical measures include, the number of people living or working in a hazard-prone area; the amount and value of property; and the amount, value and emergency necessity of public buildings and facilities.

The objectives of the vulnerability assessment are to show how a population, facility, system or environmental feature is actually vulnerable to a hazard or even a combination of hazards. The assessment also allows one to gain an understanding of the types of impacts caused by specific hazards which actually result in physical damage or operational failure.

This Section evaluates the following: the number of people at risk; the value of property at risk; the number and function of exposed critical facilities; the danger of secondary hazards (hazards caused by the onset of the first event), including the danger from hazardous facilities located in the risk area; the danger of exposure to hazardous materials in the wake of the disaster; the potential demand for shelter; evacuation needs and capabilities; and potential environmental impacts. Vulnerability assessments need to consider growth trends and any existing development management policies that will affect growth. As density in an area increases, so does vulnerability.

This vulnerability assessment is divided into the following sub-sections:

- **B. Vulnerable Population Assessment**
  - **Total Population and Projections**
  - **Population Densities**
  - **Population by Age Group**
  - **Institutional Population**
  - **Transient Population**
  - **Special Needs Population**
  - **Population Vulnerable to Tropical Cyclones, Flood, and Wildfire**
  - **Population in Vulnerable Structures**
- **C. Vulnerable Structures Assessment**
  - **Overview**
  - **Identifying Structures**
  - **Loss (in the “Flood” Sub-section only)**
  - **Estimating Potential Loss**
  - **Analyzing Development Trends**
  - **Multijurisdictional Risk Assessment**

### **B. VULNERABLE POPULATION ASSESSMENT**

The major objective of the Local Mitigation Strategy is to protect people from the health and safety impacts of various disasters and to make communities safer. This objective is emphasized in the Strategy’s community guiding principal, “protection of health, welfare and safety of the people.” This part of the Vulnerability Assessment attempts to identify the vulnerable population in vulnerable areas. Analysis will include consideration of the special populations such as those living in nursing homes, other assisted living facilities and in correctional institutions.

The identification of these characteristics of the population will be influential in future decision making.

The objective of the vulnerability assessment is to show how a population, facilities and systems or environmental features are actually vulnerable to hazards. Levy County continues to maintain an inventory of facilities that cater to this group as well as those registered for planning purposes regarding special population. This inventory is constantly updated and maintained.

### 1. TOTAL POPULATION AND PROJECTIONS

The most up-to-date population estimates from the Bureau of Economic and Business Research are shown in the table below. The date of these estimations is April 1, 2009. Levy County total **permanent resident** population as of April 1, 2009 is 40,418.

City/Town	Population Estimates
Bronson	1,059
Cedar Key	900
Chiefland	2,200
Fanning Springs (Inside Levy County)	576
Inglis	1,684
Otter Creek	130
Williston	2,629
Yankeetown	766
Unincorporated	30,474
<b>TOTAL</b>	<b>40,418</b>

Source: Bureau of Economic and Business Research, University of Florida, Florida Estimates of Population, January 2010.

Table VIII -2 shows the population of the Levy County cities and towns and is projected to the year 2030. The population growth trend indicates that all cities and towns will experience limited growth due to the rural traits of Levy County, including environmental characteristics and limited transportation access.

Currently, of all the Levy County cities and towns, the Town of Otter Creek is the smallest, and the Town will remain the smallest until year 2030 with a population of 126 residents. Cedar Key, Inglis and Yankeetown are the coastal communities in Levy County that are located in the surge zone areas. Due to their coastal locations, this report has identified Cedar Key, Inglis and Yankeetown as the most vulnerable areas.

City/ Town	2009	2010	2015	2020	2025	2030
Bronson	1,059	1,057	1,087	1,130	1,171	1,207
Cedar Key	900	900	937	987	1,037	1,084
Chiefland	2,200	2,189	2,239	2,315	2,386	2,452
Fanning Spring	576	581	643	718	792	863
Inglis	1,684	1,680	1,755	1,851	1,943	2,027
Otter Creek	130	132	127	129	126	126
Williston	2,629	2,619	2,707	2,822	2,941	3,051
Yankeetown	766	764	790	830	870	904
Levy Un-incorporated	30,474	30,535	32,954	35,768	38,581	41,232
County Total	40,418	40,457	43,239	46,550	49,847	52,946

Source: Shimberg Affordable Housing Center University of Florida (<http://www.flhousingdata.shimberg.ufl.edu/>)

The Shimberg Affordable Housing Center, located at the University of Florida appears to have been extremely conservative in their analysis. If the conservative figures of the Shimberg Affordable Housing Center are incorrect and the increase in population is completed strictly on a percentage basis the increase in population is approximately 3% a year. This brings the projected total for Levy County in the year 2020, 48601 persons and in 2030, 55,102 persons. The benefit of mitigating hazards becomes blatantly apparent with an increase of population.

## **2. POPULATION DENSITY**

Levy County, whose land area is 1,118 square miles, is predominantly a rural county with a climate of moderate winter temperatures. The mild temperature of the County contributes to in-migration of retirement age people. The County experiences moderate rates of growth. With a population density of 36 persons/square mile, the County retains a rural nature. According to population density, Levy County is ranked 55 among the 67 counties in the state of Florida. The socio-economic characteristics of a region influence its residents significantly in the accessibility to health care needs.

## **3. POPULATION BY AGE GROUP**

Providing data on the health and age characteristics of Levy County will allow a clear picture of the emergency management issues related to the sick or elderly population. Counties with high populations of elderly person need to put specific protocols in place in the event of a disaster. These people will many times not have the income or the ability to safely evacuate before a disaster. Having a system for notification and evacuation is important to health dependent individuals.

Table VIII-4 (page VII-5) indicates that of the total Levy County 2009 population of 40,418, approximately 24.6 percent belong to the 0-19 years age Category. The 50-64 years age group consists of 22.1 percent of the total population; the 35-49 group consists of 17.8 percent; the 20-34 group consists of 15.9 percent; and the 65-74 group consists of 10.6 percent of the total population. Finally the 75 and older age group consists of 9.1 percent. We can assume that people over the age of 80 years, due to physical limitations, will need special care and arrangements during disasters.

Table VIII-5 (page VII-5) depicts the elderly population, those who are 65 years or older, of the cities and towns of Levy County. An analysis of the table indicates that the elderly population of the Levy County cities and towns will grow steadily, and Town of Otter Creek will have the smallest number of elderly which is indicative of its small resident population.

## **4. INSTITUTIONAL POPULATION**

Table VIII-3 indicates the number of persons living in various group quarters, 2000. It is also safe to assume that the population in group quarters will not increase significantly as the facilities such as nursing homes, hospitals and prisons have fixed number of beds and cell space. Table VIII-6 indicates that of the total Levy County population, 1.57 percent lived in various institutions or group quarters.

<b>Type of Institution</b>	<b>Number of Persons</b>
Correctional Institutions	370
Nursing Homes	138
Other Institutions	33
Total - Institutional Population	541
Total - Levy County Population	34,450
Percentage in Group Quarters (of the total County population)	1.57%

Source: US Census, 2000

If a disaster were to impact a prison population, a considerable amount of manpower and resources would be needed to respond. This would also reduce the County's ability to respond in other areas. Levy County needs to make sure that contingency plans and mutual aid agreements are in place to provide the manpower and facilities needed for mass transportation of prisoners if warranted.

**Table VIII-4. Population by Age Group, 2009**

Area	Total Population	Age 0-19	Age 0-19 Percent	Age 20-34	Age 20-34 Percent	Age 35-49	Age 35-49 Percent	Age 50-64	Age 50-64 Percent	Age 65-74	Age 65-74 Percent	Age 75+	Age 75+ Percent
Bronson	1,059	309	29.2%	263	24.8%	184	17.4%	193	18.2%	59	5.6%	51	4.8%
Cedar Key	900	112	12.4%	79	8.8%	94	10.4%	317	35.2%	192	21.3%	106	11.8%
Chiefland	2,200	726	33.0%	393	17.9%	349	15.9%	332	15.1%	142	6.5%	258	11.7%
Fanning Springs	576	114	19.8%	96	16.7%	63	10.9%	223	38.7%	42	7.3%	38	6.6%
Inglis	1,684	344	20.4%	231	13.7%	289	17.2%	397	23.6%	216	12.8%	207	12.3%
Otter Creek	130	15	11.5%	10	7.7%	32	24.6%	55	42.3%	8	6.2%	10	7.7%
Williston	2,629	748	28.5%	490	18.6%	448	17.0%	408	15.5%	227	8.6%	308	11.7%
Yankeetown	766	95	12.4%	45	5.9%	101	13.2%	245	32.0%	176	23.0%	104	13.6%
Levy Un-Incorporated	30,474	7,461	24.5%	4,816	15.8%	5,622	18.4%	6,758	22.2%	3,217	10.6%	2,600	8.5%
<b>TOTAL</b>	<b>40,418</b>	<b>9,924</b>	<b>24.6%</b>	<b>6,423</b>	<b>15.9%</b>	<b>7,182</b>	<b>17.8%</b>	<b>8,928</b>	<b>22.1%</b>	<b>4,279</b>	<b>10.6%</b>	<b>3,682</b>	<b>9.1%</b>

Source: Shimberg Affordable Housing Center University of Florida (<http://www.flhousingdata.shimberg.ufl>)

**Table VIII-5. Elderly Population Projections, 2009-2030**

City/ Town	2009	2010	2015	2020	2025	2030
Bronson	110	109	132	165	181	196
Cedar Key	298	304	386	485	538	588
Chiefland	400	402	439	497	566	625
Fanning Springs	80	79	124	204	264	338
Inglis	423	426	473	533	641	729
Otter Creek	18	18	20	23	23	21
Williston	535	534	577	635	713	775
Yankeetown	280	284	339	410	473	525
Levy Un- Incorporated	5,817	5,892	6,972	8,331	10,076	11,637
<b>TOTAL</b>	<b>7,961</b>	<b>8,048</b>	<b>9,462</b>	<b>11,283</b>	<b>13,475</b>	<b>15,434</b>

Source: Shimberg Affordable Housing Center University of Florida (<http://www.flhousingdata.shimberg.ufl>)

Below is a table that lists the average daily population in the County detention facilities. This table does not include federal prisons. As indicated in Table VIII-6, of the total number of inmate population in the state of Florida in 2008, 323 inmates are in Levy County detention centers.

Area	Number of Inmates in County Detention Facilities 2008
Citrus County	186
Hernando County	455
Levy County	323
Marion County	4,202
Sumter County	8,912
Withlacoochee Region	14,078
Florida	119,396

Source: BEBR, Florida Statistical Abstract 2008, Table 1.80 Number counts as of April 1, 2007

Taking a closer look at the current 2007-2008 populations in the correctional system the local prison capacity to consist of 126 inmates and the Sheriff's Office jail and 280 all-female inmates at the Levy County Forestry Camp. Because the protocols are different for federal prisons, this County based LMS would most likely not be identifying specific mitigation strategies for these facilities. Levy County does not contain any federal Correctional Institutions.

## **5. TRANSIENT POPULATION**

The migrant and seasonal workers in Levy County tend to work during the months of June and July, which are the first two months of the hurricane season. It is safe to assume that these migrant and seasonal workers live in temporary or short term housing and/or group quarters. The short term housing generally tends to be manufactured housing or RV's which are very susceptible to high winds and thus are not very safe to be occupied during severe storms and hurricanes. Communities should take action now to prevent possible threats to lives and damage to property during natural disasters. The 2009 Comprehensive Emergency Management Plan lists this population at 750 persons.

## **6. SPECIAL NEEDS POPULATION**

The Levy County Comprehensive Emergency Management Plan 2008 lists 170 special needs people in the County. The County is directed to provide special needs shelter space for the special needs population. The official Florida Division of Emergency Management definition of special needs people are those who are "electrically dependent". This would refer to those who need an electric air pump or condenser to assist breathing or other electric device. People who are on kidney dialysis are considered to have acute medical needs and should evacuate to a medical facility. In the event of a real evacuation the special needs shelters will be announced on the radio and most people under any type of medical care will consider themselves to have "special needs." Based on the trends toward an older population, increased medical capability is needed.

This section of Chapter VIII analyzes the populations that are at risk and are vulnerable to natural hazards. In this study, the term *special population* is defined as those persons who are disabled, those living in long term care facilities, and those living in group quarters. The special population is assumed to be special needs persons who live in long-term care facilities such as health care facilities - hospitals, clinics, nursing homes, Assisted Living Facilities (ALF's), shelters, and other group quarters that generate additional concern in an emergency situation. An analysis of these segments of the community's

population enables local governments to better understand how they can develop programs to save lives of those special needs persons, protect property, and ensure their safety.

### Nursing Homes

Some nursing homes may be able to double as medical facilities in storm times, but the quantity of equipment in a nursing home will be much lower than a hospital. Many of the same protocols as the above medical facilities should be included in a nursing home plan. The major difference is the lack of responsibility to the general public. The nursing homes will be most concerned with their current residents and any additional medical supplies they can provide to the hospitals.

Included below is a table describing the nursing home population in Levy County and in the Withlacoochee Region. In 2003, there were 3,563 licensed community nursing home beds in the Withlacoochee Region and, of these, Levy County had 180 beds or 6.24 percent (Table VIII-7).

County	Number of Beds
Citrus	1,081
Hernando	660
Levy	180
Marion	1,372
Sumter	270
Withlacoochee Region	3,563

Source: BEBR, Florida Statistical Abstract, 2008. Table 2.19

### Health Care Agencies

The following health care agencies will provide medical care in an emergency situation:

- As the primary agency, the Levy County Health Department will give coordination and direction to ESF 8 activities from the EOC. The Levy County Environmental Health Unit will coordinate and direct environmental health activities.
- Levy County EMS will continue to provide services to the general public and disaster relief workers. Meridian Behavioral Health Care, Inc. will perform crisis counseling activities, to include Critical Incident Stress Debriefing (CISD) of emergency response workers.
- The American Red Cross - Coast to Coast Chapter will assist in the coordination of the nursing and mental health staff providing assistance to disaster victims as a support agency for mass care (ESF 6).
- The Nature Coast Regional Hospital, located in Williston, will receive and treat victims of disaster within its abilities. This is the only full-scale hospital in Levy County.

Medical facilities will be one of the most difficult of all the facilities to evacuate. Presumably persons who reside in hospitals are not capable of evacuating without assistance. The assistance may range anywhere from wheelchairs to oxygen and IVs. Therefore, all medical facilities need to have their own protocols in case they are called upon to evacuate. There is only one hospital facility in Levy County - Nature Coast Regional Hospital. The medical facility is located in Williston and would experience a situation related to other inland county hospitals. The facility would be under duress from the overload of patients coming from the areas closer to the coast and from patients needing immediate care from

traveling accidents. All of the medical facilities in the County may be used in a host capacity if a hurricane threatens the Tampa Bay Region, so having a plan is imperative.

## 7. POPULATION VULNERABLE TO TROPICAL CYCLONE, FLOOD, AND WILDFIRE

In 2010, the Statewide Regional Evacuation Study Program (SRESP) was completed by the Withlacoochee Regional Planning Council, as well as all other Florida Regional Planning Councils. The study included an analysis of population-at-risk (based on 2006 small area data for site-built homes and mobile/manufactured homes) of tropical cyclone, wildfire, and flood. The population-at-risk to tropical cyclone was calculated based on the population in evacuation zones. Evacuation zones are determined by County Emergency Management and are typically drawn in line with surge zones, which correspond to tropical cyclone category. The Table below reveals the SRESP findings.

**Table VIII-8. Population-at-Risk from Tropical Cyclones by Evacuation Level, 2010**

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Evacuation Zone E
Site-built Homes	1,778	1,568	620	314	1,688
Mobile/Manuf. Homes	1,087	1,249	683	364	1,471
TOTAL	2,865	2,817	1,304	678	3,158

Source: Statewide Regional Evacuation Study Program (SRESP)

**Table VIII-9. Population-at-Risk from Tropical Cyclones by Evacuation Level, 2015**

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Evacuation Zone E
Site-built Homes	1,948	1,719	680	344	1,849
Mobile/Manuf. Homes	1,191	1,369	749	399	1,611
TOTAL	3,140	3,088	1,429	743	3,461

Source: Statewide Regional Evacuation Study Program (SRESP)

The population-at-risk was determined using the 2006 small area data (TAZs) to estimate the population within the flood zones within each TAZ. Estimates and projections of the population-at-risk for flood for 2010 and 2015 are presented on Table VIII-10.

**Table VIII-10. Population-at-Risk from Flooding, 2010 – 2015**

	Site Built Population 2010	Mobile Home Population 2010	Site Built Population 2015	Mobile Home Population 2015
100-Year Floodplain	5,838	3,671	6,399	4,023
500-Year Floodplain	28	31	30	34

Source: Statewide Regional Evacuation Study Program (SRESP)

The population-at-risk was calculated using the small area data (TAZs) to determine the population within the Wildland Interface, if identified, within each TAZ. The estimates for the population-at-risk for the Wildland Interface within each county for 2010 and 2015 are presented on Table VIII-11.

**Table VIII-11. Population-at-Risk from Wildfire, 2010 – 2015**

	Site Built Population 2010	Mobile Home Population 2010	Site Built Population 2015	Mobile Home Population 2015
100-Year Floodplain	4,482	5,917	4,912	6,484
500-Year Floodplain	16,460	15,057	18,040	16,503

Source: Statewide Regional Evacuation Study Program (SRESP)

**8. POPULATION IN VULNERABLE STRUCTURES**

Table VIII-12 and Table VIII-13 analyzes housing unit types for cities and towns in Levy County. In 2000, Inglis had the largest number of mobile home units at 359, followed by Bronson and Chiefland and accounting for 194, and 158 respectively. Mobile home properties are the most vulnerable during a storm. These figures are taken from the 2000 Census, the last complete census performed nation-wide. Federal workers are in the process of completing the Census for decennial 2010 though this information will not be made available during the time horizon of this plan rewrite. The 2005-2009 American Community Survey 5-Year Estimates for Housing Types are only provided for the County as a whole in Table VIII-13.

<b>Table VIII-12. Housing Types from Census 2000 data</b>										
Housing Units by Type (All Units) , 2000 - Summary										
Place	Single Family (1 att. / detach.)	Multi-family (2 or more)	Mobile Home	Other	Total	Single Family 1 att. / detach. (%)	Multi Family 2 or More (%)	Mobile Home (%)	Other (%)	Total
Levy County	7,309	629	8,530	102	16,570	44.1	3.8	51.5	0.6	100
Bronson	212	30	194	0	436	48.6	6.9	44.5	0	100
Cedar Key	515	89	87	2	693	74.3	12.8	12.6	0.3	100
Chiefland	547	224	158	0	929	58.9	24.1	17	0	100
Fanning Springs (part)	50	41	153	3	247	20.2	16.6	61.9	1.2	100
Inglis	358	75	359	7	799	44.8	9.4	44.9	0.9	100
Otter Creek	46	0	23	0	69	66.7	0	33.3	0	100
Williston	717	88	107	0	912	78.6	9.6	11.7	0	100
Yankeetown	407	0	38	26	471	86.4	0	8.1	5.5	100
Levy-Unincorporated	4,457	82	7,411	64	12,014	37.1	0.7	61.7	0.5	100

<b>Table VIII-13</b>									
Housing Types from 2005-2009 American Community Survey 5-Year Estimates									
Housing Units by Type (All Units) , 2005-2009 - Summary									
Single Family (1 att. / detach.)	Multi-family (2 or more)	Mobile Home	Other	Total	Single Family 1 att. / detach. (%)	Multi Family 2 or More (%)	Mobile Home (%)	Other (%)	Total
8,599	998	8,464	44	18,105	47.6	5.5	46.7	0.2	100

Mobile homes or modular homes are spread throughout the County and are generally considered unsafe when winds reach 75 mph. According to the 2000 Census there are 8,530 mobile homes in Levy County. Assuming an average household occupancy rate of 2.3 people we are considering the safety of approximately 19,500 people. Most of these people will leave the area before a hurricane hits Levy County. Evacuation rates depend mainly on the severity of the storm. Additional information on behavioral characteristics during hurricane evacuations can be found in the *Cedar Key Basin Hurricane Evacuation Study*, (Army Corps of Engineers, 1996) as well as the *Statewide Regional Evacuation Study Program* (FDEM, 2010).

Mobile home structures have a high risk for destruction in a hurricane if erected on or near the coast. Mobile home residents, due to a lack of structural support, are normally encouraged to evacuate before residents of site-built homes and businesses. Because of their early evacuation, the transportation analysis will need to take into account the effect these residents have on the general process. The mobile home parks definition used for this document is the areas that have permanent residents, not including RV seasonal residents. The assumption is made that those residents who have mobility will, in fact, leave the area before the storm approaches. A listing of the mobile home parks for Levy County is shown on Table VIII-15.

**Table VIII-14. Occupied Residential Structures Built Before and After 2002 Florida Building Code**

	Built before 2003	Built in 2003 or after	% (of Total) Built before 2003	% (of Total) Built in 2003 or after
Single-Family	6,299	1,194	37.24%	7.06%
Multi-Family	284	28	1.68%	0.17%
Mobile	7,938	1,172	46.93%	6.93%

**Source: Levy County Property Appraiser, 2010**

Vulnerable structures should also include older, sub-standard buildings. As stated earlier in the Hazard Identification and Profile section, the Florida Building Code changed significantly in 2002. These changes included higher wind loads. It may be assumed that structures built before 2003 were based on the older building code, and therefore more vulnerable to high winds from tropical cyclones than newer structures. Table VIII-14 is a summary of the occupied residential structures that were built before and after the revised 2002 Florida Building Code. This dataset does not include Vacant Residential, parcels with no structures, or recorded years. Population living in these older structures may be considered more vulnerable.

An excellent project that could be undertaken by the Levy County municipalities or other jurisdiction is the establishment of location shelters. Providing a shelter to the populations in these mobile homes that may not have predicted their danger and needs could save lives. A private-public partnership could use funds from mitigation projects and in-kind services from local contractors and community groups. The mitigation funding would provide the supplies while the community groups provide the labor. This type of project could be modeled after the "Habitat for Humanity" protocol. By including local groups such as the American Red Cross, the Boy Scouts of America and local churches that participate in disaster recovery, the in-kind services would surely outweigh the federal funds.

We can make the assumption that when a residential structure is damaged more than 50% of its value it will not be habitable. Making this assumption leads to other concerns regarding evacuation, sheltering and long-term temporary housing. Evacuation issues for residents of mobile homes consist mainly of

communicating the message to evacuate early. The most important sheltering issues are shelter capacity and structural integrity. One of Levy County's listed projects is for a study of emergency shelters. Long-term temporary housing issues should be addressed in future issues of the LMS.

Table VIII-15. Levy County Mobile Home Parks

NAME	ADDRESS	CITY	ZIP CODE	MH SPACES	ID_Number
Dan's Mobile Home Park Inc	1000 HWY 40 E	Inglis	34449	13	1
Buddy's Lakeside Park I	10050 HWY 40 E	Inglis	34449	10	2
Breezy Acres Campground	10050 NE 20th Ave	Chiefland	32626	1	3
Cannon Oaks Mobile Home Park	10251 HWY 40 E	Inglis	34449	12	4
Fin and Feather Campground	10930 SE 201 St	Inglis	34449	1	5
Sunset Isle Trailer Park	11850 SW Hwy 24	Cedar Key	32625	14	6
Rainbow Country RV campground	11951 SW Shiloh Rd	Cedar Key	32625	8	7
Manatee Springs Mobile Home Park	12570 NW 82th Ct	Chiefland	32626	13	8
Snowbird Nest	14750 NE Hwy Alt. 27	Williston	32696	8	9
Parc Place	17250 NE 60th St	Williston	32696	13	10
Park Blevins MHP	3550 NW 120th St	Chiefland	32626	14	11
Dumal Park	394 Dumal Place	Inglis	34449	15	12
Shady Oaks at Otter Creek	442 SW 3rd St	Otter Creek	32683	1	13
Odyssey Campground	6510 SW 101 Terrace	Cedar Key	32625	13	14
Cedar Villas	6551 NW 135th Lane	Chiefland	32626	8	15
B's Cypress Marina & RV campground	6621 Riverside Drive	Yankeetown	34498	2	16
Twisted Oaks Estates	7050 NW 140th St	Chiefland	32626	13	17
Waccassassa Fishing Club Store LC	7951 SE 5th Ave	Gulf Hammock	32639	50	18
Village Pines Mobile Park	8150 SE 140th Lane	Inglis	34449	25	19
Bronson Heights Mobile Home	9770 NE Alt 27	Bronson	32621	8	20
Promise Acres Inc	United States Highway 27	Williston	32696	25	21
Driftwood Mobile Home Park	HWY 40 E	Inglis	34449	24	22
M.E. McDougal Inc. MHP	NW 90th Court	Fanning Springs	32693	19	23

## C. VULNERABLE STRUCTURES ASSESSMENT

In the **overviews** of each hazard below, the types of structures and infrastructure affected by each respective hazard and their potential impacts are generally described. In the **Identifying Structures** sections, Critical Facilities, Hazardous Facilities, and major roads located in vulnerable areas are listed. In order to identify all other vulnerable structures and **estimate potential losses**, data from the Levy County Property Appraiser for 2010 was obtained and analyzed. In estimating potential losses, factors that should be considered include replacement values of structures and contents, percent damage, and structure use and function loss. According to FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001), loss estimation tables may be used to determine the extent of damages, or percent damage. However, not all hazards have loss estimation tables. For those hazards without current loss estimation tables, it is suggested that the full value of the assets are calculated. For the purposes of this Plan update, the **full value of assets** (hereafter referred to as the **TOTAL Value**) is equal to the sum of just values and contents values.

Models used to calculate potential losses exist, such as the TAOS model and FEMA's HAZUS. However, both of these models utilize outdated data, property and census data from the year 2000 as well as older SLOSH model data.

The TAOS data was updated in March of 2004, creating a tool to view the potential for damage from a variety of hazards. The TAOS data used 2000 tax records to identify a monetary value of property that could be damaged or destroyed. It also employed the older SLOSH model with additional analysis of water and wind damage. By combining several different models for calculating potential damage, a strong scientific calculation was developed.

FEMA's HAZUS software is a powerful risk assessment methodology for analyzing potential losses from floods, hurricane winds, and earthquakes. In HAZUS, current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after, a disaster occurs. Potential loss estimates analyzed in HAZUS include:

- Physical damage to residential and commercial buildings, schools, critical facilities, and infrastructure
- Economic loss, including lost jobs, business interruptions, repair and reconstruction costs
- Social impacts, including estimates of shelter requirements, displaced households, and population exposed to scenario floods, earthquakes, and hurricanes.

New versions of HAZUS are continuously released, especially as operating systems are updated, i.e. Windows XP to Windows Vista to Windows 7. HAZUS was not used for this update primarily because the current version, as well as the previous version, was not compatible with current operating systems and/or exceeded hardware capabilities. When the TAOS model data is updated, or when FEMA's HAZUS data is updated, use of these models and data will be considered for the next Levy County LMS update. **In this Plan, current (2010) data from the Levy County Property Appraiser's Office will be used to estimate potential losses.**

From the 2010 Levy County Property Appraiser dataset, features, such as year built, number of buildings, use category (corresponding with the Department of Revenue categories), building values, and just values were studied. The Table below lists the number of buildings, the just values, the contents values, and the

**TOTAL Values** (just values + contents values) per use category. Contents values are a function of building values by use category, as taken from the table, “Contents Value as Percentage of Building Replacement Value” in FEMA’s *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001). It was assumed that parcel data lacking building numbers as well as Vacant Residential, Vacant Commercial, and Vacant Industrial use categories had no contents, thus a contents value of \$0. Using this current parcel data and the location of vulnerable areas presented in the Hazards Profiles from the previous section, vulnerable structures are identified and potential losses are calculated.

**Table VIII-16 Total Levy County Structures and Values by Use Category**

Use Category	# of Buildings	Just Value \$	Contents Value \$	TOTAL Value \$
<b>Agriculture</b>	2,096	1,724,982,963	159,157,026	<b>1,884,139,989</b>
<b>Residential-Single-Family</b>	7,493	1,268,022,025	266,310,061.5	<b>1,534,332,087</b>
<b>Residential-Multi-Family</b>	312	53,184,376	25,459,253	<b>78,643,629</b>
<b>Residential- Mobile Homes</b>	9,110	428,991,548	112,238,423.5	<b>541,229,972</b>
<b>Commercial</b>	732	212,555,285	95,844,727.5	<b>308,400,013</b>
<b>Industrial</b>	99	21,982,640	17,219,904	<b>39,202,544</b>
<b>Institutional</b>	193	64,950,204	45,537,504	<b>110,487,708</b>
<b>Government</b>	65	420,353,801	30,287,066.5	<b>450,640,868</b>
<b>Misc. Infrastructure</b>	19	16,135,976	3,454,465.5	<b>19,590,442</b>
<b>TOTAL</b>	<b>20,119</b>	<b>4,211,158,818</b>	<b>755,508,431.5</b>	<b>4,966,667,250</b>

A matrix was created that labels the potential vulnerability of each of the hazards as High (H), Medium (M), Low (L), or None (N) on the communities and county at large. The following table was developed based on local knowledge and historical occurrence of the jurisdiction’s vulnerability of the identified natural and manmade hazards. Jurisdictional Vulnerability is further discussed within each hazard section.

<b>VIII-17. Jurisdictional Vulnerability</b>									
	Levy-Un incorporated	Bronson	Cedar Key	Chiefland	Fanning Springs	Inglis	Otter Creek	Yankeetown	Williston
Tropical Cyclones	H	M	H	M	H	H	M	H	M
Floods	M	M	H	M	H	H	H	H	L
Wildfire	M	M	L	M	M	M	M	L	L
Sinkholes	M	M	L	M	L	M	L	M	M
Coastal Erosion	L	N	H	N	N	N	N	L	N
Drought/Extreme Heat	M	M	M	M	M	M	M	M	M
Tornadoes	M	M	M	M	M	M	M	M	M
Severe Winter Storms/ Freeze	L/M	L/M	L/M	L/M	L/M	L/M	L/M	L/M	L/M
Dam Failure	L	N	N	N	N	L	N	L	N

- **H** = High- Likely to experience threat, effect, or reoccurrence of event.
- **M** = Moderate- Average to better than average likelihood of experiencing threat, effect or reoccurrence of event.
- **L** = Low- Below average likelihood of experiencing threat, effect or reoccurrence of event.
- **N** = Very little or no likelihood threat will occur.

## 1. TROPICAL CYCLONES

### a. Overview

**Types of structures and infrastructure affected by tropical cyclones include:** all structures, mobile homes, poorly constructed homes, non-elevated homes, telecommunications, electrical utilities, sewage systems, potable water, roadways, waterways, airports, agriculture, livestock, fisheries, economic disruptions, environmental damage.

Tropical cyclones will negatively affect Levy County with a variety of **impacts** (Tropical cyclone impacts listed from NOAA's NHC are also discussed in the previous section, Hazards Profiles.):

- Severe coastal flooding
- Significant building damage from flooding and from high winds. Roofing is particularly susceptible to damage
- Human and animal deaths and injuries from flooding and from windblown debris
- Extreme disruptions to the transportation networks and to communications
- Requirements for sheltering, as well as humanitarian supplies such as food, water, blankets, first aid, etc.
- Termination of utility services, especially loss of electricity and contamination of the drinking water supplies
- Extraordinary financial impact for the immediate response as well as for long-term recovery
- Damage to critical infrastructure that requires long-term recovery.

The greatest damages from hurricanes come in the form of flooding and high winds, with flooding being responsible for far more damages to life and property. Roads in low-lying coastal areas have the potential to be submerged at various points (such as SR 24 and CR 347 in west Levy County). Flooding of US Hwy 19 from the surge of a major hurricane would seriously hinder evacuation efforts from counties to the south. Inundation of roadways not only reduces evacuation capabilities but also erodes emergency response capabilities.

Critical facilities in the County should be inspected by and hardened to withstand high winds even though located in the center of the state. Other facilities such as mobile homes are of great concern and should also be mitigated where possible. High winds could occur throughout the County making mobile homes a general county-wide vulnerability. The design and materials used to construct mobile homes and other manufactured housing structures make these housing types particularly vulnerable to destruction by high winds. These buildings generally have flat sides and ends and anchoring systems that cannot withstand the strength of high winds. Mobile homes are also more susceptible from damage to flying debris. Due to these facts of vulnerability, the National Weather Service recommends that all mobile home residents evacuate in the event of a hurricane.

### b. Identifying Structures

An analysis of the critical facilities located in the Coastal High Hazard Area (CHHA) as delineated by the Category 1 Hurricane Surge Zone reveals several critical facilities located in the CHHA, including:

Cedar Key

City Hall / Fire Department  
Police Department  
Cedar Key School  
Wastewater Treatment Plant and Lift Stations  
Water Treatment Plant  
Water Supply Well

Yankeetown

Town Hall / Fire Department  
Water Plant and Wells  
Yankeetown School

These facilities should be considered, when possible, for hazard mitigation improvements based on their level of importance to the community. Generally, any facility in identified vulnerability areas should be considered for mitigation improvements.

Small portions of Highways 19 and 121 are located in the Category 1 Surge Zone. There are also several hazardous materials facilities:

Cedar Key

Tri-County Oil Distributors  
Cedar Key Special Water and Sewerage Dis. 14266  
Cedar Key Special Water and Sewerage Dis. 14297

Yankeetown

BellSouth Communications

As stated earlier, the entire County is vulnerable to high winds. However, mobile/manufactured structures, and structures built before the Florida Building Code was updated in 2002 may be more vulnerable to high winds.

In addition to the facilities identified above, there are many structures and property within the tropical cyclone surge zones. There are also many structures that may be more vulnerable to high winds. Below are tables with the number of buildings and total values (just values + contents) within the vulnerable surge zones, and which may be more vulnerable to high winds. The data is from the Levy County Property Appraiser's Office (2010) and is inclusive of vacant structures. However, contents value of vacant structures was assumed to be \$0.

**c. Estimating Potential Loss**

According to FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001), there are no loss estimation tables to calculate extent of damage for surge or high winds from tropical cyclones. Therefore, the TOTAL Values of vulnerable areas categorized by land use were calculated to estimate potential loss.

**Table VIII-18. Tropical Cyclone Surge Vulnerability**

Use Category	Tropical Storm Surge		Up to Category 1 Surge		Up to Category 2 Surge		Up to Category 3 Surge		Up to Category 4 Surge		Up to Category 5 Surge	
	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value
<b>Agriculture</b>	25	102,218,498	58	144,178,532	137	285,952,327	197	388,463,500	247	455,271,038	382	536,339,548
<b>Residential-Single-Family</b>	1,358	354,308,952	1,422	367,407,162	1,746	430,529,235	1,848	449,490,575	1,989	476,485,801	2,218	519,554,397
<b>Residential-Multi-Family</b>	232	57,221,190	232	57,221,190	232	57,221,190	232	57,221,190	232	57,221,190	232	57,221,190
<b>Residential-Mobile Homes</b>	226	12,880,625	300	17,092,034	859	47,226,536	1,209	64,707,880	1,514	79,545,000	1,890	101,550,254
<b>Commercial</b>	136	49,005,944	145	51,076,594	159	59,558,296	165	61,450,371	166	62,860,195	180	65,900,889
<b>Industrial</b>	12	4,140,559	13	4,257,881	23	7,102,084	24	7,215,025	24	7,215,025	24	7,215,025
<b>Institutional</b>	24	9,968,586	24	9,968,586	27	11,354,224	32	13,839,809	33	14,151,499	35	16,812,053
<b>Government</b>	17	98,949,592	16	109,234,203	18	114,523,766	19	116,417,940	19	119,390,374	20	124,222,504
<b>Misc. Infrastructure</b>	9	11,178,411	9	11,395,901	10	11,940,119	10	11,965,098	10	12,095,354	10	12,198,430
<b>TOTAL</b>	<b>2,039</b>	<b>699,872,357</b>	<b>2,219</b>	<b>771,832,083</b>	<b>3,211</b>	<b>1,025,407,777</b>	<b>3,736</b>	<b>1,170,771,387</b>	<b>4,234</b>	<b>1,284,235,475</b>	<b>4,991</b>	<b>1,441,014,289</b>

**Table VIII-19. Tropical Cyclone Wind Vulnerability by Age of Structures**

Use Category	Structures Built Before 2003		Structures Built in 2003 or After		TOTAL	
	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value
<b>Agriculture</b>	<b>1,671</b>	<b>538,672,415</b>	425	170,397,224	2,096	709,069,639
<b>Residential-Single-Family</b>	<b>6,299</b>	<b>899,547,039</b>	1,194	231,911,501	7,493	1,131,458,540
<b>Residential- Multi-Family</b>	<b>284</b>	<b>68,194,331</b>	28	10,246,800	312	78,441,131
<b>Residential- Mobile Homes</b>	<b>7,938</b>	<b>432,014,277</b>	<b>1,172</b>	<b>107,119,950</b>	<b>9,110</b>	<b>539,134,227</b>
<b>Commercial</b>	<b>658</b>	<b>246,906,135</b>	74	35,348,057	732	282,254,192
<b>Industrial</b>	<b>86</b>	<b>31,623,677</b>	13	5,128,010	99	36,751,687
<b>Institutional</b>	<b>178</b>	<b>86,572,204</b>	15	17,043,888	193	103,616,092
<b>Government</b>	<b>63</b>	<b>61,110,617</b>	2	551,626	65	61,662,243
<b>Misc. Infrastructure</b>	<b>19</b>	<b>15,902,921</b>	NA	NA	19	15,902,921
<b>TOTAL</b>	<b>17,196</b>	<b>2,380,543,614</b>	<b>2,923</b>	<b>577,747,056</b>	<b>20,119</b>	<b>2,958,290,670</b>

**d. Analyzing Development Trends**

Areas vulnerable to surge, including Fanning Springs, Yankeetown, Inglis, and Cedar Key, have had the largest proportionate population growth since the 2000 census. These municipalities, as well as the County's other municipalities will continue to grow in population and density. Generalized future land uses located within surge areas include Agriculture, Conservation, Recreation, Public, Commercial, Industrial, and Residential. However, the greatest amount of land area vulnerable to surge has Conservation (County), Agriculture/Low Density Residential (County) and Forestry/Rural Residential (County) future land use designations (see Map VIII-1 through VIII-9).

As stated earlier, the entire County is vulnerable to high winds from tropical cyclone. Table VIII-19 above describes the structures by type of existing land uses that may be more vulnerable to high winds (those built before the revised 2002 Florida Building Code). The greatest portion of structures built before the 2002 FBC are residential structures.

**e. Multi-Jurisdictional Risk Assessment**

The tables below describe the structures and values, by municipality, that are vulnerable to surge and high winds from tropical cyclone. Jurisdictions most vulnerable to surge include Fanning Springs, Yankeetown, Inglis, and Cedar Key.

**Table VIII-20. Structures at Risk in Surge by Category Storm and Jurisdiction**

Jurisdiction	# Bldgs in Tropical Storm	TOTAL Value in Tropical Storm	# Bldgs in Cat 1	TOTAL Value in Cat 1	# Bldgs in Cat 2	TOTAL Value in Cat 2	# Bldgs in Cat 3	TOTAL Value in Cat 3	# Bldgs in Cat 4	TOTAL Value in Cat 4	# Bldgs in Cat 5	TOTAL Value in Cat 5
Bronson	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cedar Key	827	252,498,894	830	252,498,894	830	252,498,894	830	252,498,894	830	252,498,894	830	252,498,894
Chiefland	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fanning Springs	5	5,553,300	5	5,553,300	5	5,553,300	5	5,553,300	5	5,553,300	6	6,934,707
Inglis	441	88,005,901	441	88,005,901	662	110,089,519	822	121,124,385	823	121,596,449	823	121,596,449
Otter Creek	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Williston	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Yankeetown	451	101,160,680	462	104,409,710	490	109,230,571	490	109,230,571	490	109,230,571	490	109,230,571

**Table VIII-21. Structures at Risk to Wind by Jurisdiction**

Jurisdiction	# Mobiles Built Before 2003	TOTAL Value Mobiles Built Before 2003	# Mobiles Built in 2003 or After	TOTAL Value Mobiles Built in 2003 or After	# All Other Built Before 2003	TOTAL Value All Other Built Before 2003
Bronson	167	7,179,535	17	1,010,317	286	79,013,188
Cedar Key	41	4,080,077			733	229,563,336
Chiefland	155	5,547,620	11	699,119	788	233,669,042
Fanning Springs	163	8,881,445	29	2,713,322	88	34,698,422
Inglis	346	15,059,147	18	1,660,865	420	97,891,545
Otter Creek	32	939,570	1	59,337	63	11,676,623
Williston	115	4,192,529	6	371,704	878	248,553,246
Yankeetown	49	1,740,129	1	57,141	408	99,567,972

## 2. FLOODS

### a. Overview

**Types of structures and infrastructure affected by floods include:** All structures, mobile homes, poorly constructed homes, non-elevated homes, telecommunications, electrical utilities, sewage systems, potable water, roadways, waterways, airports, agriculture, livestock, fisheries, economic disruptions, environmental damage.

Floods will negatively affect Levy County with a variety of **impacts:**

- People, facilities, and infrastructure located within the floodplains are susceptible to flood impacts.
- The County is in the high-risk area for hurricanes and could expect to face a flooding event resulting in long-term, significant flooding. The impacts included severe property damage, severe damage to cars and other equipment, water system contamination, wastewater treatment disruptions, civil unrest, and evacuation issues.
- Flooding has caused traffic accidents and congestion that has resulted in short-term impacts on the transportation infrastructure.
- High dollar impact to uninsured property from floods. Most homeowner insurance policies do not cover floods and citizens don't always opt to purchase National Flood Insurance policies.
- Property damaged by a flooding event often results in a mold infestation that can require lengthy remediation. The mold can also create health issues for people in contact with it.
- Responders are often put at risk during flood events as they respond to calls for assistance. Their risks can range from performing dangerous rescue missions for stranded citizens to sickness due to exposure to inclement weather. Most responders, however, are not at a great health and safety risk from flooding events.
- Flooding is often the result of fast moving, severe storm systems and can include tornadoes, lightning, straight-line winds, and hail. The impact from these related hazards will compound the response and recovery issues related directly to flooding, as well as damages and injuries.

Some of the dangers of flooding are inherent with the location of residents in rural areas or at waterfront locations. Emergency vehicles cannot navigate through flooded roadways to the elderly and sick, living on sub-standard roads. Persons without trucks and other heavy-duty vehicles cannot get out to the shelters if they wait too long. This combination can increase the potential for casualties from the storm. Persons in areas with difficult vehicle access or vulnerable locations should be urged to evacuate early.

Another aspect of flooding is that it tends to remain after the storm has passed. Once a storm has passed, a community cannot return to normal if there are a large number of damaged homes and other structures. Evacuation shelters are not designed for extended stays, as many of them serve two functions, such as school and shelter. Therefore, a long-term sheltering strategy is needed in addition to a long-term recovery strategy. By pre-identifying funding to repair homes and businesses, a community can begin to recover more quickly. Plans for long term housing exist in the Disaster Housing Plan for Levy County.

With the onset of a storm there is danger, as mentioned previously, from both surge and freshwater flooding. Because roadways are the main concern for residential evacuation, the elevation of the roads along with the depth of water that can possibly occur is important. This information can provide the emergency manager with a tool to order evacuations in a timely manner. Evacuation routes that will

easily deteriorate due to surge or freshwater flooding may be subject to early closures and rerouting. Many of these risks can be mitigated through simple pre planning and preparation.

## **b. Repetitive Loss**

### **Defining Repetitive Losses**

The National Flood Insurance Program (NFIP) defines repetitive loss properties as structures within the flood insurance program that have experienced two or more insurance claims of at least \$1000 in any given 10 year period since 1978. In addition to the NFIP defined repetitive losses, adjacent and nearby properties are also considered to be in repetitive loss areas. Historical information and experience can help to define the extent of repetitive loss areas and indicate areas outside the floodplain which are prone to repetitive damage from severe weather events.

Funding sources at the Federal and State level have identified acquisition of repetitive loss structures and substantially damaged structures as the top funding priority. By virtue of the repeated and severe damage to these structures they are proven to be one of the most vulnerable places to live. As far as mitigating hazards, protecting lives is always the first consideration. Because of the life safety issues involved, the Hazard Mitigation Grant Program (HMGP) has declared that grant applications for acquisition of repetitive loss properties and substantially damaged structures do not have to undergo benefit-cost analysis and are expedited directly to the Federal Emergency Management Agency (FEMA) for funding consideration. Additionally, FEMA has paid the repair bills for reconstructing the repetitive loss properties only to have them damaged again after the next big storm. Acquisition of repetitive loss properties is far more cost-effective and safer than rebuilding after every disaster. This is the basis of FEMA's campaign for "Breaking the Cycle."

The Community Development Block Grant (CDBG) has also made acquisition of substantially damaged structures and flooded homes in general a top funding priority. This is a significant breakthrough for small local governments such as those in Levy County because CDBG grant applications do not require matching funds when associated with recovery from a Federally Declared Disaster. And, after a Federally Declared Disaster those CDBG funds can be used for matching funds for other grant sources. The end result is that small local governments with limited financial resources can leverage larger funding amounts to recover from disasters and mitigate future disasters.

Both the Hazard Mitigation Grant Program (HMGP) and the Community Development Block Grant (CDBG) have recognized the importance of the LMS process and are awarding additional points to those grant applications for projects that are included in the LMS document. Despite this fact there are no acquisition projects currently listed on the Levy County LMS.

Grants to acquire repeatedly flooded or damaged properties are mitigation projects that need the support of the local government leaders. They take a long time, even up to two years to complete the final closing. They take up staff resources, often with low grant administration funds. They reduce the tax base and increase land maintenance costs. And finally can be a highly emotional process for property owners who are displaced while waiting for grant approval.

It is recommended that the local jurisdictions in Levy County undertake a study of repetitive loss properties and properties that are expected to be damaged by a large storm. First, identify the properties that would fit in with plans for parks or open space or water retention areas. Second, survey the property

owners and determine if they would consider selling the property or if they would rebuild following severe storm damage to the structure. Finally, from this information, a repetitive loss zone map has been created. This is a process evolving from the 1999 LMS working group's recommendation. This map could be used for future mitigation planning and land use planning. The best solution to losses are preventative measures taken by the land owners and local planning mechanisms.

Because of the sensitivity of the properties on the list it is important to not list these here in this public document. Those jurisdictions wishing to apply for funding to alleviate the problem can contact the WRPC for a list or by contacting FEMA through the Flood Smart Program <http://www.floodsmart.gov/floodsmart/pages/index.jsp>. Map number VIII-10 has identified areas prone to repetitive losses. These areas are identified due to their proximity to water and their exposure to wind and tides and also the natural draining of land during and after major rain events.

Jurisdiction	Number of Structure	Structure Type
Bronson	0	
Cedar Key	28	6 Commercial, 22 Residential
Chiefland	0	
Fanning Springs	0	
Inglis	2	2 Residential
Otter Creek	0	
Williston	0	
Yankeetown	35	2 Commercial, 33 Residential
Unincorporated	13	13 Residential
Total		8 Commercial, 70 Residential, 0 Industrial

Source: Levy County Zoning Administration, Development Department, Floodplain Manager and CRS coordinator

### **c. Identifying Structures**

Vulnerable critical facilities located within the FEMA 100-year floodplain are listed above in the discussion of tropical cyclone vulnerabilities.

Levy County's coastal lowlands provide for a large number of roads that could be affected by surge flooding. The County's outcropping of coastal keys creates a large area for surge inundation. The central portion of the County will experience the greatest amount of freshwater flooding within the floodplain of the Waccasassa River. Each of the roads in Table VIII-23 will be inundated from freshwater flooding. (Based on FEMA Flood Insurance Rate Maps).

<b>Route</b>	<b>Route Segment Susceptible to Freshwater Flooding</b>
CR 326	From intersection with CR 347, west to the Gulf
CR 326	From intersection with CR 320 to CR 337
SR 24	From Cedar Key to Bronson
CR 345	From intersection with SR 24 to 1 mile south of intersection with CR 336
US 19	From 1 mile south of intersection with CR 347 to Citrus County
US 19	A 2 mile section 1 mile south of Chiefland and 1 mile north of the CR 347 intersection
CR 339	From Bronson to the intersection with CR 320
US Alt 27	From the intersection with CR 339 and 1 mile to the west
CR 343	From the intersection with CR 326 to the intersection with CR 337
CR 40	From the gulf to 1 mile east of Inglis
CR 335	East of the intersection of 335 and 121 for approximately 1 half mile

Major roads and evacuation routes subject to flooding should be included in a listing of mitigation projects addressed by the Local Mitigation Strategy.

#### **d. Estimating Potential Loss**

In addition to the facilities identified above, there are many structures and property within the 100-year floodplain. Below is a table with the number of buildings and total values (just values + contents) within the flood zones. The data is from the Levy County Property Appraiser's Office (2010) and is inclusive of vacant structures. However, contents value of vacant structures was assumed to be \$0.

**Table VIII- 24. Flood Vulnerability**

Use Category	A		AE		VE		TOTAL	
	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value
<b>Agriculture</b>	585	900,418,411	0	1,000	4	18,123,760	589	918,543,171
<b>Residential-Single-Family</b>	636	156,119,344	87	148,260,695	632	215,109,103	1,355	519,489,142
<b>Residential-Multi-Family</b>	3	2,046,212	795	163,022,658	227	54,349,963	1,025	219,418,833
<b>Residential-Mobile Homes</b>	820	52,575,074			63	5,470,655	883	58,045,729
<b>Commercial</b>	38	14,279,300	394	22,938,349	65	26,713,680	497	63,931,329
<b>Industrial</b>	11	4,220,956	42	11,927,005	3	2,245,814	56	18,393,775
<b>Institutional</b>	13	4,362,505	6	845,878	8	4,145,250	27	9,353,633
<b>Government</b>	2	135,024,715	6	3,245,997	11	74,947,697	19	213,218,409
<b>Misc. Infrastructure</b>	2	1,127,411	4	36,550,022	2	1,422,779	8	39,100,212
<b>TOTAL</b>	<b>2,110</b>	<b>1,270,173,926</b>	<b>5</b>	<b>9,581,767</b>	<b>1,015</b>	<b>402,528,700</b>	<b>3,130</b>	<b>1,682,284,393</b>

#### **e. Analyzing Development Trends**

Areas vulnerable to flood, including Fanning Springs, Yankeetown, Inglis, and Cedar Key, have had the largest proportionate population growth since the 2000 census. These municipalities, as well as the County's other municipalities will continue to grow in population and density. Generalized future land uses located within surge areas include Agriculture, Conservation, Recreation, Public, Commercial, Industrial, and Residential. However, the greatest amount of land area vulnerable to flood has Conservation (County), Agriculture/Low Density Residential (County) and Forestry/Rural Residential

(County) future land use designations (see Map VIII-1 through VIII-9).

### f. Multi-Jurisdictional Risk Assessment

The tables below describe the structures and values, by municipality, that are vulnerable to flood. Jurisdictions most vulnerable to flood include Yankeetown, Inglis, and Cedar Key.

Named Place	# Bldgs in A	TOTAL Value in A	# Bldgs in AE	TOTAL Value in AE	# Bldgs in VE	TOTAL Value in VE
Bronson	38	9,558,270	NA	NA	NA	NA
Cedar Key	NA	NA	NA	NA	790	241,878,517
Chiefland	NA	NA	NA	NA	NA	NA
Fanning Springs	NA	NA	4	4,287,348	NA	NA
Inglis	337	38,765,191	167	39,592,459	NA	NA
Otter Creek	15	2,374,518	NA	NA	NA	NA
Williston	0	17,488,866	NA	NA	NA	NA
Yankeetown	NA	NA	401	76,381,373	88	32,790,475
Levy County	NA	NA	NA	NA	NA	NA

## 3. WILDFIRES

### a. Overview

**Types of structures and infrastructure affected by wildfires include:** mobile homes, poorly constructed homes, non-elevated homes, telecommunications, electrical utilities, sewage systems, potable water, roadways, agriculture, livestock, economic disruptions, environmental damage.

Wildfires will negatively affect Levy County with a variety of impacts:

- Forested lands and any surrounding urban areas (WUI - wildland-urban interface) are most at risk to wildfires. Potential risks include destruction of land, property, and structures, as well as injuries and loss of life.
- Although rare, deaths and injuries usually occur at the beginning stages of wildfires when sudden flare-ups occur from high wind conditions. In most situations, however, people have the opportunity to evacuate the area and avoid bodily harm.
- Responders are most at risk during the process of fire suppression. Responders put themselves in harm's way to contain the fire and save lives and property. Firefighters are often trapped by fires that either grow or suddenly change directions.
- All critical facilities near fire fuel areas are at risk from fire damage. Clearing debris near structures is an important step in mitigating the risks of wildfires.
- Fire experts often disagree about the short- and long-term effects of large-scale fires on the overall environment. The case of the Yellowstone Park wildfire is the most notable event where experts initially thought long-term damage would result from the massive fires. After some years, however, the environment regenerated itself and experts now believe that the fire was actually beneficial to the long-term health of the area.
- Major fires have the ability to disrupt transportation in large areas.
- Financial losses related to wildfires include destroyed or damaged houses, barns, private facilities and equipment, loss of commercial timber supplies, and local and State costs for response and

recovery.

Dry weather and drought conditions are major contributing factors in the size and severity of a wildfire. Fuel load is also a factor in fire intensity and speaks to the need for well-managed forest lands. As stated previously Levy County has a high percentage of rural population. Those people and facilities located in rural, wooded areas are particularly vulnerable to wildfire. Subdivisions should be designed using FireWise principles and homeowners should create at least 30 feet of cleared area around the house for defensible space. This house-by-house Mitigation Strategy will be the most effective means to reduce the level of wildfire vulnerability in Levy County due to the large size of the County and the wide distribution of the unincorporated population. Map VIII-12 describes Wildland Urban Interface Areas to show wildland fire vulnerability.

### **b. Identifying Structures**

The mapped Wildland-Urban Interface Areas are considered the areas of greatest vulnerability in Levy County. The Wildland-Urban Interface is the area where houses meet or intermingle with undeveloped wildland vegetation, emphasizing focal areas for human-environment conflicts such as wildland fires. The index dataset was obtained from the Florida Division of Forestry. In creating this map, a numeric value provided by the index corresponds to a Wildland-Urban Interface Classification that is based on 2000 block-scale household density (units/ sq. km.). The categories found in Levy County are as follows:

- 23= Low Density Interface
- 24= Medium Density Interface
- 25= High Density Interface
- 33= Low Density Intermixed
- 34= Medium Density Intermixed
- 35= High Density Intermixed
- 41= Uninhabited No Vegetation
- 42= Very Low Density No Vegetation
- 43= Low Density No Vegetation
- 44= Medium Density No Vegetation
- 45= High Density No Vegetation
- 51= Uninhabited Vegetation
- 52= Very Low Density Vegetation
- 90= Water

These numeric values and their respective Wildland-Urban Interface Classifications are used to ascertain areas and population at risk to wildfire.

- Very Low Risk = >89
- Low Risk = 41-89
- High Risk = 33-40
- Very High Risk = <33

These populations and the critical facilities located in or near them are vulnerable to wildfires. Appropriate mitigation can come in the form of enhanced warning systems and the establishment of

defensible spaces around all structures. Fire responders should continually seek to improve their response capabilities.

Critical facilities located within high risk and very high risk areas include:

Bronson

Clinical Lab, Fire Station, Library, Public Schools, Public Water Supply, and Wastewater Facility

Chiefland

Public Schools, Public Water Supply, Radio Communication Tower, Wastewater Facility

Fanning Springs

Fire Station, Public Water Supply

Inglis

Fire Station, Public Water Supply, Law Enforcement

Otter Creek

Fire Station, Public Water Supply

Williston

Wastewater Facility

Yankeetown

Fire Station, Library, Public Water Supply, Radio Communication Tower

Electrical Substation

Hazardous Materials facilities located within high risk and very high risk areas include one in Fanning Springs, Williston, and Bronson , two in Chiefland, and five other in the. County

**c. Estimating Potential Loss**

In addition to the facilities identified above, there are many structures and property within areas vulnerable to wildfire. Below is a table with the number of buildings and total values (just values + contents) within the wildfire categories. The data is from the Levy County Property Appraiser's Office (2010) and is inclusive of vacant structures. However, contents value of vacant structures was assumed to be \$0.

According to FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001), there are no loss estimation tables to calculate extent of damage for wildfire. Therefore, the TOTAL Values of vulnerable areas categorized by land use were calculated to estimate potential loss.

Table VIII- 26. Fire Vulnerability, Urban Interface

Use Category	Very Low		Low		High		Very High		TOTAL	
	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value
<b>Agriculture</b>	93	187,018,492	1,395	1,366,059,703	421	221,743,688	187	107,797,598	2,096	1,882,619,481
<b>Residential-Single-Family</b>	227	90,437,289	2,708	640,235,404.5	2,473	499,975,033.5	2,061	293,405,683.5	7,469	1,524,053,410.5
<b>Residential-Multi-Family</b>	14	4,064,972	208	47,742,433	16	6,649,159.5	56	14,313,684	294	72,770,248.5
<b>Residential- Mobile Homes</b>	60	7,026,653.5	2,736	182,979,171	4,157	249,991,907.5	2,155	101,158,818.5	9,108	541,156,550.5
<b>Commercial</b>	26	10,144,709.5	342	167,193,268.5	149	52,684,837.5	209	76,247,830.5	726	306,270,646
<b>Industrial</b>	4	2,152,206.5	45	17,130,270	36	14,251,314.5	13	5,107,636	98	38,641,427
<b>Institutional</b>	NA	NA	96	63,579,556	40	27,816,044	57	19,046,980	193	110,442,580
<b>Government</b>	4	98,301,838	26	266,990,224	9	22,938,648.5	26	51,023,271	65	439,253,981.5
<b>Misc. Infrastructure</b>	2	1,445,260.5	5	4,714,637	5	4,986,669	7	8,443,875	19	19,590,441.5
<b>TOTAL</b>	<b>430</b>	<b>400,591,421</b>	<b>7,561</b>	<b>2,756,624,667</b>	<b>7,306</b>	<b>1,101,037,302</b>	<b>4,771</b>	<b>676,545,376.5</b>	<b>20,068</b>	<b>4,934,798,766.5</b>

#### d. Analyzing Development Trends

Areas most vulnerable to wildfire, include Bronson, Chiefland, Yankeetown, and Inglis. These municipalities, as well as the County's other municipalities will continue to grow in population and density. Generalized future land uses located within areas vulnerable to wildfire include Agriculture, Conservation, Recreation, Public, Commercial, Industrial, and Residential (see Map VIII-1 through VIII-9). However, the greatest amount of land area vulnerable to wildfire has Agriculture/Low Density Residential (County).

#### e. Multi-Jurisdictional Risk Assessment

The tables below describe the structures and values, by municipality, that are vulnerable to wildfire. Jurisdictions most vulnerable to wildfire include Bronson, Chiefland, Yankeetown, and Inglis.

Jurisdiction	# Bldgs in Very Low Risk	TOTAL Value in Very Low Risk	# Bldgs in Low Risk	TOTAL Value in Low Risk	# Bldgs in High Risk	TOTAL Value in High Risk	# Bldgs in Very High Risk	TOTAL Value in Very High Risk
<b>Bronson</b>	2	964,585	36	8,530,331	194	25,401,204	289	60,747,382
<b>Cedar Key</b>	133	54,351,693	466	125,517,395	127	41,366,806	65	18,039,646
<b>Chiefland</b>	NA	NA	170	116,412,538	111	20,415,937	731	125,902,908
<b>Fanning Springs</b>	2	2,250,026	28	10,455,423	218	31,616,538	49	4,574,325
<b>Inglis</b>	0	181,537	6	1,757,331	218	40,273,441	599	79,384,141
<b>Otter Creek</b>	2	888,051	11	1,041,177	59	9,528,471	24	1,217,830
<b>Williston</b>	2	1,674,468	990	255,035,302	118	25,137,978	0	1,114,400
<b>Yankeetown</b>	10	10,214,449	18	8,852,106	146	43,390,798	315	45,201,105

## 4. SINKHOLES

### a. Overview

**Types of structures and infrastructure affected by sinkholes include:** mobile homes, poorly constructed homes, non-elevated homes, telecommunications, electrical utilities, sewage systems, roadways, airports, agriculture, livestock, economic disruptions, environmental damage.

Sinkholes will negatively affect Levy County with a variety of **impacts:**

- Sinkholes can be very sudden and relatively large.
- Depending on the location of the sinkhole, severe damage can be done to individual properties or to roads and other infrastructure.
- Prior to sinkhole collapse a gradual settlement may occur in the affected area.
- Doors and windows in affected homes may fail to close properly and cracks may appear in the foundation.
- A circular pattern of ground cracks may form outlining the subsiding area and water may pond in the new low area where it has not previously.
- Fence posts and other similar small objects may become tilted.

- Differential distortion of a structure, where one portion of the building moves relative to another, causes cracks to form.

### **b. Identifying Structures**

Vulnerable critical facilities are critical facilities that are near or adjacent to existing sinkhole activity. According to the most current sinkhole inventory from the Florida Geographic Data Library (FGDL), Levy County has one solid waste facility and one hazardous waste facility (in Chiefland) with identified sinkholes. Also, the Fire Station, Correctional Facility, EOC, Law Enforcement, Public School, Library, and Wastewater Treatment facilities in Bronson, as well as the Public Water Supply and Public Schools in Chiefland are within approximately 500 feet of an identified sinkhole.

The typical methodology for sinkhole potential relies heavily on the presence of existing sinkholes and not on geology. Extreme increases in groundwater withdrawals can also make an area more vulnerable to sinkholes as the groundwater level fluctuates. In the 2004 TAOS update, a methodology for further exploration of sinkhole vulnerability was created.

Sinkhole vulnerability was determined according to points assigned to each 90m grid cell in the state. Three classes of points were assigned, for distance to historic sinkholes, geology, and soils:

- 2 points if cell was within 2000m of an existing sinkhole;
- 1 point if cell between 2000m and 5000m of an existing sinkhole;
- 1 point if the cell was in the same USGS surface geologic unit as an existing sinkhole;
- 1 point if the cell was in the same NRCS soil unit as an existing sinkhole.

Thus, each cell as assigned a value from 0 to 4:

- 0: no significant risk
- 1: low risk
- 2: moderate risk
- 3: high risk
- 4 very high risk.

This methodology was applied to Levy County using the newer County Property Appraiser data and more current sinkhole inventory from the FGDL. The Table below describes the number of buildings and total values (just values + contents) within areas vulnerable to sinkholes by vulnerability category.

### **c. Estimating Potential Loss**

In addition to the facilities identified above, there are many structures and property within areas vulnerable to sinkholes. Below is a table with the number of buildings and total values (just values + contents) within areas vulnerable to sinkholes. The data is from the Levy County Property Appraiser's Office (2010) and is inclusive of vacant structures. However, contents value of vacant structures was assumed to be \$0.

According to FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001), there are no loss estimation tables to calculate extent of damage from sinkholes. Therefore, the TOTAL Values of vulnerable areas categorized by land use were calculated to estimate potential loss.

**Table VIII-28. Sinkhole Vulnerability**

Use Category	1- Low Risk		2- Moderate Risk		3- High Risk		4- Very High Risk		TOTAL	
	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value	# Bldgs	Value
<b>Agriculture</b>	75	88,653,547	813	783,366,539	696	613,220,399	512	398,899,504	2,096	1,884,139,989
<b>Residential-Single-Family</b>	783	239,842,457	2,506	556,801,281	1,996	381,946,476	2,208	355,741,872.5	7,493	1,534,332,086.5
<b>Residential-Multi-Family</b>	228	54,503,509.5	14	4,315,852.5	11	4,277,973	59	15,546,294	312	78,643,629
<b>Residential-Mobile Homes</b>	415	24,409,434.5	2,800	184,059,229.5	2,927	167,372,822.5	2,967	165,374,178	9,110	541,229,971.5
<b>Commercial</b>	69	27,543,996	109	36,994,146.5	149	45,294,350.5	405	198,567,519.5	732	308,400,012.5
<b>Industrial</b>	5	2,523,834	37	11,392,309	16	9,369,079.5	41	15,917,321.5	99	39,202,544
<b>Institutional</b>	12	6,412,887	48	28,865,527.5	51	31,337,717	82	43,871,576.5	193	110,487,708
<b>Government</b>	9	69,683,279	7	242,617,922	7	73,745,875	42	64,593,791.5	65	450,640,867.5
<b>Misc. Infrastructure</b>	3	1,704,725	1	1,235,672	7	6,021,708.5	8	10,628,336	19	19,590,441.5
<b>TOTAL</b>	<b>1,599</b>	<b>515,277,669</b>	<b>6,335,059,229.5</b>	<b>1,849,648,479</b>	<b>5,860</b>	<b>1,332,586,401</b>	<b>6,324</b>	<b>1,269,140,393.5</b>	<b>20,119</b>	<b>4,966,667,249.5</b>

### d. Analyzing Development Trends

Areas most vulnerable to sinkholes, including Bronson, Chiefland, and Williston, are mostly located in areas with significant limestone deposits. These municipalities, as well as the County's other municipalities will continue to grow in population and density. Generalized future land uses located within vulnerable sinkhole areas include Agriculture, Conservation, Recreation, Public, Commercial, Industrial, and Residential (see Map VIII-1 through VIII-9). However, the greatest amount of land area vulnerable to sinkholes has Agriculture/Low Density Residential (County) and Forestry/Rural Residential (County) future land use designations.

### e. Multi-Jurisdictional Risk Assessment

The table below describes the structures and values, by municipality, that are vulnerable to sinkholes. Jurisdictions most vulnerable to sinkholes include Bronson, Chiefland, Inglis, and Williston.

Jurisdiction	# Bldgs in Low Risk	TOTAL Value in Low Risk	# Bldgs in Moderate Risk	TOTAL Value in Moderate Risk	# Bldgs in High Risk	TOTAL Value in High Risk	# Bldgs in Very High Risk	TOTAL Value in Very High Risk
Bronson	NA	NA	NA	NA	9	18,000,860	512	77,642,642
Cedar Key	830	252,498,894	NA	NA	NA	NA	NA	NA
Chiefland	NA	NA	NA	NA	NA	NA	1,012	262,731,382
Fanning Springs	NA	NA	NA	NA	NA	NA	297	48,896,312
Inglis	NA	NA	21	1,357,769	373	57,522,392	429	62,716,289
Otter Creek	NA	NA	0	99,916	95	11,805,956	1	769,657
Williston	1	637,350	670	159,673,059	439	123,210,027	NA	NA
Yankeetown	7	8,769,044	346	63,432,922	137	37,028,606	NA	NA

## 5. COASTAL EROSION

### a. Overview

**Types of structures and infrastructure affected by coastal erosion include:** mobile homes, poorly constructed homes, non-elevated homes, telecommunications, electrical utilities, roadways, waterways, airports, agriculture, fisheries, environmental damage.

Erosion will negatively affect Levy County with a variety of **impacts**:

- Areas of the County's coast are eroded away at varying levels at all times and especially by strong storms and hurricanes.
- Erosion can lead to property damage to houses and structures on or near the beach.
- Beach erosion can impact transportation waterways such as inlets and can interfere with boat traffic.
- Eroded beaches impact the level of tourism, and this lowers the overall economy of the coastal areas and the County.

### b. Identifying Structures

Without the velocity to cause damage quickly, the potential erosion damage is by slow erosion over time. Vulnerable facilities are limited to structures that are in, or close to, the water at normal levels and flow

rates, including bridges, dams, docks, and boat ramps. Certain residential structures that are built on pilings are also subject to erosion potential. Appropriate mitigation for erosion is periodic inspections of water-related structures. No significant erosion has been recorded outside of the tropical cyclones and periodic flooding events.

There are no critical facilities in the County that demonstrate an increased vulnerability to coastal erosion.

### c. Estimating Potential Loss

There are some structures and property within areas vulnerable to coastal erosion. Below is a table with the number of buildings and total values (just values + contents) within the areas vulnerable to coastal erosion. The only areas vulnerable to coastal erosion are in Cedar Key. The structures and values in the table below consist of areas within approximately 500 feet or about two city-blocks away from identified erosion. The data is from the Levy County Property Appraiser's Office (2010) and is inclusive of vacant structures. However, contents value of vacant structures was assumed to be \$0.

According to FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001), there are no loss estimation tables to calculate extent of damage erosion. Therefore, the TOTAL Values of vulnerable areas categorized by land use were calculated to estimate potential loss.

**Table VIII-30. Coastal Erosion Vulnerability**

Use Category	# Bldgs	Value
Agriculture	NA	NA
Residential- Single-Family	65	19,278,758
Residential- Multi-Family	59	16,233,640
Residential- Mobile Homes	1	134,767
Commercial	7	3,550,649
Industrial	NA	NA
Institutional	1	1,004,646
Government	3	10,994,973
Misc. Infrastructure	NA	NA
<b>TOTAL</b>	<b>136</b>	<b>51,197,433</b>

### d. Analyzing Development Trends

Cedar Key, which has one of the largest proportionate population growths since the 2000 census, is vulnerable to coastal erosion. Cedar Key will continue to grow in population and density. Generalized future land uses located within coastal erosion areas include Conservation, Water-dependent Commercial, Public, and Residential (see Map VIII-1 through VIII-9).

### e. Multi-Jurisdictional Risk Assessment

Cedar Key is the only municipality that is vulnerable to coastal erosion. The Table above describes structures and values in Cedar Key only.

## 6. DROUGHT/EXTREME HEAT

### a. Overview

Types of structures and infrastructure affected by drought/ extreme heat include:

telecommunications, electrical utilities, potable water, roadways, waterways, agriculture, livestock, fisheries, economic disruptions, environmental damage.

Drought/extreme heat will negatively affect Levy County with a variety of **impacts**:

- Drought is often associated with periods of long and intense heat. Drought usually does not affect humans directly, but extreme heat can cause injury and even death, particularly with children, elderly citizens, and other special needs populations. Injuries and potential deaths are most likely to impact rural, poor areas that lack air conditioning and immediate medical care.
- The largest impact of prolonged drought is the financial impact to farmers with crops and livestock. A serious drought would damage or possibly destroy annual crops and limit the number of livestock that could be properly cared for.
- Drought and extreme heat have no real effect on houses, facilities, or infrastructure. Rationing water supplies would most likely be the worst-case scenario impact for drought.
- Prolonged drought over a number of years could have long-term environmental impacts on the area, including species endangerment and necessary changes to the local agricultural makeup.

Crop loss is the greatest economic concern especially from those crops that are major exports. The vulnerability is greater in the various types of crops that are more susceptible to drought than others. Newly planted crops are extremely vulnerable to drought. Livestock must also be monitored and managed properly in cases of severe drought. Farmers in general are particularly affected by drought conditions as the water table falls and deeper wells need to be drilled for irrigation purposes.

Of course, water supply is the greatest concern during a drought and utility managers must be prepared to protect the water supply by instituting water restrictions when needed. During extended periods of extreme heat power supplies also may be depleted due to the widespread use of air conditioning systems. Appropriate mitigation for the potential loss of power is to maintain backup generators for critical facilities.

### **b. Identifying Structures**

Generally, structures are not vulnerable to drought/extreme heat. However, the agricultural sector and respective land areas can be significantly harmed by drought/extreme heat Table VIII-31 describes structures and values by jurisdiction, categorized as Agriculture.

### **c. Estimating Potential Loss**

According to FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001), there are no loss estimation tables to calculate extent of damage for drought or extreme heat. Therefore, the TOTAL Values of vulnerable areas (all areas designated as Agriculture) were calculated to estimate potential loss. The data is from the Levy County Property Appraiser's Office (2010).

### **d. Analyzing Development Trends**

As the population grows in Levy County, land in Agriculture uses maybe lost to other uses (see Map VIII-1 through VIII-9). However, as Levy County is one of the least densely-populated counties in Florida, and rate of growth is steady, Agriculture will mostly likely remain one of the County's primary land uses and economic drivers.

### **e. Multi-Jurisdictional Risk Assessment**

The table below describes the Agricultural structures and values, by municipality, that are vulnerable to drought/extreme heat. Jurisdictions most vulnerable to drought/extreme heat include Chiefland and Williston.

**Table VIII-31. Drought/ Extreme Heat and Severe Winter Storm/Freeze Vulnerability by Jurisdiction**

Jurisdiction	# Bldgs in Ag	TOTAL Value in Ag
Bronson	9	5,856,389
Cedar Key	NA	NA
Chiefland	10	15,813,850
Fanning Springs	1	2,633,629
Inglis	1	2,293,474
Otter Creek	8	1,986,147
Williston	11	8,335,632
Yankeetown	0	1,782,895
Levy Un-Incorporated	2,056	1,845,437,973

In Levy County the major crop is timber which is actively cultivated throughout the County. Traditional crops are grown in the Chiefland (watermelons) and Williston (peanuts) areas of the county. Drought or extreme heat conditions especially during planting time could cause hardship to these local economies. Cedar Key and Yankeetown are tied to the fisheries economy. Fisheries are vulnerable to a period of extended heat which could cause elevated gulf water temperatures contributing to a “red tide” fish kill. Red tide is less common this far north on the gulf coast, but occurs every 2 to 3 years from the Tampa Bay region south the keys.

The jurisdictional economies of Bronson, Fanning Springs and Inglis are not as dependent on traditional agriculture or fisheries. The general vulnerabilities of human or animal impact are potentially felt by all who cannot escape the heat, especially the elderly and those who work outdoors.

## 7. TORNADOES

### a. Overview

**Types of structures and infrastructure affected by tornadoes include:** all structures, mobile homes, poorly constructed homes, non-elevated homes, telecommunications, electrical utilities, sewage systems, potable water, roadways, waterways, airports, agriculture, livestock, fisheries, economic disruptions, environmental damage.

Tornadoes can negatively affect Levy County with a variety of **impacts:**

- Tornadoes cause localized damage in the specific area of impact and are part of a larger storm system that affects communities with flooding, lightning, hail, and straight-line winds.
- Humans and animals are often injured or killed by severe tornadic activity. Most cases involve a direct impact combined with minimal shelter or protection.
- Properties and facilities are often damaged by tornadic activity. The severity of the damage depends on the type of construction, the age of the facility, and the strength of the storm, and results can vary from minor roof damage to the complete demolition of the structure.
- Buildings, facilities, and infrastructure are often impacted by the debris caused by a tornado. Common consequences of tornadoes are power outages and power line damage caused by fallen limbs and trees. This often occurs with large trees that have not been trimmed and are located

near structures or power lines.

- It is not possible to identify the locations of at-risk facilities as tornadoes strike randomly throughout the County. All locations and critical facilities were deemed vulnerable to this hazard.
- Losses due to tornadoes tend to be localized and do not tend to have many long-term effects on the economy of the affected area. After a tornadic event, there is often an increase in economic activity as people rebuild their homes and repair additional damages. The monetary losses can be high in terms of actual damage to specific locations combined with injuries and the potential loss of life for humans and animals.
- Tornadoes usually do not have a long-term impact on the environment. Extreme damage may occur in a localized area, but long-term effects on the flora and fauna in the surrounding areas are not typical.
- Electricity and other essential services to local areas can be disrupted during storm events. In severe cases, power can be lost for several days or weeks. In most cases, however, disruptions in power are usually short-term and service is quickly restored by repair crews and responders.

The damage potential for a tornado increases as a function of population density. As the number of structures and people increase, the potential damage/injury rate increases. Mobile homes, poorly constructed or substandard housing apartment complexes are especially susceptible to damage from a tornado. Mobile homes and substandard housing are exceptionally susceptible because of their lack of resistance to high winds, and apartment complexes and low rent projects because of their size and densities. All of the incorporated municipalities, as well as the unincorporated urbanized area of Levy County is vulnerable.

### **b. Identifying Structures**

Specific vulnerable facilities cannot be identified based on the unpredictable nature of tornadoes and also based on the awesome destructive power. Mobile homes are of the greatest concern but wood frame structures are also unable to withstand the intense winds of a tornado. Concrete block structures with wooden roof truss systems are also vulnerable. Appropriate mitigation for tornadoes is to construct a safe-room specifically engineered for such use.

### **c. Estimating Potential Loss**

According to FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001), there are no loss estimation tables to calculate extent of damage for from tornadoes. Also, vulnerable areas and specific structures cannot be identified. Therefore, the entire County's structures and TOTAL values may be considered as potential losses (see Table VIII-16).

### **d. Analyzing Development Trends**

Because vulnerability to tornadoes cannot be determined geographically, development trends within a vulnerable area cannot be analyzed.

### **e. Multi-Jurisdictional Risk Assessment**

All jurisdictions within Levy County are equally vulnerable to tornadoes.

## **8. SEVERE WINTER STORMS/FREEZE**

### **a. Overview**

**Types of structures and infrastructure affected by severe winter storms/freeze include:** telecommunications, electrical utilities, potable water, roadways, waterways, agriculture, livestock, fisheries, economic disruptions, environmental damage.

Winter storms will negatively affect Levy County with a variety of **impacts:**

- Severe winter events including snow and ice are considered hazards; however, the impacts resulting from these events are historically more severe in regards to human and economic losses as opposed to damages to buildings and infrastructure.
- 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 and causing further economic losses to the local area.
- Electrical transmission lines are highly vulnerable to severe winter weather. Trees frequently fall due to the extra weight of ice accumulating on branches. Trees falling on nearby power lines causes disruption of power service, which results in additional costs for repairs and maintenance.
- 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.
- First responders are increasingly at risk as they respond to traffic incidents and calls for medical attention. They are vulnerable to the same transportation dangers as other citizens, but often have to go out in hazardous conditions when ordinary citizens would not.

Other than agricultural loss, hazards include icy roads and bridges, power outages, structural damage from fallen trees and limbs and exposure to extreme cold. The protection of economically important crops and livestock hinges on the availability and accuracy of weather information. Low income households can also become vulnerable to winter storm conditions if heating systems don't exist or are not operable. Unfortunately, public works departments in Florida generally do not have adequate resources to de-ice roads and bridges or remove snow from roadways, so even small amounts of snow and ice can be a concern.

### **b. Identifying Structures**

Generally, structures are not vulnerable to severe winter storm/freeze in Levy County. However, the agricultural sector and respective land areas can be significantly harmed by severe winter storm/freeze. Table VIII-30 (above, in the Drought/Extreme Heat section) describes structures and values by jurisdiction, categorized as Agriculture, as Agricultural land will be the most affected.

Also, Power supply facilities have proven to be the most vulnerable critical facilities because winter storms with an extended time frame cause peak use periods to also be extended. The result is that power suppliers cannot meet demand and must generate a pattern of "rolling brown-outs" that create temporary power outages in a geographic pattern.

### **c. Estimating Potential Loss**

According to FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001), there are no loss estimation tables to calculate extent of damage for severe winter storm/freeze. Therefore, the TOTAL Values of vulnerable areas (all areas designated as Agriculture) were calculated to estimate potential loss. The data is from the Levy County Property Appraiser's Office (2010). Table

VIII-30 is above, in the Drought/Extreme Heat section.

#### d. Analyzing Development Trends

As the population grows in Levy County, land in Agriculture uses maybe lost to other uses (see Map VIII-1 through VIII-9). However, as Levy County is one of the least densely-populated counties in Florida, and rate of growth is steady, Agriculture will mostly likely remain one of the County's primary land uses and economic drivers.

#### e. Multi-Jurisdictional Risk Assessment

The table above (Table VIII-31) describes the Agricultural structures and values, by municipality, that are vulnerable to severe winter storms/freeze. Jurisdictions most vulnerable to severe winter storms/freeze include Chiefland and Williston.

### 9. DAM FAILURE

#### a. Overview

**Types of structures and infrastructure affected by dam failure include:** mobile homes, poorly constructed homes, non-elevated homes, telecommunications, electrical utilities, potable water, roadways, waterways, agriculture, livestock, fisheries, economic disruptions, environmental damage. Impacts are the same as those in the Flood section.

#### b. Identifying Structures

According to the Inglis Main Dam and Bypass Channel Dam Emergency Action Plan (2003), structures in Inglis and Yankeetown that are adjacent to the Withlacoochee River are most vulnerable to flood from dam failure. Yankeetown Town Hall / Fire Department is located a block from the Withlacoochee River and is vulnerable in the case of dam failure.

#### c. Estimating Potential Loss

Following boundaries from the Inglis Main Dam and Bypass Channel Dam Emergency Action Plan (2003), parcels adjacent to the Withlacoochee River are most vulnerable to flooding from dam failure. The following table describes the number of structures and TOTAL values by land use category within this vulnerable area. Extent of damage is not considered, as no data was available to estimate percent damage.

**Table VIII-32. Dam Failure Vulnerability**

Use Category	# Bldgs	Value
Agriculture	0	466,667
Residential- Single-Family	258	69,650,340
Residential- Multi-Family	NA	NA
Residential- Mobile Homes	16	949,793
Commercial	3	1,813,341
Industrial	1	83,490
Institutional	NA	NA
Government	0	901,206
Misc. Infrastructure	5	9,451,405
<b>TOTAL</b>	<b>283</b>	<b>83,316,241</b>

#### d. Analyzing Development Trends

Areas vulnerable to flood from dam failure, including Yankeetown and Inglis, have had the largest proportionate population growth since the 2000 census. Generalized future land uses located within these vulnerable areas include Conservation, Recreation, Commercial, Industrial, with the majority of the area in Residential (see Map VIII-1 through VIII-9).

#### e. Multi-Jurisdictional Risk Assessment

The tables below describe the structures and values, by municipality, that are vulnerable to flooding from dam failure.

**Table VIII-33. Dam Failure Vulnerability by Jurisdiction**

Jurisdiction	# Bldgs	TOTAL Value
Inglis	178	41,258,720
Yankeetown	104	36,798,406
Levy Un-Incorporated	1	5,259,116

#### D. Economic Vulnerability

Agriculture is the largest economic generator in Levy County. Forestry products are a major export of the County. The forestry industry is more disaster resistant than other agricultural crops such as watermelons or peanuts which also make significant contributions to the local economy. Mitigation measures to reduce crop loss from hurricanes are not considered practical. However, mitigation of wildfire damages to the forestry industry could be implemented through policies, planning and best management practices. Chapter XII includes recommendations for initiatives to mitigate wildfires.

Another industry that brings money into the County is the tourism industry. Tourism is not fully reflected in the tables above because restaurants are included as commercial. The largest single generator of tourism income in Levy County is the Cedar Key business district. Not only is the downtown area near the Gulf and susceptible to wind and wave, but the largest and newest restaurants are built on a wharf. The foundations for these structures are actually pilings in the Gulf of Mexico. Obviously, this is a very vulnerable coastal location. The proposed hardening and storm resistance outfitting of the community center in Cedar Key will have a definite economic benefit if implemented all of Cedar Key's businesses. The initiative to harden, provide back-up power generation and secure a water filtration system for the community center will allow for a return to normalcy within the community. This will allow for businesses and citizens to resume their practice and recover in a quick and timely fashion. The actual cost savings generated by this initiative will depend on participation rates. However, the economic value the mitigation initiative brings to this small, remote island community is unarguably a very important step toward a more disaster-proof local economy. Economic losses resulting from a tropical storm or even a Category 1 hurricane can be effectively mitigated by these projects if implemented. Economic losses to the contents of Cedar Key structures will be significantly higher without their requested projects.

Another project for the city is to utilize a portable generator for lift station operation during power outages. Without this, the city will have an inoperable sewer system creating a health and environmental hazard. Cedar Key displays what may be the most profound case of lifeline dependency in the state. To reach the commercial area of Cedar Key one must cross four bridges. Roadway access to the island is cut off at bridge number 4 (the closest to the mainland) any time the Gulf waters reach 5 feet above the mean high tide. The water supply pipe that brings water to the City from the treatment facilities on the

mainland is attached to the bridge and is vulnerable to wave action and floating debris. The pipe broke in Hurricane Josephine (1996) and the water supply was cut off for several days. This past mitigation project has been addressed and corrected, however without power to the lift stations, this vulnerability will remain. Most importantly, this initiative will have significant public health benefits, but it will also ensure that the tourism industry, especially motels and restaurants, will be less vulnerable.

Though not a current project, Levy County conducted a project designed to mitigate water quality issues with regards to the aquaculture industry. The clam farming industry in Levy County has grown in the past few years with support and funding from the state's economic development resources in response to the loss of fishing industry jobs resulting from the state referendum to limit net fishing. The 1998 El Nino rainfall event sent a flush of fresh water out into the Gulf that proved to be fatal to the newly seeded crop of clams of numerous state clam leases just offshore of Levy County. Furthermore, not only were the small clams out in the Gulf killed, but the tiny clams growing in the nursery were killed. With the seed stock now dead the industry must wait 18 months for a new hatching of clams to grow large enough to be set out into the Gulf waters. The mitigation project/solution that proposes to reduce the industry's vulnerability to sudden water quality changes is a clam nursery with a closed water circulation system that does not rely on the Gulf waters. The 18 month and up to 3 year "down-time" is significant in that most of the clam farming business cannot survive without additional income sources. . The Institute of Food and Agricultural Sciences at the University of Florida (IFAS) continues to research and work on techniques to mitigate this particular vulnerability to the economic conditions of the coastal communities of Levy County.