

Indian River County Unified Local Mitigation Strategy

June 2010



*Indian River County
City of Fellsmere
Town of Indian River Shores
Town of Orchid
City of Sebastian
City of Vero Beach*

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EXECUTIVE SUMMARY

OVERVIEW

In 1992, Hurricane Andrew left South Florida devastated. In its wake, it left the area struggling to recover from \$27 billion in damages. In 1997, wildland fires burned Flagler County. During the spring of that same year, tornadoes ripped through Osceola and Volusia counties, leaving not only destroyed homes, but also fatalities in their path. In 1998, nearly 50 homes were consumed by wildland fire in Port St. Lucie. All these events could have occurred in Indian River County; fortunately, none did. Natural hazards are not the only type of hazards that create disaster situations. Disaster management changed forever following the events of September 11th in New York City and Washington D.C. Mitigating and responding to technological hazards have come to the forefront of emergency management. Throughout the state, technological disasters occur daily - truck rollovers, communication failures, toxic spills, and wellfield contamination. These types of events, as well as other historic disasters, led the Florida Department of Community Affairs to create the Local Mitigation Strategy (LMS) Program. The goal of the program was to encourage public and private sector entities to take actions that permanently reduce or eliminate the long-term risk to people and property from the different types of hazards faced by Florida residents.

Both public and private sectors win by developing an LMS. It leads to

- reducing future vulnerability to disasters;
- reducing the time (and cost) of recovery from such events when they do happen;
- minimizing disruption to the local economy;
- facilitating recovery and the receipt of post-disaster funding; and
- educating and informing the public about hazards and steps they can take to mitigate the effects.

INITIATING ACTION

In 1998, Indian River County, along with all the municipalities, the local business community, and non-profit organizations such as the American Red Cross, joined together to develop a countywide LMS. During that time, the Indian River County LMS Working Group, the policy body for this program, has had the responsibility for developing the LMS. This group focused on achieving two key results:

- The creation of a long-term LMS planning process; and
- the development of the LMS document itself along with a list of prioritized mitigation projects.

In the year 2000, the Federal Emergency Management Agency's (FEMA's) recognition of the growing costs of responding to and recovering from disasters materialized in the Disaster Mitigation Act of 2000 (DMA2K). DMA2K created a new Pre-Disaster Mitigation (PDM) Program aimed at reducing the cost of disasters as well as risk through comprehensive planning before disasters occur. Indian River County updated this LMS plan compliant with the requirements of DMA2K and on February 22, 2005 the plan was formally

adopted by resolution of the Indian River County Board of County Commissioners. In accordance with the Federal Emergency Management Agency (FEMA) regulations, all Hazard Mitigation plans must be reviewed and updated as appropriate and resubmitted to FEMA for approval every five (5) years.

THE PROCESS

The process by which the LMS was completed involved

- describing current community conditions;
- identifying the potential hazards;
- assessing each community's vulnerabilities to those specific hazards;
- proposing initiatives to reduce these vulnerabilities;
- developing evaluation criteria to rank mitigation projects regardless of jurisdiction; and
- establishing procedures that will be needed if the LMS Program is to retain long-term viability.

All of these aspects are integrated into this unified LMS document, which has been provided to Indian River County Department of Emergency Services.

FINDINGS

Some of the key findings pertinent to Indian River County include the following:

- Flooding and hurricanes occur the most frequently, place the most people at risk, and produce the greatest amount of damage of all the natural hazards faced by the County.
- While wildland fires do not occur with the frequency of flooding and hurricanes, major drought periods over the past several years have made the County extremely vulnerable to wildland fires. Exposure to the impacts of wildland fire continues to increase as new development pushes further west into wildland areas.
- Agriculture is an important component of the local economy; therefore, drought and agricultural pests and disease are as important to the agriculture community as beach erosion and flooding are to the coastal communities.
- While a major focus of mitigation is on retrofitting, the most effective time to mitigate is before development orders are approved. Adding hazard mitigation requirements may add to the cost of development, but this cost is relatively small. Following a disaster, the cost of recovery and redevelopment can be enormous. Recovery cost tends to become public cost that local governments must assume.
- While all jurisdictions in Indian River County are in the National Flood Insurance Program, not all eligible local governments have participated in the Community Rating System (CRS) Program or the Flood Mitigation Assistance (FMA) Program, to the maximum extent possible. Having a strong CRS Program reduces the cost of flood insurance premiums to Indian River County residents, and the FMA Program is a major source of funding to assist in retrofitting flooding problems.

- Properties on the barrier island are susceptible to both flooding and wind-related storm damage. There are a number of important public facilities in those areas. By hardening these facilities, the chance of them being impacted by storm events can be significantly reduced.
- As the amount of trucking on Interstate 95 increases in the future, the probability of truck rollovers and spilling of toxic contaminants will continue to increase, and hazard management teams need to plan now for this eventuality.
- The Florida East Coast Railroad passes through several areas of coastal urban population and development, putting an ever increasing number of people at risk from train derailment and potentially significant toxic materials spills.

PROJECT PRIORITIZATION LIST (PPL)

Indian River County government, as well as the individual cities, has already implemented numerous mitigation projects such as

- installing storm shutters on public buildings;
- retrofitting stormwater drainage systems;
- raising finished floor elevation to 18 inches above base elevation;
- distributing informative publications on hurricanes to local residents; and
- installing emergency generators at key critical facilities.

The objective of developing a unified, countywide PPL for mitigation projects is to allow the Indian River County city and county governments to better focus their mitigation efforts and dollars. The existence of this list will speed local receipt of Federal disaster mitigation funds after a disaster, and will place Indian River County in a more competitive position when competing for other, non-disaster-related mitigation grant funds.

To develop the PPL, each local government was invited to submit a list of mitigation projects for inclusion in the unified, countywide list. A project prioritization methodology was developed by the Working Group as a means of scoring each project and developing a ranked list of projects.

Developing this PPL is not a one-time process. To be effective this list must be dynamic. It will need to be revised as old projects are accomplished and new hazards or increased vulnerabilities are identified. The PPL process will be implemented on an ongoing basis.

UPDATING PROCESS

Like all local comprehensive planning efforts, the LMS itself will need to be reviewed and updated from time to time to ensure that it adequately addresses the various types of hazards currently facing the community. An LMS updating process was prepared and adopted by the Working Group. The Indian River County LMS will be updated every 5 years.

Indian River County LMS 2010 Review and Update

Executive Summary – A section documenting the significant changes to the 2010 plan was added. Following this change, the Working Group reviewed this section and made no additional recommendations. Section approved.

Section 1.0 (Purpose and Overview) – The Working Group reviewed this section and the only change will be to insert the updated adopted resolutions for each jurisdictions. Section approved.

Section 2.0 (Community Profile) - The Working Group reviewed this section and all statistics and references to dates were updated where appropriate. Section approved.

Section 3.0 (Institutional Analysis) – The Working Group reviewed this section and the reorganization of the Department of Emergency Services was updated, Table 3.1 (Comprehensive Growth Management Plan hazard mitigation inventory) was updated, and Table 3.2 (Summary of projects and programs for Indian River County) was updated. Each municipality was provided with sections 3.6.2 (Municipal Mitigation Policies and Ordinances) and 3.6.3 (Municipal Mitigation Projects/Initiatives) and asked to submit updates. Section approved.

Section 4.0 (Hazard Identification, Vulnerability and Risk) – After the Working Group reviewed this section, the historical events section was updated, the revised National Hurricane Center hurricane watch/warning notification was revised, combined Lightning with Thunderstorm hazard, Table 4.18 (Tornado incidents) was updated, information on lightning was updated, wildland fire section was updated. The following statement was added to Seismic Hazards: “Seismic hazards, which include dam/levee failure, earthquakes, and sinkholes and subsidence, are considered to be a small enough threat to Indian River County that they will not be fully profiled.” Table 4.3 (Repetitive Losses) updated. Section approved.

Section 5.0 (Mitigation Options) - The Working Group, in reviewing this section, found that no changes were necessary. Section approved.

Section 6.0 (Implementation Strategy) – There were minor revisions to the LMS organizational chart, beach nourishment sectors were revised, goals and objectives were changed to match the new mitigation projects, the prioritization process was updated and a new project proposal form was developed. This section was reviewed and approved by the Working Group.

Section 7.0 (References) – This section was updated and reviewed and approved by the Working Group.

Appendices

Appendix A (Policies) – This section was updated to reflect changes to the 2020 Comprehensive Growth Management Plan. Table A-4 (Disaster event damage descriptions) was updated. This section was reviewed/approved by the Working Group.

Appendix B (Mitigation Options) - The Working Group, in reviewing this section, found that no changes were necessary. Section approved.

Appendix C (Funding Sources) – This section was updated and approved by the Working Group.

Appendix D (Data Sources) - This section was updated and approved by the Working Group.

Appendix E (Participation Documentation) – This section includes copies of public announcements, e-mail notifications, meeting agendas, meeting minutes and sign-in sheets for each LMS meeting. Section approved.

Appendix F (Acronyms) - The Working Group, in reviewing this section, found that no changes were necessary. Section approved.

Appendix G (Prioritized Projects and Project Status List) – Removed project list from Section 6.0 and added to newly created Appendix G. Added project status list to indicate the status of mitigation actions from the previously approved LMS project list.

1.0 PURPOSE AND OVERVIEW

1.1 PURPOSE

According to Mileti (1999), 7 of the 10 most costly disasters in history, based on dollar losses, occurred between 1989 and 1994: Hurricane Andrew (1992), Oakland wildfire (1991), a winter storm (1993), Hurricane Iniki (1992), Loma Prieta earthquake (1989), Midwest floods (1993), and Northridge earthquake (1994) (Miletti, 1999). In the year 2000, the Federal Emergency Management Agency's (FEMA's) recognition of the growing costs of responding to and recovering from disasters materialized in the Disaster Mitigation Act of 2000 (DMA2K). DMA2K created a new Pre-Disaster Mitigation (PDM) program aimed at reducing the cost of disasters as well as risk through comprehensive planning before disasters occur. On February 22, 2005, Indian River County's revised Unified Local Mitigation Strategy (LMS) was adopted by Resolution #2005—023 of the Indian River County Board of County Commissioners. Based on hazard mitigation assistance program regulations and guidance, local governments and Indian tribal government, acting as subgrantees, must have a FEMA approved hazard mitigation plan in order to apply for and/or receive project grants to continue to be eligible for mitigation grant programs administered by FEMA. This document will be reviewed and updated as appropriate, and resubmitted to FEMA for approval every five (5) years.

Florida is one of the most hazard prone states in the nation. The state is susceptible to a number of hazards including flooding, hurricanes, tornadoes, severe thunderstorms, and wildland fires, to name a few. In Florida, the goals of the new PDM program are being achieved through the Local Mitigation Strategy (LMS) process. LMS is a pre-disaster mitigation planning initiative of the Florida Department of Community Affairs (FDCA) Division of Emergency Management, and is intended to reduce the disrupting effects of natural disasters on the economic and social fabric of the community. Pre-disaster mitigation is defined as "sustained action that reduces or eliminates long-term risk to people and property from hazards and their effects" as part of the FEMA's National Mitigation Strategy (FEMA, 1996).

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

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

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

This LMS is intended to represent the following jurisdictions:

- **Indian River County;**
- **City of Vero Beach;**
- **City of Fellsmere;**
- **Town of Indian River Shores;**
- **Town of Orchid; and**
- **City of Sebastian.**

This plan will be adopted by each of these jurisdictions. Copies of the adopted resolutions can be found at the end of this section.

The ultimate objectives of the LMS process are as follows:

- 1) Improve the total communities' resistance to damage from known natural, technological, and societal hazards;
- 2) Place Indian River County in a position to compete more effectively for pre- and post-disaster mitigation funding;
- 3) Reduce the cost of disasters at all levels; and
- 4) Speed community recovery from disasters that do occur.

Adoption of this strategy will provide the following benefits to both County and municipal governmental entities:

- Compliance with Administrative Rules 9G-6 and 9G-7, Florida Administrative Code (F.A.C.), requirements for local comprehensive emergency management plans to identify problem areas and planning deficiencies relative to severe and repetitive weather phenomenon, and to identify pre- and post-disaster strategies for rectifying identified problems;
- Compliance with FEMA's updated planning guidance and thus, eligibility for certain FEMA pre- and post-disaster funding programs;
- Credit from the National Flood Insurance Program's Community Rating System Program for developing a Floodplain Management Program, which will help further reduce flood insurance premium rates for property owners;
- Access to FEMA's Flood Mitigation Assistance (FMA) Grant Program, which provides funding for pre-disaster mitigation projects and activities; and
- Identification and prioritization of projects for funding under the State of Florida's Residential Construction Mitigation Program, to help reduce losses from properties subject to repetitive flooding damage.
- Eligibility for local governmental funds from the Emergency Management Preparedness and Assistance (EMPA) Competitive Grant Program.

1.2 PLANNING PROCESS

The original LMS plan was developed by Continental Shelf Associates, Inc. (CSA), a consulting firm, who wrote and facilitated the plan and planning process. The current (2010) planning process and all updates were a collaboration of the Indian River County Department of Emergency Services and the Indian River County LMS Working Group.

In an effort to better define the planning process used to update the Indian River County LMS, the following process description and diagram have been developed (**Figure 1.1**):

- The Indian River County Department of Emergency Services convened members of the LMS Working Group to oversee the LMS update process. (**Section 1.3.1**);
- The Indian River County Department of Emergency Services identified opportunities for individuals, jurisdictions, community organizations, and other interested stakeholders to become involved in the LMS update process;
- The Working Group reviewed/revised guiding principles for Indian River County (as a single entity composed of both the County and municipal entities) to use to address the issue of hazard mitigation;
- Indian River County Department of Emergency Services updated the community profile describing the County in terms of geography, population, infrastructure, economic resources, environmental resources, historic and cultural resources, critical facilities, and property and development trends (**Section 2.0, Community Profile**);
- Indian River County Department of Emergency Services reviewed and evaluated the existing legal, regulatory, and response framework in place to deal with hazard mitigation (**Section 3.0, Institutional Analysis**); The following key documents were reviewed as part of this capability assessment:
 - Indian River County 2020 Comprehensive (Growth Management) Plan (Mandatory Elements: Future Land Use, Transportation, Infrastructure, Conservation, Coastal Management, Intergovernmental Coordination, Housing, Recreation and Open Space, and Capital Improvements);
 - Indian River County Land Development Code;
 - Indian River County Comprehensive Emergency Management Plan;
 - Indian River County FMA and Community Rating System related plans;
 - Indian River County Planning Division July 2003 Community Development Report;
 - Indian River County Gifford Neighborhood Plan;
 - Vero Beach Comprehensive Plan (Mandatory Elements: Future Land Use, Transportation, Infrastructure, Intergovernmental Coordination, Conservation, Housing, Recreation and Open Space, Coastal Management, and Capital Improvements);
 - Sebastian Comprehensive Growth Management Plan (Mandatory Elements: Future Land Use, Transportation, Infrastructure, Housing, Recreation and Open Space, Intergovernmental Coordination, Conservation, Coastal Management, and Capital Improvements);

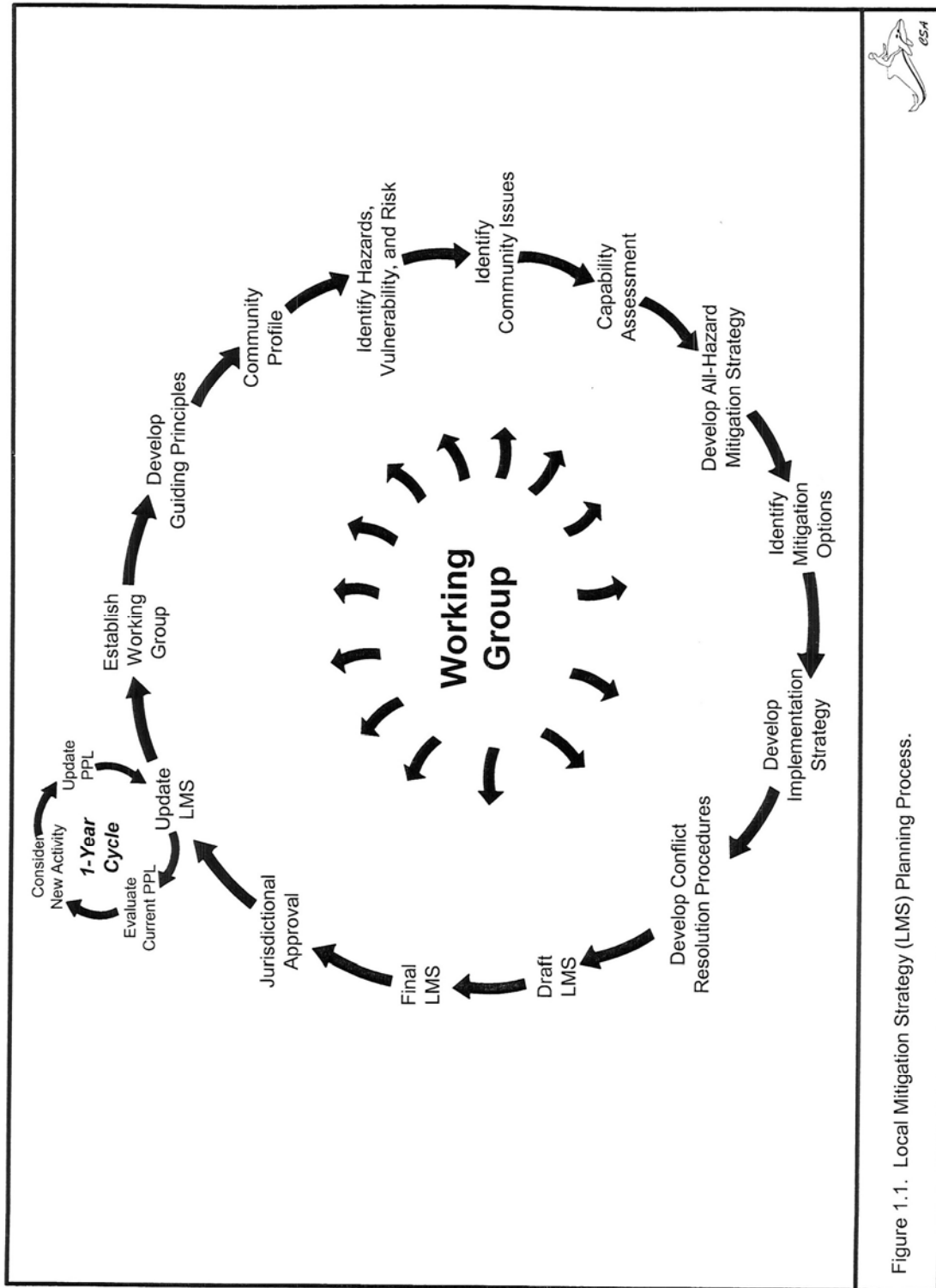


Figure 1.1. Local Mitigation Strategy (LMS) Planning Process.

- Orchid Comprehensive Growth Management Plan (Mandatory Elements: Future Land Use, Transportation, Infrastructure, Housing, Recreation and Open Space, Intergovernmental Coordination, Conservation, Coastal Management, and Capital Improvements);
- Fellsmere Comprehensive Growth Management Plan (Mandatory Elements: Future Land Use, Transportation, Infrastructure, Intergovernmental Coordination, Conservation, and Capital Improvements);
- Treasure Coast Regional Strategic Policy Plan, Emergency Management Element; and
- Florida Department of Environmental Protection (FDEP), Division of Water Facilities, Bureau of Beaches and Coastal Systems report entitled "Critical Erosion Areas in Florida."
- Indian River County Department of Emergency Services worked with the Working Group to review the known hazards to which the County is susceptible, discussed their ranges of impacts, and the individual vulnerabilities of the various jurisdictions and population centers within the County (**Section 4.0, Hazard Identification, Vulnerability, and Risk**);
- Indian River County Department of Emergency Services and the Working Group reviewed the description of mitigation options available to reduce risk (**Section 5.0, Mitigation Options**);
- An updated all-hazard mitigation strategy aimed at reducing the risks posed by natural hazards in Indian River County was reviewed and approved by the Working Group;
- Methods by which the Indian River County local governments can evaluate and prioritize proposed mitigation projects was reviewed (**Section 6.0, Implementation Strategy**);
- The conflict resolution procedure by which city and County governmental entities can resolve any differences that arise over prioritized mitigation projects or mitigation strategies during the update process was reviewed (**Section 6.0**);
- A process and schedule by which this entire Unified LMS will be reviewed, along with guidelines for updating the Project Prioritization List (PPL) was discussed (**Section 6.0**); and
- The PPL (**Section 6.0**) of mitigation projects was updated and cross-referenced with potential funding sources.

Various appendices are provided listing existing policies (**Appendix A**), mitigation options (**Appendix B**), mitigation funding sources (**Appendix C**), hazard data information sources (**Appendix D**), documentation of LMS participation (**Appendix E**), and acronyms (**Appendix F**).

1.3 LMS WORKING GROUP

Indian River County sought to involve a diverse group of individuals and organizations in planning for natural, technological, and societal hazards within the County. From a broad decision-making body to incorporating public comment to information dissemination, multiple methods of involving the jurisdictions, organizations, businesses, and citizens of Indian River County were employed. In designing the public participation process, input has been received from the existing LMS Working Group. The Working Group sought to enhance and expand opportunities for public involvement. The following graphic illustrates how the Working Group will expand participation. The Working Group

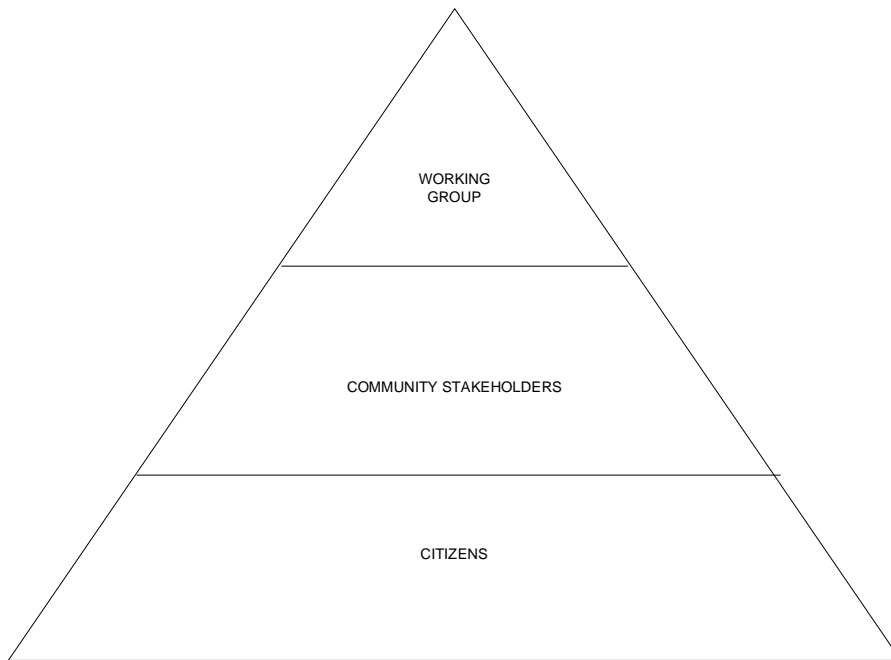
envisions a three-tiered participation process. Descriptions of each level of participation are discussed as follows.

1.3.1 Working Group

A representative Working Group (Working Group) oversees the Indian River County LMS process.

1.3.1.1 Role of Working Group

The Working Group serves as the policy development body for the LMS program. The role of the Working Group is to advise and assist in the formulation, implementation, administration, and refinement of the Unified Indian River County LMS. The Working Group shall represent the six governmental organizations and several community stakeholders located in Indian River County.



1.3.1.2 Composition

The following organizations were invited to participate on the Indian River County LMS Working Group.

- Indian River County Department of Emergency Services
- Indian River County Sheriff's Office
- Indian River County Community Development
- Indian River County Building Division
- Indian River County School Board
- Indian River County Chamber of Commerce
- Indian River County Environmental Health
- Indian River Medical Center

- Vero Beach Planning Department
- Sebastian Public Works
- Fellsmere
- Orchid
- Indian River Shores Public Safety
- American Red Cross (ARC)
- Indian River Citrus League
- Comcast
- Sebastian River Chamber of Commerce
- Gifford Front Porch Council
- BellSouth
- Florida Power & Light Company
- St. Johns Water Management District
- Indian River Farms Water Control District
- Indian River State College
- Florida Division of Forestry

All jurisdictions in Indian River County (Vero Beach, Fellsmere, Sebastian, Orchid, and Indian River Shores) participated in the development and revisions of this LMS plan by serving on the LMS Working Group and by reviewing, contributing and commenting on draft versions of the plan. These are the same jurisdictions participating since the inception of the LMS plan in 2005.

One representative from each of the organizations listed above was designated to be the contact person for that particular organization.

1.3.1.3 Working Group Responsibilities

The Steering Committee had the following responsibilities:

- To develop and revise the LMS as necessary;
- To coordinate all mitigation activities within the County;
- To set an order of priority for local mitigation projects; and
- To submit annual LMS updates to the Florida Division of Emergency Management by the last working weekday of each January. Updates shall address, at a minimum:
 - Changes to the hazard assessment;
 - Changes to the PPL;
 - Changes to critical facilities;
 - Changes to the repetitive loss list; and
 - Revisions to any maps.

The Working Group was collectively responsible for reviewing, analyzing and providing comments on all updated sections of the LMS provided by the Indian River County Department of Emergency Services. A formal voting process took place for approval of draft final and final sections of the LMS. Informal voting took place for issues other than approval of draft final or final sections of the LMS. The participating organization representatives were responsible for attending Working Group meetings, or arranging for another representative of the organization to attend the meeting in their absence.

1.3.1.4 Voting

The voting and approval process for the Working Group was as follows. Each organization listed in **Section 1.3.1.2** received one vote. A simple majority rules procedure was followed when a vote was required. If an organization's representative is not able to attend a meeting, another representative of the organization can assume the voting responsibilities of the designated representative. The LMS Coordinator is responsible for breaking any tie votes. The Director of Emergency Services for Indian River County has been designated as the LMS Coordinator.

1.3.1.5 Participation Requirement

- 1) Attend Working Group meetings;
- 2) Provide input and technical information to the planning process, (if available);
and
- 3) Disseminate information to others within represented sector.

1.3.2 Subcommittees

The LMS Coordinator is authorized to establish ad-hoc subcommittees as needed to further the goals and objectives of the LMS. These groups can be formed to address special issues and can be disbanded once the issue has been properly addressed. Subcommittee members need not be Working Group members, but may be any individual able to provide special expertise and knowledge about specific concerns addressed in the LMS.

1.3.3 Community Stakeholder Groups

Community stakeholder groups are any community group or organization with an interest in reducing the risks posed by natural hazards in Indian River County.

1.3.3.1 Role of Community Stakeholder Groups

In an effort to develop a mitigation planning process that is community based and focused on creating disaster resistant communities in Indian River County, community stakeholder groups were invited to participate. Stakeholders provide the process with valuable information about past, present, and future conditions within the community. Stakeholders were asked to participate in an effort to capture input that is representative of the diverse needs of citizens, businesses, and organizations in Indian River County.

1.3.3.2 Composition

Community stakeholder groups include any community organization that is not represented on the LMS Working Group and can range from neighborhood associations to local businesses, to civic clubs. These groups can provide data and information important in developing the LMS, and may become partners in mitigation activities at some point in the LMS process.

1.3.3.3 Responsibilities

Participation for community stakeholder groups is highly encouraged and voluntary. Groups can participate in the LMS process in the following manners:

- 1) Attend Working Group meetings; or
- 2) Provide input and technical information to the planning process; or
- 3) Review and comment on draft final sections of the LMS; or
- 4) Disseminate information to others within the stakeholder's organization.

1.3.4 Citizen Participation

1.3.4.1 Role of the Citizen

In an effort to develop a mitigation planning process that is community based and focused on creating disaster resistant communities in Indian River County, citizens are invited to participate. Citizens provide the process with valuable information about past, present, and future conditions within the community. Citizens were asked to participate in an effort to capture input that is representative of the diverse needs of citizens, businesses, and organizations in Indian River County. Citizens were made aware of the opportunity to participate in the LMS process via websites (e.g., County and municipal websites), television (e.g., local government channel), and newspapers. Documentation of the opportunity for public participation can be found in **Appendix E**.

1.3.4.2 Participation Responsibilities

Citizen participation is highly encouraged and voluntary. Individuals can participate in the LMS process in the following manners:

- 1) Review and comment on draft and final plans via County website or library system; or
- 2) Attend noticed public meetings.

1.3.5 New Jurisdictions/Entities

In the event of restructuring that duly adds, deletes, or merges jurisdictions within the County, the voting member rolls will be adjusted appropriately.

1.3.6 Documentation

Following each meeting, a summary will be prepared containing how solicitation was completed for that specific meeting along with any comments and suggestions made by the public and/or community stakeholder groups. For each meeting, a meeting summary, attendance list, public invite, public comments, and all other solicitation efforts concerning public comments will be located in **Appendix E** of the LMS.

In order to invite and promote the opportunity for broad participation, at a minimum, meeting notices and agendas will be posted through some combination of the following: newspaper ads or public service announcements, postings on County and municipal websites, announcements on the County's TV station, postings in County and municipal newsletters and calendars, and faxes and e-mailings to previous participants. The procedures of invitation will be documented along with comments in the meeting summaries located in **Appendix E** of the LMS. The various invitation notices are to ensure

the continuation of public participation in the LMS update process and other activities in the future.

RESOLUTION NO. 2010 - 059

A Resolution of
the Board of County Commissioners
of Indian River County, Florida,
for Approval of the 2010
Revised Indian River County
Unified Local Mitigation Strategy

WHEREAS, on February 22, 2005, Indian River County's updated Unified Local Mitigation Strategy (LMS) was adopted by Resolution #2005-023; and

WHEREAS, the Federal Emergency Management Agency requires that all Hazard Mitigation plans must be reviewed and updated as appropriate, and resubmitted to FEMA for approval within five (5) years; and

WHEREAS, FEMA staff has reviewed and approved Indian River County's hazard mitigation plan and determined that it is compliant with federal standards and is now ready for approval by the Board.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF INDIAN RIVER COUNTY, that:

1. The updated Unified Local Mitigation Strategy (a copy of which is located in the Clerk to the Board's Office) is hereby adopted as the official document for inclusion in the State-wide Hazard Mitigation Strategy.
2. The 2010 Revised Indian River County Unified Local Mitigation Strategy Plan will be forwarded to each municipality for their formal approval.

The Resolution was moved for adoption by Commissioner Davis. The motion was seconded by Commissioner Flescher, and, upon being put to a vote, the vote was as follows:

Chairman	Peter D. O'Bryan	Aye
Vice Chairman	Bob Solari	Aye
Commissioner	Wesley S. Davis	Aye
Commissioner	Joseph E. Flescher	Aye
Commissioner	Gary C. Wheeler	Aye

The Chair thereupon declared the Resolution duly passed and adopted this 13th day of July 2010.

Attest: J.K. Barton, Clerk

By: [Signature]
Deputy Clerk

**BOARD OF COUNTY COMMISSIONERS
INDIAN RIVER COUNTY, FLORIDA**

By: [Signature]
Peter D. O'Bryan, Chairman



Approved as to form and legal sufficiency:

By: [Signature]

Once the Local Mitigation Strategy has been adopted, insert adopted resolution for City of Vero Beach.

Once the Local Mitigation Strategy has been adopted, insert adopted resolution for Fellsmere.

Once the Local Mitigation Strategy has been adopted, insert adopted resolution for Town of Indian River Shores.

Once the Local Mitigation Strategy has been adopted, insert adopted resolution for Town of Orchid.

Once the Local Mitigation Strategy has been adopted, insert adopted resolution for City of Sebastian.

2.0 COMMUNITY PROFILE

This section describes the geography, population, infrastructure, property and development trends, economic resources, environmental resources, historic and cultural resources, and critical facilities within Indian River County and the municipalities therein. The three main sources of information for this section are the 2000 US Census, Enterprise Florida (2003), and University of Florida (2001).

2.1 GEOGRAPHY

Indian River County is located in southeast central Florida, along the Atlantic Ocean coast. The County has a total area of approximately 543 square miles (347,520 acres) of which 41.1 square miles (26,298 acres) are water, and 502 square miles (321,280 acres) are land area. Included in the land area are 5 municipalities containing approximately 37.2 square miles (23,830 acres).

Indian River County is about 33 miles wide from east to west and 22 miles long from north to south. In addition to the Atlantic Ocean, the County is bounded by Brevard County on the north, St. Lucie County on the south, Osceola County on the west, and Okeechobee County on the southwest. Indian River County receives an average of 53 inches of rain per year and sees approximately 127 days of rain per year.

Nearly two-thirds of the total land area is west of I-95; however, more than 90% of the population resides in the eastern third of the County. The City of Fellsmere is the only community in the western portion of the County. The land along the western boundary of the County is used primarily for range and pasture land with little residential development. To the east of that area is St. Johns Marsh, a large freshwater marsh extending the entire length of the County. Included in this significant wetland is the 6,000-acre Blue Cypress Lake. The land between the marsh and I-95 is devoted primarily to agriculture. Much of this land is drained marshland now used for citrus or pasture. Other than the City of Fellsmere in the north, there is little human settlement in this area.

The mainland topography of Indian River County is generally low in elevation, without significant deviation. However, two ridges parallel the coast, one about 1 mile inland from the Indian River with elevations up to 30 feet, the other about 10 miles inland with similar elevations. The coastal barrier islands have typical dune topography with dune elevations of about 15 feet.

The majority of the land in the County is devoted to agriculture. Residential, commercial, and industrial development occurs along the coastal barrier island and the western shore of the Indian River.

The climate of Indian River is mild subtropical, with average summer temperatures of about 79°F and average winter temperatures of about 62°F. Average rainfall is about 51 inches. Prevailing winds are from the southeast and east in the spring and summer, and from the northeast in the fall.

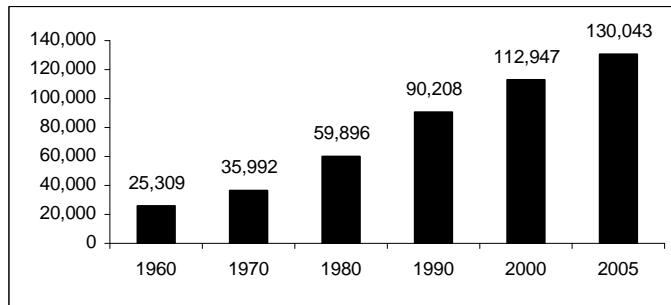
The drainage area of Indian River County is generally divided by the two geographic ridges that parallel the coast. Areas west of the inland ridge are relatively flat

and drain westward to the St. Johns Marsh, aided by extensive canals, which have been constructed for agricultural use. The basin area between the ridges is generally low and relatively flat. Drainage of the northern portion of this basin area is provided by South Prong Creek and a network of manmade canals. The central and southern portions have essentially no natural watercourses. These areas are drained by an extensive network of manmade canals and ditches that are interconnected and joined with Main Relief, North Relief, and South Relief Canals and discharge into the Indian River.

2.2 POPULATION

In 2000, the estimated countywide population was 112,947, up 25% from 1990 (**Table 2.1**). The Treasure Coast has experienced tremendous growth since the 1960's, and this trend is expected to continue. According to a FEMA Post-Disaster Recovery and Redevelopment Guide, St. Lucie County was ranked 20th of the Atlantic and Gulf Coast counties with the largest population growth rates between 1960 and 1990. The County's growth rate during this time period was 256.4%. **Figure 2.1** illustrates population growth in Indian River County between 1960 and 2000. **Figure 2.2** illustrates the projected population according to University of Florida (2001) for Indian River County between 2010 and 2030.

Figure 2.1. Population growth, Indian River County, 1960 – 2005



Source: University of Florida, 2006

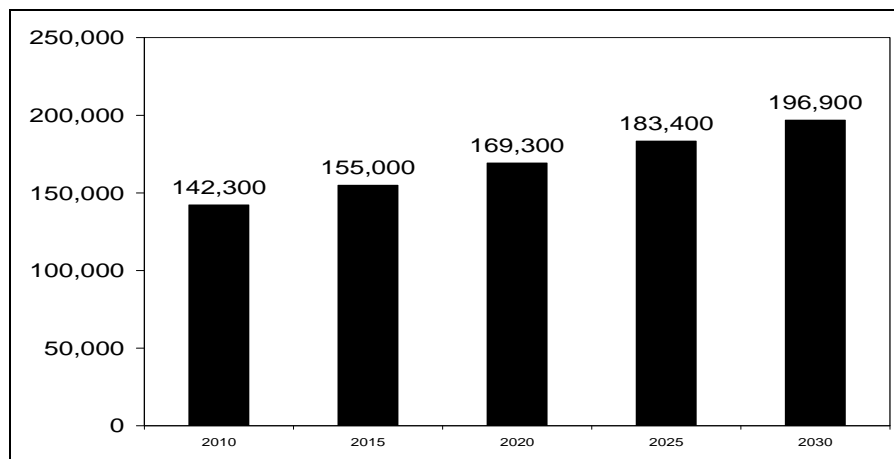


Figure 2.2. Projected population, Indian River County, 2010 – 2030.
Source: University of Florida, 2009

Table 2.1. Population growth in Indian River County.

City/County	1980 Census Data	1990 Census Data	2000 Census Data	% Increase (1980 – 1990)	% Increase (1990 – 2000)	2010 (Projected)	% Increase (2000 – 2010)
Vero Beach	N/A	17,350	17,705	N/A	2.0	N/A	N/A
Sebastian	N/A	10,205	16,181	N/A	58.6	N/A	N/A
Fellsmere	N/A	2,179	3,813	N/A	75.0	N/A	N/A
Indian River Shores	N/A	2,278	3,448	N/A	51.4	N/A	N/A
Orchid	N/A	10	140	N/A	130	N/A	N/A
Unincorporated	N/A	58,186	71,660	N/A	12.5	N/A	N/A
Countywide Totals	59,896	90,208	112,947	50.6	25.2	134,300	18.9

Sources: University of Florida, 2001; U.S. Census, 1990, 2000.

There are five municipalities in the County: Fellsmere, Indian River Shores, Orchid, Sebastian, and Vero Beach. In terms of population, there is significant variation among them. The 2000 estimate of population for Fellsmere is 3,813. Fellsmere's population is expected to grow by 70% between 2005 and 2030. Indian River Shores is estimated to have a population of 3,443 and is expected to grow by 43% in the next 30 years. Orchid has a population of 140 and is expected to grow 115% in the next 30 years. Sebastian has a population of 16,181 and is expected to grow 84% by 2030. Vero Beach has a population of 17,705 and is expected to grow by only 4% by 2030. The County Community Development Department has projected populations for municipalities as well as unincorporated communities. Those areas with growth rates greater than 50% between 2005 and 2030 include Sebastian, Fellsmere, Orchid, Florida Ridge, North Beach, and Wabasso Beach.

Other significant population characteristics include age, race, income, and special needs. The median age of Indian River County residents is 47. In 2008, twenty-five percent of the County is estimated to be over the age of 65. This is significant because elderly populations may require additional or special assistance during a disaster. Because cultural differences can influence an individual's response to an event, it is important to define the County population in terms of race. Approximately 10% of Indian River County's residents are Hispanic or Latino, while 9% are Black or African American. The County's Hispanic population more than doubled between the years of 1990 and 2000. Indian River County's African American population grew nearly 21% between 1990 and 2000 according to the U.S. Census. Nearly 11% of residents speak a language other than English at home. Language is an important consideration when developing preparedness materials for residents. The median household income in Indian River County is \$47,563 (2007), and 9.7% (2007) of families are considered to live below the poverty level. Per capita personal income in Indian River is approximately 28% higher than the State average.

2.3 INFRASTRUCTURE

2.3.1 Public Buildings

Central Services at the County is responsible for 1.4 million square feet of building space. In addition, there are a total of 12 fire stations operating in the County, as well as a total of 20 public schools, which are operated by the Indian River County School District.

2.3.2 Transportation

There are two major traffic corridors (i.e., Interstate 95 [I-95] and the Florida Turnpike), U.S. Highway 1, the main north-south route serving the coastal areas, and the Florida East Coast Railroad. The major State Road (SR) in Indian River County is SR 60, which constitutes the County's major east-west traffic corridor.

2.3.3 Utilities

Florida Power & Light Company and Vero Beach Electric provide electric service in the County. The cities of Sebastian and Vero Beach, as well as Indian River County, provide water and sewer services in the County. NVL-City Gas provides gas service to County residents. Telephone companies that provide service in the County include AT&T, BellSouth, Sprint, and MCI.

2.4 PROPERTY AND DEVELOPMENT

Indian River County has seen significant land use changes over the last 50 years. **Table 2.2** illustrates the change in historic land use between 1943 and 2007.

Table 2.2. Land use changes, Indian River County, 1943 – 2007.

Land Use	Percent Change			
	1943	1969	1984	2007
Urban	3.2%	9.6%	11.5%	15.0%
Agriculture	27.5%	46.7%	60.5%	51.4%
Natural	69.3%	43.7%	28.0%	33.5%

Source: Indian River County Comprehensive Growth Management Plan – Future Land Use Element.

Residential land use in unincorporated Indian River County constitutes the largest acreage of land developed for non-agricultural purposes. While individual residences may be found in all areas of the County, the vast majority are located within 11 miles of the coastline, east of I-95. The exception to this is the City of Fellsmere, located about 2½ miles west of I-95 on County Road (CR) 512, in the northern part of the County.

Commercial land uses in Indian River County are confined primarily to commercial/industrial nodes. Nodes are areas with defined boundaries containing a concentration of similar land uses in a non-linear pattern surrounded by other land uses. Existing commercial/industrial nodes contain approximately 5,235 acres of land. Currently, 43% of the total commercial/industrial node acreage (or 2,394 acres) is developed with commercial and/or industrial uses. The remaining 57% of node acreage is either vacant or developed with noncommercial or non-industrial uses such as agricultural, residential, public, and other uses.

Agricultural land use constitutes the largest land use category in the County. As of 2007, more than 136,000 acres were in agricultural use. This represents over 51% of the County area. Agricultural land uses are located throughout the County. This includes virtually all land west of I-95 except the City of Fellsmere, the St. John’s Marsh, and a small portion of the I-95/SR 60 Commercial/Industrial Node. There are also significant areas of agricultural land within the area bounded by I-95, 58th Avenue, SR 60, and the City of Sebastian. In the south County, land between I-95 and 43rd Avenue also contains large agricultural areas; however, several other significant land uses in this area include the Oslo Road/I-95 Commercial/Industrial Node, the County Landfill, and the State Department of Corrections facility. Other areas that contain agricultural land are the northern portion of the barrier island and the area along the Indian River Lagoon between Vero Beach and Sebastian.

The mainland portion of Vero Beach shares its boundaries with the County on the north, west, and south sides. At the northern limits of the city, east of U.S. Highway 1, low density residential development and a golf club constitute the primary city land uses; however, mangrove wetlands are found along the Indian River. West of U.S. Highway 1, the Vero Beach Municipal Airport occupies the northern limit of the city, west to 43rd Avenue. A large portion of the airport perimeter land is undeveloped vegetated land, which provides a

buffer for the high density Gifford area of the County. Most of the area east of 43rd Avenue and north of 26th Street constitutes undeveloped, vegetated land; a golf course; and low density residential development.

The western limits of the city constitute 43rd Avenue from 26th Street south to 14th Street. Dodgertown, the former spring training complex of the Los Angeles Dodgers, occupies land south to the main canal. Land from the canal south to 16th Street (including the SR 60 intersection) is predominately commercial. The County has a commercial node at the SR 60/43rd Avenue intersection. Medium density residential uses dominate 43rd Avenue from 16th Street to 14th Street.

The southern limits of the city, along 14th Street, are dominated by single-family residential development east to old Dixie Highway and the city cemetery. The land uses in the city from the cemetery north and east along the U.S. Highway 1 corridor to 6th Avenue are dominated by commercial uses; however, several older residential areas are interspersed. Moderate density residential uses dominate east of 6th Avenue to the Indian River. The city power plant and wastewater treatment plant are located along the river at the 17th Street Bridge. Land uses on the barrier island at the city limits are restricted to single-family homes.

The City of Sebastian, the largest municipality in the County, is located in the northern area of the mainland, along the Indian River. The most significant land use feature of Sebastian is low density single-family residential. This suburban land pattern dominates the southern and western limits of the city. The second most dominant land use is the municipal airport. This general aviation facility is located in the northwest portion of the city. Land uses east of the airport consist primarily of undeveloped land. Industrial and commercial uses are concentrated along the U.S. Highway 1 corridor in the northern portion of the city. The eastern boundary of Sebastian is an irregular shape and consists primarily of residential uses except that commercial and industrial uses are present where the city limits extend to the U.S. Highway 1 corridor or the Indian River Lagoon.

The City of Fellsmere is the only municipality west of I-95. The city is laid out on a grid pattern in the predominantly agricultural area of the northern County. The core area of Fellsmere is easily divided into quadrants using CR 512 and Broadway as the axes. The northwest quadrant is developed in a single-family residential pattern, and the southeast quadrant is partially developed with single-family homes and mobile homes. The southeast quadrant is primarily undeveloped; however, mobile homes are present along the city's southern limit. The northeast quadrant is a partially developed single-family area. A commercial area exists that the central intersection and between the northeast and southeast quadrants.

Indian River Shores is an affluent residential community on the barrier island. The Indian River provides a common boundary between this municipality and the County on the west. On the south, the town abuts the City of Vero Beach, and the Atlantic Ocean forms its eastern limits. Only on the north does it share a common land boundary with the County. Land uses along this common boundary consist of single and multi-family residences in planned residential developments. The desirability of ocean and other waterfront lots has resulted in the barrier island becoming an area dominated by high income housing.

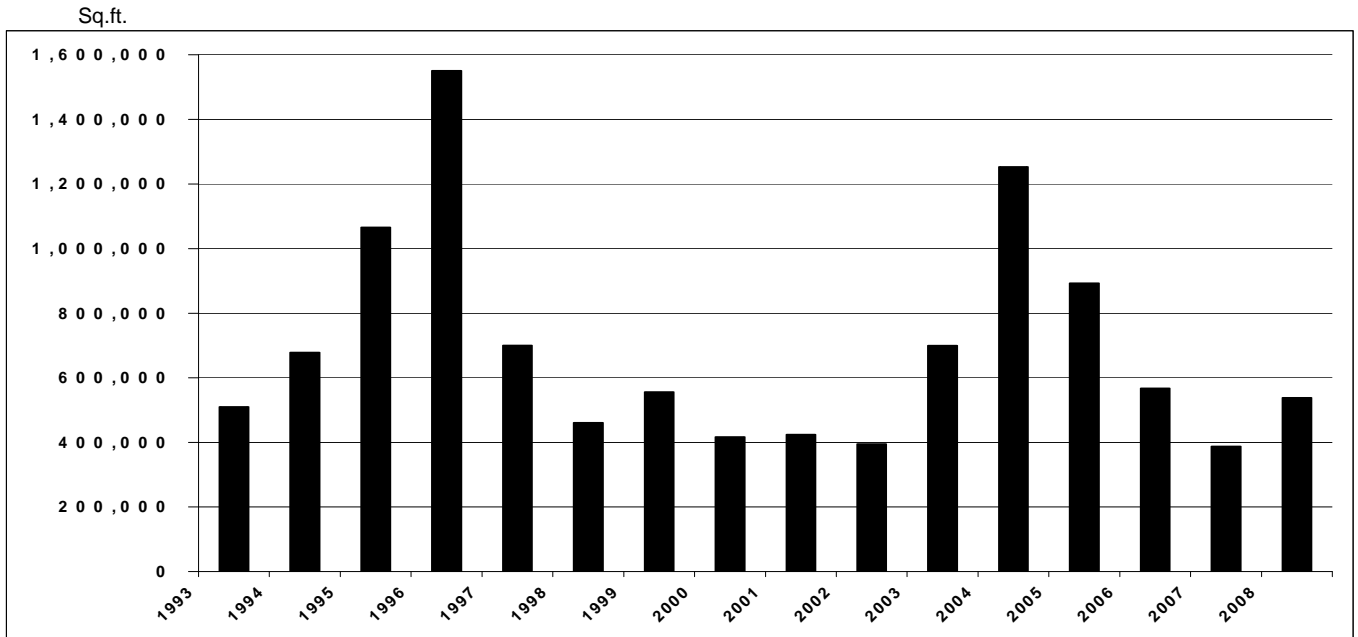
The Town of Orchid is the second municipality located exclusively on the barrier island. At the present time, land uses in the town consist of developed and undeveloped single-family lots, a golf course, a beach club, and approximately 110 acres of wetland along the Indian River Lagoon. The wetland is protected under a conservation easement. Although unlikely to be developed at the maximum allowable density, the town's approved master plan allows up to 425 residential units, approximately 340 of which are planned to be single-family homes. The town's master plan also calls for limited commercial development on +/- 7 and +/-3 acre parcels located on CR 510 and SR A1A, respectively.

Table 2.3 displays community characteristics within Indian River County.

According to the Indian River County Property Appraiser's 2007 data, the County contains approximately 15,557 acres of vacant land. Of that total, 2,489 acres are classified as vacant commercial/industrial, and 13,068 acres are classified as vacant residential. Of the 13,068 acres of vacant residential land in 2007, 9,861 acres consisted of undeveloped land. The remaining 3,207 acres of vacant residential land consists of vacant lots in existing, platted subdivisions. Of these subdivisions, Vero Lake Estates contains the largest number of vacant lots. As of 2007, there were 10,098 vacant lots in existing subdivisions within the unincorporated area of the county.

In the year 2008, commercial and industrial building permits were issued for a total of 538,513 square feet. Sixty-one percent of the permits were located on unincorporated County land, while 27% and 12% were located in Vero Beach and Sebastian. **Figure 2.3** illustrates commercial development trends within the County between 1993 and 2008. As shown in that figure, there were surges in building permit activity for industrial and commercial uses in the mid 1990's and in 2004 and 2005. The first surge in commercial/industrial building permit activity was largely associated with the construction of the Indian River Mall and nearby commercial developments along S.R. 60. The second surge in commercial building permit activity can be attributed to the effects of the 2004 hurricanes as well as an economic boom that brought new commercial/industrial uses to the county.

Figure 2.3. Commercial development trends, Indian River County, 1993 – 2008.



Source: Indian River County Community Development Department (2009).

Table 2.3. Community characteristics within Indian River County.

City	Location	Urban/Rural	Community Character (Residential/Working/ Retirement)	Economic Base (Industrial/Agricultural/ Retirement/Business)
Fellsmere	Inland	Rural	Residential	Residential/Industrial
Indian River Shores	Intracoastal	Urban	Residential	Residential/Commercial
Orchid	Coastal	Rural	Working	Agricultural
Sebastian	Inland/Intracoastal	Urban	Residential	Business
Vero Beach	Coastal	Urban	Residential/Working	Business

In 2005, Indian River County had a total of 73,798 housing units comprised mostly of single-family detached units (66%), mobile homes (10%), and multi-family units (24%). The County's Comprehensive Growth Management Plan estimates that more than 6,700 of these housing units are for seasonal residents. Almost 59% of homes in Indian River County were built prior to 1990. Nearly 66% of residents own their own home in Indian River County.

Table 2.4 displays U.S. Department of Housing and Urban Development building permit data for the County and its municipalities.

Table 2.4. Building permit data, Indian River County, 1980 – 2000.

Location	1980		1990		2000	
	Single-Family	Multi-Family	Single-Family	Multi-Family	Single-Family	Multi-Family
Unincorporated County	667	205	560	210	816	759
Fellsmere	7	20	14	0	20	5
Indian River Shores	29	26	36	0	40	18
Orchid	0	0	8	0	45	30
Sebastian	440	10	372	8	269	18
Vero Beach	71	119	50	8	24	15
Total	1,214	380	1,040	226	1,214	845

Source: U.S. Department of Housing and Urban Development, 2003.

During 2008, Indian River County and its municipalities had 615 single-family housing starts (new construction) and 40 multi-family housing starts.

The County's Future Land Use Element of the Comprehensive Plan has identified several areas where development opportunities exist. Those areas include the corridor planning opportunities along CR 510, U.S. Highway 1, and SR 60, potential for agricultural planned communities that allow clustered residential on agricultural lands, and nodal development at Oslo Road and 74th Avenue.

2.5 ECONOMIC RESOURCES

There are two Chambers of Commerce in Indian River County, with locations in Vero Beach and Sebastian. In 2000, the top three occupations were management/professional, sales and office, and service jobs. In 2007, the top three industries were retail, leisure and hospitality; health, education and social services; and construction (**Table 2.5**). According to the Indian River Chamber of Commerce (2008), the top three private sector employers in the County are Indian River Medical Center (1,706), Publix Supermarkets (1,104), and Piper Aircraft (1,063).

Table 2.5. Industry classifications within Indian River County for 2007.

Industry Classification	Employees	% of Total Employment	Annual Payroll	Average Annual Wage
Agriculture, Forestry, & Fishing	2,662	4.4%	\$62,429,224	\$23,452
Construction	5,779	9.6%	\$209,153,560	\$39,162
Manufacturing	2,323	3.8%	\$89,268,244	\$38,428
Transportation, Trade & Utilities	10,048	3.8%	\$272,220,410	\$27,092
Wholesale Trade	914	1.5%	\$48,668,672	\$53,248
Retail, Leisure & Hospitality	14,204	23.5%	\$315,016,310	\$22,178
Finance, Insurance, & Real Estate	2,715	4.5%	\$123,179,550	\$45,370
Health, Education & Social Services	10,253	17.0%	\$393,438,360	\$38,373
Public Administration	3,144	5.2%	\$128,665,050	\$40,924

Job Grant funds are available to businesses included in the list of the county's target industries indicated in the Economic Development Element of the County Comprehensive Plan. Successful applicants will create at least 5 new full-time jobs (employment positions that are scheduled for at least 35 hours per week). The salary or wage of each new qualified job listed on the application will be equal to or exceed 75% of the county's average annual salary/wage level. **Table 2.6** displays the grant calculation breakdown. Bonuses also are available to businesses located within an Enterprise Zone.

Table 2.6. Job Grant Funds, Indian River County, 2009 (Planning Department).

# of Avg. Wage of New Qualified Jobs	Grant Amount/Job
75% of county average wage	\$3,000 per job
100% of county average wage	\$5,000 per job
150% of county average wage	\$7,000 per job

Source: Indian River County (2009).

2.6 ENVIRONMENTAL RESOURCES

Indian River County maintains approximately 28 parks within the County, totaling over 3,000 acres. There are a number of natural areas within the County including the Oslo Riverfront Conservation Area, Pelican Island National Wildlife Refuge (NWR), St. Sebastian River Buffer Preserve, and the Archie Carr NWR. The Oslo Riverfront Conservation Area consists of 298 acres on the Indian River Lagoon. The Pelican Island NWR was the first NWR in the nation. The Archie Carr NWR is located on a barrier island between the Indian River and Brevard County, north of the Wabasso Causeway and south of the Sebastian Inlet. The refuge is an important site for turtle nesting.

2.7 HISTORIC AND CULTURAL RESOURCES

According to the National Register of Historic Places, there are sixteen designated places in Indian River County. In Vero Beach, designated places include the Driftwood Inn and Restaurant, Judge Henry F. Gregory House, Hallstrom House, Theodore Hausmann Estate, Indian River County Courthouse, Old Palmetto Hotel, Pelican Island NWR, Old Vero Beach Community Building, Vero Railroad Station, and the Vero Theatre. In Fellsmere, the Marian Fell Library, Fellsmere Public School, and First Episcopal Church are also designated. The Jungle Trail in Orchid as well as the Bamma Vickers Lawson House and the Spanish Fleet Survivors and Salvors Campsite in Sebastian are also listed on the National Register.

Annual cultural events and festivals in Indian River County include the Center for the Arts, Frog Leg Festival, Riverside Theatre, and Under the Oaks Arts Show.

2.8 CRITICAL FACILITIES

There are many critical facilities located within the County. Certainly, hospitals and medical facilities provide important services during disasters. The medical service facilities in Indian River County include Indian River Medical Center and Sebastian River Medical Center. According to the Health Information Site of the Agency for Health Care Administration (2009) Indian River County has a total of 6 nursing homes with 645 beds and 20 assisted living facilities with 914 beds. The County has two senior centers, which serve a growing elderly population.

Lines of communication are critical in providing information to the public before, during, and after a disaster. There are nine local radio stations broadcasting in Indian River County including:

- WAXE-AM (1370)
- WTTB-AM (1490)
- WQCS-FM (88.9)
- WSCF-FM (91.9)
- WGYL-FM (93.7)
- WOSN-FM (97.1)
- WJKD –FM (99.7)
- WCZR-FM (101.7)
- WQOL-FM (103.7)

There is one local television station – WWCI. Locally printed newspapers include the Sebastian Sun and the Vero Beach Press Journal.

Fire stations and Division of Forestry facilities are critical in the event of having to battle wildland fire. Indian River County Fire Rescue has a total of 12 fire stations located throughout the County.

3.0 INSTITUTIONAL ANALYSIS

In the mitigation planning process, it is not only important to identify which hazards a community is at risk from, it also is important to identify the resources the community has available to prepare for, mitigate against, respond to, and recover from natural, technological, or societal hazards. This section outlines the current resources available to Indian River County to reduce the risks posed by the hazards identified in **Section 4.0**. Mitigation programs, policies, and projects on the Federal, State, regional, and local levels are described and documented in this section. Sources of intergovernmental coordination, methods of strengthening the role of local governments, and background on private sector involvement also are documented.

3.1 FEDERAL GOVERNMENT

3.1.1 FEMA

The FEMA has the lead Federal role in natural hazard mitigation, preparation, response and recovery. FEMA has several programs aimed at reducing the risks posed by natural hazards in communities nationwide.

3.1.1.1 PDM Program

The PDM Program was authorized by §203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act), 42 USC, as amended by §102 of the Disaster Mitigation Act of 2000. Funding for the program is provided through the National Pre-Disaster Mitigation Fund to assist states and local governments in implementing cost-effective hazard mitigation activities that complement a comprehensive mitigation program. The Act establishes criteria for State and local hazard mitigation planning. Local governments applying for PDM funds through the states will have to have an approved local mitigation plan prior to the approval of local mitigation project grants. States also will be required to have an approved standard State mitigation plan in order to receive PDM funds for State or local mitigation projects.

3.1.1.2 National Flood Insurance Program (NFIP)

The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

3.1.1.3 Community Rating System (CRS)

The NFIP's CRS was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet the three goals of the CRS: 1) reduce flood losses; 2) facilitate accurate insurance rating; and 3) promote the awareness of flood insurance. There are ten CRS classes: Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction. The CRS recognizes 18 creditable activities, organized under four categories numbered 300 through 600: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. Through Various flood plain management activities and coordination with FEMA, Indian River County has lowered its CRS class to 6.

3.1.1.4 Map Modernization

The goal of FEMA's Map Modernization Plan is to upgrade the 100,000 panel flood map inventory by

- developing up-to-date flood hazard data for all floodprone areas nationwide to support sound floodplain management and prudent flood insurance decisions;
- providing the maps and data in digital format to improve the efficiency and precision with which mapping program customers can use this information;
- fully integrating FEMA's community and State partners into the mapping process to build on local knowledge and efforts;
- improving processes to make it faster to create and update the maps; and
- improving customer services to speed processing of flood map orders and raise public awareness of flood hazards.

3.1.1.5 Flood Mitigation Assistance (FMA) Program

The goal of the FMA Program is to reduce or eliminate claims under the NFIP. FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants.

3.1.1.6 National Hurricane Program

The National Hurricane Program conducts and supports many projects and activities that help protect communities and their residents from hurricane hazards. Three key components of the Program are Response and Recovery; Planning, Training, and Preparedness; and Mitigation.

3.1.1.7 Other Programs

The National Mitigation Strategy was developed to provide a framework for reducing the exposure of all Americans to the catastrophic losses caused by natural

disasters. In addition, FEMA sponsors the Mitigation Assistance, Disaster Preparedness Improvement Grant, Community Assistance, and Fannie Mae Pilot Loan Programs.

3.1.2 United States Environmental Protection Agency (EPA)

The EPA is the lead Federal agency for hazardous materials issues and planning. The EPA is responsible for implementing the Emergency Planning and Community Right-to-Know Act (EPCRA). EPCRA establishes requirements for Federal, State, and local governments, Native American tribes, and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous materials and toxic chemicals. The Community Right-to-Know provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities, working with facilities, can use the information to improve chemical safety and protect public health and the environment. The EPA also sponsors several grant programs focusing on environmental health, including Clean Water Act Section 319 Grants, Brownfields Economic Redevelopment Grants, and the Sustainable Development Challenge Grant.

3.1.3 United States Forest Service (USFS)

The Fire and Aviation Management part of the USFS is a diverse group of people working to advance technologies in fire management and suppression, maintain and improve the extremely efficient mobilization and tracking systems in place, and reach out in support of our Federal, State, and international fire partners.

3.1.4 United States Fish and Wildlife Service (USFWS)

The USFWS oversees the implementation of the Coastal Barrier Resources Act (CBRA). The purpose of CBRA was to eliminate Federal development incentives on undeveloped coastal barriers, thereby preventing the loss of human life and property from storms, minimizing Federal expenditures, and protecting habitat for fish and wildlife. Coastal barriers are landscape features that protect the mainland, lagoons, wetlands, and salt marshes from the full force of wind, wave, and tidal energy.

3.1.5 United States Department of Commerce (DOC)

The National Oceanic and Atmospheric Administration (NOAA) located within the DOC conducts research and gathers data about the global oceans, atmosphere, space, and sun, and applies this knowledge to science and service that touch the lives of all Americans. The DOC manages the Coastal Zone Management Program on the national level. The Economic Development Administration (EDA) within the DOC administers EDA Public Works & Infrastructure Development Grants to promote long-term economic development and assist in the construction of public works and development facilities needed to initiate and support the creation or retention of permanent jobs in the private sector in areas experiencing substantial economic distress.

3.1.6 National Weather Service (NWS)

NWS provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters, and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a

national information database and infrastructure, which can be used by other governmental agencies, the private sector, the public, and the global community.

3.1.7 United States Geological Survey (USGS)

The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

3.1.8 United States Army Corps of Engineers (USACE)

In addition to building projects, the USACE, through its Flood Plain Management Services, advises communities, industries, and property owners on protection measures they can take themselves, such as zoning regulations, warning systems, and flood proofing. Last year this service responded to more than 44,000 requests for information. The value of property protected by this program is an estimated \$6.2 billion. USACE also manages beach erosion control projects, aquatic restoration programs, floodplain management initiatives, and emergency bank protection projects.

3.1.9 United States Fire Administration (USFA)

As an entity of the Department of Homeland Security and the Federal Emergency Management Agency, the mission of the USFA is to reduce life and economic losses due to fire and related emergencies, through leadership, advocacy, coordination, and support.

3.1.10 National Response Team (NRT)

The NRT is made up of 16 Federal agencies, each with responsibilities and expertise in various aspects of emergency response to pollution incidents. With nationwide responsibilities for interagency planning, policy, and coordination, the NRT ensures that the most valuable tool in an emergency — readiness — is available for pollution incidents of all sizes and kinds. Prior to an incident, the NRT provides policy guidance and assistance. During an incident, the NRT provides technical advice and access to resources and equipment from its member agencies. The EPA serves as chair of the NRT, and the U.S. Coast Guard serves as vice-chair. This interagency planning and coordination framework is replicated at the regional, sub-regional, and local levels. In addition to interagency coordination, the NRT also engages the private sector in prevention, preparedness, and response efforts. The NRT encourages innovation and collaboration to increase the effectiveness and reduce the cost of industry compliance with planning and response regulations. The NRT receives no direct appropriations for its activities.

3.1.11 United States Department of Housing and Urban Development (HUD)

HUD sponsors a number of programs that can be used to further the goals of hazard mitigation within a community. The Community Development Block Grant (CDBG) Small Cities Program provides funding to improve local housing, streets, utilities, and public facilities in small cities. Disaster Recovery Initiative funds are provided for disaster relief, long-term recovery, and mitigation activities in areas affected by a presidential disaster declaration.

3.1.12 United States Department of the Interior (USDOI)

USDOI sponsors several programs that can help further mitigation. The Federal Land-to-Parks Transfer Program provides funds to identify, assess, and transfer available surplus Federal real property to State and local entities for use as parks, recreation areas, and open space. USDOI also supports land acquisition programs, the North American Wetland Conservation Fund, Partners for Fish and Wildlife, and the Rivers, Trails, and Conservation Assistance Program.

3.1.13 United States Department of Agriculture (USDA)

USDA sponsors the following hazard-related programs: Emergency Watershed Protection Program, Watershed Surveys and Planning, Small Watershed Program, and Rural Utilities Service Water and Waste Disposal Program.

3.1.14 United States Department of Transportation

The Federal Highway Administration sponsors a transportation enhancement program that provides funds for transportation enhancements. The Federal Transit Administration offers funding programs related to transportation capital expenses including Section 5309 Capital Funds.

3.2 NON-GOVERNMENT

3.2.1 Firewise Communities USA

Firewise Communities/USA is a project of the National Wildfire Coordinating Group's Wildland/Urban Interface Working Team and is the newest element of the Firewise program. It provides citizens with the knowledge necessary to maintain an acceptable level of fire readiness, while ensuring firefighters that they can use equipment more efficiently during a wildland fire emergency. The program draws on a community's spirit, its resolve, and its willingness to take responsibility for its ignition potential.

3.2.2 Institute for Business and Home Safety (IBHS)

IBHS is a nonprofit association that engages in communication, education, engineering, and research. The goal of IBHS is to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters.

3.2.3 American Red Cross (ARC)

Although the ARC is not a government agency, its authority to provide disaster relief was formalized when, in 1905, the ARC was chartered by Congress to "carry on a system of national and international relief in time of peace and apply the same in mitigating the sufferings caused by pestilence, famine, fire, floods, and other great national calamities, and to devise and carry on measures for preventing the same." The Charter is not only a grant of power, but also an imposition of duties and obligations to the nation, to disaster victims, and to the people who generously support its work with their donations.

3.2.4 National Fire Protection Association (NFPA)

The mission of the international nonprofit NFPA is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically-based consensus codes and standards, research, training, and education.

3.2.5 Association of State Floodplain Managers (ASFPM)

ASFPM goals include reducing the loss of human life and property damage resulting from flooding, preserving the natural and cultural values of floodplains, promoting flood mitigation for the prevention of loss and the wise use of floodplains, and avoiding actions that exacerbate flooding.

3.3 STATE GOVERNMENT

3.3.1 Florida Department of Community Affairs (FDCA)

The FDCA is the State's land planning agency. It is comprised of a number of divisions, including the Division of Emergency Management (DEM). The mission of the Division is to respond to emergencies, recover from them, and mitigate against their impacts. DEM provides FDCA with operational and programmatic guidance as articulated in the State hazard mitigation plan to promote the goals and objectives of the nationally-based National Mitigation Strategy coordinated by FEMA.

The FDCA has the lead role in coordinating State resources to support local government unless the scope of the emergency warrants a higher degree of State involvement. This may occur when emergencies involve multi-jurisdictional hazards, when local governments believe the emergency is beyond the capabilities of local resources, or when the Governor determines there is an overriding concern for the safety of the public. For these situations, the Governor can designate the primary responsibility for emergency response to the State by issuing an Executive Order under the provisions of Section 252.36, Florida Statutes (F.S.).

The DEM is the designated State Warning Point in the event of a hazardous materials incident. As such, the DEM is responsible for receiving notification of an emergency from the County Communications Coordinator, and coordinating the request(s) for County support, if requested. The DEM is responsible for assisting Local Emergency Planning Committees (LEPCs) in providing warnings and instructions to the general public. Other DEM programs include the Emergency Management Preparedness and Assistance Grant, Residential Construction Mitigation Program, and the Florida Warning and Information Network.

3.3.2 Florida Division of Forestry (FDOF)

Over the past several years, extensive damage has resulted from wildland fire. The FDOF has major responsibility for protecting forest lands and the public from the effects of wildland fire. Local fire-rescue departments have primary responsibility for structural fires. They also are the first responders to all fires. If the local fire-rescue department has determined that a wildland fire event is beyond its capacity to fight, the local fire-rescue department can request assistance from the FDOF. When that occurs, an incident

command control is established with the State and local fire-rescue departments working together to extinguish the wildland fire.

3.3.3 Florida Department of Environmental Protection (FDEP)

The FDEP Bureau of Beaches and Wetland Resources oversees the listing of critical erosion areas within the state. The Florida Geological Survey, housed in FDEP, is the State lead on geologic hazards such as sinkholes. FDEP sponsors two key mitigation related funding programs – the Revolving Fund Loan Program for WasteWater Treatment and the Pollution Control Bond Program. FDEP also is home to the State Coastal Management Program. The Florida Coastal Management Program (FCMP) coordinates among local, State, and Federal entities involved in coastal management activities. In addition to working with FDEP’s programs, the FCMP coordinates among the eight State agencies, five water management districts, and local governments that have responsibilities for coastal management under the federally-approved FCMP. The FCMP also develops partnerships with local communities to actively solve problems related to coastal development.

3.3.4 Florida Fish and Game Conservation Commission

The Fish and Game Conservation Commission sponsors environmental education programs aimed at educating adult Floridians about population growth, habitat loss, and coastal and fresh water ecosystems.

3.3.5 Florida Inland Navigation District (FIND)

FIND provides assistance on certain waterway related projects including navigation channel dredging, channel markers, navigation signs or buoys, boat ramps, docking facilities, fishing & viewing piers, waterfront boardwalks, inlet management, environmental education, law enforcement equipment, boating safety programs, beach renourishment, dredge material management, environment mitigation, and shoreline stabilization.

3.3.6 Florida Department of Transportation (FDOT)

FDOT maintains Federal and State roads as well as airport construction and zoning and various other types of transportation administration.

3.3.7 Building Officials Association of Florida (BOAF)

BOAF coordinates building code enforcement among local building officials.

3.3.8 Florida Department of Insurance (FDI)

FDI helps finance the reconstruction of communities following a disaster.

3.3.9 Agency for Health Care Administration (AHCA)

The Agency for the Health Care Administration oversees hospital construction and various health testing services.

3.3.10 Florida Department of Business and Professional Regulation (FDBPR)

The FDBPR oversees elevator maintenance and safety, building inspection, engineering, architecture, and construction contractors.

3.3.11 Florida Department of Corrections (FDOC)

The FDOC builds prisons, local detention facilities, and private contract facilities.

3.3.12 Florida Department of Education (FDOE)

The FDOE oversees school construction and maintenance. The department also has an emergency planning program that focuses on hazardous materials accident preparedness.

3.3.13 Florida Department of Management Services (FDOMS)

The FDOMS manages State public buildings and personnel services.

3.3.14 Florida Department of State

The Division of Historical Resources is one of seven divisions within the Department of State, and the State agency responsible for promoting the historical, archaeological, museum, and folk culture resources in Florida. The Division Director serves as Florida's State Historic Preservation Officer, providing a liaison with the national historic preservation program conducted by the National Park Service. The Bureau of Historic Preservation identifies, evaluates, preserves, and interprets historic structures and properties that reflect the diversity of our past. The Bureau manages the nation's largest historic preservation grants program and oversees the development of State historic markers, heritage publications, and Florida folklife programs.

3.4 REGIONAL GOVERNMENT

3.4.1 Treasure Coast Regional Planning Council (TCRPC)

The TCRPC has been enabled under Section 186.501, F.S. The Council is a multi-county entity covering Indian River, Martin, Palm Beach, and St. Lucie counties. It has major responsibility for addressing growth management issues that are multi-jurisdictional in scope. One of its key roles is to engage in area-wide comprehensive and functional planning; this includes working in cooperation with Federal and State agencies planning for emergency management as described in Section 252.34(4), F.S. The TCRPC provides full-time staffing for the District X LEPC. The LEPC is charged with administering regional compliance with hazardous materials reporting and training laws. Its many initiatives include the State Hazardous Materials Training Task Force; District X Hazardous Materials Emergency Plan; training for emergency first response personnel; hospital and hazardous materials response team needs; public hazardous chemical awareness and reporting seminars; public and private sector hazardous materials emergency exercises; and assisting public and private facilities with chemical emergency preparedness planning.

Section 186.507, F.S. directs regional planning councils to prepare strategic regional policy plans. One of the elements the plan must address is emergency

preparedness. The TCRPC promotes mitigation initiatives within Section 5.0, Emergency Preparedness, of its "Strategic Regional Policy Plan." Specific strategies that promote mitigation are summarized below. These strategies and the policies that implement them are listed in **Appendix A**.

Strategy 5.1.1 Direct development away from areas most vulnerable to the effects of natural and manmade disasters.

Strategy 5.2.1 Utilize land use, transportation, and community planning processes to address vulnerability issues.

Strategy 5.3.1 Provide shelter space for residents of areas susceptible to flooding from the effects of hurricanes and other storms.

Strategy 5.4.1 Develop the mechanisms necessary to ensure that emergency planning agencies have input into the local government decision-making process.

Strategy 5.5.1 Initiate disaster preparedness activities that will protect lives and property and reduce evacuation times.

Strategy 5.5.2 Establish mechanisms and regulations necessary for post-disaster reconstruction to occur in a consistent manner, making future disasters less destructive to life and property.

3.4.2 St. Johns River Water Management District (SJRWMD)

The creation of the St. Johns River Water Management District (SJRWMD), along with the four other water management districts was enabled under Section 373.069, F.S. As required under Section 373.036(2), F.S., each district has prepared a district water management plan (DWMP). The DWMP provides the overarching vision for each district and must address four key areas:

- Environmental protection and enhancement;
- Maintaining the water supply;
- Flood protection; and
- Water quality protection.

One of the purposes of the DWMP is to provide a framework to deal with issues related to water supply, water contamination, extreme drought, and flooding. The SJRWMD administers several programs that achieve hazard mitigation relative to flooding, hurricanes, and drought. Historically, water management districts were created primarily to mitigate the impacts of flooding. The role of districts has been expanded considerably over the years.

The SJRWMD operates and maintains the regional drainage system throughout most of its jurisdictional area. Local drainage systems are operated by a variety of special districts, private property owners, and local governments. The local systems typically convey water from individual projects to the regional system operated by SJRWMD. The District's responsibilities for flood protection relate primarily to their serving as the regional water conveyance and storage entity. The overall goal for flood protection is

"To minimize the potential for damage from floods by protecting and restoring the natural water storage and conveyance functions of floodprone areas with preference given to the use of non-structural surface water management methods."

In addition to private applicants, local units of government involved in building new stormwater systems or retrofitting older ones are required to petition the District for a surface water management permit approval.

Besides its flood control responsibility, the District is charged with the responsibility of protecting existing water resources from excessive drawdown during periods of drought, and protecting wellfields and aquifers from contamination. The District's overall goal for water supply is

"To ensure the availability of an adequate and affordable supply of water from all reasonable - beneficial uses while protecting the water and related resources of the District."

Also, the District administers the "Save Our Rivers" program for the purpose of protecting environmentally sensitive lands. A number of the lands purchased under the program have been in the Coastal High Hazard Area (CHHA); thus, in addition to achieving the program's primary goal - the protection of environmentally sensitive resources, the intensity and density of development in CHHAs are reduced.

The SJRWMD is undergoing three flood mitigation projects on the Upper St. Johns River Basin. Two of the projects are focused on increased stormwater storage at the Fellsmere Water Management Area and the Banjo Groves Restoration. The third project is focused on flood protection improvement in the Kenansville Lake area. There are two mitigation projects associated with the Indian River Lagoon Program. The Sebastian Stormwater Park is mitigating the flood hazard by increasing stormwater storage capabilities. The Sebastian River Water Control District is mitigating the flood hazard by replacing radial gates to improve the efficiency of floodwater discharge.

3.5 COUNTY GOVERNMENT

3.5.1 Listing of Agencies

Within the existing Indian River County organization structure, there are a number of departments that play key roles in hazard mitigation. They include DES, Community Development Department, and the Department of Public Works.

DES. The DES is composed of five divisions: Emergency Management, Radiological Preparedness, Fire Rescue, 9-1-1 Database and Animal Control. In terms of hazard mitigation, the Emergency Management Division has the lead role in dealing with hazard-related events. In that role, one of the Division's important functions involves overall coordination responsibility during emergency events. The County Comprehensive Emergency Management Plan (CEMP) serves as the countywide operational management plan for emergency events. It defines the roles and functions of all local governmental agencies and non-profit and private sector entities (e.g., ARC, Florida Power & Light). Another important function that is highly visible is fire protection. The County provides fire protection in all areas of the County with the exception of Indian River Shores, which has its

own public safety department. Besides its firefighting responsibility, the DES also is responsible for ensuring compliance with County fire codes.

The County Commission has assigned lead responsibility for the preparation of the LMS to the DES. In that role, the Department has been charged with the responsibility of facilitating the development of a countywide LMS. An important aspect of the work effort will be to ensure broad participation, not just within County government, but with all municipalities, special districts (e.g., water control districts), non-profits, and private sector businesses.

Community Development Department (CDD). The CDD is comprised of four divisions: Current Development, Environmental & Code Enforcement, Long-range Planning, and Building. The CDD has primary responsibility for administering the County Comprehensive Growth Management Plan (CGMP), and appraising and updating from time to time. In addition to its long-range planning role, the CDD is responsible for processing development petitions (i.e., rezoning petitions, site plans). Also, the Department is involved in the evaluation and assessment of environmental projects (e.g., shoreline stabilization projects, beach erosion initiatives). The Building Division issues and oversees compliance with all building permits. The County issues building permits and conducts inspection compliance, not only for the unincorporated portions of the County, but also for the City of Vero Beach.

Public Works Department (PWD). This department is responsible for overseeing the construction of capital projects as well as the long-term maintenance of County facilities (e.g., stormwater facilities, shoreline stabilization projects, County roads). The County coastal engineer is located in the PWD, and oversees all engineering aspects of capital projects (e.g., seawalls, docks, beach dune walkovers, beach erosion programs).

Sheriff's Office. The Indian River County Sheriff's Office is involved in a number of emergency related activities to assist in preparing for, mitigating against, responding to, and recovering from disasters. The Indian River County Sheriff's Office Standard Operating Procedures Manual identifies the following emergency-related roles:

- Emergency Response Team;
- Crisis Situations;
- Bomb Threat/Bomb Disposal;
- VIP Protection/Special Events;
- Disaster Plan;
- Disaster Recall Plan;
- Severe Weather Plan;
- Aircraft Accident Plan;
- Civil Disturbance Response Plan;
- Intercommunications for Mutual Aid; and
- Incident Command System.

3.5.2 County Mitigation Policies and Ordinances

Policy Plans. The two key policy plans that address issues related to natural and technological hazards include the County Comprehensive Plan and the County Comprehensive Emergency Management Plan. They are described briefly below.

CGMP. The CGMP (County Growth Management Plan) contains the County's data, analysis and policies that relate to development and redevelopment. The Plan consists of eleven plan elements: Introductory, Economic Development, Conservation, Coastal Management, Infrastructure (includes potable water, sanitary sewer, stormwater management, solid waste, natural aquifer recharge sub-elements), Future Land Use, Housing, Recreation and Open Space, Transportation, Intergovernmental Coordination, and Capital Improvement. Seven of the eleven elements address hazards. **Table 3.1** identifies what types of hazards are addressed by each plan element. A complete listing of Goals, Objectives, and Policies in the Indian River County 2020 Comprehensive (Growth Management) Plan that relates to hazard mitigation is in **Appendix A**. The following items provide highlights of a few key policies in the CGMP that address the issue of hazard mitigation, which were integrated based on the principles of the Local Mitigation Strategy:

- Regulate development of areas that are prone to flooding and areas within the 100-year floodplain in a manner that is consistent with the regulations established by the NFIP;
- The County shall not approve plan amendments that increase the residential density or land use intensity in the CHHA;
- The County shall limit densities in the CHHA to ensure timely evacuation of the barrier island;
- The County shall prohibit new development of adult congregate living facilities, nursing homes, homes for the aged, total care facilities, and similar developments within the CHHA;
- The County will continue its activities to retrofit the Vero Lakes Estates drainage system;
- By 2008, the County shall consider establishing a stormwater utility to fund maintenance and improvements of existing stormwater management facilities (target date being revised);
- By 2002, the County will have adopted a comprehensive floodplain management plan approved by the FEMA (target date being revised);
- Only structures vulnerable to erosion from a 15 year or less storm event shall be permitted to construct rigid shoreline stabilization structures;
- The County has established Local Road Protection Level-of-Service standards:
 - 3-year storm/24 hour duration - no flood encroachment outside existing easement and right-of-way limits;
 - 10-year storm/24 hour duration - limited encroachment of stormwater in front and rear yards;
 - 5-year storm/24 hour duration - greater encroachment of stormwater in front and rear yards with no minor street flooding (2-inch maximum); and
 - 100-year storm/3 days duration - some street flooding, but no flooding of existing and proposed residences.
- Existing drainage systems restored and upgraded during road projects; and,
- Acquiring preservation/conservation lands located within floodplains.

County CEMP. The County Commission has an adopted Comprehensive Emergency Management Plan (CEMP). It is an operations oriented document that establishes the framework for effective management by the County during emergencies and disasters. The CEMP has a dedicated annex (Annex II - Mitigation Functions) to mitigation

where Indian River County's Local Mitigation Strategy principles are integrated to serve as a tool to direct the county and municipal governments in their on-going efforts to reduce their vulnerability to the impacts produced by both natural and man-made hazards, such as:

- hurricanes and tropical storms;
- flooding;
- hazardous materials radiation exposure and contamination;
- armed violence;
- mass immigration;
- coastal oil spill;
- freezes;
- wildland fires;
- tornadoes;
- drought;
- dam failure;
- property loss/agricultural hazards;
- sinkholes and subsidence; and
- military ordnance from World War II.

Table 3.1. Comprehensive Growth Management Plan hazard mitigation inventory.

Comprehensive Plan Elements	Indian River County	Municipalities				
		Town of Fellsmere	Town of Indian River Shores	Town of Orchid	City of Sebastian	City of Vero Beach
Introductory						
Economic Development						
Conservation	A,E,F,H,HZ	F,HZ	A,D,F,H,HZ,NT	A,D,F,HZ	A,D,F,H,HZ,NT,W	A,HZ
Coastal Management	E,F,H,NT,P		E,F,H,NT,P	E,F,H,HZ,NT,P	A,E,F,P,NT	F,FI,H,HZ,NT,P
Infrastructure	F,H,HZ,WC	D,F,W	D,F,HZ	F,H,HZ	D,F,HZ,NT,W	D,F
Future Land Use	E,F,FI,H,NT	F,NT	E,F,H	F,FI,H	D,F,H,HZ,W	F,H
Housing						
Recreation and Open Spaces						
Transportation	F,H		E,F,H,NT			
Intergovernmental Coordination			F,H,HZ		F	D,H
Capital Improvement	E,F,H,NT			E,F,H	E,F,H,NT	E,F,H,HZ, P
Ports, Aviation and Associated Facilities						
Utilities						
Health and Human Services						
Public Education						
Fire Rescue						
Economic						
Library						
Historical Preservation						

Bold = Mandatory Comp Plan Element; A = Air Quality; D = Drought; E = Erosion; F = Flood; FI = Fire; H = Hurricane; HZ = Hazardous Waste; N = Nuclear Disaster; NT = Natural and Technological Disasters; PDR = Post-Disaster Redevelopment; WC = Wellfield Contamination.

Other Hazards Plans. Besides the CEMP, the DES has prepared a series of hazard plans that apply to unique situations. They include

- *Coastal Oil Spill* - Federal Region IV Oil & Hazardous Substances Regional Contingency Plan;
- *Hazardous Materials* - Indian River County Emergency Plan for Hazardous Materials;
- *Mass Immigration* - Indian River County Caribbean Refugee Plan;
- *Airports* - Vero Beach Municipal Airport Certification Manual: Aircraft and Airport Safety Plan, approved by the Federal Aviation Administration;
- *Nuclear Power Plants* - State of Florida Radiological Emergency Management Plan;
- *Ports/Marinas* - Indian River County Comprehensive Plan;
- *Emergency Notification* - Emergency Alert System Plan (Operational Area 10);
- *Military Support* - Florida National Guard Operation Plan for Military Support to Civil Officials;
- *Beach Preservation Plan* - Documents existing conditions of the beachfront in the County, identifies areas experiencing beach erosion, and recommended strategies to stabilize and/or enhance the County's beaches;
- *East Indian River County Stormwater Management Plan*;
- *Indian River County Wildfire Mitigation Plan*; and
- *Sebastian Area-wide Florida Scrub Jay Habitat Conservation Plan*.

Ordinances/Regulations. Hazard-related ordinances are administered primarily by either the DES or the CDD. The list of relevant ordinances/regulations includes

- Wellfield and Aquifer Protection;
- Building Code;
- Fire Code;
- Zoning;
- Subdivision;
- Stormwater Management and Flood Protection;
- Land Clearing;
- Coastal Management;
- Coastal Construction Code; and
- Open Burning/Air Curtain Incinerator.

The Building Code requires construction east of 82nd Avenue to meet a windload requirement of 140 mph, while in areas west of 82nd Avenue, the standard to be met is 130 mph). The regulatory scope of the Coastal Management Ordinance is fairly broad. It has protection for sea turtles and manatees. It also regulates seawalls, dock structures, and dune protection and maintenance.

Indian River County Code Chapter 930, addresses Stormwater Management and Flood Protection and was updated in February of 2003 to clarify that all mechanical equipment (as well as base floors) must be 6 inches above the base flood elevation in 100-year floodplains. The East Indian River County Master Stormwater Management Plan addresses issues of flooding, erosion, and water quality in the County. In March 2007, Indian River County adopted a revised Industrial Pretreatment Regulations Ordinance

(County Code Chapter 201, Part III) that enables the County to comply with National Pollutant Discharge Elimination System (NPDES) requirements.

3.5.3 County Mitigation Projects/Initiatives

There are a number of projects and initiatives the County has implemented to mitigate potential damage resulting from various hazards. See **Table 3.2** for a summary of projects and programs. Most are related to flooding and hurricanes. Through the Indian River County Environmental Lands Program, the County has purchased a number of important parcels in the CHHA. Most were purchased because they exhibited environmentally significant habitat; however, the County also gains by reducing the intensity and density of development in a high risk area, the CHHA.

Also, the County, like other local governments in Florida, has revised its building code since Hurricane Andrew struck south Florida in 1992. The code now requires a finish floor elevation at 6 inches above minimum 100-year flood level. The County's building code also requires corrosion resistant hurricane clips, water resistant adhesives for shingles, and trusses manufactured in accordance with local wind models.

The County has taken a variety of actions to mitigate the impact of coastal erosion along its shoreline. In 1996, the County installed an offshore breakwater, the Prefabricated Erosion Prevention reef, offshore of a 3,000-foot segment of shoreline in downtown Vero Beach that had experienced significant damage in the Thanksgiving storm of 1984. Since installation, the adjacent beach has stabilized. In response to Hurricanes Floyd and Irene 1999, the County, with funding from FEMA, placed 65,000 cubic yards of sand at eight locations in the County to rebuild areas of dune that had been damaged by the storms. In 2003, the County completed its first large-scale beach restoration project, placing 535,505 cubic yards of sand along 2.5 miles of beach in northern Indian River County, in the only area of the barrier island subject to overwash from a Category 3 hurricane.

Private property owners have also taken measures to prevent damage from coastal erosion. There are currently 37 seawalls and other coastal armoring structures in Indian River County, protecting a total of 6,461 feet of developed property.

Table 3.2. Summary of projects and programs for Indian River County.

Projects/Initiatives/Programs/Ordinances	Indian River County	Radiological Preparedness Division	Community Development Department	Public Works Department	Municipalities/Organizations					
					Town of Fellsmere	Town of Indian River Shores	Town of Orchid	City of Vero Beach	Florida Power & Light	City of Sebastian
Acquisition of Property			X			X				
Retrofitting of Public Facilities						X		X		
Structural Hazard Control			X	X		X				
Stormwater Drainage										
Beach Preservation			X	X						
Warning Systems		X				X				
Hazards-Specific Building Codes			X			X	X	X		
Tax Incentives for Mitigation						X		X	X	
Public Information Campaigns		X		X		X		X	X	
Preparedness Training		X				X	X	X	X	
Professional Training		X	X			X		X	X	
Maintenance Programs						X	X	X		
Stormwater Drainage						X		X		
Hazardous Materials Management										
Emergency Operations Plan						X		X		
Post-Disaster Redevelopment Plan						X			X	

The County's Beach Preservation Plan, implemented in 1988, provides long-term strategies for coastal management and sets up a revenue source for shoreline protection activities in Indian River County.

To inform the public about the dangers as well as measures citizens need to take to protect their property as well as themselves, the Indian River County Emergency Management Division speaks to numerous groups on matters of disaster preparedness. The Division has developed a disaster preparedness brochure, and has many other brochures, available for distribution to the public.

Emergency Management staff attends various conferences and seminars during the year and are involved in emergency preparedness drills. Building inspectors are provided opportunities to attend professional development seminars as a means of keeping them up-to-date on new construction methods that mitigate the effects of hazards.

The County Community Development Department engages in a number of mitigation activities including the following:

- Abandoned artesian well plugging program;
- Environmental Lands Program;
- NFIP Community Rating Systems Program;
- Maintenance of drainage canals and ditches;
- Annual letter to flood insurance providers;
- BellSouth Yellow Pages/Phone Book Hurricane Preparedness/Flood Protection Information Pages; and
- Beach renourishment programs.

The Department of Public Works engages in a number of mitigation activities including:

- Developed and distributes stormwater awareness brochures;
- NPDES Stormwater Phase II Permits;
- Completed the East Gifford Stormwater Improvement Project;
- East Gifford Middle School Science Department Adopt-a-Pond;
- Completed the Preliminary Engineering for the Main Relief Canal Pollution Control Structure;
- South Relief Canal Pollution Control Structure – Preliminary Engineering;
- Construction the Egret Marsh Regional Stormwater Park – Preliminary Engineering Report; and
- Completed the East Roseland Stormwater Improvement Project.

3.6 MUNICIPALITIES

Within Indian River County, there are five municipalities: Town of Fellsmere, Town of Indian River Shores, Town of Orchid, City of Sebastian, and City of Vero Beach. There is a wide variation among each jurisdiction in terms of community character. This difference in type of community character (i.e., degree of urbanization, size of population, location), affects the perception of each towards specific hazards. Certainly there are hazards that all jurisdictions, regardless of the community character, have concern over -- such as flooding, hurricanes, and tornadoes. However, there are instances where

community character definitely affects its perception of hazard priorities. In agricultural areas, agricultural pest and disease, freezes, and drought are more likely to have relevance as compared to the more urban areas. For example, in the Town of Orchid, times have changed its focus from citrus production to residential development. The Town of Orchid, for most of its existence was owned by one family; however, in the eighties, the family sold its property to a development firm, thus changing the character of the Town forever. During earlier times, Orchid's priority listing of hazards might have looked relatively similar to Fellsmere's, where agricultural pest and disease, drought, and freezes would generate considerable concern. However, today, the Town of Orchid's prioritization of hazards may be more reflective of the Town of Indian River Shores since both communities are situated on the barrier island, bordering both the Intracoastal Waterway on the west and the Atlantic Ocean on the east. Now, beach erosion and shoreline stabilization may have more significance to the Town of Orchid than previously due to the change in community character. Being more urbanized, having significant concentrations of commercial and industrial uses, and situated along major transportation corridors, communities like Vero Beach and Sebastian have higher risk of being impacted by a wider variety of hazards than its smaller municipal neighbors.

3.6.1 Listing of Agencies

The organizational structure of each municipality in the County differs in terms of organizational complexity and functional responsibility. The following is a brief discussion of agencies within the municipal organizational structure that may have certain functional responsibilities as they relate to hazard mitigation.

Emergency Management. Vero Beach is the only municipality that has a staff person who is assigned as the City's emergency management planning contact. During emergency events, such as hurricanes, each local government has an "executive group" (e.g., Mayor, city manager, police chief) that coordinates the city's efforts with the DES.

Indian River Shores is the only municipality in Indian River County that has its own Fire Department. As mentioned earlier, fire service in all other parts of the County are provided for the Indian River County Fire Department, which operates under the administrative umbrella of the DES.

Planning. Sebastian and Vero Beach, both have planning departments. The departments review zoning petitions, site plans, and other development orders (e.g., variances, special exceptions), as well as administering their local comprehensive plan. In the three smaller communities, planning has generally been assigned to a lay planning and zoning board, and provided staff support by a building official or comparable staff person.

Building Departments. Fellsmere, Indian River Shores, Orchid, and Sebastian issue their own building permits. Within the City of Vero Beach, applicants secure their building permits from the County Building Division. The County and the City of Vero Beach operate under the same building code.

Public Works & Engineering. The City of Vero Beach has a Public Works and Engineering Department. It is responsible for implementing structural improvements (e.g., storm water facility retrofit, shuttering buildings). The smaller jurisdictions do not have

such a formalized structure. Most contract out for engineering services. Overseeing the construction of capital projects is a responsibility of the contract engineer.

3.6.2 Municipal Mitigation Policies and Ordinances

Municipal Comprehensive Plans. Like the County, each municipality has an adopted Comprehensive Plan. They serve as a policy instrument for each city, and defines the particular city's development and redevelopment policies. All plans, with the exception of City of Fellsmere, contain the required nine plan elements: Conservation, Coastal Management, Infrastructure (i.e., potable water, sanitary sewer, stormwater management, solid waste, natural aquifer recharge), Future Land Use, Housing, Recreation and Open Space, Transportation, Intergovernmental Coordination, and Capital Improvement. Six of the nine plan elements address hazards. **Table 3.1** summarizes in a matrix format by municipality, type of hazards by plan element (see page 3-13).

Each municipal comprehensive plan has been reviewed. Specific mitigation-related objectives and policies have been identified and have been described and cross-referenced in **Appendix A**.

Regardless of municipality, most hazard-related issues are addressed in four plan elements of the Comprehensive Plan: Conservation, Future Land Use, Infrastructure, and Coastal Management (exception being Fellsmere). While local government comprehensive plans have a lot of similarities in their objectives and policies, there are variations. Some of the variations are highlighted below.

Fellsmere.

- The Town plugs abandoned, free flowing artesian wells.
- The Town "shall develop an emergency response plan to handle accidents involving hazardous waste and shall include provisions for the protection of natural resources."

Note: Being a community that is not located in the coastal zone (as defined by Chapter 380, F.S.), the City of Fellsmere's Comprehensive Plan does not contain a Coastal Management Element; therefore, issues relative to hurricanes and hazard mitigation are not required to be addressed.

Town of Indian River Shores.

- The Public Safety Officers, Utility Department and Building Department have undergone extensive training from state agencies and FEMA to determine the appropriate restoration/reconstruction alternatives for damaged public facilities.
- It is the policy of the Town to maintain a contingency fund that is used as match money for recovery activities after a storm.
- Water conservation is emphasized in the Conservation Element. Use of native plants and water saving plumbing fixtures in new developments is encouraged and prohibiting use of potable water sources for irrigation where non-potable alternative sources are available.

- The Green Building Concept and energy and water conservation in town renovations as well as new development is promoted at every opportunity.

Town of Orchid.

- Since the entire Town is in the CHHA, reduce density townwide from five units per acre to two units per acre.
- It is the policy of the Town that there be "no net loss of flood storage capacity."
- Promotes returning mosquito impoundments to their natural state to increase flood storage capacity.
- Requires hurricane contingency plan for any water-dependent facility prior to initiating operation.

City of Sebastian.

- The City participates with other Indian River County local governments in issues that have impacts that transcend the City's political jurisdiction. Issues include north County central water and wastewater systems and area-wide drainage and stormwater management master plan, proposed improvements and implementing programs.
- It is the policy of the City not to use public funds to subsidize development within the CHHA.
- The City actively seeks to work with entities capable of providing reclaimed water to the City and its residents for irrigation purposes.

City of Vero Beach.

Limit densities within the CHHA and direct future development outside this area.

- It is the policy of the City to expend funds in the CHHA only for projects that 1) enhance and restore natural resources in the area, 2) relocate threatened infrastructure away from the area, or 3) replace worn out or obsolete facilities.
- To promote water conservation, the City uses an inverted rate structure for potable water, requiring water conserving plumbing fixtures, promotes drought tolerant vegetation for landscaping, and an effluent reuse program.
- The City requires a fuel management/spill contingency plan for any new or expanded marina.
- It is the policy of the City to limit future development on the barrier island through the use of 1) building height limitation to 35 feet; 2) density limitations; 3) open space requirements; and 4) parking restrictions.

Building Codes. The vast majority of communities in the state use the Standard Building Code; however, they have had the option of tailoring their local building code to meet special local conditions. Examples of building requirements local governments have added to their local code have included shuttering, glazing of glass, and stainless steel hurricane clips. The following is a summary of the building codes by jurisdiction.

Fellsmere. The Town's building code has incorporated provisions that require brace gable and roof framing, corrosion resistant hurricane clips, and trusses manufactured in accordance with local wind models.

Indian River Shores. The Town's Building Code includes key hazard-specific provisions. They include brace gable end roof framing, corrosion resistant hurricane clips, and pressure positively treated lumber. The Town's code requires structures to meet the 140 mph windload. In addition, the Town has modified its Flood Damage Prevention Ordinance by raising the base floor elevation.

Orchid. Orchid's Building Code includes key hazard-specific provisions. They include brace gable end roof framing, corrosion resistant hurricane clips, and pressure positively treated lumber. According to the code, all construction must meet the Town's 130 mph windload requirement. The finished floor elevation is more stringent than the one recommended by FEMA.

Sebastian. The City's Building Code is patterned after the Standard Building Code. It contains key hazard-specific provisions, such as brace gable end roof framing, water resistant adhesives for shingles, and trusses manufactured to withstand a maximum windload of 130 mph. Also, the City requires that the finished floor elevation be 19 inches above minimum 100-year flood.

Vero Beach. The City does not issue building permits. They contract with Indian River County. Development within the City that takes place east of 82nd Avenue must be built to withstand 140 mph windload; while in areas to the west of 82nd, builders are held to a lesser standard, 130 mph since the area is not immediately fronting on the Atlantic Ocean. The City requires finished floor elevation to be 18 inches above the minimum 100-year flood level in the Flood Insurance Rate Map (FIRM) "V" zone (see **Table 4.2** for an explanation of zone codes).

Other Ordinances. All the municipalities partner in the County's wellfield protection ordinance. Also, each has provisions in their development code that require buffering between proposed development areas and adjacent wetlands and natural areas. Each jurisdiction has emergency water conservation ordinances in effect.

The City of Sebastian has adopted a controlled burn ordinance supporting burning under certain conditions. In becoming CRS qualified in 1998, the City enacted a Flood Damage Prevention ordinance.

The City of Vero Beach has adopted a Flood Damage Prevention and Drainage Ordinance. Recently, the City amended the ordinance to require any new building within the FEMA FIRM "V" zone be constructed with a finished floor elevation 18 inches above the 100-year Base Flood Elevation. It also requires a stormwater drainage plan for all new construction.

3.6.3 Municipal Mitigation Projects/Initiatives

Each jurisdiction was surveyed to update the projects and initiatives each governmental entity had or is implementing. Projects are capital improvements, while initiatives can include purchase of property to upgraded building codes to incentives to public information campaigns to preparedness training and drills to professional

development seminars. Existing municipal hazard mitigation projects and programs are summarized in **Table 3.2** (see page 3-16). The following provides a brief discussion of the accomplishments of each jurisdiction.

Town of Fellsmere. In 1997, the Town paved and improved the drainage systems along several streets. Also, the Town carries out regularly scheduled maintenance of its stormwater drainage system.

Being a non-coastal jurisdiction, the Town's Comprehensive Plan does not contain a coastal management element; therefore, there is no focus on disaster preparedness issues such as hurricanes or flooding as coastal communities must address in their coastal management elements.

The Town is in the NFIP, and has been a participant in the CRS program since 1999. Fellsmere currently has a CRS rating of 8, which enables residents to receive a 10% reduction in their NFIP rates. Fellsmere is thus eligible to receive funding from the NFIP's Flood Mitigation Program to correct drainage problems.

Town of Indian River Shores. The Town of Indian River Shores has undergone extensive capital improvements in the past five years to insure the entire Town complex has eliminated any municipal hazards or inadequate disaster preparedness that might have existed.

Widespread renovations were made to the Public Safety Building and all Town Hall facilities. All town owned structures are in full compliance with the current Florida Building Codes. A new garage area was built to accommodate the ambulances, fire trucks and life safety apparatus. This building was designed to be disaster resistant in all aspects. The administrative section of Public Safety has been rededicated to a higher standard of public awareness. The building now has a large class room and training facility, frequently used for professional training seminars and also resident training, disaster awareness and alertness. In addition, the Town stocks the two Public libraries with all available literature from FEMA. This literature is also available at a disaster preparedness informational booth at public functions and at the Building Department office. Mailings are sent out to each resident twice yearly with disaster recommendations specific to this location.

The Town Public Safety staff has prepared their own Emergency Operation Plan in addition to and in conjunction with the County Emergency Operation Plan. This plan, designed and administered by the Public Safety Director, outlines the chain of command for each employee and their duties in the event of a disaster. Meetings are held to inform and prepare staff for pre event, the event and the aftermath. The plan is based on FEMA training and lessons we all learned firsthand.

To the best of our knowledge all drainage problems have been eliminated. Storm water runoff has been properly directed to discharge into the mosquito impoundment. Optimistically we will have no further problems with storm water runoff.

Indian River Shores remains in the NFIP. Steps and activities have been initiated to reduce the CRS rating from an eight to a seven. This increased the resident's reduction in their NFIP rate from 10 % to a 15% savings.

Town of Orchid. Orchid has no emergency operations plan. It adheres to the County Emergency Operations Plan. Annually, the Town conducts two mock hurricane drills.

City of Sebastian. The City has taken a number of actions to reduce its vulnerability to hazards. They include capital projects such as, shuttering City Hall Complex, and installing a new emergency power generator at the city maintenance garage. Sebastian has significantly improved the ditch and swale drainage system by removing exotic plant species and implementation of a perpetual management program. Improvements to North Bridge, which crosses the Sebastian River, was recently completed. The City has prepared a hazmat spill plan that ensures for a coordinated, effective response to spills of hazardous substances should such an event occur.

Sebastian is in the NFIP, and in 1997, the City entered the CRS program. Based on the 1,036 the City scored on its CRS evaluation, it received a rating of 8. A rating of 9 enables Sebastian residents to receive a 5% reduction in their NFIP rates.

Sebastian has a citywide Emergency Operations Plan. Essentially, the city conducts emergency operations from the Sebastian Police Station. The station has an emergency power supply, has hurricane shutters, and is not in a flood prone area. While the city does not have an official post-disaster redevelopment plan, the issue of redevelopment is discussed in the Coastal Management Element of the Comprehensive Plan.

In terms of preparedness, every 2 weeks the city Public Works Department conducts tests of their power generators.

Members of the Building Department do attend professional training sessions. They include the yearly conference for Building Officials of Florida, as well as courses on hurricane resistant structural design, roofing updates, and fire resistance.

City of Vero Beach. The City of Vero Beach has undertaken numerous capital projects to retrofit city critical facilities. The City has installed shutters on City Hall, the airport, a Public Works facility, a Transmission & Distribution facility, and the Recreation Department.

The City administers an ongoing stormwater inspection (twice a year) and maintenance program of the drainage ditches, catch basins, and culverts that comprise the city's stormwater system. The Public Works Department removes all excess debris as needed after major storm events.

The City is in the NFIP, participates in the NFIP's CRS program, and has a CRS rating of 8. A rating of 8 enables Vero Beach residents to receive a 10% reduction in their NFIP rates. In addition, the City is eligible to seek FMA funds to be used to remedy flooding problems.

In 1998, the City completed a hurricane evacuation shelter evaluation.

The City is active in upgrading staff skills by sending them to technical conferences and workshops. Staff attended a conference that focused on effective disaster recovery techniques. The County building officials, who also serve the City, attend Southern

Building Code Congress International and State-mandated continuing education programs annually.

In terms of public information, the City has prepared and distributed a brochure on flooding, *Vero Beach Flood Information*.

National Flood Insurance Program (NFIP) Compliance. Each jurisdiction within the county is an active participant in the NFIP. In an effort to ensure continued compliance with the NFIP, each participating community will:

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

Table 3.3. NFIP Summary (as of 7/31/2009).

Community Name	Policies in Force	Insurance in Force \$	Written Premium In-Force \$
Indian River County	15,621	3,778,304,500	6,313,271
Vero Beach	5,051	1,184,506,000	2,578,058
Sebastian	1,437	318,305,300	740,748
Indian River Shores	2,990	752,811,500	1,715,351
Orchid	294	92,029,200	196,704
Fellsmere	102	16,993,100	61,540

3.7 COMMUNITY ORGANIZATIONS

Community organizations can range from faith-based organizations to Chambers of Commerce to the local historic society. These groups represent the diverse interests present within a community and provide vital services to the community as well. Many services provided by Indian River County’s community organizations can help to achieve the goals of hazard mitigation identified in this mitigation strategy. The following lists provide information on services provided by organizations that work within Indian River County to reduce the risks posed by disasters. All participating organizations of the LMS Working Group were invited to provide information; only those who responded are included below.

3.7.1 American Red Cross (ARC)

The ARC is active in promoting hazard preparedness and mitigation in Indian River County. Their efforts include

- Masters of Disasters Education Program;
- Facing Fear Education Program;
- Community Disaster Education;
- Disaster Resistant Neighborhoods Program;

- Disaster Drills;
- Evaluation of structures to be used as shelters;
- Conduct volunteer training courses;
- Cardiopulmonary Resuscitation (CPR) and First Aid courses;
- Disaster planning assistance to local businesses; and
- Hurricane preparedness and mitigation fliers.

3.8 INTERGOVERNMENTAL COORDINATION

Disasters know no boundaries; governments and service providers must work together to strengthen communities against the loss of life and property. An essential element of the hazard mitigation process is intergovernmental coordination. Coordination is important not only horizontally at the local level between County, municipalities, non-profit organizations, and the private sector, but also vertically with key State and Federal agencies. Besides the potential of the LMS initiative, there are several other coordination mechanisms that already exist. They are described briefly below.

3.8.1 Metropolitan Planning Organization

The Metropolitan Planning Organization, commonly known as the MPO, coordinates local, State, and Federal funding for thoroughfare improvements. The policy board is comprised of elected officials from the County and five municipalities. Two key policy documents of the MPO are the long-range transportation plan and the 5-year transportation improvement plan (TIP). The TIP identifies and schedules all future roadway improvements in the near-term. The MPO is housed in the Indian River County Community Development Department.

3.8.2 Local Government Comprehensive Plans

One mechanism to achieve intergovernmental coordination is the local comprehensive plan. As previously described, each comprehensive plan contains an intergovernmental coordination plan element.

3.8.3 Indian River County Comprehensive Emergency Plan

A second mechanism that has relevance is the County's CEMP. The CEMP must be integrated into and coordinated with emergency management plans and programs of the State and Federal government. It is operations-oriented and addresses evacuation in terms of local and regional evacuation, public shelter, post-disaster response and recovery, rapid deployment of resources, communications and warning systems, training exercises, and agency responsibilities. These responsibilities are clearly defined as 18 Emergency Support Functions (ESFs) (ESF functions - **Table 3.3**). Each ESF is headed by a lead agency, which has been selected based on its authorities, resources, and capabilities in the functional area. The ESFs also serve as the primary mechanism through which outside assistance to Indian River County is coordinated.

Table 3.4. Emergency Support Functions (ESFs) and their designations.

Emergency Support Function	Designation
Transportation	ESF - 1
Communications	ESF - 2
Public Works and Engineering	ESF - 3
Firefighting	ESF - 4
Information and Planning	ESF - 5
Mass Care	ESF - 6
Resource Support	ESF - 7
Health and Medical Services	ESF - 8
Search and Rescue	ESF - 9
Hazardous Materials	ESF - 10
Food and Water	ESF - 11
Energy and Utilities	ESF - 12
Military Support	ESF - 13
Public Information	ESF - 14
Volunteers and Donations	ESF - 15
Law Enforcement and Security	ESF - 16
Animal Care	ESF - 17
Special Needs Care	ESF - 18

3.8.4 District X Local Emergency Planning Committee

The LEPC is an important vehicle to coordinate administering regional compliance with hazardous materials reporting and training laws. The TCRPC provides staff to administer the activities of the Committee.

3.8.5 State Comprehensive Emergency Management Plan

The State of Florida CEMP establishes the framework of a coordination system to ensure that the state of Florida will be prepared to respond to the occurrence of emergencies and disasters. The plan describes roles and responsibilities of State agencies, special districts, local governments, and voluntary organizations. The CEMP unites the efforts of these groups for a comprehensive approach. The plan is divided into three sections.

The Basic Plan:

Outlines how the state will assist counties in response, recovery, and mitigation of disasters; details responsibility at various levels of government; describes method of operations and financial management policies; ensures continuity of government; and addresses recovery issues.

Specific Response/Recovery Actions: These actions are unique to a specific hazard and take the place of the Basic Plan and Response Functions sections.

Response Functional Annexes: Present the State's strategies for disaster response by outlining ESFs. ESFs are structured from the Federal Response Plan.

3.9 STRENGTHENING THE ROLE OF THE LOCAL GOVERNMENTS

As has been described in the text, local governments in Indian River County have taken steps to strengthen themselves both in terms of capital facility improvements and ordinances, regulations, and programs. Becoming more disaster-resistant is not limited just to hardening of structures. There are a number of activities that the County and municipalities can undertake to strengthen the role of local governments and to lessen the impacts resulting from emergency events that do not require expending money on capital projects. Plans can be modified, laws and regulations can be amended, informational materials can be published and distributed, and professional training can be augmented. Ideas were generated from a variety of sources: interviews with local jurisdictions, and information generated from LMS datasheets, the LMS Steering Committee, and discussions with local governments. The suggestions resulting from the various discussions with local government include:

- 1) Projects on the LMS PPL should be incorporated into local government capital improvement elements (CIEs) located in the comprehensive plans, at the time the CIEs are reviewed on an annual basis in accordance with Section 163.3177(3)(a), F.S.
- 2) As permitted under Section 163.3177(7)(h)&(l), F.S., local governments could incorporate optional comprehensive plan element for public safety, or a hazard mitigation/post-disaster redevelopment plan;
- 3) Integrating the LMS into the Indian River County CEMP.
- 4) Making all communities CRS eligible (Orchid is in the NFIP program, but not in the CRS program);
- 5) Assessing existing CRS programs to determine ways to strengthen and improve the local jurisdiction's CRS rating;
- 6) Requesting technical assistance from the Treasure Coast Regional Planning Council to augment CRS;
- 7) Designing and implementing a hazard mitigation retrofit program;
- 8) Monitoring the outcome of the Florida Building Commission. Be prepared to evaluate the existing building code, identify deficiencies, and recommend desired changes to strengthen the existing building code;

- 9) The designing and bidding of all public building construction, whether it be new construction or renovation of older public structures, should incorporate hazard mitigation building practices, whenever financially feasible;
- 10) Requiring all mobile home parks to retrofit a community space engineered to withstand Category 3 hurricane windloads and an F2 tornado. An adequate warning system needs to be incorporated into the retrofit. Such a structure would then provide the mobile home park residents a "safe haven refuge" should such an event occur. Once constructed, the mobile home park administration should conduct mock drills to familiarize the residents with the procedure they need to follow should the occasion arise that they would need to evacuate to the "safe haven refuge."
- 11) Implementing a "safe room" requirement in the local building codes that addresses, not only new construction, but renovation as well;
- 12) All jurisdictions should prepare and adopt post-disaster redevelopment plans.
- 13) Getting year-round coverage in the local media to get the message out to people, not only that it is important to be prepared, but also to sell the idea the hazard mitigation saves dollars in the end.
- 14) Working with the private sector to develop procedures that ensure coordination and mutual support between the County and business community, before, during, and after a disaster event.
- 15) Helping the private sector prepare a "business contingency handbook" and provide support in holding training workshop for local business owners.

3.10 PRIVATE SECTOR BACKGROUND AND ANALYSIS

During events such as hurricanes, there can be massive disruption of the local economy. However, due to the lack of frequency over the past 20 years, even with Hurricane Andrew in 1992, people have become somewhat complacent about such events. This also is reflected in the business community. The large firms like Florida Light & Power, Southern Bell, Piper Aircraft, Publix, as well as the banking community have prepared contingency plans in event of such an event. It is primarily among the smaller businesses where hazard mitigation and disaster preparedness have minimal attention. September 11th has again raised the awareness among the business community of the need to be prepared.

As part of the LMS effort, the Indian River County DES extended invitations to the business community to participate as a member of the LMS Working Group. Florida Light & Power Company, the American Red Cross North Treasure Coast Chapter, and Southern Bell Telephone Company have been active in the planning effort. However, key sectors of the community were not represented such as finance, agriculture, medical, building supply, as well as Senior Resource Association, Piper Aircraft (a major local employer), The Indian River County/Vero Beach Chamber of Commerce, and the Sebastian Chamber of Commerce. There is a definite need to augment private sector involvement before the private sector can become a player in the community's hazard mitigation efforts.

The most important activity that needs to be implemented is an LMS Private Sector Subcommittee.

There are a number of activities in which the private sector can become involved in the LMS effort; however, the first and foremost obstacle has been energizing the interest of businesses to become involved in the process in the first place. In most communities, there are businesses that clearly understand that it is in their interest to develop a hazard mitigation plan prior to an actual event occurring. These are the organizations that need to become the core private sector group that spreads the word about the importance of "being prepared," taking steps and creating a plan before the disaster occurs. The private sector body needs to be developing materials that raise awareness and educate businesses of the need to be prepared for potential disasters that may occur.

It is envisioned that expanding the roles and responsibilities of private sector businesses in disaster events, beyond those that have historically been involved, will require educating businesses of the importance of hazard mitigation planning. Besides awareness and education, other roles that businesses can assume to strengthen private sector involvement in the LMS include business contingency planning and creating a private sector - emergency support function (a procedure to assist the business community during a disaster event). Not only does the business community benefit, but the community as a whole benefits as well. Both activities would mitigate against the local economy becoming disrupted following a disaster. A key element in mobilizing the private sector, and an initial task of the Private Sector Subcommittee would be the development of an "Action Plan" that sets out a list of priority activities the Subcommittee would like to achieve in the coming year.

4.0 HAZARD IDENTIFICATION, VULNERABILITY, AND RISK

The purpose of this chapter is to describe the hazards facing Indian River County in terms of potential impact, vulnerability, and loss. The hazards faced in Indian River County fit into three general classifications: natural, technological, and societal hazards. Natural hazards include floods, hurricanes/tropical storms, tornadoes, thunderstorms, lightning, wildland fires, muck fires, extreme temperatures, soil/beach erosion, severe droughts, seismic hazards (including earthquakes, sinkholes, and dam and levee failures), agricultural pests and diseases, and epidemics. Tsunamis are not addressed in this plan because of the low probability of occurrence. According to the State Natural Hazard Mitigation Plan, only four tsunamis have impacted Florida since 1886. Technological hazards include radiological accidents, power failures, hazardous materials accidents, transportation system accidents, wellfield contaminations, communication failures, and unexploded military ordnance. Societal hazards include terrorism and sabotage, civil disturbance, and immigration crises.

The hazard identification subsections for each hazard describe the hazard and provide historical events and impacts if available. When available, maps are provided to illustrate the location and extent of the hazards. Disasters are classified by the magnitude of their effect. The recognized classification system is as follows (Indian River County Department of Emergency Services, 2002):

- Minor Disaster: Any disaster that is likely to be within the response capabilities of local government and results in only minimal need for State or Federal assistance.
- Major Disaster: Any disaster that will likely exceed local capabilities and require a broad range of State and Federal assistance. The FEMA will be notified, and potential Federal assistance will be predominantly recovery-oriented.
- Catastrophic Disaster: Any disaster that will require massive State and Federal assistance, including immediate military involvement. Federal assistance will involve response as well as recovery needs.

The vulnerability assessment for each hazard describes the community assets and potential impact for each hazard. A community's vulnerability depends on the extent of the hazard exposure and the value of potentially vulnerable assets. Higher risk areas with higher potential damage warrant mitigation practices that are more extensive. Communities in this situation may rely on land use and site design rather than on relatively simple measures such as building codes and hardening existing structures. Other factors that influence vulnerability and are important for communities to consider when selecting mitigation practices are for pre-disaster mitigation, the amount of undeveloped and underdeveloped land, and in the case of post-disaster mitigation, the amount of developed land within the community (FDCA, 2003a). There are three types of vulnerability – individual, social, and biophysical. Individual vulnerability describes the susceptibility of a person or a structure to potential harm from hazards. Social vulnerability describes demographic characteristics of social groups that make them more or less susceptible to the adverse impacts of hazards. Biophysical vulnerability examines the distribution of hazardous conditions arising from a variety of initiating events such as natural hazards, chemical contaminants, or industrial accidents (Cutter, 2001).

Factors influencing vulnerability include, but are not necessarily limited to a community's location, type of construction, demographics, and cultural characteristics. **Table 4.1** lists the general hazards to which Indian River County is vulnerable and indicates their projected impact potential across the entire spectrum of community exposure and services. The hazards identified in **Table 4.1** and discussed here are organized based on the maximum projected impact potential (i.e., hazards capable of producing the maximum community-wide impact, such as hurricanes and floods, are discussed first). This does not mean other identified hazards are less important or less worthy of mitigation, only that their potential to affect the total community is lower.

In order to effectively plan hazard mitigation projects and allocate scarce financial resources, a community's vulnerability to a specific hazard must be coupled with other critical factors to perform a risk assessment.

Risk, or the probability of loss depends on three elements:

- 1) Frequency – How frequently does a known hazard produce an impact within the community?;
- 2) Vulnerability – How vulnerable is a community to the impacts produced by a known hazard?; and
- 3) Exposure – What is the community's exposure in terms of life and property to the impacts produced by a specific hazard?

Once these three factors are established, the risk level faced by a community with regard to any specific hazard can be calculated using the "Risk Triangle" approach (Crichton, 1999; see **Figure 4.1**).

In this approach, these three factors become the sides of a triangle, and the risk or probability of loss is represented by the triangle's area (**Figure 4.1a**). The larger the triangle, the higher the community's risk with respect to a given hazard. If a community reduces any of these three factors, they reduce their risk of potential for loss. For example, if a community reduces its exposure to hurricanes, as has actually happened historically, by moving from a barrier island to the mainland, they will reduce their exposure and therefore their risk of loss (**Figure 4.1b**). Likewise, if a community reduces its vulnerability to hurricanes by strengthening its buildings, it also will reduce its risk of loss (**Figure 4.1c**).

In terms of natural hazards, there is very little if anything that can be done to change the frequency with which they produce impacts in a community. Mitigation planning relative to those hazards must therefore focus on reducing the community's vulnerability or exposure. In terms of technological and societal hazards, the most cost-effective type of mitigation is to limit or reduce the frequency with which such hazards actually occur.

At the time of publication, detailed risk assessments were only available for floods and hurricanes. Data sources used to prepare the hazard vulnerability and risk assessments are documented in **Appendix D**.

Table 4.1. Identification and projected impact potential for Indian River County hazards.

Hazard Category	Projected Impact Potential																			
	Excessive wind	Excessive water	Damaging hail	Soil/beach erosion	Electric power outage	Surface and air transportation disruption	Navigable waterway impairment	Potable water system loss or disruption	Sewer system outage	Telecommunications system outage	Human health and safety	Psychological hardship	Economic disruption	Disruption of community services	Agricultural/fisheries damages	Damage to critical environmental resources	Damage to identified historical resources	Fire	Toxic releases	Stormwater drainage impairment
Natural Hazards																				
Floods		X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Hurricane/tropical storm	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tornado	X				X	X				X	X	X	X							
Severe thunderstorm/lightning	X	X	X		X	X				X	X	X	X					X		X
Drought													X		X	X		X		
Temperature extremes					X						X	X	X		X	X				
Agricultural pests and disease											X	X	X		X	X				
Wildland/Urban Interface Zone					X	X				X	X	X	X	X	X	X		X	X	
Muck fires						X					X		X		X	X		X	X	
Soil/beach erosion				X			X						X			X				X
Epidemic											X	X	X	X						
Seismic hazards (sink holes/soils failure)						X													X	

Table 4.1. (Continued).

Hazard Category	Projected Impact Potential																			
	Excessive wind	Excessive water	Damaging hail	Soil/beach erosion	Electric power outage	Surface and air transportation disruption	Navigable waterway impairment	Potable water system loss or disruption	Sewer system outage	Telecommunications system outage	Human health and safety	Psychological hardship	Economic disruption	Disruption of community services	Agricultural/fisheries damages	Damage to critical environmental resources	Damage to identified historical resources	Fire	Toxic releases	Stormwater drainage impairment
Technological Hazards																				
Hazardous materials accident					X	X				X	X	X	X				X	X		
Radiological accidents including nuclear power plant accidents					X	X				X	X	X	X		X			X		
Communications failure										X	X	X	X							
Transportation system accidents						X	X			X		X	X				X			
Wellfield contamination								X	X	X	X	X	X							
Power failure (outages)					X	X		X	X	X	X	X	X							
Unexploded military ordnance										X	X				X			X		
Societal Hazards																				
Civil disturbance						X					X	X	X	X			X			
Terrorism and sabotage					X	X		X		X	X	X	X		X	X	X	X	X	
Immigration crisis											X	X	X	X						



(a) Area of triangle represents probability of loss - The larger the triangle the higher probability of loss.



(b) One element of risk such as exposure can be reduced and therefore the overall probability of loss is reduced.



(c) More than one element of risk can be reduced and therefore the overall probability of loss is even greater reduced.

Figure 4.1. Risk triangle.

4.1 NATURAL HAZARDS

Indian River County is susceptible to a number of natural hazards with the potential to cause extensive damage within the community. The cost of responding to and recovering from these disasters has proven to be significant. Planning for these events before they occur can significantly reduce costs in the future. This subsection will now identify those hazards in Indian River County identified as being naturally occurring.

4.1.1 Flooding

4.1.1.1 Hazard Identification

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

Flooding in Indian River County results from one or a combination of both of the following meteorological events:

- 1) Tidal surge associated with northeasters, hurricanes, and tropical storms; and
- 2) Overflow from streams and swamps associated with rain runoff.

When intense rainfall events occur, streams and drainage ditches tend to reach peak flood flow concurrently with tidal water conditions associated with coastal storm surge. This greatly increases the probability of flooding in the low-lying areas of the coastal zone. Areas along the Indian River are particularly susceptible to flooding under these conditions. The most flood prone areas in the eastern portion of the County feature poorly drained soils, a high water table, and relatively flat terrain, all of which contribute to their flooding problems. Flat terrain and heavily wooded areas aggravate flood problems by preventing rapid drainage in some areas.

Riverine flooding occurs when the flow of rainwater runoff exceeds the carrying capacities of the natural drainage systems. During extended periods of heavy rainfall, certain low-lying neighborhoods within the County are subject to considerable flood damage and isolation caused by the inability of natural and mechanical drainage systems to effectively remove the water. Heavy rainfalls can cause considerable damage to County infrastructure including roadbeds, bridges, drainage systems, and the water supply.

The buildup of uncontrolled sediment contributes to the problem of inadequate drainage in natural and mechanical drainage systems. When a storm produces an overwhelming amount of stormwater runoff, the accumulation of loose sediment causes flooding by clogging the drainage systems. This buildup of sediment in Indian River County waterways has led to the degradation of the national estuary. The County is currently working to address this issue by replacing bottom opening radial gates with tilting gates at four water control structures.

Long-term climate monitoring stations indicate that rainfall in Indian River County averages about 51.5 inches annually, with about half of this volume occurring during the

4 months from June through September. Only about 20% of the total annual volume of precipitation occurs during the four driest months, December through March. The maximum annual rainfall that has been recorded for the Vero Beach climatological station is 81.74 inches, (Indian River County Public Works, 2002).

In comparison to riverine flooding, coastal flooding is usually the result of a severe weather system such as a tropical storm or hurricane. The damaging effects of coastal floods are caused by a combination of storm surge, wind, rain, erosion, and battering by debris. All coastal property and inhabitants are subject to severe damage and loss of life resulting from floods caused by hurricane-associated storm surge. Some coastal property, road arteries, and bridge approaches are subject to severe flooding caused by rare astronomical tides as well.

Historical Flooding Events. Data on previous occurrences of flooding events in municipalities are limited; therefore, the following events are based on the best available data.

Hurricane of September 1928. This hurricane made Florida landfall near the City of Palm Beach as a strong Category 4 hurricane with one of the lowest barometric pressures ever recorded in this area (928.9 millibars [27.43 inches]). It reached Lake Okeechobee with very little decrease in intensity. In all, 1,836 people were killed and another 1,870 injured during this storm's passage. Nearly all the loss of life was in the Okeechobee area and was caused by overflowing of the lake along its southwestern shore.

Hurricane of September 1933. This major Category 3 hurricane passed over Jupiter Island with a barometric pressure of 947.5 millibars (27.98 inches). Maximum winds recorded were 127 mph. There was considerable property damage all along the Florida east coast, mostly in the area between Jupiter and Ft. Pierce. Severe waterfront damage was reported in Stuart, located in Martin County.

Flood of 1947. This flood is generally considered to be the most severe flood recorded in southern Florida. Heavy rainfall, including the rains from two hurricanes, occurred over a period of 5 months. Many parts of Martin County, to the south, were flooded for months, and there was extensive damage to dairy pastures and agriculture in general. Such a flooding event in Indian River County would be much more significant today because of the increase in land development along the eastern side of the County.

Hurricane of August 1949. This Category 3/Category 4 hurricane made landfall in Florida between Delray and Palm Beach with winds of 130 mph and a barometric pressure of 954.0 millibars (28.17 inches). As it moved inland, its center passed over the northern part of Lake Okeechobee. The levees in that area held, and no major flooding occurred. Damages in Florida were estimated at \$45 million. Tides of 11.3 feet at Ft. Pierce, 8.5 ft at Stuart, and 6.9 ft at Lake Worth were reported. Statewide, over 500 people lost their homes as a result of this storm.

Flood of 1953. As occurred in 1947, this flood was preceded by 5 months of heavier than normal rainfall, which included a tropical storm in October. June through October rainfall was approximately 48 inches. Damage was heaviest in the beef cattle industry, with extensive losses of improved pastureland, which required supplemental feeding of cattle. Vegetable growers and dairy farmers also suffered significant losses as a

result of this flood. There were significant damages to buildings and roads in the eastern part of the County as well.

Tropical Storm (Florence) of September 1960. Tropical Storm Florence deposited a total of 10 to 11 inches of rain countywide over a 5-day period from 20 to 25 September 1960. Fortunately, the previous month's rainfall had been rather low, and overall flooding was not extensive. The most significantly damaged area was in the Allapattah Marsh area north of the St. Lucie Canal. Several dike systems failed and allowed water to overrun several ranches.

Hurricane Andrew of August 1992. Hurricane Andrew was a small and ferocious Cape Verde hurricane that wrought unprecedented economic devastation along a path through the northwestern Bahamas, the southern Florida peninsula, and south-central Louisiana. Damage in the U.S. was estimated to be near 25 billion, making Hurricane Andrew the most expensive natural disaster in U.S. history. The tropical cyclone struck southern Dade County, Florida, especially hard, with violent winds and storm surges characteristic of a Category 4 hurricane on the Saffir/Simpson Hurricane Scale, and with a central pressure (922 millibars) that is the third lowest this century for a hurricane at landfall in the U.S. In Dade County alone, the forces of Hurricane Andrew resulted in 15 deaths and up to one-quarter million people left temporarily homeless. An additional 25 lives were lost in Dade County from the indirect effects of Andrew. The direct loss of life seems remarkably low considering the destruction caused by this hurricane (Rappaport, 1993).

Flash Flood of March 1993. The City of Vero Beach experienced a flash flood following heavy rains causing minor damage in 50 homes and washed out roads around Highway 60. The flood caused an estimated \$500,000 in damages.

Tropical Storm (Gordon) of October 1994. Indian River County experienced a period of extensive growth during the 1970's and 1980's. Most of this growth took place in the form of residential and commercial land development in the eastern portion of the County along the major transportation corridor. The rain event associated with Tropical Storm Gordon in October 1994 was the most significant rain event to occur after this period of development.

The Unnamed Storm of October 1995. Almost exactly 1 year after the Tropical Storm Gordon flooding incident in 1994, a stalled frontal system dropped 15.5 inches of rain on Indian River County over a period of 39 hours.

Flooding of August 1999. The City of Sebastian experienced heavy rains in early August that flooded roads along U.S. Highway 1. The high water disabled six vehicles in the area as well. The City of Vero Beach experienced heavy rains producing flooding of some major roadways round the City in late August.

Hurricane Floyd of September 1999. This large Category 4 storm moved parallel to the southeast Florida coast. While the storm did not make landfall in Florida, it did impact Florida coastal communities. Peak gusts associated with the storm were estimated to be as high as 155 mph. Fifty-seven deaths and 1.3 billion dollars in insured losses were attributed to the storm. Readings taken in Ft. Pierce indicate that sustained winds were 33 mph, and peak wind gusts were up to 49 mph. The ARC opened 7 shelters in Indian River County and served 2,000 meals during the hurricane.

Hurricane Irene of October 1999. This Category 2 hurricane made landfall in the Keys and moved north, heading back out to sea at the Jupiter Inlet. Insured property losses in Dade, Broward, and Palm Beach counties exceeded \$600 million. Total insured losses from the rest of the state totaled \$200 million. Over 700,000 customers were left without power following the storm. Readings taken in Ft. Pierce indicate that sustained winds were 42 mph, and peak wind gusts were up to 51 mph. Peak wind gusts in Vero Beach measured 71 mph.

Tropical Storm Leslie of October 2000. This tropical storm mainly impacted Miami-Dade and Broward counties, causing \$700 million in damage, \$500 million of which were agricultural crop losses. During this storm, the City of Sebastian experienced significant flooding.

Hurricane Gabrielle of September 2001. This hurricane made landfall on the west coast of Florida and traveled northeast across the state. The storm spawned a total of 18 tornadoes. Insured losses associated with this storm totaled \$115 million. Total damage is estimated to be nearly \$230 million. Readings taken in Ft. Pierce indicate that sustained winds reached 27 mph, and peak wind gusts were up to 37 mph. Rain meters in Ft. Pierce indicated 1.97 inches of rainfall during this period.

Flooding of June 2002. The Town of Fellsmere experienced flooding from heavy rains, which rendered some roads impassible and flooded two homes in the Fellsmere area. This storm caused an estimated \$10,000 in damage.

Flooding of August 2002. The City of Vero Beach experienced heavy rain measuring about 5 inches in a few hours, which flooded streets and three houses in the City. The storm caused an estimated \$50,000 in damage.

Hurricane Frances of September 2004. This hurricane made landfall over the southern end of Hutchinson Island, Florida as a Category 2 hurricane. Frances gradually weakened as it moved slowly west-northwestward across the Florida Peninsula, and became a tropical storm just before emerging into the northeastern Gulf of Mexico near New Port Richey early on 6 September. The National Weather Service Melbourne Weather Forecast Office (WFO) estimated storm surge at 8 ft near Vero Beach and 6 ft around Cocoa Beach. Frances caused widespread heavy rains and associated freshwater flooding over much of the eastern United States. Storm-total rainfalls of 5-10 in were common elsewhere along Frances' track as a tropical cyclone. Frances caused an estimated \$850 million in damage to insured property in Indian River County. The storm spawned a total of 101 tornadoes – 23 in Florida. Sustained winds reached 105 mph. There was one fatality recorded in Indian River County.

Hurricane Jeanne of September 2004. Jeanne made landfall as a Category 3 hurricane on the east coast of Florida early on September 26 with the center crossing the coast at the southern end of Hutchinson Island just east of Stuart. Maximum winds at landfall are estimated at 121 mph. Widespread rainfall of up to 8 inches accompanied Hurricane Jeanne as it moved across eastern, central and northern Florida. A narrower band of 11 to 13 inches was observed in the vicinity of the eyewall track over Osceola, Broward and Indian River counties of east central Florida. Storm surge flooding of up to 6 ft above normal tides likely occurred along the Florida east coast from the vicinity of Melbourne southward to Ft. Pierce. Jeanne caused an estimated \$2 billion in damage to insured property Indian River County.

Hurricane Wilma of October 2005. Wilma made landfall in southwestern Florida near Cape Romano as a Category 3 hurricane on October 24 with sustained winds estimated to be around 120 mph. The hurricane crossed the southern Florida peninsula in 4.5 hours, with the center emerging into the Atlantic just southeast of Jupiter. Maximum winds had decreased to near 109 mph (Category 2) during the crossing of Florida. Because the hurricane moved quickly across the southern Florida peninsula, however, the rain amounts were not very large in Florida and storm totals ranged generally from 3 to 7 inches. Some locations in southeast Florida had totals of only 1 to 2 inches -- or less. Wilma produced 10 tornadoes over the Florida peninsula on 23-24 October: one each in Collier, Hardee, Highlands, Indian River, Okeechobee, and Polk Counties, and four in Brevard County.

Tropical Storm Ernesto of August 2006. Ernesto made landfall at Plantation Key, Florida, in the upper Florida Keys, as a tropical storm with winds of 46 mph. The storm moved northward along the center of the Florida peninsula and within a weakness in the mid-level ridge, and the cyclone passed over Lake Okeechobee gradually turning emerging over the Atlantic Ocean near Cape Canaveral, Florida. The storm dropped 3–6 inches of rain in many areas near the path of the storm's center, from the Cape Canaveral area to Lake Okeechobee, in portions of southwestern Florida, and in isolated spots in the Upper Florida Keys.

Tropical Storm Fay of September 2008. Fay was a long-lived tropical storm that made eight landfalls – including a record four landfalls in Florida (Key West, Cape Romano, Flagler Beach and Carrabelle) – and produced torrential rainfall that caused extensive floods across the Dominican Republic, Haiti, Cuba, and Florida. Heavy rainfall was the most notable hazard caused by Tropical Storm Fay. Melbourne, Florida broke a 50-year old record for a rainfall event. There were numerous rainfall reports of more than 20 in reported across east-central Florida and amounts in excess of 10 in were common elsewhere across the central and northern Florida.

4.1.1.2 Vulnerability Assessment

Flooding events can have the following potential impacts within a community:

- Excessive water;
- Soil/beach erosion;
- Electric power outage;
- Surface and air transportation disruption;
- Navigable waterway impairment;
- Potable water system loss or disruption;
- Sewer system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Agricultural/fisheries damage;
- Damage to critical environmental resources;
- Damage to identified historical resources;
- Fire;

- Toxic releases; and
- Stormwater drainage impairment.

Figure 4.2 illustrates the flood prone areas of Indian River County based on the FIRMs. Two numerical models predict the effects of storm surge in Indian River County. The older model, developed by NOAA, is called the "Sea, Lake and Overland Surges from Hurricanes" (SLOSH) model. **Figure 4.3** shows the storm Category 1, 3, and 5 surge zones as predicted by the SLOSH model for Indian River County. According to the Florida Coastal Management Program, 43.2% of residents in Indian River County live in the Category 1 Surge Zone.

Figure 4.2 can be used to determine the extent of the flooding hazard in each of the six jurisdictions represented by this plan. Overall, the flooding hazard in the unincorporated areas of the County varies. The extreme western unincorporated portions of the County are located in FEMA NFIP flood zones A, AE, and AO.

Table 4.2 describes the definitions of each of the FEMA flood zones.

Table 4.2. Federal Emergency Management Agency Flood Zones.

Zone	Description
A	An area inundated by 1% annual chance flooding, for which no Base Flood Elevations (BFEs) have been determined.
AE	An area inundated by 1% annual chance flooding, for which BFEs have been determined.
AH	An area inundated by 1% annual chance flooding (usually an area of ponding), for which BFEs have been determined; flood depths range from 1 to 3 feet.
ANI	An area not included in mapping.
AO	An area inundated by 1% annual chance flooding, for which average depths and velocities have been determined; flood depths range from 1 to 3 feet.
OFFFIRM	An area located off of the Flood Insurance Rate Map.
UNDES	A body of water, such as a pond, lake, ocean, etc., located within a community's jurisdictional limits that has no defined hazard.
VE	An area inundated by 1% annual chance flooding with velocity hazard (wave action); no BFEs have been determined.
X	An area that is determined to be outside the 1% and 0.2% annual chance flood plains.
X500	An area inundated by 0.2% annual chance flooding; an area inundated by 1% annual chance flooding with average depths of less than 1 foot or with drainage areas of less than 1 square mile; or an area protected by levees for 1% annual chance flooding.

The western portions of the City of Vero Beach are in the 500-year floodplain, while portions of the City located to the east of the coastal ridge are located in the AE zone. There are also portions of the barrier island in the City of Vero Beach that are subject to wave action.

The Town of Indian River Shores, which is located entirely on the barrier island, has a great potential for flooding. The majority of the coastal land along the Atlantic Ocean is subject to wave action and is located in the NFIP VE flood zone. The remainder of the land in Indian River Shores is located in the AE zone.

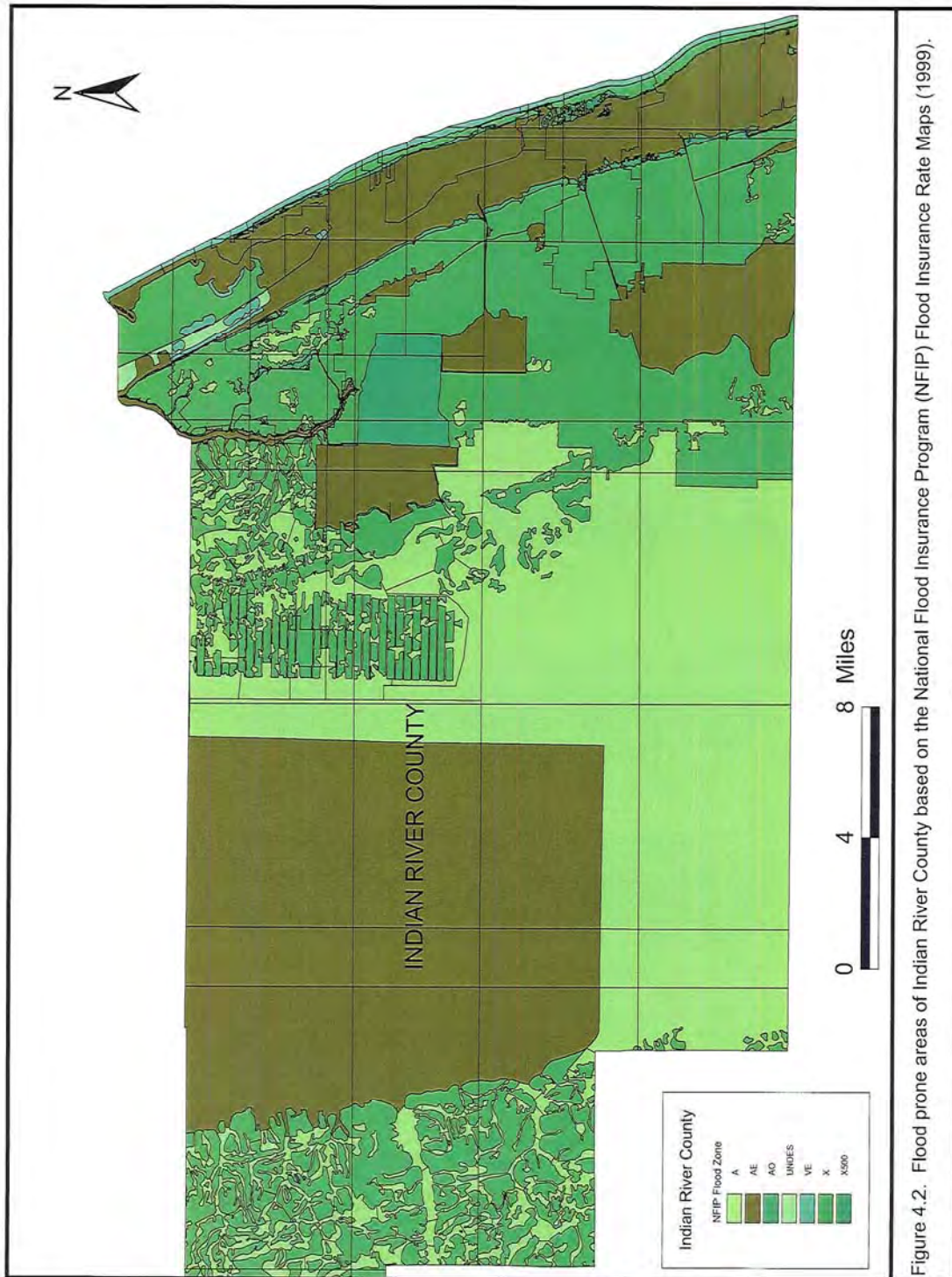
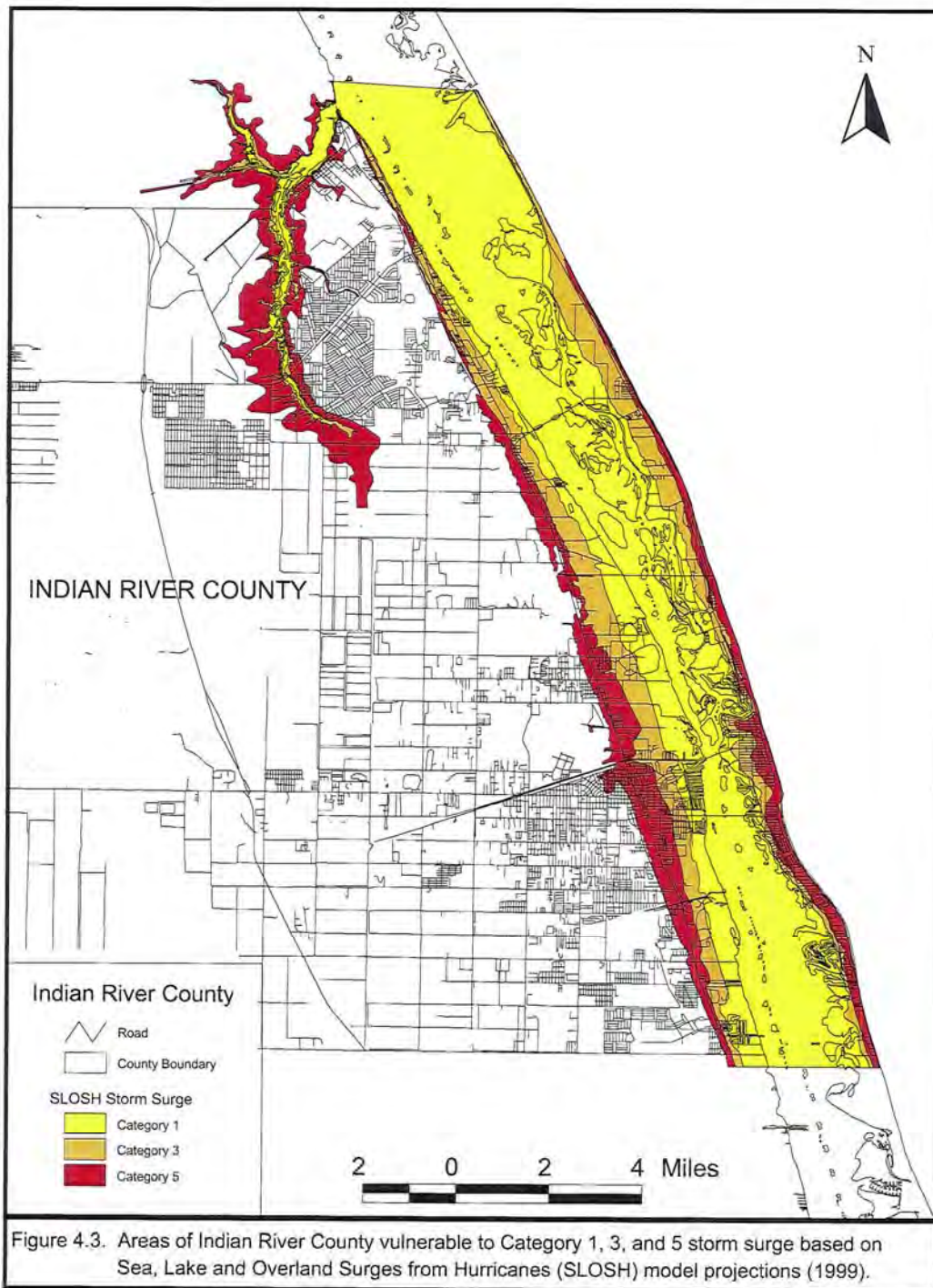


Figure 4.2. Flood prone areas of Indian River County based on the National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (1999).



Like Indian River Shores, the Town of Orchid is located entirely on the barrier island and has a great potential for flooding. Coastal land along the Atlantic Ocean is subject to wave action and is located in the NFIP VE flood zone. The remainder of the land in Orchid is located in the AE zone.

The majority of land in the City of Sebastian is located in the X zone, or the 500-year floodplain. Lands lying adjacent to the Sebastian Creek have been identified as being in the NFIP AE zone.

The Town of Fellsmere, located to the west of I-95, consists of interspersed lands identified as being in the NFIP A and X flood zones.

Figure 4.3 can be used to determine the extent of the hurricane hazard for each jurisdiction represented by this LMS. According to the SLOSH model, overall storm surge risk in the County is limited to the eastern coast and lands adjacent to Sebastian Creek. Lands adjacent to either the Atlantic Ocean or the Intercoastal Waterway are subject to storm surge for Category 1 and higher storm events.

The SLOSH model predicts that the eastern portions of the City of Vero Beach will be impacted by storm surge. Portions of the City located on the barrier island and the Intercoastal Waterway will be subject to storm surge in a Category 1 hurricane. Storm surge associated with a Category 3 storm is expected to reach several blocks west of the Intercoastal Waterway. In a Category 5 storm, the surge is expected to impact U.S. Highway 1.

Because of the Town of Indian River Shore's location on the barrier island, land adjacent to the Atlantic Ocean and Intercoastal Waterway is expected to be impacted by storm surge in a Category 1 or higher event.

The Town of Orchid's location on the barrier island makes the potential for storm surge great. The western portions of the Town, located on the Intercoastal Waterway, are expected to be inundated in a Category 1 storm. The eastern portions of the Town can expect higher surge levels than the western portion of the Town during Category 3 or higher storms.

The majority of land in the City of Sebastian is located out of the storm surge zone. However, lands adjacent to the Intercoastal Waterway on the eastern side of the City and lands adjacent to Sebastian Creek on the western side of the City may be at risk from surge during Category 3 or higher storms.

The entire Town of Fellsmere is located outside of the storm surge zone.

The State of Florida is able to model hurricane storm surge as well as wind and property damage. This model, known as The Arbiter of Storms (TAOS) model, predicts storm surge height and wind field intensity for Category 1 through Category 5 hurricanes.

Figure 4.4 shows Indian River County's storm surge vulnerability in a Category 5 hurricane based on the TAOS model. When evaluating these data, it is important to remember the TAOS projections are based on multiple model runs combining all the worst possible hurricane paths and strikes. Consequently the TAOS projections presented here must be considered the Maximum of Maximums (MOM), or absolute worst-case scenario.

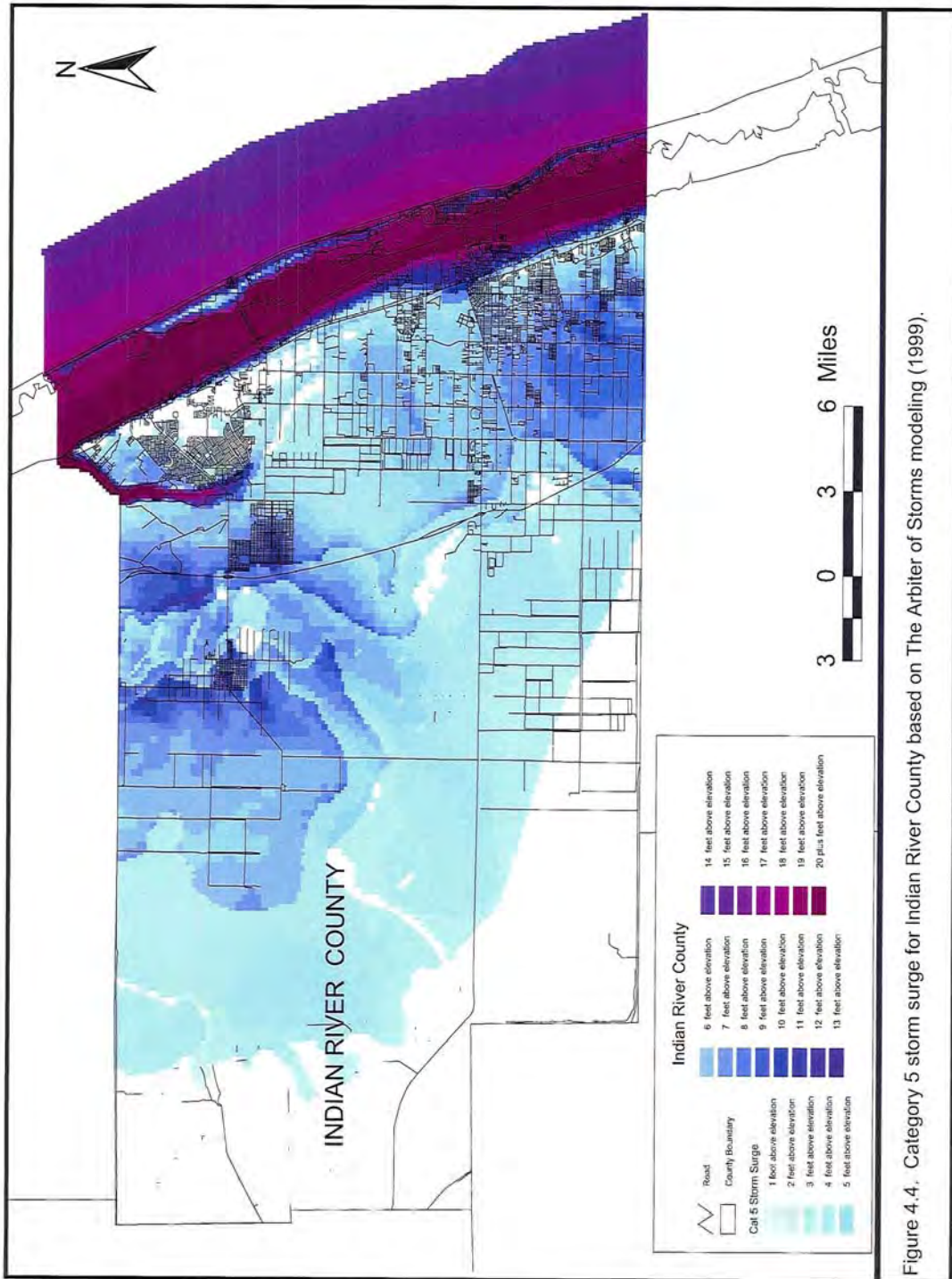


Figure 4.4. Category 5 storm surge for Indian River County based on The Arbiter of Storms modeling (1999).

Figure 4.4 can be used to determine the extent of hurricane-related storm surge for the individual jurisdictions in Indian River County based on the TAOS model. Surge predictions in **Figure 4.4** are based on a Category 5 event. Overall, unincorporated lands adjacent to the Atlantic Ocean and Intercoastal Waterway are subject to surge ranging from 5 feet above elevation to 18 feet above elevation.

Portions of the City of Vero Beach located on the barrier island and adjacent to the Intercoastal Waterway can expect surge from a Category 5 storm to range from 5 feet above elevation to 15 feet above elevation. Lands located along the western banks of the Intercoastal Waterway will received the largest impact from storm surge. Western portions of the City west of U.S. Highway 1 may be inundated with 4 to 8 feet of surge.

The entire Town of Indian River Shores will be inundated with surge during a Category 5 event. Surge is expected to reach up to 18 feet above elevation in all portions of the Town.

The entire Town of Orchid will be inundated with surge during a Category 5 event. Surge is expected to reach up to 18 feet above elevation. The central portions of the Town are slightly less at risk according to the TAOS model.

The City of Sebastian’s location on portions of the coastal ridge makes it less likely to experience surge in the western portions of the City. However, those lands adjacent to the Intercoastal Waterway and Sebastian Creek may be impacted by between 1 and 13 feet of surge.

The Town of Fellsmere’s location to the west of I-95 makes it less likely to experience the high surge levels found on the coastal areas in the County. Despite its location away from the coastline, the Town may experience between 1 and 8 feet of surge during a Category 5 event. The extent of surge is fairly uniform throughout the Town.

Documented Repetitive Losses. For this analysis, documented repetitive losses are restricted to the narrow FEMA definition and represent only those properties whose owners have made more than one claim on their flood insurance policies as recorded by the NFIP. As of December 2009, Indian River County had a total of 201 repetitive flood loss properties with a total of 254 claims. Total payments for building damage on these claims was \$17,377,496.01, while total payments for content damage was \$4,359,999.82 (**Table 4.3**).

Table 4.3. National Flood Insurance Program repetitive flood loss properties by jurisdiction, Indian River County, State Flood Plain Manager, 2009.

Community	Number of Properties	Occupancy Type					Number of Claims	Total Building Payments	Total Content Payments
		Single Family	Multi Family	Non-Resident	Condo	Other			
Indian River Co	92	83	0	6	2	1	29	\$6,977,661.86	\$1,361,232.88
Vero Beach	92	66	1	19	4	3	190	\$9,710,143.90	\$2,705,616.07
Sebastian	12	10	0	2	0	0	25	\$553,325.48	\$173,548.43
Fellsmere	2	2	0	0	0	0	4	\$84,014.22	\$473.20
I.R. Shores	3	2	0	1	0	0	6	\$52,350.55	\$119,129.24
TOTAL								\$17,377,496.01	\$4,359,999.82

Note: The Town of Orchid is not a participant in the Community Rating System Program.

Frequencies from flooding associated with rain events other than tropical storms and hurricanes are more difficult to estimate. Eastern Florida shows an annual dry cycle stretching from early November through mid-May. During this part of the year, monthly rainfall rarely exceeds 3.5 to 4.0 inches per month. The wet season, beginning in mid-May and running through late October, shows monthly rainfall levels in the area to be 6.0 to 8.5 inches. Heaviest rainfall usually occurs in June and September. In Indian River County, the eastern or coastal section of the County receives more rain than the western section. The average annual rainfall in Indian River County ranges between 50 and 55 inches. The County sees its maximum monthly rainfall in September, and its minimal rainfall in January. This rainfall pattern coupled with the hurricane season (June through November) makes Indian River County particularly vulnerable to flooding associated with tropical storms and hurricanes because they typically occur when the water table is high and the ground is saturated. The County's Flood Insurance Study, dated 4 May 1989, identified the following sources of flooding within the County:

- Sebastian Creek;
- South Prong Creek;
- St. Johns River;
- Elkcam Waterway – Collier Waterway;
- Lateral G;
- Lateral H;
- Lateral J;
- North Relief Canal;
- South Relief Canal;
- Main Relief Canal; and
- Vero Lakes Channels A, B, C, and D.

The East Indian River County Master Stormwater Management Plan also identified the following flood zones within the County: North Relief Canal Sub-basin, Main Relief Canal Sub-basin, and South Relief Canal Sub-basin.

North Relief Canal Sub-Basin. The second largest areas of flooding within the Indian River Farms Water Control District (IRFWCD) is within the North Relief Canal Sub-basin C-1. The boundaries are as follows: 65th Street to the north, 66th Avenue to the east, 74th Avenue to the west, and 45th Street to the south. The flood elevations range from 22 to 23 feet. Another flood prone area is located along the Lateral "G" Canal, 1/4 mile wide from 85th Street to 65th Street. Flood elevations range from 19 to 23 feet south to north, in this area. Furthermore, an area connected to the North Relief Canal by the Lateral "H" Canal is subject to flooding. This designated zone is bounded by 45th Street on the north, 28th Avenue on the east, 35th Avenue on the west, and 41st Street on the south. Flood elevations are between 21 and 22 feet. The flood prone areas of the northern basin will be addressed in detail in a subsequent phase of the Stormwater Master Plan (Indian River County Public Works, 2002).

Main Relief Canal Sub-Basin. According to the 1988 Storm Water Management Model, the largest area of flooding within the Main Relief Canal Sub-basin during a 10-year storm event is connected to the Indian River Lagoon by both the Main and South Relief Canals. The approximate boundaries of this flood prone area are as follows: the Main Relief Canal to the north, 43rd Avenue to the east, and 74th Avenue to the west. The other flood prone area within this sub-basin, located along the Main Relief Canal from Country Club

Drive to the Indian River Lagoon, is a portion of the IRFWCD that extends 1 mile east to west and 1/2 mile north to south. The flood elevations range from 6 feet at the west end to 8 feet at the junction of the Main Relief Canal to the Indian River Lagoon (Indian River County Public Works, 2002).

South Relief Canal Sub-Basin. A portion of the largest flood prone area within the IRFWCD is located in this sub-basin. The approximate boundaries of this flood prone area are as follows: South Relief Canal to the north, 43rd Avenue to the east, 74th Avenue to the west, and the St. Lucie County line to the south. The flood elevations in this area range from 21 to 24 feet. This area floods due to the limited discharge capacity of the relief canals and low elevation. The other flood prone area in this sub-basin is located along the Lateral "J" Canal; it is a ¼-mile wide area that extends from 13th Street southeast to the St. Lucie County line. Flood elevations are from 19 to 21 feet (Indian River County Public Works, 2002).

The Department of Public Works has identified the following areas as being chronically flooded:

- 35th Avenue south of 12th Street;
- U.S. Highway 1 at 10th Street;
- CR 512 at North County Park;
- 27th Avenue between 4th Street and 5th Street SW; and
- Old Dixie Highway between 4th Street and Oslo Road.

4.1.1.3 Risk Assessment

Flooding is the single hazard producing the most recurrent impacts in Indian River County. All communities within Indian River County are highly vulnerable to flooding, but they are not all vulnerable for the same reasons. The barrier island communities (Town of Orchid, Indian River Shores, and the beach side of the City of Vero Beach) are obviously highly vulnerable to storm surge damage from hurricanes. The communities of Sebastian and Orchid, located near the Sebastian Inlet and along the Sebastian River, also are highly vulnerable to flooding associated with hurricane winds and storm surge. The mainland portion of the City of Vero Beach is less vulnerable to oceanic storm surge due to its location between inlets. Wind packing of the water within the Indian River may still produce substantial flooding along the riverfront. Communities away from the water such as Fellsmere and the urbanized areas along Route 60 west of Vero Beach are more vulnerable to wind damage from hurricanes and flooding associated with rain rather than storm surge.

The risk assessment data for flooding in Indian River County are based on data developed for the MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System) developed by the FDCA. The MEMPHIS data utilized for this report is the most updated and revised historical database available to staff at this time and is considered to still be fairly accurate.

Table 4.4 illustrates the number and value of structures in each of the FEMA-identified flood zones. The zone with the highest number of structures, structure value, and people is the X zone, which is known as the 500-year flood. **Table 4.2** describes the definitions of each of the FEMA flood zones.

Table 4.4. Flooding exposure in FEMA-identified flood zones, Indian River County, 2003.

Flood Zone	Total Number of Structures	Total Value of Structures	Total Population in Flood Zone
AE	15,304	\$2,822,995,200	20,893
X500	2,648	\$385,599,840	7,772
X	33,511	\$3,245,771,520	69,003
A	1,773	\$441,895,424	8,124
ANI	2	\$17,705	0
AH	19	\$3,718,117	0
OFFFIRM	4	\$1,772,164	5,229
VE	7	\$2,051,647	1,926

Source: Florida Department of Community Affairs, 2004a.

Table 4.5 illustrates the total number and value of structures expected to be flooded in given storm events. The following table provides information about the number and value of structures subject to either wave action, flooding, or neither.

Table 4.5. Flooding exposure by storm event, Indian River County, 2003.

Exposure	100-Year Flood	50-Year Flood	25-Year Flood	10-Year Flood
Total Number in Wave/Current	2,052	689	353	0
Total Number in Flood	14,837	14,136	12,301	7,802
Total Number in Neither	36,379	38,443	40,614	45,466
Total Value in Wave/Current	\$152,142,128	\$61,622,280	\$35,440,008	N/A
Total Value in Flood	\$2,542,515,968	\$2,259,844,608	\$1,870,655,488	\$1,259,951,488
Total Value in Neither	\$4,209,181,952	\$4,582,359,040	\$4,997,712,896	\$5,643,951,488

Source: Florida Department of Community Affairs, 2004a.

N/A = not available.

Table 4.6 displays the flood exposure in Indian River County associated with the five different hurricane intensities. The table provides information on the number and value of structures subject to wave action and flooding.

Table 4.6. Hurricane flood exposure, Indian River County, 2003.

Exposure	Category 5	Category 4	Category 3	Category 2	Category 1
Total Number in Wave/Current	19,286	13,546	8,620	2,335	275
Total Number in Flood	28,563	32,329	23,078	17,534	12,759
Total Number in Neither	5,419	7,393	21,570	33,399	40,234
Total Value in Wave/Current	\$2,815,956,224	\$2,059,265,024	\$1,234,294,656	\$222,923,696	\$29,819,612
Total Value in Flood	\$3,062,205,184	\$3,623,070,976	\$3,152,670,208	\$2,840,867,328	\$1,932,205,312
Total Value in Neither	\$1,025,632,832	\$1,221,507,456	\$2,516,793,344	\$3,840,057,600	\$4,941,782,528

Source: Florida Department of Community Affairs, 2004a.

Table 4.7 provides the overall exposure by structure type in Indian River County. Single-family homes have the highest exposure in the County.

Table 4.7. Flooding exposure, Indian River County, 2004.

Rank	Structure Type	Exposure
1.	Single-family	\$3,159,379,456
2.	Condominia	\$1,260,790,912
3.	Orchard, Grove, Citrus	\$686,234,560
4.	Grazing Land Soil Class I	\$146,461,168
5.	Public Schools	\$90,840,200

Source: Florida Department of Community Affairs, 2004a.

The MEMPHIS data provide a calculation that will determine the savings in average annualized loss that can be experienced as a result of flood mitigation (for example, raising height of structure 1 foot above base flood elevation). **Table 4.8** illustrates this calculation. The biggest mitigation gains would be to mitigate flood hazards in single-family and condominium structures.

Table 4.8. Mitigation savings by structure type, Indian River County, 2004.

Rank	Structure Type	Expected Annualized Loss
1.	Single-family	\$15,346,880
2.	Condominia	\$9,664,728
3.	Orchard, Grove, Citrus	\$1,224,463
4.	Other Municipal	\$686,698
5.	Homes for the Aged	\$275,893

Source: Florida Department of Community Affairs, 2004a.

4.1.2 Hurricanes/Tropical Storms

4.1.2.1 Hazard Identification

Hurricanes are tropical cyclones with winds that exceed 74 mph and blow counter-clockwise about their centers in the Northern Hemisphere. They are essentially heat pumping mechanisms that transfer the sun's heat energy from the tropical to the temperate and polar regions. This helps to maintain the global heat budget and sustain life. Hurricanes are formed from thunderstorms that form over tropical oceans with surface temperatures warmer than 81°F (26.5°C). The ambient heat in the sea's surface and moisture in the rising air column set up a low pressure center and convective conditions that allow formation of self sustaining circular wind patterns. Under the right conditions, these winds may continue to intensify until they reach hurricane strength. This heat and moisture from the warm ocean water is the energy source of a hurricane. Hurricanes weaken rapidly when deprived of their energy source by traveling over land or entering cooler waters.

When a hurricane threatens the coast, advisories are issued by the National Hurricane Center (NHC). The storm's current location and intensity are described along with its projected path. Advisories are issued at 6-hour intervals: 5:00 A.M., 11:00 A.M., 5:00 P.M., and 11:00 P.M., Eastern Time.

In addition to advisories, the NHC may issue a hurricane watch or warning. A hurricane watch indicates that hurricane conditions are possible and may threaten the area within 48 hours. A hurricane warning is issued when winds of at least 74 mph are to be expected in the area within 36 hours.

Advisories and hurricane watches and warnings will frequently refer to the category of a storm. Hurricanes are classified using the Saffir-Simpson scale as follows:

- Category 1 – Winds 74 to 95 mph;
- Category 2 – Winds 96 to 110 mph;
- Category 3 – Winds 111 to 130 mph;
- Category 4 – Winds 131 to 155 mph; and
- Category 5 – Winds >155 mph.

Hurricane damage occurs through two means – high winds and storm surge. Generally it is the wind that produces most of the property damage associated with hurricanes, while the greatest threat to life is from flooding and storm surge. Although hurricane winds can exert tremendous pressure against a structure, a large percentage of hurricane damage is caused not from the wind itself, but from flying debris. Tree limbs, signs and sign posts, roof tiles, metal siding, and other loose objects can become airborne missiles that penetrate the outer shells of buildings, destroying their structural integrity and allowing hurricane winds to act against interior walls not designed to withstand such forces. Once a structure's integrity is breached, the driving rains associated with hurricanes can enter the structure and completely destroy its contents.

Hurricane winds are unique in several ways:

- 1) They are more turbulent than winds in most other types of storms;
- 2) They are sustained for a longer period of time (several hours) than any other type of atmospheric disturbance;
- 3) They change slowly in direction; thus, they are able to seek out the most critical angle of attack on a given structure; and
- 4) They generate large quantities of flying debris as the built environment is progressively damaged; thus, amplifying their destructive power.

In hurricanes, gusts of wind can be expected to exceed the sustained wind velocity by 25% to 50%. This means a hurricane with sustained winds of 150 mph will have wind gusts exceeding 200 mph. The wind's pressure against a fixed structure increases with the square of the velocity. For example a 100-mph wind will exert a pressure of approximately 40 pounds per square foot on a flat surface, while a 190-mph wind will exert a force of 122 pounds per square foot on that same structure. In terms of a 4- by 8-foot sheet of plywood nailed over a window, there would be 1,280 pounds of pressure against this sheet in a 100-mph wind, and 3,904 pounds or 1.95 tons of pressure against this sheet in a 190-mph wind.

The external and internal pressures generated against a structure vary greatly with increases in elevation, shapes of buildings, openings in the structures, and the surrounding buildings and terrain. Buildings at ground level experience some reductions in wind forces simply because of the drag exerted by the ground against the lowest levels of the air column. High-rise buildings, particularly those located along the beachfront will receive the full strength of hurricane winds on their upper stories. Recent studies estimate that wind speed increases by approximately 37% just 15 feet above ground level.

The wind stream generates uplift as it divides and flows around a structure. The stream following the longest path around a building, generally the path over the roof, speeds up to rejoin the wind streams following shorter paths, generally around the walls. This is the same phenomenon that generates uplift on an aircraft's wing. The roof in effect becomes an airfoil that is attempting to "take off" from the rest of the building. Roof vortexes generally concentrate the wind's uplift force at the corners of a roof. These key points can experience uplift forces two to five times greater than those exerted on other parts of the roof.

Once the envelope of the building has been breached through the loss of a window or door, or because of roof damage, wind pressure on internal surfaces becomes a factor. Openings may cause pressurizing or depressurizing of a building. Pressurizing pushes the walls out, while depressurizing will pull the walls in. Internal pressure coupled with external suction adds to the withdrawal force on sheathing fasteners. Damages from internal pressure fluctuations may range from blowouts of windows and doors to total building collapse due to structural failure.

During Hurricane Andrew, catastrophic failure of one- and two-story wood-frame buildings in residential areas was observed more than catastrophic failures in other types of buildings. Single-family residential construction is particularly vulnerable because less engineering oversight is applied to its design and construction. As opposed to hospitals and public buildings, which are considered "fully engineered," and office and industrial buildings, which are considered "marginally engineered," residential construction is considered "non-engineered." Historically, the bulk of wind damage experienced nationwide has

occurred to residential construction. Fully engineered construction usually performs well in high winds due to the attention given to connections and load paths.

Hurricane winds generate massive quantities of debris that can easily exceed a community's entire solid waste capacity by three times or more. Debris removal is an integral first step toward recovery, and as such, must be a critical concern of all those tasked with emergency management and the restoration of community services.

A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from 4 to 5 feet in a Category 1 hurricane and up to 20 feet in a Category 5 storm. The storm surge arrives ahead of the storm's actual landfall, and the more intense the hurricane is, the sooner the surge arrives. Water rise can be very rapid, posing a serious threat to those who have waited to evacuate flood prone areas. A storm surge is a wave that has outrun its generating source and become a long period swell. The surge is always highest in the right-front quadrant of the direction the hurricane is moving in. As the storm approaches shore, the greatest storm surge will be to the north of the hurricane eye.

Such a surge of high water topped by waves driven by hurricane force winds can be devastating to coastal regions. The stronger the hurricane and the shallower the offshore water, the higher the surge will be. In addition, if the storm surge arrives at the same time as the high tide, the water height will be even greater. The storm tide is the combination of the storm surge and the normal astronomical tide.

Damage during hurricanes also may result from possible spawned tornadoes, and inland flooding associated with heavy rainfall that usually accompany these storms. Hurricane Andrew, a relatively "dry" hurricane, dumped 10 inches of rain on south Florida and left many buildings extensively water damaged. Rainwater may seep into gaps in roof sheathing and saturate insulation and ceiling drywall, in some cases causing ceilings to collapse.

Crop damage is another powerful effect of hurricanes and tropical storms. Recently, Tropical Storm Mitch dropped as much as 10 inches of rain in some south Florida areas, which resulted in approximately \$20 million in crop damage in Palm Beach County alone (Associated Press, 1998). According to the University of Florida (2001), of Indian River County's 322,112 acres, 168,399 acres are farmland. With 52% of its land area being farmed, Indian River County is particularly vulnerable to crop damage resulting from the wind and rain from hurricanes and tropical storms. Hurricanes Charley, Frances, and Jeanne crossed citrus-producing counties in Florida in 2004, followed by Hurricane Wilma in 2005. Hurricanes Frances and Jeanne affected the Treasure Coast directly, making landfall three weeks apart in Martin County. A special census to measure the losses was conducted in mid-2005 in the four counties of Indian River, Martin, Palm Beach, and St. Lucie. Because of these hurricanes, Indian River and St. Lucie Counties only produced 36% of the state's grapefruit in 2004-05, compared to the normal 66%. Overall, the number of boxes of Florida citrus was down 42% from the 2003-04 season, bringing a 17% drop in value for the same period (USDA, 2005). After the 2004 hurricane season, the rate of tree removal and burning efforts were intensified in an effort to eradicate canker from commercial groves before the onset of the 2005 hurricane season. Before the plan could be completed, hurricane Wilma contributed to the spread of canker from south Florida up through central Florida, far beyond the ability to control it with the existing eradication plan. Estimates placed the spread of the disease at 183,000 acres. The existing eradication plan would have required the destruction

of one-fourth of the commercial acreage in Florida, an amount that would have devastated the citrus industry (Conner, 2006).

Historic Events. Specific information on previous occurrences of hurricanes and tropical storms is located in the flooding section. From 1930 through 1959, a total of 58 hurricanes struck the U.S. mainland; 25 of which were Category 3 or higher (major storms). Between 1960 and 1989, 43 hurricanes struck the U.S.; 16 of which were Category 3 or stronger. Most hurricane experts feel we are entering a period of increased hurricane formation similar to the levels seen in the 1930's and 1940's. Current hurricane risk calculations are complicated by climatic factors suggesting the potential for even greater hurricane frequency and severity in all of the world's hurricane spawning grounds. Since 1995, there have been 33 Atlantic hurricanes, and there were 10 in 1998 alone. Global warming may cause changes in storm frequency and the precipitation rates associated with storms. A modest 0.9°F (0.5°C) increase in the mean global temperature will add 20 days to the annual hurricane season and increase the chances of a storm making landfall on the U.S. mainland by 33%. The warmer ocean surface also will allow storms to increase in intensity, survive in higher latitudes, and develop storm tracts that could shift farther north, producing more U.S. landfalls.

Currently an average of 1.6 hurricanes strike the U.S. every year. Severe (Category 4 or 5 on the Saffir-Simpson scale) hurricanes strike the U.S. on the average of one every 5.75 years. Annually, hurricanes are estimated to cause approximately \$1.2 billion in damages. The proximity of dense population to the Atlantic Ocean, as well as the generally low coastal elevations, significantly increases the County's vulnerability. The potential for property damage and human casualties in Indian River County has increased over the last several decades primarily because of the rapid growth this County has experienced since 1970, particularly along the vulnerable coastline areas.

Since 1886, 51 storms of hurricane intensity have passed within 125 miles of Indian River County. This represents an average of one hurricane every 2 years. The number of direct hits on the southeastern Florida coastline between 1899 and 1999 has been as follows:

- Category 1 Storms (winds 74 to 95 mph) = 5 storms (4% annual probability);
- Category 2 Storms (winds 96 to 110 mph) = 10 storms (10% annual probability);
- Category 3 Storms (winds 111 to 130 mph) = 7 storms (7% annual probability);
- Category 4 Storms (winds 131 to 155 mph) = 6 storms (6% annual probability); and
- Category 5 Storms (winds >155 mph) = 1 storm (1% annual probability)

For many years, the risk of significant loss of life and property due to hurricanes seemed small. Many, if not the majority of existing homes and business along the U.S. Atlantic and Gulf Coasts were located there during the 1970's and 1980's, a period of relatively inactive hurricane formation. Most of the people currently living and working in coastal areas have never experienced the impact of a major hurricane. Hurricanes that impacted Florida during the 1970's and 80's were infrequent and of relatively low intensity. Homeowners, business interest, and government officials grew to regard hurricane risk as manageable by private insurance supplemented occasionally by Federal disaster funding

and subsidized flood insurance. The hurricane risk did not seem sufficient to warrant increased investment in mitigation. Two major hurricanes, Hugo in 1989 and Andrew in 1992, forced a re-evaluation of this risk assessment. While experts sometimes disagree on the annual cost, all sources agree that Hurricane Andrew was the most costly hurricane event ever to affect the U.S. Insured losses from Hurricane Andrew topped \$17 billion, and most sources agree that the total cost of Hurricane Andrew exceeded \$25 billion.

Florida is the most vulnerable state in the nation to the impacts of hurricanes and tropical storms. South Central Florida is particularly exposed to the dangers presented by hurricanes due to its topography. The region is largely a flat, low-lying plain. The potential for property damage and human casualties in Indian River County has been increased by the rapid growth of the County over the last few decades, particularly along the coastline. Population risk also has been exacerbated by some complacency due to the recent period of reduced hurricane frequency.

Florida not only has the most people at risk from hurricanes, but it also has the most coastal property exposed to these storms. Over the 20-year period between 1980 and 2000, Florida's population increased by 68%, while the value of insured residential property rose from \$178 billion in 1980 to \$882 billion in 2002, an increase of 395%. Between 1980 and 1993, the insured value of commercial property increased 192%, from \$155 billion to \$453 billion.

4.1.2.2 Vulnerability Assessment

Hurricane events can have the following potential impacts within a community:

- Excessive wind;
- Excessive water;
- Soil/beach erosion;
- Electric power outage;
- Surface and air transportation disruption;
- Navigable waterway impairment;
- Potable water system loss or disruption;
- Sewer system outage;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Agricultural/fisheries damage;
- Damage to critical environmental resources;
- Damage to identified historical resources;
- Fire;
- Toxic releases; and
- Stormwater drainage impairment.

Figure 4.5 graphically illustrates the expected wind fields across Indian River County during a Category 5 hurricane based on the TAOS model. Hurricanes have historically altered the depth and location of the Sebastian Inlet (Florida Tech, 2003). The TAOS model also has the ability to predict debris accumulated per acre. The result of this

analysis for Indian River County is found in **Table 4.9**. For the unincorporated County, the data range from 46,037.9 cubic yards per acre for a tropical storm to 18,821,224 cubic yards per acre for a Category 5 hurricane.

Table 4.9. Indian River County debris accumulated in cubic yards per acre based on The Arbiter of Storms (TAOS) model projections (1999).

Entity	Tropical Storm	Category 1	Category 2	Category 3	Category 4	Category 5
Indian River County	46,037.9	310,199.2	887,890.7	2,062,996.4	4,991,807.3	18,821,224.0
City of Vero Beach	8,520.6	62,696.0	177,171.5	412,430.3	935,368.9	2,902,880.7
City of Sebastian	2,808.8	18,958.2	55,336.3	132,665.6	323,288.9	925,187.4
City of Fellsmere	302.9	1,747.2	5,129.3	11,755.6	24,797.3	185,615.6
Town of Orchid	545.7	3,610.3	9,558.1	21,459.6	55,865.8	115,281.9
Town of Indian River Shores	5,355.3	36,086.3	93,576.7	213,945.5	427,035.0	867,099.1

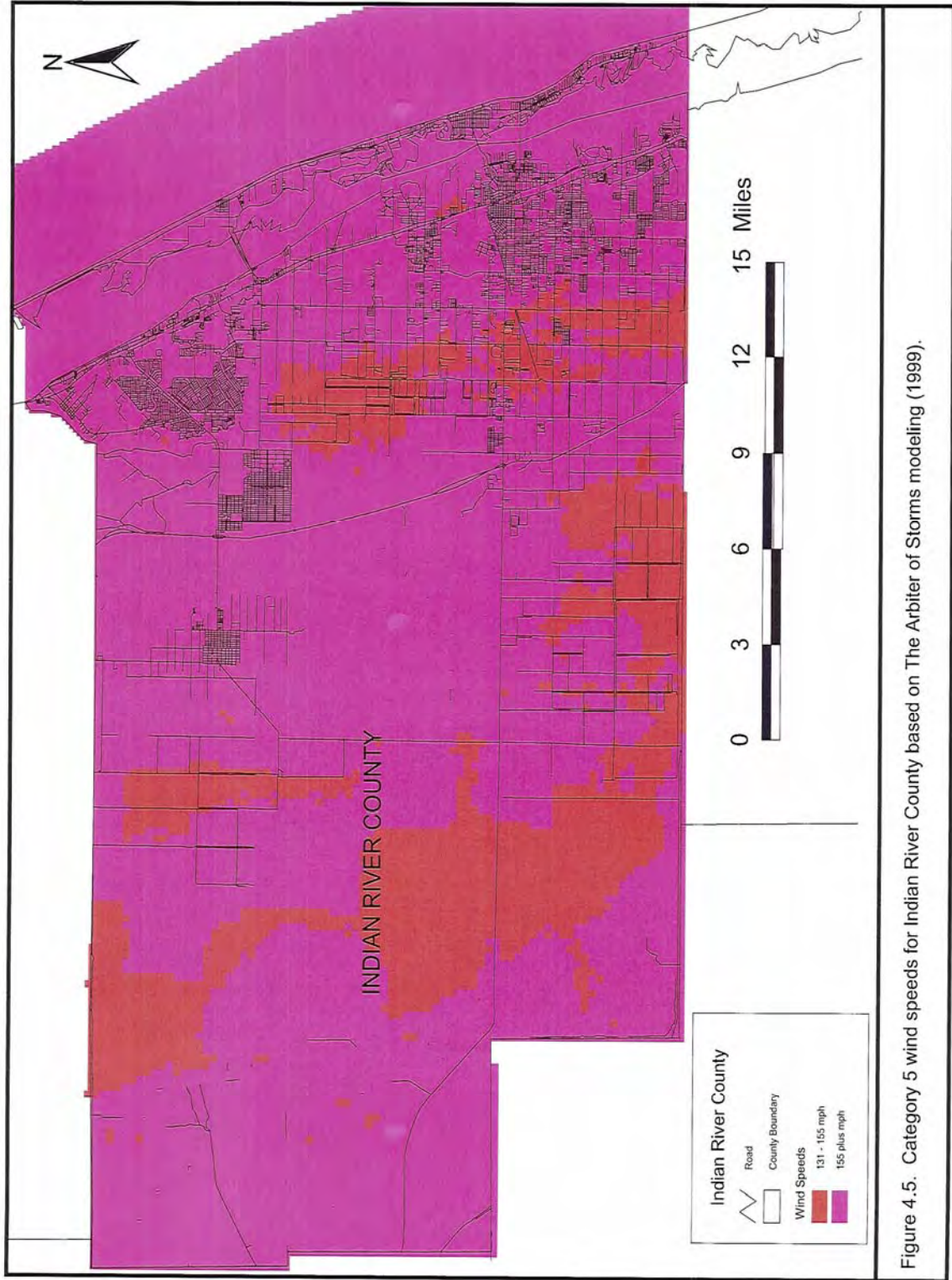


Figure 4.5. Category 5 wind speeds for Indian River County based on The Arbiter of Storms modeling (1999).

Figure 4.5 can be used to estimate the extent of the wind-related hazard in the individual jurisdictions located in Indian River County. According to the TAOS model, there is no real significant difference in expected wind speeds among the jurisdictions in Indian River County. All jurisdictions can expect wind speeds ranging from at least 131 to 155 mph during a Category 5 event.

4.1.2.3 Risk Assessment

All communities within Indian River County are highly vulnerable to hurricanes, but they are not all vulnerable for the same reasons. The barrier island communities (Town of Orchid, Indian River Shores, and the beach side of the City of Vero Beach) are obviously highly vulnerable to both wind and storm surge damage from hurricanes. The communities fronting on Indian River County's estuaries and rivers are also highly vulnerable to flooding associated with hurricane winds and storm surge. Inland communities may have less hurricane vulnerability from flooding but more hurricane vulnerability from wind damage due to their older or less substantial type of construction.

The risk assessment data for hurricanes in Indian River County are based on data developed for MEMPHIS, which was developed by the FDCA. The MEMPHIS data utilized for this report is the most updated and revised historical database available to staff at this time and is considered to still be fairly accurate.

Table 4.10 illustrates the total exposure to wind damage for four different event categories.

Table 4.10. Wind damage exposure, Indian River County, 2003.

Exposure	100-Year Event	50-Year Event	25-Year Event	10-Year Event
Total Number Moderate Damaged	6,187	0	0	0
Total Number Light Damage	47,081	53,268	53,266	19,738
Total Number No Damage	0	0	2	33,530
Total Value Moderate Damage	\$1,224,159,488	0	0	0
Total Value Light Damage	\$5,679,512,064	\$6,903,527,424	\$6,903,511,040	\$2,968,267,520
Total Value No Damage	0	0	\$17,705	\$3,935,561,472
Total Number of People Affected Moderate Damage	10,539	0	0	0
Total Number of People Affected Light Damage	102,408	112,947	112,947	31,728
Total Number of People Affected No Damage	0	0	0	81,219

Source: Florida Department of Community Affairs, 2004a.

Table 4.11 illustrates the total exposure to wind damage for the five hurricane intensity categories.

Table 4.11. Hurricane wind damage exposure, Indian River County, 2003.

Exposure	Category 5	Category 4	Category 3	Category 2	Category 1
Total Number Destroyed	47,672	0	0	0	0
Total Number Severe Damage	5,521	28,540	0	0	0
Total Number Heavy Damage	73	24,378	0	0	0
Total Number Moderate Damage	0	348	53,169	9,590	5
Total Number Light Damage	2	2	99	43,678	53,266
Total Number No Damage	0	0	0	0	2
Total Value Destroyed	\$5,764,345,856	0	0	0	0
Total Value Severe Damage	\$1,092,370,816	\$4,019,174,912	0	0	0
Total Value Heavy Damage	\$46,908,544	\$2,638,434,048	0	0	0
Total Value Moderate Damage	0	\$246,142,176	\$6,836,543,488	\$2,106,457,760	0
Total Value Light Damage	\$17,705	\$17,705	\$67,015,016	\$4,797,234,176	\$6,903,511,040
Total Value No Damage	0	0	0	0	\$17,705

Source: Florida Department of Community Affairs, 2004a.

Table 4.12 displays the wind damage exposure for the top five vulnerable structure types in the County.

Table 4.12. Wind exposure, Indian River County, 2004.

Rank	Structure Type	Exposure
1.	Single-family	\$3,159,379,456
2.	Condominia	\$1,260,790,912
3.	Orchard, Grove, Citrus	\$686,234,560
4.	Grazing Land Soil Class I	\$146,461,168
5.	Public Schools	\$90,840,200

Source: Florida Department of Community Affairs, 2004a.

A calculation was made to determine the reduction in wind losses when mitigation was included. **Table 4.13** illustrates the reduction in average annual loss when structures are mitigated for an additional 5 mph.

Table 4.13. Wind mitigation savings, Indian River County, 2004.

Rank	Structure Type	Exposure
1.	Single-family	\$2,548,132
2.	Condominia	\$1,082,683
3.	Orchard, Grove, Citrus	\$449,325
4.	Grazing Land Soil Class I	\$93,631
5.	Public Schools	\$73,448

Source: Florida Department of Community Affairs, 2004a.

Table 4.14 depicts the mitigation savings that can be achieved for wind-related hazard by each hurricane intensity category.

Table 4.14. Wind-related exposure and mitigation, Indian River County, 2004.

Hurricane Category	Total Exposure	Exposure After Mitigation	Savings
Category 1	\$265,684,512	\$175,548,864	\$90,135,648
Category 2	\$830,269,824	\$628,748,160	\$201,521,664
Category 3	\$1,990,336,128	\$1,620,502,772	\$369,833,856
Category 4	\$4,325,369,344	\$3,698,419,456	\$626,949,888
Category 5	\$6,723,366,912	\$6,545,553,408	\$177,813,504

Source: Florida Department of Community Affairs, 2004a.

Table 4.15 depicts the mitigation savings that can be achieved for the flooding hazard by each hurricane intensity category.

Table 4.15. Flood-related exposure and mitigation, Indian River County, 2004.

Hurricane Category	Total Exposure	Exposure After Mitigation	Savings
Category 1	\$591,960,832	\$434,004,480	\$157,956,352
Category 2	\$1,213,005,056	\$1,005,437,760	\$207,567,296
Category 3	\$2,097,954,944	\$1,863,964,544	\$233,990,400
Category 4	\$3,079,032,320	\$2,720,572,160	\$358,460,160
Category 5	\$3,753,407,744	\$3,364,619,264	\$388,788,480

Source: Florida Department of Community Affairs, 2004a.

4.1.3 Tornadoes

4.1.3.1 Hazard Identification

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. It is generated by a thunderstorm or hurricane when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The most common type of tornado, the relatively weak and short-lived type, occurs in the warm season, with June being the peak month. The strongest, most deadly tornadoes occur in the cool season, from December through April (FDCA, 2004b). Occasional windstorms accompanied by tornadoes, such as the winter storm of 1993, also are widespread and destructive.

When a tornado threatens, only a short amount of time is available for life-or-death decisions. The NWS issues two types of alerts:

- Tornado Watch – means that conditions are favorable for tornadoes to develop.
- Tornado Warning – means that a tornado has actually been sighted.

Tornadoes are classified using the Fujita-Pearson scale (**Table 4.16**).

Table 4.16. Fujita-Pearson Scale.

F = Intensity	P = Path Length	W = Mean Width
F0 = Light Damage	P0 = less than 1 mile	W0 = less than 0.01 mile
F1 = Moderate Damage	P1 = 1.0 to 3.1 miles	W1 = 0.01 to 0.03 miles
F2 = Considerable Damage	P2 = 3.2 to 9.9 miles	W2 = 0.04 to 0.09 miles
F3 = Severe Damage	P3 = 10.0 to 31.0 miles	W3 = 0.10 to 0.31 miles
F4 = Devastating Damage	P4 = 32.0 to 99.0 miles	W4 = 0.32 to 0.99 miles
F5 = Catastrophic Damage	P5 = 100 miles or greater	W5 = 1.00 miles or wider

Historic Events. Florida ranks third in the United States in the number of tornado strikes, and the first in the number of tornadoes per square mile. The odds of a tornado striking any specific point in southeastern Florida are 0.04, or once per 250 years.

The damage from a tornado is a result of the high wind velocity and wind-blown debris. Florida's average is 75 tornadoes annually since 1950, causing an average of 3 fatalities and 60 injuries each year (FDCA, 2004b). According to FDCA on-line hazard maps, there have been three light damage, one moderate damage, and two significant damage tornadoes in Indian River County between 1961 and 1990. **Table 4.17** illustrates the associated wind speeds with each of the tornado damage categories used in the FDCA map.

Table 4.17. Tornado wind speeds.

Category	Wind Speed (mph)
Light	40-72
Moderate	73-112
Significant	113-157
Severe	158-206
Devastating	207-260
Incredible	261-318

Source: Florida Department of Community Affairs, 2003b.

The National Climate Data Center (NCDC) indicates that there have been a total of 26 tornado incidents in Indian River County since 1950. The majority of the events have been F0 and F1. NCDC data also indicate that there has been one tornado-related injury, no deaths, and \$1,397,000 in property damage associated with tornado events in the County. **Table 4.18** describes some of the more significant tornado events that have occurred within the County.

Table 4.18. Tornado incidents, Indian River County, 1950 – 2009.

Date	Magnitude	Path Length (miles)	Path Width (yards)	Description
4 October 1978	F0	0	20	None available
3 September 1979	F1	0	30	None available
25 May 1985	F1	2	30	None available
12 July 1987	F0	1	30	None available
27 June 1992	F0	0	10	None available
25 September 1998	F1	2	40	Downed trees and damaged roofs in Sebastian
24 June 2001	F1	2	1	Downed trees and damaged roofs and shed in Sebastian
13 December 2002	F1	1	60	Destroyed 2 homes, damaged 7 homes and 3 vehicles in Wabasso (¼ mile south of SR 570 and ½ mile west of U.S. Highway 1)
25 September 2004	F1	1	30	As the main eye wall of Hurricane Jeanne crossed the coast, a tornado-like event moved through the NE corner of the intersection of I-95 and Hwy 60, west of Vero Beach. There was a path of blown down trees surrounded by trees with little damage.

Source: National Climatic Data Center, 2009.

The NCDC has recorded tornado events in unincorporated Indian River County, the City of Vero Beach, the City of Sebastian, Town of Fellsmere, and Wabasso (located in unincorporated County). No events have been recorded in the Town of Indian River Shores or Orchid.

During the tornado in December of 2002, the ARC provided services to three families hit by the tornado and opened a shelter for 38 families who were ordered to evacuate because their homes were deemed unsafe.

Because tornadoes are hazards that are not bounded by geographic or topographic characteristics, there are no definite means to determine whether or not the extent of this hazard differs from jurisdiction to jurisdiction within Indian River County.

4.1.3.2 Vulnerability Assessment

Tornado events can have the following potential impacts within a community:

- Excessive wind;
- Electric power outage;
- Surface and air transportation disruption;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship; and
- Economic disruption.

Indian River County's vulnerability to tornadoes is compounded by the high concentration of mobile home residents in large mobile home communities. According to the 2000 U.S. Census, there are 6,786 mobile homes in Indian River County, representing 11.7% of the total housing units in the County. Three municipalities within Indian River County have significant concentrations of mobile homes. Sebastian has a total of 564 mobile homes, representing 7.6% of the total housing units. Wabasso has a total of 166 mobile homes, representing 31.9% of the total housing units. Fellsmere has a total of 397 mobile homes, representing 42.4% of the total housing units.

4.1.3.3 Risk Assessment

Historical data indicate the overall vulnerability of Indian River County to tornadoes is low, but some specific communities have a moderate to high vulnerability to this hazard due to the type of construction or numbers of mobile homes (manufactured housing units) within their boundaries. These communities include Sebastian, Wabasso, and Fellsmere.

The risk assessment data for tornadoes in Indian River County are based on data developed for the MEMPHIS, which was developed by the FDCA. The MEMPHIS data utilized for this report is the most updated and revised historical database available to staff at this time and is considered to still be fairly accurate.

Tornado risk is defined as the annual probability of significant structural damage and is divided into four probabilities of occurrence: <1 in 500, 1 in 500, 1 in 200, and 1 in 100. **Table 4.19** illustrates the tornado exposure in Indian River County.

Table 4.19. Tornado exposure, Indian River County, 2003.

Probability of Occurrence	Number of Structures	Value of Structures	Population at Risk
1 in 500	53,268	\$6,903,527,424	112,947

Source: Florida Department of Community Affairs, 2004a.

4.1.4 Severe Thunderstorms/Lightning

4.1.4.1 Hazard Identification

A severe thunderstorm is defined as a thunderstorm containing one or more of the following phenomena: hail 3/4 inch or greater, winds gusting in excess of 57.5 mph, and/or a tornado (NOAA, NWS, 1994). Severe weather can include lightning, tornadoes, damaging straight-line winds, and large hail. Most individual thunderstorms only last several minutes; however, some can last several hours.

Long-lived thunderstorms are called super cell thunderstorms. A super cell is a thunderstorm that has a persistent rotating updraft. This rotation maintains the energy release of the thunderstorm over a much longer time than typical, pulse-type thunderstorms, which occur in the summer months. Super cell thunderstorms are responsible for producing the majority of severe weather, such as large hail and tornadoes (NOAA, NWS, 2003). Downbursts also are occasionally associated with severe thunderstorms. A downburst is a strong downdraft resulting in an outward burst of damaging winds on or near the ground. Downburst winds can produce damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder (NOAA, NWS, 2003). Strong squall lines also can produce widespread severe weather, primarily very strong winds and/or microbursts.

When a severe thunderstorm approaches, the NWS will issue an advisory. According to NOAA, NWS (1994) two possible advisories are as follows:

- Severe Thunderstorm Watch: Conditions are favorable for the development of severe thunderstorms.
- Severe Thunderstorm Warning: Severe weather is imminent or occurring in the area.

Historic Events. In 1997, thunderstorms spawned 103 tornadoes, injured 121 people, and produced over \$38 million in property damage statewide. According to FDCA's on-line hazard maps, Indian River County averages more than 70 days with thunderstorms per year, with the most frequent occurrences being between the months of July and September. According to the NCEM, there have been a total of 59 thunderstorm events in Indian River County since 1953, causing a total of \$1.376 million in property damage. On 13 March 1993, a downburst in Vero Beach damaged eight homes and three commercial buildings. On 5 April 1995, a thunderstorm damaged several homes in the Windsor Subdivision in Wabasso. On 26 June 1995, a thunderstorm knocked down stadium

lighting at Dodgertown in Vero Beach. In Sebastian, storms in May 1996 and August 2002 damaged a 20-passenger airplane and 3 moored vessels, respectively. In January of 1999, a thunderstorm in Vero Beach caused \$5,000 worth of damage to doors at the Vero Beach Municipal Airport. In the past 5 years, the City of Vero Beach has recorded two severe thunderstorm events; and the City of Sebastian has recorded one severe thunderstorm event, none of which reported significant property damage (these were reports to NCDC through 11/30/09).

NCDC has recorded 53 incidents of hail in Indian River County. The average accumulation for these events being 1.15 inches. The City of Vero Beach has recorded fifteen incidents of hail since 1999, the Town of Fellsmere, six, and the City of Sebastian, four (these were reports to NCDC through 11/30/09).

Because thunderstorms are hazards that are not bounded by geographic or topographic characteristics, there are no definite means to determine whether or not the extent of this hazard differs from jurisdiction to jurisdiction within Indian River County.

Perhaps the most dangerous and costly effect of thunderstorms is lightning. As a thunderstorm grows, electrical charges build up within the cloud. Oppositely charged particles gather at the ground below. The attraction between positive and negative charges quickly grows strong enough to overcome the air's resistance to electrical flow. Racing toward each other, the charges connect and complete the electrical circuit. Charge then surges upward from the ground at nearly one-third the speed of light and produces a bright flash of lightning (Cappella, 1997).

On average, lightning kills more people than any other weather event. Florida leads in the nation in lightning related deaths and injuries. Most lightning strike fatalities occur in June, July, and August. Between 1959 and 1994, there have been 345 lightning-related deaths in Florida (National Lightning Safety Institute, 2004a). Florida also has the most strikes, about 12 strikes per square kilometer per year in some places (National Lightning Safety Institute, 2004b). Nationwide, lightning-related economic losses amount to over \$5 billion dollars per year, and the airline industry alone loses approximately \$2 billion a year in operating costs and passenger delays from lightning (National Lightning Safety Institute, 2004c).

Between 1959 and 2009, Indian River County recorded one lightning-related death (Wabasso) and seven injuries (4 Wabasso, 3 Sebastian). According to the NCDC, two major lightning incidents caused \$1,050,000 in property damage. The majority of the damage came on 1 June 1997 when a lightning-related fire destroyed a million dollar home in Vero Beach. Between 1994 and 2009 there have been five lightning events recorded with the NCDC – resulting in seven injuries (4 in Wabasso and 3 in Sebastian) and one death (in Wabasso).

4.1.4.2 Vulnerability Assessment

Thunderstorm events can have the following potential impacts within a community:

- Excessive wind;
- Excessive water;
- Damaging hail;

- Electric power outage;
- Surface and air transportation disruption;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Fire; and
- Stormwater drainage impairment.

Thunderstorms typically cause damage in a community by knocking down trees and power lines. Downed trees can block key roadways within a community, making emergency response more difficult. Downed power lines block roadways, disrupt businesses when power is lost, and pose threats to people when lines are severed. Mobile homes also are more susceptible during severe thunderstorm activity. According to the 2000 U.S. Census, there are 6,786 mobile homes in Indian River County, representing 11.7% of the total housing units in the County. Three municipalities within Indian River County have significant concentrations of mobile homes. Sebastian has a total of 564 mobile homes, representing 7.6% of the total housing units. Wabasso has a total of 166 mobile homes, representing 31.9% of the total housing units. Fellsmere has a total of 397 mobile homes, representing 42.4% of the total housing units.

4.1.4.3 Risk Assessment

Vulnerability to severe thunderstorms and lightning is high in Indian River County, but many of the jurisdictions and population centers have only moderate vulnerabilities relative to these hazards. This variation in relative levels of vulnerability is again primarily due to construction practices and community characteristics. Working communities have a higher vulnerability to economic impacts by lightning than residential or retirement communities, all other factors being equal, while residential and retirement communities have a historically higher vulnerability in terms of lightning fatalities.

At the time of publication, a risk assessment model for severe thunderstorms was not available. The County can expect losses similar to what it experienced in the past, which is about an average of \$17,500 per year in property damage.

The table below gives some hail size estimates and descriptions. The potential damage and hailstorm intensity is described H0 to H10 according to the TORRO Hail Storm Intensity Scale. *Indian River County could reasonably expect hail of a size code 3 during a severe thunderstorm.

Table 4.20 TORRO Hail Storm Intensity Scale/Hail Stone Size Classification

Size Code	Diameter	Description	Intensity Range
1	5 to 10 mm	Pea	H0-H2
2	11 to 15 mm	Mothball, bean	H0-H3
3*	16 to 20 mm	Cherry, penny	H1-H4
4	21 to 30 mm	Walnut	H2-H5
5	31 to 45 mm	Golf ball	H3-H6
6	46 to 60 mm	Billiard Ball	H4-H7
7	61 to 80 mm	Tennis ball, orange	H5-H8
8	81 to 100 mm	Grapefruit, softball	H6-H9
9	101 mm to 125 mm	Melon	H7-H10
10	Over 150 mm	Coconut	H8-H10

The table below is the Beaufort wind scale, which is used for estimating wind speed when there is no standard instrumentation available. Indian River County could expect to receive Force 11 winds during a severe thunderstorm.

Table 4.21 Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (13-20 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41-47	Strong Gale	High waves (20 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-30 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11*	56-63	Violent Storm	Exceptionally high (30-45 ft) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	

4.1.5 Wildland/Urban Interface Zone

4.1.5.1 Hazard Identification

Over 16 million acres of Florida is covered with forests. Although the state's abundant rain and sunshine are vital to the survival of Florida's forests, another element is necessary to maintaining them...fire. Over thousands of years, Florida's forests have developed because of the presence of fire. In fact, many of Florida's ecosystems require fire in order to exist.

Fire has been present since the peninsula known as Florida emerged from the sea. Prior to the arrival of humans, weather conditions and fuels determined the occurrence of fires. When the first humans arrived in Florida over 10,000 years ago, their activities provided new ignition sources for fire. Along with periodic natural fires, Native Americans used fire as a tool to shape the environment and to improve hunting. Lightning fires and fires set by early humans helped to maintain natural areas conducive to the growth of herbs, berries, wildflowers, grasses and low shrubs. Later, when European settlers began colonizing Florida, they remarked upon the open forests and grasslands swept clean by fire.

Over the past fifty years, more and more Floridians have moved out of the cities to build homes and businesses in the outlying fringe areas known as the wildland urban interface. In fact, almost one-third of our population lives in these interface areas where structures intermingle with forests and wildlands. Residents here, however, usually don't realize they may live too "close to nature", they may, in fact, be living on the edge of a wildland fire disaster. When dry years come, Florida experiences severe wildfires – wildfires that destroy homes, disrupt people's lives and impact our economy.

Fire is a self-propagating chemical reaction known as combustion. It can be defined as rapid oxidation of a material accompanied by the release of energy in the form of heat and light. To have fire, three ingredients are needed: oxygen, heat and fuel. Removing any of these three ingredients will extinguish a fire. Indian River County Fire Rescue uses water to extinguish the heat element. The Florida Division of Forestry uses a tractor-plow and removes the fuel element (vegetation).

Florida's wildfire season is twelve months long. Indian River County has wildfires throughout the year. The most active part the year is typically December through the beginning of June. Generally, Indian River County experiences the greatest number of wildfires during April, May, and June.

Why homes burn? Wildland Urban Interface homes are usually lost because of the "little things" associated with the two most vulnerable parts of a home: the roof and the area immediately surrounding the structure.

There are 3 ways a house can catch fire: (1) Direct Flame Contact- this is where a homeowner builds their house too close to the woods and the fires travels from the woods to the home. Fire agencies recommend a 30 foot parameter from the woods and the home to protect from radiant heat and so firefighters can safely protect the home. (2) Radiant Heat – the fuel (vegetation) from a wildfire can preheat a home in front of the fire until the fuel reaches its ignition temperature and burst into flames. (3) Fire Brands –wind blown leaves, twigs and combustible items catch on fire showering in front of the main fire. Fire brands can be carried up to a mile away from the main fire igniting wood roofs or debris on roofs or dead vegetation around the home.

The 2 homes lost in Martin County in 2009 were directly caused by fire brands. The most susceptible part of the house to fire brands is the roof and soffits. Wood shingles can easily catch fire from flying fire brands. Roofs with fire resistant shingles can also catch fire from embers if there is an accumulation of leaves and pine needles on the roof and in the gutters. Exposed eaves can allow fire brands into the attic and catch the roof on fire. Vinyl soffits are not recommended in fire prone areas unless they have backing of 1/8" noncombustible (wire) mesh. They melt easily and can allow fire brands into the attic area.

Response to wildfires in the State of Florida is primarily a partnership effort between the Division of Forestry and local fire agencies. Frequently, when a fire emergency occurs, the notification is processed through the local 911 emergency phone system or Division of Forestry detection. The local fire department responds and the Division of Forestry is notified. As the first responder, the local department may arrive on scene first and determine the need for forestry resources to continue. In a true wildfire situation, the Division of Forestry, or the appropriate federal agency on federal property, may be dispatched and arrive first and determine the need for additional resources.

The Division of Forestry has statutory responsibility for all wildfires within the State of Florida. Local fire agencies have responsibility for fire protection within their jurisdictional boundaries. Using the National Incident Management System (NIMS) model, the first arriving agency assumes command of the incident. Command is then transferred as necessary as additional units or agencies arrive on the scene. In a working incident, the primary agency having responsibility for the fire will assume command of the operation after their arrival. When fires involve the interface between the wildland areas and the urban and suburban communities, there is joint responsibility to combat the spread of these fires by both the local agencies and the Division of Forestry. In these cases, all agencies must work together and support each other in a unified command operation to provide the most efficient use of resources.

On a wildfire, there could be over a hundred people working on one fire. Not all personnel are firefighters. There are dispatchers, media experts, mechanics, accountants, meteorologists, police, local experts (on land, fuel, terrain, waterways, so on), electrical and infrastructure experts and many more specialized individuals depending on the fire. **Table 4.22** illustrates the number and total acreage of wildland fires in 2008 by ignition type.

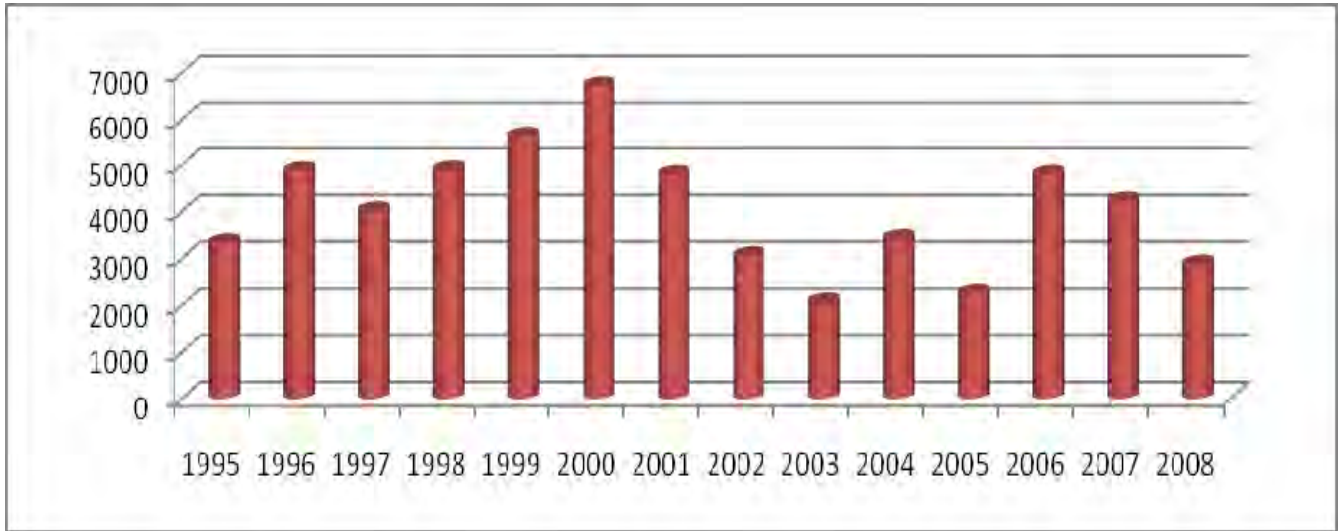
Table 4.22. Wildland fires by type, Indian River County, 2008.

Cause of Wildland Fire	Number of Wildland Fires	Acreage Burned
Railroad	26	319
Smoking	27	61
Campfire	110	949
Children	104	355
Equipment	194	2,067
Miscellaneous	296	3,616
Unknown	338	8,245
Incendiary	428	59,531
Lightning	780	18,208
Debris	584	12,139
Total	2,887	105,183

Source: Florida Division of Forestry, 2009.

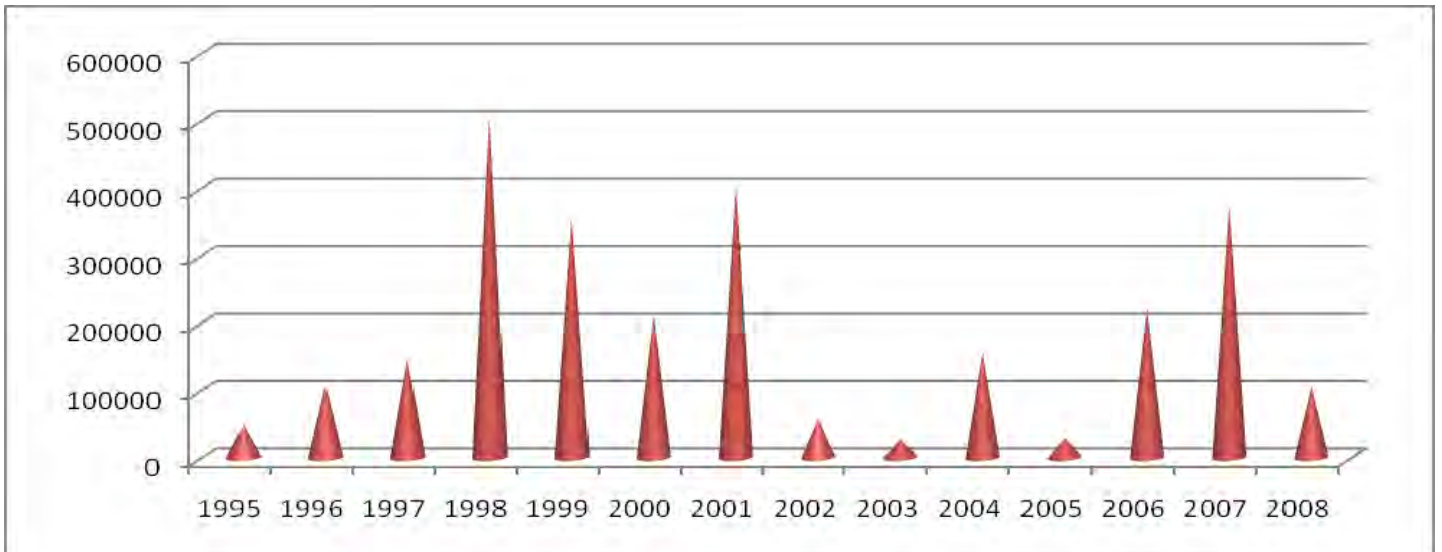
Figures 4.6 and **4.7** illustrate the number of wildland fires and the acres burned statewide between 1995 and 2008, respectively.

Figure 4.6. Number of Florida wildland fires, 1995 – 2008.



Source: Florida Division of Forestry, 2009.

Figure 4.7. Florida wildland fire acres burned, 1995 – 2008.



Source: Florida Division of Forestry, 2009.

Since 1995, Indian River County has had 514 wildfires that have charred 16,819 acres. Lightning, debris, or children were the most common ignition source for wildland fires in Indian River County (Florida Division of Forestry, 2009).

A muck fire is a fire that consumes all the organic material of the forest floor and also burns into the underlying soil. It differs from a surface fire by being invulnerable to wind. If the fire gets deep into the ground, it could smolder for several years. In a surface fire, the flames are visible, and burning is accelerated by wind. Whereas in a muck fire, wind is not generally a serious factor (Canadian Soil Information System, 1996). Another extraordinary fact about muck fires has to do with their release of carbon dioxide. A peat bog that is on fire can release more carbon dioxide into the atmosphere than all the power stations and car engines emit in Western Europe in 1 year (Pearce, 1997). This type of fire could have a significant impact on global warming.

Historic Events. Muck fires are not a frequent threat to Florida. However, during a drought in the 1980's, fires in the Everglades consumed the rich, dried out muck that had once been the bottom of the swamp. These fires burned deep into the ground and required alternative firefighting techniques. Muck fires occur very infrequently in Indian River County, and the only areas where this hazard might produce impacts are in the western portions of the County. At the present time, muck fires are not considered a significant hazard.

4.1.5.2 Vulnerability Assessment

Wildland fires can have the following potential impacts within a community:

- Electric power outage;
- Surface and air transportation disruption;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Agricultural/fisheries damage;
- Loss of livestock;
- Damage to critical environmental resources;
- Damage to identified historical resources;
- Fire; and
- Toxic releases.

Locations where forested lands and homes or businesses intermingle create potential risk areas for wildland fire. Less urbanized communities and vacant tracts of land within the County are more vulnerable to wildland fires than the more developed communities. Large areas in the western part of the County and many isolated unincorporated pockets of residential development are quite vulnerable to wildland fire in Indian River County. As of the year 2000, there was an estimated 31,200 acres of forested land in Indian River County, accounting for nearly 10% of the area of the County (University of Florida, 2001). In 2001, Indian River County developed a wildland fire mitigation plan in an effort to identify at-risk areas as well as strategies to reduce the risks posed by wildland fire in the County. **Figure 4.8** illustrates the County's overall risk to wildland fires.

Figure 4.8 can be used to determine the extent of the wildland fire hazard in each of the participating jurisdictions. Overall, the high wildland fire risk areas are located in the

western portions of the unincorporated County and in populated areas of the eastern portion of the County.

The portion of the City of Vero Beach located on the barrier island and the easternmost portions of the mainland have been assessed as having a low wildland fire risk. Areas in the southwestern portion of the City have been assessed as having a moderate risk.

The entire land area of the Town of Indian River Shores is located on the barrier island and has been assessed as having a moderate risk level for wildland fire.

The entire land area of the Town of Orchid is located on the barrier island and has been assessed as having a moderate risk level for wildland fire.

The majority of land within the City of Sebastian has been assessed as having a moderate wildland fire risk, while a small portion in the northern portion of the City has a low risk.

The majority of the Town of Fellsmere has been assessed as having a high risk to wildland fire.

4.1.5.3 Risk Assessment

The risk assessment data for wildland fires in Indian River County are based on data developed for the MEMPHIS, which was developed by the FDCA. The MEMPHIS data utilized for this report is the most updated and revised historical database available to staff at this time and is considered to still be fairly accurate.

According to MEMPHIS, 80,881 (72%) residents live in areas of low wildland fire risk, 17,766 (16%) live in areas of medium wildland fire risk, and 14,300 (13%) live in areas of high wildland fire risk. In terms of the number and value of structures at risk, there are

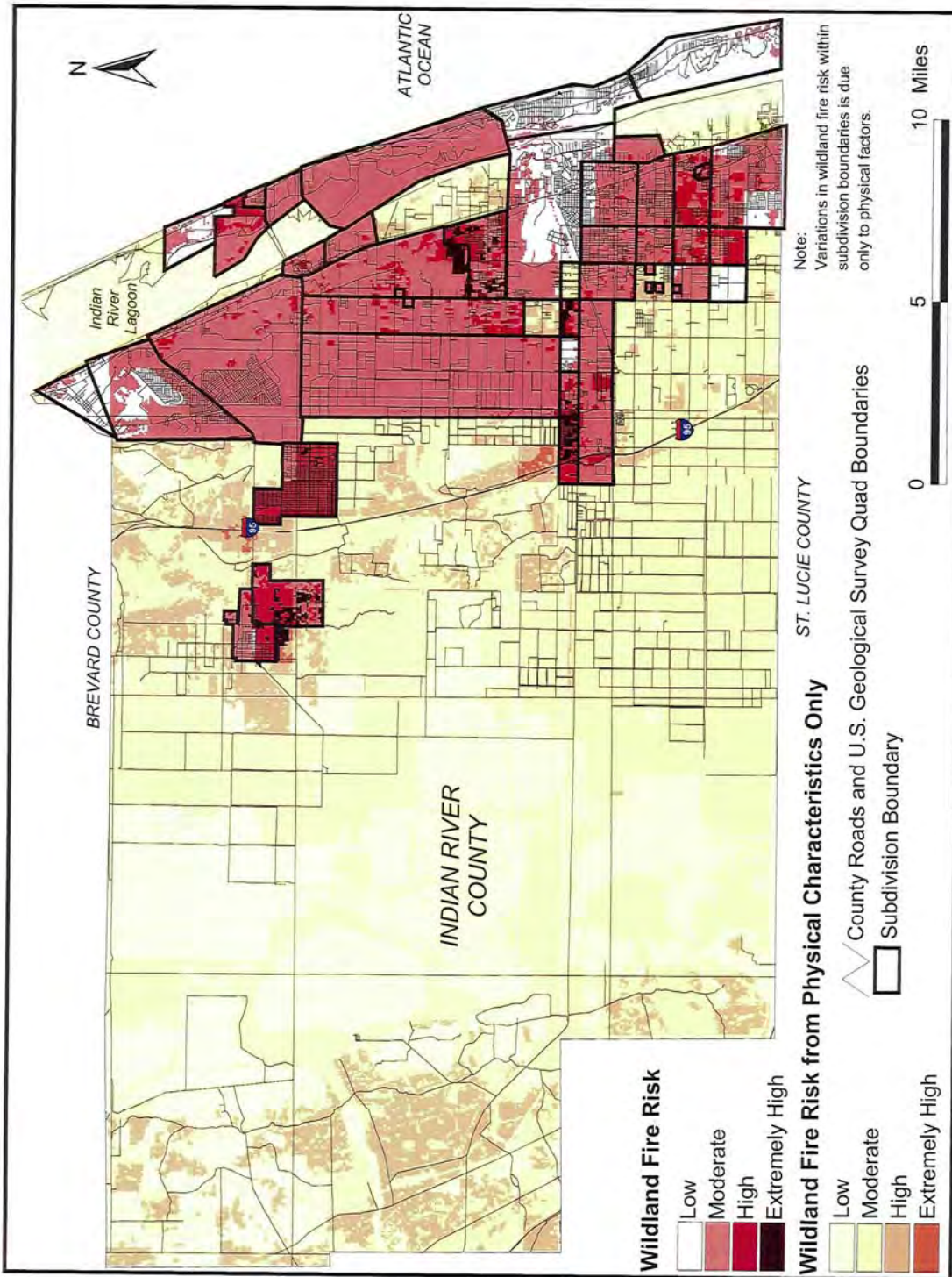


Figure 4.8. Countywide wildland fire risk (1999).

40,515 structures in low risk areas, 5,241 in medium risk areas, and 7,512 in high risk areas. The corresponding exposure for each risk level is as follows. Structures in the low risk areas are valued at \$4.9 billion, structures in the medium risk areas are valued at \$790 million, and structures in the high risk areas are valued at \$1.1 million. **Table 4.21** illustrates the average annual loss due to wildland fire by structure type in the County.

Table 4.23. Average annual loss due to wildland fire, Indian River County, 2004.

Rank	Structure Type	Average Annual Loss
1.	Single-family	\$47,554
2.	Orchards, Grove, Citrus	\$17,599
3.	Condominia	\$15,406
4.	Grazing Land Soil Class I	\$4,404
5.	Regional Shopping Mall	\$4,302

Source: Florida Department of Community Affairs, 2004a.

4.1.6 Extreme Temperatures

4.1.6.1 Freezing Temperatures

Hazard Identification. According to the U.S. Department of Agriculture and Consumer Services, a moderate freeze may be expected every 1 to 2 years. Severe freezes may be expected on an average of once every 15 to 20 years. Freezes pose a major hazard to the agriculture industry in Indian River County on a recurring basis, and are a significant threat to the economic vitality of the State's vital agriculture industry. Agricultural lands represent nearly one-half of all land in Indian River County (University of Florida, 2001).

Historic Events. Indian River County has experienced eight significant freezes between 1970 and the present. Florida has experienced a number of severe or disastrous freezes, when the majority of the winter crops are lost. The lowest temperature ever recorded in the state of Florida is -2°F (NCDC, 1999a) on February 13, 1899 in Tallahassee. Since December 1889, there have been at least 22 recorded severe freezes; the most recent being in 2010, when a Secretarial Disaster Declaration was issued for crop losses estimated to be in the hundreds of millions of dollars. During this event, everything from fruits and vegetables to nursery plants and shrubs to tropical fish felt the effects of the freeze. There were no data available to document previous occurrences of severe freeze by jurisdiction.

Because temperature extremes are hazards that are not bounded by geographic or topographic characteristics, there are no definite means to determine whether or not the extent of this hazard differs from jurisdiction to jurisdiction within Indian River County.

4.1.6.2 **Extreme Heat**

Hazard Identification. Temperatures that remain 10° or more above the average high temperature for a region and last for several weeks are defined as extreme heat (FEMA, 1993). Humid conditions, which add to the discomfort of high temperatures, occur when an area of high atmospheric pressure traps hazy, damp air near the ground.

Human bodies dissipate heat in one of three ways: by varying the rate and depth of blood circulation; by losing water through the skin and sweat glands; and by panting. As the blood is heated to above 98.6°, the heart begins to pump more blood, blood vessels dilate to accommodate the increased flow, and the bundles of tiny capillaries penetrating through the upper layers of skin are put into operation. The body's blood is circulated closer to the surface, and excess heat is released into the cooler atmosphere. At the same time, water diffuses through the skin as perspiration. The skin handles about 90% of the body's heat dissipating function.

Heat disorders generally have to do with a reduction or collapse of the body's ability to cool itself by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When the body cannot cool itself, or when it cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise and heat-related illness may develop. Studies indicate that, other things being equal, the severity of heat disorders tend to increase with age. Heat cramps in a 17-year old may be heat exhaustion in a 40-year old, and heat stroke in a person over 60.

When the temperature gets extremely high, the NWS has increased its efforts to alert the general public as well as the appropriate authorities by issuing special weather statements. Residents should heed these warnings to prevent heat-related medical complications. As a result of the latest research findings, the NWS has devised the "Heat Index" (HI). The HI, given in degrees Fahrenheit, is an accurate measure of how hot it really feels when relative humidity is added to the actual air temperature. The NWS will initiate alert procedures when the HI is expected to exceed 105°F for at least two consecutive days. Possible heat disorders related to the corresponding HI are listed below.

- Heat Index of 130°F or higher – Heatstroke/sunstroke with exposure for people in higher risk groups;
- Heat Index of 105°F-130°F – Sunstroke, heat cramps, and heat exhaustion likely and heatstroke possible with prolonged physical activity;
- Heat Index of 90°F-105°F – Sunstroke, heat cramps with prolonged exposure; and
- Heat Index of 80°F-90°F – Fatigue possible with prolonged exposure and physical activity (NWS, 1999b).

Historic Events. The highest temperature ever recorded in the state was on 29 June 1931 at 109°F in Monticello at an elevation of 207 feet (NCDC, 2003b). In a normal year, approximately 175 Americans die from extreme heat. However, in 1995, the death toll was 1,021 (NWS, 1997). There were no data available to document previous occurrences of extreme heat by jurisdiction.

Because temperature extremes are hazards that are not bounded by geographic or topographic characteristics, there are no definite means to determine whether or not the extent of this hazard differs from jurisdiction to jurisdiction within Indian River County.

4.1.6.3 Vulnerability Assessment

Extreme temperature events can have the following potential impacts within a community:

- Electric power outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Agricultural/fisheries damage; and
- Damage to critical environmental resources;

Temperature extremes, both freezes and periods of excessive heat, impact communities with a larger population of older people to a greater extent than those with younger populations. According to the 2000 U.S. Census, 32,972 residents (29%) in Indian River County are over the age of 60. Freezing conditions primarily affect agriculture and homeless indigents. When conditions are predicted to be below freezing, shelters are opened. A survey of the County's homeless population was conducted in 2002, indicating that there are approximately 457 homeless individuals within the County (Florida Department of Children and Families, 2002). Inland communities away from the moderating influence of the ocean or the estuary are more vulnerable to temperature extremes as are areas with significant agricultural assets. According to the FDCA, between 1979 and 1998, there were 230 extreme temperature-related deaths in the state. This number is greater than the number of deaths caused by hurricanes and tornadoes combined.

Extreme temperatures, especially freezes, can have significant impacts on agricultural economics in a community. As stated earlier, nearly one-half of land in Indian River County is currently designated as agricultural land. More than 60,000 acres in Indian River County are devoted to citrus production. In 1997, the value of all farm lands and buildings in Indian River County was estimated to be \$1,243,117 (University of Florida, 2001).

4.1.6.4 Risk Assessment

At the time of publication, a risk assessment model for extreme temperatures was not available. The County can expect losses similar to what it has experienced in the past.

4.1.7 Erosion

4.1.7.1 Soil Erosion

Hazard Identification. Soil erosion is the deterioration of soil by the physical movement of soil particles from a given site. Wind, water, animals, and the use of tools by man may all be reasons for erosion. The two most powerful erosion agents are wind and water, but in most cases, these are damaging only after man, animals, insects, diseases, or fire have removed or depleted natural vegetation. Accelerated erosion caused by human

activity is the most serious form of soil erosion, and can occur so rapidly that surface soil may sometimes be blown or washed away down to the bedrock.

Undisturbed by man, soil is usually covered by shrubs and trees, dead and decaying leaves, or a thick mat of grass. Whatever the vegetation, it protects the soil when rain falls or wind blows. Root systems of plants hold soil together. Even in drought, the roots of native grasses, which extend several feet into the ground, help tie down the soil and keep it from blowing away. With the vegetation cover stripped away, soil is vulnerable to damage. Whether through cultivation, grazing, deforestation, burning, or bulldozing, once the soil is bare to the erosive action of wind and water, the slow rate of natural erosion is greatly increased. Losses of soil take place much faster than new soil can be created. With the destruction of soil structure, eroded land is even more susceptible to erosion.

The occurrence of erosion has greatly increased. This is because of the activities of modern development and population growth, particularly agricultural intensification. It also is in the field of agriculture that most efforts have been made to conserve soils, with mixed success (Union of International Associations, 1999).

Particles scattered by erosion can also cause problems elsewhere. Stormwater drainage systems, both natural and mechanical, are frequently clogged by loose sediment. If drainage systems are not cleared of uncontrolled sediment on a regular basis, they lose function.

4.1.7.2 Beach Erosion

Hazard Identification. Wind, waves, and long shore currents are the driving forces behind coastal erosion. This removal and deposition of sand permanently changes beach shape and structure (Sea Grant Haznet, 1998). Most beaches, if left alone to natural processes, experience natural shoreline retreat. Shoreline retreat is exacerbated by the effects of stabilized (jettied) coastal inlets, which trap and impound sound and promote erosion on the downdrift beaches. It has been estimated that on the east coast of Florida, as much as 80% of the observed erosion is directly attributable to the effects of stabilized inlets (Dean and Work 1993). As houses, highways, seawalls, and other structures are constructed on or close to the beach, the natural shoreline retreat processes are interrupted. The beach jams up against these man-made obstacles and narrows considerably as the built-up structures prevent the beach from moving naturally inland. When buildings are constructed close to the shoreline, coastal property soon becomes threatened by erosion. The need for shore protection often results in "hardening" the coast with a structure such as a seawall or revetment.

A seawall is a large concrete or steel sheet pile wall designed to protect buildings or other man-made structures from beach erosion. A revetment is a cheaper option constructed with "rip rap" such as large boulders, concrete rubble, or even old tires. Although these structures may serve to protect beachfront property for a while, the resulting disruption of the natural coastal processes has serious consequences for all beaches in the area. Seawalls inhibit the natural ability of the beach to adjust its slope to the ever-changing ocean wave conditions. Large waves wash up against the seawall and rebound back out to sea, carrying large quantities of beach sand with them. With each storm, the beach narrows, sand is lost to deeper water, and the long shore current scours the base of the wall. Eventually, large waves impact the seawall with such force that a bigger structure becomes necessary to continue to resist the forces of the ocean (Pilkey and Dixon, 1996).

Historic Events. Hurricanes Floyd and Irene (1999) and Hurricanes Frances and Jeanne (2004) caused significant beach erosion along the Atlantic Ocean. Oceanfront property in the City of Vero Beach, Town of Indian River Shores, and Town of Orchid also experienced beach erosion during these two events.

The 2005 hurricane season was a record breaking season with 27 named storms. Florida was impacted by Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma, and Tropical Storms Arlene and Tammy. While the cumulative impact of these storms exacerbated erosion conditions in south and northwest Florida, Indian River County was spared.

2008 was a relatively mild tropical storm season for Florida's beaches with Tropical Storm Fay affecting predominantly the Atlantic shoreline, and the gulf coast receiving the fringe impacts of Hurricanes Gustav and Ike.

Because of their location along the Atlantic Ocean and Intercoastal Waterway, the City of Vero Beach, Town of Indian River Shores, Town of Orchid, the City of Sebastian, and unincorporated County are more apt to experience beach erosion associated with wave or current action.

4.1.7.3 Vulnerability Assessment

Erosion can have the following potential impacts within a community:

- Soil/beach erosion;
- Navigable waterway impairment;
- Economic disruption;
- Damage to critical environmental resources; and
- Stormwater drainage impairment.

Indian River County's vulnerability to soil collapse and beach erosion is moderate along its entire coastline. The City of Vero Beach has a significant beach erosion problem, which resulted in two of the FEMA repetitive damage properties reported. Other beachfront communities report low to moderate erosion problems. Erosion also is a potential vulnerability for the communities located on both the Indian and Sebastian rivers. Vulnerability in the rest of the County is low to very low, with the exception of specific locations along some drainage canals. The Department of Public Works has identified the following areas as being in need of beach nourishment projects:

- Sectors 1 & 2 – R-4 to R-17;
- Sector 3 – R-20 to R-55;
- Sector 5 – R-74 to R-86; and,
- Sector 7 – R-97 to R-107.

4.1.7.4 Risk Assessment

FDEP updated a statewide assessment of beach erosion in 2005. In that assessment, FDEP defined the "critical erosion area" as a segment of shoreline where natural processes or human activity have caused or contributed to erosion and recession of

the beach or dune system to such a degree that upland development, recreation interests, wildlife habitat, or important cultural resources are threatened or lost.

There are three critical erosion areas (15.7 miles) in Indian River County. The northern 9.5 miles (R1-R51.3) south of Sebastian Inlet is critically eroded threatening State Road AIA, Sebastian Inlet State Park facilities, the McLarty Treasure Museum, and private development along Ambersand Beach, Sanderling, Summerplace, and Wabasso Beach. The museum has a rock revetment, and inlet sand transfer is conducted south of the inlet. A beach restoration project has been constructed at Ambersand Beach. The northern 3.1 miles of Vero Beach (R70-R86) is critically eroded with development and recreational interests being threatened. Much of this area has seawalls, dune restoration, and small dune nourishment projects, although a major beach restoration has not yet been designed. In southern Indian River County a 3.1-mile segment (R99-R115.7) is critically eroded threatening development interests. A beach restoration project has been constructed along a portion of this area (FDEP 2010).

4.1.8 Droughts

4.1.8.1 Hazard Identification

Drought is a normal, recurrent feature of climate, although many perceive it as a rare and random event. In fact, each year some part of the U.S. has severe or extreme drought. Although it has many definitions, drought originates from a deficiency of precipitation over an extended period of time, usually a season or more (National Drought Mitigation Center, 2010). It produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area producing physical drought. This complexity exists because water is essential to our ability to produce goods and provide services (National Drought Mitigation Center, 2010).

In Indian River County, the primary sources of water are deep wells for utility systems and shallow wells for rural areas. Excess water from an interconnected series of lakes, rivers, canals, and marshes flows either north to the St. Johns River or east to the Indian River Lagoon (Indian River County Department of Emergency Services, 2002). When this cycle is disrupted by periods of drought, one of the most potentially damaging effects is substantial crop loss in the western agricultural areas of the County. In addition to obvious losses in yields in both crop and livestock production, drought in Indian River County is associated with increase in insect infestations, plant disease, and wind erosion. The incidence of forest fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

The St. Johns Water Management District and County staff manage the County's water resources. Complementing the District's water management efforts during periods of critical water shortage, a countywide, uniform, forceful, contingency plan is in place to effectively restrict the use of water.

Historic Events. Florida experienced one of the most severe droughts in 2007 dating back to when records started in the early 1900s. Lake Okeechobee, the region's primary reservoir, was down to less than half a foot above its record low. The \$15 billion landscaping and nursery industries, which comprise Florida's largest agricultural sector, may have been the hardest hit. In November 2009 the lack of rainfall during rainy season led to Indian River County being named the driest county in the state and in danger of wildfires.

Because drought is a hazard that is not bounded by geographic or topographic characteristics, there is no definite means to determine whether or not the extent of this hazard differs from jurisdiction to jurisdiction within Indian River County.

4.1.8.2 Vulnerability Assessment

Drought can have the following potential impacts within a community:

- Economic disruption;
- Agricultural/fisheries damage;
- Damage to critical environmental resources; and
- Wildland fire.

While Indian River County is moderately vulnerable to impacts from drought due to the County's large agricultural land tax base, some communities are less vulnerable due to their location and non-agricultural economic base.

A few examples of direct impacts of drought are reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat. Social impacts include public safety, health, conflicts between water users, reduced quality of life, and inequities in the distribution of impacts and disaster relief. Income loss is another indicator used in assessing the impacts of drought; reduced income for farmers has a ripple effect throughout the region's economy (National Drought Mitigation Center, 2003).

The web of impacts is so diffuse that it is very difficult to come up with financial estimates of damages. However, FEMA estimates \$6 to \$8 billion in losses as the annual average (FEMA, 1995). The worst drought (36% of U.S.) in recent history occurred in July 1988, and the NCDRC reports the estimated cost as \$40 billion (National Drought Mitigation Center, 2010).

4.1.8.3 Risk Assessment

Indian River County overall, has a moderate vulnerability to the impacts from drought due to the County's large agricultural land tax base. The western area of the County is most vulnerable to the impacts of drought because this area is extensively involved in farming and ranching. As of 2007, the average annual market value of agricultural products in Indian River County was \$136 million (www.agcensus.usda.gov). The urbanized communities along the County's coast are less vulnerable due to their location and non-agricultural economic base. Potential impacts to Indian River County's potable water supply during drought conditions appear to be slight.

The Palmer Drought Index has become the semi-official drought index. It is most effective in determining long term drought—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses a 0 as normal, and drought is shown in terms of minus numbers; for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought. The Palmer Index can also reflect excess rain using a corresponding level reflected by plus figures; i.e., 0 is normal, plus 2 is moderate rainfall, etc.

Another reference tool is the Keetch-Byram drought index (KBDI), which is a continuous reference scale for estimating the dryness of the soil and duff layers. The index increases for each day without rain (the amount of increase depends on the daily high temperature) and decreases when it rains. The scale ranges from 0 (no moisture deficit) to 800 (prime drought condition). The range of the index is determined by assuming that there is 8 inches of moisture in a saturated soil that is readily available to the vegetation. In November, 2009, the lack of rainfall during rainy season led to Indian River County being named the driest county in the state of Florida and, according to the Florida Division of Forestry, in danger of wildfires. According to the Keetch Bryam Drought Index, the county measured in at 649 when the normal range for that time of year is 271-420. Indian River County could reasonably expect to see a drought index of this magnitude.

4.1.9 Seismic Hazards

Seismic hazards, which include dam/levee failure, earthquakes, and sinkholes and subsidence, are considered to be a small enough threat to Indian River County that they will not be fully profiled.

4.1.9.1 Dam/Levee Failure

Hazard Identification. Dam/levee failure poses a minor threat to population and property in Indian River County. All dams and levees are earthen structures and are State, regional, local, or privately controlled. The most significant risk related to dam/levee failure is flooding due to substantial rainfall and its eastward migration to final discharge in the Indian River Lagoon. Structural and non-structural techniques to slow and contain this runoff incorporate several drainage systems. Rainfall in excess of designed capacities could cause erosion of constructed drainage facilities and flooding of many areas including primary roadway evacuation routes (Indian River County Emergency Management, 2002). According to the National Inventory of Dams, there are five listed dams in Indian River County (South Relief Structure, Lateral C Structure, Main Canal Structure, North Relief Canal Structure, Lateral Structure #3 (United States Army Corps of Engineers, 1999).

Best available data do not indicate that there have been any dam or levee failures in Indian River County or the municipalities. The overall extent of seismic hazards in Indian River County is uniform throughout the individual jurisdictions in the County.

4.1.9.2 Earthquakes

Hazard Identification. Although Florida is not usually considered to be a state subject to earthquakes, several minor shocks have occurred over time, but only one caused any damage (USDOI, USGS, 2004).

Historic Events.

- In January 1879, a shock occurred near St. Augustine that is reported to have knocked plaster from walls and articles from shelves. Similar effects were reported in Daytona Beach. The shock was felt in Tampa, throughout central Florida, and in Savannah, Georgia as well (USDOI, USGS, 2004).

- In January 1880 another earthquake occurred, this time with Cuba as the focal point. Shock waves were sent as far north as the town of Key West (USDOI, USGS, 2004).
- In August 1886, Charleston, South Carolina was the center of a shock that was felt throughout northern Florida. It rang church bells in St. Augustine and severely jolted other towns along sections of Florida's east coast. Jacksonville residents felt many of the strong aftershocks that occurred in September, October, and November 1886 (USDOI, USGS, 2004).
- In June 1893, Jacksonville experienced a minor shock that lasted about 10 seconds. Another earthquake occurred in October 1893, which also did not cause any damage (USDOI, USGS, 2004).
- In November 1948, doors and windows rattled in Captiva Island, west of Ft. Myers. It was reportedly accompanied by sounds like distant heavy explosions (USDOI, USGS).
- In November 1952, a slight tremor was felt in Quincy, a town located 20 miles northwest of Tallahassee. Windows and doors rattled, but no damage was reported (USDOI, USGS).

The Modified Mercalli Intensity Scale of 1931 is the basis for the U.S. evaluation of seismic intensity. Unlike earthquake magnitude, which indicates the energy a quake expends, Mercalli intensity denotes how strongly an earthquake affects a specific place. The scale has 12 divisions, identified in the table below, and given that the best available data do not indicate that there have ever been any earthquakes in Indian River County or the municipalities, we could reasonable expect to experience Level I on the intensity scale.

Table 4.24 The Modified Mercalli Intensity Scale

I. Not felt except by a very few under especially favorable circumstances.
II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated.
IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, and doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motorcars rock noticeably.
V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction slight to moderate in well built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken. Noticed by persons driving motor cars.
VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.
IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed over banks.
XI. Few, if any (masonry), structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

4.1.9.3 Sinkholes and Subsidence

Hazard Identification. Sinkholes are a common feature of Florida's landscape. They are only one of many kinds of karst landforms, which include caves, disappearing streams, springs, and underground drainage systems, all of which occur in Florida. Karst is a generic term that refers to the characteristic terrain produced by erosional processes associated with the chemical weathering and dissolution of limestone or dolomite, the two most common carbonate rocks in Florida. Dissolution of carbonate rocks begins when they are exposed to acidic water. Most rainwater is slightly acidic and usually becomes more acidic as it moves through decaying plant debris. Limestones in Florida are porous, allowing the acidic water to percolate through them, dissolving some limestone and carrying it away in solution. Over time, this persistent erosion process has created extensive underground voids and drainage systems in much of the carbonate rocks throughout the state. Collapse of overlying sediments into the underground cavities produces sinkholes (Florida Geological Survey, 1998).

The FDEP has recorded four sinkholes in Indian River County. The first developed in 1981 in Fellsmere and was 3 x 3 x 1 foot. The second developed in 1981 in Fellsmere and was 1 x 1 x 2 feet. The third developed in 1981 in Fellsmere and was 3 x 3 x 1 foot. And, the fourth developed in 1985 in Fellsmere and was 45 x 45 x 45 feet. The FDEP database does not document any sinkholes in Vero Beach, Indian River Shores, Orchid, or Sebastian.

4.1.9.4 Vulnerability Assessment

There are areas in western Indian River County where canal bank failures could cause or exacerbate flooding during heavy rain events or storms. This problem is, however, more related to soil erosion than to actual levee failure. There has never been any seismic activity, soil failures, and few sinkholes in Indian River County. While these hazards may exist, County vulnerability to them at this time is considered very low.

Seismic events can have the following potential impacts within a community:

- Electric power outage;
- Surface and air transportation disruption;
- Potable water system loss or disruption;
- Sewer system outage;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Damage to identified historical resources;
- Fire;
- Toxic releases; and
- Stormwater drainage impairment.

The USDOJ, USGS and the Florida Department of Natural Resources Bureau of Geology have created a map illustrating sinkhole type, development, and distribution for the state of Florida. Sinkhole risk is categorized using four categories. According to this map,

Indian River County lies in Area II, which is classified as having coverage between 30 and 200 feet thick, consisting of incohesive and permeable sand. Sinkholes are few, shallow, of small diameter, and develop gradually. Cover-subsidence sinkholes dominate in this area.

4.1.9.5 Risk Assessment

The risk assessment data for seismic hazards (sinkhole only) in Indian River County are based on data developed for the MEMPHIS, which was developed by the FDCA. The MEMPHIS data utilized for this report is the most updated and revised historical database available to staff at this time and is considered to still be fairly accurate.

According to MEMPHIS, there are 51,052 structures located in the very low hazard area, 3 structures in the low hazard area, 7 in the medium hazard area, 1 in the high hazard area, and none in the very high hazard area. Building values in each of the hazard categories is as follows. There is \$5.8 billion dollars worth of exposure in the very low, \$1.3 million in the low, \$171,000 in the medium, \$62,000 in the high, and \$2,100 in the very high.

4.1.10 Agricultural Pests and Diseases

Florida is among the top three agriculture-producing states in the nation. Agriculture generates farm cash receipts of nearly \$6 billion annually, of which citrus and vegetable crops contribute more than 40%. The industry is susceptible to many hazards including freezes, droughts, and exotic pests or diseases. Agricultural crops are grown throughout the state, and every region is vulnerable to the effects of an exotic pest or disease infestation. As a result, Florida uses the second highest volume of pesticides in the nation.

Agriculture and citrus production play a key role in the Indian River County economy; 52% of the County is farmland. The main threats to the Indian River County agriculture industry are 1) Citrus canker, 2) Mediterranean fruit fly (Medfly), 3) Sugarcane pests, and 4) Tomato Yellow Leaf Curl Virus (TYLCV).

Best available data do not indicate that there have been incidents of agricultural pests and diseases in Indian River County or the municipalities.

4.1.10.1 Citrus Canker and Citrus Greening

Citrus canker has been found in Dade County, and the potential for its spread to other counties is high. Citrus canker is a bacterial disease of citrus that causes premature leaf and fruit drop. It affects all types of citrus, including oranges, sour oranges, grapefruit, tangerines, lemons, and limes. Symptoms found on leaves and fruit are brown, raised lesions surrounded by an oily, water-soaked area and a yellow ring or halo (Indian River County Department of Emergency Services, 2002).

There is no known chemical compound that will destroy the citrus canker bacteria. In order to eradicate the disease, infected trees must be cut down and disposed of properly. It is a highly contagious disease that can be spread rapidly by windborne rain, lawnmowers and other landscaping equipment, animals and birds, people carrying the infection on their hands or clothing, and moving infected or exposed plants or plant parts (Indian River County Department of Emergency Services, 2002).

Citrus greening, also known as huanglongbing (HLB) or yellow dragon disease, is one of the most serious citrus diseases in the world. It is a bacterial disease that greatly reduces production, destroys the economic value of fruit, and can kill trees. It has significantly reduced citrus production in Asia, Africa, the Arabian Peninsula, and Brazil. Once infected, there is no cure for a tree with citrus greening disease. In areas of the world where citrus greening is endemic, citrus trees decline and die within a few years. The disease specifically attacks citrus plants and presents no threat to humans or animals.

4.1.10.2 Mediterranean fruit fly (Medfly)

Another threat to Indian River County's agriculture industry is the Medfly. It is one of the world's most destructive pests and infests more than 250 different plants that are important for U.S. food producers, homeowners, and wildlife. It is considered the greatest pest threat to Florida's \$1.5 billion citrus crop, as well as endangering many other economically significant crops (Florida Department of Agriculture and Consumer Services, 1998a). For example, a Medfly outbreak in 1997 cost an estimated \$32 million to eradicate in Manatee, Marion, Orange, Polk, and Sarasota counties (United States Department of Agriculture, 1999). If a long-term or widespread Medfly infestation were to occur, Florida growers would not be permitted to ship numerous fruit and vegetable crops to many foreign and domestic markets. The movement of fruits and vegetables, even within the state, would be disrupted, which could lead to higher prices in the supermarket. Costly post-harvest treatment of fruits and vegetables to meet quarantine restrictions of domestic and foreign markets would also be required. If the Medfly is not eradicated in Florida, ongoing pesticide treatments by homeowners and commercial growers will be necessary.

Adult Med flies are up to ¼ inch long, black with yellow abdomens, and have yellow marks on their thoraxes. Their wings are banded with yellow. The female Medfly damages produce by laying eggs in the host fruit or vegetable. The resulting larvae feed on the pulp, rendering the produce unfit for human consumption. In addition to citrus, med flies will feed on hundreds of other commercial and backyard fruit and vegetable crops.

Because med flies are not strong fliers, the pest is spread by the transport of larval-infested fruit. The major threats come from travelers, the U.S. mail, and commercial fruit smugglers. Several steps have been taken to prevent new infestations. State and Federal officials are working with postal authorities to develop ways to inspect packages suspected of carrying infested fruit. In addition, public education efforts carrying the message, "Don't Spread Med" are being expanded (Florida Department of Agriculture and Consumer Services, 1998b).

4.1.10.3 Sugarcane Pests

Changes in sugarcane agriculture, including new disease and insect pests, have seriously impacted the quality of cane and juice delivered to the mill for processing. These changing developments affect the level of sucrose, purity, fiber, and color of cane, resulting in a loss of sugar and decrease in the quantity and quality of sugar produced (Legendre et al., 1998).

4.1.10.4 TYLCV

The TYLCV is believed to have entered the state in Dade County sometime in early 1997 (Florida Department of Agriculture and Consumer Services, 1999). Symptoms vary among tomato types, but in general, leaves produced shortly after infection are reduced in size, distorted, cupped inward or downward, and have a yellow mottle. Fewer than 1 in 10 flowers will produce fruit after TYLCV infection, severely reducing yields.

The virus is transmitted by adult silverleaf whiteflies. Although frequent applications of pesticides help to decrease whitefly populations and suppress the spread of TYLCV, virus management through whitefly control is not possible in years where whitefly populations are high. Fortunately, the virus is not transmitted through seed or casual contact with infected plants.

4.1.10.5 Vulnerability Assessment

Agricultural pests and diseases can have the following potential impacts within a community:

- Human health and safety;
- Psychological hardship
- Economic disruption;
- Agricultural/fisheries damage; and
- Damage to critical environmental resources.

Agricultural pests and diseases are a more significant hazard in those areas of the County where agriculture is a more significant element in the economic base. The western portion of Indian River County is a major ranching area, and there are numerous nurseries and smaller agricultural-related businesses located throughout the County.

4.1.10.6 Risk Assessment

Because agricultural pests and diseases can have a significant impact on agricultural-related businesses, it is important to look at agricultural-related income to determine potential loss. Approximately 14 million cartons of "Indian River" fruit were exported during the 2006-2007 season. The State of Florida is the nation's largest producer of fresh tomatoes and the crop value exceeds \$619 million (floridatomatoes.org, 2009). The Fellsmere and Wabasso areas are major agribusiness centers.

4.1.11 Epidemics

Infectious diseases emerging throughout history have included some of the most feared plagues of the past. New infections continue to emerge today, while many of the old plagues are still with us. As demonstrated by influenza epidemics, under suitable circumstances, a new infection first appearing anywhere in the world could travel across entire continents within days or weeks (Morse, 1995). Due to the potential of complex health and medical conditions that can threaten the general population, Florida's vulnerability to an epidemic is continually being monitored. With millions of tourists arriving and departing the state annually, disease and disease exposure (airborne, vector, and ingestion) are constantly evaluated and analyzed.

Primarily as a result of the entrance of undocumented aliens into south Florida, and the large number of small wildlife, previously controlled or eradicated diseases have surfaced. Health officials closely monitor this potential threat to the public health. The emphasis upon preventive medical measures such as school inoculation, pet licensing, rodent/insect eradication, water purification, sanitary waste disposal, health inspections, and public health education mitigate this potential disaster.

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

Best available data indicate that there have been no previous occurrences of epidemics in Indian River County or the municipalities.

Because epidemics are hazards that are not bounded by geographic or topographic characteristics, there are no definite means to determine whether or not the extent of this hazard differs from jurisdiction to jurisdiction within Indian River County.

4.1.11.1 Vulnerability Assessment

Florida is more vulnerable than many other states to possible outbreaks of infectious diseases due to the large number of international and U.S. tourists it attracts. The number of illegal aliens reaching U.S. shores also increases vulnerability to disease hazards. Indian River County's vulnerability to epidemic outbreaks is considered relatively low when assessed against other Florida counties, primarily because its population is lower and it is not a key destination for illegal immigration. Medical facilities are adequate for current need, but would be stressed if forced to deal with a major disease outbreak.

4.2 TECHNOLOGICAL HAZARDS

This subsection will now identify those hazards in Indian River County identified as being technological hazards.

4.2.1 Radiological Accidents

While an actual release of radioactive material is extremely unlikely and the immediate threat to life extremely low, vulnerability to a nuclear plant disaster could consist of long-range health effects with temporary and permanent displacement of population from affected areas. The potential danger from an accident at a nuclear power plant is exposure to radiation. This exposure could come from the release of radioactive material from the plant into the environment, usually characterized by a plume (cloudlike) formation. The area the radioactive release may affect is determined by the amount released from the plant, wind direction and speed and weather conditions (e.g., rain), which would quickly drive the radioactive material into the ground, hence causing increased deposition of radionuclides.

Thirty of the 67 counties in the State of Florida are involved in preparedness planning for a commercial nuclear power plant emergency. Emergency Planning Zones (EPZs) have been designated for each power plant to enhance planning efforts for an emergency. An EPZ is comprised of two zones, the 10-mile plume exposure zone and the

50-mile ingestion exposure zone (Nuclear Energy Institute, 2004). Specific coordinating procedures for response to a general emergency at a nuclear power plant have been prepared in the form of standard operating procedures. These include emergency classification levels, which assist in notifying the public if a problem occurs at a plant. They are defined by four categories (FEMA, 2004):

- Notification of Unusual Event – The event poses no threat to plant employees, but emergency officials are notified. No action by the public is necessary.
- Alert – An event has occurred that could reduce the plant's level of safety, but back-up systems still work. Emergency agencies are notified and kept informed, but no action by the public is necessary.
- Site Area Emergency – The event involves major problems with the plant's safety and has progressed to the point that a release of some radioactivity into the air or water is possible, but is not expected to exceed EPA Protective Action Guidelines (PAGs). Thus, no action by the public is necessary.
- General Emergency – The event has caused a loss of safety systems. If such an event occurs, radiation could be released that would penetrate the site boundary. State and local authorities will take action to protect the residents living near the plant. The alert and notification system will be sounded. People in the affected areas could be advised to evacuate, or in some situations, to shelter in place. When the sirens are sounded, radio and television alerts will have site-specific information and instructions.

The St. Lucie nuclear power generation plant is located 12 miles southeast of the City of Ft. Pierce on Hutchinson Island in St. Lucie County. The facility contains two reactors and is owned and operated by the Florida Power & Light Company. Counties within the 50-mile EPZ include all or portions of St. Lucie, Indian River, Glades, Osceola, Okeechobee, Brevard, Highlands, Palm Beach, and Indian River.

4.2.1.1 Vulnerability Assessment

Radiological accidents can have the following potential impacts on a community:

- Electric power outage;
- Surface and air transportation disruption;
- Telecommunications system outage;
- Human and health safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Damage to critical environmental resources; and
- Toxic releases.

Because of its location relative to the St. Lucie nuclear power plant, parts of Indian River County have a high vulnerability to a nuclear power plant accident or nuclear materials release. While the County's level of vulnerability is high, the frequency with which nuclear power plant accidents occur is very low, and the overall risk to the citizens of Indian River County is therefore considered low. Nuclear emergency in Indian River County has received massive emergency management attention at all levels of government. Emergency

management planning and regulation relative to nuclear power plant accidents exists at the Federal, State, local, and corporate levels.

4.2.1.2 Risk Assessment

At the time of publication, no data were available to determine the potential loss associated with a radiological accident in Indian River County.

4.2.2 Power Failure

Power failure can result from a variety of related causes, including sagging lines due to hot weather, flashovers from transmission lines to nearby trees, and incorrect relay settings. According to the electric utility industry's trade association, the potential for such disturbances is expected to increase with the profound changes now sweeping the electric utility industry.

To address times when generating capacity is tight, or falls below consumer demand due to State or local emergencies, the Florida Electrical Emergency Contingency Plan was developed. Alerts have been created to give early warning of potential electricity shortfalls and bring utilities, emergency management officials, and the general public to a state of preparedness. The Contingency Plan has four stages (Florida Reliability Coordinating Council, 2004):

- **Generating Capacity Advisory** – A Generating Capacity Advisory is primarily for information purposes. It starts utility tracking activities, and it initiates inter-utility and inter-agency communication. No action by the public is required. General information may be distributed to consumers to forewarn them of conditions if necessary.
- **Generating Capacity Alert** – A Generating Capacity Alert starts actions to increase reserves. Available emergency supply options will be explored. When reserves fall below the size of the largest generating unit in the state, loss of that size unit to an unexpected mechanical failure could lead to blackouts somewhere since insufficient backup is available.
- **Generating Capacity Emergency** – A Generating Capacity Emergency occurs when blackouts are inevitable somewhere in Florida. Every available means of balancing supply and demand will be exhausted. Rolling blackouts, manually activated by utilities, are a last resort to avoid system overload and possible equipment damage. Frequent status reports are provided to agencies and the media. The Division of Emergency Management will consider using the Emergency Broadcast System to inform citizens of events and to direct them to available shelters if conditions warranted. Recognizing the consequences of a loss of electricity, individual utility emergency plans include provisions for special facilities critical to the safety and welfare of citizens.
- **System Load Restoration** – System Load Restoration is instituted when rolling blackouts have been terminated and power supply is adequate. It is the recovery stage, and efforts are made to provide frequent system status reports.

Historic Events. In the U.S., from 2 July to 10 August 1996, the Western States Utility Power Grid reported widespread power outages that affected millions of customers in several western states and adjacent areas of Canada and Mexico.

A massive power outage struck the northeast on Thursday, 14 August 2003. Areas affected by the outage included New York City and Albany, New York; Cleveland and Toledo, Ohio; Detroit and Lansing, Michigan; parts of New Jersey and Connecticut; as well as Toronto and Ontario, Canada. The most extensive power failure in history, it shut down 10 major airports, 9 power plants, affected 50 million people, and led to a declared State of Emergency in New York City. The Ford Motor Company lost production capability at 21 of its facilities. Two deaths and 71 fires were attributed to the outage in New York City alone (Gellman and Milbank, 2003). The preliminary economic impacts of this event are large. It is estimated that the power failure cost approximately \$1 billion, including \$800 million in unsold goods and services and \$250 million in spoiled food.

4.2.2.1 Vulnerability Assessment

Power failure can have the following potential impacts on a community:

- Electrical power outage;
- Surface and air transportation disruption;
- Potable water system loss of disruption;
- Sewer system outage;
- Telecommunication system outage;
- Human and health safety;
- Psychological hardship;
- Economic disruption; and
- Disruption of community services

Power failures have the same potential impacts in all Indian River County communities. The vulnerabilities of all communities to power failures is considered moderate. The power grid throughout Indian River County is diversified, and there are no single choke points or distribution nodes whose failure would disrupt power distribution to the entire community.

4.2.2.2 Risk Assessment

At the time of publication, no model was available to determine the potential loss associated with power failure in Indian River County.

4.2.3 Hazardous Materials Accident

Hazardous materials accidents can occur anywhere there is a road, rail line, pipeline, or fixed facility storing hazardous materials. Virtually the entire state is at risk to an unpredictable accident of some type. Most accidents are small spills and leaks, but some result in injuries, property damage, environmental contamination, and other consequences. These materials can be poisonous, corrosive, flammable, radioactive, or pose other hazards and are regulated by the Department of Transportation. However, out of approximately 2,140 hazardous materials incidents reported statewide in 2008, 58 fatalities were reported, 386 were injured, and 4,613 were evacuated.

Emergencies involving hazardous materials can be expected to range from a minor accident with no off-site effects to a major accident, which may result in an off-site release of hazardous or toxic materials. The overall objective of chemical emergency response planning and preparedness is to minimize exposure for a wide range of accidents that could produce off-site levels of contamination in excess of Levels of Concern established by the EPA. Minimizing this exposure will reduce the consequences of an emergency to people in the area near to facilities that manufacture, store, or process hazardous materials (Treasure Coast Regional Planning Council, 1998).

A large volume of hazardous materials is transported to and through the County by railroad and highway, air, water, and pipeline daily. Within Indian River County, there are a number of both public and private fixed facilities that produce or use hazardous materials. Coordinating procedures for hazardous material response are found within the County's Emergency Plan for Hazardous Materials.

Mishandling and improper disposal or storage of medical wastes and low-level radioactive products from medical use are also a hazard to Indian River County. For example, a few years ago an incident occurred in New Jersey when improper disposal of medical wastes resulted in some of the used products ending up on Atlantic Ocean beaches.

4.2.3.1 Vulnerability Assessment

Hazardous materials events can have the following potential impacts within a community:

- Surface and air transportation disruption;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Fire; and
- Toxic releases.

A community's vulnerability to hazardous materials accidents depends on three factors. These are

- 1) The major transportation routes that pass through the community;
- 2) The hazardous material generators located in or near the community; and
- 3) The resources in terms of people and property are in an area of possible impact from a hazardous materials release.

Overall, Indian River County has a moderate vulnerability to impacts from hazardous materials releases. There are relatively few major generators within the County, and those that do exist are generally away from major population centers. An area of high vulnerability for hazardous materials accidents is the City of Vero Beach, due to the transportation network (both highway and rail) that passes through the area.

4.2.3.2 Risk Assessment

At the time of publication, no data were available to determine the loss in Indian River County due to power failure.

4.2.4 Transportation System Accidents

Florida has a large transportation network consisting of major highways, airports, marine ports, and passenger railroads. The heavily populated areas of Indian River County are particularly vulnerable to serious accidents, which are capable of producing mass casualties. With the linear configuration of several major highways in Indian River County, such as interstate highways and the Florida Turnpike, major transportation accidents could occur in a relatively rural area, severely stressing the capabilities of local resources to respond effectively. Installing cameras on interstate highways and major transportation routes can assist in monitoring movement throughout the County, as well as provide for quicker response to traffic system accidents as well. A notorious example is the crash in the Everglades of ValuJet Flight 597 on 11 May 1996, which resulted in 109 fatalities and cost millions of dollars, severely taxing the financial and public safety resources of Dade County (FDCA, 2001). Similarly, a major transportation accident could involve a large number of tourists and visitors from other countries, given Florida's popularity as a vacation destination, further complicating the emergency response to such an event. In the past, wildland fires in Florida have forced the closing of interstate highways, creating tremendous impacts on the transportation systems.

As a major industrial nation, the U.S. produces, distributes, and consumes large quantities of oil. Petroleum-based oil is used as a major power source to fuel factories and various modes of transportation, and in many everyday products, such as plastics, nylon, paints, tires, cosmetics, and detergents (EPA, 1998). At every point in the production, distribution, and consumption process, oil is stored in tanks. With billions of gallons of oil being stored throughout the country, the potential for an oil spill is significant, and the effects of spilled oil can pose serious threats to the environment.

In addition to petroleum-based oil, the U.S. consumes millions of gallons of non-petroleum oils, such as silicone and mineral-based oils and animal and vegetable oils. Like petroleum products, these non-petroleum oils are often stored in tanks that have the potential to spill, causing environmental damages that are just as serious as those caused by petroleum-based oils. To address the potential environmental threat posed by petroleum and non-petroleum oils, the EPA has established a program designed to prevent oil spills. The program has reduced the number of spills to less than 1% of the total volume handled each year (EPA, 1998).

Indian River County has about 18 miles of Atlantic Ocean coastline that is subject to contamination caused by an oil spill. By Executive Order, the responsibility for preparing response plans for coastal oil spills is designated to the Florida Department of Environmental Protection, Division of Florida Marine Patrol (Indian River County Emergency Management Division, 2000). The Florida Coastal Pollutant Spill Plan has been prepared to coordinate response procedures and recovery efforts after a spill. There are two active oil field regions in Florida: in Escambia and Santa Rosa counties in the Panhandle, and Collier, Dade, Hendry, and Lee counties in southwest Florida.

4.2.4.1 Vulnerability Assessment

Transportation system accidents can have the following potential impacts within a community:

- Surface and air transportation disruption;
- Navigable waterway impairment;
- Human health and safety;
- Economic disruption;
- Disruption of community services;
- Fire; and
- Toxic releases.

There is no longer any commercial air traffic coming into the Vero Municipal Airport, but the Vero Airport is a major general aviation facility with two large flight schools, Piper Aircraft, and considerable private and charter air traffic. Aviation is an important element of the economy in Indian River County, and this activity raises the County's vulnerability to aviation-associated accidents. Vulnerability to transportation system accidents also is associated with the highway and rail systems that run through the County. Individual community and population center vulnerabilities to this hazard are entirely dependent upon location. The cities of Vero Beach and Sebastian have higher vulnerabilities to rail system accidents. The western unincorporated portion of the County has a higher vulnerability to major highway accidents due to the presence of I-95. The Towns of Orchid and Indian River Shores have a low vulnerability in this area. The Florida East Coast Railroad blocks traffic to the hospital when trains pass through town; grade separated overpasses are necessary at 41st Street, Aviation Boulevard and 33rd Street, and 4th Street.

4.2.4.2 Risk Assessment

At the time of publication, data were not available to determine the potential loss in Indian River County due to transportation system accidents.

4.2.5 Wellfield Contamination

The development of wellfield protection programs is a major preventative approach for the protection of community drinking water supplies. Wellfield protection is a means of safeguarding public water supply wells by preventing contaminants from entering the area that contributes water to the well or wellfield over a period of time. Management plans are developed for the wellfield protection area that include inventorying potential sources of ground water contamination, monitoring for the presence of specific contaminants, and managing existing and proposed land and water uses that pose a threat to ground water quality.

Ground water is an essential natural resource. It is a source of drinking water for more than half of the U.S. population and more than 95% of the rural population (Browning, 1998). In addition, ground water is a support system for sensitive ecosystems, such as wetlands or wildlife habitats.

Between 1971 and 1985, there were 245 ground water-related outbreaks of disease, resulting in more than 52,000 individuals being affected by associated illnesses

(Browning, 1998). While most of these diseases were short-term digestive disorders caused by bacteria and viruses, hazardous chemicals found in wells nationwide also pose risks to public health.

The 1986 Amendments to the Federal Safe Drinking Water Act require states to implement wellfield protection programs for public water wells. Prevention strategies include maintaining isolation distances from potential contamination sources, reporting to the state violations of isolation distance, and asking a local governmental unit to regulate these sources.

Cleaning up contaminated ground water can be technically difficult, extremely expensive, and sometimes simply cannot be done. Contaminated ground water also affects the community by discouraging new businesses or residents from locating in that community.

4.2.5.1 Vulnerability Assessment

Wellfield contamination can have the following potential impacts within a community:

- Potable water system loss or disruption;
- Sewer system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption; and
- Disruption of community services.

Wellfield contamination has not been a major problem for most of Indian River County. There is some potential exposure to this hazard in the eastern portion of the County, but overall, the County vulnerability to this hazard is considered low. The County addresses the issue of wellfield contamination in the Comprehensive Growth Management Plan – Future Land Use Element.

4.2.5.2 Risk Assessment

At the time of publication, no data were available to determine the potential loss associated with wellfield contamination in Indian River County.

4.2.6 Communications Failure

As society emerges from industrial production into the age of information, we are seeing new kinds of technological accidents/disasters. Recently, a communications failure occurred that was the worst in 37 years of satellite service. Some major problems with the telecommunications satellite Galaxy IV drastically affected 120 companies in the paging industry (Rubin, 1998). Radio and other forms of news broadcasts also were affected. The pager failure not only affected personal and business communications, but emergency managers and medical personnel as well.

4.2.6.1 Vulnerability Assessment

Communication failure can have the following potential impacts within a community:

- Telecommunications system outage;
- Economic disruption; and
- Disruption of community services.

Communications failures have a greater potential to produce adverse economic impacts in business-based rather than retirement or residential communities. On the other hand, communications system failures in residential and retirement communities may put more human lives at risk. Indian River County's vulnerability to communications systems failures is generally considered moderate. The City of Vero Beach has a higher vulnerability to this hazard because it is the center of government and business within the County, and Fellsmere has a low vulnerability due to its location and small population size. Basically, Indian River County's vulnerability to this hazard is no greater or less than most other Florida coastal counties.

4.2.6.2 Risk Assessment

At the time of publication, no data were available to determine the potential loss associated with communication failure in Indian River County.

4.2.7 Military Ordnance from WWII

Unexploded military ordnance is a hazard unique to Indian River County. The former Ft. Pierce Naval Amphibious Training Base was established in 1942, and its training exercises were conducted on outlying areas of North and South Hutchinson Islands. Training at the base included testing of bombs, rockets, and mines. Several explosive devices left over from these training missions have been found along the shores of Vero Beach and Ft. Pierce. Public exposure to unexploded ordnance could occur primarily as a result of three types of activities: earth moving (building construction, pool construction, and major landscaping), recreational diving, and use of beach areas. Unexploded ordnance also may wash ashore or be exposed after storms (Indian River County Department of Emergency Services, 2002). Prior clean-up operations have been coordinated by the U.S. Army Corps of Engineers (Jacksonville office) with the full cooperation of the Indian River County Department of Emergency Management.

4.2.7.1 Vulnerability Assessment

Unexploded military ordnance can have the following potential impacts within a community:

- Health and human safety;
- Psychological hardship;
- Damage to critical environmental resources; and
- Toxic release.

There is some exposure to risk from unexploded military ordnance in Indian River County, but the overall vulnerability of County residents to this hazard is very low. The communities most vulnerable to this hazard are the City of Vero Beach and the unincorporated areas along the eastern side of Hutchinson Island south of Vero Beach to the St. Lucie County line. While old military ordnance does occasionally surface along these beaches, there has never been a case where this ordnance was still live.

4.2.7.2 Risk Assessment

At the time of publication, no data were available to determine the potential loss associated with unexploded military ordnance in Indian River County.

4.3 SOCIETAL HAZARDS

This subsection will now identify those hazards in Indian River County identified as being societal hazards.

4.3.1 Terrorism and Sabotage

4.3.1.1 Terrorism

Terrorist attacks may take the form of induced dam or levee failures, the use of hazardous materials to injure or kill, or the use of biological weapons to create an epidemic. While there have not been any successful acts of terrorism committed in Florida in recent years, it is recognized that the state has many critical and high-profile facilities, high population concentrations, and other potentially attractive venues for terrorist activity that are inherently vulnerable to a variety of terrorist methods. Governmental/political, transportation, commercial, infrastructure, cultural, academic, research, military, athletic, and other activities and facilities constitute ideal targets for terrorist attacks, which may cause catastrophic levels of property and environmental damage, injury, and loss of life. Furthermore, a variety of extremist groups are known to operate within Florida, and potential terrorist attacks have been investigated and averted in recent years (Indian River County Department of Emergency Services, 2002).

Acts of terrorism also are capable of creating disasters that threaten the safety of a large number of citizens. The U.S. has been relatively untouched by the storm of terrorist activities experienced in other parts of the world; however, in recent years, an increasing incidence of terrorism has been recorded in this nation.

The Federal government has recognized that the U.S. has entered the post-Cold War era. As a result, Federal planning guidelines regarding military threats are in transition. However, nuclear weapons continue to be a serious planning concern especially in areas surrounding military installations (Indian River County Department of Emergency Services, 2002). Those involved with the emergency management of government monitor the influx of undocumented aliens into south Florida from areas unfriendly to the interests of the U.S.

Historical Events. On 11 September 2001, terrorists attacked the World Trade Center in New York City and the Pentagon in Washington, DC, crashing hijacked commercial airplanes into the structures. All told, approximately 3,000 civilians and emergency response personnel perished in the attack. The long-term economic and psychological impacts of this event are astounding. New York City alone experienced capital losses totaling 34 million

dollars. The attack on the World Trade Center resulted in a loss of 12.5 million square feet of office space and damaged 7.7 million more. The insured losses associated with the event totaled 52 million dollars. The City estimates that 125,300 jobs were lost because of the attack (National Conference of State Legislatures, 2003). The September 11th attacks also had local connections to Indian River County as some of the New York City terrorists received flight training at the Vero Beach Municipal Airport.

4.3.1.2 Computer Accidents and Sabotage

The President's Commission on Critical Infrastructure Protection (PCCIP) recently reported that there is increasing threat that the U.S. could suffer something similar to an "Electronic Pearl Harbor" (Rubin, 1998). Networked information systems present new security challenges in addition to the benefits they offer. Long-term power outages could cause massive computer outages, with severe economic impacts such as loss of sales, credit checking, banking transactions, and ability to communicate and exchange information and data. "Today, the right command sent over a network to a power generating station's control computer could be just as effective as a backpack full of explosives, and the perpetrator would be harder to identify and apprehend," states the PCCIP report.

With the growth of a computer-literate population, increasing numbers of people possess the skills necessary to attempt such an attack. The resources to conduct a cyber attack are now easily accessible everywhere. A personal computer and an Internet service provider anywhere in the world are enough to cause a great deal of harm. Threats include (Rubin, 1998)

- Human error;
- Insider use of authorized access for unauthorized disruptive purposes;
- Recreational hackers - with or without hostile intent;
- Criminal activity - for financial gain, to steal information or services, or organized crime;
- Industrial espionage;
- Terrorism - including various disruptive operations; and
- National intelligence - information warfare, intended disruption of military operations.

The effects of such activities may take the form of disruption of air traffic controls, train switches, banking transfers, police investigations, commercial transactions, defense plans, power line controls, and other essential functions. As the Internet becomes more and more important, the loss of its services, whether by accident or intent, becomes a greater hardship for those relying on this new form of communication. Computer failures could affect emergency communications as well as routine civilian applications, such as telephone service, brokerage transactions, credit card payments, Social Security payments, pharmacy transactions, airline schedules, etc.

4.3.1.3 Vulnerability Assessment

Terrorism and sabotage events can have the following potential impacts within a community:

- Electric power outage;
- Surface and air transportation disruption;
- Potable water system loss or disruption;
- Sewer system outage;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Damage to critical environmental resources;
- Damage to identified historical resources;
- Fire; and
- Toxic releases.

The possibilities for terrorism and sabotage in Indian River County are extremely limited, and the County's vulnerability to this hazard is very low. The City of Vero Beach has a slightly higher vulnerability to terrorism as the center of government, but this vulnerability is still considered low. The towns of Indian River Shores and Orchid have a slightly higher risk of what may be described as "celebrity terrorism" due to the national prominence of some of their citizens, but the overall community vulnerability still remains low.

4.3.2 Civil Disturbance

As in any other area, Indian River County is subject to civil disturbances in the form of riots, mob violence, and a breakdown of law and order in a focalized area. Communities with racial mixtures, gang violence, and drug trafficking are increasingly aware of the need to plan for civil disturbance emergencies (Indian River County Department of Emergency Services, 2002). Although they can occur at any time, civil disturbances are often preceded by periods of increased tension caused by questionable social and/or political events such as controversial jury trials or law enforcement actions (Indian River County Department of Emergency Services, 2002). Police services are responsible for the restoration of law and order in any area of the County.

4.3.2.1 Vulnerability Assessment

Civil disturbance can have the following potential impacts within a community:

- Surface and air transportation disruption;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Damage to identified historical resources; and
- Fire.

The potential for civil disturbances in Indian River County is considered very low. The City of Vero Beach has a moderate vulnerability in this area, but in general, civil disturbance is not a significant hazard faced by Indian River County.

4.3.2.2 Risk Assessment

At the time of publication, there were no data available to determine the loss associated with civil disruption in Indian River County. However, property damage and some injuries could be expected during such an event.

4.3.3 Immigration Crisis

Florida's location as the nearest U.S. landmass bordering the Caribbean basin makes it a chosen point of entry for many migrants attempting to enter the country illegally. A major consequence of a mass arrival of illegal immigrants could be disruption to the routine functioning of the impacted community, resulting in significant expenditures related to the situation. An example of this threat occurred in 1994, when the State responded to two mass migration incidents. In May 1994, there was an unexpected migration of approximately 100 Haitian refugees; while in August 1994, there was an influx of 700 Cubans (Indian River County Department of Emergency Services, 2002). These events are typically preceded by periods of increasing tension abroad, which can be detected and monitored. Enforcement of immigration laws is a Federal government responsibility. However, it is anticipated that joint jurisdictional support of any operation will be required from the State and local governments.

The Atlantic shore of Indian River County is the frequent scene of the arrival of undocumented aliens, usually Haitian or Cuban (Indian River County Department of Emergency Services, 2002). The County has both the history and the potential for the unannounced arrival of a large number of aliens. Until relieved of the responsibility by the State and Federal governments, Indian River County must be capable of providing mass refugee care to include shelter, food, water, transportation, medical, police protection, and other social services.

4.3.3.1 Vulnerability Assessment

Immigration crises can have the following potential impacts within a community:

- Human health and safety;
- Psychological hardship;
- Economic disruption; and
- Disruption of community services.

Reviewing the data on past illegal immigration and mass population movements such as the Haitian influx and Cuban raft incidents of the 1980's indicates that illegal immigration has never reached a crisis state for the local authorities in Indian River County. Overall, the County vulnerability to this hazard is very low. Due to demographic features, the City of Vero Beach has a slightly higher, but still low vulnerability to illegal immigration impacts.

4.3.3.2 Risk Assessment

At the time of publication, there were no data available to determine the loss associated with immigration crises in Indian River County. However, property damage and some injuries could be expected during such an event.

4.4 SUMMARY

Indian River County's proximity to water and large population concentrations contribute to the heightened potential for property and content damage, loss of life, community and emergency service disruption, and economic losses due to flooding associated with both flooding and storm surge. While flooding is the most probable and frequent hazard in Indian River County, wind damage associated with tornadoes and severe thunderstorms can be significant hazards due to construction materials and methods. Because agriculture plays such a large role in the Indian River County economy, agricultural pests and diseases, droughts, and temperature extremes are important hazards against which to mitigate.

The City of Vero Beach's location adjacent to the Atlantic Ocean and Intercoastal Waterway make it especially vulnerable to water and wind-related hazards as well as erosion. The City has low to moderate risk from wildland fires due to its location and development patterns.

The Town of Indian River Shores, located on the barrier island, is particularly vulnerable to flooding, erosion, and both water and wind associated with tropical storms and hurricanes. The Town has a low risk from wildland fires due to its location and development patterns.

The Town of Orchid, located on the barrier island, is particularly vulnerable to flooding, erosion, and both water and wind associated with tropical storms and hurricanes. The Town has a low risk from wildland fires due to its location and development patterns.

The City of Sebastian, located adjacent to both the Intercoastal Waterway and Sebastian Creek is vulnerable to flooding and storm surge. The majority of the City has been assessed as having a moderate wildland fire risk due to its location and development patterns.

The Town of Fellsmere is less vulnerable to the impacts of tropical storms and hurricanes due to its location west of I-95; however, its rural nature, makes it more susceptible to the impacts of wildland fires.

Indian River County is a large and diversified County, and while all County residents are exposed to some degree to the hazards identified in **Table 4.25**, geographic location as well as other factors greatly affects individual vulnerabilities to specific hazards. While there are only five incorporated jurisdictions in Indian River County, there are several geographically distinct urbanized population centers, and their relative vulnerabilities have also been indicated in **Table 4.25**.

Because mitigation dollars tend to be scarce, it is important for communities to use the dollars on projects or activities that are cost effective. FEMA has made cost effectiveness a requirement of funding for most of their programs. Cost-effective projects are

those that aim to reduce, if possible, the frequency, vulnerability, and exposure of hazards in the community. **Table 4.26** summarizes Indian River County's risk or potential for loss relative to each of the hazards identified.

Those hazards identified in our plan as having low or very low hazard vulnerability will not be required to have project representation due to the reduced likelihood of a jurisdiction experiencing damage from that hazard.

Note: The MEMPHIS data utilized for this report is the most updated and revised historical database available to staff at this time and is considered to still be fairly accurate in determining the potential losses to a community.

Table 4.25. Indian River County hazard vulnerability by incorporated jurisdiction and population centers.

Hazard Category	Jurisdictions					Population Centers						County
	Town of Fellsmere	Town of Indian River Shores	Town of Orchid	City of Sebastian	City of Vero Beach	Unincorporated Orchid Island	South County Area	Route 60 Area	Wabasso Area	Vero Lake Estates	Western County	Overall Vulnerability
Natural Hazards												
Flood	●	●	●	●	—	●	●	●	●	●	—	●
Hurricane/tropical storm	●	●	●	●	●	●	●	●	●	●	—	●
Tornado	—	□	□	—	—	□	—	—	—	—	—	—
Severe thunderstorm/lightning	—	—	—	—	●	—	—	—	—	—	—	—
Drought	—	□	□	—	—	□	—	□	—	□	□	—
Temperature extremes	□	—	—	□	□	□	—	□	—	□	—	—
Agricultural pests and diseases	□	—	—	□	—	□	—	—	●	□	●	—
Wildland/Urban Interface Zone	—	□	□	□	□	□	—	—	●	—	●	—
Muck fires	○	○	○	○	○	○	□	○	○	○	□	○
Soil/beach erosion	○	—	—	□	●	—	□	□	□	□	○	—
Epidemic	—	□	□	—	—	□	—	—	—	—	□	—
Seismic hazards (sink holes/soils failure)	□	□	□	□	□	□	□	□	□	□	□	□

● = High, — = Moderate, □ = Low, and ○ = Very Low.

Table 4.25. (Continued).

Hazard Category	Jurisdictions					Population Centers						County
	Town of Fellsmere	Town of Indian River Shores	Town of Orchid	City of Sebastian	City of Vero Beach	Unincorporated Orchid Island	South County Area	Route 60 Area	Wabasso Area	Vero Lake Estates	Western County	Overall Vulnerability
Technological Hazards												
Hazardous materials accident	—	○	○	—	—	○	—	—	□	□	—	—
Radiological accidents including nuclear power plant accidents	—	—	—	—	●	●	●	●	—	—	—	—
Communications failure	□	□	□	□	—	□	□	—	□	□	○	□
Transportation system accidents	□	○	○	—	●	□	—	—	—	□	□	□
Wellfield contamination	—	□	□	—	—	□	—	—	—	□	□	—
Power failure (outages)	—	—	—	●	●	—	—	●	—	—	□	—
Unexploded military ordnance	○	□	□	○	□	□	○	○	○	○	○	○
Societal Hazards												
Civil disturbance	□	○	○	□	□	○	□	□	□	○	○	□
Terrorism and sabotage	○	□	□	○	□	○	○	○	○	○	○	○
Immigration crisis	□	○	○	□	□	○	□	□	□	○	○	□

Unincorporated Hutchinson Island = Areas of the barrier not within city jurisdictions.
 South County Area = The area south of the City of Vero Beach and west of the Indian River (Both sides of U.S. Highway 1).
 Route 60 Area = Area west of the City of Vero Beach along Route 60 between the City and I-95.
 Wabasso Area = The area to the south of the City of Sebastian.
 Vero Lake Estates = The large development area west and south of the City of Sebastian.
 Western County = Area west of I-95.

● = High, _ = Moderate, □ = Low, and ○ = Very Low.

Table 4.26. Risk assessment and hazard evaluation for Indian River County.

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Natural Hazards							
Floods	X			Flooding significant enough to damage property occurs regularly in Indian River County. This is particularly true in unincorporated areas and in the Town of Fellsmere.	Countywide vulnerability is high but area specific.	Property damage along the coast of Indian River County occurs most often in the late winter or early spring and is associated with winter storms and northeasters. Flooding in the inland portions of the County occurs most often in the fall and is often associated with tropical depressions and tropical storms. Incidences of flooding in specific areas on Indian River County seem to be on the increase. Total flooding exposure for all building types based on the Federal Emergency Management Agency's Flood Insurance Rate Maps data from the 2004 Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS) database is \$3,266,942,271 (A+V Zones)	Frequency = High Vulnerability = High Exposure = High Risk = High
Hurricanes/Tropical Storms							
Tropical Storms	X			Pass within 100 nautical miles of Indian River County once or twice every year.	High from rain-associated flooding damages; relatively low from wind damage.	The major causes of damage associated with tropical storms are heavy rain and flooding. Many communities within Indian River County have particularly high vulnerabilities to flooding associated with these storms. Total tropical storm exposure for Indian River County based on The Arbitrator of Storms (TAOS) (1999) is \$699,931,922	Frequency = High Vulnerability = High Exposure = Moderate Risk = High

*As defined on Page 4-1

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Category 1 Hurricanes		X		Pass within 100 nautical miles of Indian River County once every 3.1 years.	High from rain-associated flooding; moderate from wind damage.	The continental shelf off Indian River County is beginning to widen. Consequently, Indian River County's vulnerability to storm surges from the Atlantic is relatively high when compared to counties to the south. Total Category 1 hurricane exposure for Indian River County based on MEMPHIS (2004) is Flood Exposure - \$1,962,024,924 Wind Exposure Light Damage - \$6,903,511,040	Frequency = High Vulnerability = High Exposure = High Risk = High
Category 2 Hurricanes		X		Pass within 100 nautical miles of Indian River County once every 5.3 years.	High from rain-associated flooding; significant from wind damage.	Winds in Category 2 storms range from 96 to 110 mph. Significant damage is possible in older wood frame residential construction. Total Category 2 hurricane exposure for Indian River County based on MEMPHIS (2004) is Flood Exposure - \$1,962,024,924 Wind Exposure Moderate Damage - \$2,106,437,760 Light Damage - \$4,797,234,176	Frequency = High Vulnerability = High Exposure = High Risk = High
Category 3 Hurricanes		X		Pass within 100 nautical miles of Indian River County once every 11.5 years	Very high from rain-associated flooding coupled with storm surge; major from wind damage.	Winds in Category 3 storms range from 111 to 130 mph. These winds can do major damage to most residential construction. Total Category 3 hurricane exposure for Indian River County based on MEMPHIS (2004) is Flood Exposure - \$4,386,964,864 Wind Exposure Moderate Damage - \$6,836,543,488	Frequency = Moderate Vulnerability = High Exposure = High Risk = High

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Category 4 Hurricanes			X	Pass within 100 nautical miles of Indian River County once every 202 years.	Very high from rain-associated flooding coupled with storm surge; massive from wind damage.	<p>Light Damage - \$67,015,016</p> <p>Sustained winds in a Category 4 hurricane range from 131 to 155 mph. There are very few commercial structures in Indian River County engineered to withstand such winds. Total Category 4 hurricane exposure for Indian River County based on MEMPHIS (2004) is</p> <p>Flood Exposure - \$5,682,336,000 Wind Exposure Severe Damage - \$4,019,174,912 Heavy Damage - \$2,638,434,048 Moderate Damage - \$246,142,176 Light Damage - \$17,705</p>	Frequency = Low Vulnerability = High Exposure = High Risk = Moderate
Category 5 Hurricanes			X	Pass within 100 nautical miles of Indian River County once every 1,500 years	High from rain-associated flooding; catastrophic in terms of wind damage.	<p>Sustained winds in a Category 5 hurricane range upward from 155 mph. Very few structures can withstand these winds. Massive flooding may occur in the western part of the County resulting from the storm surge in Lake Okeechobee. Total Category 5 hurricane exposure for Indian River County based on MEMPHIS (2004) is</p> <p>Flood Exposure - \$5,878,161,408 Wind Damage Destroyed - \$5,764,345,856 Severe Damage - \$1,092,370,816 Heavy Damage - \$46,908,544 Light Damage - \$17,705</p>	Frequency = Very Low Vulnerability = High Exposure = High Risk = Low

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Tornadoes		X		<p>Between 1950 and 2009 there were 126 tornadoes, waterspouts, and funnel clouds reported from the Treasure Coast area. Twenty-six of these tornadoes directly impacted Indian River County. Of these, 83 touched down on land and were officially classified as tornadoes (1.41 tornadoes per year). In tornado prone southeast Florida, the odds of a tornado striking any specific location are once every 250 years.</p>	<p>Between 1950 and 2009, tornadoes caused one injury and \$1.4 million in property damage in the County.</p> <p>In the County, tornadoes cause an average of \$23,728 in property damage per year.</p>	<p>Tornadoes are rated from 0 to 5 based on their path length and mean width (Fujita-Pearson Scale). F0 tornadoes cause light damage, and F5 tornadoes cause incredible or catastrophic damage.</p> <p>Of the 83 tornadoes recorded from the Treasure Coast area between 1950 and 2009, 54 were classified as F0 (88%), 17 (21%) were classified as F1, 7 (9%) were classified as F2, and 3 (4%) was classified as an F3 tornado.</p>	<p>Frequency = Moderate Vulnerability = Moderate Exposure = Low Risk = Low</p>
Severe Thunderstorms and Lightning	X			<p>Between 1960 and 2009 64 severe thunder and lightning storms were reported in Indian River County. (1.31 per month).</p>	<p>These storms resulted in 1 fatality (lightning) and 9 injuries (2/thunderstorms; 7/lightning), and a total of \$2.426 million in reported property damage (also from lightning). This represents an average of \$49,510 in damages per year. Wood structures are particularly vulnerable to</p>	<p>Thunderstorms with strong wind, downbursts, hail, and lightning are very common on Florida's southeast coast. Lightning is responsible for more than \$5 billion in total insurance industry losses annually, according to Hartford Insurance Co.</p>	<p>Frequency = High Vulnerability = Moderate Exposure = Moderate Risk = Moderate</p>

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
					lightning damage. We are a coastal community. Beaches are very open places, making beachgoers, swimmers, and boaters exceptionally vulnerable to lightning strikes.		
Drought	X			Every year, some portion of the U.S. endures drought conditions. Florida has recently experienced drought conditions annually in the spring and summer.	Indian River County's vulnerability to drought-related damage and economic loss can occur in many areas. Direct impacts include reduced crop yield, increased fire hazard, reduced water levels, increased livestock and wildlife mortality rates, and damage to wildlife and fishery's habitat. While drought causes little structural damage, the social impacts include public safety, health, conflicts between water users, and general reduction in the quality of life.	Indian River County's most direct exposure to drought is the economic loss endured by its agricultural community. The average annual market value of agricultural products from Indian River County is approximately \$625 million.	Frequency = High Vulnerability = Moderate Exposure = High Risk = Moderate
Temperature Extremes	X			Between 1970 and 2010, eight significant freezes have affected	Indian River County as a whole has a high economic vulnerability to	While the loss of life from either extreme low or high temperatures in Indian River County is not great compared to national statistics,	Frequency = Moderate Vulnerability = Moderate Exposure = Moderate

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
				<p>Indian River County.</p> <p>Prolonged periods of extremely high temperatures are relatively rare in Indian River County; however, due to the consistently high humidity, the local "heat index" is often significantly above the actual temperature during the summer months.</p>	<p>freezing temperatures. The most significant area of impact is the commercial agricultural segment of the community, but countywide cold-sensitive ornamental landscaping also leaves many entities, public and private, open for significant economic loss.</p> <p>While the frequency of "heat waves" is low, the frequency of heat indexes within the range of causing health problems is moderate to high during the summer months.</p> <p>Elderly people, young children, and those who are sick or overweight are more likely to become victims of extreme heat.</p>	<p>Indian River County does have a significant economic exposure to low temperatures in both the public and private sectors.</p>	<p>Risk = Moderate</p>

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Agricultural Pests and Diseases	X			To date, infestations of agricultural plant diseases in Indian River County have been rare. Livestock diseases and wild animal vector diseases such as rabies continue to be a problem.	Indian River County is highly vulnerable to agricultural diseases and pests due to its location and the amount of traffic that passes through it.	Exposure to agricultural pests, particularly livestock diseases, is high in terms of the County's agricultural community. The average annual market value of agricultural products in Indian River County as of 1996 was \$625 million.	Frequency = Moderate Vulnerability = Moderate Exposure = High Risk = Moderate
Wildland/Urban Interface Zone		X		Wildland fires have become a common annual occurrence in wooded areas during Florida's dry season.	Wildland fire is a significant and frequent hazard in specific areas of Indian River County. Vulnerability varies extensively with location.	Exposure to wildland fire varies greatly across Indian River County. While exposure is relatively low along the County's urbanized coastline, it is quite high in some of the landlocked interior communities. Mitigation projects addressing this issue need to be evaluated on a case by case basis. The 2004 MEMPHIS data indicates that Indian River County has the following wildland fire exposures Low Risk - \$4,992,785,408 Medium Risk - \$790,627,008 High Risk - \$1,120,291,968	Frequency = Moderate Vulnerability = Moderate Exposure = Moderate Risk = Moderate
Muck Fires	X			Muck fires are not a frequent threat to Indian River County. They occur during periods of extreme drought, when the swamp muck	Areas with the highest vulnerability to this hazard are on the western side of the County.	There have been no significant muck fires in Indian River County in the last 30 years, and this hazard is considered to be a limited danger. There were significant muck fires in the Everglades in the 1980's. Because the fires are so difficult to extinguish, they	Frequency = Low Vulnerability = Low Exposure = Low Risk = Low

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
				becomes dried out and is ignited. Once ignited, these fires burn deep within the muck and are extremely difficult to extinguish.		become significant air quality problems. Specific mitigation projects must be evaluated based on location and potential danger.	

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
oil/Beach Erosion		X		<p>Beach erosion constantly occurs along Indian River County's coastline. In some areas, specific structures are threatened. Other specific sites where erosion is a persistent problem are along stormwater drainage points into the Intracoastal Waterway and along canals.</p>	<p>All the coastal communities have high vulnerability relative to beach erosion. Beach erosion problems require public and private cooperation to address.</p> <p>Potential long-term mitigation will focus on overall sand budgets and sand transport rates. Mitigation projects in this area should be evaluated carefully by experienced coastal engineers.</p> <p>The erosion vulnerability is associated with stormwater outfalls and canals and is limited and site-specific in nature.</p> <p>Non-elevated structures along the coast are most vulnerable to coastal erosion.</p>	<p>Some specific locations have a higher "immediate exposure" than others. Overall, Indian River County's exposure to direct economic losses from erosion is moderate. Within the City of Vero Beach, this exposure is high.</p> <p>Stormwater drainage outfall and canal bank stabilization projects should be evaluated based on site specifics.</p> <p>Florida Department of Environmental Protection has identified 9.1 miles of critical and 4.7 miles of noncritical erosion areas along the County's coast.</p>	<p>Frequency = High Vulnerability = Moderate Exposure = Moderate Risk = Moderate</p>
Epidemic		X		<p>There has never been an outbreak of a serious disease epidemic in Indian River County. Annual occurrences of</p>	<p>Indian River County's vulnerability to disease outbreaks is higher than many areas of the nation simply because of the</p>	<p>Due to the large number of retired and elderly people living in Indian River County, the countywide exposure to serious impacts from disease outbreaks must be considered moderate.</p>	<p>Frequency = Low Vulnerability = Moderate Exposure = Moderate Risk = Low</p>

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
				flu and periodic outbreaks of so- called children's diseases have not reached epidemic proportions.	amount of tourist traffic that passes through the County.		
Seismic Hazards (sinkhole/soil failure)	X			Soil failure or collapse is rare in Indian River County and is generally related to some other natural hazard, such as canal bank or levee failure during a period of flooding. Sinkholes are not considered to be a significant hazard in Indian River County.	Countywide vulnerability to this type of hazard is low; however, areas that might be affected by dam or levee failure need to be evaluated carefully.	Overall, the community exposure to these types of hazards is low other than in specific locations and under specific circumstances. Total sinkhole exposure in Indian River County based on MEMPHIS (2004) is \$6,903,527,424 (in very low potential category)	Frequency = Low Vulnerability = Low Exposure = Low Risk = Low
Technological							
Hazardous Materials Accident	X			The frequency with which hazardous materials incidents occur in Indian River County is essentially the same as for other counties located along the major Florida east coast transportation corridor. Minor spills occur with a moderate frequency.	Countywide, Indian River County has a low vulnerability with respect to hazardous materials releases. Some areas such as the City of Vero Beach have moderate vulnerability to this hazard due to specific circumstances.	Countywide, the exposure relative to a site-specific hazardous materials release is low.	Frequency = Moderate Vulnerability = Low Exposure = Low Risk = Moderate

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Radiological Accidents Including Nuclear Power Plant Accidents	X			To date, the frequency of radiological accidents and releases has been very low.	Indian River County is moderately vulnerable to radiological accidents due to its location with respect to the St. Lucie Nuclear Power Plant.	Countywide, the exposure to a nuclear power plant accident must be considered high, while exposure to other types of radioactive materials releases is considered low.	Frequency = Very Low Vulnerability = Moderate Exposure = High Risk = Low
Communications Failure	X			Major communications failures have occurred infrequently in Indian River County to date.	Indian River County as a whole has a relatively low vulnerability to communication system breakdown. In some areas, such as the Town of Vero Beach, this vulnerability is higher.	Indian River County's exposure in the event of a major communication system failure is relatively low due to its agricultural economic base.	Frequency = Low Vulnerability = Low Exposure = Low Risk = Low
Hazardous Material Releases		X		Indian River County has some 38 reported (Section 302) hazardous material sites; some of which are located in urban areas. To date, the frequency of releases from these facilities have been low compared to the number of releases from transportation accidents.	Due to the number and location of hazardous material sites within the community, Indian River County must be considered to have a moderate vulnerability with respect to this hazard.	Countywide exposure in term of life and property from toxic material releases is considered moderate.	Frequency = Low Vulnerability = Moderate Exposure = Moderate Risk = Moderate

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Transportation System Accidents		X		Indian River County has major rail lines, north-south highway corridors, and a significant airport. Ground transportation accidents occur relatively frequently. Major transportation accidents such as rail and plane crashes to date have been rare.	Due to this concentration of transportation industries and activities in the eastern portion of the County, Indian River County, and particularly the City of Vero Beach has a high vulnerability to transportation system accidents.	Low countywide, but high in specific areas.	Frequency = Low Vulnerability = Low Exposure = Low (Countywide) Risk = Low
Wellfield Contamination	X			Indian River County maintains a program designed to monitor this risk. To date, instances of wellfield contamination in Indian River County have been rare.	The eastern part of the County along the coastline is particularly vulnerable to this hazard. This is the area with the greatest population and the most industrialization. During times of drought, this area is also vulnerable to wellfield contamination from salt water intrusion.	Exposure in terms of property value is moderate with regard to this hazard.	Frequency = Low Vulnerability = Moderate Exposure = Moderate Risk = Low

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Power Failure (outages)	X			Business and industry in Indian River County are affected regularly by power fluctuation and short-term power outages. Major, long-term outages are rare.	All modern societies are highly vulnerable to prolonged power failures. Even power failures of 12 to 24 hours would have significant impacts on both the County's economy and on human health and safety.	Short-term power loss has a significant, but hard to quantify economic impact in terms of equipment damage and lost productivity. Prolonged power failures lasting days or weeks would be a major disaster for Indian River County both economically and in terms of human health and safety.	Frequency = Low for major power disruptions Vulnerability = Moderate Exposure = High Risk = Moderate
Societal							
Civil Disturbances	X			There have never been significant civil disturbances in Indian River County. Minor civil disturbances occur with moderate frequency in specific jurisdictions.	Overall, vulnerability to civil disturbance in Indian River County is low; however, there are several specific areas and jurisdictions that are moderately if not highly vulnerable to this hazard.	Exposure in terms of dollars to the effects of civil disturbances must be considered low within the overall perspective of the County. Exposure in terms of human health and safety is moderate.	Frequency = Low Vulnerability = Low (Countywide) Exposure = Moderate Risk = Low
Terrorism and Sabotage		X		Other than random "hate crimes" there have never been any significant acts of terrorism or sabotage in Indian River County.	Indian River County has a low vulnerability for acts of terrorism and sabotage. It has a slightly higher than average potential for "celebrity terrorism."	Indian River County's exposure to this hazard may be greater than some other areas, but overall must be considered low. There are many other areas offering equally attractive targets in America, and there are several climatological, geographic, and infrastructural aspects to Indian River County that reduce its attractiveness to large scale acts of terrorism.	Frequency = Low Vulnerability = Low Exposure = Low Risk = Low

Table 4.26. (Continued).

Hazard Category	Extent*			Hazard Evaluation			
	Minimum	Major	Catastrophic	Frequency	Vulnerability	Exposure	Risk (Potential for Loss)
Immigration Crises		X		Illegal immigration has, and continues to impact Indian River County. While major immigration crises are rare, Indian River County has been affected by most of those that have occurred.	Because of its demographics and large agricultural industry, Indian River County has a moderate vulnerability to immigration crisis arising from anywhere in the Caribbean, Latin America, or South America.	Exposure in terms of dollars from an immigration crisis would result mainly from the stress on local police and health services. Exposure in terms of human health and safety would result from the possible introduction of diseases and stress on the existing healthcare network.	Frequency = Moderate over the last decade Vulnerability = Moderate Exposure = Moderate Risk = Moderate

5.0 MITIGATION OPTIONS

This section of the Indian River County LMS outlines a menu of mitigation options available to reduce the risks posed by natural disasters.

5.1 MITIGATION DEFINITION AND INTRODUCTION

Mitigation activities are those activities that aim to reduce the risks from natural and man-made hazards in a community. Mitigation is not a "one size fits all" process; a successful risk reduction activity in one community may not work in another. Several factors play a role in the decision on which mitigation activities to pursue including – frequency and severity of the hazard, the community's ability to address the problem, ease of implementation, costs and benefits, availability of funding, and a local champion to spearhead the activity, among others. There are several different types of mitigation activities that a community can undertake to reduce the risk posed by natural and man-made hazards. FEMA has identified six broad categories of mitigation actions including prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects.

5.2 MITIGATION CATEGORIES

The following definitions were included in the FEMA How To Guide 3: Developing the Mitigation Plan (FEMA, 2003).

- Prevention – Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses.
- Property Protection – Actions that involve the modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area.
- Public Education and Awareness – Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.
- Natural Resource Protection – Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- Emergency Services – Actions that protect people and property during and immediately after a disaster or hazard event.
- Structural Projects – Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

5.3 MITIGATION OPTIONS BY CATEGORY

The following mitigation options are categorized using the categories identified above. While these lists are not comprehensive, they serve to provide examples of what can be done to reduce risk.

Prevention.

- planning and zoning;
- building codes;
- capital improvement programs;
- coastal zone management regulations;
- density controls;
- design review standards;
- easements;
- environmental review standards;
- floodplain development regulations;
- forest fire fuels reduction;
- open space preservation;
- performance standards;
- shoreline setback regulations;
- special use permits;
- stormwater management regulations;
- subdivision and development regulations; and
- transfer of development rights.

Property Protection.

- acquisition;
- construction of barriers around structures;
- elevation;
- relocation;
- structural retrofits;
- storm shutters; and
- shatter-resistant glass.

Public Education and Awareness.

- outreach projects;
- real estate disclosure;
- hazard information centers; and
- school-age and adult education programs.

Natural Resource Protection.

- best management practices;
- dune and beach restoration;
- forest and vegetation management;
- sediment and erosion control;
- stream corridor restoration;
- stream dumping regulations;
- watershed management;
- forest and vegetation management; and
- wetland restoration and preservation.

Emergency Services.

- warning systems;
- emergency response services; and
- protection of critical facilities.

Structural Projects.

- channel maintenance;
- construction of dams/reservoirs;
- construction of levees and floodwalls;
- construction of seawalls/bulkheads; and
- construction of safe rooms.

5.4 MITIGATION OPTIONS BY HAZARD

The following mitigation options broken down by specific hazard, were found mainly in North Carolina Emergency Management's Tools and Techniques: An Encyclopedia of Strategies to Mitigate the Impacts of Natural Hazards (North Carolina Division of Emergency Management, 2002) and FEMA's How to Guide: Integrating Human-Caused Hazards into Mitigation Planning (FEMA, 2002). They represent only a small fraction of the total possible mitigation options available to a community. For additional resources on mitigation options, see **Appendix B**.

All Hazard.

- acquisition and land banking;
- citizen outreach programs;
- community awareness programs;
- development impact tax/improvement tax;
- floating zones;
- home inspection programs;
- purchase of development rights;
- smart growth principles;
- structural retrofit;
- subdivision ordinance; and
- tax abatement, subsidies, low-interest loans, and other incentives.

Drought.

- contingency planning;
- fire breaks;
- housing code;
- new construction;
- water conservation programs
- monitoring and warning programs;
- drought tolerant vegetation; and
- wildland fire mitigation.

Erosion.

- beach nourishment;
- dune protection and shoreline setbacks;
- green infrastructure;
- structural relocation;
- open space preservation;
- revetments for beach management; and
- vegetation.

Flooding.

- acquisition;
- elevation;
- floodplain management plans
- floodproofing;
- flood insurance education;
- stormwater management;
- green infrastructure;
- porous pavement;
- retention ponds;
- sewage treatment plant retrofit; and
- tie downs.

Hurricane.

- acquisition;
- floodplain management plans;
- floodproofing;
- shuttering;
- enhanced building codes;
- preparedness outreach;
- tree and limb maintenance;
- mobile home parks storm shelter;
- safe rooms; and
- stormwater drain maintenance.

Thunderstorm.

- drainage system maintenance;
- impervious surface limits;
- tree and limb maintenance;
- encourage flood insurance;
- mobile home parks storm shelter;
- stormwater drain maintenance; and
- traffic light and other traffic controls.

Tornado.

- mobile home parks storm shelter;
- protecting natural environmental features;

- warning systems;
- enhanced building codes;
- safe room;
- tie downs;
- traffic lights and other traffic controls;
- utility lines; and
- windproofing.

Wildland Fire.

- fire breaks;
- fuel loads;
- housing code;
- new construction;
- open space acquisition;
- BEHAVE Fire Behavior Prediction and Fuel Modeling System;
- prescribed burns;
- tree limb removal; and
- wildland fire mitigation planning.

Terrorism.

- site planning and landscape design;
- architectural and interior space planning;
- structural engineering;
- mechanical engineering;
- electrical engineering;
- public education;
- drills;
- fire protection engineering;
- security; and
- parking.

Table 5.1 displays various mitigation activities by both mitigation category and hazard. Only select hazards are compared in the table.

5.5 MITIGATION OPTIONS ADDRESSING SPECIAL ISSUES

This section identifies several risk reduction strategies for three special issues of relevance in Indian River County – Repetitive Flood Loss Properties, Barrier Islands, and the CRS.

5.5.1 Repetitive Flood Loss Properties

FEMA has placed special emphasis on addressing repetitive flood loss properties through the mitigation planning process; therefore, it is important to identify strategies to lower the number of repetitive loss properties within the County. The following are examples of actions that can be taken to lower or eliminate both the number of repetitive loss claims and properties in the County.

Table 5.1. Mitigation options by category and hazard.

Category	Mitigation Alternatives	Hazard			
		Flood	Hurricane	Tornado	Wildland Fire
Prevention	building codes	X	X	X	
	coastal zone management regulation	X	X		
	density controls	X	X		X
	design review standards	X	X	X	X
	easements	X	X		X
	environmental review standards	X	X	X	X
	floodplain development regulations	X	X		
	floodplain zoning	X	X		
	forest fire fuel reduction				X
	hillside development regulation				X
	open space preservation	X	X		X
	performance standards	X	X	X	X
	shoreline setback regulation	X	X		
	special use permits	X	X		X
	stormwater management regulations	X			
	subdivision and development regulations	X	X	X	X
transfer of development rights	X	X		X	
Property Protection	acquisition of hazard-prone structures	X	X		X
	construction of barriers around structures	X	X		
	elevation of structures	X	X		
	relocation out of hazard areas	X	X		X
	structural retrofits	X	X	X	
Public Education and Awareness	hazard information center	X	X	X	X
	public educational and outreach programs	X	X	X	X
	real estate disclosure	X	X	X	X
Natural Resource Protection	best management practices	X	X		X
	dune and beach restoration		X		
	forest and vegetation management	X			X
	sediment and erosion control regulations	X	X		
	stream corridor restoration	X			
	stream dumping regulations	X			
	urban forestry and landscape management	X			X
wetlands development regulations	X	X		X	
Emergency Services	critical family protection	X	X	X	X
	emergency response services	X	X	X	X
	hazard threat recognition	X	X	X	X
	health and safety maintenance	X	X	X	X
	post-disaster mitigation	X	X	X	X
Structural Projects	channel maintenance	X	X		
	dams/reservoirs	X			
	levees and floodwalls	X	X		
	safe rooms/shelters		X	X	
	seawalls/bulkheads		X		

Source: Federal Emergency Management Agency's (FEMA's) How To Guide 3: Developing the Mitigation Plan (FEMA, 2003).

- acquisition;
- building codes;
- detention basins;
- drainage culverts;
- drainage system maintenance;
- dune protection and shoreline setbacks;
- elevation;
- firebreaks;
- floating zones;
- floodplain management plans;
- floodproofing;
- moratoria;
- real estate disclosure requirements;
- relocation;
- sewage lift stations; and
- stormwater drainage maintenance.

5.5.2 Barrier Islands

Geologic and meteorological processes associated with barrier islands create a number of potential hazards. The following actions are examples of mitigation activities that can be implemented to protect the people, buildings, and infrastructure on barrier islands before and during natural hazard events.

- acquisition;
- beach management plans;
- beach nourishment;
- carrying capacity;
- dredging;
- dune protection and shoreline setbacks;
- floating zones;
- groins;
- jetties;
- offshore breakwaters;
- revetments;
- roadway realignment;
- sand dunes;
- sand scraping;
- seawalls and bulkheads; and
- coastal sediment trapping and vegetation.

5.5.3 CRS Projects

Participation in the CRS program can help to lower flood insurance premiums for residents within Indian River County. The more flood mitigation actions that are initiated, the lower the premiums will be. The following subsection outlines example mitigation activities that qualify for potential premium-reducing CRS points.

- *310 Elevation Certificates* – elevation;
- *330 Outreach Projects* – audits of small business, community awareness programs, education and training, home inspection programs, and notification of location of hazards;
- *340 Hazard Disclosure* – real estate disclosure requirements;
- *400SH Special Hazard Areas* – beach management plans, dune protection and shoreline setbacks, sand dunes, sediment trapping vegetation, and wetland preservation and riparian habitat protection;
- *410 Additional Flood Data* – hazard identification, mapping hazards, risk assessment, and vulnerability assessment;
- *420 Open Space Preservation* – acquisition and comprehensive plans;
- *430 Higher Regulatory Standards* – building codes, government expenditure limitation in high hazard areas, moratoria, sewage lift station, and sewer manholes;
- *430 LZ Low Density Zoning* – development density;
- *450 Stormwater Management* – grassy swales, impervious surface limits, onsite sediment retention, performance or impact zoning, retention ponds, stormwater management, and vegetation;
- *510 Floodplain Management Planning* – floodplain management plans, hazard mitigation and post-disaster reconstruction, porous pavement, and stormwater basins;
- *520 Acquisition and Relocation* – acquisition, capital facilities plans, commercial parks, critical facilities, emergency shelters, parks, public housing, public records, relocation, safe site, and school facilities;
- *530 Retrofitting* – dikes, levees, floodwalls and berms, elevation, floodproofing, public housing, public records, public school buildings, retrofit of fire stations and police stations, and sewage treatment plant retrofit;
- *540 Drainage System Maintenance* – drainage culverts, drainage system maintenance, retention ponds, and stormwater drain maintenance;
- *610 Flood Warning Program* – capability analysis and disaster warning;
- *620 Levee Safety* – dikes, levees, floodwalls, and berms; and
- *630 Dune Safety* – dams and reservoirs.

5.6 MITIGATION IN DEPTH

As the Community Profile (**Section 2.0**) indicated, the Treasure Coast region has and will continue to experience increased population growth. Population growth has a major impact on how and where development takes place in the County. As new development moves outward from the urbanized core and corridors, the potential for natural hazards to impact life and property increases. Because growth issues are so prevalent in the County, select development related mitigation activities have been identified and are described below. These activities are provided as examples only, and they are not reflective of the broad spectrum of mitigation options available. The mitigation activities and the accompanying information were developed from North Carolina Division of Emergency Management in the Tools and Techniques document (North Carolina Division of Emergency Management, 2002).

5.6.1 Floating Zoning

5.6.1.1 Definition

Floating zones are written into the zoning code but "float" above the map until triggered by a set of conditions. Unlike overlay zones, floating zones replace the existing code for the places in which they are implemented. Once certain conditions (usually development-related) are met, the ordinance becomes affixed to a particular site. Floating zones are typically used when a community knows that it wants to apply a set of regulations to certain uses (such as a shopping center), but is waiting for events to decide the location for those uses.

5.6.1.2 Implementation

One of the best uses of floating zones is to reduce the density in areas that have been hit by a natural disaster. For example, areas where structures have suffered, on average, a certain degree of damage could anchor a floating zone that reduces the allowable density in that area. The damage zones where these regulations would be applied could be identified during the recovery phase.

5.6.1.3 Critique

Since one or several lots are subject to different regulations than their neighbors, floating zones are often attacked as being a form of spot zoning. While the location of floating zones can be subject to special interests and politics, they are usually based on facts, as opposed to speculated future needs.

5.6.2 Impact Fees/System Development Charges

5.6.2.1 Definition

Impact fees require new developments to share in the financial burden that their arrival imposes on a town. These assessments are typically one-time, up-front charges (although some jurisdictions allow payments over time) against new development to pay for off-site improvements. The fees also can be set up to allow new development to buy into existing services with excess capacity. Impact fees are typically based on ratios that show what services the average new resident will require.

5.6.2.2 Implementation

Every impact fee must meet a three part legal test. First, the need for improvements funded by the fee must be created by the new development. Second, the amount charged the new development must be proportionate to the cost of its use. Third, all revenues must be spent in proximity to the new development and within a reasonable period of time. If any of these are not met, the community may face legal action. Communities should have a comprehensive plan and capital improvements program in place to defend their use of impact fees or exactions.

Impact fees can be linked to environmental impact analyses in order to charge proportionate fees for projects that will have broader or lesser impacts. While there are several methods for analyzing impacts (checklists or spreadsheet models, for example),

most look only at individual project impacts. An alternative is a cumulative impact assessment, which looks at the total effect of all development in a particular environment. This approach might allow planners to estimate the combined effects of several potential developments on reducing the flood storage capacity of a single watershed. The fee in this case would go toward mitigating increased flood heights, perhaps by creating flood storage elsewhere in the floodplain.

5.6.2.3 Critique

Impact fees can be applied to a wider variety of services than either exactions or special assessment districts. Unlike land dedications, these can be payments that cover the full costs of needed improvements. They are typically used in place of negotiated exactions because they take less time and are more predictable and equitable. Impact fees do not help with maintenance costs.

5.6.3 Porous Pavement

5.6.3.1 Definition

Substitute porous or open-grid pavement for impervious pavement to limit the amount of stormwater runoff that contributes to localized flooding.

5.6.3.2 Implementation

Pavement will ideally be pervious enough to absorb rainfall but with pores small enough not to clog with debris or cause problems for pedestrian traffic. Some brands of asphalt or concrete that lack the finer sediment of conventional cement hold promise. Several websites containing photographs and/or useful information regarding porous and open-grid pavement include

- http://www.gcpa.org/pervious_concrete_pavement.htm; and
- <http://www.greenbuilder.com/sourcebook/PerviousMaterials.html>.

5.6.3.3 Critique

Reservations apply to the use of open-grid, or open-cell, pavement: it is treacherous for those with mobility challenges (and those in high heels) and also is expensive to install. However, open-grid pavement is appropriate for limited-use access routes or overflow parking lots.

5.6.4 Transfer of Development Rights (TDR)

5.6.4.1 Definition

Like Purchase of Development Rights, TDR programs treat development as a commodity separate from the land itself. The local government first awards each property owner in a sending area a set of development rights based on the value or acreage of land. Sending areas contain land the local authority seeks to protect. The government then establishes a receiving area for these rights that is a preferred site for development. Landowners in the sending area are typically prohibited from developing their land; however,

they can sell their rights to developers in the receiving areas. Developers who acquire these development rights can build to higher densities than would otherwise be permissible.

5.6.4.2 Implementation

TDR could be used for mitigation purposes by designating high hazard areas as sending zones. The development rights for parcels within this zone would be targeted at a receiving zone located outside the hazard area. The zone would need to have sufficient room to accommodate the sending rights. In jurisdictions with limited available space, the program could be aimed at redevelopment rather than new development. Alternatively, the community could completely downzone itself. Both options could help create a market for development rights.

One way to ensure that people participate in the program is to make it mandatory; although, the legality of mandatory TDR programs is currently under challenge. In a mandatory program, the marketability of the rights would have to be guaranteed. One way to do so would be to create a municipal land bank that would purchase the rights and resell them when demand was sufficient to generate value. Suitable receiving areas outside the hazard area must be available for TDR to be successful. TDR can be used to achieve a variety of associated community goals, including promoting compact development with less impervious surfaces and preserving agricultural, rural, or open spaces. Since TDR can be applied to areas of a community, rather than individual parcels, it can be more thoroughly effective than acquisition or cluster development techniques.

5.6.4.3 Critique

TDR is a complex system, which makes it difficult for planning staffs to implement and for landowners to understand and accept. It is frequently unpopular with residents in the receiving zone, who are subject to development that exceeds the apparent zoning limits. Perhaps most importantly, a region must have a significant amount of development pressure to make the rights marketable.

5.6.4.4 Example

Collier County, Florida, began a TDR program in the 1980's to protect 40,000 acres of coastal barrier islands, mangroves, salt marshes, and beaches. These areas were designated as sending zones. The receiving zones were already set for multi-family housing, but could be built to a higher density using the development rights. Parcels for which the development rights have been sold must be protected by a restrictive covenant or by donation to the County or a conservation organization. A moratorium was placed on the program when the transfer resulted in density concentrating in only one receiving site and overwhelming it.

6.0 IMPLEMENTATION STRATEGY

6.1 INTRODUCTION

Plan implementation is a vitally important aspect of the overall program. Without an implementation program, the Plan either "gathers dust on the shelf" or lags along, implementing projects incrementally based more on agencies' or individuals' interest than on a prioritized need basis. Discussed below are issues related to the organizational arrangement and administrative responsibility, the role of the Working Group, plan monitoring, plan funding, and plan update process.

6.2 INSTITUTIONAL ARRANGEMENT

The creation of a disaster-resistant community is achieved once the concept becomes part of the mindset and fabric of the private and public sectors of a community. Effective implementation requires the strong support of the locally elected body. In addition, it requires an advocate. Someone or a group who believes the issue to be essential to the long-term sustainability of the community. This individual or group of individuals continually is reassessing the vulnerabilities of the community, and identifying potential strategies and partners to address the vulnerabilities and means to affecting change whether it be a brick and mortar project or implementing a new programmatic initiative or modification to existing codes or plans.

This section describes the comprehensive organizational arrangement required to effectively implement the countywide LMS program. It also describes the administrative framework that defines the roles and responsibilities of those at the staff level who carry out activities on a daily basis.

6.2.1 Organizational Structure

The LMS organizational structure consists of several levels (see **Figure 6.1**, LMS organizational structure). Heading the effort is the LMS Working Group. This group must have broad representation to be effective. It should embrace all stakeholder groups in the County from both the public and private sectors. Therefore, when the Indian River County Working Group was created, representatives were chosen so that all affected groups would have representation in the planning process and in the ongoing implementation of the LMS. The Working Group interacts directly with the County Commission and the general public. The Indian River County DES staff provides direct support to the Working Group. In addition, the DES is the liaison to the Florida Division of Emergency Management within the FDCA, and the FEMA, Department of Homeland Security.

6.2.2 Administrative - Lead Responsibility

The Director of the DES shall be the individual responsible for implementing, **monitoring**, and updating this LMS. As depicted in **Figure 6.1**, the Director of DES must interact with the County Administrator on a frequent basis, reporting on the progress of the implementation program, obstacles or problems that have delayed the implementation

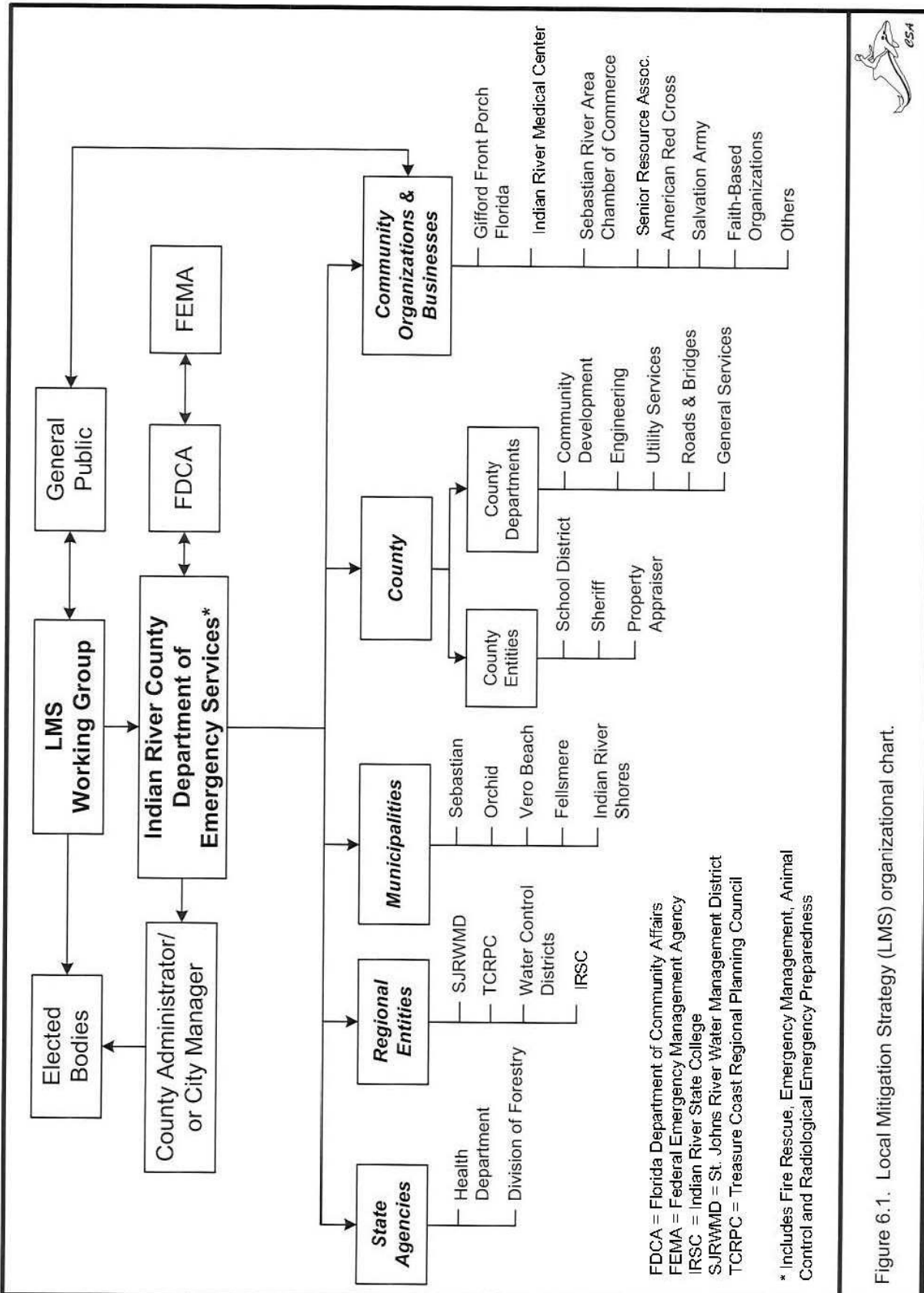


Figure 6.1. Local Mitigation Strategy (LMS) organizational chart.

program, and ideas or alternative options to overcome the obstacles and/or problems being encountered. The intention is that all projects will be implemented as soon as funding becomes available.

Responsibilities of the Director of DES will be:

- To be the Hazard Mitigation Advocate at staff level;
- To keep current with all changes in LMS/DMA2K programs;
- To interact frequently with Florida Division of Emergency Management County Liaison;
- To work closely with the LMS Chairperson;
- To organize meetings of the Working Group;
- To coordinate and contact with all members of the Working Group on a regular basis;
- To maintain avenues of communication with the general public;
- To set-up and maintain files documenting progress of LMS program;
- To update the PPL as needed; and
- To coordinate 5-year LMS update.

6.2.3 Administrative - Support Responsibility

Successfully implementing the LMS is not the sole responsibility of DES; it is the responsibility of all participating organizations. Participating organizations from both the public and private sectors can fulfill administrative responsibility in a number of ways including

- Promote and educate others about the significance of local hazard mitigation;
- Interact and coordinate frequently with the LMS Coordinator;
- Manage mitigation projects or activities;
- Provide assistance to other organizations so that they can implement their mitigation projects or activities;
- Disseminate hazard mitigation-related information to constituents;
- Document the progress of one's organization's hazard mitigation activities; and
- Make available to LMS Coordinator new data and information relevant to the LMS process.

An example of providing support to other organizations could involve assisting in an all-hazard public awareness/education program. While it may be the responsibility of the LMS Coordinator to see that the project is implemented, other organizations such as the County Fire Rescue, ARC, Indian River County School District, and even homeowner associations could serve in a support role designing such a program. Supporting organizations can assist in making sure that its members or member organization publicize and disseminate the program information generated as a result of the development of the public awareness/education program.

6.3 IMPLEMENTATION STRATEGY

The implementation strategy is based on information gathered from the Working Group as well as key community stakeholders and citizens. The hazards and community issues identified as well as the community's institutional analysis are used to determine the

best means to implement mitigation strategies in Indian River County. The implementation strategy includes the goals and objectives identified by the Working Group as well as a list of prioritized mitigation activities.

6.3.1 Goals and Objectives

In formulating the goals and objectives, appropriate plans, policy statements, laws, codes, and ordinances from each participating local government have been reviewed. With multiple local governmental entities involved in defining a community-wide vision, this becomes a complex process. To help clarify the process, a facilitated discussion with the Working Group was conducted, and a comprehensive list of the areas where disasters affect the community was developed. The list included the following:

- Loss of life;
- Loss of property;
- Community sustainability;
- Health/medical needs;
- Temporary sheltering;
- Food and water;
- Communication;
- Housing;
- Historical structures;
- Adverse impacts to natural resources (e.g., beaches, water quality);
- Economic disruption;
- Fiscal impact;
- Recurring damage;
- Damage to repair to public infrastructure (e.g., roads, water systems, sewer systems, stormwater systems, electrical power);
- Debris removal;
- Redevelopment/reconstruction;
- Development practices;
- Environmental damage;
- Intergovernmental coordination; and
- Mental health counseling.

Along with these general hazard impacts, specific issues related to preparing for, mitigating against, responding to, and recovering from disasters were identified by the Working Group. The issues identified are summarized below.

- Trade off between flood protection and water quality;
- Public infrastructure at risk from flooding;
- Connections between County and St. Johns River Water Management District's Stormwater Management Plans;
- Catastrophic events surpass what is planned for in current stormwater management plans;
- Bridges and transportation facilities are built to withstand a typical 100-year storm;
- The Town of Orchid is not a participant in the CRS program;

- Coordination between government entities and private developments and homeowner associations;
- Only the County and Sebastian have pre-arranged contracts for debris removal following an event;
- Linkage between the County and municipal Emergency Management Plans;
- Law Enforcement needs an upgraded firing range;
- Including additional utility providers in place at the Emergency Operations Center;
- Need to revisit emergency plans and operations with various County and municipal entities;
- Public awareness about livestock relocation;
- Public awareness about including safe room construction into new developments;
- The following roadway has been identified as suffering from chronic flooding and needs additional outfall capacity or flood storage;
 - 27th Avenue between 4th Street and 5th Street
- Several areas on the barrier island are in need of beach nourishment including:
 - Sectors 1 & 2 – R-4 to R-17;
 - Sector 3 – R-20 to R-55;
 - Sector 5 – R-74 to R-86; and,
 - Sector 7 – R-97 to R-107.
- The FEC railroad blocks traffic to the hospital when the train passes. Grade separated overpasses located at 41st Street, Aviation Boulevard and 33rd Street, and 4th Street would help alleviate the problem.
- Funding for protracted incidents.
- Unexploded military ordnance disposal is time-consuming because assistance must be requested from nearby service providers. The County could benefit from having its own bomb disposal unit.

These concerns, along with information generated from the inventory of local planning documents and ordinances, resulted in the following goals and objectives for all hazard mitigation planning in Indian River County.

The Indian River County LMS Working Group identified the following goals and objectives. The goals and objectives were selected because of their ability to address community issues that were identified earlier in the mitigation planning process. Goals as defined by FEMA are general guidelines that explain what you want to achieve. They are usually broad policy statements and are long-term in nature. Objectives as defined by FEMA are strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and measurable. The goals and objectives define the broad direction of the mitigation strategy and provide the focus for developing and adopting mitigation projects and activities. Projects implementing the stated goals and objectives are detailed further in **Appendix G**.

Goal 1. To minimize the loss of life and property and repetitive loss.

Objective 1.1 Create and maintain current an all-hazards database.

Project #9. Mapping and assessment of public wellfields and reverse osmosis plant protection zones to guard against groundwater contamination.

Project #11. Retrofitting the Gifford Youth Activity Center by hardening the roof and windows for disaster activities.

Project #37. Establishment of a county GIS department to improve flood mapping for flood damage reduction.

Project #19. Obtain an updated countywide geohydrological study with seismic profiles.

Project #24. Mockingbird Drive stormwater improvements to provide positive outfall in low-lying area previously served by percolation inlets to reduce flooding.

Project #29. Club Drive drainage project – Sandfly and Painted Bunting to provide positive outfall in low-lying area currently served by percolation inlets to reduce flooding.

Project #30. Construction of Weir gates across two canals that connect Rockridge Subdivision with the lagoon to prevent flooding.

Project #34. Potomac ditch improvements to prevent flooding and assist with drainage in the area.

Project #35. Laconia ditch improvements to prevent flooding and assist with drainage in the area.

Project #38. Culvert replacement for ditch/street crossings to promote better drainage in the City of Sebastian.

Project #44. Dredging of George Street Canal in the City of Sebastian to improve holding capacity of canal system to retain water and provide better flood control.

Project #6. Indian River Shores helipad to prevent death/injury for trauma patients. Helipad will be utilized for trauma helicopters to transport critically injured patients to trauma hospital and available to all county agencies.

Objective 1.2 Restore or protect waterfront areas susceptible to erosion/drought.

Project #33. Acquisition of land along the Indian River Lagoon within the Coastal High Hazard Area to reduce potential future losses.

Project #4. Study the feasibility and appropriateness of relocating the county Dune Stabilization Setback Line (DSSL) westward.

Project #45. Restoration of critically eroded areas along an 8.3-mile stretch of the Atlantic shoreline in an effort to provide needed storm protection.

Project #28. Construction of seawall/revetment along Humiston Beach in the City of Vero Beach to prevent flooding/erosion.

Project #32. Sebastian Highlands swale improvements to improve drainage to prevent residential flooding.

Project #39. Construction of seawall along Conn Beach in the City of Vero Beach to provide erosion and flood control.

Project #43. Collier Creek headwall improvements to control water flow into Collier Creek and the St. Sebastian River to provide erosion and flood control.

Project #46. Retrofit Town of Orchid to receive recycled water from Indian River County to keep ponds full enough to prevent loss of fish and birdlife in the Town of Orchid, a certified Audubon International Sanctuary.

Objective 1.3. Improve local roadways to ensure safe, efficient evacuation.

Project #17. Improvements to 53rd St. (East-West connector) for improved traffic access and emergency evacuations.

Project #18. Replacement of County bridges constructed below the 100-year flood plain for improved access, evacuation and exposure to flooding.

Project #21. Laconia Avenue improvements, including a new bridge over the St. Sebastian River, to provide an emergency evacuation route.

Project #23. 34th Avenue bridge replacement over the Main Relief Canal to provide traffic relief during post-disaster.

Project #41. Barber/Schumann intersection improvements to assist with emergency evacuations through the City of Sebastian.

Project #42. Corridor street improvements at Periwinkle, South Easy Street, Laconia Street and Schumann Drive to assist with emergency evacuations through the City of Sebastian.

Project #25. Fred Tuerk Drive and Highway A1A drainage improvements to correct drainage and flash flood problems that impinge and impact the Indian River Shores Public Safety station and City Hall.

Objective 1.4 Reduce the potential threat of wildland fires.

Project #8. Conduct prescribed burns in certain conservation areas vulnerable to wildland fire.

Project #27. Removal of dead vegetation on the NE side of C.R. 510 Bridge and from C.R. 510 north on Jungle Trail to remove or minimize the vulnerability of wildland fire.

Project #26. Removal of dead vegetation from Jungle Trail bordering the Town of Orchid (from C.R. 510 north to the turn at the Indian River Lagoon) to remove or minimize the vulnerability of wildland fire.

Objective 1.5 Increase primary shelter space and supplies to meet stated need.

Project #1. Retrofits to the county's public schools that serve as public shelters.

Project #36. Retrofits to the City of Vero Beach Recreation facility to reduce vulnerability to wind and flood damage.

Goal 2. To achieve safe and fiscally sound, sustainable communities.

Objective 2.1 Ensure that local planning and development matters address hazard mitigation.

Project #20. Protection of superficial aquifer groundwater quality and quantity as a secondary potable water source through acquisition of primary recharge areas and through the plugging of abandoned artesian wells.

Project #2. Replacement of three fire escape towers at Indian River Medical Center.

Project #12. Drill and connect a well for emergency use at Indian River Medical Center.

Project #5. Install and connect a portable water tank to provide emergency water services to Indian River Medical Center to provide emergency water services for patient care.

Project #13. Adopt procedures in the LMS for removal of marine debris resulting from natural disasters.

Project #7. Revise Indian River Farms Water Control District elevation references from NGVD 29 to NAVD 88 to reduce potential for elevation data inconsistencies with modernized NFIP firm maps.

Project #22. Construction of a hurricane debris staging area in Indian River Shores for enhanced disaster recovery efforts.

Objective 2.2 Retrofit critical facilities.

Project #16. Retrofits to the City of Vero Beach Police Department, Public Works facility and Electric Transmission and Distribution (a secondary critical facility) to reduce vulnerability to wind and flood damage.

Project #36. Retrofits to the City of Vero Beach Recreation Facility (a secondary critical facility) to reduce vulnerability to wind and flood damage.

Project #10. Rebuild non-wind code compliant fire rescue stations.

Project #31. Retrofits to the City of Fellsmere library for flood damage reduction.

Project #14. Retrofits to the North County Library to reduce vulnerability to wind and flood damage.

Project #15. Retrofits to the County's main library to reduce vulnerability to wind and flood damage.

Project #1. Retrofits to the County's public schools, which serve as public shelters, to reduce vulnerability to wind and flood damage, thereby reducing the County's safe shelter deficit.

Project #40. Modifications to the outfall structure at Stonebridge Subdivision for flood damage reduction.

6.4 INTEGRATION INTO LOCAL PLANS

Hazards are pervasive throughout our local communities. While it is understood that the issue of hazard mitigation is a central focus of the unified LMS, there are other planning mechanisms where this important issue should be addressed. Issues of land use, infrastructure, and environment have been addressed in local comprehensive plans; however, few plans properly address the impact disasters may have on existing and future development. Disasters have enormous physical and social impacts on the community. Other types of planning mechanisms where hazards should be addressed include county and city CEMPs, Continuity of Operations Plans, flood mitigation plans, State Housing Initiative Partnership Program (SHIP), and Land Development Regulations. Disaster planning is relevant to historic resources, waterfront development, community redevelopment, and low income neighborhoods where substandard housing is typically found has resulted due to use of poor construction methods and materials, and/or lack of adequate maintenance by the homeowner.

From a regulatory standpoint, the local government comprehensive plans administered under the provisions of Section 163.3161, F.S. are the cornerstone of growth management in Florida. Being supported by force of law, local comprehensive plans are extremely important vehicles to implement hazard mitigation. Local governments under Section 163.3161, F.S. are required to update their capital improvement lists annually. The projects included on the LMS PPL also should be incorporated into the local comprehensive plan CIEs. This should be accomplished annually in keeping with the annual update of the jurisdiction's CIE list of projects.

As described in **Section 6.7, Continuing Public Involvement**, the LMS Working Group will meet quarterly. It is anticipated that one of the quarterly meetings will focus on integrating hazard mitigation into comprehensive plans. At that meeting, ideas will be shared about how successes were achieved and obstacles overcome.

6.4.1 The Integration Process

The following process will be followed to ensure widespread integration of hazard mitigation into local planning mechanisms in Indian River County.

- 1) A letter from the LMS Chair, along with a letter of support from the chair of the elected body, will be transmitted to local planning directors, inviting each to attend an LMS Working Group meeting to discuss ways in which hazard mitigation can be best integrated into planning matters.
- 2) A meeting of the LMS Working Group is held. This phase could be said to be the institutionalization of hazard mitigation into the local planning and development.
- 3) Each director will be asked to work with their planning staff to develop a strategy to integrate hazard mitigation into their planning programs and to evaluate whether their regulations address hazard mitigation, and if found to be lacking, identify several possible alternatives.
- 4) At the next meeting of the LMS, each director will report their situation to the LMS Working Group.
- 5) Identified changes will be made through the plan amendment process. Refer to Section 163.3187, F.S. and Chapter 9J-11, F.A.C. Local governments can seek plan amendments twice each year. This is the preferred approach because the formal, legally-mandated Evaluation and Appraisal Report process in which local comprehensive plans undergo extensive review and scrutiny and modification will not be triggered until 2008 for Indian River County and 2010 for the municipalities.

A similar process as described in Points 1-4 above will be taken by the LMS Working Group to study the feasibility and implementation mechanics relative to other planning processes active in the County such as the Metropolitan Planning Organization, important in addressing transportation matters, SHIP, which is active with low-income housing issues, and Gifford Front Porch Florida, a neighborhood improvement program. Historical resources also will be evaluated since there are a number of historical structures in risk areas in the County.

6.5 PLAN MONITORING

Once the LMS is adopted by participating local governments, monitoring the progress of plan implementation is extremely important. It is through the monitoring process that the Working Group can determine whether or not implementation is occurring as originally envisioned. Determining whether or not the implementation timeframes are being met is critical. The monitoring process may be more important in identifying why actions/initiatives are not occurring. The identification of obstacles to implementation is also important. Funding cutbacks, unsuccessful competitive grant applications, and staff changes (e.g., key individual resigns or reassigned to new job, unexpected design problems, unexpected complexity in securing permits, lose commitment of partner agencies/organizations) can have significant impacts on implementing the LMS. Certain events or circumstances can alter the traditional means of operation, as was the case following September 11th. Changes such as this make plan monitoring important in keeping the LMS current.

6.5.1 Process

- Step 1 Each quarter, the designated contact for all mitigation projects or initiatives identified on the PPL will report progress to the LMS Coordinator. For the first and third quarters, the point-of-contact will complete an Individual Project Progress Report – **Form #1** for each project and submit it to the LMS Coordinator. For the second and fourth quarters, an informal progress check-in will take place between the point of contact and the LMS Coordinator. The point-of-contact also will be responsible for submitting any supporting documentation such as newspaper articles or other relevant media.
- Step 2 Based on the submitted progress report forms and progress check-ins, the LMS Coordinator will complete quarterly progress reports for the overall LMS program and present them to the elected boards of the County and municipalities.
- Step 3 At the end of each year, the LMS Coordinator will prepare an Annual LMS Report – **Form #2**. The Annual Report will be presented to the elected boards of the County and municipalities. It is important that the Annual Report, not just be placed on the consent agenda of each local government, but a formal presentation be made where, not only is the status reported, but the elected officials have an opportunity to ask questions about the program. A separate project list will be maintained by the LMS Coordinator that identifies the completed, deleted or deferred mitigation actions as a benchmark for progress. This status list can be found in Appendix G.
- Step 4 Besides reporting to local governments, LMS Coordinator and/or Chair of the LMS Working Group will be available to make similar presentations to private sector organizations, non-profit organizations (e.g., Senior Resource Association, chambers of commerce), and community organizations (e.g., Kiwanis, Rotary, Lions).

ANNUAL LOCAL MITIGATION STRATEGY (LMS) REPORT

Date: _____

From: LMS Project Coordinator

To: Elected Officials

This report is prepared to inform locally elected officials in Indian River County of the progress being made to make our community more disaster-resistant. The following briefly summarizes the status of **Existing Projects** presently being developed and identifies **New Projects** expected to be undertaken in the upcoming year.

Period: _____

6-13

Rank on PPL	Project Title	Purpose of Project	Status of Completion	Obstacles/Problems/ Solutions

FORM #2

**Annual Local Mitigation Strategy (LMS) Report
(Continued)**

Period: _____

PPL Ranking	Project Title	Purpose of Project	Funding Source(s)	Anticipated Problems/ Solutions	Start/End Dates

6-14

**FORM #2
(Continued).**

6.5.2 Evaluation of Continued Project Priority

Part of the monitoring process will be for the group to evaluate the continued priority for each project. This determination will be made with consideration of the following factors:

- The proposed project's relationship to current or more recent hazard identification and risk assessment evaluations conducted by the LMS Working Group,
- Recent experience with hazard events in Indian River County and the relevance to the proposed project to mitigating the vulnerabilities to those hazards,
- The current probability of receiving funding for implementation from local, state or federal sources and its consistency with current local, state or federal program priorities.

On an annual basis, and for preparation for the next updated edition of the plan, jurisdictions will recommend that an initiative continue at its currently designated priority, or deferred for future action.

6.6 UPDATING THE PLAN

There are two updating processes connected to the LMS. One describes how the PPL is updated annually. A detailed description of the PPL updating procedure is provided below. The second updating process, involves the 5-year update of the entire LMS.

6.6.1 PPL

At the heart of the LMS is the PPL. The PPL is a rank order of priority projects that if implemented will result in a more disaster-resistant community. Because projects are completed, new needs surface, new funding opportunities arise, and dramatic events occur that affect priorities, it is important that the PPL be a dynamic document. For this reason, the window to submit projects to the PPL will always be open. The following sections identify the multi-step prioritization methodology.

6.6.1.1 Methodology

Potential LMS mitigation projects and activities will be evaluated based on the following criteria:

- 1) Suitability;
- 2) Risk Reduction; and
- 3) Cost

In order to evaluate the projects, the Working Group previously established the priority of goals and hazards using the following methodology. The process listed below will be followed during each update of the LMS.

6.6.1.2 Prioritization Process

For the 2010 LMS update, we introduced an upgraded priority ranking system that seems to be simplified and less cumbersome than the former system. The rating system has been in use in Miami-Dade for some time and has been found to deal with projects on an objective basis and all participants feel that the system is fair and equitable. Other counties have used the system with success as well.

There are three components on the Scoring Sheet used to obtain the total score, with a total of 15 variables resulting in a total of 1500 points that are then converted to a percent score. The applicant will assign a score to each of the variables. If the calculations are done by the spreadsheet, the score will be converted automatically and work as follows:

30% Suitability of the project

- 40% Addresses Goals
- 15% Addresses Hazards
- 10% Environmental Impact
- 10% Consistent with Existing Legislation and/or Policies
- 25% Consistent with Existing Plans and Priorities

45% Risk Reduction/Community Effect produced by the project

- 15% Scope of Benefits
- 35% Potential to Save Human Lives
- 15% Importance of Benefits
- 10% Level of Inconvenience or "Nuisance Factor"
- 10% Economic Effect or Loss
- 15% Number of People to Benefit

25% Cost of the project

- 20% Estimated Costs
- 75% *Initial Cost*
- 25% *Maintenance/Operating Costs*
- 25% Financing availability
- 25% Affordability
- 30% Repetitive Damages Corrected

Priority of Goals: The Working Group previously prioritized the following LMS goals according to the following priority ranking:

- Minimize the loss of life, property, and repetitive loss;
- Achieve safe and fiscally sound, sustainable communities; and
- Minimize economic disruption and ensure orderly, effective recovery and redevelopment.

Priority of Hazards: The Working Group previously prioritized the following LMS hazards according to the following priority ranking:

- 1) Hurricane/Tropical Storm
- 2) Wildland Fire
- 3) Flooding
- 4) Tornado
- 5) Hazardous Materials Accident
- 6) Transportation System Accident

- 7) Power Failure
- 8) Communication Failure
- 8) Terrorism/Sabotage
- 8) Thunderstorm/Lightning
- 9) Erosion
- 10) Immigration Crisis
- 10) Radiological Hazards
- 10) Wellfield Contamination
- 11) Agricultural Pest and Disease
- 11) Civil Disturbance
- 11) Drought
 - Economic Collapse
 - Epidemic
 - Extreme Temperature
 - Military Ordnance
 - Seismic (Sinkholes, Earthquakes, Dam/Levee Failure)
 - Societal Alienation
 - Substance Abuse

Bulleted hazards indicate that no priority score was given; therefore, the hazard is a "non-immediate priority" hazard.

6.6.1.3 *Prioritization Scoring*

The rankings above were translated into scores so that priority could be determined. Consistent with the previously prioritized goals and hazards, staff converted the rankings into numerical scores to fit the new scoring criteria.

6.6.1.4 *Project Evaluation*

Any organization interested in submitting a project for the PPL must complete a project proposal form (Form #3). **Prior to submitting project applications, applicants are required to perform a self-evaluation and determine if their project: (1) is cost/beneficial, (2) is environmentally sound, (3) has been considered the best alternative, and (4) will actually solve a problem and be a permanent solution.** Applicants will be asked to identify parameters such as; which goal(s) the project addresses, which hazard(s) the project addresses, how high the potential to save human lives is, etc. DES staff will apply the criteria listed above to projects that are up for consideration for the LMS PPL. Each project will be scored according to the point system discussed above. Projects will be listed on the PPL ranked according to their total evaluation score. The project with the most points will be ranked first.

Indian River County Local Mitigation Strategy (LMS) Sample Project Proposal Form – Page 1

Indian River County Local Mitigation Strategy Project Proposal Form - Step 1

Final Score 0

Instructions:

The total score is derived from the following three parameters: **Suitability, Risk Reduction/Community Effect** and **Cost**. Within these parameters are a total of 15 variables resulting in a possible total of 1,500 points. Applicants will assign a score to each of the variables appropriate for their proposed project. If you use the electronic version of the Prioritization Matrix (<http://www.ircgov.com/Boards/LMS/Index.htm>) in Step 2, the scores will be calculated (using a percentage) and converted to points automatically.

Without the benefit of the electronic version on the Prioritization Matrix, applicants are to print and complete all but the "Points" column of the Project Proposal Form. The final points and ranking will be tabulated for you once the entire proposal form is submitted for review.

The final score is what will be used to establish a priority of one project compared to another. The higher the score, the higher the priority. All scored projects will be added to the project list in prioritized order. Tied projects will be handled in accordance with the Tie-Break Methodology of the LMS Plan (6.6.1.5).

Each project must be accompanied by a Project Proposal form and submitted to:

Etta LoPresti, Emergency Management Planner
Indian River County Department of Emergency Services
Emergency Management Division
4225 43rd Avenue
Vero Beach, FL 32967
elopresti@ircgov.com

Step 1: Complete the following basic information before moving on to the Prioritization Matrix

Applicant Name:	
Agency Name:	
E-Mail:	
Phone:	
Project Name:	
Proposed Mitigation Measure:	
Estimated Project Cost:	
Estimated Time to Complete Project:	
Hazard(s) Mitigated:	
Jurisdictions Involved in Project:	
Possible Funding Sources:	Click here to go to website to find a list of possible funding sources

**Indian River County Local Mitigation Strategy (LMS)
Sample Project Proposal Form – Page 2**

**Indian River County
Local Mitigation Strategy Working Group
(LMS Project Proposal Form and Prioritization Matrix - Step 2)**

Name of Applicant:	0
Date of Application:	
Project Cost:	\$0

SUITABILITY	30%	0%	0
RISK REDUCTION/ COMMUNITY EFFECT	45%	0%	0
COST	25%	0%	0
TOTAL	100%		0

Parameter	Weighting Factor	Scoring Criteria	Score	Points
Suitability				
1	Addresses Goals	40%		0
		5 - High: Minimizes the loss of life, property and repetitive loss (or project addresses multiple goals). 3 - Medium: Minimizes economic disruption and ensures orderly, effective recovery and redevelopment. 1 - Low: Achieves safe and fiscally sound sustainable communities.		
2	Addresses Hazards	15%		0
		5 - High: Hurricane/Tropical Storm, Wildland Fire, Flooding, Tornado (or multiple hazards). 3 - Medium: Hazardous Materials Accident, Transportation System Accident, Power Failure. 1 - Low: Communication Failure, Terrorism/Sabotage, Thunderstorm/Lightning, Erosion. 0 - Very Low: All other hazards.		
3	Environmental Impact	10%		0
		5 - Positive effect on the environment. 3 - No effect - environmentally neutral. 1 - Adverse effect on the environment.		
4	Consistent with Existing Legislation and/or Policies	10%		0
		5 - High: Consistent with existing laws and policies. 3 - Medium: New legislation or policy changes needed, but no conflicts identified. 1 - Low: Conflicts with existing laws, regulations and/or policies.		
5	Consistent with Existing Plans and Priorities	25%		0
		5 - High - Supported in multiple plans or policies. 3 - Medium - Supported in a plan or policy. 1 - Low - Conflicts with existing plans and priorities, does not fit in with identified initiatives or is not supported in the Comprehensive Plan.		
Parameter Subtotal		100%	sum of parameter scores; max = 500	0
Suitability subtotal			(sum of parameter scores) / (maximum possible score)	0%

**Indian River County Local Mitigation Strategy (LMS)
Sample Project Proposal Form – Page 3**

**Indian River County
Local Mitigation Strategy Working Group
(LMS Project Proposal Form and Prioritization Matrix - Step 2)**

Name of Applicant:	0
Date of Application:	
Project Cost:	\$0

SUITABILITY	30%	0%	0
RISK REDUCTION/ COMMUNITY EFFECT	45%	0%	0
COST	25%	0%	0
TOTAL	100%		0

Parameter	Weighting Factor	Scoring Criteria	Score	Points
Risk Reduction/ Community Effect	45%			
1 Scope of Benefits	15%	5 - High: Benefits all municipalities and the unincorporated area, directly or indirectly. 3 - Medium: Benefits more than half but not all of the municipalities and/or the unincorporated area. 1 - Low: Benefits less than half of the municipalities and/or the unincorporated area.		0
2 Potential to Save Human Lives	35%	5 - High: More than 1,000 lives. 3 - Medium: Up to 1,000 lives. 1 - Low: No lifesaving potential.		0
3 Importance of Benefits	15%	5 - High: Needed for essential services. 3 - Medium: Needed for other services. 1 - Low: No significant implications.		0
4 Level of Inconvenience or "Nuisance Factor" (During project implementation)	10%	5 - None: Causes few problems. 3 - Moderate: Most major problems avoided. 1 - Significant: Causes much inconvenience (e.g., traffic jams, loss of power, delays).		0
5 Economic Effect or Loss (During project implementation)	10%	5 - Minimal economic loss (little effect during project). 3 - Moderate economic loss (minimum disruption). 1 - Significant economic loss (businesses closed, jobs affected, etc.).		0
6 Number of People to Benefit	15%	5 - High: More than 100,000 people. 3 - Medium: 10,000 to 100,000 people. 1 - Low: Fewer than 10,000 people.		0
Parameter Subtotal	100%	sum of parameter scores; max = 500		0
Risk Reduction/ Community Effect Subtotal		(sum of parameter scores) / (maximum possible score)		0%

**Indian River County Local Mitigation Strategy (LMS)
Sample Project Proposal Form – Page 4**

FORM #3

**Indian River County
Local Mitigation Strategy Working Group
(LMS Project Proposal Form and Prioritization Matrix - Step 2)**

Name of Applicant:	0
Date of Application:	
Project Cost:	\$0

SUITABILITY	30%		0%	0
RISK REDUCTION/ COMMUNITY EFFECT	45%		0%	0
COST	25%		0%	0
TOTAL	100%			0

Parameter	Weighting Factor	Scoring Criteria	Score	Points
Cost	25%			
1 Estimated Costs*	20%			0
i. Initial Cost	75%	5 - Low: \$0 to \$100,000. 3 - Moderate: \$100,001 to \$1 million. 1 - High: More than \$1 million.		0
ii. Maintenance & Operating Costs	25%	5 - Low costs 3 - Moderate costs 1 - High costs		0
2 Financing availability	25%	5 - Good: Readily available through grants or other funding sources. 3 - Moderate: Limited grant or matching funds available. 1 - Poor: No funding sources or matching funds are identified.		0
3 Affordability	25%	5 - Good: Project is easily affordable. 3 - Moderate: Project is somewhat affordable. 1 - Poor: Project is very costly for the jurisdiction.		0
4 Repetitive Damages Corrected	30%	5 - High: Alleviates repetitive loss. Property must have been damaged in the past by a disaster event. 3 - Medium: Repetitive loss may have occurred but was not documented. 1 - Low: No effect on repetitive loss.		0
Parameter Subtotal	100%	sum of parameter scores: max =	500	0
Cost Subtotal		(sum of parameter scores) / (maximum possible score)		0%

* Estimated costs are comprised of two secondary parameters: initial and maintenance/operating costs.

Project Scoring.

The LMS Project Proposal Form and Prioritization Matrix scores the projects as follows:

Parameter	Possible Score	Calculated Points
Addresses Goals		
Minimizes the loss of life, property and loss	5	200
Minimizes economic disruption	3	120
Achieves safe and fiscally sound communities	1	40
Addresses Hazards		
Hurricane/T.Storm, Fire, Flooding, Tornado or Multiple Hazards	5	75
HazMat Accident, Transportation Accident, Power Failure	3	45
Communication Failure, Terrorism/Sabotage, T.Storm, Erosion	1	15
Environmental Impact		
Positive impact	5	50
No effect	3	30
Adverse effect	1	10
Consistent w/Existing Legislation and/or Policies		
Supported in multiple plans or policies	5	75
Supported in a plan or policy	3	45
Supported in a plan or policy	1	15
Conflicts w/existing laws, regs and/or policies		
Consistent with Existing Plans and Policies		
Supported in multiple plans or priorities	5	125
Supported in a plan or policy	3	75
Conflicts w/existing plans and/or policies	1	25
Scope of Benefits		
Benefits all municipalities and uninc. Areas	5	75
Benefits more than half but not all municipalities	3	45
Benefits less than half of municipalities	1	15
Potential to Save Human Lives		
More than 1,000 lives	5	175
Up to 1,000 lives	3	105
No lifesaving potential	1	35
Importance of Benefits		
Needed for Essential Services	5	75
Needed for Other Services	3	45
No Significant Implications	1	15
Level of Inconvenience or "Nuisance Factor"		
Causes Few Problems	5	50
Most Major Problems Avoided	3	30
Causes Much Inconvenience	1	10
Economic Effect or Loss		
Minimal Economic Loss	5	50
Moderate Economic Loss	3	30
Significant Economic Loss	1	10
Number of People to Benefit		
More than 100,000 people	5	75
10,000 to 100,000 people	3	45
Fewer than 10,000 people	1	30

Parameter	Possible Score	Calculated Points
Initial Cost		
Low: \$0 to \$100,000	5	375
Moderate: \$100,001 to \$1 million	3	225
High: More than \$1 million	1	75
Maintenance and Operating Costs		
Low costs	5	175
Moderate costs	3	75
High costs	1	25
Financing Availability		
Readily available through grants or other	5	125
Limited funds available	3	75
No funding sources identified	1	25
Affordability		
Project is easily affordable	5	125
Project is somewhat affordable	3	75
Project is very costly	1	25
Repetitive Damaged Corrected		
Alleviates repetitive loss	5	150
Repetitive loss occurred but not documented	3	90
No effect on repetitive loss	1	30

Repetitive Damages Corrected:

The maximum score for a project is 1,500 points, which would be received by a project that addresses multiple goals and hazards, is supported by multiple plans and policies, addresses issues related to public health, safety, and welfare, and is cost-effective.

The scores for the three parameters will be added together. The total scores for each of the criteria will be the basis of the ranked list of projects. The projects with the highest score will be ranked first on the PPL.

After the total scores have been determined, a revised PPL will be developed by listing the projects in ranked order according to score.

The LMS PPL will set the priorities for mitigation projects within the County, but it is important to note that given funding availability, changes in political will, or the occurrence of a disaster, priorities may shift.

6.6.1.5 Tie-break Methodology

This project prioritization methodology will most likely result in tie scores for projects that address the same hazards. For instance, most stormwater management projects will address the same goals and hazards, resulting in tie ranking scores. Because of this, it is important to develop a tie-break methodology.

For projects with identical ranking scores that address different hazards, the project that addresses the highest priority hazard shall be ranked the higher. For instance, if a tornado project and a hazardous materials accident project received identical ranking scores, the tornado project would be ranked higher because its overall hazard priority is higher than hazardous materials accidents.

For projects with identical ranking scores that address the same hazards, the least expensive project will be placed higher in rank.

6.6.2 Comprehensive Update

The LMS planning process is dynamic and results in the development of a set of prioritized projects and initiatives with the aim of mitigating hazard impacts. To ensure this Local Hazard Mitigation Strategy remains consistent with current community issues and characteristics, it is important that it be periodically reviewed and updated.

In developing this updating process, three key sources were consulted to shape the process and procedures developed herein: Section 163.3191, F.S.: the evaluation and appraisal process of local government comprehensive plans; the ARC, Ten-Step Informative Model; and the FEMA's DMA2K local mitigation planning requirements. A key objective in the development of the process was to keep it from being excessively bureaucratic and cumbersome.

The LMS update process will occur on a 5-year cycle as is recommended by FEMA's DMA2K. The Working Group indicated that there needed to be some abbreviated reassessment of the Strategy following a Disaster Declaration.

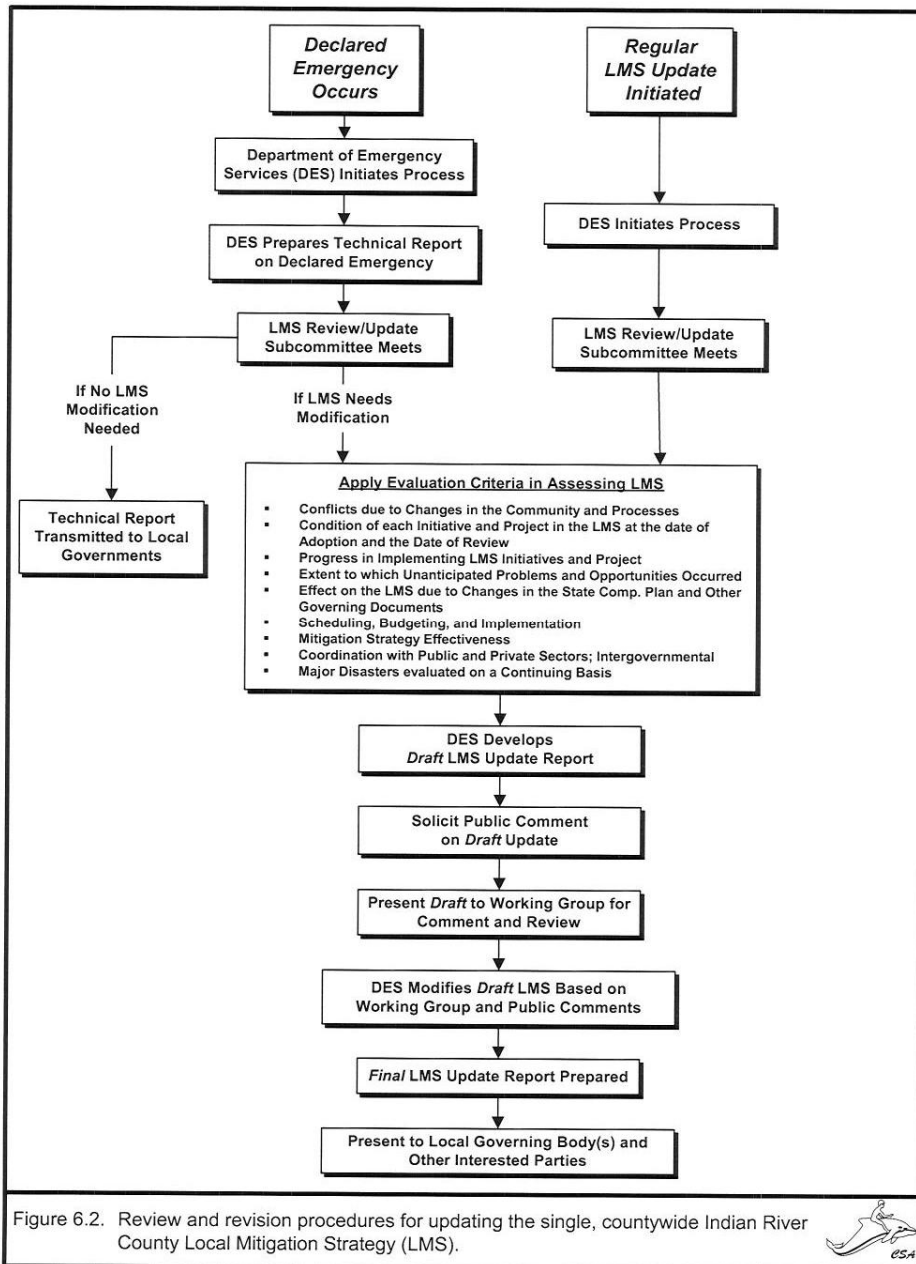
The LMS monitoring, evaluating and updating procedures will be initiated and carried out by the Director of the DES. Both the regular, 5-year Strategy update processes, as well as the abbreviated review process applicable following a Disaster Declaration, are depicted in **Figure 6.2**.

6.6.2.1 Regular LMS Update Procedures

The regular updating process will occur every 5 years. The administrative steps, as described below, constitute the procedures that will be followed.

- Step 1 The Director of DES will activate the update process in January of the fourth year of the update cycle by notifying each member of the Working Group of an initial organizational meeting. At that time, the DES will evaluate and request information updates on those serving on the Working Group (name of person, address, telephone and fax number, and e-mail address, if available).
- Step 2 The Director of DES prepares a meeting agenda in coordination with the Chairman of the Working Group to be distributed in advance of the meeting to members of the Working Group.
- Step 3 A Working Group meeting is held. A brief review of the updating process is discussed. A discussion of whether the evaluation criteria are still appropriate or whether modifications or additions are needed due to changing conditions over the period since the last update process occurred. The data needs will be reviewed, data sources identified, and responsibility for collecting information assigned to members.
- Step 4 A draft report is prepared. Evaluation criteria to be addressed include the following:

- A. Changes in the community and government processes that are hazard-related and have occurred since the last Strategy review;
 - 1. Community change
 - a. Growth and development in vulnerable areas;
 - b. Impact of actions resulting from growth that adversely affect natural resources in vulnerable areas, such as seawalling, beach erosion, heightening deposition in inlets;
 - c. Demographic changes;
 - d. New hazards identified;
 - e. Changes in community economic structure; and
 - f. Special needs population changes.
 - 2. Government process changes
 - a. New or changing laws, policies, and regulations;
 - b. Changes in funding sources or requirements;
 - c. Change in priorities for implementation;
 - d. Changes in government structure; and
 - e. Shifts in responsibility and mitigation committee resources.



- B. Progress in implementing LMS initiatives and projects - the Strategy initiatives and projects as compared with actual results at the date of the report;
- C. Effectiveness of the implemented initiatives and projects;
- D. Evaluation of unanticipated problems and opportunities that have occurred between the date of adoption and date of report;
- E. Evaluation of hazard-related public policies, initiatives, and projects;
- F. Assess the effectiveness of public and private sector coordination and cooperation.

- Step 5 The Director of DES determines the best method to solicit public input. The Director of DES is responsible for public noticing/advertising requirements. All Working Group members are informed and requested to attend the public meeting.
- Step 6 A public meeting is held. The Director of DES or a representative of the Working Group presents findings, conclusions, and recommendations of the Strategy effort. Public comments are recorded.
- Step 7 The Director of DES distills and synthesizes public comments in the memorandum.
- Step 8 The Director of DES coordinates and organizes second meeting of the Working Group. The draft Strategy Update Report is distributed to each participant 7 days prior to the meeting. The Working Group meeting is held. Consensus is reached on changes to the draft. If agreement can not be reached by certain local governments on certain issue(s) and/or project prioritization(s), the conflict resolution process (**Section 6.8**) may be triggered for those specific items parties cannot agree upon. A vote is taken securing approval of the draft Strategy Update Report, contingent upon integrating Working Group comments into the draft report.
- Step 9 The Director of DES incorporates modifications/additions resulting from the Working Group meeting.
- Step 10 The Director of DES finalizes the Strategy Update Report. Copies are distributed to Working Group members.
- Step 11 Each jurisdictional representative presents the updated Strategy to their respective governing body and other interested parties. If there are new or modified recommendations that their local government could implement to further the countywide Strategy, member seeks direction from governing body to implement appropriate strategies.

Step 12 The final updated LMS is forwarded on to the State Hazard Mitigation Officer at the Florida Division of Emergency Management and then to FEMA Region IV for review.

Step 13 The final updated LMS is formally adopted by all of the participating jurisdictions.

6.6.2.2 Declared Emergency Assessment

Step 1 Within 6 months following a Disaster Declaration, the Director of DES will initiate a post disaster review and assessment. The Director of DES will activate the assessment by appointing a Strategy Update Subcommittee. Each member of the Strategy Update Subcommittee will be notified that the assessment process is being commenced.

Step 2 The Director of DES, through the Strategy Update Subcommittee, will draft a Technical Report. The purpose of the report is to document the facts of the event and assess whether the Strategy effectively addressed the hazard. The Report should contain, at a minimum, the following:

- A. Identification of whether the hazard creating the declared emergency has been addressed in the Strategy;
- B. Documentation of the event: the magnitude of the event, areal extent of damages, and specific damages sustained (public infrastructure [e.g., potable water and wastewater treatment plants and collection systems] and private infrastructure [e.g., utilities, power]);
- C. Discussion of impacts to the private sector, such as obstacles to recovery, utilization of local vendors, deficits in types of products needed, accessibility of vendor suppliers, demand for space for temporary relocation, local business contingency plans, etc.;
- D. Analysis of effectiveness of coordination among institutional entities (e.g., local governments, Senior Resource Association, Indian River County Health Department, medical facilities, Florida Power & Light Company, BellSouth, Red Cross, Salvation Army, South Florida and St. Johns River Water Management Districts, FDCA, Florida Department of Transportation), and make recommendations, as necessary;
- E. Evaluation of the accuracy of the hazard vulnerability and risk assessment in Strategy relative to an actual event;
- F. Identification of Strategy initiatives/projects that had been implemented to mitigate impacts of the type of flooding hazard creating the emergency event, and evaluate effectiveness.

- G. Discussion of unanticipated impacts and identification of potential mitigation measures; and
 - H. Synthesis of information and prepare conclusions.
Recommendation of whether the Strategy needs to be amended.
- Step 3 The Director of DES schedules a meeting of the Working Group and distributes copies of the draft Technical Report prior to the meeting.
- Step 4 A meeting of the Working Group is held. Members discuss the Report findings, conclusions, and recommendations, and determine whether the Strategy needs to be modified.
- Step 5 If the conclusion is that no modification is needed for the Strategy, the Report is approved and transmitted to local governments.
- Step 6 If it is determined that the Strategy is to be amended, the Working Group prepares a draft Amended Strategy. The Amended Strategy should do the following:
- A. Utilize information from the Technical Report;
 - B. Provide justification of the need to amend the Strategy;
 - C. Contain a review and analysis of existing Strategy initiatives/projects in light of new initiatives/projects recommended in Technical Report; and
 - D. Include a re-prioritization of initiatives/projects.
- Step 7 A draft Amended Strategy is provided to each member of the Working Group 1 week in advance of the scheduled meeting.
- Step 8 A meeting of the Working Group is held. The draft Amended Strategy is discussed. Modifications are suggested.
- Step 9 The Director of DES, in consultation with Working Group, establishes appropriate method(s) to solicit public input. The Director of DES is responsible for public noticing/advertising requirements. Working Group members are informed and requested to attend the public meeting.
- Step 10 Public meeting is held. The Director of DES or a representative of the Working Group presents findings, conclusions, and recommendations of Draft Amended Strategy.
- Step 11 The Director of DES distills and synthesizes public comments and circulates them among the Working Group for comment. If comments are extensive and/or controversial, a meeting of the Working Group is scheduled and organized by the Director of DES. If no meeting of Working Group is warranted, skip to Step 13.
- Step 12 A meeting of the Working Group is held. Public comments are discussed. Consensus reached as to how comments are to be

reflected in the Amended Strategy. If agreement can not be reached by certain local governments on certain issue(s) and/or project prioritization(s), the conflict resolution process (**Section 6.8**) may be triggered for those specific items parties cannot agree upon. A vote is taken securing approval of the draft Strategy Update Report, contingent upon integrating Working Group comments into the draft report.

- Step 13 The Director of DES modifies the draft report based on the outcome of the results of Working Group meetings (Steps 8 & 12), or makes modifications resulting from public comments generated during Step 10.
- Step 14 The Director of DES finalizes the Amended Strategy. Copies of the Amended Strategy are distributed to the Working Group for review.
- Step 15 Each jurisdictional representative presents the Amended Strategy to their local governing body and other interested parties. If there are new or modified recommendations that their local government could implement to further the countywide Strategy, the member seeks direction from the governing body to implement appropriate strategies.
- Step 16 The final updated LMS is formally adopted by all participating jurisdictions
- Step 17 The final updated LMS is forwarded to the State Hazard Mitigation Officer at the Florida Division of Emergency Management and FEMA Region IV for review.

6.7 CONTINUING PUBLIC INVOLVEMENT

The Indian River County LMS Working Group recognizes the importance of public involvement in the LMS planning process. The committee is committed to providing opportunities for the public to be involved in the LMS planning process and welcomes input from neighboring communities, agencies, businesses, academia, nonprofits and other interested parties. The Group will ensure continued public involvement through the following methods:

- 1) Advertising quarterly meetings of the LMS Working Group in local newspapers and websites to invite the public to attend;
- 2) Posting updated LMS information and data on County and municipal websites when available;
- 3) Engaging in public hazard awareness programs to make residents more aware of the hazards that Indian River County faces; and
- 4) Providing copies of the final LMS at local library branches for the public to view.

The LMS Coordinator shall have the responsibility of ensuring that these activities are being implemented.

6.8 CONFLICT RESOLUTION

Background. With multiple local governments involved in the development of the Indian River County LMS, differences of opinions may arise over the course of the program with regard to goals, objectives, policies, and projects. Governments often have different interests, priorities, and needs as well as distinct constituents. In cases where an impasse occurs, there needs to be a procedure that can be activated to resolve such conflicts. This section describes the procedure that will be used to resolve conflicts arising among the participating entities in the development of the Indian River County LMS. The Conflict Resolution Process is depicted in **Figure 6.3**. The specific steps are described in detail below.

Prior to developing the process, other dispute resolution processes were investigated. They included the TCRPC Dispute Resolution Process, the Palm Beach County Multi-jurisdictional Issues Coordination Forum, the South Florida Growth Management Conflict Resolution Consortium, the Volusia County Coastal Management Element Conflict Resolution Program, and the Monroe County procedures for resolving disputes during the planning, design, construction, and operation of wastewater collection/treatment and effluent disposal facilities.

The two types of conflicts that may arise are issues and disputes. Issues are technical problems that are susceptible to informal solution by emergency management or planning office staff. Disputes are problems that escalate to levels requiring formal resolution by neutral third parties. In either case, resolution or settlement will not be binding, but a mutual, agreed to understanding among the disputing parties.

Developing an LMS is a cooperative, collaborative process, and local governments should be able to reach consensus on most issues and problems that arise during the development period. When occasions arise where local governments cannot reach agreement on a particular issue or project, they will be able to petition a hearing of the issues before the Working Group.

The LMS Coordinator would provide staff support.

Conflict Resolution Process. The following provides a detailed, step by step procedure that would be followed should a dispute arise during the study.

Objective: To institute a fair, effective, and efficient process to resolve conflicts among local governments during the development of the single, Countywide LMS.

During the development of the LMS, local governments may reach an impasse on a particular issue or position. The local government has an opportunity to elect to exercise the following LMS Conflict Resolution Process.

Step 1 The local government would submit a letter of dispute (LOD) to the LMS Coordinator explaining in as much detail as possible their concern and position along with documentation to support their position. Also, they would outline potential alternative solutions.

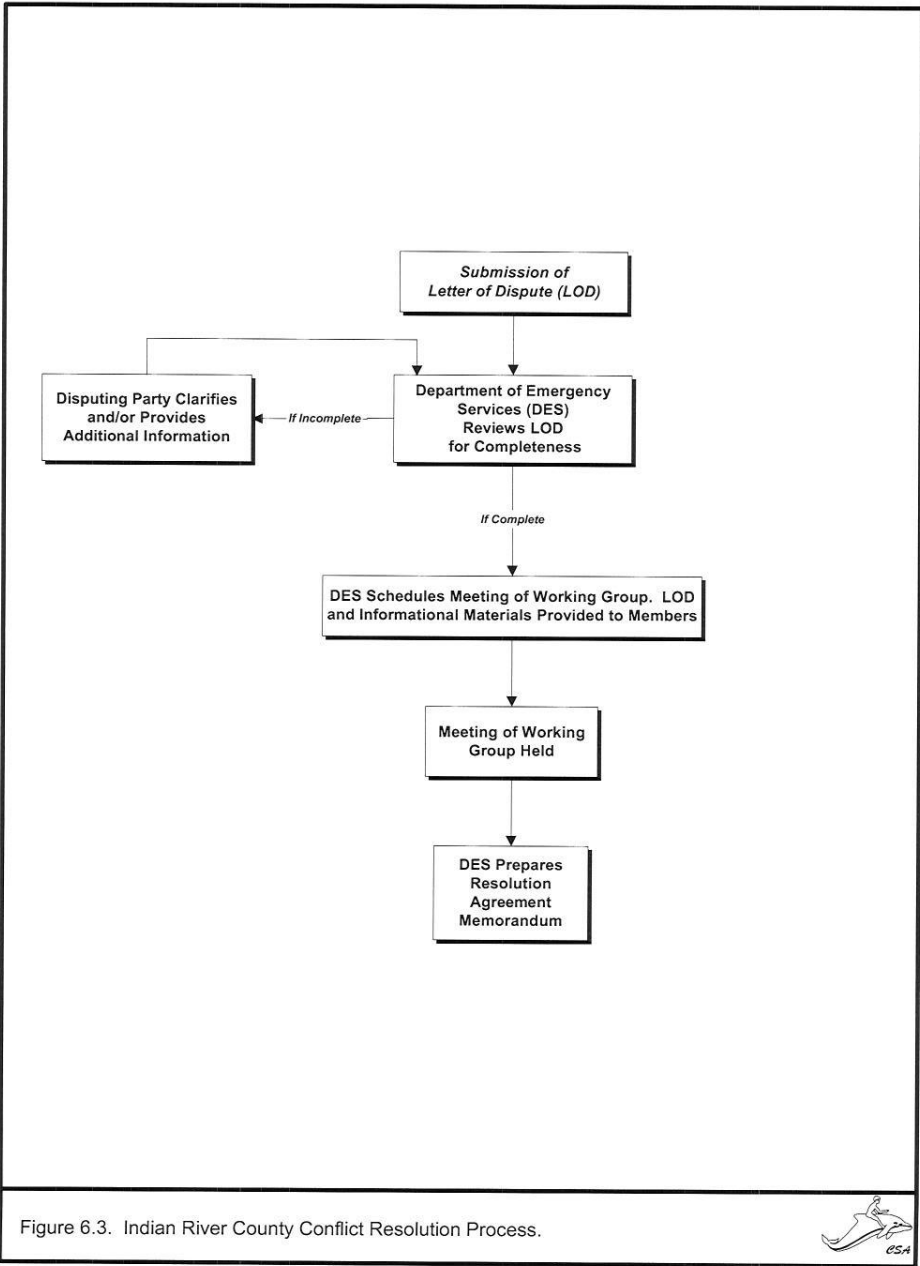


Figure 6.3. Indian River County Conflict Resolution Process.



- Step 2 The LMS Coordinator would review the LOD making sure that it clearly outlined the position of the local government(s) and provided sufficient information supporting their position so the dispute at question could be easily understood by the members of the Working Group. If necessary, the LMS Coordinator would contact the disputing party and ask for additional information/data necessary to clarify the position.

- Step 3 The LMS Coordinator will schedule a meeting of the full LMS Working Group. In an effort to continue to try to resolve the impasse expeditiously, the LMS Coordinator will make every attempt to schedule the meeting within two calendar weeks from the date that the LOD is determined sufficient. Each member of the Working Group will be sent a copy of the LOD and any supportive materials provided by the disputing party. The disputing party will be notified of the meeting date and time.

- Step 4 A meeting of the Working Group will be held. The representative of the disputing party will present their positions to the Working Group. Based on the ensuing discussion, hopefully resolution will be achieved. At the end of the meeting, if no mutually acceptable compromise is achieved, the position of the Working Group will be final. Whatever the outcome of the meeting, a memorandum of understanding will be prepared by the LMS Coordinator. To be official, the memorandum must have the concurrence of the Working Group Chair and a representative of the disputing party.

6.9 FUNDING

Whether projects are implemented in many instances is dependent on whether or not funding is available or whether a grant application was awarded. Potential funding sources are listed in **Appendix C**. However, because funding programs are so fluid (funded some years cutback other years, or completely eliminated), the County and its municipalities maintain contact with their FDCA liaison and the TCRPC, who are familiar with available grants. Also, Region IV, FEMA – Pre-disaster Mitigation Senior Coordinator and the Hazard Mitigation Grant Program Coordinator for Florida are excellent resources, as well. Each participating agency and organization is responsible for implementation of the mitigation initiatives contained within their portion of the Indian River County LMS when the necessary resources, funding, authorities and/or authorizations to become available. The LMS Coordinator will attempt to notify all LMS Working Group members of any notices of funding availabilities and open application periods for mitigation grant programs administered by the Florida Division of Emergency Management or the Federal Emergency Management Agency. Notices of other potential hazard mitigation grant opportunities will be forwarded when they become available; however, it is the applicant's ultimate responsibility to monitor potential funding sources available for their project. Projects will be selected by order of priority ranking and availability of funding for implementation. The applicable agency is responsible for completing all necessary application forms, providing any matching funds, etc. If the agency or organization is unable or unwilling to undertake the application process, the LMS Working Group and/or program staff would notify the agency or organization with the next highest ranked proposed mitigation initiatives on the prioritized project list.

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APPENDICES

APPENDIX A
POLICIES

Table A-1. Indian River County 2020 Comprehensive (Growth Management) Plan hazard mitigation inventory.

Policy/Objective/Project	Source	Notes
Indian River County shall provide the following services based on the following criteria: Fire and Emergency Services - Within the urban service area, station shall be located to enable a response time of 4-6 minutes based on a 40 miles/hour speed and a 5 mile service radius within urban service areas. Access shall be on roadways of sufficient capacity to adequately accommodate delivery of emergency services.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 2.8.a, pp. 84.	Fire, Natural and Technological Disaster Mitigation
Indian River County shall regulate development of areas, which are prone to flooding and areas within the 100-year floodplain in a manner that is consistent with the regulations established by the National Flood Insurance Program.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 7.1, pp. 89.	Flood Mitigation
Indian River County shall include within its land development regulations a mechanism to assess the impact of new development on emergency evacuation.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 12.3, pp. 94.	Hurricane Mitigation
During the 1995-2020 time period, the County will have no increase in land use designation density or intensity within the Coastal High Hazard Area (CHHA).	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Objective 17, pp. 97.	Erosion, Flood, and Hurricane Mitigation
The County shall not approve plan amendments that increase the residential density or land use intensity within the CHHA.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 17.1, pp. 97.	Erosion, Flood, and Hurricane Mitigation
The County shall support programs of land acquisition on the barrier island for natural resource preservation, recreation or both.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 17.2, pp. 97.	Erosion, Flood, and Hurricane Mitigation

A-2

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
The County shall limit densities in the CHHA to ensure timely evacuation of the barrier island.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 17.3, pp. 97.	Erosion, Flood, and Hurricane Mitigation
The County shall prohibit new development of adult congregate living facilities, nursing homes, homes for the aged, total care facilities, and similar developments within the CHHA.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 17.4, pp. 97.	Erosion, Flood, and Hurricane Mitigation
Within one year the issuance of a Hazard Mitigation Report by Indian River County or the Treasure Coast Regional Planning Council, any recommendations that identify land use conflicts or inconsistencies will have been implemented.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Objective 19, pp. 101.	Natural and Technological Disaster Mitigation
Indian River County shall issue Hazard Mitigation Reports for following natural or manmade hazardous incidents. Such incidents may include, but not be limited to, hurricanes and tropical storms, tornadoes, flooding, hazardous material accidents, nuclear power plant accidents, armed violence (civil disturbance, terrorism, or military conflict), mass immigration, coastal oil spill, freezes, fires, and drought.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 19.1, pp. 101.	Natural and Technological Disaster Mitigation, Hurricane, Flood, Erosion, Hazardous Waste, Nuclear, Fire, and Drought Mitigation
Following the issuance of any Hazard Mitigation Reports, Indian River County shall review its comprehensive plan for consistency with that Hazard Mitigation Report. Appropriate Hazard Mitigation Report based plan amendments shall be processed at that time.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 19.2, pp. 101.	Natural and Technological Disaster Mitigation

A-3

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
Through 2020, the County will have no instances of sanitary sewer facilities contaminating surface water or groundwater resources.	Indian River County 2020 Comprehensive (Growth Management) Plan, Sanitary Sewer Sub-Element, Objective 3, pp. 38.	Wellfield Contamination Mitigation
The County shall continue to prohibit the locations of septic systems within two hundred feet of a public water supply well, unless otherwise approved by the FDEP or HRS.	Indian River County 2020 Comprehensive (Growth Management) Plan, Natural Groundwater Aquifer Recharge Sub-Element, Policy 1.3, pp. 29.	Wellfield Contamination Mitigation
The County shall continue to protect existing and future public water supply wells from contamination by continuing to implement Chapter 931 of the County's land development regulations and by prohibiting any non-residential land use which stores, handles, or produces a toxic degradation or petroleum-based product, from locating within 1,000 feet of a public water supply well.	Indian River County 2020 Comprehensive (Growth Management) Plan, Natural Groundwater Aquifer Recharge Sub-Element, Policy 1.5, pp. 29.	Wellfield Contamination Mitigation
The County shall prohibit new developments or changes of uses that produce hazardous materials from locating on the Atlantic Coastal Ridge or the Ten Mile Ridge areas of Indian River County.	Indian River County 2020 Comprehensive (Growth Management) Plan, Natural Groundwater Aquifer Recharge Sub-Element, Policy 1.6, pp. 30.	Hazardous Materials Disaster and Wellfield Contamination Mitigation
It is the goal of Indian River County to have an efficient and environmentally sound solid and hazardous waste management system to prevent spread of disease, to promote orderly growth within the County, and to meet existing and projected demand for the management and disposal of waste.	Indian River County 2020 Comprehensive (Growth Management) Plan, Natural Groundwater Aquifer Recharge Sub-Element, Goal, pp. 30.	Hazardous Materials Disaster Mitigation

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
The solid waste disposal district shall provide convenient locations at which residents can drop off household hazardous materials free of charge.	Indian River County 2020 Comprehensive (Growth Management) Plan, Natural Groundwater Aquifer Recharge Sub-Element, Policy 2.4 pp. 30.	Hazardous Materials Disaster Mitigation
The County shall encourage the County Environmental Health Department to continue to perform regular inspections of small quantity hazard waste generators.	Indian River County 2020 Comprehensive (Growth Management) Plan, Solid Waste Element, Policy 2.9, pp. 30.	Hazardous Materials Disaster Mitigation
The County shall encourage the Department of Environmental Protection to continue to perform regular inspections of large quantity hazardous waste generators and private licensed waste handlers to ensure that bio-hazardous waste, generated by medical establishments and handled by private firms, is properly managed.	Indian River County 2020 Comprehensive (Growth Management) Plan, Solid Waste Element, Policy 2.10, pp. 32.	When improper management of bio-hazardous waste is found during an inspection, the private waste handler (the violator) will be prosecuted and fined by the Environmental Control Board. The County shall continue to inspect the bio-hazardous waste which enters the landfill. Hazardous Materials Disaster Mitigation
To effectively implement a stormwater management program, the County must establish a source of funding dedicated exclusively to stormwater management. A stormwater utility assesses a user fee based on the stormwater runoff characteristics of a particular parcel.	Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Element, pp. 69.	Flood Mitigation

A-5

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>Provide a drainage system for Indian River County which reduces the risk of property damage and inconvenience from long term flooding, promotes stormwater recharge of the shallow aquifer, reduces stormwater pollutant loading of the Indian River Lagoon and receiving waters and provides proper floodplain management.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Infrastructure Element, Goal, pp. 70</p>	<p>Flood Mitigation</p>
<p>By 2020, all existing and new development in the unincorporated section of Indian River County will be protected from flooding from a 25 year/24 hour storm event.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Infrastructure Element, Objective 1, pp. 71.</p>	<p>Flood Mitigation</p>
<p>The County hereby adopts the following level-of-service standard for all new drainage systems within the unincorporated County: New development requiring major site plan approval or subdivision platting shall construct a drainage system capable of Conservation Service Type 2 modified rainfall curves.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Infrastructure Element, Policy 1.1, pp. 71.</p>	<p>Flood Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>The finished floor elevation of any new buildings constructed within a flood zone, as designated in the 1989 Federal Emergency Management Agency (FEMA) Flood Insurance Study - Indian River County and Incorporated Areas. "AE" zone structures must be elevated a minimum of six (6) inches above the base flood level; "A" zone - structures must be elevated a minimum of 18 in. above the crown of the road or at the elevation required by the DHRS, whichever is higher; if no base flood data are available, the structure must be elevated at least three (3) feet above the highest natural elevation or the ground surface prior to construction next to the proposed walls of the structure; "VE" zone - structures must be elevated so that the bottom of the lowest horizontal structural member of the lowest floor is elevated on-half (1/2) foot or more above the base flood level.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Element, pp. 71.</p>	<p>Flood Mitigation</p>
<p>The County shall ensure that adequate stormwater management facilities are constructed and maintained to prevent major flooding of the road network of Indian River County during storm events.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Infrastructure Element, Policy 1.2, pp. 71.</p>	<p>Flood Mitigation</p>
<p>All major bridges shall be designed to withstand a 100 year/3 day storm event.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Policy 1.5, pp. 71.</p>	<p>Flood Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
By 2010, all drainage basins in Indian River County shall, at minimum, meet the Flood Protection Level of Service (FPLOS) for a 10 year/24 hour storm event.	Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 2, pp. 72.	Flood Mitigation
In existing developments, the County will reconstruct existing drainage systems and restore design capacity when road paving is programmed under the County's Petition Paving Program.	Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 2, Policy 2.1, pp. 72.	Flood Mitigation
By 2010, all existing roadways in the County shall be improved to meet the following level-of-service standard: Minimum road crown elevation for existing roads shall be raised during resurfacing/rebuilding to the flood elevation resulting from the 2 year/24 hour storm event on local streets. The center two lanes of rebuilt roads must be at or above flood levels resulting from a 10 year/24 hour storm event on Arterial and Collector roads.	Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 2, Policy 2.2, pp. 72.	Flood Mitigation
All drainage basins will meet the following level-of-service standards: By 2000 - 2 year/24 hour storm event; By 2005 - 5 year/24 hour storm event; By 2010 - 10 year/24 hour storm event.	Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 2, Policy 2.3, pp. 72.	Flood Mitigation

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>By 2002, the County will adopt a Stormwater Master Plan. In developing the Stormwater Master Plan, the County will analyze each basin in the unincorporated County, identify existing conditions and problems in each basin, and identify projected growth in each basin. As a result of that analysis, the County will identify a design storm parameter, discharge rate, land use allowance, and structural improvement plan for each basin. The County will coordinate with the City of Sebastian, and will prioritize analysis of the areas within and adjacent to the St. Sebastian River basin.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 2, Policy 2.5, pp. 73.</p>	<p>Flood Mitigation</p>
<p>To ensure stormwater management facilities function properly, the County will establish defined levels of maintenance for public and private stormwater management facilities, and will conduct inspections on a routine basis.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 2, Policy 2.6, pp. 73.</p>	<p>Flood Mitigation</p>
<p>The County will continue its activities to retrofit the Vero Lakes Estates drainage system.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 2, Policy 2.8, pp. 73.</p>	<p>Flood Mitigation</p>
<p>By 2002, Indian River County will have an adopted Stormwater Master Plan, which will guide all improvements to stormwater management facilities in Indian River County over a 20 year time frame.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 3, pp. 73.</p>	<p>Flood Mitigation</p>

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Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>In all major transportation improvement projects, the County shall include stormwater management facilities to serve the discharge needs of developments existing at the time of the improvement project within the upstream watershed area. Funding shall be included in the Transportation CIP.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 3, Policy 3.2, pp. 73.</p>	<p>Flood Mitigation</p>
<p>By 2002, the County shall consider establishing a stormwater utility to fund maintenance and improvements of existing stormwater management facilities.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 3, Policy 3.4, pp. 74.</p>	<p>Flood Mitigation</p>
<p>The County shall coordinate with the SJRWMD, and encourage the municipalities within the County to adopt stormwater master plans.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 4, Policy 4.5, pp. 74.</p>	<p>Flood Mitigation</p>
<p>By 2002, the County will have adopted a comprehensive floodplain management plan approved by the Federal Emergency Management Agency (FEMA).</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 5, pp. 75.</p>	<p>Flood Mitigation</p>
<p>The County shall prohibit encroachments, including fill, new construction, substantial improvements, and other development, within a County adopted regulatory floodway, as identified in the data section of this sub-element, that would result in any increase in flood levels during the occurrence of a flood discharge, unless specifically approved by the Administrator of the Federal Insurance Administration under the provisions of</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 5, Policy 5.1, pp. 75.</p>	<p>Flood Mitigation</p>

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Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
44 CFR 65.12, as amended.		
The County will allow only low density land uses in areas designated as flood prone (within the 100 year floodplain) as depicted on the Future Land Use Map. The only exception is where platted subdivisions were developed prior to existing regulations.	Indian River County 2020 Comprehensive (Growth Management) Plan, Stormwater Management Sub-element, Objective 8, Policy 8.1, pp. 77.	Flood Mitigation
Indian River County shall maintain, periodically review, revise if necessary, and enforce land development regulations. Those regulations shall include, but not be limited to provisions for the use of areas subject to periodic flooding and the provision of adequate drainage and stormwater protection.	Indian River County 2020 Comprehensive (Growth Management) Plan, Future Land Use Element, Policy 1.3, pp. 69.	Flood Mitigation
The County shall not fund transportation improvements, which allow increased development in CHHAs.	Indian River County 2020 Comprehensive (Growth Management) Plan, Transportation Element, Policy 7.4, pp. 122.	Erosion, Flood, and Hurricane Mitigation

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>The County shall evaluate and prioritize its capital improvement projects based on the following criteria. These criteria are ranked in order of importance.</p> <ul style="list-style-type: none"> • Preservation of the health and safety of the public by eliminating public hazards; • Compliance with all mandates and prior commitments; • Elimination of existing deficiencies; • Maintenance of adopted level-of-service standards; • Provision of infrastructure concurrent with the impact of new development; • Protection of prior infrastructure investments; • Consistency with the county plan and plans of other agencies; • Accommodation of new development and redevelopment facility demands; • Consistency with plans of state agencies and water management districts that provide public facilities within the local government’s jurisdiction; • Promotion of compact development by discouraging growth outside of urban service areas; • Demonstration of linkages between projected growth and facility location; • Utilization of the economics of scale and timing of other improvements; • Reduction of operating costs; • Adjustment for unseen opportunities, situations, and disasters. 	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Capital Improvements Element, Policy 1.3, pp. 51.</p>	<p>Natural and Technological Disaster Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
Through 2020, development in CHHAs will not increase beyond the density or intensity levels indicated on the current Future Land Use Map.	Indian River County 2020 Comprehensive (Growth Management) Plan, Capital Improvements Element, Objective 2, pp. 52	Erosion, Flood, and Hurricane Mitigation
The County shall not increase land use density and intensity, in the CHHA, beyond that reflected in the County's current Future Land Use Map.	Indian River County 2020 Comprehensive (Growth Management) Plan, Capital Improvements Element, Policy 2.2, pp. 53.	Erosion, Flood, and Hurricane Mitigation
The County shall make appropriations for infrastructure in CHHAs only to maintain the adopted level-of-service standards.	Indian River County 2020 Comprehensive (Growth Management) Plan, Capital Improvements Element, Policy 2.3, pp. 53.	Erosion, Flood, and Hurricane Mitigation
The County shall ensure that the replacement of infrastructure in the CHHA will be limited to maintaining the adopted level-of-service standards.	Indian River County 2020 Comprehensive (Growth Management) Plan, Capital Improvements Element, Policy 2.4, pp. 53.	Erosion, Flood, and Hurricane Mitigation
The County shall require that all developments and all single family units in CHHAs fully pay the cost for required infrastructure improvements through impact fees, developer dedications, assessments, and contributions.	Indian River County 2020 Comprehensive (Growth Management) Plan, Capital Improvements Element, Policy 2.5, pp. 53.	Post-Disaster Redevelopment; Erosion, Flood, and Hurricane Mitigation
The County shall not use public funds to subsidize increased density and intensity of urban development in CHHAs. However, public beach, shoreline access, resources restoration, or similar projects may be constructed.	Indian River County Comprehensive Growth Management Plan, Capital Improvements Element, Policy 2.6, pp. 53.	Erosion, Flood, and Hurricane Mitigation

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
New development requiring major site plan approval or subdivision platting shall construct a complete drainage system to mitigate the impacts of a 25 year/24 hour design rainfall event using the soil conservation service type 2 modified rainfall curves.	Indian River County Comprehensive Growth Management Plan, Capital Improvements Element, Policy 3.5, pp. 54.	Flood Mitigation
Post development runoff for any drainage basin shall not exceed pre-development runoff unless a maximum discharge rate has been adopted and the discharge does not exceed that rate. If a maximum discharge rate has not been adopted for a basin, post development discharge may not exceed pre-development discharge.	Indian River County 2020 Comprehensive (Growth Management) Plan, Capital Improvements Element, Policy 3.5, pp. 54.	Flood Mitigation
By 2010, all existing roadways in the county shall be improved to meet the following level-of-service standards: Minimum road crown elevation for existing roads shall be raised during resurfacing/rebuilding to the flood elevation resulting from the 2 year/24 hour storm event on local streets; the center two lanes of rebuilt roads must be at or above flood levels resulting from a 10 year/24 hour storm event on Arterial and Collector roads; and all drainage basins will meet the following level of service standards: By 2005 – 5-year/24 hour storm event, by 2010 – 10-Year/ 24 hour storm event.	Indian River County 2020 Comprehensive (Growth Management) Plan, Capital Improvements Element, Policy 3.5, pp. 54.	Flood Mitigation
In coordination with the Office of Radiation Control and the Indian River County Health Department, the County shall make available information on the detection and control of radon gas.	Indian River County 2020 Comprehensive (Growth Management) Plan, Conservation Element, Policy 1.2, pp. 89.	Air Pollution Mitigation

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Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
Through 2020, there will be no reduction in flood storage capacity or the other natural functions and values of floodplains in Indian River County.	Indian River County 2020 Comprehensive (Growth Management) Plan, Conservation Element, Objective 4, pp. 94.	Flood Mitigation
The County shall regulate development in areas designated as regulatory floodways in the 1989 FEMA Flood Insurance Study for Indian River County. Within designated regulatory floodways, all encroachment shall be prohibited, including: fill, new construction, substantial improvements, and other development within the adopted regulatory flood that would result in any increase in flood levels within the County during the occurrence of the base flood discharge.	Indian River County 2020 Comprehensive (Growth Management) Plan, Conservation Element, Policy 4.1, pp. 94.	Flood Mitigation
The County shall continue to regulate development within flood prone areas to minimize flood storage capacity reduction and to afford protection to life and property within floodplains.	Indian River County 2020 Comprehensive (Growth Management) Plan, Conservation Element, Policy 4.2, pp. 95.	Flood Mitigation
The County hereby adopts the following specific criteria pertaining to shoreline stabilization within the unincorporated portion of Indian River County and within the municipal limits of the City of Vero Beach: Only structures vulnerable to erosion from a 15 year or less storm event shall be permitted to construct rigid shoreline stabilization structures.	Indian River County 2020 Comprehensive (Growth Management) Plan, Conservation Element, Policy 10.5, pp. 104.	Erosion Mitigation

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
By 2000, to reduce improper management of hazardous and solid waste, the County will investigate illegal waste disposal practices, evaluate current enforcement policies, and revise County enforcement policies if deemed appropriate.	Indian River County 2020 Comprehensive (Growth Management) Plan, Conservation Element, Policy 11.3, pp. 104.	Hazardous Materials Disaster Mitigation
Existing known hazardous waste contaminated sites shall be monitored and remediated, when feasible.	Indian River County 2020 Comprehensive (Growth Management) Plan, Conservation Element, Policy 11.4, pp. 106.	Hazardous Materials Disaster Mitigation
Through 2004, there will be no expansion of infrastructure within the CHHA other than that which is deemed necessary to maintain existing levels-of-service.	Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Objective 5, pp. 96.	Erosion, Flood, and Hurricane Mitigation
The County shall not subsidize public facilities within the CHHA, other than those which are deemed necessary to maintain existing level-of-service standards, and those which are directly related to public access and/or resource management.	Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 5.2, pp. 96.	Erosion, Flood, and Hurricane Mitigation
Following a storm event, the Public Works Department shall assess all County facilities damaged from storm activity in the CHHA, and shall make recommendations to reduce future expenditures and potential damage risks. In addition, the Public Works Department shall conduct a cost/benefit analysis to evaluate the relocation of storm damaged infrastructure or infrastructure which is repeatedly threatened by potential storm damage.	Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 5.3, pp. 96.	Post-Disaster Redevelopment

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>The County shall maintain, at a minimum, a Federal Emergency Management Agency (FEMA) Community Rating System (CRS) classification of "6" by continuing to enforce LDR Chapter 930 - Stormwater Management and Flood Protection, and by evaluating structures for compliance with the FEMA's 50% Rule.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 5.4, pp. 96.</p>	<p>Flood Mitigation</p>
<p>Consistent with Chapter 252, F.S., by 1998, the County will conduct a survey of existing schools, municipally-owned, and County-owned buildings to identify those building that are approximately designed and located to serve as hurricane evacuation shelters. Once this survey is completed, the County will solicit State funding from the Florida Division of Emergency Management to decrease the deficit of "safe" shelter capacity by retrofitting existing primary shelter facilities.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 6.2, pp. 97.</p>	<p>Hurricane Mitigation</p>
<p>By August 1999, The utilities department and public works department shall assist the Department of Emergency Services in assessing the vulnerability of public infrastructure within the CHHA. The Community Development Department shall assist the Department of Emergency Services in assessing the vulnerability of private residences and businesses within the CHHA, and by ensuring that all new developments incorporate hazard mitigation techniques, such as dedicating emergency accesses, as required by the Department of Emergency Services.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 6.3, pp. 97.</p>	<p>Hurricane, Flood, and Technological Disaster Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>Indian River County shall continue to coordinate with the Treasure Coast Regional Planning Council (TCRPC), Brevard County and St. Lucie County concerning evacuation routes and populations involved to assess the impact of regional growth on local evacuation times.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 6.4, pp. 97.</p>	<p>Hurricane Mitigation</p>
<p>By August 1999, the County shall adopt a Local Mitigation Strategy that meets the requirements of Chapter 163, F.S. and DCA Rule 9J-5, as an annex to the Indian River County Comprehensive Growth Management Plan (CEMP) and address post-natural disaster mitigation and economic recovery.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Objective 7, pp. 97.</p>	<p>Post-Disaster Redevelopment; Natural and Technological Disaster Mitigation</p>
<p>The County, in cooperation with the incorporated municipalities of Indian River County, will develop a County-wide Local Mitigation Strategy (LMS), and will amend the comprehensive plan to include the appropriate mitigation initiatives identified in the LMS, such as policies, programs, and projects to reduce potential damage from natural disasters.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 7.2, pp. 98.</p>	<p>Natural and Technological Disaster Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>By June 1, 1998, the County shall appoint a Local Mitigation Strategy Working Group to develop a Local Mitigation for Indian River County. This working group will be comprised of representatives from public agencies, non-profit relief organizations and private enterprises including, but not limited to: Municipal and County public works officials; Municipal and County building officials; Utilities officials (including Florida Power & Light); Law Enforcement officials; Property Appraisers; County Health officials; Emergency Services personnel; Local Red Cross staff; Insurance agency representatives; and Local contractors.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 7.3, pp. 98.</p>	<p>Natural and Technological Disaster Mitigation</p>
<p>The Local Mitigation Strategy Working Group will be charged with making recommendations for short-term directives and long-term strategies that will be initiated by the County contingent upon the occurrence of a natural disaster. Short-term recovery issues to be evaluated by the Local Mitigation Strategy Working Group include, but are not limited to, the following: establishing a uniform list of mitigation goals and objectives to address hazard mitigation; providing for coordination between the County and the five municipalities; identifying sources and disbursement of State and federal recovery funds; establishing criteria for emergency reconstruction permits; establishing licensing criteria for building inspectors and contractors; enacting a temporary moratorium for re-zonings; issuing temporary use permits; and providing temporary housing.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 7.4, pp. 98.</p>	<p>Natural and Technological Disaster Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>Long-term redevelopment and mitigation strategies to be evaluated by the working group shall include, but are not limited to: performing a benefit-cost analysis to identify beneficial hazard mitigation techniques; developing incentives and criteria for economic recovery; adopting more stringent building codes; pre-identifying potential post-disaster mitigation projects; and, relocating of infrastructure.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 7.4, pp. 99.</p>	<p>Natural and Technological Disaster Mitigation</p>
<p>Consistent with National Flood Insurance Program (NFIP) requirements, any structure predating 1989 FEMA Flood Insurance Rate Maps (FIRMs) and located within a flood hazard area that sustains "substantial damage" due to a natural disaster (i.e., repair costs that exceed 50% more of the building's value) shall be required to be elevated a minimum of six (6) inches above the base flood elevation (BFE), as depicted on current FIRMs.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 7.6, pp. 99.</p>	<p>Flood Mitigation</p>
<p>Consistent with NFIP requirements, any proposed "substantial improvement" (i.e., additions, renovations, or modifications that exceed 50% or more of the building's value) to a pre-FIRM structure located within a flood hazard area shall be required to be elevated a minimum of six (6) inches above the BFE, as depicted on current FIRMs. The list contained in Annex IV of the CEMP will be used to determine the total value of "substantial improvement."</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 7.7, pp. 99.</p>	<p>Flood Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>The County shall continue to regulate development and manage natural resources within the Coastal Zone by: Continuing to enforce LDR Chapter 932 - Coastal Management, and LDR Chapter 402 - Coastal Construction Code; Preserving flood storage capacity in the 100 year floodplain, in accordance with the policies listed under Objective 5 of the Stormwater Management Sub-Element; Maintaining or reducing land use density allowances in the CHHA in accordance with the policies under Objective 17 of the Future Land Use Element and Objective 11 of this element.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 7.8, pp. 99.</p>	<p>Erosion, Flood, and Hurricane Mitigation</p>
<p>Through 2020, the level of service (LOS) for traffic circulation, recreational facilities, stormwater management, and potable water and sewer service in the coastal zone of Indian River County will be consistent with the LOS standards set forth in the concurrency section of the Capital Improvements Element.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Objective 10, pp. 102.</p>	<p>Flood Mitigation</p>
<p>By 2003, the County shall decommission all remaining wastewater treatment package plants in the Hurricane Vulnerability Zone.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 10.1, pp. 102.</p>	<p>Erosion, Flood, and Hurricane Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
<p>The County shall identify and assess all infrastructure located within the CHHA to determine its vulnerability. This vulnerability assessment will be based on data from FIRMs. The Arbiter of Storms (TAOS) computer model, and the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) map. Any decision to abandon or relocate infrastructure outside the CHHA following a natural disaster will be based on a benefit-cost analysis of vulnerable infrastructure. This benefit-cost analysis will be included in the Local Mitigation Strategy, once completed.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 10.2, pp. 102.</p>	<p>Erosion, Flood, and Hurricane Mitigation</p>
<p>The County shall not allow new underground storage tanks or septic facilities to be located oceanward of the County's Dune Stabilization Setback Line (DSSL).</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 10.5, pp. 102.</p>	<p>Erosion, Flood, and Hurricane Mitigation</p>
<p>Through 2020, there will be no increase in the density of land use within the CHHA.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Objective 11, pp. 102.</p>	<p>Erosion, Flood, and Hurricane Mitigation</p>
<p>Lands acquired by the County under its Environmental Lands Program shall include property located within the Hurricane Vulnerability Zone (HVZ). This land shall be used for either natural resource conservation, passive recreation or both.</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 11.1, pp. 103.</p>	<p>Erosion, Flood, and Hurricane Mitigation</p>
<p>Within the CHHA, the County will not make infrastructure improvements to accommodate development more intense than allowed by the</p>	<p>Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal</p>	<p>Erosion, Flood, and Hurricane Mitigation</p>

Table A.1. (Continued).

Policy/Objective/Project	Source	Notes
comprehensive plan.	Management Element, Policy 11.2, pp. 103.	
The County shall utilize all applicable State and Federal regulations, and the appropriate objectives and policies of the Indian River County Comprehensive Growth Management Plan, to limit public and private development in the CHHA.	Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 11.3, pp. 103.	Erosion, Flood, and Hurricane Mitigation
The County shall utilize all applicable State and Federal regulations, and the appropriate objectives and policies of the Indian River County Comprehensive Growth Management Plan, to limit public and private development in the CHHA.	Indian River County 2020 Comprehensive (Growth Management) Plan, Coastal Management Element, Policy 11.3, pp. 103.	Erosion, Flood, and Hurricane Mitigation

- BFE = base flood elevation.
- CEMP = Comprehensive Emergency Management Plan.
- CHHA = Coastal High Hazard Area.
- CIP = Capital Improvement Plan.
- CRS = Community Rating System.
- DHRS = Department of Health and Rehabilitative Services.
- DSSL = Dune Stabilization Setback Line.
- FDEP = Florida Department of Environmental Protection.
- FEMA = Federal Emergency Management Agency.
- FIRM = Flood Insurance Rate Map.
- FPLOS = Flood Protection Level of Service
- HRS = Health and Rehabilitative Services.
- HVZ = Hurricane Vulnerability Zone.
- LDR = Land Development Regulation.
- LMS = Local Mitigation Strategy.
- LOS = level of service.
- NFIP = National Flood Insurance Program.
- SJRWMD = St. Johns River Water Management District.
- SLOSH = Sea, Lake, and Overland Surges from Hurricanes.
- TAOS = The Arbiter of Storms.
- TCRPC = Treasure Coast Regional Planning Council.

Table A.2. Existing plans, reports, or studies.

Organization	Title	Date	Issue Addressed
Sheriff's Office	Emergency Response Team Plan	October 2001	Event Response
Sheriff's Office	Crisis Situations	October 2001	Terrorism, Civil Disturbance
Sheriff's Office	Bomb Threat/Bomb Disposal	November 2001	Terrorism
Sheriff's Office	VIP Protection/Special Events	November 2001	Terrorism
Sheriff's Office	Disaster Plan	October 2001	All-Hazards
Sheriff's Office	Disaster Recall Plan	October 2001	All-Hazards
Sheriff's Office	Severe Weather Plan	October 2001	Flood, Hurricane, Severe Thunderstorm, Lightning, Extreme Temperatures, Tornado
Sheriff's Office	Aircraft Accident Plan	October 2001	Transportation System Accident
Sheriff's Office	Civil Disturbance Response Plan	October 2001	Civil Disturbance
Sheriff's Office	Intercommunications for Mutual Aid Plan	May 1999	All-Hazards
Sheriff's Office	Incident Command System Plan	2003	All-Hazards
Community Development	East Indian River County Stormwater Management Plan	December 2002	Flood
Community Development	Indian River County Wildfire Mitigation Plan	June 2001	Wildfire
Community Development	Indian River County Comprehensive Emergency Management Plan	2002	All-Hazards
Community Development	Sebastian Area-wide Florida Scrub Jay Habitat Conservation Plan	March 2000	Wildfire
Indian River County Public Works	East Indian River County Stormwater Management Plan	December 2002	Flooding, Erosion, Water Quality

Table A.3. Existing programs or activities.

Organization	Title	Date	Hazard Addressed
American Red Cross	Masters of Disaster	Ongoing	All-Hazard
American Red Cross	Facing Fear	Ongoing	Terrorism
American Red Cross	Community Disaster Education	Ongoing	All-Hazard
American Red Cross	Disaster Resistant Neighborhoods	Ongoing	Hurricane, All-Hazard
American Red Cross	Disaster Drills	Ongoing	Hurricane, Radiological Accident
American Red Cross	Shelter Evaluation	Ongoing	Hurricane
American Red Cross	Volunteer Training	Ongoing	All-Hazard
American Red Cross	Cardiopulmonary resuscitation & First Aid Training	Ongoing	All-Hazard
American Red Cross	Business Disaster Planning Training	Ongoing	All-Hazard
American Red Cross	Hurricane Preparedness and Mitigation Fliers	Ongoing	Hurricane
Community Development	Abandoned artesian well plugging program	Ongoing	Flood, Wellfield Protection
Community Development	Environmental Lands Program	Ongoing	Flood
Community Development	National Flood Insurance Program Community Rating System	Ongoing	Flood
Community Development	Maintenance of drainage canals and ditches	Ongoing	Flood
Community Development	Annual letter to flood insurance providers	Yearly	Flood
Community Development	BellSouth Yellow Pages – Phone Book Hurricane Preparedness/Flood Protection Information Pages	Ongoing	Flood, Hurricane
Community Development	Beach renourishment	Began 2003	Flood, Erosion
IRC Public Works	Stormwater Awareness Brochures	November 2003	Flood, Water Quality
IRC Public Works	NPDES Stormwater Phase II Permit	June 2003	Erosion, Water Quality

Table A.3. (Continued).

Organization	Title	Date	Hazard Addressed
IRC Public Works	East Gifford Stormwater Improvement Project	January 2004	Flooding, Water Quality
IRC Public Works	East Gifford Middle School Science Department Adopt-A-Pond	December 2003	Flooding
IRC Public Works	Main Relief Canal Pollution Control Structure – Preliminary Engineering	January 2004	Floating Debris, Water Quality
IRC Public Works	South Relief Canal Pollution Control Structure – Preliminary Engineering	January 2004	Floating Debris, Water Quality
IRC Public Works	Egret Marsh Regional Stormwater Park – Preliminary Engineering Report	January 2004	Water Quality
IRC Public Works	East Roseland Stormwater Improvement Project	Ongoing	Flooding, Water Quality
St. Johns River Water Management District	Sebastian Stormwater Park	Completed	Flooding
St. Johns River Water Management District	Sebastian River Water Control District Radial Gate Replacement	Pending	Flooding
St. Johns River Water Management District	Fellsmere Water Management Area – increased stormwater storage	Expected completion February 2015	Flooding
St. Johns River Water Management District	Banjo Groves Restoration	Completed	Flooding
St. Johns River Water Management District	Kenansville Lake Drainage Improvements	Completed	Flooding

IRC = Indian River County.

NPDES = National Pollutant Discharge Elimination System.

Table A.4. Disaster event damage descriptions.

Event	Date	Organization	Damage Description
Hurricane Floyd	September 1999	American Red Cross	Opened 7 shelters, Provided 2,000 meals
Hurricane Irene	October 1999	IRC Emergency Management	Substantial beach erosion
Tornado	June 2001	IRC Emergency Management	An F1 tornado caused minor damage in the western part of Sebastian and moved southeast along a 2 mile path through town.
Flood	June 2002	IRC Emergency Management	Flooding from heavy rains rendered some roads impassable and flooded two homes in the Fellsmere area.
Flood	August 2002	IRC Emergency Management	Heavy rain measuring about 5 inches in a few hours flooded streets and 3 homes in Vero Beach.
Tornado	December 2002	American Red Cross	Sheltered 38 families, Provided services to 3 families
Hurricane Frances	September 4, 2004	IRC Emergency Management	Cat 2 hurricane causing severe erosion, storm surge of 8 feet around Vero Beach and severe inland flooding.
Hurricane Jeanne	September 25, 2004	IRC Emergency Management	Cat 3 hurricane where 8300 residences were damaged or destroyed and over 41,000 residences were damaged. Total wind damage for the county was over \$2 billion.
Tropical Storm Wilma	October 2005	IRC Emergency Management	Produced widespread minor wind damage with trees and power lines down and damage to roofs and out buildings. As much as 6 inches of rain fell on the county.
Tropical Storm Ernesto	August 2006	IRC Emergency Management	A hurricane warning was issued for Indian River County but the highest recorded winds were 31 mph. There were no official reports of damage or injury.
Erosion	Ongoing	Indian River County Public Works	Degradation of national estuary

APPENDIX B
MITIGATION OPTIONS

Table B.1. Potential hazard mitigation measures.

Potential mitigation initiatives are presented by hazard type. Specific references are given by number for each mitigation initiative listed. **Table B.2** presents an annotated bibliography of data sources for all mitigation initiatives in the previous sections. This bibliography identifies, describes, and where possible, cross references data sources with funding sources for the proposed mitigation measures.

Natural Hazards

Hurricane.

- Encourage neighborhood preservation/revitalization for flood and wind damage retrofitting (50)
- Provide information to contractors and homeowners on the risks of building in hazard-prone areas (50)
- Develop a list of techniques for homeowner self-inspection and implementation of mitigation activities (50)
- Implement dune restoration programs (50)
- Acquire shorefront land for open space (50)
- Develop a beach management plan (30)
- Assess the need for beach nourishment projects (30)
- Develop maintenance program to clear debris from bridges (30)
- Develop a drainage system management and maintenance program (30)
- Develop a floodplain management plan (30)
- Construct shelters in mobile home parks (30)
- Require that new development be oriented to convey wind and water (30)
- Identify vulnerable properties for relocation programs (30)
- Encourage the construction of safe rooms in new construction (30)
- Require tie-downs for propane tanks and mobile homes (30)
- Install resilient street signs for navigation (30)
- Develop a comprehensive sheltering system with funding provided for the acquisition and construction of shelters (50)
- Identify “refuges of last resort” for those unable to reach shelters (50)
- Implement a Tree Hazard Management Program to encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets (2)
- Encourage building inspection by a hazard mitigation professional (2,15)
- Practice a tree trimming maintenance program (50)
- Re-landscape with native species (50)
- Distribute hurricane preparedness information including pet sheltering plans (9)
- Encourage the purchase of flood insurance (9)
- Enforce building codes (29)
- Award insurance premium credits (29)
- Retrofit:
 - Wet floodproofing (allowing water to enter uninhabited areas of the house) (35)
 - Dry floodproofing (sealing the structure to prevent floodwaters from entering) (35)
 - Install backflow valves on sewer systems (50)
 - Venting on roofs (3)
 - Garage doors with stiffer horizontal members (3, 24)
 - Glider tracks and track supports should be strengthened (3, 24)
 - In-place shutters (3, 9, 15, 24)
 - Hurricane straps and hurricane clips (15)

Table B.1. (Continued).

<ul style="list-style-type: none"> - Reinforcement of concrete block wall; concrete tie-columns at all corners (3) - Bracing with struts or pilaster columns in walls perpendicular to freestanding walls (3) - Elevation of structures by piers, posts, and columns, and pilings (3) - Adequate connection or anchoring of each element to the adjacent element (3) - Add shutters for glazed openings (3, 24) - Renail sheathing (3) - Create a secondary water barrier (35) - Provide support for sliding glass doors and double doors opening to the outside (3, 24) - Improve anchorage of windows to openings (3) - Add ridge ventilators to reduce uplift of wood sheathing (3) - Strengthen garage doors and particularly double-wide garage doors (3, 24) - Anchor adjacent structures, including privacy fences, pool enclosures, and patio roofs (3) - Improve connections of porch roofs and overhangs (3) - Reinforce entry doors (3, 34) • Modify building codes: <ul style="list-style-type: none"> - Hip roofs instead of gable (3, 24, 34) - Metal panels that simulate tile instead of tile roofs (3) - Consistent mortar pad placement (3) - Full 10-inch mason's trowel of mortar on tile roofs (3) - 4 to 6 inch nail spacing on sheathing panel (3, 34) - Venting on roofs (3, 34) - Garage doors with stiffer horizontal members (3, 34) - Multiple panel sliding glass doors and windows should be avoided (3) - Individual panel width should be no more than 3 feet (3) - Total window and door openings should be no more than 31% of a wall's total area (3) - Shatter-resistant transparent material (3, 34) - Improved adherence to adequate attachment procedures (3) - Hurricane straps and hurricane clips (3, 34) - Reinforcement of concrete block walls; concrete tie-columns at all corners (3) - Bracing with struts or pilaster columns in walls perpendicular to freestanding walls (3) - Walls sufficiently anchored in the foundation or story below (3) - Adequate connection or anchoring of each element to the adjacent element (3) - Require hurricane shelters on multi-unit housing (50) - Construction products examined by independent laboratories under the guidance of the county compliance office (34) - Contractors must install high-quality shutters or strong "impact" glass, like that found in car windshields in each new single family home (34) <p><i>Flood.</i></p> <ul style="list-style-type: none"> • Acquire floodprone homes (30) • Maintenance program to clear debris from bridges (30) • Develop a floodplain management plan (30) • Encourage the use of roadside grassy swales (30)

Table B.1. (Continued).

<ul style="list-style-type: none"> • Limit impervious surfaces by encouraging the use of porous pavement (30) • Require new development to be oriented to convey floodwaters (30) • Include retention ponds in new developments (30) • Require setback from waterways for new construction or major renovation (30) • Require tie-downs for propane tanks and mobile homes (30) • Encourage neighborhood preservation/revitalization for floodproofing techniques (50) • Elevate structures above the 100-year flood level (35, 50) • Maintenance program to clear debris from stormwater drainage areas (50) • Provide information to contractors and homeowners on the risks of building in hazard-prone areas and mitigation (50) • Provide the public with Federal Emergency Management Agency (FEMA) floodplain maps (50) • Develop a list of techniques for homeowner self-inspection and implementation of mitigation activities (50) • Install backflow valves in sewer systems (50) • Incorporate a “hazard disclosure” requirement for deed transfers, leases, or other contracts for sale or exchange of property in flood hazard areas (50) • Improve storm drainage areas (50) • Develop sediment control to prevent clogged drainage systems such as street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground (1, 40, 45) • Investigate the use of flood prone areas as open space (29, 40, 42, 46, 47, 50) • Retrofit critical facilities (50) • Purchase flood insurance (7, 15) • Know evacuation routes (7) • After a flood, inspect foundations of buildings for cracks and other damage (7) • Make sure buildings are not in danger of collapsing after a flood (7) • Encourage building inspection by a hazard mitigation professional (2, 15) • Regulate development in the floodplain (40, 46) • Enforce building codes (29) • Insurance premium credits (29) • Retrofit: <ul style="list-style-type: none"> - Elevate the lowest floor above the 100-year flood level (35) - Wet floodproofing (allowing water to enter uninhabited areas of the structure) (35) - Dry floodproofing (sealing the structure to prevent flood waters from entering) (35) - Levees and floodwalls (constructing a barrier around the structure to keep out flood waters) (35) - Demolition (tearing down the structure and rebuilding with appropriate floodproof techniques or relocating the structure) (7) - Elevate the main breaker or fuse box (15) <p><i>Severe Thunderstorms and Lightning.</i></p> <ul style="list-style-type: none"> • Clear dead or rotting trees and branches (12) • Public information on when to turn off gas, electricity, and water; how to develop an emergency communication plan; and actions to take during a severe thunderstorm such as avoiding bathtubs, water faucets, and sinks (12) • Develop a stormwater drainage management and maintenance plan (31) • Construct shelters in mobile home parks (31)

Table B.1. (Continued).

<ul style="list-style-type: none">• Secure outdoor objects that could become projectiles (12)• Install lightning rods (12)• Encourage purchase of flood insurance (12) <p><i>Wildland Fire.</i></p> <ul style="list-style-type: none">• Acquire land susceptible to fire for conversion to open space (44, 48, 50)• BEHAVE (Fire Behavior Prediction and Fuel Modeling System) (32)• METAFIRE (National information system that transmits daily severity index values for every climate division in the country) (32)• Create fire breaks (30)• Conduct prescribed burns to limit fuel load (30)• Require larger sideyards to allow access to backyards (30)• Encourage landscaping with fire-resistant or slow burning vegetation (30)• Move shrubs and other landscaping away from the sides of the structure (16)• Clean brush and dead grass from the property (13, 16)• Public information on safe fire practices (build away from nearby trees or bushes, fire extinguisher availability) (13, 30)• Building code modification<ul style="list-style-type: none">- Fire-resistant materials when renovating, building, and retrofitting (13, 30)- Create a safety zone between the structure and combustible plants and vegetation (stone walls, swimming pools) (13)- Install power lines underground (13)- Install tile, fire-retardant shingles, asphalt, fiberglass, concrete tile, or metal on the roof (4, 13, 16)- Plant trees in clusters so that there are gaps in the tree branch canopies overhead (4)- Use alternatives to wood and other combustible materials such as brick, stone, or metal when building walls (4)- Adequate water supply (30)- Access for fire trucks (a turnaround) (30)• Prescribed burns (21, 22, 23, 43)• Keep trees trimmed so there is no contact with power lines or other wires (16)• Cut back tree limbs that overhang the structure (4)• Remove combustible debris from around the structure (4)• Adopt the wildland/urban interface building code (30)• Development of ongoing fire safety education programs (21)• Identification of businesses located within rural areas that contain flammable substances (21)• Enhancement of intergovernmental relationships and coordinated action (21)• Development of a local component of the Wildfire Response Plan (21)• Formation of volunteer rural fire protection districts (21)• Firesafe considerations for site improvement and building construction that may include, but may not be limited to, the following (21):<ul style="list-style-type: none">- Assure that all water mains within the development be of proper size, looped or griddled with no dead-end, or low flow areas- Avoid dead-ended cul-de-sacs- Assure hydrants at cul-de-sacs to be on a loop or griddled to eliminate loss of water flow due to high usage of the system during wildland fires
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Table B.1. (Continued).

- Design swimming pools so that fire trucks can reach them for pumping water on fires
- Develop written provisions that afford access to subdivision water systems for firefighting services
- Assure the provision of alternative access roads
- Identify and provide proper signage for access points where fire trucks can drive within 16 feet of creeks, rivers, lakes, or ponds to fill pumpers
- Provide underground wiring for electric power supply
- Assure a minimum 30-foot non-combustible areas around housing units
- Provide a firebreak around all structures and around subdivision
- Include firesafe construction performance standards such as the use of fire-resistant materials for roofs and building exteriors

Tornadoes.

- Telephone warning system (31)
- Community warning sirens (31)
- Construct shelters in mobile home parks (31)
- Require tie-downs for propane tanks and mobile homes (31)
- Install resilient street signs for navigation (31)
- National Oceanic and Atmospheric Administration (NOAA) weather radio tone alerts (31)
- Underground shelter actions to be taken during hurricanes and tornadoes need better distinction, especially among elderly residents (31)
- Retrofit structures to include reinforced “safe room” (14)
- Modify building codes:
 - Include an interior reinforced “safe room” in all new structures (14)
 - Shingles around the edges of the roof should be set into a special mastic (28)
 - Roof sheathing: the plywood or particle board should be nailed securely to the rafters; nails should be 6 inches on center at the edges, and 12 inches on center elsewhere (28)

Extreme Temperatures.

- Install window air conditioners snugly (6)
- Install temporary reflectors, such as aluminum foil covered cardboard to reflect any heat back outside (6)
- Consider keeping storm shutters up all year (6)
- Conserve electricity (6)
- Public information on heat-related disease prevention (drink plenty of water, avoid strenuous outdoor activities) (6)

Soil/Beach Erosion.

- Sand management (38)
- Relocation of threatened facilities (38)
- Threatened real estate may be set aside as open space (38)
- Vegetation replenishment program (36, 38)
- Develop a beach management plan (30)
- Require dune protection and shoreline setbacks for new construction and major renovations (30)

Table B.1. (Continued).

- Cooperative approach (vs. individual i.e., one property will have a seawall, another a groin, etc.) (37)

Agricultural Pest and Disease.

- Prompt removal of citrus trees infected by citrus canker (18)
- Prompt removal of tomato plants infected with tomato yellow leaf curl virus (19)
- Eliminate breeding spots of insects (33)
- Patch screens and other places where pests enter greenhouses (33)

Drought.

- Create cooperative Federal/non-Federal drought contingency plans for rapid implementation during water shortages (27)
- Develop an early warning system (27)
- Evaluate the current use of ground water (27, 46)
- Establish new data collection networks (27)
- Study public willingness to pay more for more reliable water supplies (27)
- Study effectiveness of conservation measures (27, 46)
- Monitor vulnerable public water supplies (27)
- Pass legislation to protect and manage ground water (27)
- Provide funds for water recycling projects (27)
- Organize drought information meetings for the public and media (27)
- Implement water conservation awareness programs (27)
- Assist water agencies in developing contingency plans (27)
- Establish stronger economic incentives for private investment in water conservation (27)
- Implement water metering and leak detection programs (27)
- Adopt an emergency water allocation strategy to be implemented during severe drought (27)
- Evaluate worst-case drought scenarios for possible further actions (27)

Seismic Hazards.

- No mitigation activities have been listed as this is not a significant hazard to Martin County

Epidemic.

- Anthrax vaccine is available (17)
- Rodent control (25)
- Mosquito control (25)
- Regular maintenance of cooling and plumbing systems (25)
- Wellfield protection and water purification maintenance (25)
- Adequate sanitation control measures (25)
- Proper food processing (25)
- Regulate widespread use of antibiotics (25)

Table B.1. (Continued).

<p>Technological Hazards</p> <p><i>Nuclear Disaster.</i></p> <ul style="list-style-type: none">• Prepare a community accident response plan (10)• Install community sirens (10)• Install a telephone warning system (10)• Distribute tone alert radios (10)• Conduct public information meetings (10)• Disseminate emergency information throughout the community (in-place sheltering) (10) <p><i>Power Failure.</i></p> <ul style="list-style-type: none">• Voluntary conservation public information (bill inserts) (22)• Electrical Emergency Contingency Plan (22) <p><i>Hazardous Materials Accident.</i></p> <ul style="list-style-type: none">• Public information on detecting a spill/release (8)• Public information on response/evacuation plans (8)• Install a telephone warning system (8)• Install community sirens (8)• Retrofit seal gaps and air-conditioning systems (8) <p><i>Transportation System Accident.</i></p> <ul style="list-style-type: none">• Develop accident contingency plans (49)• Response training (49) <p><i>Wellfield Contamination.</i></p> <ul style="list-style-type: none">• Have water tested by EPA (26)• Maintain isolation distances from potential contamination sources (26)• Inventory potential sources of contamination (26)• Develop water supply contingency strategy (5)• Reward landowners who do not conduct activities that could contaminate the water supply by easing their taxes (5)• Investigate growth management programs to ensure that wellfield protection programs are in place before development occurs (5) <p><i>Communications Failure.</i></p> <ul style="list-style-type: none">• No mitigation activities have been listed as this is not a significant hazard to Martin County <p>Societal Hazards</p> <p><i>Terrorism and Sabotage.</i></p> <ul style="list-style-type: none">• Encourage public education programs on terrorism including information on potential targets, visible targets, etc. (11)• Drills for people who work in large buildings including knowing where fire exits are located, keeping fire extinguishers in working order, learning first aid (11)• Develop a bomb threat plan (11)

Table B.1. (Continued).

<ul style="list-style-type: none">• Develop an explosion plan for building (cover nose and mouth with a wet cloth, stay below smoke, exit building as quickly as possible, tap on a pipe if trapped so rescuers know where to look) (11) <p><i>Civil Disturbance.</i></p> <ul style="list-style-type: none">• No mitigation activities have been listed as this is not a significant hazard to Martin County <p><i>Immigration Crisis.</i></p> <ul style="list-style-type: none">• No mitigation activities have been listed as this is not a significant hazard to Martin County <p>All Hazards</p> <ul style="list-style-type: none">• Map vulnerable areas and distribute information about the hazard mitigation strategy and projects (50)• Provide information to contractors and homeowners on the risks of building in hazard-prone areas (50)• Develop a list of techniques for homeowner self-inspection and implementation of mitigation activities (50)• Organize and conduct professional training opportunities regarding natural hazards and hazard mitigation (50)• Distribute NOAA weather radios (school superintendents, etc.) (50)• Sound land use planning based on known hazards (50)• Enforcing effective building codes and local ordinances (30, 50)• Increasing public awareness of community hazards (50)• Provide sites that are as free as possible from risk to natural hazards for commercial and industrial activities (30, 50)• Consider conservation of open space by acquisition of repetitive loss structures (30, 50)• Ensure a balance among residential growth and conservation of environmental resources through a detailed analysis of the risks and vulnerability to natural hazards (30,50)• Joint planning and sharing of resources across regions, communities, and states (30, 50)• Establish a hazard mitigation council (50)• For future proposed development design guidelines, incorporate hazard mitigation provisions, including improved maps (30, 50)• Add a “safe room” requirement for all new buildings (15, 24)• Establish incentives to encourage business owners and homeowners to retrofit buildings with hazard-resistant features (29)• Teach disaster and hazard awareness in schools (29)

Table B.2. Annotated bibliography for mitigation measure data sources.

#	Reference	Description	Funding Source
1	St. Johns River Water Management District. "The Indian River Lagoon's problems are as common as dirt." Indian River Lagoon Update. Winter 1998.	Describes the detrimental effects that uncontrolled sediment can have on local waterways and drainage areas; also presents potential mitigation projects to control sediment.	
2	Alachua County Office of Emergency Management. "Hazard mitigation page." http://www.co.alachua.fl.us/~acem/mitigati.htm (26 Jun 1998)	Defines mitigation and provides examples of community-wide and individual mitigation practices.	Florida Department of Community Affairs, Florida Department of Environmental Protection, Florida Department of Health, Florida Department of Agriculture, Federal Emergency Management Agency (FEMA), U.S. Department of Energy, U.S. Department of Housing and Urban Development.
3	Ayscue, J. Natural Hazards Research Center. Hurricane damage to residential structures: risk and mitigation. (Nov 1996) http://www.colorado.edu/hazards/wp/wp94/wp94.html#intro	Describes potential hurricane hazards from wind and water; discusses building techniques that can mitigate hurricane damage.	
4	Boulder County. "Wildfire hazard identification and mitigation system for Boulder County, Colorado." http://www.boco.gov/gislu/whims.html (25 Jan 1999)	Contains a summary of the Wildfire Hazard Identification and Mitigation System project, detailed maps from the project, and mitigation suggestions to protect structures from wildfire.	Multiple local, State, and Federal government inter-agencies.
5	Browning, C. "Community wellhead protection programs." http://hermes.ecn.purdue.edu/water_quality/documents/oef-890.ok.ascii (13 Nov 1998)	Describes each element of a community wellfield protection program.	
6	Federal Emergency Management Agency. "Fact sheet: extreme heat." (15 Jan 1998) http://www.fema.gov/library/heatf.htm (2 Dec 1998)	Mitigation measures related to extreme heat; most are individual actions.	
7	Federal Emergency Management Agency. "Fact sheet: floods and flash floods." (13 Jan 1998) http://www.fema.gov/library/floodf.htm (2 Dec 1998)	Describes activities that may prevent a flood emergency, reduce the chance of a flood emergency happening, or lessen the effects of unavoidable emergencies. Activities are categorized as before, during, and after a flood event.	

Table B.1. (Continued).

#	Reference	Description	Funding Source
8	Federal Emergency Management Agency. "Fact sheet: hazardous materials accidents." (10 Jan 1998) http://www.fema.gov/library/hazmatf.htm (2 Dec 1998)	Contains information on preparing for and detecting a hazardous material accident.	
9	Federal Emergency Management Agency. "Fact sheet: hurricanes." (14 Jan 1998) http://www.fema.gov/library/hurricaf.htm (2 Dec 1998)	Describes measures to be taken before, during, and after a hurricane to prevent loss of life and property.	
10	Federal Emergency Management Agency. "Fact sheet: nuclear power plant emergency." (27 Feb 1997) http://www.fema.gov/library/radiolo.htm (2 Dec 1998)	Explains the nature of a nuclear disaster and describes related mitigation measures.	
11	Federal Emergency Management Agency. "Fact sheet: terrorism." (10 Jan 1998) http://www.fema.gov/library/terrorf.htm (2 Dec 1998)	Mitigation measures related to various terrorist attacks.	
12	Federal Emergency Management Agency. "Fact sheet: thunderstorms and lightning." (30 Jan 1998) http://www.fema.gov/library/thunderf.htm (2 Dec 1998)	Contains mitigation measures relating to thunderstorms and lightning.	
13	Federal Emergency Management Agency. "Fact sheet: wildland fires." (10 Jan 1998) http://www.fema.gov/library/wildlanf.htm (2 Dec 1998)	Mitigation practices for before, during, and after a wildland fire event.	
14	Federal Emergency Management Agency. "Taking shelter from the storm: building a safe room in your house." http://www.fema.gov/mit/tsfs01.htm (25 Nov 1998)	Contains two sections: one is a description of hazards that may threaten a structure, and the second is how to plan and construct a "safe room."	
15	Federal Emergency Management Agency. "What can homeowners do to reduce their risk from disasters?" (24 Aug 1996) http://www.fema.gov/mit/lowcost.htm	Low-cost mitigation measures related to floods, seismic events, wind events, and wildfire.	
16	Federal Emergency Management Agency. "Wildfire - wildland/urban interface." (17 Oct 1996) http://www.fema.gov/mit/wfmit.htm (30 Oct 1998)	Examples of how to create a "Safety Zone" around a home or business.	
17	Findlay, S. USA Today. "Clinton sees little anthrax threat to civilians." (17 Dec 1997) http://home.eznet.net/~kenberry/materials/usatodayarticle.htm (12 Aug 1998)	Article found on the internet states that an anthrax vaccine is available.	

Table B.1. (Continued).

#	Reference	Description	Funding Source
18	Florida Department of Agriculture and Consumer Services. "Citrus canker - the threat to Florida agriculture - Frequently Asked Questions." http://doacs.state.fl.us/canker/faqs.htm (4 Nov 1998)	Identifies citrus canker and the procedure to eradicate the disease.	
19	Florida Department of Agriculture and Consumer Services. "The latest on Tomato Yellow Leaf Curl Virus." (26 Aug 1997) http://www.ifas.ufl.edu/~entweb/updatetyl.htm (3 Nov 1998)	Describes symptoms of Tomato Yellow Leaf Curl Virus and methods of eradication.	
20	Florida Department of Emergency Management. "Review of efforts to optimize management and production of timber on State lands and review of the prescribed burning policy of the Division of Forestry." (Oct 1998) http://www.state.fl.us/comaff/DEM/gwfrmrc/gwrmrc.htm (21 Dec 1998)	Reviews the benefits and drawbacks of prescribed burning.	Federal Rural Community Fire Protection Program
21	Florida Department of Community Affairs, Bureau of Recovery and Mitigation. Wildfire Mitigation Suggestions. Retrieved 10 October 1998 from the World Wide Web: http://www.dca.state.fl.us/brm/	Wildfire Mitigation Suggestions (website no longer active).	
22	Florida Reliability Coordinating Council. "Generating Capacity Shortage Plan." http://www.frcc.com/capacityemergencyplan.htm#gca	Plan for when generating capacity is tight, also suggestions for voluntary conservation.	
23	Hickenlooper, B. "Fire damaged lands begin to heal." Stream Lines. Winter 1998, p.4	Prescribed burning is used to control wildfire outbreaks on St. Johns River Water Management District land, and this article describes its many benefits.	
24	Manatee County Emergency Management. "Hazard mitigation." http://www.co.manatee.fl.us/em_html/haz_mit.htm (20 Nov 1998)	Hurricane mitigation suggestions.	
25	McNeill, W. "Emerging infectious diseases plan." (1976) http://www.cdc.gov/ncidod/publications/eid_plan/summary.htm (11 Nov 1998)	Centers for Disease Control and Prevention Strategic Plan emphasizing surveillance, applied research, and prevention activities to maintain a strong defense against infectious diseases.	

Table B.1. (Continued).

#	Reference	Description	Funding Source
26	Minnesota Dept. of Health. "Wellhead protection for Minnesota." (23 Sep 1998) http://www.health.state.mn.us/divs/eh/whp_mn2.html (13 Nov 1998)	Wellfield protection plans.	
27	National Drought Mitigation Center. "Drought mitigation tools for states." (15 Nov 1995) http://enso.unl.edu/ndmc/mitigate/policy/tools.htm	Drought mitigation tools for governments based on two surveys of states.	
28	National Science Foundation. "Tornadoes - protecting your home from the mighty twister." http://whyfiles.news.wisc.edu/013tornado/strong_house.html (4 Feb 1999)	Suggestions for protecting your home against a tornado.	
29	Nelson. L. 1997. Emergency management - a legislator's guide. National Conference of State Legislatures, Denver, CO. 47 pp.	Explains how Illinois, Missouri, and Iowa purchased lands from homeowners whose homes were repetitive damage structures; describes how building code enforcement prevented damage from wildfires, floods, and earthquakes; explains how insurance premium credits work; mentions the development of a wildland/urban interface building code, etc.	FEMA, Community Development Block Grant, State government, State government competitive grant money from the Emergency Management and Assistance Trust Fund.
30	North Carolina Division of Emergency Management. "Tools and Techniques: An Encyclopedia of Strategies to Mitigate the Impacts of Natural Hazards." (23 Dec. 2003) http://www.ncem.org/mitigation/Library/Encyclopedia2.pdf	Comprehensive source of mitigation actions for all hazards.	
31	Schmidlin, T., et al. Natural Hazards Research Center. "Risk factors for death in the 22-23 February 1998 Florida tornadoes." (1998) http://www.colorado.edu/hazards/qr/qr106/qr106.html (7 Aug 1998)	Draws conclusions toward tornado mitigation from surveys, interviews, and damage reports from the 22-23 February 1998 Florida tornadoes.	
32	Subcommittee on Natural Disaster Reduction. "Agency success stories in natural disaster reduction." (18 Oct 1995) http://www.usgs.gov/sndr/success.html (30 Dec 1998)	Briefly describes the BEHAVE and METAFIRE prediction/modeling systems.	
33	The National Food Safety Database. "Controlling insects." (June 1993) http://www.foodsafety.org/dh/dho45.htm (14 Dec 1998)	Suggestions for insect control, and insect control after a natural disaster.	

Table B.1. (Continued).

#	Reference	Description	Funding Source
34	Tibbetts, J. Sea Grant Haznet. "Racing to catch up: south Florida's hurricane threat and building codes." (6 Aug 1998) http://www.haznet.org/text/sflhurricane.html (9 Nov 1998)	Reveals the changes made in south Florida's building codes since Hurricane Andrew.	
35	United States Army Corps of Engineers. "Local floodproofing programs." June 1994, 28 pp.	Provides examples and photographs of projects financed by local governments and also identifies lessons learned that can help communities interested in financing floodproofing projects.	
36	United States Army Corps of Engineers. "New planting." http://superior.lre.usace.army.mil/shore.protection/nwplntng.html (4 Nov 1998)	Explains how vegetation can be used as an erosion control device.	
37	United States Army Corps of Engineers. "Planning considerations." http://superior.lre.usace.army.mil/shore.protection/plncns.html (4 Nov 1998)	Cooperative measures against beach erosion are detailed.	
38	United States Army Corps of Engineers. "Solutions to coastal erosion." http://www.rain.org/~pjenkin/point/growing/solution.html (4 Nov 1998)	Examples of general solutions, hard solutions, soft solutions, and retreat as coastal erosion mitigation.	
39	United States Department of Agriculture. "USDA conservation programs - conservation plant material." http://www.nrcs.usda.gov/NRCSProg.html (2 Feb 1999)	Explains the Conservation Plant Material Center Program's purpose as providing native plants that can help solve natural resource problems such as erosion.	Conservation Plant Materials Center Program
40	United States Department of Agriculture. "USDA conservation programs - resource conservation and development program (RC&D)." http://www.nrcs.usda.gov/NRCSProg.html (2 Feb 1999)	Describes the RC&D Program.	Resource Conservation and Development Program
41	United States Department of Agriculture. "USDA conservation programs - conservation reserve program." http://www.nrcs.usda.gov/NRCSProg.html (2 Feb 1999)	The Conservation Reserve Program encourages farmers to convert highly erodible land to vegetative cover.	Conservation Reserve Program
42	United States Department of Agriculture. "USDA conservation programs - flood risk reduction program." http://www.nrcs.usda.gov/NRCSProg.html (2 Feb 1999)	Describes the Flood Risk Reduction program, who is eligible, and what the requirements of the program are.	Flood Risk Reduction Program

Table B.1. (Continued).

#	Reference	Description	Funding Source
43	United States Department of Agriculture. "USDA conservation programs - forestry incentives program." http://www.nrcs.usda.gov/NRCSProg.html (2 Feb 1999)	Explains the Forestry Incentives Program. It supports good forest management practices on privately owned non-industrial forest lands nationwide.	Forestry Incentives Program
44	United States Department of Agriculture. "USDA conservation programs - stewardship incentives program." http://www.nrcs.usda.gov/NRCSProg.html (2 Feb 1999)	Qualifications to participate in the program and benefits provided.	Stewardship Incentives Program
45	United States Department of Agriculture. "USDA conservation programs - watershed and river basin planning and installation Public Law 83-566 (PL566)." (26 Oct 1998) http://www.ftw.nrcs.usda.gov/pl566/WHIP.html (2 Feb 1999)	Lists the purposes of watershed projects and describes the program.	Watershed and River Basin Planning and Installation Public Law 83-566.
46	United States Department of Agriculture. "USDA conservation programs - watershed surveys and planning." http://www.nrcs.usda.gov/NRCSProg.html (2 Feb 1999)	Overview of the Watershed Surveys and Planning Program.	Watershed Surveys and Planning Program.
47	United States Department of Agriculture. "USDA conservation programs - wetlands reserve program." http://www.nrcs.usda.gov/NRCSProg.html (2 Feb 1999)	Overview of this voluntary program to restore wetlands.	Wetlands Reserve Program
48	United States Department of Agriculture. "USDA conservation programs - wildlife habitat incentives program (WHIP)." (8 Oct 1997) http://www.ftw.nrcs.usda.gov/pl566/WHIP.html (2 Feb 1999)	Description of the WHIP program, benefits, and requirements.	Wildlife Habitat Incentives Program
49	United States Environmental Protection Agency. "Preparing for spills." (7 Oct 1998) http://www.epa.gov/oilspill/prepare.htm (3 Nov 1998)	U.S. Environmental Protection Agency oil spill preparedness program highlights.	
50	Watson, L. et al. 1998. Strategy for reducing risks from natural hazards in Pawtucket, Rhode Island: A multi-hazard mitigation strategy. Rhode Island Sea Grant. Narragansett, RI. 44 pp.	Section 1 explains why communities are writing hazard mitigation strategies and describes the hazard assessment that was completed by city officials. Section 2 uses the risk assessment from Section 1 to determine potential mitigation actions for high risk areas.	

**APPENDIX C
FUNDING SOURCE**

Primary Mitigation Funds (All Hazards)

Pre Disaster Mitigation (PDM) Fund
Hazard Mitigation Grant Program (HMGP) Funds
Flood Mitigation Assistance (FMA) Program Funds

Emergency Preparedness & Assistance Funds (EMPA)

EMPA Competitive Grant Program
EMPA Base Grant Program

Hurricane Mitigation Funding Sources

Anheuser-Busch Companies, Inc.
Bank Enterprise Award Program
Beach Erosion Control Projects
Business and Industry Loans
Challenge 21, Floodplain
Coastal Services Center
Coastal Zone Management Administration Awards
Coastal Wetlands Planning, Protection, and Restoration Act
Coastal Construction Building Zone Program
Community Development Block Grant
Community Facilities Loans and Grants
Community Development Block Grants/Economic Development Initiative
Community Development Block Grants/Entitlement Grants
Community Development Block Grants/State=s Program
Community Development Block Grants/Small Cities Program
Community Development Block Grants/Special Purpose Grants/Technical Assistance Program
Conservation Plant Material Centers
Conservation Reserve Program
Cooperative Extension Service
Cora Brown Fund
Crop Insurance
Direct Housing: Natural Disaster
Disaster Housing Program
Disaster Reserve Assistance
Disaster Recovery Initiative Grants
Economic Development - Public Works Impact Program
Economic Injury Disaster Loans
Emergency Loan Assistance
Emergency Rehabilitation of Flood Control Works or Federally Authorized Coastal Protection Works
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Relief Program
Emergency Management: State and Local Assistance
Emergency Advance Measures for Flood Prevention
Emergency Management Training Institute: Training Assistance
Emergency Operations Flood Response and Post Flood Response
Emergency Loans
Emergency Shelter Grants Program
Financial Assistance for Ocean Resources Conservation and Assessment Program
Flood Control Projects
Flood Insurance

Flood Plain Management Services
Habitat Conservation
Hazard Mitigation Grant Program
Highway Planning and Construction
Historic Preservation Fund Grants-in-Aid
Hurricane Program
Impact Aid: Facilities Maintenance
Individual and Family Grants
John D. and Catherine T. MacArthur Foundation
Learn and Serve America Program
Local Initiatives Support Corporation
Mitigation Assistance
National Weather Service
North American Wetlands Conservation Act Grant Program
Outdoor Recreation: Acquisition, Development and Planning
Physical Disaster Loans
Planning and Program Development Grants
Planning Assistance to States
Project Impact: Building Disaster Resistant Communities
Property Improvement Loan Insurance for Improving All Existing Structures and Building
of New Nonresidential Structures
Public Assistance
Rehabilitation Mortgage Insurance
Resource Conservation and Development
Rural Economic Development Loans and Grants
Snagging and Clearing for Flood Control
Soil and Water Conservation
Special Economic Development and Adjustment Assistance Program: Sudden and
Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
STP
Sustainable Agriculture Research and Education
Sustainable Development Challenge Grants
The Community Foundation for Palm Beach and Martin Counties
U.S. Army Corps of Engineers
U.S. Geological Survey
Urban Park and Recreation Recovery Program
Wallace Global Fund
Water Bank Program
Watershed Surveys and Planning
Watershed Protection and Flood Prevention Loans
Wetlands Protection Grants
Wetlands Program
Wetlands Reserve Program
Wetlands Protection: Development Grants
Wildlife Restoration
Wildlife Habitat Incentives Program

Flood Mitigation Funding Sources

Anheuser-Busch Companies, Inc.
Bank Enterprise Award Program
Beach Erosion Control Projects
Business and Industry Loans
Challenge 21, Floodplain
Coastal Services Center
Coastal Zone Management Administration Awards

Coastal Wetlands Planning, Protection, and Restoration Act
Community Rating System
Community Development Block Grant
Community Facilities Loans and Grants
Community Development Block Grants/Entitlement Grants
Community Development Block Grants/State=s Program
Community Assistance Program: State Support Services Element
Community Development Block Grants/Small Cities Program
Community Development Block Grants/Special Purpose Grants/Technical Assistance
Program
Conservation Technical Assistance
Conservation Plant Material Centers
Conservation Reserve Program
Cooperative Extension Service
Cora Brown Fund
Crop Insurance
Direct Housing: Natural Disaster
Disaster Housing Program
Disaster Reserve Assistance
Disaster Recovery Initiative Grants
Disposal of Federal Surplus Real Property for Parks, Recreation, and Historic
Monuments
Economic Development - Public Works Impact Program
Economic Injury Disaster Loans
Emergency Loan Assistance
Emergency Rehabilitation of Flood Control Works or Federally Authorized Coastal
Protection Works
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Relief Program
Emergency Management: State and Local Assistance
Emergency Advance Measures for Flood Prevention
Emergency Management Training Institute: Training Assistance
Emergency Operations Flood Response and Post Flood Response
Emergency Loans
Environmental Quality Incentives Program
Farmland Protection Program
Financial Assistance for Ocean Resources Conservation and Assessment Program
Flood Control Projects
Flood Insurance
Flood Risk Reduction Program
Flood Mitigation Assistance Program
Flood Plain Management Services
Habitat Conservation
Hazard Mitigation Grant Program
Highway Planning and Construction
Historic Preservation Fund Grants-in-Aid
Individual and Family Grants
John D. and Catherine T. MacArthur Foundation
Land Protection, Natural Resources Conservation Service
Learn and Serve America Program
Local Initiatives Support Corporation
Mitigation Assistance
National Flood Mitigation Fund
National Flood Insurance Program

National Weather Service
North American Wetlands Conservation Act Grant Program
Outdoor Recreation: Acquisition, Development and Planning
Physical Disaster Loans
Planning Assistance to States
Project Impact: Building Disaster Resistant Communities
Property Improvement Loan Insurance for Improving All Existing Structures and Building
of New Nonresidential Structures
Protection of Essential Highways, Highway Bridge Approaches, and Public Works
Public Assistance
Rehabilitation Mortgage Insurance
Resource Conservation and Development
Rural Economic Development Loans and Grants
Snagging and Clearing for Flood Control
Soil and Water Conservation
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
STP
Sustainable Agriculture Research and Education
Sustainable Development Challenge Grants
The Community Foundation for Palm Beach and Martin Counties
Transportation Enhancements Program
U.S. Army Corps of Engineers
U.S. Geological Survey
Urban Park and Recreation Recovery Program
Wallace Global Fund
Water Bank Program
Watershed Surveys and Planning
Watershed Protection and Flood Prevention Loans
Wetlands Protection Grants
Wetlands Program
Wetlands Reserve Program
Wetlands Protection: Development Grants
Wildlife Restoration
Wildlife Habitat Incentives Program

Severe Thunderstorm and Lightning Funding Sources

Community Facilities Loans and Grants
Cooperative Extension Service
Direct Housing: Natural Disaster
Disaster Housing Program
Disaster Recovery Initiative Grants
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Emergency Shelter Grants Program
Hazard Mitigation Grant Program
Individual and Family Grants
John D. and Catherine T. MacArthur Foundation
Learn and Serve America Program
Local Initiatives Support Corporation
Mitigation Assistance
National Weather Service

Physical Disaster Loans
Project Impact: Building Disaster Resistant Communities
Property Improvement Loan Insurance for Improving All Existing Structures and Building
of New Nonresidential Structures
Public Assistance
Rehabilitation Mortgage Insurance
State Disaster Preparedness Grants
U.S. Army Corps of Engineers
Wallace Global Fund

Wildfire Funding Sources

Community Facilities Loans and Grants
Community Development Block Grants/Economic Development Initiative
Conservation Technical Assistance
Cooperative Forestry Service
Cooperative Extension Service
Cora Brown Fund
Direct Housing: Natural Disaster
Disaster Housing Program
Disaster Reserve Assistance
Disaster Recovery Initiative Grants
Economic Injury Disaster Loans
Emergency Loan Assistance
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Emergency Loans
Environmental Quality Incentives Program
Florida Game and Freshwater Fish Commission Environmental Grant Program
Hazard Mitigation Grant Program
Individual and Family Grants
John D. and Catherine T. MacArthur Foundation
Learn and Serve America Program
Local Initiatives Support Corporation
Mitigation Assistance
National Fire Academy Training Assistance
National Forest: Dependent Rural Communities
National Fire Academy Educational Program
North American Wetlands Conservation Act Grant Program
Outdoor Recreation: Acquisition, Development and Planning
Physical Disaster Loans
Project Impact: Building Disaster Resistant Communities
Property Improvement Loan Insurance for Improving All Existing Structures and Building
of New Nonresidential Structures
Protection of Forests and Rangelands
Public Assistance
Rehabilitation Mortgage Insurance
Resource Conservation and Development
Rural Economic Development Loans and Grants
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
Stewardship Incentives Program
Sustainable Development Challenge Grants

The Community Foundation for Palm Beach and Martin Counties
Urban Park and Recreation Recovery Program
Wallace Global Fund
Wildlife Restoration
Wildlife Habitat Incentives Program

Tornado Funding Sources

Bank Enterprise Award Program
Business and Industry Loans
Community Development Block Grant
Community Development Block Grants/Entitlement Grants
Community Development Block Grants/State's Program
Cooperative Extension Service
Cora Brown Fund
Direct Housing: Natural Disaster
Disaster Housing Program
Disaster Recovery Initiative Grants
Economic Injury Disaster Loans
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Emergency Loans
Emergency Shelter Grants Program
Hazard Mitigation Grant Program
Impact Aid: Facilities Maintenance
Individual and Family Grants
John D. and Catherine T. MacArthur Foundation
Learn and Serve America Program
Mitigation Assistance
National Weather Service
Physical Disaster Loans
Project Impact: Building Disaster Resistant Communities
Property Improvement Loan Insurance for Improving All Existing Structures and Building
of New Nonresidential Structures
Public Assistance
Rehabilitation Mortgage Insurance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
Sustainable Development Challenge Grants
The Community Foundation for Palm Beach and Martin Counties
Wallace Global Fund

Extreme Temperatures Funding Sources

Community Development Block Grants/State=s Program
Cooperative Extension Service
Crop Insurance
Disaster Reserve Assistance
Emergency Loan Assistance
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance

Emergency Loans
Hazard Mitigation Grant Program
John D. and Catherine T. MacArthur Foundation
Learn and Serve America Program
Local Initiatives Support Corporation
Mitigation Assistance
National Weather Service
Physical Disaster Loans
Project Impact: Building Disaster Resistant Communities
Property Improvement Loan Insurance for Improving All Existing Structures and Building
of New Nonresidential Structures
Public Assistance
Rehabilitation Mortgage Insurance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and
Long-Term Economic Deterioration
State Disaster Preparedness Grants
Sustainable Agriculture Research and Education
The Community Foundation for Palm Beach and Martin Counties
Weatherization Assistance for Low-Income Persons

Soil/Beach Erosion Funding Sources

Anheuser-Busch Companies, Inc.
Bank Enterprise Award Program
Beach Erosion Control Projects
Business and Industry Loans
Challenge 21, Floodplain
Coastal Services Center
Coastal Zone Management Administration Awards
Community Development Block Grant
Community Development Block Grants/Entitlement Grants
Conservation Technical Assistance
Conservation Plant Material Centers
Conservation Reserve Program
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Environmental Quality Incentives Program
Farmland Protection Program
Financial Assistance for Ocean Resources Conservation and Assessment Program
Hazard Mitigation Grant Program
Land Protection, Natural Resources Conservation Service
Learn and Serve America Program
Mitigation Assistance
North American Wetlands Conservation Act Grant Program
Outdoor Recreation: Acquisition, Development and Planning
Physical Disaster Loans
Planning Assistance to States
Project Impact: Building Disaster Resistant Communities
Protection of Essential Highways, Highway Bridge Approaches, and Public Works
Public Assistance
Rehabilitation Mortgage Insurance
Resource Conservation and Development
Soil and Water Conservation

State Disaster Preparedness Grants
STP
Sustainable Agriculture Research and Education
Sustainable Development Challenge Grants
Wallace Global Fund
Water Bank Program
Watershed Surveys and Planning
Wetlands Program
Wetlands Reserve Program
Wetlands Protection: Development Grants

Agricultural Pest and Disease Funding Sources

Bank Enterprise Award Program
Community Facilities Loans and Grants
Cooperative Extension Service
Crop Insurance
Disaster Reserve Assistance
Emergency Loan Assistance
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Emergency Loans
Hazard Mitigation Grant Program
Learn and Serve America Program
Mitigation Assistance
Physical Disaster Loans
Plant and Animal Disease, Pest Control, and Animal Care
Project Impact: Building Disaster Resistant Communities
Public Assistance
Rural Economic Development Loans and Grants
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants

Drought Funding Sources

Conservation Technical Assistance
Cooperative Extension Service
Crop Insurance
Disaster Reserve Assistance
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Conservation Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Emergency Loans
Hazard Mitigation Grant Program
Land Protection, Natural Resources Conservation Service
Learn and Serve America Program
Mitigation Assistance
Physical Disaster Loans
Project Impact: Building Disaster Resistant Communities
Public Assistance
Soil and Water Conservation
Special Economic Development and Adjustment Assistance Program:

Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
U.S. Army Corps of Engineers
Wallace Global Fund
Watershed Surveys and Planning

Seismic Hazards Funding Sources

Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Hazard Mitigation Grant Program
Learn and Serve America Program
Mitigation Assistance
Physical Disaster Loans
Project Impact: Building Disaster Resistant Communities
Public Assistance
Rehabilitation Mortgage Insurance
State Disaster Preparedness Grants
Sustainable Development Challenge Grants

Epidemic Funding Sources

Cora Brown Fund
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Hazard Mitigation Grant Program
John D. and Catherine T. MacArthur Foundation
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
The Community Foundation for Palm Beach and Martin Counties

Nuclear Disaster Funding Sources

Bank Enterprise Award Program
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Emergency Shelter Grants Program
Hazard Mitigation Grant Program
Individual and Family Grants
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Radiation Control: Training Assistance and Advisory Counseling
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants

Power Failure Funding Sources

Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Hazard Mitigation Grant Program
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants

Hazardous Materials Accident Funding Sources

Brownfield Pilots Cooperative Agreements
Capitalization Grants for Drinking Water State Revolving Fund
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Florida Coastal Protection Trust Fund
Grants-in-Aid for Railroad Safety: State Participation
Hazard Mitigation Grant Program
Hazardous Waste Worker Health and Safety
Hazardous Waste Management State Program Support
Hazardous Materials Training Program for Implementation of the Superfund Amendment and Reauthorization Act of 1986
Individual and Family Grants
Interagency Hazardous Materials Public Sector Training and Planning Grants
Learn and Serve America Program
Mitigation Assistance
NIEHS Hazardous Waste Worker Health and Safety Training (Superfund)
Project Impact: Building Disaster Resistant Communities
Public Assistance
Railroad Safety
State Disaster Preparedness Grants
Water Pollution Control: State and Interstate Program Support

Transportation System Accident Funding Sources

Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Grants-in-Aid for Railroad Safety: State Participation
Hazard Mitigation Grant Program
Hazardous Waste Worker Health and Safety
Hazardous Waste Management State Program Support
Highway Planning and Construction (Federal Aid Highway Program)
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Protection of Essential Highways, Highway Bridge Approaches, and Public Works
Public Assistance
Railroad Safety

Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
STP
Transportation Enhancements Program
Water Pollution Control: State and Interstate Program Support

Wellfield Contamination Funding Sources

Bank Enterprise Award Program
Brownfield Pilots Cooperative Agreements
Capitalization Grants for Drinking Water State Revolving Fund
Coastal Zone Management Administration Awards
Community Development Block Grant
Disaster Recovery Initiative Grants
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Habitat Conservation
Hazard Mitigation Grant Program
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
Wallace Global Fund
Water Pollution Control: State and Interstate Program Support
Water Quality Program Management

Communications Failure Funding Sources

Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Hazard Mitigation Grant Program
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants

Terrorism and Sabotage Funding Sources

Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
First Responder Anti-Terrorism Training Assistance
Hazard Mitigation Grant Program
Learn and Serve America Program
Local Firefighting and Emergency Services Training

Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants

Civil Disturbance Funding Sources

Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Hazard Mitigation Grant Program
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants

Immigration Crisis Funding Sources

Community Services Block Grant
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Hazard Mitigation Grant Program
John D. and Catherine T. MacArthur Foundation
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Special Economic Development and Adjustment Assistance Program: Sudden and
Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants

All Hazards Funding Sources

Economic Development - Technical Assistance
Emergency Management Institute: Independent Study Program
Emergency Management Institute: Resident Educational Program
Emergency Management: State and Local Assistance
Emergency Management Training Institute: Training Assistance
Hazard Mitigation Grant Program
Individual and Family Grants
John D. and Catherine T. MacArthur Foundation
Learn and Serve America Program
Mitigation Assistance
Project Impact: Building Disaster Resistant Communities
Public Assistance
Special Economic Development and Adjustment Assistance Program:
Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration
State Disaster Preparedness Grants
Wallace Global Fund

Table C.1. Description of potential funding sources.

Funding Source	Objective	Eligibility	Sponsoring Organization
Anheuser-Busch Companies, Inc.	Supports charitable organizations active in the fields of education, health care, programs for minorities and youth, cultural enrichment, and environmental protection.	Support is restricted almost entirely to cities where the company has manufacturing facilities.	Anheuser-Busch Companies, Inc. One Busch Place St. Louis, MO 63118 (314) 577-2000
Antiterrorism and Emergency Assistance Program	To provide assistance programs for victims of mass violence and terrorism occurring within and outside the United States, and a compensation program for victims of international terrorism.	Public and private nonprofit victim assistance agencies.	Department of Justice Office for Victims of Crimes www.usdoj.gov
Assistance to Firefighter Grants	To provide direct assistance, on a competitive basis, to fire departments of a State or tribal nation for the purpose of protecting the health and safety of the public and firefighting personnel against fire and fire-related hazards.	Eligible applicants for this grant program are limited to fire departments located in the fifty United States, tribal nations, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, or the Commonwealth of the Northern Mariana Islands.	Department of Homeland Security 245 Murray Drive S.W. Washington, DC 20528 (202) 282-8000 http://www.dhs.gov
Bioterrorism Training and Curriculum Development Grant	To equip a workforce of healthcare professionals to address emergency preparedness and response issues. The goals of this program are the development of a healthcare workforce that possesses the knowledge, skills, and abilities to 1) recognize indications of a terrorist event in their patients; 2) treat their patients and their communities in a safe and appropriate manner; 3) participate in a coordinated, multidisciplinary response to terrorist events; and 4) rapidly and effectively alert the public health system of such an event at the community, State, and national level. Effective responses to public health emergencies require close collaboration between all types of health professionals involved in patient care including healthcare providers, medical specialists, the public health infrastructure, and all participants in the emergency response. To achieve such a collaborative environment, it will be necessary to implement new models of undergraduate/graduate curricula and continuing education and training for health professionals that broaden public health knowledge and ensure that essential multidisciplinary and interdisciplinary collaborative	<p>Applicant Eligibility: Continuing Education and Curriculum Development: Entities eligible to apply for this program are public or private nonprofit accredited or licensed health professions schools, multi-State or multi-institutional consortia of such schools, and other appropriate educational entities such as professional organizations and societies, and other nonprofit institutions or entities including faith-based organizations and community-based organizations.</p> <p>Beneficiary Eligibility: The public or private nonprofit accredited or licensed health professions schools, multi-State or multi-institutions or entities including faith-based organizations and community-based organizations.</p>	<p>The Bioterrorism Training and Curriculum Development Program is administered by Lynn Rothberg Wegman Division of State, Community and Public Health Bureau of Health Professions Health Resources and Services Administration (HRSA) Room 9-105 Parklawn Building, 5600 Fishers Lane Rockville, Maryland 20857 (301) 443-1648</p> <p>Grants Management Contact: Director, Division of Grants Management Operations HRSA 5600 Fishers Lane, Room 11-03 Rockville, Maryland 20857</p>

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
	responses to emergencies will occur. Bioterrorism Training and Curriculum Development Program will consist of two discrete foci of activity: 1) Provision of Continuing Education for Practicing Providers, and 2) Curricular Development in Health Professions Schools. Each of the categories above must have a distinct and separate application.		
Capitalization Grants for Drinking Water State Revolving Fund (Drinking Water State Revolving Fund)	State may use Federal funds to establish new programs that emphasize preventing contamination problems through source water protection and enhanced water systems management.	States and Puerto Rico are eligible to receive capitalization grants.	James Bounne, Implementation and Assistance Division, Office of Groundwater and Drinking Water, U.S. Environmental Protection Agency, Washington, DC 20460 (202) 260-5526
Challenge 21, Floodplain	To protect floodplains.		Department of Defense U.S. Army Corps of Engineers Attn: CECW-PM DoD Washington, DC 20314-1000 (202) 272-0169 http://www.usace.army.mil/
Citizen Corps	To support the formation of State and local Citizen Corps Councils to help drive local citizen participation by coordinating Citizen Corps programs, developing community action plans, assessing possible threats, and identifying local resources to make communities safer, stronger, and better prepared to respond to the threats, of terrorism, crime, public health issues, and disasters of all kinds.	States with a pass through to local governments.	Department of Homeland Security Emergency Preparedness and Response Directorate www.citizencorps.gov
Clean Water Act Section 319 Grants	Grants to States to implement non-point source programs, including support for non-structural watershed resource restoration activities.		Non-point Source Management Program 2600 Blair Stone Road Mail Station 3570 Tallahassee, FL 32399-2400 (850) 245-7508

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Clean Water State Revolving Funds	Loans at actual or below-market interest rates to help build, repair, relocate, or replace wastewater treatment plants.		Environmental Protection Agency Office of Water State Revolving Fund Branch Branch Chief (202) 260-7359 A list of Regional Offices is available upon request
Coastal Construction Building Zone Program	This program establishes a standard to improve the resistance to hurricane-force winds of buildings in Florida's coastal building zone. Staff trains building officials, monitors local progress in adopting ordinances, and provides technical assistance.	Compliance program only.	Rick Dixon (850) 487-1824
Coastal Partnerships Initiative Grant	To provide financial assistance for projects in specific initiative categories. The categories are: Remarkable Coastal Places, Community Stewardship, Access to Coastal Resources, and Working Waterfronts. Financial awards are limited to no more than \$50,000 and no less than \$15,000 and may be used for planning and coordination activities, land acquisition, small construction, or capital improvement projects.	Local governments of the 35 coastal counties and all municipalities within their boundaries designated as "coastal" by the state land planning agency or required to include a coastal element in the local comprehensive plan; national estuarine research reserves; and national estuary programs. Public and private colleges and universities, regional planning councils, and non-profit groups, as long as an eligible local government, national estuarine research reserve, or national estuary program agrees to participate as a partner. Partnerships between regional and local agencies and non-profit organizations are encouraged.	Debbie Skelton Florida Coastal Management Program 3900 Commonwealth Boulevard, MS 47 Tallahassee, FL 32399-3000 (850) 245-2161 Fax: (850) 245-2191 E-mail: debbie.skelton@dep.state.fl.us
Coastal Services Center	To support projects aimed at developing a science-based, multi-dimensional approach that will allow for the maintenance or improvement of environmental quality, while at the same time, allowing for economic growth. In Fiscal Year (FY) 96, five Fellowship Awards were made to the states of CA, CT, FL, MA, and OR. In FY 98, a cooperative agreement was awarded for an ecological and socioeconomic characterization of Kachemak Bay, AK. Uses will be in the following Center areas: Coastal Management Service: Training and Communications:	State and local governments, public nonprofit institution/organization, other public institution/organization.	Dr. Nancy Foster, Ph.D., Assistant Administrator, National Ocean Service 1305 East-West Highway Silver Spring, MD 20910 (301) 713-3074

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
	training materials development and dissemination of information; and Coastal Information Services: Coastal Change Analysis Program: To develop land cover and change analysis products.		
Coastal Wetlands Planning, Protection and Restoration Act	To grant funds to coastal states to carry out coastal wetlands conservation projects.	Available to all states bordering on the Atlantic, Gulf (except Louisiana), and Pacific coasts, and states bordering the Great Lakes.	Department of the Interior Fish and Wildlife Service 4401 N. Fairfax Dr., Rm. 140 Arlington, VA 22203 (703) 358-2156 http://www.fws.gov
Coastal Zone Management Program	Grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration.		Department of Commerce National Oceanic and Atmospheric Administration National Ocean Service Office of Ocean and Coastal Resource Management Chief, Coastal Programs Division: (301) 713-3102
Community Development Block Grant (CDBG)	Provide for long-term needs, such as acquisition, rehabilitation, or reconstruction of damaged properties and facilities and redevelopment of disaster-affected areas. Funds also may be used for emergency response activities, such as debris clearance and demolition, and extraordinary increases in the level of necessary public services.	State governments that have elected to administer CDBG funds for non-entitlement communities. States with designated major disaster areas may receive statutory and regulatory waivers of program requirements regarding the use of regular CDBG funds, which recipients designate to address the damage.	Department of Housing and Urban Development Community Planning and Development 451 7 th Street, S.W. Washington, DC 204107 (202) 708-3587 http://www.hud.gov
Community Emergency Response Teams	To train people in neighborhoods, the workplace, and schools in basic disaster response skills, such as fire suppression, urban search and rescue, and medical operations, and help them take a more active role in emergency preparedness.	States with pass through to local jurisdictions.	Department of Homeland Security Emergency Preparedness and Response Directorate www.fema.gov
The Community Foundation for Palm Beach and Martin Counties	To provide innovative responses to recognized community needs, which do not unnecessarily duplicate other efforts; strive to equip people to help themselves; significantly strengthen the capacity of existing institutions to reach a broader segment of the community; emphasize shared values and collective interests and action among divergency groups that have little or no history of working	Unrestricted grants are made for charitable purposes primarily to organizations serving Palm Beach and Martin counties. Applicants must be exempt from income taxes under Section 501(c)(3).	The Community Foundation for Palm Beach and Martin Counties 324 Datura St., Suite 340 West Palm Beach, FL 33401 Palm Beach: (561) 659-6800 Martin: (888) 832-6542 e-mail: cfpbmc@aol.com

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
	together; programs that are neighborhood driven.		
Community Rating System	Encourages State and community flood loss reduction activities beyond those required for participation in the National Flood Insurance Program. Flood insurance premiums are lower in those communities that undertake activities to reduce flood losses, facilitate accurate insurance rating, promote the awareness of flood insurance, and protect the natural and beneficial functions of flood hazard areas.		FEMA Region IV CRS Program 3003 Chamblee-Tucker Rd. Atlanta, GA 30431 (770) 220-5200
Community Services Block Grant	To provide services and activities having measurable and potential major impact on causes of poverty in the community.		Department of Health and Human Services, Administration for Children and Families Office of Community Services 370 L'Enfant Promenade, SW Washington, DC 220447 (202) 401-9340 http://www.acf.dhhs.gov/programs/ocs
Conservation Reserve Program	The Conservation Reserve Program reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter strips, or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.		Contact U.S. Department of Agriculture (USDA), Farm Service Agency http://mimosas.itc.nrcs.usda.gov/scripts/ndi_sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Conservation Plant Material Centers	The purpose of the program is to provide native plants that can help solve natural resource problems. Beneficial uses for which plant material may be developed include biomass production, carbon sequestration, erosion reduction, wetland restoration, water quality improvement, streambank and riparian area protection, coastal dune stabilization, and other special conservation treatment needs.		Contact USDA, Natural Resources Conservation Service http://mimosas.itc.nrcs.usda.gov/scripts/ndi_sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Conservation Technical Assistance	The purpose of this program is to assist land-users, communities, units of State and local government, and other Federal agencies in planning and implementing conservation systems. The purpose of the conservation systems are to reduce erosion, improve soil and water quality, improve and conserve wetlands, enhance fish and wildlife habitat, improve air quality, improve pasture and range condition, reduce upstream flooding, and improve woodlands.	Individual land users, communities, conservation districts, and other units of State and local government and Federal agencies to meet their goals for resource stewardship and help individuals to comply with State and local requirements.	Contact USDA, Natural Resources Conservation Service http://mimosa.itc.nrcs.usda.gov/scripts/ndi_sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Cooperative Extension Service	To provide information and educational material to farmers, ranchers, and others on what they can do to protect themselves and their property against the hazards associated with disasters; and advice on cleanup of damaged property, sanitation precautions, insect control, food preparation in an emergency, recovery actions on damaged farms, and renovation of damaged equipment and property.	Farmers and rural residents who have suffered losses as the result of natural disasters. There is also assistance available to producers who suffer losses as a result of crop or livestock disease or pest infestation.	Contact USDA, Natural Resources Conservation Service http://mimosa.itc.nrcs.usda.gov/scripts/ndi_sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Community of Oriented Police Services (COPS) Interoperable Communications Technology Program	To facilitate communications interoperability public safety responders at the State and local level.	Tribal, State, and local law enforcement agencies.	Department of Justice Office of COPS www.cops.usdoj.gov
Cora Brown Fund	To use funds made possible by a bequest of funds from the late Cora C. Brown of Kansas City, Missouri, who left a portion of her estate to the United States for the purpose of helping victims of natural disasters not caused by or attributed to war.	Individuals, families, and groups in need of 1) disaster-related home repair and rebuilding; 2) disaster-related unmet needs; and 3) other services that alleviate human suffering and promote the well being of disaster victims.	Department of Homeland Security 245 Murray Drive SW Washington, DC 20528 (202) 282-8000 http://www.dhs.gov
Decision, Risk, and Management Science Program	Funding for research and related educational activities on risk, perception, communication, and management (primarily technological hazards).		National Science Foundation – Directorate for Social, Behavioral and Economic Science, Division of Social Behavioral and Economic Research, Decision, Risk, and Management Science Program (703) 306-1757 www.nsf.gov/sbe/drms/start.htm

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Disaster Mitigation Planning and Technical Assistance	Technical and planning assistance grants for capacity building and mitigation project activities focusing on creating disaster-resistant jobs and workplaces.		Department of Commerce, Economic Development Administration (EDA): (800) 345-1222 EDA's Disaster Recovery Coordinator: (202) 482-6225 www.doc.gov/eda
Disaster Recovery Initiative (DRI) Grants	Provides flexible grants to help cities, counties, and states recover from Presidentially-declared disasters, especially in low-income areas. Grantees may use DRI funds for recovery efforts involving housing, economic development, infrastructure, and prevention of further damage. Examples include buying damaged properties in a flood plain and relocating them to safer areas; relocation payments for people and businesses displaced by the disaster; debris removal; rehabilitation of homes and buildings damaged by the disaster; buying, constructing, or rehabilitating public buildings; and code enforcement.	States and local governments in places that have been designated by the President of the United States as disaster areas.	For a guide to DRI, contact Community Connections at (800) 998-9999
Disaster Reserve Assistance	To provide emergency assistance to eligible livestock owners, in a state, county, or area approved by the secretary or designee, where because of disease, insect infestation, flood, drought, fire, hurricane, earthquake, hail storm, hot weather, cold weather, freeze, snow, ice, and winterkill, or other natural disaster, a livestock emergency has been determined to exist.	Basic program eligibility requirements include 1) For the Disaster Reserve Assistance Program, crop losses in areas that have suffered a 40 percent or greater loss of normal grazing, and feed grain and forage production, and determined to be in a livestock feed emergency due to a natural disaster; 2) for the Emergency Feed Grain Donation Program: a) the State committee must determine and document a livestock feed emergency on a county-by-county basis, when the danger of eligible livestock perishing as a result of snow and freezing conditions exists in the county; b) the livestock owner, or other person or entities (public or private) certify that the eligible livestock were or are in danger of perishing without immediate assistance; and 3) the Foundation Livestock Relief (Cost-Share) Program: a) when foundation livestock are stranded and in imminent danger of perishing; and b) when the State committee determines and documents livestock losses due to severe weather conditions.	Department of Agriculture, Farm Service Agency, Emergency and Noninsured Assistance Program Division, STOP 0526 1400 Independence Avenue SW Washington, DC 20250-0526 (202) 720-3168 http://www.fsa.usda.gov

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Domestic Anti-Terrorism Technology Development Program	To support the development of counter terrorism technologies, assist in the development of standards for those technologies, and work with State and local jurisdictions to identify particular areas vulnerable to terrorist acts and be better prepared to respond if such acts occur.	States and local governments, non-profit and for-profit organizations, and universities.	Department of Justice National Institutes of Justice www.usdoj.gov
Economic Development: Public Works Impact Program	To promote long-term economic development and assist in providing immediate useful work to unemployed and underemployed persons in highly distressed areas. Examples of funded projects: 1) renovation of buildings, including historic preservation; 2) repairing industrial streets and roads; construction of water/sewer systems.	Eligibility is based on designation of a community or neighborhood as a redevelopment area.	David L. McIlwain, Director, Public Works Division, Economic Development Administration Room H7326, Herbert C. Hoover Bldg. Washington, DC 20230 (202) 482-5265
Economic Development - Technical Assistance	To promote economic development and alleviate underemployment and unemployment in distressed areas, Economic Development Administration operates a technical assistance program. The program provides funds to: 1) enlist the resources of designated university centers in promoting economic development; 2) support innovative economic development projects; 3) disseminate information and studies of economic development issues of national significance; and 4) finance feasibility studies and other projects leading to local economic development.	Most technical assistance recipients are private or public non-profit organizations, educational institutions, municipal, county, or State governments.	Department of Commerce Research and National Technical Assistance Division, Economic Development Administration Rm. H7315 Herbert C. Hoover Bldg. Washington, DC 20230 (202) 482-4085 http://www.doc.gov/eda
Emergency Advance Measures for Flood Prevention (Public Law 84-99 Code 500 Program)	To perform activities prior to flooding that would assist in protecting against loss of life and damages to property due to flooding. Examples of funded projects: emergency drawdown of Spirit Lake, Washington; emergency levee construction, Utah Lake, Provo, Utah; Temporary levee raising, Cowlitz River, Washington; and levee setback, Red River, Louisiana. Authorized assistance includes work such as removal of waterway obstructions, work necessary to prevent dam failure, and work necessary to prepare for abnormal snowmelt. There must be an immediate threat of unusual flooding present before advance measures can be considered. Any work performed under this program will be temporary in nature and must have a favorable benefit cost ratio.	The Governor of the affected state must request assistance. All persons living in areas subject to floods.	U.S. Army Corps of Engineers, Attn: CECW-OE, Washington, DC 20314 (202) 272-0251

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Emergency Community Water Assistance Grants.	Through the Emergency Community Water Assistance Grant Program, the Rural Utilities Service is authorized to help rural residents who have experienced a significant decline in quantity or quality of water to obtain adequate quantities of water that meet the standards of the Safe Drinking Water Act.	Rural Utilities Service may make grants to public bodies, private nonprofit corporations, and political subdivisions of a state, as well as Indian tribes.	Assistant Administrator, Water and Environmental Programs, Rural Utilities Service, Department of Agriculture, Washington, DC 20250 (202) 690-2670
Emergency Conservation Program	To enable farmers to perform emergency conservation measures to control wind erosion on farmlands, to rehabilitate farmlands damaged by wind erosion, floods, hurricanes, or other natural disasters and to carry out emergency water conservation or water enhancing measures during periods of severe drought.	Any agricultural producer who as owner, landlord, tenant, or sharecropper on a farm or ranch, including associated groups, and bears a part of the cost of an approved conservation practice in a disaster area, is eligible to apply for cost-share conservation assistance. This program is also available in Guam, Commonwealth of the Northern Mariana Islands, Puerto Rico, and the Virgin Islands.	USDA/Farm Service Agency (FSA)/Conservation Environmental Programs Division (CEPD), Stop 0513, 1400 Independence Ave. SW Washington, DC 20250-0513 (202) 720-6221 http://www.fsa.usda.gov
Emergency Loans	To assist established (owner or tenant) family farmers, ranchers, and aquaculture operators with loans to cover losses resulting from major and/or natural disasters, which can be used for annual farm operating expenses, and for other essential needs necessary to return disaster victim's farming operations to a financially sound basis in order that they will be able to return to private sources of credit as soon as possible. Loan funds may be used to repair, restore, or replace damaged or destroyed farm property and supplies that were lost or damaged as a direct result of a natural disaster.	Must meet requirements.	Department of Agriculture, Farm Service Agency, Director, Loan Making Division, Ag Box 0522 Washington, DC 20250 (202) 720-1632
Emergency Management Performance Grants	To provide basic assistance to sustain the nation's emergency management system, build State and local emergency management capability, and serve as the foundation for first responder activities.	States with pass through to local emergency management organizations.	Department of Homeland Security Emergency Preparedness and Response Directorate www.fema.gov

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
<p>Emergency Management Preparedness and Assistance Trust Fund:</p> <p>Emergency Management Competitive Grants</p> <p>Municipal Competitive Grant Program</p>	<p>Competitive: Provides competitive grants to State or regional agencies, local governments, and private non-profit organizations to implement projects that will further State and local emergency management objectives.</p> <p>Municipal: Provides competitive grants to municipalities that are legally constituted, have an authorized, established, and maintained emergency management program, and have signed the current Statewide Mutual Aid Agreement (SMAA) and supplied all required information and documentation such that the SMAA is ready to be signed by the Division as of the date of the application deadline.</p>		<p>Department of Community Affairs 2555 Shumard Oak Blvd Tallahassee, FL 32399-2100 (850) 488-8466 Fax: (850) 921-0781 http://www.dca.state.fl.us/cps/grants.htm</p>
<p>Emergency Management Institute Training Assistance</p>	<p>To defray travel and per diem expenses of State, local, and tribal emergency management personnel who attend training courses conducted by the Emergency Management Institute, at the Emmitsburg, Maryland facility, Bluemont, Virginia facility, and selected off-site locations. Its purpose is to improve emergency management practices among State, local, and tribal government managers, in response to emergencies and disasters. Program embodies the Comprehensive Emergency Management System by unifying the elements of management common to all emergencies: planning, preparedness, mitigation, response, and recovery.</p>	<p>State, local, and tribal emergency managers.</p>	<p>Department of Homeland Security Emergency Preparedness and Response Directorate www.fema.gov</p>
<p>Emergency Operations Centers</p>	<p>The purpose of the Emergency Operations Centers program is to supplement and assist State and local efforts to improve their capabilities to respond to emergencies or disasters including any that may be caused by terrorist attacks using conventional means or Weapons of Mass Destruction. The program provides grants to the States to encourage the development of Emergency Operations Centers that provide flexibility, sustainability, security, survivability, and interoperability. Fully capable emergency operations facilities at the State and local levels are an essential element of a comprehensive national emergency management system and are necessary to ensure continuity of operations and continuity of government in major disasters caused by any hazard.</p>	<p>States are eligible to apply for the assistance under this program. For purposes of this program and consistent with the Stafford Act, 42 U.S.C. 5122(4), "State" means any State of the United States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. Local governments may receive assistance as subgrantees to the States in which they are located. The term "local government" as used in this program has the meaning set forth in the Stafford Act, 42 U.S.C. 5122(6).</p>	<p>Gil Jamieson, Federal Emergency Management Agency, Office of National Preparedness 500 C Street, SW Washington, DC 20472 (202) 646-4090 e-mail: gil.jamieson@fema.gov Fax: (202) 646-4053 24-hour per day FEMA Telephone Operator Service is available at (202) 566-1600 http://www.fema.gov</p>

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Emergency Operations Flood Response and Post Flood Response (Public Law 84-99 Code 200 Program)	To provide emergency flood response and post flood response assistance as required to supplement State and local efforts and capabilities in time of flood or coastal storm. Emergency assistance is provided in all phases of flood response and post flood response to supplement State and local efforts.	State or local public agencies for flood response and the State for post flood response.	Commander, U.S. Army Corps of Engineers, Attn: CECW-OE Washington DC 20314-1000 (202) 272-0251
Emergency Rehabilitation of Flood Control Works or Federally Authorized Coastal Protection Works (Public Law 84-99, Code 300 Program)	To assist in the repair and restoration of flood control works damaged by flood, or federally authorized hurricane flood and shore protection works damaged by extraordinary wind, wave, or water action. Authorized assistance includes emergency repair or rehabilitation of flood control works damaged by flood, and restoration of federally authorized coastal protection structures damaged by extraordinary wind, wave, or water action.	Owners of damaged flood protective works, or State and local officials of public entities responsible for their maintenance, repair, and operation must meet current guidelines to become eligible for Public Law 84-99 assistance.	Commander, U.S. Army Corps of Engineers, Attn: CECW-OE Washington DC 20314 (202) 272-0251
Emergency Relief Program	To assist State transportation agencies in the planning and development of an integrated, interconnected transportation system important to interstate commerce and travel by constructing and rehabilitating the National Highway System, including the Interstate System; and for transportation improvements to all public roads except those classified as local or rural minor collectors; to provide aid for the repair of Federal-aid roads following disasters; to foster safe highway design; to replace or rehabilitate deficient or obsolete bridges; and to provide for other special purposes.		Department of Transportation Federal Highway Administration Director, Office of Engineering Federal Highway Administration 400 7 th St. SW Washington, DC 20590 (202) 366B4853 http://www.fhwa.dot.gov/
Emergency Shelter Grants (ESG) Program	The program is designed to help improve the quality of emergency shelters and transitional housing for the homeless, to make available additional shelters, to meet the costs of operating shelters, to provide essential social services to homeless individuals, and to help prevent homelessness.	States, metropolitan cities, urban counties, and territories. Local governments and non-profit organizations may apply for ESG funds directly from states. The territories receive their allocations based on their population size.	Community Planning and Development, Department of Housing and Urban Development Office of Special Needs Assistance Programs 451 7 th St. SW, Rm. 7254 Washington, DC 20410 (202) 708-4300
Emergency Watershed Protection Program	Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events.		USDA – Natural Resource Conservation Service (NRCS) National Office: (202) 690-0848 Watersheds and Wetlands Division: (202) 720-3042

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Emergency Medical Services for Children	To support demonstration projects for the expansion and improvement of emergency medical services for children who need treatment for trauma or critical care. It is expected that maximum distribution of projects among the States will be made and that priority will be given to projects targeted towards populations with special needs, including Native Americans, minorities, and the disabled.	State governments and schools of medicine.	Department of Health and Human Services Health Resources and Services Administration www.hrsa.gov
Environmental Quality Incentives Program (EQIP)	Technical, educational, and limited financial assistance to encourage environmental enhancement.		USDA-NRCS NRCS County Offices or NRCS EQUIP Program Manager: (202) 720-1834 www.nrcs.usda.gov
Federal Land Transfer/Federal Land to Parks Program	Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space.		DOI-National Park Service (NPS) General Services Administration Offices Fort Worth, TX: (817) 334-2331 Boston, MA: (617) 835-5700 or Federal Lands to Parks Leader NPS National Office: (202) 565-1184
Financial Assistance for Ocean Resources Conservation and Assessment Program	To determine the long-term consequences of human activities that affect the coastal and marine environment; to assess the consequences of these activities in terms of ecological, economic, and social impacts upon human, physical, and biotic environments, and to define and evaluate management alternatives that minimize adverse consequences of human use of the coastal and marine environments and resources.	Universities, colleges, technical schools, institutes, laboratories, State and local government agencies, public or private or profit or non-profit entities or individuals.	Department of Commerce Office of Ocean Resources Conservation and Assessment, National Ocean Service, National Oceanic and Atmospheric Administration 1305 East-West Hwy Silver Springs, MD 20910 (301) 713-2989 http://www.noaa.gov
Fire Management Assistance Grant – FEMA Readiness, Response and Recovery (RRR)	Grants to states, tribal governments, and local governments for the mitigation, management, and control of any fire burning on publicly (non-Federal) or privately owned forest or grassland that threatens such destruction as would constitute a major disaster.	State governments and Indian tribal governments are eligible for fire management assistance grants. The State or Native American tribal government may be the Grantee. The Grantee is the government to which a grant is awarded and is accountable for the use of funds provided.	FEMA, RRR, Region IV

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Flood Control Projects (Small Flood Control Projects)	To reduce flood damages through projects not specifically authorized by Congress. Corps of Engineers designs and constructs the projects. Provides a cash contribution for land enhancement benefits and for project costs assigned to project features other than flood control; prevent future encroachment, which might interfere with proper functioning of the project for flood control; and, maintain the project after completion.	States, political subdivisions of states, or other responsible local agencies established under State law with full authority and ability to undertake necessary legal and financial responsibility.	U.S. Army Corps of Engineers Attn: CECW-PM Washington, DC 20314-1000 (202) 272-1975
Flood Insurance	To enable persons to purchase insurance against physical damage to or loss of buildings and/or contents therein caused by floods, mudslide, or flood-related erosion, thereby reducing Federal disaster assistance payments, and to promote wise floodplain management practices in the Nation's flood-prone and mudflow-prone areas.	Any state of political subdivision with authority to adopt floodplain management practices. Beneficiaries may include residents, businesses, and property owners in applicant community, in which like states can ensure municipal structures.	Federal Emergency Management Agency Federal Insurance Administration Washington, DC 20472 (202) 646-2781 http://www.fema.gov/nfip
Flood Mitigation Assistance (FMAP) Program Planning Grants	To assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). Examples of funded projects are published in a Biennial Report to Congress as required under Section 554 of the National Flood Insurance Reform Act (NFIRA). This report is available from Mr. Robert F. Shea, Jr., Program Support Division, Federal Emergency Management Agency (FEMA). Planning Grants may be used to assist states and communities in developing and updating Flood Mitigation Plans. Eligible activities under this grant are conducting local planning discussions, contracting for consulting technical services such as engineering and planning, surveying structures at risk, and assessing structures subject to repetitive flood loss. Eligible activities under this grant are the acquisition, relocation, elevation, or dry-floodproofing of insured structures, minor structural projects, and beach nourishment activities.	Eligible applicants of Technical Assistance Grants are State agencies or departments that are responsible for administering the FMAP program. Eligible applicants for Planning Grants are states and communities participating in the NFIP.	Mr. Robert F. Shea, Jr. Program Support Division Federal Emergency Management Agency 500 C Street, SW Washington, DC 20472 (202) 646-3619

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Flood Plain Management Services	To promote appropriate recognition of flood hazards in land and water use planning and development through the provision of flood and flood plain related data, technical services, and guidance. Available information identifies areas subject to flooding and flood losses from streams, lakes, and oceans and describes flood hazard at proposed building sites. It can be used as a basis for planning flood plain use, for flood emergency preparedness planning, for hurricane evacuation and preparedness planning, for assistance in developing flood plain regulations, for setting elevations for flood proofing, and implementing flood proofing measures, and for indicating areas to be acquired for open space. Services are available to states and local governments without charge, but within annual funding limitations, on request.	States, political subdivisions of States, other non-Federal public organizations and the public.	U.S. Army Corps of Engineers Attn: CECW-PF Washington, DC 20314-1000 (202) 761-0169
Flood Risk Reduction Program	The Flood Risk Reduction Program was established to allow farmers who voluntarily enter into contracts to receive payments on lands with high flood potential. In return, participants agree to forego certain USDA program benefits. These contract payments provide incentives to move farming operations from frequently flooded land.		Contact USDA, Farm Service Agency http://mimoso.itc.nrcs.usda.gov/scripts/ndi_sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Florida Coastal Protection Trust Fund	The purpose is to provide a mechanism to have financial resources immediately available for prevention of, and cleanup and rehabilitation after, a pollutant discharge, to prevent further damage by the pollutant, and to pay for damages.		Florida Statutes http://www.leg.state.fl.us/citizen/documents/statutes/1993/CHAPTER_376_11.html

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Florida Communities Trust	<p>Florida Communities Trust (FCT) is a State land acquisition grant program housed at the Florida Department of Community Affairs.</p> <p>FCT provides funding to local governments and eligible non-profit environmental organizations for acquisition of community-based parks, open space, and greenways that further outdoor recreation and natural resource protection needs identified in local government comprehensive plans. Matching and full grants for land acquisition projects are provided to communities through an annual competitive application cycle. Approximately \$66 million is available to eligible applicants each year, and applicants are eligible for up to 6.6 million or 10 percent of this amount.</p>		<p>2555 Shumard Oak Blvd Tallahassee, FL 32399-2100 (850) 922-2207 Fax: (850) 921-1747 E-mail: fcinfo@dca.state.fl.us http://www.dca.state.fl.us/ffct/</p>
Florida Hurricane Catastrophe Fund (FHCF)	<p>The purpose of the FHCF is to protect and advance the State's interest in maintaining insurance capacity in Florida by providing reimbursements to insurers for a portion of their catastrophic hurricane losses.</p>		<p>1801 Hermitage Blvd. Tallahassee, FL 32308 (850) 413-1349 Fax: (850) 413-1344 www.fsba.state.fl.us/fhcf/about.asp</p>
Hazard Mitigation Grant Program	<p>To prevent future losses of lives and property due to disasters, to implement State or local hazard mitigation plans, to enable mitigation measures to be implemented during immediate recovery from a disaster, and to provide funding for previously identified mitigation measures to benefit the disaster area.</p>	<p>State and local governments; certain private and nonprofit organizations or institutions; Native American tribes or authorized tribal organizations; and native villages or organizations.</p>	<p>Federal Emergency Management Agency Mitigation Directorate 500 AC@ St., SW Washington, DC 20472 (202) 646-4621 http://www.fema.gov/mit/</p>
Hazard Reduction Program	<p>Funding for research and related educational activities on hazards.</p>		<p>National Science Foundation, Directorate for Engineering, Division of Civil and Mechanical Systems, Hazard Reduction Program (703) 306-1360</p>
Hazardous Materials Assistance Program (Comprehensive Environmental Response, Compensation and Liability Act [CERCLA] Implementation)	<p>Provide technical and financial assistance through the States to support State, local, and tribal governments in oil and hazardous materials emergency planning and exercising. To support the Comprehensive Hazardous Materials Emergency Response – Capability Assessment Program activities.</p>	<p>State, local, and tribal governments, State emergency response committees, local emergency planning commissions.</p>	<p>Department of Homeland Security Emergency Preparedness and Response Directorate</p>

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Hazardous Materials Emergency Preparedness (HMEP) Grant	The HMEP grant program is intended to provide financial and technical assistance as well as national direction and guidance to enhance State, territorial, tribal, and local hazardous materials emergency planning and training. The HMEP Grant Program distributes fees collected from shippers and carriers of hazardous materials to emergency responders for hazmat training and to Local Emergency Planning Committees for hazmat planning.		Federal Emergency Management Agency 500 C St., SW Washington, DC 20472 http://www.fema.gov/
Hazardous Materials Emergency Preparedness Training and Planning Grants	Increase State, local, territorial, and Native American tribal effectiveness to safely and efficiently handle HazMat accidents and incidents, enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986, and encourage a comprehensive approach to emergency planning and training by incorporating response to transportation standards.	States, local, territorial, tribal governments	Department of Transportation Research and Special Programs Administration www.rspa.dot.gov
Hazardous Waste Management State Program Support	To assist State governments in the development and implementation of an authorized hazardous waste management program for the purpose of controlling the generation, transportation, treatment, storage, and disposal of hazardous wastes. State project to develop a hazardous waste program designed to meet the substantive and procedural requirements of an authorized program. (Section 3006).	State agencies responsible for hazardous waste management within the 50 states.	Grants Administration Division (3903R), Environmental Protection Agency, Washington, DC 20460
Hazardous Waste Worker Health and Safety	To assist organizations in the development of institutional competency through appropriate training and education to hazardous waste workers.		Department of Health and Human Services, Public Health Service National Institutes of Health Office of Extramural Outreach and Information National Institutes of Health 6701 Rockledge Dr., MSC 7910 Bethesda, MD 20892-7910 (301) 435-7910 http://www.nih.gov/

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Healthy Homes Demonstration Grants.	The purpose of the Healthy Homes Demonstration Program is to develop, demonstrate, and promote cost-effective, preventive measures to correct multiple safety and health hazards in the home environment that produce serious diseases and injuries in children of low-income families. The U.S. Department of Housing and Urban Development (HUD) is interested in reducing health threats to the maximum number of residents, especially children, in a cost efficient manner.	Eligible applicants include not-for-profit institutions; for-profit institutions (for-profit firms are not allowed to profit from the project) located in the U.S., State, and local governments; and Federally-recognized Native American tribes. Federal agencies and Federal employees are not eligible to apply for this program.	Ms. Ellen Taylor, Director, Healthy Homes Program. Office of Healthy Homes and Lead Hazard Control, (202) 755-1785, extension 116 E-mail: Ellen_R._Taylor@hud.gov
Historic Preservation Fund Grants-in-Aid	To provide matching grants to states for the identification, evaluation, and protection of historic properties by such means as survey, planning technical assistance, acquisition, development, and certain Federal tax incentives available for historic properties; to provide matching grants to States to expand the National Register of Historic Places; and to provide matching grants to the National Trust for Historic Preservation for its congressionally chartered responsibilities to preserve historic resources.	State and local governments and public and private nonprofit organizations and individuals.	Department of the Interior National Park Service, Preservation Heritage Services Division 1849 C Street, NW Washington, DC 20240 (202) 343-6004
Historic Preservation Grants	To assist in the identification, excavation, protection, and rehabilitation of historic and archaeological sites in Florida; to provide public information about these important resources; and to encourage historic preservation in smaller cities through the Florida Main Street program.	Departments or agencies of the State (including universities), cities, counties, and other units of local government, and not-for-profit organizations.	Division of Historical Resources 500 S. Bronough Street Tallahassee, FL 32399-0250 (850) 245-6300
Human Health Studies, Applied Research and Development	To solicit scientific proposals designed to answer public health questions arising from situations commonly encountered at hazardous waste sites. The objective of this research program is to fill gaps in knowledge regarding human health effects of hazardous substances identified during the conduct of Agency for Toxic Substances and Disease Registry's (ATSDR's) health assessments, consultations, toxicological profiles, and health studies, including but not limited to those health conditions prioritized by ATSDR.	State health departments.	Department of Health and Human Services Centers for Disease Control www.atsdr.cdc.gov

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Hurricane Loss Mitigation Program	Funds Residential Construction Mitigation Program, which was developed in coordination with an advisory council consisting of representatives designated from the Department of Insurance, Florida Home Builders Association, Florida Insurance Council, Federation of Manufactured Home Owners, Florida Association of Counties, and Florida Manufactured Housing Association.		2555 Shumard Oak Blvd Tallahassee, FL 32399-2100 (850) 410-1563 Fax: (850) 410-1555 E-mail: ted.court@dca.state.fl.us http://www.floridacommunitydevelopment.org/programs/rcmp/files/onepager.PDF
Hurricane Program	To significantly reduce the loss of life, property, economic disruption, and disaster assistance costs resulting from hurricanes.	Texas, Louisiana, Mississippi, Alabama, Florida.	Federal Emergency Management Agency Mitigation Directorate 500 AC@ St., SW Washington, DC 20472 (202) 646-4621 http://www.fema.gov/mit
Immunization Grants	To assist states and communities in establishing and maintaining preventative health service programs to immunize individuals against vaccine-preventable diseases.	States.	Department of Health and Human Services Centers for Disease Control www.cdc.gov
Immunization Research, Demonstration, Public Information and Education	To assist states, political subdivisions of states, and other public and private nonprofit entities to conduct research, demonstrations, projects, and provide public information on vaccine-preventable diseases and conditions.	States and nonprofit organizations.	Department of Health and Human Services Centers for Disease Control www.cdc.gov
Individual Assistance	To provide assistance to individuals and families who have been affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund.	Individuals and families.	Department of Homeland Security Emergency Preparedness and Response Directorate
Interoperable Communications Equipment Grant	To facilitate communications interoperability among public safety emergency responders at the State and local level.	State and local governments.	Department of Homeland Security Emergency Preparedness and Response Directorate
John D. and Catherine T. MacArthur Foundation	Initiates programs and supports their purposes including community development activities in Palm Beach County, Florida.	Open to non-profit, tax-exempt organizations.	John D. and Catherine T. MacArthur Foundation Program Area, Grants Management, Research and Information 140 S. Dearborn St., Suite 1100 Chicago, IL 60603-5285 (312) 726-8000 E-mail: 4answers@macfdn.com

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Land and Water Conservation Fund (LWCF)	LWCF is a competitive program that provides grants for acquisition or development of land for public outdoor recreation use.	All local governmental entities with the legal responsibility for the provision of outdoor recreational sites and facilities for the use and benefit of the public.	Department of Environmental Protection Division of Recreation & Parks Bureau of Design & Recreation Services 3900 Commonwealth Boulevard MS #585 Tallahassee, Florida 32399-3000 (850) 488-7896 (Suncom 278-7896) Fax: (850) 488-3665 (Suncom 278-3665)
Land Protection, Natural Resources Conservation Service (NRCS)	The NRCS provides technical and financial assistance for runoff retardation and soil erosion prevention as needed to reduce hazards to life and property from floods, drought, and the products of erosion on any watershed impaired by a natural disaster. NRCS provides technical assistance for rehabilitation of land conservation systems for which FSA provides cost-sharing, and emergency protection to assist in relieving imminent hazards to life and property from floods and products of erosion created by natural hazards that are causing a sudden impairment of a watershed.		Contact USDA http://mimosa.itc.nrcs.usda.gov/scripts/ndi_sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Local Firefighting and Emergency Services Training	To provide specialized training and equipment to enhance the capability of metropolitan fire and emergency service departments to respond to terrorist attacks. To enhance readiness and preparedness of fire and emergency services personnel to respond to terrorist incidents of mass destruction where incendiary devices, nuclear, biological, or chemical agents are utilized.	Applicants requesting funding must have the capability to develop and provide training for fire and emergency service personnel that will prepare them to respond to a terrorist incident.	Office of State and Local Domestic Preparedness Support, Office of Justice Programs, Department of Justice 633 Indiana Ave. NE Washington, DC 20531 (202) 616-2920
Local Initiatives Support Corporation (LISC)	Helps existing community development groups revitalize urban neighborhoods throughout the country. By combining investments, technical assistance, and grants, LISC seeks to increase the ability of experienced local development groups to design projects of significant scale, raise and manage necessary capital, and work effectively with their natural allies in the private sector.	Available upon request.	John Mascotte, Chairman of the Board, or Paul S. Grogan, President Local Initiatives Support Corporation 733 3 rd Ave. New York, NY 10017 (212) 455-9800
Map Modernization	This funding provides assistance to develop digital flood maps, support flood-mapping activities, and expand the Cooperating Technical Partners Program to communities and regional entities.	State, local, and tribal governments.	Department of Homeland Security Emergency Preparedness and Response Directorate

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
National Fire Academy Educational Program	To increase the professional level of the fire service and others responsible for fire prevention and control. Students are provided an opportunity to attend courses at the National Fire Academy resident facility or at a convenient off-campus location with a minimal cost to the individual or the fire department represented. The increase in the number of students attending impacts the professional level of fire service personnel. Training is provided at the resident facility in Emmitsburg, Maryland, and in the field in cooperation with State or local fire training agencies on specific subjects to specific audiences.	Any individual who is a member of a fire department or has significant responsibility for fire prevention and control.	National Emergency Training Center, Educational and Technology Services Branch 16825 S. Seton Ave. Emmitsburg, MD 21727 (301) 447-1000
National Fire Academy Training Assistance (Student Stipend Reimbursement Program)	To provide travel stipends to students attending Academy courses. Examples of funded projects: students are provided an opportunity to attend courses at the National Fire Academy resident facility with a minimal cost to the individual or the fire department represented. The increase in the number of students attending impacts the professional level of fire service personnel.	Any student who is a member of a fire department or has significant responsibility for fire prevention and control and has been accepted into an eligible course at the National Fire Academy may apply for stipend reimbursement.	National Emergency Training Center, Educational and Technology Services Branch, 16825 S. Seton Ave Emmitsburg, MD 21727 (301) 447-1035
National Flood Insurance Program	Provides federally-backed flood insurance to those who generally were not able to obtain it from the private-sector companies, and to promote sound floodplain management practices in flood prone areas.		FEMA Region IV CRS Program 3003 Chamblee-Tucker Rd. Atlanta, GA 30431 (770) 220-5200
National Flood Mitigation Fund	To fund activities designed to reduce the risk of flood damage.	States and units of local government. Local governments must be participating in the National Flood Insurance Program.	Federal Emergency Management Agency Mitigation Directorate 500 AC@ St., SW Washington, DC 20472 (202) 646-4621 http://www.fema.gov/mit

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
National Hospital Bioterrorism Preparedness Grant	HRSA is providing financial assistance to authorized jurisdictions through the National Hospital Bioterrorism Preparedness Program's Cooperative Agreements to upgrade the preparedness of the Nation's health care system to respond to bioterrorism, other outbreaks of infectious disease, and other public health threats and emergencies. Awardees are required to address the following priority areas: hospital bed capacity, isolation capacity, health care personnel, hospital-based pharmaceutical caches, mental health services, trauma and burn care capacity, communications and information technology, personal protective and decontamination equipment, emergency medical services, linkages with public health departments, education and training, and preparedness exercises.	Public Health Departments in all 50 States Territories (USVI, Guam, Puerto Rico, American Samoa, N. Marianas Islands) Freely Associated States of the Pacific (Federated States of Micronesia, Marshall Islands, Palau) New York, NY, Los Angeles County, CA, Chicago, IL, District of Columbia.	National Bioterrorism Hospital Preparedness Program Contacts Parklawn Building, Room 18A-38 5600 Fishers Lane Rockville, MD 20857 Fax: (301) 443-1296
National Weather Service	Provides weather and flood warnings, public forecasts, and advisories for all of the United States and territories. Technical assistance is provided to local, regional, and State agencies developing and operating warning programs.		National Weather Service, National Oceanic and Atmospheric Administration 1325 East-West Highway Silver Spring, MD 20910 http://www.nws.noaa.gov
National Institute of Environmental Health Services Hazardous Waste Worker Health and Safety Training (Superfund Worker Training Program)	To provide cooperative agreements and project grant support for the development and administration of model worker health and safety training programs consisting of classroom and practical health and safety training of workers and their supervisors, who are engaged in activities related to hazardous materials, hazardous waste generation, treatment, storage, disposal, removal, containment, transportation, or emergency response. Programs provide health and safety training and education for occupational population involved in waste handling and processing at active and inactive hazardous substance treatment, storage, and disposal facilities; cleanup, removal, containment, or remedial action at waste sites; hazardous substance emergency response; hazardous substance disposal site risk assessment and investigation, remedial actions, or clean-up by State and local personnel; and transportation of hazardous wastes.	A public or private nonprofit entity providing worker health and safety education and training may submit an application and receive a cooperative agreement or project grant for support of waste worker education and training by a named principal investigator. Nonprofit organizations that are incorporated under 501(c)(4) are prohibited from receiving grants.	Grants Management Contact: Dorothy G. Williams, Grants Management Officer, Grants Management Branch, Division of Extramural Research and Training, National Institute of Environmental Health Sciences, National Institutes of Health, Department of Health and Human Services P.O. Box 12233 Research Triangle Park, NC 27709 (919) 541-2749 E-mail: Williams@niehs.nih.gov

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
National Institute of Environmental Health Sciences (NIEHS) Superfund Hazardous Substances: Basic Research and Education (NIEHS Superfund Research Program)	It is intended to integrate advanced or graduate training into the multidisciplinary research program to provide for training in environmental and occupational health and safety; the engineering aspects of hazardous waste control; and graduate training in the geosciences. This interdisciplinary program supports basic research in the following: development and use of methods and technologies to detect hazardous substances in the environment; development of advanced techniques for the detection, assessment, and evaluation of the effects of human health presented by hazardous substances; and the development and use of basic biological, chemical, and physical methods and technologies to reduce the amount of toxicity of hazardous substances.	An accredited institution of higher education, as defined in the Higher Education Act, 20 U.S.C. (annotated) 3381, may submit an application and receive a grant for support of research by a named principal investigator. Nonprofit organizations that are incorporated under 501(c)(4) are prohibited from receiving grants.	Grants Management Contact: Dorothy G. Williams, Grants Management Officer, Department of Health and Human Services P.O. Box 12233 Research Triangle Park, NC 27709 (919) 541-2749 E-mail: Williams@niehs.nih.gov
Non-Structural Alternatives to Structural Rehabilitation of Damaged Flood Control Works	Direct planning and construction grants for non-structural alternatives to the structural rehabilitation of flood control works damaged in floods or coastal storms (\$9 million FY 99).		Department of Defense-U.S. Army Corps of Engineers (USACE) Emergency Management contact in respective USACE field office South Atlantic (404) 331-6795
North American Wetlands Conservation Act (NAWCA) Grant Program	The North American Wetlands Conservation Act Grant Program promotes long-term conservation of North American wetland ecosystems, waterfowl and other migratory birds, fish, and wildlife that depend upon such habitat. Principal conservation actions supported by NAWCA are acquisition, enhancement, and restoration of wetlands and wetlands-associated habitat. The program encourages voluntary, public-private partnerships to conserve North American wetland ecosystems by creating an infrastructure and providing a source of funding.	Public or private, profit or non-profit entities or individuals establishing public-private sector partnerships.	Department of the Interior Fish and Wildlife Service, North American Waterfowl and Wetlands Office 4401 N. Fairfax Dr., Rm. 110 Arlington, VA 22203 (703) 358-1784 http://www.fws.gov/~r9nawwo/homepag.html
Office of Domestic Acquisition Program (ODP)	The goal of the ODP Equipment Grant Program is to provide funding to enhance the capacity of State and local jurisdictions to respond to, and mitigate the consequences of, incidents of domestic terrorism involving the use of weapons of mass destruction.	All 50 states, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, the Commonwealth of Northern Mariana Islands (CNMI), Guam, and the U.S. Virgin Islands.	ODP Help Line at (800) 368-6498

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Outdoor Recreation: Acquisition, Development and Planning (Land and Water Conservation Fund Grants)	To provide financial assistance to the states and their political subdivisions for the preparation of Statewide Comprehensive Outdoor Recreation Plans (SCORPs) and acquisition and development of outdoor recreation areas and facilities for the general public, to meet current and future needs. Examples of funded projects: acquisition and development grants may be used for a wide range of outdoor recreation projects, such as picnic areas, inner city parks, campgrounds, tennis courts, boat launching ramps, bike trails, outdoor swimming pools, and support facilities such as roads, water supply, etc.	For planning grants, only the State agency formally designated by the Governor or State law as responsible for the preparation and maintenance of the SCORP is eligible to apply. For acquisition and development grants, the above designated agency may apply for assistance for itself, or on behalf of other State agencies or political subdivisions, such as cities, counties, and park districts.	Chief, Recreation Program, National Park Service, (2225), Department of the Interior 1849 C Street, NW, Room 3624 Washington, DC 20240 (202) 565-1133
Partners for Fish and Wildlife	Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats.		Department of Interior – Fish and Wildlife Service National Coordinator, Ecological Services: (703) 358-2201 A list of State and regional contacts is available from the National Coordinator upon request.
Physical Disaster Loans and Economic Injury Disaster Loans	Disaster loans to non-farm, private sector owners of disaster damaged property for uninsured losses. Loans can be increased by up to 20 percent for mitigation purposes.		Small Business Administration National Headquarters Associate Administrator for Disaster Assistance: (202) 205-6734
Planning Assistance to States (Section 22)	To cooperate with any state in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources of drainage basins located within the boundaries of such state. The state must have a planning program for the development, utilization, or conservation of the water and related land resources underway or laid out in sufficient detail so that the relationship of a state's request for Corps input for some particular aspect of the program may be appraised.	The 50 states.	U.S. Army Corps of Engineers Attn: CECW-PF Washington, DC 20314-1000 (202) 272-0169
Planning Assistance to States Program	To assist the states in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources. Floodplain management services intended to assist states in planning related to water supply, water quality, water conservation, environmental restoration and enhancement, hydropower	States, District of Columbia, U.S. Territories, and federally recognized Native American tribes.	Department of Defense U.S. Army Corps of Engineers Attn: CECW-PM DoD Washington, DC 20314-1000 (202) 272-0169 http://www.usace.army.mil/

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
	development, flood control, or erosion and navigation.		
Port Security Grants for Critical National Seaports	To support efforts of critical national seaports/terminals to enhance port security through security assessments and mitigation strategies; and enhanced facility and operational security (e.g., terminal, commuter, or ferry vessels access control, physical security, cargo security, and passenger security), including proof of concepts.	Public and private ports or terminals; State/local government entities; and consortiums composed of local stakeholder groups (i.e., river groups, ports, and terminal associations). Private entities will be considered when security interests related to location and/or operation affects the greater public interest. Consultants may prepare applications for an eligible party, but only the eligible party may submit and be considered for the grant. Prerequisites: for Enhanced Facility and Operational Security grants, applicants must have already completed a security assessment and tie the security enhancements to the assessment.	Transportation Security Administration Headquarters, Office of Maritime and Land Security, Grants/Contracts Management Branch, TSA-8 701 South 12th Street Arlington VA 22202 Tony Corio tony.corio@dhs.gov (571) 227-1233
Post-Disaster Economic Recovery Grants and Assistance	Grant funding to assist with the long-term economic recovery of communities, industries, and firms adversely impacted by disasters.		Department of Commerce – Economic Development Administration (EDA) EDA Headquarters Disaster Recovery Coordinator: (202) 482-6225
Pre-Disaster Mitigation Program	This program provides funding for mitigation activities before disasters strikes. In recent years it has provided assistance for mitigation planning. In FY 03, Congress passed a competitive pre-disaster mitigation grant program that will include project funding.	State, local, and tribal government.	Department of Homeland Security Emergency Preparedness and Response Directorate
Project Modifications for Improvement of the Environment	Provides for ecosystem restoration by modifying structures and/or operations or water resources projects constructed by the USACE, or restoring areas where a USACE project contributed to the degradation of an area.		Department of Defense (DOD)-USACE Chief of Planning @ appropriate USACE Regional Office South Atlantic: (404) 331-6270
Property Improvement Loan Insurance for Improving All Existing Structures and Building of New Nonresidential Structures (Title I)	To facilitate the financing of improvements to homes and other existing structures and the building of new nonresidential structures. Insured loans may be used to finance alterations, repairs, and improvements for existing structures and the building of new nonresidential structures that substantially protect or improve the basic livability or utility of the properties.	Eligible borrowers include the owner of the property to be improved, lessee having a lease extending at least 6 months beyond maturity of the loan, or a purchaser of the property under a land installment contract.	Persons are encouraged to contact the Homeownership Center serving their state, or nearest local HUD office.

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Protection of Essential Highways, Highway Bridge Approaches, and Public Works (Emergency Bank Protection)	To provide bank protection of highways, highway bridges, essential public works, churches, hospitals, schools, and other nonprofit public services endangered by flood-caused erosion. Reinforced barriers at either side of bridge approachments. Corps of Engineers designs and constructs the project. Nonfederal sponsor must share in projects costs, including cash and lands, easements, right-of-way and utility relocations; hold and save the United States free from damages; and maintain the project at local cost after completion.	States, political subdivisions of states or other responsible local agencies established under State law with full authority and ability to undertake necessary legal and financial responsibilities.	U.S. Army Corps of Engineers Attn: CECW-PM Washington, DC 20314-1000 (202) 272-1975
Protection of Forests and Rangelands	The Forest Service (FS) sets priorities, establishes policies, and provides financial and technical assistance to State Foresters. The FS provides technical and financial assistance to State Foresters in mitigating and improving their fire suppression capability, and serves as a technical fire advisor to FEMA in the Fire Suppression Assistance Program.	Federal and State agencies and organizations, and State and private lands.	Contact USDA http://mimoso.itc.nrcs.usda.gov/scripts/ndi/sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Public Assistance	To provide supplemental assistance to states, local governments, and certain private nonprofit organizations to alleviate suffering and hardship resulting from major disasters or emergencies declared by the President.	State and local governments and any political subdivision of a state, Native American tribes, and native villages are eligible. Also eligible are private nonprofit organizations that operate educational, utility, emergency, or medical facilities and provide custodial care or other essential services of governmental nature to the general public.	Federal Emergency Management Agency Infrastructure Support Division, Response and Recovery Directorate 500 AC@ St., SW Washington, DC 20472 (202) 646-3026 http://www.fema.gov/mit/
Public Health and Social Services Emergency Fund	To continue to prepare our nation's public health system and hospitals for possible mass casualty events, and to accelerate research into new treatments and diagnostic tools to cope with possible bioterrorism incidents.	Individuals, families, Federal, State, and local government agencies and emergency health care providers.	Department of Health and Human Services www.hhs.gov
Public Housing Modernization Reserve for Disasters and Emergencies	Funding to public housing agencies for modernization needs resulting from natural disasters (including elevation, floodproofing, and retrofit).		HUD Director, Office of Capital Improvements: (202) 708-1640

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Radiation Control: Training Assistance and Advisory Counseling	To assist states in achieving, maintaining, and improving their capabilities to conduct radiation control programs. This will assure that State programs established through agreements with NRC for transfer of certain NRC regulatory authority over atomic energy materials to the states will continue to be adequate to protect health and safety and be compatible with NRC's regulatory program. Training is made available to personnel of State and local governments in order to improve the radiological health training of staff members responsible for carrying out radiation control programs. Courses are provided in health physics and radiation protection, safety aspects of using radioactive materials, regulatory practices and procedures, and compliance inspection.	State and local government agencies that are or will be responsible for administering radiation control programs under an agreement with NRC for assumption by the State of regulatory authority initially exercised by the NRC.	Brenda Usilton, Office of State Programs, Nuclear Regulatory Commission, Washington, DC 20555 (301) 415-2348
Recreation Development Assistance Program	Florida Recreation Development Assistance Program (FRDAP) is a competitive program that provides grants for acquisition or development of land for public outdoor recreational use or to construct or renovate recreational trails.	Municipal and county governments or other legally constituted entities with the legal responsibility to provide public outdoor recreation.	Bureau of Design and Recreation Services 3900 Commonwealth Boulevard Mail Station #585 Tallahassee, Florida 32399-3000 (850) 488-7896 (Suncom 278-7896) Fax: (850) 488-3665 (Suncom Fax 278-3665)
Rehabilitation Mortgage Insurance (203[k])	To help families repair or improve, purchase and improve, or refinance and improve existing residential structures more than 1 year old. HUD insures lenders against losses on loans. These loans may be used to rehabilitate an existing one to four unit dwelling in one of four ways: purchase a structure and the land on which the structure is located and rehabilitate it; purchase a structure on another site, move it onto a new foundation on the mortgaged property, and rehabilitate it; refinance the existing indebtedness and rehabilitate such a structure; or rehabilitate such a structure.	Individual purchasers or investors are eligible to apply.	Persons are encouraged to contact the Homeownership Center serving their State, or the nearest local HUD office.

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Rural Development Assistance -- Utilities	Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.		USDA-Rural Utilities Service Program Support: (202) 720-1382 Northern Regional Division: (202) 720-1402 Electric Staff Division: (202) 720-1900 Power Supply Division: (202) 720-6436
Rural Development Assistance – Housing	Grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary.		USDA-Rural Housing Service Community Programs: (202) 720-1502 Single Family Housing: (202) 720-3773 Multi Family Housing: (202) 720-5177
School Emergency Response and Crisis Management Plan Discretionary Grant Program	To provide school districts with funds to strengthen and improve current school crisis plans in preparation for emergencies including potential terrorist attacks.	School districts.	Department of Education www.ed.gov/emergencyplan/
Section 108 Loan Guarantee Program	Loan guarantees to public entities for community and economic development (including mitigation measures).		HUD Community Planning and Development staff at appropriate HUD field office, or the Section 108 Office at HUD Headquarters: (202) 708-1871
Small Business Administration (SBA) Pre-Disaster Mitigation Loan Program	The purpose of the Pre-Disaster Mitigation Loan Program is to make low-interest, fixed-rate loans to eligible small businesses for the purpose of implementing mitigation measures to protect business property from damage that may be caused by future disasters. The program is a pilot program, which supports FEMA's Pre-Disaster Mitigation Program. SBA's Pre-Disaster Mitigation Program is available to businesses whose proposed mitigation measure conforms to the priorities and goals of the mitigation plan for the community, as defined by FEMA, in which the business is located.		Disaster Area 2 Office One Baltimore Place, Suite 300 Atlanta, GA 30308 1-800-359-2227 http://www.sba.gov/disaster_recov/loaninfo/pre_disaster_mitigation.html
Small Cities Community Development Block Grant Program	Provides funds to rural communities to improve local housing, streets, utilities, and public facilities. The Section 108 Loan Guarantee Program offers local governments a source of financing for economic development, large-scale public facility projects, and public infrastructure.		Ian Smith (850) 922-1870 Susan Cook (850) 487-3644 Rick Stauts, Planning Manager with the Department of Community Affairs (850) 487-3644

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Snagging and Clearing for Flood Control (Section 208)	To reduce flood damages. Corps of Engineers designs and constructs the project. The nonfederal sponsor must provide all lands, easements, and rights-of-way; provide all project costs in excess of the Federal limit of \$500,000; agree to maintain project after construction; hold and save the United States free from damages; provide a contribution toward construction costs for land enhancement or special benefits; agree to prevent future encroachment, which might interfere with proper functioning of the project for flood control.	States, political subdivisions of states, or other responsible local agencies established under State law with full authority and ability to undertake necessary legal and financial responsibilities.	U.S. Army Corps of Engineers Attn: CECW-PM Washington, DC 20314-1000 (202) 272-1975
South Florida Coastal Ecosystem Program	To seek the most technically sound and cost effective proposals that specifically address priority issues within South Florida's coastal ecosystem, such as restoring and enhancing degraded coastal uplands and estuarine wetlands, removing exotic vegetation from coastal areas and promoting research and public awareness of South Florida's ecological problems, to identify opportunities in which partnerships can be formed to create, restore and enhance coastal resources, and to develop partnerships among Federal, State, and local governments as well as academic, non-governmental, and business entities in South Florida.	Federal, State, and local government agencies, academic institutions, non-profit groups, and/or citizens are eligible to respond directly.	U.S. Fish & Wildlife Service South Florida Ecological Services Office 1339 20 th Street Vero Beach, Florida 32960-3559
Special Economic Development and Adjustment Assistance Program - Sudden and Severe Economic Dislocation and Long Term Economic Deterioration	To help State and local areas develop and/or implement strategies designed to address structural economic adjustment problems resulting from sudden and severe economic dislocation such as plant closings, military base closures, and defense contract cutbacks, and natural disasters, or from long-term economic deterioration in the area's economy.	States, cities, counties, or other political subdivisions of a State, consortia of such political subdivisions, public or private nonprofit organizations representing redevelopment areas designated under the Public Works and Economic Redevelopment Act of 1965, Economic Development Districts established under Title IV of the Act, and Native American tribes.	Department of Commerce Economic Adjustment Division, Economic Development Administration Room H7327, Herbert C. Hoover Bldg. Washington, DC 20230 (202) 482-26659 http://www.doc.gov/eda/
State Disaster Preparedness Grants (Disaster Preparedness Improvement Grants)	To assist states in developing and improving State and local plans, programs, and capabilities for disaster preparedness and prevention. Improvement grants have produced a variety of products such as mitigation training courses, enhanced State preparedness efforts, revised assistance, and hazard mitigation plans.	All states are eligible.	C. Dwight Poe, State and Local Preparedness, Training, and Exercises Directorate, Federal Emergency Management Agency Washington, DC 20472 (202) 646-3492

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
State Domestic Preparedness Equipment Support Program	Funding will be provided to enhance first responder capabilities, and to provide for equipment purchases and exercise planning activities for response to Weapons of Mass Destruction domestic terrorist incidents.	State and local governments.	Department of Justice Office of Domestic Preparedness www.usdoj.gov
State Homeland Security Grant Program	To provide for the purchase of specialized equipment to enhance the capability of State and local agencies to prevent and respond to incidents of terrorism involving the use of chemical, biological, radiological, nuclear or explosive (CBRNE) weapons; for the protection of critical infrastructure and prevention of terrorist incidents; for costs related to the design, development, conduct, and evaluation of CBRNE exercises; for costs related to the design, development, and conduct, of a State CBRNE Training Program; and for costs associated with updating and implementing each state's Homeland Security Strategy.	State and local governments; first responders.	Department of Homeland Security Border and Transportation Security Directorate www.ojp.usdoj.gov
State and Local All Hazards Emergency Operations Planning	The purpose of the State and Local All Hazards Emergency Operation Planning Program is to supplement and assist State and local efforts to prepare themselves to respond to emergencies or disasters including any that may be caused by terrorist attacks using conventional means or Weapons of Mass Destruction. Such preparedness requires an extraordinary level of inter-service and inter-jurisdictional planning and coordination. The program provides grants to the states to encourage the development or updating of comprehensive, all-hazard emergency management plans by the states and by local governments. The requisite planning base supports and promotes efforts to establish lasting working relationships and facilitates the development of a common incident command system, general availability of interoperable communications, and effective mutual aid. In partnership with the Federal Government, strong emergency management and emergency services organizations at the State and local levels ensure the continuance of a comprehensive national emergency management system for disasters or emergencies resulting from natural disasters or accidental or man-made events.	States are eligible to apply for assistance under this program. For purposes of this program and consistent with the Stafford Act, 42 U.S.C. 5122(4), "state" means any state of the United States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. Local governments may receive assistance as subgrantees to the states in which they are located. The term "local government" as used in this program has the meaning set forth in the Stafford Act, 42 U.S.C. 5122(6).	Gil Jamieson, Federal Emergency Management Agency, Office of National Preparedness 500 C Street, SW Washington, DC 20472 (202) 646-4090 E-mail: gil.jamieson@fema.gov Fax: (202) 646-4053 24-hour per day FEMA Telephone Operator Service is available at (202) 566-1600 http://www.fema.gov

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
State and Local Anti-Terrorism Training	To provide delivery of specialized, multi-agency anti-terrorism preparedness training. This training, along with related research, law enforcement intelligence, operational issues development, and technical assistance support activities, is delivered to State and local law enforcement and prosecution authorities. While State and local law enforcement preparation and readiness issues addressed in this project are tailored to interventions in domestic terrorism, major portions of the program's preparedness and operational readiness outcomes are equally applicable to any terrorist threat or incident whether domestically or internationally inspired.	State and local law enforcement and prosecution authorities.	Office of Justice Programs, Bureau of Justice Assistance, Department of Justice 810 Seventh Street, NW Washington, DC 20531 Contact: Program Development Division (202) 514-5943 www.usdoj.gov/bja
State and Local Domestic Preparedness Exercise Support	To enhance the capacity of State and local first responders to respond to a weapons of mass destruction terrorism incident involving chemical, biological, nuclear, radiological, incendiary, and explosive devices.	Eligible applicants are public or private organizations with the expertise and experience to provide assistance to State and local jurisdictions; to facilitate, conduct, and evaluate exercises; and/or to develop guidance, materials, and publications related to the conduct of exercises or lessons learned.	Office for Domestic Preparedness, Office of Justice Programs U.S. Department of Justice 810 Seventh Street, NW Washington, DC 20531 (202) 305-9887 http://www.ojp.usdoj.gov
State and Local Domestic Preparedness Technical Assistance	To enhance the capacity of State and local first responders to respond to a weapons of mass destruction terrorism incident involving chemical, biological, nuclear, radiological, incendiary, and explosive devices. The program goals are to enhance the ability of State and local jurisdictions to develop, plan, and implement a program for weapons of mass destruction preparedness and to sustain and maintain specialized equipment.	Applicants may be public or private organizations with the expertise and experience to provide a specialized service or a full range of assistance to enhance the capacity of State and local emergency response agencies to respond to a weapons of mass destruction terrorism incident.	Office for Domestic Preparedness, Office of Justice Programs U.S. Department of Justice 810 Seventh Street, NW Washington, DC 20531 (202) 305-9887 http://www.ojp.usdoj.gov
State Rural Hospital Flexibility Program	To help states work with rural communities and hospitals to develop and implement a rural health plan, designate critical access hospitals, develop integrated networks of care, improve emergency medical services, and improve quality, service, and organizational performance.	States with at least one hospital in a non-metropolitan region.	Department of Health and Human Services Health Resources and Services Administration www.ruralhealth.hrsa.gov

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Stewardship Incentives Program	The Stewardship Incentives Program provides technical and financial assistance to encourage non-industrial private forest landowners to keep their lands and natural resources productive and healthy. Qualifying land includes rural lands with existing tree cover or land suitable for growing trees and which is owned by a private individual, group, association, corporation, Native American tribe, or other legal private entity. Eligible landowners must have an approved Forest Stewardship Plan and own 1,000 or fewer acres of qualifying land. Authorization may be obtained for exceptions of up to 5,000 acres.		Contact USDA, Forest Service http://mimoso.itc.nrcs.usda.gov/scripts/ndi/sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Surface Transportation Program (STP)	The STP provides flexible funding that may be used by States and localities for projects on any Federal-aid highway, including the National Highway System, bridge projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities. A portion of funds reserved for rural areas may be spent on rural minor collectors. Eligible activities include environmental restoration and pollution abatement projects, including retrofit or construction of stormwater treatment facilities and natural habitat mitigation.		Florida Department of Transportation
Superfund Hazardous Substances Basic Research and Education	To establish and support an innovative program of basic research and training consisting of multi-project, interdisciplinary efforts that may include each of the following: methods and technologies to detect hazardous substances in the environment; advance techniques for the detection, assessment, and evaluation of the effects of hazardous substances on humans; methods to assess the risk to human health presented by hazardous substances; and basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances.	Any public or private entity involved in the detection, assessment, evaluation, and treatment of hazardous substances; and State and local governments.	Department of Health and Human Services National Institute of Health www.nih.gov

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Surveillance of Hazardous Substance Emergency Events	To assist State health departments in developing a State-based surveillance system for monitoring hazardous substance emergency events. This surveillance system will allow the State health department to better understand the public health impact of hazardous substance emergencies by developing, implementing, and evaluating a State-based surveillance system	State, local, territorial, and tribal public health departments.	Department of Health and Human Services Centers for Disease Control www.atsdr.cdc.gov
Surveys, Studies, Investigations, Training Demonstrations and Educational Outreach	Grants are awarded to support Surveys, Studies, Investigations, Training Demonstrations, Educational Outreach and Special Purpose assistance relating to the protection of public health and the environment from potential risk from toxic chemicals to come. Funding priority: annual funding priority topics for FY 2003 include, but are not limited to, promotion of pollution prevention and the public's right to know about chemical risks, evaluation of pesticides and chemicals to safeguard all Americans, including children and other vulnerable members of the population, as well as our most threatened species and ecosystems from environmental harm and emerging issues like biotechnology, endocrine disruptors, and lead poisoning prevention.	Assistance under this program is generally available to states, U S territories or possessions, federally recognized Native American tribal governments and organizations, public and private universities and colleges, hospitals, laboratories, and other public or private nonprofit institutions and individuals. Non-profit organizations described in Section 501(c)(4) of the Internal Revenue Code that engage in lobbying activities as defined in Section 3 of the Lobbying Disclosure Act of 1995 are not eligible to apply.	EPA, Office of Prevention, Pesticides, and Toxic Substances 1200 Pennsylvania Avenue, NW Washington, DC 20460
Sustainable Development Challenge Grants	To catalyze community-based and regional projects and other actions that promote sustainable development, thereby improving environmental quality and economic prosperity; leverage significant private and public investments to enhance environmental quality by enabling community sustainability efforts to continue past Environmental Protection Agency funding; build partnerships that increase a community's long-term capacity to protect the environment through sustainable development; and enhance the Environmental Protection Agency's ability to provide assistance to communities and promote sustainable development, through lessons. Examples of funded projects: from Grassroots to Tree Roots – Sustaining Forestry in New Hampshire promotes using better forest management practices to protect environmental quality and sustain the State's timber industry. Mid-City Green Project Building Materials	Eligible applicants include community groups and other nonprofit organizations, local governments, universities, tribes, and states.	Office of Air and Radiation Environmental Protection Agency Program Contact: Pamela Hurt (202) 260-2441

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
	Exchange will expand its current Paint Exchange into a full-scale building materials exchange to reduce the amount of discarded construction materials waste in the New Orleans area and encourage urban renewal. This will be accomplished through construction materials recovery, transformation, and low-cost resale; neighborhood rehabilitation promotion; creative reuse; and education.		
Transfers of Inventory Farm Properties to Federal and State Agencies for Conservation Purposes	Transfers title of certain inventory farm properties owned by Farm Service Agency to Federal and State agencies for conservation purposes (including the restoration of wetlands and floodplain areas to reduce future flood potential).		U.S. Department of Agriculture – Farm Service Agency Farm Loan Programs National Office: (202) 720-3467 extension 1632
Transportation Enhancements Program	Transportation enhancements are transportation-related activities that are designed to strengthen the cultural, aesthetic, and environmental aspects of the nation's intermodal transportation system. Eligible projects include environmental mitigation to address water pollution due to highway runoff or reduce vehicle-caused wildlife mortality while maintaining habitat connectivity.		Florida Department of Transportation
Trauma/Emergency Medical Services Grant	To improve the nation's overall emergency medical system, including the joint efforts between HRSA and National Highway Traffic Safety Administration to assess State systems and recommend improvements to the current system.		Rick Smith (301) 443-5372 rsmith@hrsa.gov
Urban Park and Recreation Recovery Program	To provide Federal grants to local governments for the rehabilitation of recreation areas and facilities, demonstration of innovative approaches to improve park system management and recreation opportunities, and development of improved recreation planning. Rehabilitation grants have been awarded to renovate a wide variety of existing community park and recreation facilities. Innovation grants have been awarded to demonstrate unique and cost-effective methods for providing better recreation services.	Eligible applicants are cities and counties meeting the eligibility requirements. Eligibility is based on need, economic and physical distress, and the relative quality and condition of urban recreation facilities and systems.	National Park Service, Recreation Programs 1849 C Street, NW, Room 3624 Washington, DC 20240 Contact: Ken Compton (202) 565-1133

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
U.S. Army Corps of Engineers	Provide planning and technical assistance to local governments to address local flood problems. The Floodplain Management Service Program and Planning Assistance to States Program can help local governments develop their own plans and initiate floodplain management actions. Under these programs, the Corps can provide flood data and carry out certain local studies.		http://www.usace.army.mil http://www.saw.usace.army.mil
U.S. Geological Survey	Assists states and local governments in maintaining stream gauge stations. In addition, the agency has prepared inundation maps in many communities. These quadrangle floodplain maps of flood prone areas are often used to delineate the approximate floodplain boundaries on the maps FEMA has provided to local governments.		Florida Geological Survey http://www.usgs.gov
Volunteer Fire Assistance (VFA) Grants	The purpose of the VFA Program, formerly known as the Rural Community Fire Protection Program, is to provide Federal financial, technical, and other assistance to State foresters to organize, train, and equip fire departments in rural areas and rural communities to prevent and suppress fires.	<p>A single fire department serving a rural area or a rural community with a population of 10,000 or less is eligible (latest census).</p> <p>Area fire departments (fire districts, townships, etc.) may serve an aggregate population of greater than 10,000 as long as the service area of the fire department includes a rural area or a rural community having a population of 10,000 or less. The VFA funding must be used to benefit the rural population.</p> <p>A single county or town with a population over 10,000 that is served by two or more fire districts operating entirely within the bounds of the county or town may qualify as long as the service area of a given fire department includes a rural area or a rural community or the population of the fire department's jurisdiction is 10,000 or less. The VFA funding must be used for the rural area.</p> <p>A single community with a population greater than 10,000 and having a single fire department with one or more fire stations may</p>	Forest Protection Bureau Division of Forestry 3125 Conner Boulevard Tallahassee, FL 32399-1650 (850) 488-6111

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Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
		<p>qualify. The fire department must have a service area that includes a rural area or community that does not exceed 10,000 in population. The VFA funding must be used only for the benefit of the rural population. Similarly a single community with a population greater than 10,000, which also provide fire protection to an adjoining rural community of 10,000 or less population by contract, also may be eligible, provided the VFA funding is used entirely to support the rural community.</p> <p>A single community fire department serving a population greater than 10,000 and not providing protection to a rural area or to a rural community is not eligible for VFA financial assistance.</p>	
Wallace Global Fund	<p>The Wallace Global Fund supports initiatives that promise to advance globally sustainable development in some fundamental way. The Fund seeks to maximize its impact by investing its resources in projects that meet the following criteria: tackle root problems that impede progress toward a sustainable future; propose compelling strategies for promoting environmentally and/or socially sustainable development, such as leveraging additional financial resources, catalyzing policy change, implementing innovative programs; offer potential for significant impact at the global level; and require private money, at least initially.</p>		<p>http://www.wgf.org/program_criteria.html</p>
Water Pollution Control: State and Interstate Program Support (106 Grants)	<p>To assist states and interstate agencies in establishing and maintaining adequate measures for prevention and control of surface and ground water pollution. Grants are made to states and tribes for the administration of State and tribal programs for the prevention, reduction, and control of pollution. Activities funded include administration of State and Tribal Water Quality Standards programs; National Pollutant Discharge Elimination System permit programs; and compliance and enforcement, monitoring, and hazardous materials spills response. Broad support for the</p>	<p>Eligible entities include State and interstate water pollution control agencies as defined in the Federal Water Pollution Control Act.</p>	<p>Carol Crow, State and Interstate Agencies, Section 106 Coordinator, Section 106, Office of Wastewater Management (4201), Office of Water, Environmental Protection Agency Washington, DC 20460 (202) 260-6742</p>

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
	prevention and abatement of surface and ground water pollution from point and non-point sources including water quality planning, monitoring, water quality standards, assessments, permitting, pollution control studies, planning, surveillance and enforcement; advice and assistance to local agencies; training; and public information.		
Water Quality Program Management	To improve water quality.		Environmental Protection Agency Office of Water Office of Wastewater Management (4201), Office of Water Washington, DC 20460
Watershed Operations -Small Watershed Program and Flood Prevention Program (WF 08 or FP 03)	The Small Watershed Program works through local government sponsors and helps participants solve natural resource and related economic problems on a watershed basis. Projects include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement, wetlands creation and restoration, and public recreation in watersheds of 250,000 or fewer acres. Both technical and financial assistance are available.		Contact USDA, Natural Resources Conservation Service http://mimosas.itc.nrcs.usda.gov/scripts/ndi_sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Watershed Protection and Flood Prevention	To provide technical and financial assistance in carrying out works of improvement to protect, develop, and utilize the land and water resources in small watersheds.	Any State agency, county or groups of counties, municipality, town or township, soil and water conservation district, flood prevention or flood control district, Indian tribe or tribal organization, or any other non-profit agency with authority under State law to carry out, maintain, and operate watershed works of improvement may apply for assistance.	U.S. Department of Agriculture Natural Resources Conservation Service P.O. Box 2890 Washington, DC 20013
Watershed Protection and Flood Prevention Loans	To provide loan assistance to sponsoring local organizations in authorized watershed areas for share of cost for works of improvement.	Be a sponsoring local organization, such as a municipal corporation, soil and water conservation district, or other organization not operated for profit in the approved watershed project; and have authority under State law to obtain, give security for, and raise revenues to repay the loan and to operate and maintain the facilities to be financed with the loan.	Department of Agriculture Water and Waste Rural Utilities Service Washington, DC 20250 (202) 690-2670

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Watershed Surveys and Planning	<p>The purpose of the program is to help Federal, State, and local agencies and tribal governments to protect watersheds from damage caused by erosion, floodwater, and sediment and to conserve and develop water and land resources. Resource concerns addressed by the program include water quality, opportunities for water conservation, wetland and water storage capacity, agricultural drought problems, rural development, municipal and industrial water needs, upstream flood damages, and water needs for fish, wildlife, and forest-based industries. Types of surveys and plans include watershed plans, river basin surveys and studies, flood hazard analyses, and flood plain management assistance. The focus of these plans is to identify solutions that use land treatment and nonstructural measures to solve resource problems.</p>		<p>Contact USDA, Natural Resources Conservation Service, Watershed Surveys and Planning http://mimosa.itc.nrcs.usda.gov/scripts/ndi/sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415</p>
Watershed Surveys and Planning (Small Watershed Program; PL-566; Watershed Surveys and Planning)	<p>To provide planning assistance to Federal, State, and local agencies for the development of coordinated water and related land resources programs in watersheds and river basins. Special priority is given to the objectives of setting priorities in helping to solve problems of upstream rural community flooding, water quality improvement coming from agricultural non-point sources, wetland preservation and drought management for agriculture and rural communities. Special emphasis is given to helping communities that desire to adopt floodplain management regulations to meet the requirements of the National Flood Insurance Program and State agencies in developing a strategic water resource plan. Examples of funded projects: in New Castle County, Delaware, the Central Pencader flood plain management study was initiated to guide land use, zoning, and subdivision decisions to develop sound flood plain and storm water management practices.</p>	<p>Any local or State water resource agency or other Federal agency concerned with water and related land resource development, counties, municipalities, town or township, soil and water conservation district, flood prevention or flood control district, Native American tribe or tribal organization or nonprofit organization.</p>	<p>Deputy Chief For Programs, Natural Resources Conservation Service, Department of Agriculture P.O. Box 2890 Washington, DC 20013 (202) 720-4527</p>

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Wetlands Program	To protect natural wetlands.		Department of Defense U.S. Army Corps of Engineers Attn: CECW-PM DoD Washington, DC 20314-1000 (202) 272-0169 http://www.usace.army.mil/
Wetlands Protection Grants	To assist states and Native American tribes in developing new or enhancing existing wetlands protection programs.	States, Native American tribes, and local governments.	Environmental Protection Agency Office of Water Office of Wastewater Management (4201), Office of Water Washington, DC 20460
Wetlands Reserve Program	The Wetlands Reserve Program is a voluntary program to restore wetlands. Participating landowners can establish conservation easements of either permanent or 30-year duration, or can enter into restoration cost-share agreements where no easement is involved.		Contact USDA, Natural Resources Conservation Service http://mimoso.itc.nrcs.usda.gov/scripts/ndi_sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415
Wetlands Protection: Development Grants	To assist states, tribes, and local governments in developing new or enhancing existing wetlands protection management and restoration programs. The projects that will be funded under this program should support the initial development of a wetlands protection restoration program or support enhancement/refinement of an existing program. Projects must clearly demonstrate a direct link to increasing a State's, tribe's, or local governments ability to protect, manage, and/or restore its wetlands resources.	State or tribal agencies, interstate/inter-tribal entities and associations, and local governmental entities are eligible to receive funding.	Peter Kalla, Wetlands Protection Section, Environmental Protection Agency Region IV, Atlanta, GA 30365 (404) 562-9414
Wetlands Reserve Program	Financial and technical assistance to protect and restore wetlands through easements and restoration agreements.		USDA-NRCS National Policy Coordinator NRCS Watersheds and Wetlands Division: (202) 720-3042

Table C.1. (Continued).

Funding Source	Objective	Eligibility	Sponsoring Organization
Wildland Urban Interface Community and Rural Fire Assistance	To implement the National Fire Plan and assist communities at risk from catastrophic wildland fires by providing assistance in the following areas: provide community programs that develop local capability including assessment and planning, mitigation activities, and community and homeowner education and action; plan and implement hazardous fuels reduction activities, including the training, monitoring, or maintenance associated with such hazardous fuels reduction activities, on Federal land, or on adjacent nonfederal land for activities that mitigate the threat of catastrophic fire to communities and natural resources in high risk areas; enhance local and small business employment opportunities for rural communities; enhance the knowledge and fire protection capability of rural fire districts by providing assistance in education and training, protective clothing, and equipment purchase, and mitigation methods on a cost share basis.	States and local governments at risk as published in the Federal Register, Native American tribes, public and private education institutions, nonprofit organizations, and rural fire departments serving a community with a population of 10,000 or less in the wildland/urban interface.	Bureau of Land Management Jackson, Mississippi Field Office 411 Briarwood Drive, Suite 404 Jackson, MS 39206 (601) 977-5400
Wildlife Habitat Incentives Program (WHIP)	The WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private lands. It provides both technical assistance and cost share payments to help establish and improve fish and wildlife habitat.	All lands are eligible for WHIP, except for: Federal lands; land currently enrolled in Waterbank, Conservation Reserve Program, Wetlands Reserve Program, or other similar programs; and lands where the expected impacts from on-site or off-site conditions make the success of habitat improvement unlikely.	Contact USDA http://mimosas.itc.nrcs.usda.gov/scripts/ndi/sapi.dll/oip_public/USA_map for a USDA service center in your area. WPB: West Palm Beach Service Center 559 N. Military Tr. West Palm Beach, FL 33415

APPENDIX D
DATA SOURCES

Table D.1. Data sources used for the Indian River County Hazard Vulnerability and Risk Assessment.

Source	Data Type
<i>Natural Hazards - Hazards resulting from weather conditions, geologic conditions, or disruption of natural systems</i>	
Hurricanes and Severe Storms (Includes Tropical Storms and Northeasters)	
Natural Hazards Research Center	Historical and current data on all types of natural hazards
Atlantic Hurricane Tracking Database	Historical data on hurricane tracks and intensities
National Oceanic and Atmospheric Administration (NOAA) Tropical Cyclone Database	Historical hurricane data
Colorado State University (Dr. Gray online site)	Hurricane probability
National Aeronautics and Space Administration (NASA) Natural Disaster Reference Database	Historical data on all types of natural hazards
National Weather Service	Weather statistics
National Climate Data Center - online database	Weather statistics
Atlantic Ocean and Meteorological Laboratory, Hurricane Research Division	Hurricane forecast models
U.S. Census	Housing data
Federal Emergency Management Agency	Emergency management procedures
Tropical Storm Watch Database	Tropical storm data worldwide
Flood Insurance Rate Maps and Community Status Book	Areas vulnerable to potential rising water
Storm Surge Atlas for Indian River County (Sealand Overland Surges for Hurricanes [SLOSH] model)	Areas vulnerable to storm surge flooding based on the SLOSH model
U.S. Geological Survey	Base maps and historical flood plain and elevation data
Florida State University (Meteorology Department)	Data and expertise concerning all Florida natural hazards
Florida Atlantic University	Data and expertise concerning all Florida natural hazards
National Severe Storms Laboratory	Data on storm effects
Independent Insurance Agents of America (Natural Disaster Risk Database)	Probability data and estimated exposure. Building code recommendations to reduce exposure
Florida Coastal Management Program	Population in surge zone data

Table D.1. (Continued).

Source	Data Type
Florida Department of Community Affairs, Division of Emergency Management	The Arbiter of Storms (TAOS) maps and computer model projections as well as technical support and data
Florida Department of Environmental Protection	Environmental risk and exposure to hurricanes, environmental effects, and environmental hazards
Florida Game and Fresh Water Fish Commission	Hurricane effects on fish and wildlife
Florida Department of Corrections	Prison statistics and emergency management plans
Florida Department of Education	School and Board of Education emergency guidelines
St. Johns River Water Management District	Climatic and weather data, hydrologic data, water release schedules, and emergency management plans
Treasure Coast Regional Planning Council	Building codes and impacts of proposed State-wide unified building code
Indian River County Airports	Weather data and hurricane protection procedures
Indian River County Comprehensive Growth Management Plan	Land management, zoning, and hurricane mitigation related ordinances
Indian River County Building Division	Building codes and zoning ordinances
Indian River County Community Development Department	Building codes and zoning ordinances
Indian River County Property Appraiser	Tax assessor records for use in determining dollar value of exposed property
Indian River County Computer Support Services	Statistical data
Indian River County Traffic Engineering and Public Works	Engineering, drainage, road elevations, and storm water data
Indian River County Health Department	Critical facilities and health risk data
Indian River County School District	Schools, shelter, and critical facilities data and emergency management plans
Indian River County Attorney's Office	Building codes and ordinances
Indian River County Parks Division	Environmental and recreational data and potential impacts data
Indian River County Emergency Services	Emergency management plans, historical data, critical facilities, special needs, and general guidance
Indian River County Clerk of the Court	County prison population and emergency management plans

Table D.1. (Continued).

Source	Data Type
Indian River County Animal Control	Animal protection, regulation, and control plans following natural disasters (hurricanes)
Indian River County Sheriff's Department	Emergency management plans and law enforcement procedures following a natural disaster
Indian River County Tourist Development Council	Potential economic loss and specific areas of economic vulnerability
Indian River County Utilities Department	Critical facilities locations and emergency management procedures
Indian River County Red Cross	Historical data, shelter data, and emergency management plans
Hospitals, Clinics, and Nursing Facilities	Critical facilities locations, special equipment, special needs, and evacuation plans
Florida Power & Light and Other Municipal/Private Power Companies	Power grid vulnerabilities, structure, and emergency management plans
Home Depot/Lowe's	Emergency management supply plans for preparation and recovery
Publix/Winn Dixie	Emergency food supply plans
Southern Bell	Critical facilities locations, and emergency communication maintenance plans
AT&T Wireless Services	Critical facilities locations, and emergency communication maintenance plans
U.S. Cellular Wireless Communications	Critical facilities locations and emergency communication maintenance plans
Local Radio and Television Stations	Critical facilities locations and emergency management plans (operating plans) during natural disaster
<i>Tornadoes and Thunderstorms</i>	
Natural Hazards Research Center	Historical and current data on all types of natural hazards
The Tornado Project On-Line	Historical data
U.S. Census	Housing data
Optical Transient Detector Database	Lightning associated with thunderstorms (lightning statistics)
NASA Natural Disaster Reference Database	Historical data on all types of natural hazards
National Weather Service	Weather statistics
National Climate Data Center - online database	Weather statistics
NOAA Wind Related Fatalities Database	Wind related fatalities
NOAA Tropical Prediction Center	Storm predictions

Table D.1. (Continued).

Source	Data Type
Florida State University	Data and expertise concerning all Florida natural hazards
Florida Atlantic University	Data and expertise concerning all Florida natural hazards
National Severe Storms Laboratory	Storm and tornado statistics and storm effects
Independent Insurance Agents of America (Natural Disaster Risk Database)	Financial data concerning losses resulting from thunderstorms and tornadoes
Florida Department of Community Affairs, Division of Emergency Management	Incident reports and historical data
St. Johns Water Management District	Climatic data
Indian River County Airports	Weather data and protection plans and procedures during thunderstorms and tornadoes
Indian River County Fire Department	Thunderstorm and tornado fire and fatality data
Indian River County Emergency Services	Thunderstorm and tornado historical data
Indian River County Emergency Medical Services	Historical data on thunderstorm and tornado related medical emergencies
Public Safety, Emergency Management, Health Department, and Fire and Rescue Departments within each municipality	Historical data on impacts of thunderstorms and tornadoes at the local level
Indian River County Red Cross	Historical data on impacts
Florida Power & Light and other municipal/private power companies	Historical data on impacts to the power grid
Southern Bell	Historical data on communications impacts
AT&T Wireless Services	Historical data on communications disruptions
U.S. Cellular Wireless Communications	Historical data on communications disruptions
Local radio and television stations	Historical data on losses and possible future losses
Lightning/Electromagnetic Disturbances (normally included under thunderstorms but along the Treasure Coast, we believe this hazard is significant enough to be considered alone)	
Natural Hazards Research Center	Lightning research and statistics
NASA Natural Disaster Reference Database	Lightning statistics
National Weather Service	Lightning strike data
National Climate Data Center - online database	Lightning strike data
NOAA Lightning Related Fatalities Database	Lightning fatalities

Table D.1. (Continued).

Source	Data Type
National Lightning Safety Institute (NLSI)	Lightning research and protection measures
Florida State University	Data and expertise concerning all natural hazards
Florida Atlantic University	Data and expertise concerning all natural hazards
University of Florida Lightning Research Laboratory	Current research on lightning causes and effects
National Severe Storms Laboratory	Lightning statistics
Independent Insurance Agents of America (Natural Disaster Risk Database)	Financial losses attributable to lightning and related electromagnetic discharges
Florida Department of Community Affairs, Division of Emergency Management	Data on major fires caused by lightning
Florida Fire Chief's Association	Data on fires caused by lightning
St. Johns River Water Management District	Data on lightning related losses
Indian River County Airports	Lightning data and protective measures
Indian River County Fire Division	Lightning related fires and injuries
Indian River County Parks & Division	Data on lightning related losses
Indian River County Emergency Services	Lightning protection procedures
Emergency Medical Services	Lightning related injuries
Indian River County Sheriff's Department	Data on communication disruption
Florida Power & Light	Financial losses and power grid disruptions due to lightning
Southern Bell	Financial losses and communications disruptions due to lightning
AT&T Wireless Services	Financial losses and communications disruptions due to lightning
U.S. Cellular Wireless Communications	Financial losses and communications disruptions due to lightning
Coastal and Riverine Flooding	
Association of State Floodplain Managers	Flood plain data, flooding statistics, and mitigation approaches
Natural Hazards Research Center	Technical data on all natural hazards
NOAA Flood Related Fatalities Database	Flood related fatalities
NOAA Hydrologic Information Center	Hydrologic data
NOAA Tropical Cyclone Database	Rainfall associated with specific types of storm events
NASA Natural Disaster Reference Database	Specific flooding and mitigation data nationwide
NASA Flood Hazard Research Center	Flood research and mitigation approaches
National Weather Service	Climatic data

Table D.1. (Continued).

Source	Data Type
National Climate Data Center - online database	Weather/rainfall historical data
National Flood Proofing Committee Database	Mitigation procedures
National Association of Flood and Storm Water Management Agencies	Storm water management data and procedures
Atlantic Ocean and Meteorological Laboratory, Hurricane Research Division	Historical meteorological data
Federal Emergency Management Authority	Historical flooding data
Tropical Storm Watch Database	Rainfall events and flooding data
Flood Insurance Rate Maps and Community Status Book	Identification of properties within the flood plain
U.S. Geological Survey	Topographic maps
U.S. Army Corps of Engineers	Historical flooding data and flood prevention projects
Dartmouth Flood Observatory	Flooding research
Earth Satellite Corporation (EarthSat) Floodwatch Database	Historical flooding data
Florida State University	Data and expertise concerning all Florida natural hazards
Florida Atlantic University	Data and expertise concerning all Florida natural hazards
National Severe Storms Laboratory	Rainfall data and related flooding events
Independent Insurance Agents of America (Natural Disaster Risk Database)	Property and financial losses as a result of flooding
Florida Department of Community Affairs, Division of Emergency Management	Historical data on flooding events in Indian River County
Florida Association of Floodplain Managers	Flood data specific to Florida
Florida Department of Environmental Protection	Environmental parameters and risk associated with flooding
Florida Game and Fresh Water Fish Commission	Wildlife resources impacted by flooding
St. Johns Water Management District	Water management, hydrology, and flood prevention procedures
Indian River County Community Development Department	Zoning ordinances and building codes that affect flood protection
Indian River County Property Appraiser	Property value within flood zones
Indian River County Traffic Engineering and Public Works Departments	Highway and storm water management procedures
Indian River County Fire Department	Flooding associated fires and injuries
Indian River County Health Department	Disease risk and contamination potential associated with flooding

Table D.1. (Continued).

Source	Data Type
Indian River County Parks Division	Recreational resources at risk due to flooding
Indian River County Emergency Services	Historical flooding data and emergency management procedures
Indian River County Emergency Medical Services	Flooding related injuries
Indian River County Animal Control	Animal control problems associated with flooding
Indian River County Sheriff Department	Emergency management procedures associated with flooding
Indian River County Utilities Department	Critical facilities at risk due to flooding and potential impacts
Indian River County Red Cross	Historical flooding data and repetitively damaged structures data
Florida Power & Light	Flooding emergency plans and critical facilities at risk
Extreme Temperatures	
National Weather Service	Historical records on extreme temperatures
National Climate Data Center - online database	Historical records on extreme temperatures
U.S. Department of Agriculture - County Extension Agents	Local agricultural data on frequency, impacts, and financial losses due to extreme temperatures (heat and cold)
Florida Citrus Commission	Frequency and amount of financial losses to citrus crops due to freezing temperatures and long-term industry impacts
Florida Department of Citrus	Frequency and amount of financial losses to citrus crops due to freezing temperatures and current mitigation strategies
Florida Department of Children and Families	Homeless population data
Florida Department of Agriculture & Consumer Services	Frequency and amount of financial losses to all agricultural business as a result of extreme temperatures (heat and cold)
Florida Farm Bureau	Frequency and amount of financial losses to all agricultural business as a result of extreme temperatures and current mitigation and risk reduction strategies
Florida State University	Agricultural research and new mitigative strategies to reduce freeze impacts

Table D.1. (Continued).

Source	Data Type
Florida Atlantic University	Temperature impacts to aquaculture industry
University of Florida	Agricultural research and new mitigative strategies to reduce freeze impacts
University of Miami	Agricultural research and new mitigative strategies to reduce freeze impacts
Florida Department of Environmental Protection	Environments at risk from temperature extremes and environmental consequences of current mitigation strategies
St. Johns River Water Management District	Climate records and water demands associated with freeze mitigation
Indian River County Agriculture Extension Service	Historical impact and financial losses resulting from freezing temperatures in Indian River County
Indian River County Citrus and Farming Interest	Historical freeze/heat losses and current mitigation strategies
Indian River County Red Cross	Impacts to poor and homeless due to temperature extremes
Wildland Fires (Urban interface wildland fires and muck fires)	
National Weather Service	Climate data/drought predictions
National Interagency Coordination Center Reports	Wildland fire reports
National Climate Data Center - online database	Climate data
U.S. Forest Service	Wildland fire reports and preventative measures
U.S. Department of Agriculture - County Extension Agents	Controlled burning/muck deposits
U.S. Geological Survey	Soil types/muck deposits
Florida Geological Society	Soil types/muck deposits
The Wildland Fire Assessment System	Wildland fire statistics and containment procedures
Florida Forest Protection Bureau	Florida specific wildland fire statistics and current preventative practices
Florida Department of Environmental Protection	Natural resources at risk and protective measures
Florida Fire Chief's Association	Florida specific wildland fire statistics, firefighting technology, and potential mitigative measures for Florida communities
St. Johns River Water Management District	Water resources and right-of-way management practices

Table D.1. (Continued).

Source	Data Type
Indian River County Agriculture Extension Service	Land use patterns in Indian River County to establish areas at risk
Indian River County Community Development Department	Land use patterns in Indian River County to establish areas at risk
Indian River County Parks Division	Land use patterns in Indian River County to establish areas at risk
Indian River County Fire Department - Fire Prevention Plan Review and Inspection	Land use patterns in Indian River County to establish areas at risk and current or in-place protective measures
Indian River County Wildland Fire Mitigation Plan	Risk maps and wildland fire history
Wildland Fire Magazine Database	Wildland fire statistics
Drought	
National Weather Service	Climate data/drought predictions
National Climate Data Center - online database	Climate data
U.S.G.S historical and real time data on water resources of south Florida	Water resources
U.S. Department of Agriculture - County Extension Agents	Historical data on droughts and the economic impacts to local agriculture
Florida Citrus Commission	Economic losses to the citrus industry from droughts
Florida Department of Citrus	Economic losses to the citrus industry from droughts and current irrigation technology
Florida Forest Protection Bureau	Drought statistics
Florida Department of Environmental Protection	Environmental impacts of droughts to natural ecosystems
Florida Department of Agriculture & Consumer Services	Agricultural losses due to droughts and current irrigation technology
St. Johns River Water Management District	Water allocations during drought conditions
Indian River County Agricultural Extension Service	County specific economic losses from drought and current economic vulnerability
Indian River County Parks Division	Recreational resources impacted by droughts
Indian River County Utilities Department	Impacts from droughts of the potable water supplies and impacts in urban areas. Water rationing plans
Municipal water utilities	Impacts of, and water allotment plans during times of droughts in cities. Water rationing plans
Erosion (Beach and Waterways)	
U.S. Army Corps of Engineers	Indian River County beach erosion statistics and beach restoration projects

Table D.1. (Continued).

Source	Data Type
Florida Department of Environmental Protection – Bureau of Beaches and Coastal Systems	Critical erosion areas in Florida
Florida Inland Navigational District	Maintenance records for the Intracoastal Waterway and other Indian River County navigable waters
St. Johns Water Management District	Canal maintenance and erosion
Indian River County Engineering Department	Environmental problems associated with erosion control and natural resources threatened by erosion
Indian River County Engineering and Public Works Departments	Current erosion prevention measures
Indian River County Parks Division	Current erosion prevention measures
Indian River County Municipalities	Current erosion problems and prevention measures
Sebastian Inlet District	Information on beach erosion in and around Sebastian Inlet
Agricultural Pests and Diseases	
U.S. Forest Service	Forest diseases and current problem/preventative measures
U.S. Department of Agriculture - County Extension Agents	Local agricultural pests and potential exotic threats
U.S. Customs	Current programs to prevent introduction of agricultural pests and diseases
Florida Farm Bureau	Economic losses due to agricultural pests and diseases
Florida Citrus Commission	Citrus losses due to agricultural pests and diseases
Florida Forest Protection Bureau	Forest diseases and current problem/preventative measures
Florida State University	Agricultural research and pest control
Florida Atlantic University	Agricultural research and pest control
University of Florida	Agricultural research and pest control
University of Miami	Agricultural research and pest control
Florida Department of Environmental Protection	Environmental resources at risk and environmental consequences of current or proposed control measures
Florida Department of Agriculture & Consumer Services	Economic losses from agricultural pests and diseases and current control technology
Indian River County Agricultural Extension Service	Economic losses and current control programs
Indian River County Parks Division	Pest control programs on public lands

Table D.1. (Continued).

Source	Data Type
Seismic Hazards (Sinkholes, Tidal Waves, and Other Geologic Hazards)	
U.S. Geological Survey	Geologic structure and seismic risk
Florida Geological Society	Geologic structure and soil characteristics
<i>Technological/Manmade Hazards - Hazards due to accidents involving man-made facilities or functions</i>	
Radiological Hazards	
U.S. Nuclear Regulatory Commission	Nuclear power plant regulation, accident statistics, and emergency procedures
Federal Emergency Management Agency	Nuclear power plant accident statistics and emergency procedures
National Emergency Management Agency	Nuclear power plant and radiological emergency management procedures
Florida Division of Emergency Management	Nuclear power plant and radiological emergency management procedures
Florida Emergency Preparedness Association	Radiological emergency management procedures
State and Local Emergency Data Users Group Database	Radiological accident management database
Florida Power and Light Emergency Plan	Industry emergency management plans
Indian River County Emergency Services - Emergency Management Comprehensive Emergency Management Plan (CEMP)	Local radiological emergency management plan
Hospital Plans - Both Radiological Materials Disposal (Hazardous Waste) and Mass Radiation Casualties or Nuclear Accident Plans	Local radiological emergency plans and safeguards
Hazardous Material	
Federal Emergency Management Agency	Hazardous material emergency management guidelines
National Transportation Safety Board	Hazardous material transport regulation, spill cleanup procedures, and spill statistics
Occupational Safety and Health Agency	Hazardous material handling requirements
U.S. Environmental Protection Agency	List of hazardous materials
Hazardous Chemicals Database (online)	Hazardous materials data
Material Safety Data Sheets (online)	Specific chemical facts
State Emergency Response Commission (SERC) Emergency Plan for Hazardous Materials	Spill response procedures
Florida District and Local Emergency Planning Committee (LEPC) Emergency Plan for Hazardous Materials	Local sources and emergency management plans (vulnerabilities)

Table D.1. (Continued).

Source	Data Type
Facilities Database for Users of Extremely Hazardous Substances (EHS) and Hazardous Materials	Geo-referenced local database of users
Florida Division of Emergency Management	Methodology for handling hazardous material releases
Florida Emergency Preparedness Association	Methodology for handling hazardous material releases
Florida Department of Transportation	Highway spill data for hazardous material spill data. Methodology for handling hazardous material releases
State and Local Emergency Data Users Group Database	Spill and release of hazardous materials statistics
Florida Fire Chief's Association	Hazardous material emergency plans and containment procedures. Spill/release statistics
Indian River County Emergency Services	Methodology for handling hazardous material releases
Indian River County Fire Department	Methodology for handling hazardous material releases
Municipal Fire and Police Departments	Methodology for handling hazardous material releases
Indian River County Health Department	Methodology for handling hazardous material releases and emergency treatment procedures
Identified Users of EHS Emergency Plans	Industry control and emergency management plans for hazardous material
Local Gasoline and Natural Gas Companies	Location of critical facilities/infrastructure elements
Transportation System Accidents	
Federal Aeronautical Administration	Aircraft accident statistics and airport safety procedures
National Transportation Safety Board	Aircraft accident statistics
U.S. Coast Guard	Boating/shipping accidents (including oil and hazardous materials releases) and spill containment procedures
Florida Department of Transportation - Motor Carrier Compliance Division	Truck accidents (including oil and hazardous materials releases)
Florida Highway Patrol	Truck accidents (including oil and hazardous materials releases)
Florida Marine Patrol	Boating/shipping accidents (including oil and hazardous materials releases) and spill containment procedures

Table D.1. (Continued).

Source	Data Type
Indian River County Airports Administration	Aircraft accident statistics and airport safety procedures
Indian River County Sheriff's Department - Marine Unit and Environmental Crimes Unit	Boating/shipping accidents (including oil and hazardous materials releases), spill containment procedures, and environmental crimes statistics
Florida East Coast Railway	Railway accident statistics (including oil and hazardous materials releases), and safety procedures
CSX Rail	Railway accident statistics (including oil and hazardous materials releases), and safety procedures
Indian River County Fire Department and Emergency Medical Services	Accident statistics involving injuries in Indian River County
Municipal police and fire departments	Accident statistics involving injuries in the cities
Power/Communications/Computer Grid System Failures	
Washington Post Article	2003 Northeast Power Failure
Florida Power & Light Emergency Management Plans and Historical Database	Historical data and emergency management plans
SouthernBell Emergency Management Plan and Historical Database	Historical data and emergency management plans
Cellular and Satellite Communication Companies	Historical data and emergency management plans
The Banking Industry (Large Area Networks - LANs Protection and Emergency Restoration Plans, as well as historical data on system failures)	Historical data and emergency management plans
<i>Societal Hazards - Hazards arising from disruptions in normal government and community function</i>	
Civil Disturbance	
Federal Bureau of Investigation Database	Historical data
National Security Council Database	Historical data and risk analysis
Drug Enforcement Agency Database	Historical data
Immigration and Naturalization Service Database	Historical data
U.S. Customs Service	Historical data
U.S. Census Database	Population demographics
Florida Department of Law Enforcement	Historical data and situation plans
Florida Department of Health Education and Welfare	Historical data
Indian River County Sheriff's Department	Historical data and situation plans

Table D.1. (Continued).

Source	Data Type
Municipal Police Departments	Historical data and situation plans
Indian River County Emergency Medical Services	Historical data and situation plans
Terrorism and Sabotage	
National Conference of State Legislators	Economic data for September 11th
Federal Bureau of Investigation Database	Historical data, situation plans, and risk analysis
National Security Council Database	Historical data, situation plans, and risk analysis
Drug Enforcement Agency Database	Historical data
Immigration and Naturalization Service Database	Historical data and preventative measures
U.S. Census Database	Population demographics
American Society for Industrial Security	Risk analysis techniques and database
Florida Department of Law Enforcement	Historical data, situation plans, and risk analysis
Florida Department of Health Education and Welfare	Population demographics
Indian River County Sheriff's Department	Historical data, situation plans, and risk analysis
Municipal Police Departments	Historical data, situation plans, and risk analysis
Indian River County Public Safety Department, Emergency Medical Services Division	Historical data on injuries
Mass Immigration	
U.S. Coast Guard	Historical data and situation plans
Immigration and Naturalization Service	Historical data, situation plans, and risk analysis
Florida Marine Patrol	Situation plans and interagency coordination
Florida Department of Law Enforcement	Historical data, situation plans, risk analysis, and interagency coordination
Florida Department of Health Education and Welfare	Population demographics
Indian River County Sheriff's Department	Historical data, situation plans, risk analysis, and interagency coordination
Municipal Police Departments	Historical data, situation plans, risk analysis, and interagency coordination
Indian River County Emergency Services	Situation plans and interagency coordination

Table D.1. (Continued).

Source	Data Type
Indian River County Emergency Medical Services	Historical data and medical risk analysis
Other Hazards - Crime, Drug Abuse, Economic Crises, Communicable Diseases	
Federal Bureau of Investigation Database	Historical data
National Security Council Database	Historical data
Drug Enforcement Agency Database	Historical data
Immigration and Naturalization Service Database	Historical data
U.S. Census Database	Population demographics
U.S. Public Health Service - Center for Communicable Disease	Disease risk
Florida Department of Law Enforcement	Historical data
Florida Department of Health Education and Welfare	Historical data
Florida Department of Labor	Historical data
Indian River County Sheriff's Department	Historical data
Municipal Police Departments	Historical data
Indian River County Emergency Services	Historical data
Indian River County Emergency Medical Services	Historical data
Indian River County Health Department	Historical data

APPENDIX E
PARTICIPATION DOCUMENTATION

E.1 BACKGROUND

The ever-increasing time and cost associated with responding to and recovering from disasters has prompted a shift towards planning for disasters before they strike. This shift towards pre-disaster mitigation planning is evident in the Federal Emergency Management Agency's (FEMA's) development of the Disaster Mitigation Act of 2000 (DMA2K). DMA2K requires that local jurisdictions have a natural hazard mitigation plan in place in order to be eligible for hazard mitigation grant funds as well as some post-disaster assistance programs. The development of DMA2K has created a number of new natural hazard planning responsibilities for both local and State jurisdictions, including responsibilities for identifying hazards, completing risk assessments, and involving citizens. With the focus of the requirements being on the process rather than the product, citizen involvement has become a vital component of the mitigation planning process (see **Table E.1**).

Table E.1. Language of the Disaster Mitigation Act of 2000.

<p>Citizen Involvement Requirements of the Disaster Mitigation Act of 2000</p> <p>Planning Process. An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include</p> <ol style="list-style-type: none">1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.2. An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process.
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Source: National Archives and Records Administration. 2002. Federal Emergency Management Agency 44 CFR Parts 201 and 206 Hazard Mitigation Planning and Hazard Mitigation Grant Program; Interim Final Rule in Federal Register.

This Appendix documents the steps taken to include various stakeholder groups and the public in general in the LMS planning process.

E.2 WORKING GROUP MEETINGS

The main method of involving jurisdictions, community organizations, stakeholders, and the public in the LMS planning process was through the Working Group. Individuals and organizations with directives or programs supporting mitigation were invited to become involved in the Working Group. The groups listed below were invited to join the Working Group:

- Comcast Cable Communications
- Sebastian River Chamber of Commerce
- Gifford Progressive League
- Indian River Citrus League
- Indian River Community College
- Indian River County Department of Emergency Services

- Town of Indian River Shores Public Safety
- City of Sebastian
- Town of Orchid
- City of Vero Beach
- St. Johns Water Management District
- Indian River County Sheriff's Office
- Indian River County Building Division
- Indian River Planning Division
- City of Fellsmere
- BellSouth Telecommunications
- Florida Power & Light
- Treasure Coast Regional Planning Council
- Indian River County Chamber of Commerce
- American Red Cross
- Indian River County School District
- Indian River County Community Development Department
- National Association for the Advancement of Colored People
- Indian River County Public Works

The Indian River County LMS Working Group met a total of four times throughout the 2010 plan update process. Each meeting's invitation process and outcome are described below.

E.2.1 Meeting #1

The first meeting of the Working Group was held on 15 October 2008 at the Indian River County Emergency Operations Center and served as a kick-off meeting for the LMS update process. E-mail invitations were sent to all Working Group members who were identified as being key stakeholders in mitigation hazards in Indian River County. Organizations in attendance included

- Indian River Medical Center
- Indian River County Emergency Services
- Florida Division of Forestry
- City of Vero Beach
- Saint Edward's School
- Indian River County Sheriff's Office
- Indian River County Public Works Department
- Indian River County Planning Division

The focus of this meeting was to go over the new requirements for the updated LMS and go over the tasks to be completed. The letter of invitation, agenda, sign-in sheet, and minutes from this meeting can be found attached to this Appendix.

E.2.2 Meeting #2

The second meeting of the Working Group took place on 9 September 2009 at the Indian River County Emergency Operations Center. Working Group members were notified of the meeting through e-mailed communication. The following organizations were in attendance:

- Indian River County Emergency Services
- Town of Orchid
- Town of Indian River Shores
- Indian River County Building Department
- Indian River Medical Center

- City of Vero Beach
- Florida Division of Forestry
- Gifford Youth Activity Center
- Indian River County Planning Division
- Indian River County Environmental Planning
- Indian River Farms Water Control District

The focus of the meeting was to discuss the participation process, the background and importance of hazard mitigation, current and proposed projects, current grant opportunities and data needs. The letter of invitation, agenda, sign-in sheet, and minutes from this meeting can be found attached to this Appendix.

E.2.3 Meeting #3

The third meeting of the Working Group was held on 16 October 2009 at the Indian River County Emergency Operations Center. Working Group members were notified of the meeting through e-mail reminders. The following organizations were in attendance:

- Indian River County Emergency Services
- Town of Fellsmere
- City of Vero Beach
- Indian River Farms Water Control District
- Florida Division of Emergency Management
- American Red Cross
- Town of Orchid
- City of Sebastian
- Indian River County Public Works
- Indian River County Bldg. Department
- Indian River County Planning Department
- Indian River County Emergency Management
- Gifford Youth Activity Center

The focus of this meeting was to receive technical assistance from the Florida Division of Emergency Management and hear an overview of the program and improvements that have been made. We reviewed the updated Project Prioritization List and encouraged the group to continue submitting new projects. Draft copies of sections 1-3 were distributed for review and comments. The timeline and deliverables for submitting the updated LMS plan were discussed. The letter of invitation, agenda, sign-in sheet and minutes from this meeting can be found attached to this Appendix.

E.2.4 Meeting #4

The fourth meeting of the Working Group was held on 20 November 2009 at the Indian River County Emergency Operations Center. Working Group members were notified of the meeting through e-mail reminders. The following organizations were in attendance:

- Indian River County Emergency Services
- Florida Division of Forestry
- Indian River County Fire Rescue
- Indian River County Planning Division
- Town of Orchid
- Indian River County Public Works
- Gifford Youth Activity Center
- Town of Fellsmere

- City of Vero Beach
- City of Sebastian

The focus of this meeting was to discuss a proposed revision to the scoring and project prioritization process and to vote on draft sections 1-3. The letter of invitation, agenda, sign-in sheet and minutes from this meeting can be found attached to this Appendix.

E.2.5 Meeting #5

The fifth meeting of the Working Group was held on 16 December 2009 at the Indian River County Emergency Operations Center. Working Group members were notified of the meeting through e-mail reminders. The following organizations were in attendance:

- Indian River County Emergency Services
- Indian River County Fire Rescue
- Indian River County Planning Division
- Indian River County Environmental Planning
- Town of Orchid
- Indian River County Public Works
- Gifford Youth Activity Center
- Town of Fellsmere
- City of Vero Beach
- American Red Cross
- Florida Division of Emergency Management
- Indian River Medical Center

The focus of this meeting was to review and approve the updated prioritized project list and the draft LMS plan for submission to the Florida Division of Emergency Management. We provided an overview of the submittal process and what to expect following approval of our plan. The plan adoption requirements were discussed as well as the meeting schedule for 2010. The letter of invitation, agenda, and sign-in sheet from this meeting can be found attached to this Appendix.

ATTACHMENTS

Indian River County Florida

Board of County Commissioners



2009 Agendas and Minutes [Home > Other Boards, Committees and Councils > Local Mitigation Strategy Work Group](#)

2008 Agendas and Minutes The following schedule has been established for the Indian River County Local Mitigation Strategy update meetings. All meetings will be held at 10:00 a.m. and located at the Indian River County Emergency Operations Center located at 4225 43rd Avenue, Vero Beach, FL 32967.

2005 Agendas and Minutes

- Friday, October 16, 2009
- Wednesday, November 18, 2009
- Wednesday, December 16, 2009

2004 Agendas and Minutes

2003 Agendas and Minutes

Indian River County Emergency Management is requesting the participation of members of the public as well as community and business leaders to help review and implement the county's Local Mitigation Strategy. All of our LMS meetings are opened to the public for either full-time membership or casual participation.

Unified Local Mitigation Strategy - Approved 2005

Project /Proposal Form

LMS Update

FEMA Plan Review Crosswalk

Indian River County is currently updating its Local Mitigation Strategy (LMS), a plan identifying projects and activities aimed at reducing the impacts of natural disasters such as hurricane, tornadoes, and flooding.

Current Grant Opportunities
Pre-Disaster Mitigation Program
Flood Mitigation Assistance Program

The current Local Mitigation Strategy was approved by FEMA on February 22, 2005. The adopting jurisdictions are: City of Vero Beach, Town of Indian River Shores, City of Sebastian, Town of Orchid, City of Fellsmere, and Indian River County. All hazard mitigation plans must be reviewed, updated and resubmitted to FEMA for approval every five (5) years. We would like to allow the public an opportunity to review the "Draft" Local Mitigation Strategy (LMS) Plan 2010 update. The LMS Working Group will have a series of meetings prior to submission to FEMA for approval and everyone is encouraged to review the draft and provide comments or ask questions.

Indian River County Mitigation Overview

Adoption of the Local Mitigation Strategy is an eligibility requirement for various hazard mitigation grant programs. Our LMS meetings are open to the public and we encourage everyone interested to attend and participate in our process. Our efforts are for the benefit of our citizens; we want you, our community residents and visitors, to help provide us the direction that provides you the most benefit from our activities.

Types of Projects that Can/Cannot be funded

A working draft is currently available for public review. We encourage comments and feedback from anyone willing to take the time to review the documents and email or call us. We read and address every comment.

Regular meetings will be held at the Indian River County Emergency Operations Center. Please check this website for the meeting schedule.

Please contact the LMS Vice Chairperson, Brian Nolan at (772) 226-3852 or bnolan@ircgov.com with any comments, changes, or feedback you may have.

- Resolution 2005-04 Town of Orchid Accepting the 2005 Revised Unified LMS Plan
- Resolution 2005-123 adopted the Indian River County Unified Local Mitigation Strategy.
- Resolution 2005-10 City of Vero Beach Accepting the 2005 Revised Unified LMS Plan
- Resolution 05-08 Indian River Shores Accepting the 2005 Revised Unified LMS Plan
- Resolution 05-E Fellsmere Accepting the 2005 Revised Unified LMS Plan
- Resolution R-05-10 Sebastian Accepting the 2005 Revised Unified LMS Plan

Implimentation Program 6.0

The purpose, overview and composition of the Working Group

Potential Mitigation Funding Sources

Meetings are held on an as-needed basis.

October 15, 2008

From: [Etta LoPresti](#)
To: Cheryl_Dunn@doh.state.fl.us; Cliff.Schroeder_drisinger@auduboninternational.org; "George Simons"; info@sebastianchamber.com; Kathy.Burke@srmc.hma-corn.com; mjkelly@cultural-council.org; hgreene@steds.org; aduffdcd@bellsouth.net; "Al Minner"; "Barbara Morey"; bbrunner@ircsheriff.org; "Bill Messersmith"; Bob Keating; Brian Burkeen; "Captain Bud Spencer"; "Chief Schauman"; citymanager@cityoffellsmere.org; Deb Branwell (orchid.manager@comcast.net); "Don Dexter"; Ed Prime; Erik Olson; Etta LoPresti; Freddie L. Woolfork; "Gery Koziel"; James "Buddy" Akins; Jim Davis; John King; Joni Kinsley; lwalth@conshelf.com; "Maria Lewicka"; marilyn.johnson@bellsouth.com; menzel@sirvmd.com; "Monte Falls"; "Penny Chandler"; Rachel Ivey; rbolton@covb.org; Rich Rogers; Sarah Ruwe; "Shai Francis"; Slezak, Rob; spatari@doacs.state.fl.us; Stan Bolino; thess@tcpc.org; tom_c_kunz@fl.com
Subject: LMS Meeting
Date: Thursday, October 02, 2008 9:08:55 AM
Attachments: [hmap_fact_sheet.pdf](#)
[HMGPFAQs.doc](#)

ATTN: ALL LOCAL MITIGATION STRATEGY (LMS) WORKING GROUP MEMBERS

With the disaster declaration following Tropical Storm Fay (FEMA-1785-DR), all counties in the State of Florida are eligible to apply for assistance under the Hazard Mitigation Grant Program (HMGP).

John King, LMS Chairman, has scheduled an LMS Working Group meeting for Wednesday, October 15, 2008 at 10:00 a.m. here at the Indian River County Emergency Operations Center. This will be a brief, but very important meeting, particularly if you plan on applying for grant funds. **Please be aware that only projects identified in our LMS will qualify for grant funding.**

Among the topics of discussion will be:

- Projects currently on the prioritized project list
- Eligibility criteria and addition of new projects to the project list
- Updating the LMS for the January 2010 deadline

I have attached some HMGP resource material for your review.

You are receiving this notification because you were either listed on the roster as a member of our LMS Working Group or at some time you expressed interest in submitting a potential project. If you no longer wish to receive invitations for these meetings, or would like to designate someone else in your place, please notify me and I will make the appropriate adjustments.

Thanks,
Etta LoPresti

Etta LoPresti, FPTEM
Emergency Management Planner
Indian River County Emergency Management
4225 43rd Avenue
Vero Beach, Florida 32967
(772) 226-3856
Fax: (772) 567-9323

AGENDA

Indian River County Local Mitigation Strategy Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967

October 15, 2008
10:00 a.m. – 11:00 a.m.

-
- | | | |
|----|---|-------------------|
| 1. | Welcome and Introductions
<i>John King</i>
<i>Indian River County Emergency Services</i> | <i>10:00 a.m.</i> |
| 2. | Additions/Deletions to Working Group Roster
<i>John King</i> | <i>10:05 a.m.</i> |
| 3. | Mitigation Projects – Review of existing projects and criteria for eligible projects
<i>Etta LoPresti</i>
<i>Indian River County Emergency Management</i> | <i>10:15 a.m.</i> |
| 4. | Plan Update
<i>John King</i> | <i>10:25 a.m.</i> |
| 5. | Next Meeting
<i>John King</i> | <i>10:45 a.m.</i> |
| 6. | Adjournment | <i>11:00 a.m.</i> |

Indian River County LMS Working Group
 Wednesday, October 15, 2008 - 10:00 a.m.
 Indian River County Emergency Management
 4225 43rd Avenue, Vero Beach, FL 32967

NAME	ORGANIZATION	ADDRESS	CITY/STATE/ZIP	PHONE#	E-MAIL ADDRESS
CLIFF SCHROEDER	IRME	1000 30TH STREET	VERO Beach	772-794-1453	cliff.schroeder@irme.cc
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ELIE HABYAN	IRMC	1000 30th St.	VERO Beach	772 507 431/1145	elie.habyan@irme.cc
Melissa Jonas	FL DOF	5500 PEACOCK RD PO BOX ST. LOUIS, FL	PSY, FL 32950	772 200 0053	jonasm@doacs.state.fl.us
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Nancy Greene	Saint Edwards	1895 Saint Edwards Dr	VB FL 32963	772 492 2317	ngreene@steds.org
L.E. Bud Spencer	IRLSD	4055 41 Ave	VB FL 32960	772-478-6212	b.spencer@irlsken.fl.gov
Kim Poole	IRCSO	4055 41st Ave	VB FL 32960	772-978-6244	kpoole@ircsnet.fl.gov
Brian Burckow	IRCFR	4225 43rd Ave	VB FL 32967	772 226 3580	bburckow@ircgov.com
James Davis	IRCC Public Works	1801 27th St.	" 32960	772-226-1245	jdavis@ircgov.com
ROLAND DEBLERIS	IRC ENVIRONMENTAL PLANNING	1801 27th STREET	VERO BEACH, FL 32960	772-226-1258	rdeblaris@ircgov.com
Stan Salving	IRC Planning	" "	" "	772-226-1253	ssalving@ircgov.com

Minutes

Indian River County Local Mitigation Strategy
Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967
October 15, 2008
10:00 a.m. – 10:30 a.m.

John King, Chairman of the Indian River County Working Group, regrettably had a last minute commitment and was unable to preside over the meeting. The meeting was led by Etta LoPresti, who began the meeting with the welcome and introductions.

Etta LoPresti, Indian River County Emergency Management, explained that due to the disaster declaration following Tropical Storm Fay, all counties in the State of Florida are eligible to apply for assistance under the Hazard Mitigation Grant Program (HMGP).

Ms. LoPresti discussed the importance of having hazard mitigation projects/initiatives listed on the LMS Project Prioritization List (PPL) as projects will not be funded if they do not appear on the list. The PPL was distributed to the group for their review and it was requested that all previously submitted projects be reviewed for elimination from the list. Discussion of current projects will continue at the next meeting. She explained that the following issues can change the list:

1. Projects are completed
2. New needs surface
3. New funding opportunities arise
4. Events occur that affect priorities

It was explained that we have been mandated by the state to update our LMS by January 2010 and that we will be conducting regular LMS meetings between now and then to accomplish the updates to that plan.

The HMGP program suffered from prior criticism so the group was asked to share their experiences with HMGP. Chief Prime shared with the group that although the process was extensive, a great deal of money was received from the program to build new fire stations following the damage from the 2004 hurricanes. It was encouraging to note that the work was worth it.

Ms. LoPresti explained that FEMA has assigned a state liaison to each county and our appointed mitigation planner is Ms. Anne Borland. It was suggested that Ms. Borland be invited to a future LMS meeting to discuss the direction of LMS and to assist with the application process. FEMA has advised that the program has improved with new guidance documents available on their website.

Project Proposal Forms were distributed and the group was asked to think about potential projects. Copies of Chapter 9G-22, rules regarding HMGP, were distributed and reviewed. Project eligibility was discussed and the group was reminded that only local governments, state agencies, federally recognized Indian Tribal governments and non-profit organizations and institutions are eligible applicants under the HMGP program.

A Notice of Funding Amount (NOFA) has not yet been announced so we do not know how much money has been allocated at this time. This announcement should occur very soon.

The meeting adjourned at 10:30 a.m. The next meeting of the Indian River County Unified Local Mitigation Strategy Working Group will be announced at a later date.

September 9, 2009

From: Etta LoPresti
To: Cheryl_Dunn@doh.state.fl.us; Cliff_Schroeder; drisinger@auduboninternational.org; mtkelly@cultural-council.org; "ngreene@steds.org"; ahenedetti@sjrwmd.com; aduffrcd@bellsouth.net; "Al Minner"; andrew.feeney@bellsouth.com; "Barbara Morey"; "Bill Messersmith"; Bob Keating; Brian Burkeen; Brian Nolan; "Captain Bud Spencer"; "Chief Schauman"; citymanager@cityoffellsmere.org; David Gunter (dgunter@fbb.net); Deb Branwell (orchid.manager@comcast.net); Debbie Vaughn (dvaughn@fbb.net); "Don Dexter"; Ed Prime; Erik Olson; Etta LoPresti; Freddie L. Woolfork; Gerry Koziel; Herbert_Laura; info@sebastianchamber.com; James "Buddy" Akins; Jim Davis; Jim Roberts (jim.roberts@em.myflorida.com); John King; Joni Kinsley; "Maria Lewicka"; marilyn.johnson@bellsouth.com; "Monte Falls"; "Penny Chandler"; Rachel Ivey; rbolton@covb.org; Rich Rogers; Roland Deblois; Ruth Stanbridge (stanbr@aol.com); Sarah Ruwe; Slezak, Rob; spatari@doacs.state.fl.us; Stan Boling; Tim Elder (tekler@ircsheriff.org); tom_c_kunz@fpl.com
Subject: Meeting Reminder
Date: Tuesday, September 08, 2009 10:40:44 AM
Attachments: Project List 2010.pdf

Dear LMS Working Group members:

This is a reminder that an Indian River County Local Mitigation Strategy Working Group meeting has been scheduled for tomorrow (Wednesday, September 9) at 10:00 a.m. here at our Emergency Operations Center located at 4225 43rd Avenue, Vero Beach.

If you intend on applying for disaster mitigation grants in the future, it is important you are represented at our LMS meetings. Agencies or cities that do not participate in the LMS process, including adoption of the plan by resolution, will not be eligible for Federal Hazard Mitigation grants. These grants include the Pre Disaster Mitigation (PDM) grant and the Hazard Mitigation Grant Program (HMGP) following declared disasters.

Attached for your reference is an updated project list, which shows who the original project applicant was. Please review the projects you have submitted and let me know the status of the project (confirm, withdraw or revise the estimated project cost). It is important that our list be accurate.

The following is a link to our updated LMS website should you need to review any of the past agendas, minutes, resolutions, etc.

<http://www.ircgov.com/Boards/LMS/Index.htm>

See you tomorrow.

Etta LoPresti

Etta LoPresti, JPTEM
Emergency Management Planner
Indian River County Emergency Management
4225 43rd Avenue
Vero Beach, Florida 32967
(772) 226-3856
Fax: (772) 567-9323

*"Let our advance worrying become advance thinking and planning."
Sir Winston Churchill*

AGENDA

Indian River County Local Mitigation Strategy Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967

September 9, 2009
10:00 a.m. – 11:00 a.m.

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- | | | |
|----|---|-------------------|
| 1. | Welcome and Introductions
<i>John King, LMS Chairman</i>
<i>Indian River County Emergency Services</i> | <i>10:00 a.m.</i> |
| 2. | What is Mitigation?
<i>Etta LoPresti, Emergency Management Planner</i>
<i>Indian River County Emergency Services</i> | <i>10:05 a.m.</i> |
| 3. | Mitigation Projects – Review of existing projects and
Eligibility for New Projects
<i>Brian Nolan, LMS Vice Chairman</i>
<i>Indian River County Emergency Services</i> | <i>10:20 a.m.</i> |
| 4. | Current Grant Opportunities
<i>Etta LoPresti, Emergency Management Planner</i> | <i>10:35 a.m.</i> |
| 5. | Plan Update
<i>Etta LoPresti</i> | <i>10:45 a.m.</i> |
| 6. | Next Meeting
<i>Brian Nolan</i> | <i>10:55 a.m.</i> |
| 7. | Adjournment | <i>11:00 a.m.</i> |

Indian River County LMS Working Group
 Wednesday, September 9, 2009 - 10:00 a.m.
 Indian River County Emergency Management
 4225 43rd Avenue, Vero Beach, FL 32967

NAME	ORGANIZATION	ADDRESS	CITY/STATE/ZIP	PHONE#	E-MAIL ADDRESS
Ann Valleria	Orchid	7406 US Hwy 1	Vero 32967	509-7686	Orchid.clerk@comcast.net
Charlene Hall	IRSPSD	6001 N. A1A	Indian River Shore 32963	231-2451	chall@irpspd.org
Rheta Shore	IRSDPS	6001 N. A1A	IRAS FL 32963	231-2451 ext 225	rshabce@irpspd.org
John King	IRCES	4225 43rd Ave	Vero Beach, FL 32967	226-3858	jking@irsgov.com
Buddy Atkins	IRCB Building	1801 27th St.	Vero Beach FL 32960	226-1268	latkins@irsgov.com
CLIFF SCHNEIDER	IRMAC	1000 36TH ST.	VERO BEACH, FL	567-4311	cliff.schneider@irmac.de
MARIA LEMICKA	COVB	1053 20TH PLACE	VERO BEACH, FL	978-4550	mlemicka@covb.org
Melissa Unas	FLDDF	5500 PEACOCK RD P.O. BOX 10000, VERO BEACH, FL	FSC, FL	772-467-3008	yunasm@doacs.state.fl.us
FREDRIC Woodfork	GyAC	4875-43rd Ave	VERO BEACH	772-794-1005 X34	fwoodfork@gyac.sc
ROLAND DeBLOIS	IRC ENV. PLANNING	1801 27th St.	VERO BEACH	226-1258	rdeblois@irsgov.com
Stan Baling	IRC Planning	" "	" "	226-1253	sbaling@irsgov.com
DON DEXTER	CITY OF VERO BEACH	3405 AIRPORT WBSY DR.	" "	978-4800	ddexter@covb.org
DAVID E. GUNTER	IRFUND	7305 4th St.	VERO BEACH	562-2141	dgunter@flbb.net
Etta Lopresti	IRCO. E.M.	4225 43rd Ave	Vero Beach	226-3856	elopresti@irsgov.com
Brian Nolan	IRCO. E.M.	" "	" "	226-3852	bnolan@irsgov.com

Minutes

**Indian River County Local Mitigation Strategy
Working Group Meeting**

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967
September 9, 2009
10:00 a.m. – 11:00 a.m.

John King, Chairman of the Indian River County Local Mitigation Strategy Working Group, called the meeting to order at 10:00 a.m. Mr. King welcomed all attendees and asked that everyone introduce themselves.

The Town of Orchid, Town of Indian River Shores and the City of Vero Beach were each represented at today's meeting. It was noted that their participation is very important because agencies or cities that do not participate in the LMS process, including adoption of the plan by resolution, will not be eligible for Federal Hazard Mitigation grants.

Etta LoPresti, representing Indian River County Emergency Management, gave an informative PowerPoint presentation explaining the background of hazard mitigation and what role the LMS group plays.

Don Dexter from the City of Vero Beach asked how much of the funds previously awarded to Indian River County were actually expended and on what projects. Etta explained that she had made some inquiries but has been unable to find specific information on that subject. She stated that perhaps our LMS contact at the state could provide us with an answer to that question.

Cliff Schroeder, from the Indian River Medical Center, questioned how the process will work with the state. Ms. LoPresti explained that one of the most important components of our plan is updating our project list. It is important that our list be accurate and projects that are no longer viable be removed. Proposed projects need to be placed on the list and the group will follow the steps in the plan to prioritize them. This list will be submitted to the state along with our updated LMS plan.

David Gunter, Indian River Farms Water Control District, presented questions regarding debris removal and vegetative management. It was suggested he present those questions next month during our technical assistance meeting.

Brian Nolan, LMS Vice Chairman, briefly discussed the current project list and again reiterated the importance of keeping the list current. He suggested that

proposed projects be considered and submitted as soon as possible. Project Proposal forms were distributed and will also be available on our website. He went on to provide examples of the types of projects that can/cannot be funded (this handout will also be available on the website). Brian informed the group that once this priority list is updated, any projects added in the future will be added to the end of the list until the project prioritization process takes place again at some point in the future. This, he explained, is why it is important to include your projects during this update process.

Ms. LoPresti announced that there is currently an open application period for several mitigation grants but the application period is fast approaching (deadline is November 2). The following FEMA grant programs are currently available: Pre-Disaster Mitigation, Flood Mitigation Assistance, Repetitive Flood Claims and Severe Repetitive Loss Grant Programs. Each grant has different requirements and a link to the website for additional information will be forwarded to each Working Group member.

Ms. LoPresti reminded the group that the purpose of our meetings is to update our LMS plan, which is due to expire in February 2010. The FEMA crosswalk is posted on the website and group participation will be required in order to update the plan. We will be meeting monthly over the next couple of months to accomplish this goal. Recognizing everyone's busy schedules we will try to accomplish the majority of the work via e-mail.

John King closed the meeting reminding the group to review the current project list and provide us with a confirmation of the status of your project. The group was also reminded to consider new projects carefully and submit a project proposal as soon as possible.

Mr. Nolan stated in closing that he hopes to have a draft project list by October 2, 2009 in order to review it with the group and Ms. Herbert.

Information from today's meeting will be available on the LMS section of the county's website: <http://www.ircgov.com/Boards/LMS/Index.htm>

The meeting adjourned at 10:52 a.m. The next meeting of the Indian River County Local Mitigation Strategy Working Group is tentatively scheduled for Wednesday, October 7, 2009 at 10:00 a.m. at the Indian River County Emergency Operations Center located at 4225 43rd Avenue, Vero Beach, FL 32967.

October 16, 2009

From: [Etta LoPresti](#)
To: [Etta LoPresti](#)
Subject: LMS Meeting Reminder
Date: Thursday, October 15, 2009 11:00:55 AM
Attachments: [Update LMS 2010 Funding Sources App C.pdf](#)
[Update LMS Project List 2010.pdf](#)

Dear LMS Working Group members:

This is a reminder that an Indian River County Local Mitigation Strategy Working Group meeting will be held tomorrow (Friday, October 16) at 10:00 a.m. here at our Emergency Operations Center located at 4225 43rd Avenue, Vero Beach.

Ms. Laura Herbert, a hazard mitigation specialist with the Florida Division of Emergency Management, is on our agenda to answer your questions related to mitigation projects and the hazard mitigation grant program. She also intends on discussing how the program has improved and how it is expected to work more efficiently for us in the future.

I have posted a "Draft" of the first three sections of the updated 2010 LMS on our website (http://www.ircgov.com/Boards/LMS/ULMS_2010_Draft.pdf) and request that you review and provide your comments as soon as possible. A hardcopy will be provided to those attending the meeting.

We have been advised that LMS plans are being rejected by FEMA for not identifying specific information on their project lists. It has been suggested we add the following columns to our project list: 1) a column stating which hazard(s) the project is intended to mitigate, 2) a column indicating which jurisdictions will benefit from the mitigation project; and, 3) a column identifying possible funding sources.

I have updated our project list to reflect those recommendations. Our most recent project list is attached and I am requesting you review your proposed project(s) for accuracy. All incomplete information has been highlighted and needs to be provided as soon as possible so our project list will be complete and acceptable to FEMA. An updated funding sources list (Appendix C) is attached for your reference.

Reminder: If you intend on applying for disaster mitigation grants in the future, it is important you are represented at our LMS meetings. Agencies or cities that do not participate in the LMS process, including adoption of the plan by resolution, will not be eligible for Federal Hazard Mitigation grants.

You are receiving this notification because you were either listed on the roster as a member of our LMS Working Group or at some time you expressed interest in submitting a potential project. If you no longer wish to receive invitations for these meetings, or would like to designate someone else in your place, please notify me and I will make the appropriate adjustments.

See you tomorrow.

Etta LoPresti

AGENDA

Indian River County Local Mitigation Strategy Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967

October 16, 2009
10:00 a.m. – 11:00 a.m.

-
- | | | |
|----|---|-------------------|
| 1. | Welcome and Introductions
<i>John King, LMS Chairman</i>
<i>Indian River County Emergency Services</i> | <i>10:00 a.m.</i> |
| 2. | Review of Updated Project List
<i>Etta LoPresti, Emergency Management Planner</i>
<i>Indian River County Emergency Services</i> | <i>10:05 a.m.</i> |
| 3. | Technical Assistance
<i>Laura Herbert, Mitigation Planner</i>
<i>Florida Division of Emergency Management</i> | <i>10:10 a.m.</i> |
| 4. | Distribution of Draft Document
<i>Brian Nolan, Emergency Management Coordinator/LMS Vice Chairman</i> | <i>10:45 a.m.</i> |
| 5. | Plan Update – Timeline and Deliverables
<i>Etta LoPresti</i> | <i>10:50 a.m.</i> |
| 6. | Meeting Schedule
<i>Brian Nolan</i> | <i>10:55 a.m.</i> |
| 7. | Adjournment | <i>11:00 a.m.</i> |

Indian River County LMS Working Group
 Friday, October 16, 2009 - 10:00 a.m.
 Indian River County Emergency Management
 4225 43rd Avenue, Vero Beach, FL 32967

NAME	ORGANIZATION	ADDRESS	CITY/STATE/ZIP	PHONE#	E-MAIL ADDRESS
Laura Herbert	FDEM	3555 SHIMMERS OAK BLVD	TILTON AVE FL 32944	852-972-5580	laura.herbert@flmiflorida.com
John Nunemake	Fellsmere	21 Cypress st	32948	772-571-1116	citymanager@fellsmere.org
ATHALIA JONES	RED CROSS	2504 17th AVE	VB, FL 32940	772-562-7549	ATHALIA.JONES@REDCROSS.ORG
DEBB BRANNEN	ORCHARD	7404 US HWY 1 / VERO	VB, FL 32967	772-569-7688	orchard.manager@comcast.net
A. KINNOCK	SEBASTIAN	1225 MAIN ST	SEBAS 32958	388-8200	awimmer@cityofsebastian.org
Scott Melanson	Fellsmere	21 SCYPRESS ST	Fellsmere 32948	772-571-1360	psilvethire@cityofsebastian.org
Marianne Caron	IRFWCD	1708 21st St VB, FL 32940	VB, FL	772-552-4191	
Chris Mora	Public Works	1801 27th St. Vero Beach FL 32960		772-226-1379	cmora@iregov.com
Pattie Nugent	GYAC	4875 43rd Ave 32967	VB, FL	772-794-1005	pattinuge@yahoo.com
Buddy Akers	IRE Building	1801 27th St 32960	VB, FL	226-61268	Lafaris@irc.gov.com
John Kinne	VERES	4225 43 Ave, US 32967		226-3859	jkinne@iregov.com
DON DEXTER	CITY OF VERO BEACH	3405 Air port West Dr	VB	772-678-4800	d.dexter@iregov.com
MARIA LEMICKA	CITY OF VERO BEACH	1053 20th AVE	VB	978-4590	mlemick@iregov.com
Stan Boling	IRE Planning	1801 27th Street	VB	226-1253	sboling@iregov.com
ROLAND DEBLOIS	IRE ENV. PLANNING	1801 27th St	VB	226-1253	roland@iregov.com

Minutes

Indian River County Local Mitigation Strategy
Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967
October 16, 2009
10:00 a.m. – 11:00 a.m.

John King, Chairman of the Indian River County Local Mitigation Strategy Working Group, called the meeting to order at 10:00 a.m. welcoming all attendees. He introduced our guest, Ms. Laura Herbert, who is with the Florida Division of Emergency Management. All attendees were then asked to introduce themselves.

The City of Vero Beach, City of Sebastian, City of Fellsmere, Town of Orchid, and Town of Indian River Shores were each represented at today's meeting. It was noted that their participation is very important to assist with maintaining the LMS plan and project list so we can all be eligible for potential future funding.

Mr. King stated most everyone has been participating with getting their projects in and making sure the list is updated. He further stated there is a small window of time after today's meeting to add projects to the list.

Etta LoPresti, Indian River County Emergency Management Planner, distributed and discussed the updated project list. Currently there are 29 previously ranked projects, 12 currently unranked projects and 10 previous projects that have been purged from the list. Ms. LoPresti stated that FEMA is requesting some additional information be placed on project lists and that some plans are being denied for lack of this information. Ms. LoPresti requested that everyone review their project(s) appearing on the updated list and make sure all missing information is provided in order to make sure our project list is complete.

Ms. LoPresti asked Laura Herbert whether FDEM or FEMA will accept unranked projects. Ms. Herbert stated that as long as the county has a ranking procedure in place it does not matter when the projects are ranked. Mr. King stated that it is much easier to rank projects prior to a disaster because staff is so overwhelmed with dealing with the after effects of a disaster that there is no time for ranking the projects afterwards. Ms. LoPresti also noted that our current ranking process can be quite time consuming.

Ms. LoPresti explained that she purged the withdrawn projects from the list which resulted in each of the remaining projects moving up on the list. She asked for

permission to change the number sequence on the list to be consecutive now that certain project numbers no longer appear on the list. Jason Nunemaker made the motion to approve the request; Stan Boling seconded the motion, with the motion unanimously passed. Ms. LoPresti asked Laura Herbert for a recommendation on the best way to deal with ranking the currently unranked projects and assimilating them into the list with the ranked projects. Ms. Herbert recommended re-ranking the entire project list.

Mr. King discussed the scoring committee and the interpretation of the ranked projects. He noted that it is not important to have the project high on the list but to get the projects on the list. Laura Herbert agreed and reiterated that in order to get funding the project **must** be on the list. The ranking is a FEMA requirement and it identifies what a county's top priorities are. Projects are chosen by cost effectiveness, what funding is available, and the number of people affected. Ms. LoPresti suggested that she look into finding a less cumbersome way of scoring the projects and she will bring it to the group at the next meeting. Additionally, she mentioned that the county's LMS website (<http://www.trogov.com/Boards/LMS/Index.htm>) provides a list with a sampling of the types of projects that can and cannot be funded as well as a comprehensive list of possible funding sources.

Laura Herbert informed the committee that the process has come a long way since the 2004/2005 hurricanes but there are limitations and still no quick turnarounds. Ideal projects for HMGP funding are projects that might not be done normally. She went on to explain that if a project needed immediate funding, HMGP would not be the best route to pursue. There are different ways to meet the 25% match like an In-kind match or it can be matched with other projects that the county is already funding.

In addition to the Hazard Mitigation Grant Program (HMGP), there are a number of other grant funding opportunities, such as: Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance Program, Repetitive Flood Claims, and the Severe Repetitive Loss Grant Programs. Ms. Herbert will forward information that can be posted on the county website regarding how the projects are reviewed and determined for funding at the state level. To get a project approved it must be very clear on what hazards affects what jurisdictions. She then discussed the FEMA LMS plan approval process. FDEM will review our LMS plan and either make recommendations for improvement or send it on to FEMA for final review. FEMA will conduct their review and once FEMA approves our LMS, our Board of County Commissioners must adopt a resolution approving the updated LMS plan. The jurisdictions will then have 1-year to officially adopt the updated LMS plan. If any jurisdiction does not adopt the LMS plan within 1-year they will not be eligible for HMGP monies. Private non-profits are eligible for submitting projects but the jurisdiction for which the project lies must be the representative officially submitting the application.

Brian Nolan noted that it is very important for everyone to get their comments to Etta LoPresti so the project list can get completed. Ms. LoPresti explained that there is a time crunch on turning in the project list. Recognizing that everyone's time is valuable, much of the correspondence can be done via email with only a couple of meetings over the coming months. The plan is to get some ideas on project prioritization from Laura Herbert and bring them back to the working group at the November meeting. By the December meeting it is hoped that the group can vote on the final project list and the "Draft" LMS plan to be submitted for FDEM for approval prior to submission to FEMA.

Brian Nolan informed everyone that the next LMS meeting is scheduled for **Wednesday, November 18, 2009 and the following meeting will be Wednesday, December 16, 2009 (both at 10:00 a.m.). John King reiterated how important it is for everyone to get their projects submitted and ranked because there is no time to handle them after a disaster.

The meeting adjourned at 10:50 a.m. The next meeting of the Indian River County Unified Local Mitigation Strategy Working Group is tentatively set for **November 18, 2009 at 10:00 a.m.

**** (Please Note: the meeting has been rescheduled to Friday, November 20, 2009)**

November 20, 2009

From: Etta LoPresti
To: Etta LoPresti
Bcc: abenedetti@sirvmd.com; aduffdcd@bellsouth.net; "Al Minner"; andrew.feenev@bellsouth.com; Athalia Jones; "Barbara Morey"; "Bill Messersmith"; Bob Keatino; Brian Burkeen; Brian Nolan; "Captain Bud Spencer"; "Chief Schaubman"; Chris Mora; citymanager@cityoffellsmere.org; David Gunter (dgunter@fbb.net); Deb Branwell (orchid_manager@comcast.net); Debbie Vaughn (dvaughn@fbb.net); "Don Dexter"; Ed Prime; Erik Olson; Etta LoPresti; Freddie L. Woolfork; Gerry Koziel; Herbert, Laura; info@sebastianchamber.com; James "Buddy" Akins; Jim Roberts (jim.roberts@iem.myflorida.com); John King; "Maria Lewicka"; marilyn.johnson@bellsouth.com; "Mary Jayne Kelly"; Melissa Yunas (yunasm@doacs.state.fl.us); "Monte Falle"; "Penny Chandler"; Rachel Ivey; rbolton@covb.org; Roland Deblols; Ruth Stanbridge (stanbr@aol.com); Sarah Ruwe; Sharon Rayner; Slezak, Rob; spatari@doacs.state.fl.us; Stan Boling; Terri Wallace; Tim Elder (telder@ircsheriff.org); tom c. Kunz@fpl.com; Cheryl_Dunn@doh.state.fl.us; Cliff Schroeder; drisinger@auduboninternational.org; "Ingreene@steds.org"
Subject: LMS Meeting Reminder
Date: Monday, November 16, 2009 2:14:28 PM
Attachments: Draft Indian River County Method.xls
Update LMS Project Status List 2010.pdf
Update LMS Project List 2010.pdf
October 16 2009.pdf

Dear LMS Working Group members:

Please Note Scheduling Change:

This is a reminder that the Indian River County Local Mitigation Strategy Working Group meeting tentatively scheduled for Wednesday, November 18, 2009 has been rescheduled to Friday, November 20, 2009 at 10:00 a.m. here at our Emergency Operations Center located at 4225 43rd Avenue, Vero Beach.

Required Tasks:

- 1. All proposed projects need to be scored and prioritized. Using your proposed project, you are being asked to test out our proposed LMS Project Proposal Form and Prioritization Matrix (attached). Bring your print-out and final score to the meeting for discussion. If you are unable to use the attachment, please bring information related to your proposed project and your project will be scored at the meeting. NOTE: Completion of the new project proposal form will fulfill new FEMA requirements for data that is required to be on the updated project list.
2. Review the attached LMS Project Status List and submit justification of why your previous project was withdrawn from the list. This is a FEMA requirement.

For your review, the meeting minutes from the October 16, 2009 meeting are attached. If you have any questions, don't hesitate to give me a call.

Etta LoPresti

Etta LoPresti, FP&EM
Emergency Management Planner
Indian River County Emergency Management
4225 43rd Avenue
Vero Beach, Florida 32967
(772) 226-3856
Fax: (772) 567-9323

"Let our advance worrying become advance thinking and planning."
Sir Winston Churchill

AGENDA

Indian River County Local Mitigation Strategy Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967

November 20, 2009
10:00 a.m. – 11:00 a.m.

-
- | | | |
|----|--|-------------------|
| 1. | Welcome and Introductions
<i>John King, LMS Chairman</i>
<i>Indian River County Emergency Services</i> | <i>10:00 a.m.</i> |
| 2. | Review, Comment, and/or Approval of LMS Executive Summary, Sections 1-3
<i>John King</i> | <i>10:05 a.m.</i> |
| 3. | Discussion of Project Scoring
<i>Etta LoPresti, Emergency Management Planner</i>
<i>Indian River County Emergency Management</i> | <i>10:10 a.m.</i> |
| 4. | Distribution of Draft Document Sections 4-5
<i>Brian Nolan, Emergency Management Coordinator/LMS Vice Chairman</i> | <i>10:45 a.m.</i> |
| 5. | Overview of Timeline and Deliverables
<i>Brian Nolan</i> | <i>10:50 a.m.</i> |
| 6. | Meeting Schedule
<i>Brian Nolan</i> | <i>10:55 a.m.</i> |
| 7. | Adjournment | <i>11:00 a.m.</i> |

Indian River County LMS Working Group
 Friday, November 20, 2009 - 10:00 a.m.
 Indian River County Emergency Management
 4225 43rd Avenue, Vero Beach, FL 32967

NAME	ORGANIZATION	ADDRESS	CITY/STATE/ZIP	PHONE#	E-MAIL ADDRESS
Ey Pringe	IRCFR	5225 43rd Ave	VB	126 3867	eyprinc@ircgov.com
Michelle Morris	Sensations (For Alimind)	1201 Main St. Sub.	Substation	388-9750	morris@cityofsubstation.org
Keth McCully	IRC Public Works	1801 27th St. #21	Vero Beach	226-1562	KMcCully@ircgov.com
RONALD DEBLOIS	IRC PLANNING	1801 27th St.	Vero Beach	226-1258	rdeblois@ircgov.com
DEB BRANNON	Town of Okech	7406 US Hwy 1	V. B.	569-7686	orchid.manager@comcast.net
John King	IRCES	4225 43rd Ave	VB	226-3859	johnking@ircgov.com
FACONIC WOOD/FUNK	GyAC	4875-43rd Ave.	V.B.	794-1005 X34	Fwoodfunk@gymc.vic
Scott Helanson	Fellsmere	21 S. Cypress St	Fellsmere 32948	571-1360	phel@cityoffellsmere.org
BRIAN NOLAN	EMERGENCY MGT	225 43rd Ave	V. B.	226-3852	Brian@IRCMC.gov.com
MARIA GENICCA	CITY OF VERO BEACH	1053 20th Place	VERO BEACH	998-4550	molanica@cityofvero.org
Melissa Yunes	FDOF	5520 Pensacola	S.L.C. P.S.C.	772-260-0053	yunesm@doacs.state.fl.us
Don Deyter	City of Vero Beach	3405 Airport West Dr	V.B. 32900	975-4861	
Etta Lopresti	I.R.Co. Em. Mgt.	4225 43rd Ave	V.B. 32967	226-3856	elopresti@ircgov.com

Minutes

**Indian River County Local Mitigation Strategy
Working Group Meeting**

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967
November 20, 2009
10:00 a.m. – 11:00 a.m.

John King, Chairman of the Indian River County Local Mitigation Strategy Working Group, welcomed attendees and called the meeting to order at 10:00 a.m. He asked everyone to introduce themselves.

John King spoke about the importance of the project list how it relates to getting funding after a disaster and how there is no time after a disaster to work on the project list. Mr. King said that the Ms. LoPresti took the LMS Plan and broke it down into segments and, with that, today's purpose is to go through and approve some of the language that has already been forwarded to each member. Ms. LoPresti informed the committee that the LMS plan meets the FEMA crosswalk to the best of her knowledge and once the plan is approved it will be sent to FDEM for approval.

Mr. King asked if anyone had any issues with the Executive Summary. Chief Michelle Morris made a motion to except the executive summary as presented. The motion was seconded by Melissa Yunas from the Division of Forestry. The motion was unanimously approved and passed.

Mr. King moved to Section One and asked if anyone had any concerns, comments, or recommendations. Mr. King told the committee if they have any issues after returning to their offices to please feel free to call. Freddie Woolfork from the Gifford Youth Activity Center made a motion to approve Section One. Chief Melanson, City of Fellsmere, seconded the motion. The motion was unanimously approved and passed.

Chief Scott Melanson, City of Fellsmere, made a motion to approve Section Three, Institutional Analyses, with Chief Michelle Morris seconding the motion. The motion was unanimously approved and passed.

Mr. King talked about the scoring process and asked if anyone has concerns about the forms or the way it is scored or ranked. Etta LoPresti gave a demonstration on how the scoring sheet works and the ease of use. The new score sheet does not change policies but makes it much easier to use because it is more streamlined. Mrs.

LoPresti reiterated the fact that it is not important where the project is located on the list but that it is on the list. Mr. King stated that this new score sheet is much more effective than the old scoring sheets that were so cumbersome. Mrs. LoPresti let the committee know that every project must be reprioritized. If the committee adopts the new scoring sheet the reprioritization will be very quick and if the committee does not adopt the new scoring sheet then a sub-committee must be formed and redo the form. John King stated that the older projects must be resubmitted because at least the cost to do the projects has changed. Mr. King asked the committee if there are any questions or comments. Chief Melanson, City of Fellsmere made a motion to approve the new scoring sheet and (Unidentified) seconded the motion. The motion was unanimously approved and passed.

Mrs. LoPresti stated that she has distributed draft sections four and five and it has been placed on the county website for the committees review. She feels that they meet the FEMA crosswalk as best as they can. She stated that she would like for the committee to review them and provide her with any comments. These will be submitted to DEM after the December meeting. Mr. King stated that by breaking up the strategy into sections and doing a few at a time it is much easier to go over and comprehend. He asked if anyone brought any projects to the meeting that they need to add to the project list and if they have any questions they can stay after the meeting to get them answered. Ms. LoPresti stated she will be happy to help anyone who needs it.

Mr. King talked about declarations and how it triggers the funding for the projects. Mrs. LoPresti explained how HMGP works, how the funding is allocated and why the projects need to be on the list. Brian Nolan stated that the next LMS meeting is scheduled for Wednesday, December 16, 2009, at 10:00 a.m. and the following day everything will be sent to DEM. Everyone needs to review the draft of sections 4 thru 5 and note any changes or corrections ready for the December 16th meeting. The meeting schedule next year will be determined after comments are received from DEM.

Mr. King asked if anyone has any other issues, concerns, questions that need to be brought to the table, need help or brought any projects. Mr. King stated that the window is closing quite quickly on the project. The holidays are coming and December 16th is right around the corner and the date is not negotiable so if there are any projects they need to be submitted to be on the list now.

The meeting adjourned at 10:40 a.m. The next meeting of the Indian River County Unified Local Mitigation Strategy Working Group is tentatively set for December 16, 2009 at 10:00 a.m.

December 16, 2009

From: [Etta LoPresti](#)
To: [Etta LoPresti](#)
Subject: LMS Meeting Reminder
Date: Monday, December 14, 2009 1:19:21 PM

Dear LMS Working Group members:

This is a reminder that an Indian River County Local Mitigation Strategy Working Group meeting has been scheduled for **Wednesday, December 16th at 10:00 a.m.** here at our Emergency Operations Center located at 4225 43rd Avenue, Vero Beach.

This is a very important meeting because we will be voting on approving our draft 2010 LMS plan and our updated Prioritized Project List prior to submission to the state. The group has previously voted favorably to accept the Executive Summary, Sections 1-3 and 6.

The entire draft plan has been posted on the website for your review and can be found by clicking on the link below:

<http://www.ircgov.com/Boards/LMS/Update2010.pdf>

The updated project list has been posted on the website for your review and can be found by clicking on the link below:

http://www.ircgov.com/Boards/LMS/2010_Project_List.pdf

Hope to see you all on Wednesday.

Etta LoPresti

Etta LoPresti, JPTEM
Emergency Management Planner
Indian River County Emergency Management
4225 43rd Avenue
Vero Beach, Florida 32967
(772) 226-3856
Fax: (772) 567-9323

*"Let our advance worrying become advance thinking and planning."
Sir Winston Churchill*

AGENDA

Indian River County Local Mitigation Strategy Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967

December 16, 2009
10:00 a.m. – 10:30 a.m.

-
- | | | |
|----|---|-------------------|
| 1. | Welcome and Introductions
<i>John King, LMS Chairman</i>
<i>Indian River County Emergency Services</i> | <i>10:00 a.m.</i> |
| 2. | Review, Comment, and/or Approval of 2010 LMS Prioritized Project List
<i>John King</i> | <i>10:05 a.m.</i> |
| 2. | Review, Comment, and/or Approval of 2010 LMS Plan
<i>John King</i> | <i>10:10 a.m.</i> |
| 3. | Discussion of Plan Submittal Process
<i>Etta LoPresti, Emergency Management Planner</i>
<i>Indian River County Emergency Management</i> | <i>10:15 a.m.</i> |
| 4. | Plan Adoption Requirement
<i>Brian Nolan, Emergency Management Coordinator/LMS Vice Chairman</i> | <i>10:20 a.m.</i> |
| 5. | Adjournment | <i>10:30 a.m.</i> |

Indian River County LMS Working Group
 Wednesday, December 16, 2009 - 10:00 a.m.
 Indian River County Emergency Management
 4225 43rd Avenue, Vero Beach, FL 32967

NAME	ORGANIZATION	ADDRESS	CITY/STATE/ZIP	PHONE#	E-MAIL ADDRESS
Erica Polkenti	I.R. Co. Emerg. Mgt.	4225 43rd Ave	VB FL 32967	226-3856	elgrest@ircgov.com
El Piny	TRCA	4225 43 Ave	VA 22811	226-3856	+ Piny@ircgov.com
Shari Wallace	Journal of Orchid	1406 US 1	VB 7	569-7686	orchid.alex@comcast.net
ATHALIA JONES	RED CROSS	2506 17th AVE	VB 32960	562-2549	ATHALIA.JONES@NTA-REDCROSS.ORG
J. Roberts	FL DEN	2702 Directors Row	Orlando 32807	250-558-862	jim.roberts@em.mgflorida.com
Ed Ballis	Indian River Shores Public Safety	6001 N A1A	VB 32963	772-2312451	eballis@ircpsd.com
Don Dexter	City of V.B.	3405 Airport West Dr	VB 32960	772-978-4861	dldext@colub.org
Cliff Schroeder	I R MC	1000 50th St	VB 32960	567-4711	cliff.schroeder@ircmc.com
ROLAND DEBARI	IRC ENV PLANNING	1801 27th St.	VB 32960	774-226-1258	rdebarris@ircgov.com
Stan Boling	IRC Planning	1801 27th St.	VB 32960	226-1253	sboling@ircgov.com
CHRIS MORA	IRC PUBLIC WORKS	1801 27th St.	VB 32960	772-226-1379	cmora@ircgov.com
Sharon Johnson	CITY OF VERO BEACH	1053 20th PL	VB 32960	978-4550	sharon@verobeach.net

Minutes

Indian River County Local Mitigation Strategy
Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967
December 16, 2009
10:00 a.m. – 10:30 a.m.

John King, Chairman of the Indian River County Local Mitigation Strategy Working Group, welcomed attendees and called the meeting to order at 10:00 a.m. He started the meeting by introducing Mr. Jim Roberts from the Florida Division of Emergency Management who is our regional contact from Tallahassee. He then asked everyone to introduce themselves.

Brian Nolan thanked everyone for sending in the status of their projects that were removed from the previous LMS project list. FEMA requires we maintain a status list so everyone's cooperation is appreciated.

All members have been provided with an **updated prioritized project list**. Mr King asked if anyone had issues regarding the list. Brian Nolan reminded the group that our plan does have a conflict resolution procedure so if someone does have issues with the list there is a procedure to follow. Not hearing any issues, Mr. King asked for a motion to accept the list as presented. Mr. Cliff Schroeder, Indian River Medical Center, made a motion to accept the list as presented. Jason Nunemaker, City of Fellsmere, seconded the motion. The motion was unanimously approved and passed.

The Executive Summary, sections one, two and three were previously approved by the working group and sections four and five were presented as drafts at the last meeting. The entire draft plan has been posted on our website for review and comments have been solicited. Athalia Jones, American Red Cross, made a motion to accept the **remaining sections of the draft LMS plan** (accounting for the entire plan) as presented. Don Dexter, City of Vero Beach seconded the motion. The motion was unanimously approved and passed.

Now that the Working Group has approved our draft LMS plan and prioritized project list, we will send the plan off to the Florida Division of Emergency Management for their review. Following their review, we will either receive written comments for suggested corrections or notification that the plan will be forwarded to FEMA for their final review. Etta LoPresti stated that she would expect to receive written comments and John King concurred. This is to be construed only as

Minutes

Indian River County Local Mitigation Strategy
Working Group Meeting

Indian River County Emergency Operations Center
4225 43rd Avenue
Vero Beach, FL 32967
December 16, 2009
10:00 a.m. – 10:30 a.m.

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Now that the Working Group has approved our draft LMS plan and prioritized project list, we will send the plan off to the Florida Division of Emergency Management for their review. Following their review, we will either receive written comments for suggested corrections or notification that the plan will be forwarded to FEMA for their final review. Etta LoPresti stated that she would expect to receive written comments and John King concurred. This is to be construed only as

constructive criticism. Once FEMA approves our LMS plan, John King, as LMS Chairman, will receive written notification that our plan satisfies the criteria. We will then go before the Board of County Commissioners to adopt the plan by resolution.

Brian Nolan reminded the group that once the Board of County Commissioners adopts our LMS plan, the municipalities will have one year to complete their paper work to do the same. He presented a sample Resolution and reminded the group that each municipality has a copy of their current Resolution posted on the website.

The meeting schedule has not yet been established for next year but Mr. King stated that we will be meeting some time in the first quarter of 2010. We are going to try to establish a quarterly meeting schedule to keep our plan current.

Don Dexter posed a question about disaster funding allocations. Mr. Jim Roberts explained that every county emergency management office will be noticed of disaster funding opportunities. Ms. LoPresti added that there is a link to the state on our website (<http://www.ircgov.com/Boards/LMS/Index.htm>) that details all recent disaster declarations and that site will have *Notices of Funding Availability*. John King stated that projects are not chosen by their order on the list. Some times there are specific types of projects that FEMA is looking to fund (i.e., drainage, paving, etc.) and that will be decided post-disaster.

The meeting adjourned at 10:30 a.m. The next meeting of the Indian River County Unified Local Mitigation Strategy Working Group is unscheduled at this time but will be some time in the first quarter of 2010.

**APPENDIX F
ACRONYMS**

Table F.1. Acronyms used in the Local Mitigation Strategy.

Acronym	Full Name
ARC	American Red Cross
ASFPM	Association of State Floodplain Managers
BFE	Base Flood Elevation
BOAF	Building Officials Association of Florida
CBRA	Coastal Barrier Resources Act
CDBG	Community Development Block Grant
CDD	Community Development Department
CEMP	Comprehensive Emergency Management Plan
CGMP	Comprehensive Growth Management Plan
CHHA	Coastal High Hazard Area
CIE	Capital Improvements Element
CNMI	Commonwealth of North Mariana Islands
COOP	Continuity of Operations Plan
CPR	Cardiopulmonary Resuscitation
CR	county road
CRS	Community Rating System
CSA	Continental Shelf Associates, Inc.
DEM	Division of Emergency Management
DEP	Department of Environmental Protection
DES	Department of Emergency Services
DMA2K	Disaster Mitigation Act of 2000
DOC	Department of Commerce
DRI	Disaster Recovery Initiative
DWMP	District Water Management Plan
EDA	Economic Development Administration
EHS	Extremely Hazardous Substance
EMPA	Emergency Management and Preparedness Assistance
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPCRA	Emergency Preparedness and Community Right to Know Act
EPZ	Emergency Planning Zone
EQIP	Environmental Quality Incentives Program
ESF	Emergency Support Function
ESG	Emergency Shelter Grant
F.A.C.	Florida Administrative Code
FCMP	Florida Coastal Management Program
FCT	Florida Communities Trust
FDBPR	Florida Department of Business and Professional Regulation
FDCA	Florida Department of Community Affairs
FDEP	Florida Department of Environmental Protection
FDOC	Florida Department of Corrections
FDOE	Florida Department of Education
FDOF	Florida Division of Forestry

Acronym	Full Name
FDOI	Florida Department of Insurance
FDOMS	Florida Department of Management Services
FDOT	Florida Department of Transportation
FEC	Florida East Coast Railroad
FEMA	Federal Emergency Management Agency
FIND	Florida Inland Navigation District
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
F.S.	Florida Statutes
FSA	Farm Service Agency
HI	Heat Index
HMEP	Hazardous Materials Emergency Preparedness
HUD	United States Department of Housing and Urban Development
IBHS	Institute of Business and Home Safety
IRFWCD	Indian River Farms Water Control District
LEPC	Local Emergency Planning Committee
LMS	Local Mitigation Strategy
LOD	Letter of Dispute
MEMPHIS	Mapping for Emergency Management, Parallel Hazard Information System
MOM	Maximum of Maximums
mph	miles per hour
MPO	Metropolitan Planning Organization
NASA	National Aeronautics and Space Administration
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NFIRA	National Flood Insurance Reform Act
NFPA	National Fire Protection Administration
NLSI	National Lightning Safety Institute
NHC	National Hurricane Center
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRT	National Response Team
NWR	National Wildlife Refuge
NWS	National Weather Service
PAGs	Protective Action Guidelines
PCCIP	President's Commission on Critical Infrastructure Protection
PDM	Pre-Disaster Mitigation
PHSW	Public Health, Safety, and Welfare
PPL	Project Prioritization List
PWD	Public Works Department
SBA	Small Business Administration
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SERC	State Emergency Response Commission

Acronym	Full Name
SHIP	State Housing Initiative Partnership Program
SJRWMD	St. Johns River Water Management District
SLOSH	Sea Land Overland Surges for Hurricanes
SR	state road
STP	Surface Transportation Program
TAOS	The Arbiter of Storms
TCRPC	Treasure Coast Regional Planning Council
TDR	Transfer of Development Rights
TIP	Transportation Improvement Plan
TYLCV	Tomato Yellow Leaf Curl Virus
USACE	United States Army Corp of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USDOI	United States Department of the Interior
USDOT	United States Department of Transportation
USFA	United States Fire Administration
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WHIP	Wildlife Habitat Incentives Program

APPENDIX G
PRIORITIZED PROJECTS AND PROJECT STATUS LIST

**Indian River County
Local Mitigation Strategy
Project Prioritization List**

Project Priority	Project Score	Project Description	Estimated Project Cost & Estimated Time of Completion	Applicant	Mitigation to be Accomplished	Hazards Mitigated	Jurisdiction(s) Involved	Possible Funding Sources	Date Confirmed/ Added
1	93	Retrofits to the county's public schools that serve as public shelters.	\$75,000 ~12 months	Indian River County Emergency Management John King	Reduces vulnerability to wind and flood damage and provides for critically needed shelter (primary critical facilities) and reducing the county's safe shelter space deficit.	Hurricane and Tropical Storm	All Jurisdictions	Coastal Construction Building Zone Program; CDBG; DRI; HMGP; Hurricane Program; NFMF	Confirmed 9/6/2009 (John King)
2	93	Fire Escape Replacement	\$2 million >12 months	Indian River Medical Center Cliff Schroeder	Replacement of three fire escape towers on the patient wings of the hospital. The current towers are open-air towers that offer no protection from inclement weather. These required fire evacuation routes become unusable during a hurricane. This puts a large population of patients and healthcare workers at serious risk during a severe storm. A severe storm increases the risk of a catastrophic event that would require the evacuation of this population. The current design also increases the risk to building damage and loss of our ability to sustain operations during and post storm. Each tower serves a patient population of approximately 75 and healthcare staff of 45.	Hurricane and Tropical Storm	All Jurisdictions	HMGP	Confirmed 10/2/2009 (Cliff Schroeder)
3	93	Fellsmere paving and drainage project	\$15,889,032 >12 months	City of Fellsmere Jason Nunemaker	Paving and drainage project to reduce flooding and provide for safer and more efficient evacuations for residents.	Hurricane, Tropical Storm and Flood	Fellsmere	CDBG, HMGP, DRI, USDA, EDA	Added 11/20/2008
4	92	Study the feasibility and appropriateness of relocating the county's emergency shelter line (DSSU) westward.	\$50,000 2011	Indian River County Community Development Roland DeBols	Will mitigate potential impact to coastal/seafront structures by requiring an updated/appropriate oceanfront building setback to minimize coastal erosion damage.	Beach erosion	City of Vero Beach	Florida Inland Navigation District (FIND) HMGP	Added 9/15/2009
5	92	Portable water storage system	\$600,000 ~12 months	Indian River Medical Center Cliff Schroeder	Install and connect a portable water tank to provide emergency water services to the hospital for patient care.	Hurricane, Tropical Storm, Wellfield contamination, Terrorism & Sabotage	All Jurisdictions	HMGP	Confirmed 10/2/2009 (Cliff Schroeder)

Indian River County LMS
*Indicates jurisdiction interest in this project
and support wherever necessary.

April 2010

1 of 7

**Indian River County
Local Mitigation Strategy
Project Prioritization List**

Project Priority	Project Score	Project Description	Estimated Project Cost & Estimated Time of Completion	Applicant	Mitigation to be Accomplished	Hazards Mitigated	Jurisdiction(s) Involved	Possible Funding Sources	Date Confirmed/Added
6	91	I.R. Shores Trauma Helipad	\$250,000 6 months	I.R. Shores Ed Ballas	Death/injury prevention for trauma patients; helipad will be utilized for trauma helicopters to transport critically injured patients to trauma hospital. Helipad will be available to all county agencies.	Transportation System Accidents	Indian River Shores, City of Vero Beach	EMPA, HMGP, State Disaster Preparedness Grants	Added 12/10/08 Ed Ballas
7	91	Revise Indian River Farms Water Control District (IRFWCD) elevation references from NGVD29 to NAVD88 to reduce potential for elevation data inconsistency with modernized NFIP FIRMs	\$300,000 2011	Indian River County Community Development Roland DeBlais	Will minimize errors in base flood elevations of new structures and thus mitigate potential flooding of such structures.	Flood	Indian River County	HMGP	Added 9/15/2009
8	88	Prescribed burns in certain conservation areas vulnerable to wildfire.	\$3,000 >12 months	Indian River County Community Development Roland DeBlais	Reduces vulnerability to wildfire.	Midland Fire	All Jurisdictions	Conservation Technical Assistance; DRI, HMGP, Protection of Forests and Rangelands	Confirmed 10/2/09 (Roland DeBlais)
9	88	Mapping and assessment of public wellfields and reverse osmosis plant protection zones to guard against groundwater contamination.	\$100,000 >12 months	Indian River County Community Development Roland DeBlais	Reduces the countywide exposure to wellfield contamination by allowing more effective management of resource.	Wellfield Contamination	All Jurisdictions	Capitalization Grants for Drinking Water State Revolving Fund; Coastal Wetlands Planning, Protection, and Restoration Act; Conservation Technical Assistance; DRI; HMGP; Planning Assistance to States Program; Water Pollution Control; State and Interstate Program; Support; Water Quality Program Management	Confirmed 10/2/09 (Roland DeBlais)
10	88	Rebuild non-wind code compliant Fire Rescue Stations.	\$4 million 18 months	Indian River County Emergency Services Ed Prime	This will allow these critical facilities to withstand major hurricane impact, and support the personnel on an extended basis with power water and sewer facilities. These projects will benefit all citizens and visitors of Indian River County as well as the surrounding counties we assist through mutual aid by providing uninterrupted Fire Rescue and EMS service during and after a major disaster event.	Hurricane, Tropical Storm and Flood	All Jurisdictions	HMGP	Revised 8/31/2009 (Ed Prime)

Indian River County LMS
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**Indian River County
Local Mitigation Strategy
Project Prioritization List**

Project Priority	Project Score	Project Description	Estimated Project Cost & Estimated Time of Completion	Applicant	Mitigation to be Accomplished	Hazards Mitigated	Jurisdiction(s) Involved	Possible Funding Sources	Date Confirmed/Added
11	85	Retrofitting Gifford Youth Activity Center	\$110,000 <12 months	Gifford Youth Activity Center, Inc. Freddie Woolford	Harden facility (roof and window improvements) for disaster activities.	Hurricane/Tropical Storm	Indian River County	HMGP	Added 12/16/09
12	85	Well for emergency use	\$300,000 <12 months	Indian River Medical Center Cliff Schroeder	Drill and connect a well for emergency use if water service is disrupted to the hospital fire sprinkler system. Loss of water service puts approximately 760 patients and healthcare workers at risk of loss of life. It puts a \$220,000,000 building and equipment investment at risk of loss by fire.	Hurricane/Tropical Storm	All Jurisdictions	HMGP	Confirmed 10/2/2009 (Cliff Schroeder)
13	84	Adopt procedures in the LMS for removal of marine debris resulting from natural disasters.	\$50,000 2011	Indian River County Community Development Roland DeBlats	Will mitigate potential damage to marine vessels and would alleviate potential obstruction to navigation of waterways.	Hurricane/Tropical Storm	Indian River County, City of Vero Beach	Florida Inland Navigation District (FIND), HMGP	Added 9/15/2009
14	81	Retrofit to the North County Library to reduce vulnerability to wind and flood damage.	\$10,000 <12 months	Indian River County General Services Tom Frame	Reduces vulnerability of a public building and contents (library) to flooding damage.	Hurricane, Tropical Storm and Flood	All Jurisdictions	Public Library Construction Grant; Coastal Construction Building Zone Program; CDBG; DRI; RMAP; HMGP; Hurricane Program; NFMF	Confirmed 9/8/2009 (Tom Frame)
15	81	Retrofit to the county's main library to reduce vulnerability to wind and flood damage.	\$10,000 <12 months	Indian River County General Services Tom Frame	Reduces vulnerability of a public building and contents (library) to flooding damage.	Hurricane, Tropical Storm and Flood	All Jurisdictions	Public Library Construction Grant; Coastal Construction Building Zone Program; CDBG; DRI; RMAP; HMGP; Hurricane Program; NFMF	Confirmed 9/8/2009 (Tom Frame)
16	79	Retrofit to the City of Vero Beach Police Department, Public Works facility and the Electrical Transmission and Distribution Department (critical facilities) to reduce vulnerability to wind and flood damage.	\$2 million >12 months	City of Vero Beach Don Dexter	Reduces the vulnerability to category 4 or 5 hurricanes for two critical facilities.	Hurricane/Tropical Storm and flood	City of Vero Beach	HMGP, CDBG, BMP&A Trust Fund (DCA), Pre-disaster Mitigation Program (FEMA), Hurricane Program (FEMA)	Confirmed/Revised 8/31/2009 (Don Dexter)
17	79	Improvements to 53rd St. (East-West connector) for improved traffic access and emergency evacuations.	Phase I - \$2 million Phase II - \$7 million >12 months	Indian River County Public Works Department Chris Mora	Reduces the risk of fatalities (loss of life) during evacuation.	All hazards	All Jurisdictions	CDBG; DRI; HMGP; Hurricane Program; NFMF; Public Assistance	Confirmed 10/5/2009 (Chris Mora)
18	79	Replacement of county bridges constructed below the 100-year flood plain for improved access, evacuation and exposure to flooding	\$10 million >12 months	Indian River County Public Works Department Chris Mora	Reduces the risk of fatalities (loss of life) during evacuation.	All hazards	All Jurisdictions	CDBG; DRI; Emergency Relief Program; RMAP; HMGP; Hurricane Program; NFMF; STP	Confirmed 10/5/2009 (Chris Mora)

Indian River County LMS

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**Indian River County
Local Mitigation Strategy
Project Prioritization List**

Project Priority	Project Score	Project Description	Estimated Project Cost & Estimated Time of Completion	Applicant	Mitigation to be Accomplished	Hazards Mitigated	Jurisdictions(s) Involved	Possible Funding Sources	Date Confirmed/Addressed
19	78	Obtain an updated countywide geohydrological study with seismic profiles.	\$300,000 2015	Indian River County Community Development Roland DeBlais	Will reduce the risk of limited public water supply in times of drought by providing groundwater hydrology data at key locations in the county.	Drought	All Jurisdictions	HMGP	Added 9/15/2009
20	78	Protection of the Surficial Aquifer groundwater quality and quantity as a secondary potable water source through acquisition of primary recharge areas and through the plugging of abandoned artesian wells.	\$2 million on-going	Indian River County Community Development Roland DeBlais	Reduces the exposure to potential wellfield contamination.	Drought	All Jurisdictions	Capitalization Grants for Drinking Water State Revolving Fund; Conservation Technical Assistance; DRI-HMGP; Planning Assistance to States Program; Water Pollution Control; State and Interstate Program Support; Water Quality Program Management	Confirmed 10/2/09 (Roland DeBlais)
21	77	Laconia Avenue extension	\$5 million >12 months	City of Sebastian Al Miner	This project will provide a major emergency evacuation route. that will include a new bridge over the St. Sebastian River. It will provide a much-needed major escape route not directly impacted by the Florida East Coast Railway.	Flood	Sebastian	DOB; Emergency Relief; FMAP; HMGP	Confirmed/Revised 10/27/2009 (Al Miner)
22	76	Hurricane Debris Staging Area	\$75,000 6 months	Town of L. R. Shores Ed Bellas	Construction of a hurricane debris staging area will enhance recovery efforts.	Hurricane/Tropical Storms	Indian River Shores	FDM; HMGP; EMPA; Disaster Recovery Initiative Grants; Emergency Management; State and Local Assistance; Direct Housing; Natural Disaster	Added 12/1/09 Ed Bellas
23	76	34th Avenue bridge replacement over the Main Keller Canal. This project will replace the existing bridge that provides a connection to the Vero Beach Airport from S.R. 80.	\$3.6 million >12 months	City of Vero Beach Don Dexter	The existing bridge does not conform to the current design standards. This route is heavily used for relief supply distribution post-disaster.	All Hazards	All Jurisdictions	HMGP	Confirmed/Revised 9/9/2009

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**Indian River County
Local Mitigation Strategy
Project Prioritization List**

Project Priority	Project Score	Project Description	Estimated Project Cost & Estimated Time of Completion	Applicant	Mitigation to be Accomplished	Hazards Mitigated	Jurisdiction(s) Involved ¹	Possible Funding Sources	Date Confirmed/Added
24	75	Mockingbird Drive stormwater facilities – provide positive outfall in low-lying area previously served by percolation inlets.	\$150,000 >12 months	City of Vero Beach Don Dexter	This project will reduce flooding in this low-lying area, which was flooded for an extended period following recent hurricanes due to failure of percolation systems.	Flood	Vero Beach	HMGP, DEP 319 Grant	Revised 8/31/2009 (Don Dexter)
25	74	Fred Tuek Drive/A1A drainage improvements	\$1,000,000 >12 months	I.R. Shores Ed Ballas	Correct drainage and flash flood problems that impinge and impact the Indian River Shores Public Safety station (Fred Tuek Drive) and City Hall (Highway A1A).	Flood	Indian River Shores	Flood Plain Management Services, HMGP, FMA, State Preparedness Grant	Added 12/19/09 Ed Ballas
26	72	Jungle Trail dead vegetation removal (from Jungle Trail bordering Orchid Island Golf Club, from C.R. 510, to the turn north at the I.R. Lagoon)	\$300,000 6 months	Town of Orchid Deb Branwell/TernWallace	Removal of dead vegetation to remove or minimize fire hazard.	Midland Fire	Orchid	HMGP, CDBG, Community Facility Loans & Grants, Cooperative Forestry Service	Added 10/1/2009
27	72	Jungle Trail dead vegetation removal (NE side of C.R. 510 bridge)	\$450,000 7 months	Town of Orchid Deb Branwell/TernWallace	Removal of dead vegetation to remove or minimize fire hazard.	Midland Fire	Orchid	HMGP, CDBG, Community Facility Loans & Grants, Cooperative Forestry Service	Added 10/1/2009
28	72	Construction of seawall/retreatment along Humiston Beach in the City of Vero Beach.	\$600,000 >12 months	City of Vero Beach Don Dexter	Residents and business owners will benefit from continued and uninterrupted access to the beach facilities and associated parking.	Flood and Erosion	Vero Beach	HMGP	Confirmed 8/31/09 (Don Dexter)
29	71	Club Drive drainage project – Sandfly and Painted Bunting – provide positive outfall in low-lying area currently served by percolation	\$100,000 ~12 months	City of Vero Beach Don Dexter	This project will reduce flooding in this low-lying area, which was flooded for an extended period following recent hurricanes due to failure of percolation systems.	Flood	Vero Beach	HMGP, DEP 319 Grant	Revised 8/31/09 (Don Dexter)
30	71	Construction of Billing Weir gates across two canals that connect Rockridge subdivision with the lagoon.	\$6.5 million >12 months	Indian River County Public Works Chris Mora	Will prevent flooding in the subdivision during hurricane events.	Flood	Unincorporated Indian River County	HMGP	Confirmed 10/5/2009 (Chris Mora)

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**Indian River County
Local Mitigation Strategy
Project Prioritization List**

Project Priority	Project Score	Project Description	Estimated Project Cost & Estimated Time of Completion	Applicant	Mitigation to be Accomplished	Hazards Mitigated	Jurisdiction(s) Involved ¹	Possible Funding Sources	Date Confirmed/Added
39	64	Construction of seawall along Conn Beach in the City of Vero Beach.	\$1.7 million >12 months	City of Vero Beach Don Dexter	This project will provide erosion control, prevent damage to Ocean Drive and the Boardwalk which sustained approximately \$1 million in damages from Hurricanes Frances and Jeanne.	Hurricane/Tropical Storm, flood and coastal erosion	Vero Beach	HMGP	Revised 9/31/09 (Don Dexter)
40	63	Modifications to the outfall structure at Stonebridge Subdivision for flood damage reduction.	\$5000 >12 months	Indian River County Public Works Chris Mora	Reduces vulnerability to flooding at this site.	Flood	Unincorporated Indian River County	CDBG; DRI; Emergency Rehabilitation of Flood Control Works; FMAP; HMGP; Hurricane Program; NFMP; Public Assistance	Confirmed 10/6/2009 (Chris Mora)
41	63	Barber/Schumann intersection improvements	\$3 million >12 months	City of Sebastian Al Minner	Intersection widening and improvements to help with emergency evacuations.	All hazard	Sebastian	CDBG; Emergency Relief; FMAP; HMGP	Added 10/22/09
42	63	Corridor street improvements at Penwinkle, South Easy Street, Laconia Street, and Schumann Drive.	\$3 million >12 months	City of Sebastian Al Minner	Improve street surface and drainage and streets to promote better access points for evacuation.	All hazard	Sebastian	CDBG; Emergency Relief; FMAP; HMGP	Added 10/22/09
43	63	Collier Creek headwall improvements	\$3 million >12 months	City of Sebastian Al Minner	Improve headwall and upgrade outfall to control water flow into Collier Creek and the St. Sebastian River.	Flood/erosion	Sebastian	CDBG; Emergency Relief; FMAP; HMGP	Added 10/22/09
44	60	Dredge George Street Canal	\$6 million >12 months	City of Sebastian Al Minner	Improve holding capacity of canal system to retain water and provide better flood control.	Flood	Sebastian	CDBG; Emergency Relief; FMAP; HMGP	Added 10/22/09
45	59	Restoration of critically eroded areas along an 0.3-mile stretch of the Atlantic shoreline in an effort to provide needed storm protection.	\$18 million initial/ \$48 million long-term >12 months	Indian River County Public Works Department Chris Mora	Reduces storm surge and flooding vulnerability.	Flood	City of Vero Beach	CDBG; Conservation Plant Material Centers; Conservation Technical Assistance; DRI; FMAP; HMGP; Hurricane Program; Land Protection; Planning Assistance to States Program	Confirmed 10/4/09 (Chris Mora)
46	46	Recycled water project	\$100,000 6 months	Town of Orchid Deb Bramwell/TernWallace	Project to retrofit the town to receive recycled water from Indian River County to keep ponds full enough to prevent loss of fish and wildlife in the Town of Orchid, a certified Audubon International Sanctuary.	Drought	Orchid	Conservation Technical Assistance; Cooperative Extension Service; HMGP; U.S. Army Corps of Engineers	Added 10/1/2009

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**Indian River County
LMS Working Group
2005-2009 LMS Project Status**

ID#	Project Description	DR or State Assigned Project #	Project Status (Pending, Completed, Denied, Withdrawn, etc.)	NOTES
1	Improved mapping of the Coastal High Hazard Area to allow for better and more precise implementation of County regulation's related to the development within that area.		WITHDRAWN 10/7/2009 (Sasan Rohani)	State (Department of Community Development) is doing the mapping of the Coastal High Hazard Area
2	Establishment of a public education program on the importance of maintaining drainage systems.		COMPLETED 10/5/2009 (Chris Mora)	This project is complete and on-going. The county stormwater educator has prepared and regularly provides presentations to discuss drainage systems. No mitigation funds were used.
3	Stabilization of Jungle Trail along the Indian River Lagoon to improve public access and reduce erosion.		WITHDRAWN 9/15/2009 (Roland DeBlouis)	Project completed with a cost-share grant from the Florida Inland Navigation District (FIND).
4	Improvements to CR 512 for improved traffic access and emergency evacuations.		COMPLETED 10/5/2009 (Chris Mora)	Completed in 2008 using funds from the County Incentive Grant Program (CIGP) and state sidewalk funds.
5	Elevation of grade crossing over RR at 41st St. for improved traffic access and emergency evacuation.		WITHDRAWN 10/5/2009 (Chris Mora)	This project was removed from the county's long-range transportation plan.
6	Proposed Egret Marsh Regional Stormwater Park.		COMPLETED 10/5/2009 (Chris Mora)	Expected to be completed in January 2010. No mitigation funds were used.
7	Raise elevation for six homes in Country Club Pointe.		WITHDRAWN 10/5/2009 (Chris Mora)	This project was withdrawn due to a poor cost/benefit ratio and lack of funding.
8	Remove vegetation, particularly exotics, in 8 miles of drainage canals and 50 miles of rear drainage ditches in the City of Sebastian.		COMPLETED 10/23/09 (Al Minner)	Al Minner reported that project is complete, a success and proved extremely helpful during T. S. Fay.
9	Provide shoreline stabilization at Main Street dock area in the City of Sebastian.		WITHDRAWN 10/22/2009 (Al Minner)	The City recently completed a major renovation on the Main Street boat ramp and the surrounding area. Funds were used from the county's CRA and grants were received from FIND and FWS. After the 2004 hurricanes, the city received FEMA funds to stabilize the lagoon banks. After these improvements were made, it was determined that this project was no longer a priority.

**Indian River County
LMS Working Group
2005-2009 LMS Project Status**

ID#	Project Description	DR or State Assigned Project #	Project Status (Pending, Completed, Denied, Withdrawn, etc.)	NOTES
10	Returbish / replace approximately 10,000 LF of seawalls along both sides of Collier Creek Canal north of CR-512 in the City of Sebastian.		COMPLETED 10/22/2009 (Al Minner)	Al Minner reports that the city received a 319 grant and the project was around \$4 million and a "huge" project for the city.
11	Rehabilitate the two primary drainage ditches that run parallel to Runways 13-31 and 4-22 at Sebastian Municipal Airport.		COMPLETED 10/22/2009 (Al Minner)	Road improvements in this area have addressed the drainage concern.
12	Elevating structures within the City of Vero Beach that are in the flood plain that are below base flood elevation and/or experienced flood damage as a result of Hurricanes Frances and/or Jeanne.		WITHDRAWN 9/4/2009 (Maria Lewicka)	
13	Dredge IRFWCD settling basin within the Main Canal. Project includes the removal of an estimated 50,000 C.Y. of sand along a 1,750 L.F. section of canal East of Indian River Blvd.		WITHDRAWN 10/7/2009 (Deborah Vaughn)	FEMA rejected the project stating it was a "maintenance" issue.
14	Replacement of undersized culverts along the IRFWCD Sub-lateral B-2-E ditch (adjacent to 12th Street), between 20th Avenue and 58th Avenue.		WITHDRAWN 10/7/2009 (Deborah Vaughn)	It was determined that this project was too expensive for the district to participate.
15	Construction of five seawalls in the Oceanside Subdivision along the Atlantic Ocean.		WITHDRAWN 10/5/2009 (Chris Mora)	Individual property owners built 2 of the 5 seawalls on their own. The beach along the remaining properties was restored with the Section 7 Beach Renourishment project and completed in 2007 with grant funding.
16	Mockingbird Drive stormwater facilities – provide positive outfall in low-lying area previously served by percolation inlets.		PARTIALLY COMPLETED 8/31/09 (Don Dexter) Needs to construct outfall treatment structure	Portions were funded as a capitol projects without the benefit of grant monies.
17	Replacement and relocation of the emergency power generation plant.	N/A	COMPLETED 10/2/2009 (Cliff Schroeder)	Funded without the benefit of grant monies.
18	Rockridge sewer collection system to improve sewer service during prolonged power outages and/or flood conditions.	FEMA-1561-DR	COMPLETED in 2008 11/25/2009 (Larry Brown - IRC Utilities)	The \$8 million project was funded for by a HUD CDBG & FEMA hazard mitigation grant.

**Indian River County
LMS Working Group
2005-2009 LMS Project Status**

ID#	Project Description	DR or State Assigned Project #	Project Status (Pending, Completed, Denied, Withdrawn, etc.)	NOTES
19	Wind retrofits to preserve the 1916 Fellsmere School.	N/A	WITHDRAWN 12/1/2009 (Jason Nunemaker)	The entire structure is being restored in accordance with state historical guidelines that would not permit the aggressive windstorm measures originally considered. The City of Fellsmere is funding this project themselves.