

Executive Summary

The experiences of the 2004 Hurricane Season epitomize the importance of better integrating hazard mitigation activities into local comprehensive planning. Last fall, residents from all over the state experienced significant damages from Hurricanes Charley, Frances, Jeanne, and Ivan by either winds, tornadoes, surge, or flooding. But this was not the only time that we have experienced natural disaster, nor will it be the last. In 1992, Hurricane Andrew devastated South Florida. In 1998 and 1999, most counties in Florida experienced wildfires. In some cases, despite fire fighters' best efforts, the fires advanced through neighborhoods and homes were lost. Every year in Central Florida, new sinkholes emerge swallowing homes and damaging infrastructure. The cost of recovery for these various disasters ranges from hundreds of thousands to billions of dollars, significantly taxing local, state, and federal financial sources. Losses covered through federal funding as a result of the 2004 hurricanes alone could reach as high as \$7 billion. Worst of all, however, are the many lives that, directly or indirectly, are lost due to natural disasters. It is imperative that we reduce the human and financial costs of natural disasters. Through better integration of natural hazard considerations into local comprehensive planning, we can build safer communities.

This profile of Putnam County has been prepared as part of a statewide effort by the Florida Department of Community Affairs (DCA) to guide local governments on integrating hazard mitigation principles into local comprehensive plans. Through the process outlined in this profile, planners will be able to (1) convey Putnam County's existing and potential risk to identified hazards; (2) assess how well local hazard mitigation principles have been incorporated into the County's Comprehensive Plan; (3) provide recommendations on how hazard mitigation can better be integrated into the Comprehensive Plan; and (4) determine if any enhancements could be made to the LMS to better support comprehensive planning. Best available statewide level data is provided to convey exposure and risk as well as to illustrate the vulnerability assessment component of the integration process.

Summary of Recommendations

Putnam County's Comprehensive Plan has good integration of hazard mitigation principles and its LMS has adequate data and goals to support comprehensive planning. There are goals, objectives, and policies that support risk reduction from hurricanes and floods in the LMS and Comprehensive Plan. However, there are always ways to strengthen such plans, and the following is a summary of options for the County to do so.

Comprehensive Plan Preliminary Recommendations

The following recommendations include hazard mitigation measures through which Putnam County can continue to reduce or eliminate risks to storm surge, flood, and wildfire. These recommendations pertain to the use of vacant lands and/or redevelopment practices. Based on the land use tabulations, most of the vacant acreage is susceptible to storm surge, flood, and wildfire. Sinkholes were discussed in the LMS, but the potential for occurrence was considered to be very low. Therefore, Putnam County's Comprehensive Plan elements were not reviewed for policies pertaining to sinkhole hazards. For more information about the methodology and data used for the land use tabulations, please refer to Section 2. Hazard Vulnerability in this hazards profile.

Of the vacant lands, 439 acres are susceptible to Category 1 storm surge (CHZ), 2,232 acres are susceptible to Category 1 – 3 storm surge (HVZ), 22,298 are susceptible to 100-year flood, and 5,458 acres are susceptible to wildfire.

Storm Surge

Nearly 36% of the 439 vacant acres in the Coastal Hazard Zone and 42% of the 2,232 vacant acres in the Hurricane Vulnerability Zone are to be developed for residential, commercial, industrial uses or public facilities, indicating that these risk reduction strategies should be considered prior to development of this vacant land.

- The Comprehensive Plan should continue to maintain low density residential development in the Coastal High Hazard Area (CHHA), prohibit new or expanded mobile home or recreational vehicle developments on barrier islands or V-Zones, protect the coastline naturally, and other existing measures to minimize risk.
- The Comprehensive Plan should consider transfer of development rights to from areas within the CHHA to outside the CHHA, as another measure to reduce density in the CHHA.
- The County should consider retrofitting essential public facilities that exist in the CHHA to mitigate impacts from surge.
- The County should consider prohibiting septic tanks in the CHHA except in cases of excessive hardship where (1) no reasonable alternative exists, (2) a discharge from a septic tank will not adversely affect public health and will not degrade surface or ground water and (3) where the Health Department determines that soil conditions, water table elevation and setback provisions are adequate to meet state requirements.
- The County should consider prohibiting new schools in the CHHA and retrofitting new schools as shelters outside the HVZ, where possible.
- The County should consider only allowing new on-site shelters outside the HVZ, where possible.
- The Comprehensive Plan should consider prohibiting the development of nursing homes, adult congregate living facilities, and hospitals inside the Coastal High Hazard Area and other high-risk developments, similar to how most county funded facilities have been regulated. Building these facilities out of harm's way reduces evacuation needs of the special needs population. In addition, the number of evacuees is reduced who are under medical supervision or need medical staff chaperones, potentially reducing hurricane evacuation clearance times.

Flood

About 14% of the 22,298 vacant acres in the 100-year floodplain are to be developed for residential, commercial, industrial uses or public facilities, indicating that these risk reduction strategies should be considered prior to development of this vacant land.

- The Comprehensive Plan should continue the implementation of policies for preserving and enhancing the natural environment (i.e., 100-year floodplain) through the enforcement of land development regulations for floodplain management and stormwater management to maintain the natural functions.
- The County should continue to promote the acquisition of floodplains along the St. Johns and Ocklawaha Rivers through available state and federal programs.
- The Comprehensive Plan should continue to require that the County maintain an inventory of environmentally sensitive areas which shall include 100-year floodplains.
- The Comprehensive Plan should continue to require that all proposed development submit drainage plans meeting minimum adopted level of service standards, including on-site retention and positive outfall, and require that such plans meet St.

Johns River Water Management District permitting requirements, in addition to local stormwater permitting requirements, prior to development approval.

- The Comprehensive Plan should continue including a policy for reducing future losses through transfers of development rights from areas within the 100-year floodplain to areas outside the 100-year floodplain.
- The Comprehensive Plan should continue to require 1 foot of freeboard above base flood elevation.
- The Comprehensive Plan should continue to require that the use of septic tanks in the 100-year floodplain and floodways will be restricted.
- The Comprehensive Plan should continue to incorporate the existing Flood Control Ordinance 87-1 into the Land Development Regulations which restricts development in floodways and requires clustering outside the floodplain,
- The Comprehensive Plan should continue to require that the County use FEMA FIRM maps to determine the location of areas of special flood hazard. The County should continue to regulate development in these through the LDRs.
- The Comprehensive Plan should continue to require that the County adopt Land Development Regulations which regulate stormwater runoff.
- The Comprehensive Plan should continue to require that the dredging and filling of lands within floodplains shall not be permitted to adversely impact upon the natural functions of the 100-year floodplain, and shall be carried out, only in strict accordance with state or federal permits.
- The County should consider requiring that developers maintain 50 foot buffers from wetlands.
- The County should consider requiring that structures be elevated on pilings on existing sites which do not contain sufficient uplands, and not allow lots or parcels to be created without sufficient uplands.
- The County should consider retrofitting stormwater management facilities.
- The County should consider including a policy to not approve variances to required flood elevations.
- The County should consider establishing an impact fee and/or other equitable user-oriented revenue sources for the construction of drainage facilities, either county-wide or in districts of high flooding potential.
- The County should consider promoting the use of vegetated swales, sodding, landscaping, and retention of natural vegetation as components of the drainage system for natural runoff through the use of landscape and subdivision ordinances.
- The County should consider requiring that the maintenance and operation of private stormwater systems is funded by private sources.
- The County should consider requiring areas that have not established base flood elevations to be studied prior to development.
- The County should consider calling for compensating storage calculations in flood hazard areas.
- The Comprehensive Plan should consider requiring that new or expansions of existing critical facilities (including schools) not occur in floodways and in areas where potential for flooding exists.

Wildfire

About 20% of the 5,458 vacant acres that are susceptible to wildfire are to be developed for residential, commercial, industrial uses or public facilities, indicating that these risk reduction strategies should be considered prior to development of this vacant land.

- The Comprehensive Plan should continue to require that the County coordinate with the North Florida Prescribed Burn Council and other appropriate entities including the U.S. Forest Service, the Florida Division of Forestry, the St. Johns River Water Management District, and the Nature Conservancy, in promoting prescribed burns on public lands.
- The County should continue to support educational efforts to promote prescribed burning which include developing a public education program for local governments and the public to inform them about the importance of conducting periodic prescribed burns. Educational brochures should be made available to the public at City Halls, the County Courthouse, Agricultural Extension offices etc., and periodic workshops and seminars shall be held prior to each burning season
- The County should continue to coordinate with area volunteer fire departments to ensure fire protection is provided to all areas of the County.
- The County should consider participating in the Firewise Medal Community program to reduce risks within the wildland urban interface.
- Where reasonable, consideration should be made to design structures and sites within the County to minimize potential for loss of life and property (e.g., outdoor sprinkler systems, fire-resistant building materials or treatments, and landscaping and site design practices); review proposals for subdivisions, lot splits, and other developments for fire protection needs during site plan review process; coordinate with fire protection service or agencies to determine guidelines for use and development in wildfire-prone areas.
- The County should consider a requirement for all new development to include and implement a wildfire mitigation plan specific to that development, subject to review and approval by the County Fire Rescue Department.

Sinkhole

Sinkholes were discussed in the LMS, but the risk was considered to be very low for the entire county. The Comprehensive Plan does not address the sinkhole hazard, therefore preliminary recommendations were not provided for this hazard.

- Sinkhole hazards could be evaluated further in the next update of the hazards analysis of the LMS to determine the risk. However, based on available data, it appears that sinkhole risk is very low.

General

- The Comprehensive Plan should consider including a policy to incorporate recommendations from existing and future interagency hazard mitigation reports into the Comprehensive Plan, and should consider including these recommendations during the Evaluation and Appraisal Report process as determined feasible and appropriate by the Board of County Commissioners.
- Include each hazard layer on the existing and future land use maps to determine where risks are possible to target hazard mitigation strategies.

- The Comprehensive Plan should consider including a policy to incorporate applicable provisions of the Comprehensive Plan into the Comprehensive Emergency Management Plan and the Local Mitigation Strategy.
- Continue educating the public, especially those at high risk from storm surge, floods and wildfires, and make them aware of proactive steps they can take to mitigate damage.

Local Mitigation Strategy Preliminary Recommendations

The following data and information could be included in an update of the LMS. This information could help convey how and where disasters impact the population and the built environment to support comprehensive planning.

- Include data for population and property exposure to storm surge, flood, or wildfire.
- Include a clear description of geographic areas exposed to each of the hazards that the community is most susceptible to.
- Include hazard maps which include data layers to illustrate population (i.e., density) or property (i.e, value) exposure.
- Include future land use maps that include hazard data layers to illustrate which future land use categories are susceptible to each hazard.
- Include loss estimates by land use.
- Include a quantitative risk assessment for existing and future development (i.e., loss estimates) or specific critical facilities. The LMS Committee is planning on including this information in the future.

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1. County Overview

Geography and Jurisdictions

Putnam County is located in northeast Florida. It covers a total of 827 square miles, of which approximately 722 square miles are land and 105 square miles are water. There are five incorporated municipalities within Putnam County, as shown in **Table 1.1**. Palatka serves as the county seat.



Population and Demographics

According to the April 1, 2004 population estimate by the University of Florida's Bureau of Economic and Business Research (BEBR), population estimates for all jurisdictions within Putnam County and the percent change from the 2000 U.S. Census are presented in **Table 1.1**. While some residents live in incorporated jurisdictions approximately 79% live in the county's unincorporated areas. Putnam County has experienced moderate population growth in recent years, a trend that is expected to continue. Between 1990 and 2000, Putnam County had a growth rate of 8.2%, which is nearly two-thirds lower than the statewide average of 23.5% for the same time period.

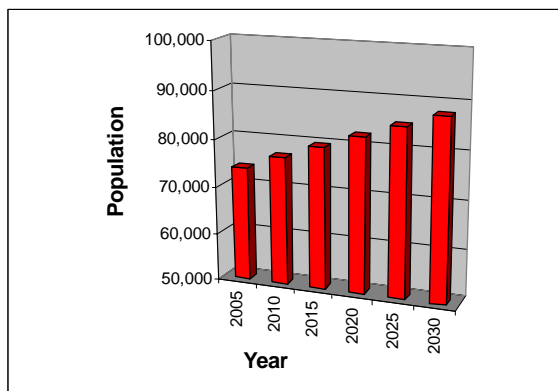
Table 1.1 Population Estimates by Jurisdiction

Jurisdiction	Population (Census 2000)	Population (Estimate 2004)	Percent Change 2000-2004	Percent of Total Population (2004)
Unincorporated	55,764	57,727	3.52%	78.83%
Crescent City	1,776	1,787	0.62%	2.44%
Interlachen	1,475	1,496	1.42%	2.04%
Palatka	10,033	10,820	7.84%	14.78%
Pomona Park	789	796	0.89%	1.09%
Welaka	586	600	2.39%	0.82%
Total	70,423	73,226	3.98%	100.00%

Source: University of Florida, Bureau of Economic and Business Research, 2004

According to BEBR (2004), Putnam County's population is projected to grow steadily and reach an estimated 87,700 by the year 2030, increasing the average population density of 101 to 121 persons per square mile. **Figure 1.1** illustrates medium growth population projections for Putnam County based on 2004 calculations.

Figure 1.1 Population Projections for Putnam County, 2005–2030



Source: University of Florida, Bureau of Economic and Business Research, 2004

Of particular concern within Putnam County’s population are those persons with special needs or perhaps limited resources such as the elderly, disabled, low-income or language isolated residents. According to the 2000 Census, of the 70,423 persons residing in Putnam County 18.5% are listed as 65 years old or over, 32.1% are listed as having a disability, 20.9% are listed as below poverty, and 7.3% live in a home where the primary language is other than English.

2. Hazard Vulnerability

Hazards Identification

The highest risk hazards for Putnam County as identified in the County’s Local Mitigation Strategy (LMS) are wildfires, localized flooding, hazardous materials releases, hurricanes, and tornadoes or severe storms. Sinkholes were discussed in the LMS, but the potential for occurrence was considered to be very low for the entire county. The Putnam County LMS notes that although Putnam County is located inland, it does have storm surge associated with the St. John’s River and its associated tributaries.

Hazards Analysis

The following analysis examines four major hazard types: surge from tropical cyclones, flood, wildfire, and sinkholes. All of the information in this section was obtained through the online Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS). MEMPHIS was designed to provide a variety of hazard related data in support of the Florida Local Mitigation Strategy DMA2K revision project, and was created by Kinetic Analysis Corporation (KAC) under contract with the Florida Department of Community Affairs (DCA). Estimated exposure values were determined using the Category 3 Maxima Scenario for storm surge; FEMA’s designated 100-year flood zones (A, AE, V, VE, AO, 100 IC, IN, AH) for flood; all medium-to-high risk zones from MEMPHIS for wildfire (Level 5 through Level 9); and the combined high, very high, extreme and adjacent zones for sinkhole based on the KAC analysis. Storm surge exposure data is a subset of flood exposure; therefore, the storm surge results are also included in the flood results. For more details on a particular hazard or an explanation of the MEMPHIS methodology, consult the MEMPHIS Web site (<http://lmsmaps.methaz.org/lmsmaps/index.html>).

Existing Population Exposure

Table 2.1 presents the population currently exposed to each hazard throughout Putnam County. Of the 70,423 (U.S. Census 2000) people that reside in Putnam County, 24.3% are exposed to 100-year flooding, 24.4% are exposed to wildfire, no persons are exposed to storm surge or sinkholes. Of the 17,134 people exposed to flood, 20% are over age 65 and nearly 55% are disabled.

Table 2.1 Estimated Number of Persons Exposed to Selected Hazards

Segment of Population	Flood	Wildfire
Total (all persons)	17,134	17,177
Minority	3,138	4,159
Over 65	3,475	3,224
Disabled	9,366	8,733
Poverty	3,209	3,354
Language Isolated	0	0
Single Parent	1,015	1,066

Source: Mapping for Emergency Management, Parallel Hazard Information System

*Note: The "Total" amount does not equal the sum of all segments of the population, but indicates the total population at risk to the selected hazards.

Evacuation and Shelters

As discussed in the previous sections, population growth in Putnam County has been steady, and the trend is projected to continue. Additionally, storm events requiring evacuation typically impact large areas, often forcing multiple counties to issue evacuation orders simultaneously and placing a greater cumulative number of evacuees on the roadways which may slow evacuation time further. Thus, it is important to not only consider evacuation times for Putnam County, but also for other counties in the region as shown in **Table 2.2**. Also, population that will reside in new housing stock might not be required to evacuate as new construction will be built to higher codes and standards.

Table 2.2 County Clearance Times per Hurricane Category (Hours)
(High Tourist Occupancy, Medium Response)

County	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane	Category 4 Hurricane	Category 5 Hurricane
Baker	12	12	19.5	19.5	19.5
Clay	9	9	11.25	11.25	11.25
Duval	8.5	12	16.75	19.5	19.5
Nassau	10.25	12.25	12.75	13.25	13.25
Putnam	10	12	17.75	18	18
St. Johns	11	14	16	16.75	16.75

Source: DCA, DEM Hurricane Evacuation Study Database, 2005

As the population increases in the future, the demand for shelter space and the length of time to evacuate will increase, unless measures are taken now. Currently, it is expected to take between 10 and 18 hours to safely evacuate Putnam County depending on the corresponding magnitude of the storm, as shown in **Table 2.2**. This data was derived from eleven regional Hurricane Evacuation Studies that have been produced by FEMA, the United States Army Corps of Engineers and Regional Planning Councils in Florida. The study dates range from 1995 to 2004. These regional studies are updated on a rotating basis with Northeast Florida region scheduled for completion in the fall of 2005.

Similar to most of Florida's coastal counties, Putnam County currently has a significant shelter deficit. According to Florida's Statewide Emergency Shelter Plan, Putnam County has an existing shelter capacity of 2,025 people. The 2004 shelter demand for a Category 4 or Category 5 hurricane is 9,487 people, leaving an existing shelter deficit of 7,462. In 2009, the projected shelter demand is 9,856, leaving an anticipated shelter deficit of 7,831.

Per an objective in the Coastal Element (9J-5.012(3)(b)7.), counties must maintain or reduce hurricane evacuation times. This could be accomplished by using better topographical data to determine the surge risk to populations to evaluate which areas to evacuate, and increasing the ability to shelter in place to decrease the number of evacuees. Putnam County could encourage new homes to be built with saferooms, community centers in mobile home parks or developments to be built to shelter standards (outside of the hurricane vulnerability zones), or require that new schools be built or existing schools be retrofitted to shelter standards; which would be based on FEMA saferoom and American Red Cross shelter standards. Additionally, the county could establish level of service (LOS) standards that are tied to development.

Existing Built Environment Exposure

While the concern for human life is always highest in preparing for a natural disaster, there are also substantial economic impacts to local communities, regions, and even the state when

property damages are incurred. To be truly sustainable in the face of natural hazards, we must work to protect the residents and also to limit, as much as possible, property losses that slow down a community’s ability to bounce back from a disaster. **Table 2.3** presents estimates of the number of structures in Putnam County by occupancy type that are exposed to each of the four hazards being analyzed. Exposure refers to the number of people or structures that are susceptible to loss of life, property damage and economic impact due to a particular hazard. The estimated exposure of Putnam County’s existing structures to the storm surge, flood, wildfire and sinkhole hazards was determined through MEMPHIS.

Table 2.3 Estimated Number of Structures Exposed to Selected Hazards

Occupancy Type	Storm Surge	Flood	Wildfire	Sinkhole
Single Family	41	16,267	9,752	167
Mobile Home	66	6,797	5,498	304
Multi-Family	7	3,716	1,763	37
Commercial	1	2,260	1,414	12
Agriculture	2	2,605	1,717	5
Gov. / Institutional	1	736	818	14
Total	118	32,381	20,962	539

Source: Mapping for Emergency Management, Parallel Hazard Information System

*Note: Storm surge related flooding building exposure results are a subset of the flood results.

There are 53882 structures exposed to at least one of the four hazards, of which most are single-family homes in subdivisions. Of these structures, 60% are exposed to flood. Over 32,000 structures are located within the 100-year floodplain, of which approximately 0.4% is exposed to storm surge induced flooding. Nearly 56% of the structures exposed to surge are mobile homes and approximately 35% are single family homes. These structures are exposed to surge due to their proximity to the tidally influenced St. Johns River. According to the latest National Flood Insurance Program Repetitive Loss Properties list, as of March 2005, there are 17 repetitive loss properties in unincorporated Putnam County. Under the National Flood Insurance Program (NFIP), repetitive loss properties are defined as “any NFIP-insured property that, since 1978 and regardless of any change(s) of ownership during that period, has experienced: a) four or more paid flood losses; or b) two paid flood losses within a 10-year period that equal or exceed the current value of the insured property; or c) three or more paid losses that equal or exceed the current value of the insured property.”

Of the 20,962 structures exposed to wildfire, 46.5% are single-family dwellings. Most susceptible areas are generally located at the urban/rural interface in the northeastern quadrant of Putnam County, especially in areas where subdivisions occur adjacent to large undeveloped areas of forestland, such as areas in Palatka and Crescent City (Putnam County LMS, 2004). Only 1.3% or 539 structures are located within sinkhole susceptible areas, of which 56% are mobile homes and 31% are single family homes.

In addition to understanding exposure, risk assessment results must also be considered for prioritizing and implementing hazard mitigation measures. The risk assessment takes into account the probability (how often) and severity (e.g., flood depth, storm surge velocity, wildfire duration) of the hazard as it impacts people and property. Risk can be described qualitatively, using terms like high, medium or low; or quantitatively by estimating the losses to be expected from a specific hazard event expressed in dollars of future expected losses. Although people and property are exposed to hazards, losses can be greatly reduced through building practices, land use, and structural hazard mitigation measures. The next section of this report examines the existing and future land use acreage in hazard areas. This information can be useful to consider where to implement risk reducing comprehensive planning measures.

Analysis of Current and Future Vulnerability Based on Land Use

The previous hazards analysis section discussed population and existing structures at risk from surge, flooding, sinkholes, and wildfire according to MEMPHIS estimates. This section is used to demonstrate the County's vulnerabilities to these hazards in both tabular format and spatially, in relation to existing and future land uses. Existing land use data was acquired from County Property Appraisers and the Florida Department of Revenue in 2004 for tabulation of the total amount of acres and percentage of land in identified hazard areas, sorted by existing land use category for the unincorporated areas. The total amount of acres and percentage of land in the identified hazards areas was tabulated and sorted by future land use category according to the local Future Land Use Map (FLUM), as well as the amount of these lands listed as vacant according to existing land use. Putnam County future land use data was acquired in March 2005 and might not reflect changes per recent future land use amendments. Maps of existing land use within hazard areas are based on the 2004 County Property Appraiser geographic information system (GIS) shapefiles. Maps of future land uses in hazard areas were developed using the Putnam County future land use map dated March 2005. A series of maps were created as part of the analysis and are available as attachments to the county profile. All maps are for general planning purposes only.

For the purposes of this profile, the identified hazard areas include the coastal hazards zone in relation to storm surge, hurricane vulnerability zones in relation to evacuation clearance times, flood zones in relation to the 100-year flood, wildfire susceptible areas, and sinkhole susceptible areas.

In **Attachment A**, two maps present the existing and future land uses within the Coastal Hazards Zone (CHZ), which represents the Category 1 Hurricane Evacuation Zone joined with the Category 1 Storm Surge Zone. The areas that are most susceptible to storm surge are located along the St. Johns River and its tributaries. The total amount of land in the CHZ is 1,582 acres. As shown in **Table 2.4**, 39.4% are used for government, institutional, hospitals or education purposes; 27.7% are currently undeveloped; 16% are used for residential single-family homes; and 11.4% are designated for agricultural use. **Table 2.5** shows that of the 438.9 undeveloped acres, 42% are designated for conservation with one dwelling unit per ten acres. Nearly half of the acreage in the CHZ contains critical facilities (e.g., hospitals, schools and government buildings). The County should take this into account so as not to increase vulnerability with future development by allowing high density development in areas subject to inland storm surge. The County has taken favorable action in designating 42% of vacant acreage in the CHHA for conservation with very low dwelling density, thus limiting population growth in the CHHA.

In **Attachment B**, two maps present the existing and future land uses within the Hurricane Vulnerability Zone (HVZ), which represents Category 1 to 3 Hurricane Evacuation Zones. The HVZ is predominantly associated with the St. Johns River and its tributaries. The total amount of land in the HVZ is 8,932.5 acres. As shown in **Table 2.4**, 25% are currently undeveloped; 22.6% are used for residential single family homes; 18.7% are in agricultural use; and 14% are used for government, institutional, hospitals or education purposes. **Table 2.5** shows that of the 2,231.5 undeveloped acres, 38.2% are designated for agriculture with 10 to 20 dwelling units per acre and 13.6% is designated for agriculture with 5 to 10 dwelling units per acre. The County is taking positive action in designating a large portion of the acreage as low to medium density and conservation to reduce vulnerability and limiting the amount of people who would need to evacuate or be sheltered from a hurricane.

In **Attachment C**, two maps present the existing and future land uses within a 100-year flood zone. There are flood-prone areas scattered across the County, predominantly located along the St. Johns River and its tributaries. The total amount of land in the special flood hazard area is 163,841.9 acres. As shown in **Table 2.4**, 37.7% are used for government, institutional, hospitals or education purposes; 32.2% are in agricultural use; 13.6% are currently undeveloped; and 6% are used for residential single family homes. **Table 2.5** shows that of the 22,297.9 undeveloped

acres, 57.8% are designated for agricultural use with one dwelling unit per 10 to 20 acres. Since a large portion of the acreage is designated agricultural, the County has the opportunity to maintain this land use and low density development to prevent increased vulnerability to flooding. Although stormwater management systems are designed to eliminate flooding, these systems can fail during a storm if debris blocks drainage channels or culverts washout.

In **Attachment D**, two maps present the existing and future land uses within wildfire susceptible areas. These areas are scattered throughout the county. The total amount of land in the wildfire susceptible areas is 28,304.2 acres. As shown in **Table 2.4**, 43.6% are used for agriculture; 19.3% are currently undeveloped; and 11% are used for residential single family homes. **Table 2.5** shows that of the 5,458 undeveloped acres, 51.8% are designated for agricultural use with one dwelling unit per 10 to 20 acres; 22.2% are designated for agricultural use with one dwelling unit per 5 to 10 acres; and 15.2% is designated as rural residential with one dwelling unit per one to five acres. The County should continue to take measures to reduce wildfire risk within the urban/rural interface.

In **Attachment E**, two maps present the existing and future land uses within sinkhole susceptible areas. These areas are located in the western portion of the county as well as in the southeastern corner. The total amount of land in the sinkhole susceptible areas is approximately 2,177 acres. As shown in **Table 2.4**, 39.9% are currently undeveloped; 18.1% are single family residential homes; and 17.7% are residential mobile homes or commercial parking lots. **Table 2.5** shows that of the 869.4 undeveloped acres, 55.8% are designated for agricultural use with one dwelling unit per 10 to 20 acres; 16.9% are designated for conservation with one dwelling unit per 10 acres; and 9.8% are designated as rural center acreage.

**INTEGRATION OF THE LOCAL MITIGATION STRATEGY INTO THE LOCAL COMPREHENSIVE PLAN
PUTNAM COUNTY PROFILE**

Table 2.4 Total Unincorporated Acres in Hazard Areas by Existing Land Use Category

Existing Land Use Category		Coastal Hazard Zone	Hurricane Vulnerability Zone	Flood Zones	Wildfire Susceptible Areas	Sinkhole Susceptible Areas
Agriculture	Acres	179.9	1,672.4	52,689.3	12,340.3	247.9
	%	11.4	18.7	32.2	43.6	11.4
Attractions, Stadiums, Lodging	Acres	0.0	44.6	279.1	25.0	0.0
	%	0.0	0.5	0.2	0.1	0.0
Places of Worship	Acres	2.5	11.4	84.7	45.0	1.3
	%	0.2	0.1	0.1	0.2	0.1
Commercial	Acres	1.6	79.1	305.4	46.4	5.1
	%	0.1	0.9	0.2	0.2	0.2
Government, Institutional, Hospitals, Education	Acres	624.0	1,253.1	61,722.6	2,734.2	117.3
	%	39.4	14.0	37.7	9.7	5.4
Industrial	Acres	0.7	9.8	1,146.3	67.1	0.0
	%	0.0	0.1	0.7	0.2	0.0
Parks, Conservation Areas, Golf Courses	Acres	0.9	56.6	2,628.8	623.3	12.5
	%	0.1	0.6	1.6	2.2	0.6
Residential Group Quarters, Nursing Homes	Acres	0.0	0.0	474.2	60.0	0.0
	%	0.0	0.0	0.3	0.2	0.0
Residential Multi-Family	Acres	48.8	521.7	2,744.9	681.5	97.6
	%	3.1	5.8	1.7	2.4	4.5
Residential Mobile Home, or Commercial Parking Lot	Acres	21.6	903.3	5,915.0	2,747.8	385.9
	%	1.4	10.1	3.6	9.7	17.7
Residential Single-Family	Acres	253.0	2,022.2	9,899.7	3,103.4	394.6
	%	16.0	22.6	6.0	11.0	18.1
Submerged Land (Water Bodies)	Acres	0.0	0.0	752.4	33.4	42.6
	%	0.0	0.0	0.5	0.1	2.0
Transportation, Communication, Rights-Of-Way	Acres	0.7	39.9	464.1	109.9	3.1
	%	0.0	0.4	0.3	0.4	0.1
Utility Plants and Lines, Solid Waste Disposal	Acres	9.4	86.9	2,437.5	228.9	0.0
	%	0.6	1.0	1.5	0.8	0.0
Vacant	Acres	438.9	2,231.5	22,297.9	5,458.0	869.4
	%	27.7	25.0	13.6	19.3	39.9
Total Acres	Acres	1,582.0	8,932.5	163,8412.0	28,304.2	2,177.3
	%	100.0	100.0	100.0	100.0	100.0

Source: Department of Community Affairs

Table 2.5 Total Unincorporated Acres in Hazard Areas by Future Land Use Category

Future Land Use Category		Coastal Hazard Zone		Hurricane Vulnerability Zone		Flood Zones		Wildfire Susceptible Areas		Sinkhole Susceptible Areas	
		Total	Vacant	Total	Vacant	Total	Vacant	Total	Vacant	Total	Vacant
Agriculture 1, 1:5 to 1:10 du/ac	Acres	210.2	38.1	2,430.8	304.5	9,881.8	2,155.7	3,473.0	1,213.0	292.9	82.7
	%	13.3	8.7	27.2	13.6	6.0	9.7	12.3	22.2	13.5	9.5
Agriculture 2, 1:10 to 1:20 du/ac	Acres	138.4	29.4	1,572.8	432.9	84,029.0	12,896.7	16,854.0	2,827.4	1,349.6	484.9
	%	8.7	6.7	17.6	19.4	51.3	57.8	59.5	51.8	62.0	55.8
Commercial	Acres	1.6	1.3	60.6	7.6	192.6	55.7	95.9	18.3	0.0	0.0
	%	0.1	0.3	0.7	0.3	0.1	0.2	0.3	0.3	0.0	0.0
Conservation, 1:10 du/ac	Acres	824.4	185.0	1,437.7	279.8	55,881.2	3,881.0	2,051.0	222.0	173.2	146.7
	%	52.1	42.2	16.1	12.5	34.1	17.4	7.2	4.1	8.0	16.9
Industrial	Acres	4.7	0.0	43.0	0.7	896.6	88.5	181.0	39.5	0.0	0.0
	%	0.3	0.0	0.5	0.0	0.5	0.4	0.6	0.7	0.0	0.0
Mining	Acres	0.0	0.0	0.0	0.0	3,200.2	89.2	1,385.3	21.8	0.0	0.0
	%	0.0	0.0	0.0	0.0	2.0	0.4	4.9	0.4	0.0	0.0
Public Facilities	Acres	0.0	0.0	0.0	0.0	484.4	5.3	175.0	10.0	8.0	0.0
	%	0.0	0.0	0.0	0.0	0.3	0.0	0.6	0.2	0.4	0.0
Rural Center	Acres	38.8	26.3	456.3	272.6	823.3	281.1	321.9	112.4	151.8	85.4
	%	2.5	6.0	5.1	12.2	0.5	1.3	1.1	2.1	7.0	9.8
Rural Residential, 1:1 to 1:5 du/ac	Acres	274.0	92.1	2,725.8	851.4	6,518.7	2,222.8	2,751.0	830.6	201.8	69.8
	%	17.3	21.0	30.5	38.2	4.0	10.0	9.7	15.2	9.3	8.0
Urban Reserve, 1:1 to 4:1 du/ac	Acres	0.0	0.0	0.0	0.0	1,160.6	358.0	932.5	149.1	0.0	0.0
	%	0.0	0.0	0.0	0.0	0.7	1.6	3.3	2.7	0.0	0.0
Urban Service, 1:1 to 9:1 du/ac	Acres	89.8	66.7	205.5	82.0	773.6	263.7	83.8	13.8	0.0	0.0
	%	5.7	15.2	2.3	3.7	0.5	1.2	0.3	0.3	0.0	0.0
Total	Acres	1,582.0	438.9	8,932.6	2,231.5	163,842.0	22,297.9	28,304.3	5,458.0	2,177.4	869.4
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Department of Community Affairs

The amount of total land and existing vacant land in identified hazard areas was also tabulated for each of Putnam County’s five incorporated municipalities. These amounts are listed in **Table 2.6**. Only Welaka has vacant acreage in the HVZ. Interlachen has the most vacant acreage in the flood zones and wildfire susceptible areas. No municipality contains any sinkhole susceptible areas. Vacant land is often destined to be developed. It is prudent to conduct further analyses of what the vacant lands will be used for, to determine whether they will be populated, and at what level of intensity/density, to ensure that hazard risks are minimized or eliminated. Each of the municipalities in Putnam County has vacant lands that are in hazard areas. Since hazards cross jurisdictional boundaries, it is important to consider all hazard areas to collaboratively formulate hazard mitigation strategies and policies throughout the county.

Table 2.6 Total Land and Existing Vacant Land in Hazard Areas by Municipal Jurisdiction

Jurisdiction		Hurricane Vulnerability Zone		Flood Zones		Wildfire Susceptible Areas		Sinkhole Susceptible Areas	
		Total	Vacant	Total	Vacant	Total	Vacant	Total	Vacant
Crescent City	Acres	0.0	0.0	308.8	200.7	0.0	0.0	0.0	0.0
	%	0.0	0.0	11.2	29.5	0.0	0.0	0.0	0.0
Interlachen	Acres	0.0	0.0	911.0	231.6	226.1	110.4	0.0	0.0
	%	0.0	0.0	33.2	34.1	28.7	49.2	0.0	0.0
Palatka	Acres	0.0	0.0	941.9	185.3	49.5	20.5	0.0	0.0
	%	0.0	0.0	34.3	27.3	6.3	9.1	0.0	0.0
Pomona Park	Acres	0.0	0.0	463.2	46.3	477.5	86.1	0.0	0.0
	%	0.0	0.0	16.9	6.8	60.7	38.3	0.0	0.0
Welaka	Acres	103.7	30.3	123.5	15.4	33.9	7.6	0.0	0.0
	%	100.0	100.0	4.5	2.3	4.3	3.4	0.0	0.0
Total Acres	Acres	103.7	30.3	2,748.4	679.4	786.9	224.5	0.0	0.0
	%	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0

Source: Department of Community Affairs

3. Existing Mitigation Measures

Local Mitigation Strategy (LMS) Assessment

The Local Mitigation Strategy is suited to be a repository for all hazard mitigation analyses (i.e., vulnerability and risk assessment), programs, policies and projects for the county and municipalities. The LMS identifies hazard mitigation needs in a community and alternative structural and nonstructural initiatives that can be employed to reduce community vulnerability to natural hazards. The LMS is multi-jurisdictional and intergovernmental in nature. Communities can reduce their vulnerability to natural hazards by integrating the LMS analyses and mitigation priorities into the local government comprehensive plan.

Per the *DCA's Protecting Florida's Communities* Guide, LMSs prepared pursuant to the state's guidelines (Florida Department of Community Affairs, 1998) have three substantive components:

Hazard Identification and Vulnerability Assessment (HIVA). This section identifies a community's vulnerability to natural hazards. Under Florida rules, the HIVA is required to include, at a minimum, an evaluation of the vulnerability of structures, infrastructure, special risk populations, environmental resources, and the economy to any hazard to which the community is susceptible. According to FEMA, LMSs revised pursuant to the Disaster Mitigation Act of 2000 (DMA 2000) criteria must include maps and descriptions of the areas that would be affected by each hazard to which the jurisdiction is exposed, information on previous events, and estimates of future probabilities. Vulnerability should be assessed for the types and numbers of exposed buildings, infrastructure, and critical facilities with estimates of potential dollar losses. Plan updates will be required to assess the vulnerability of future growth and development.

Guiding Principles. This section lists and assesses the community's existing hazard mitigation policies and programs and their impacts on community vulnerability. This section typically contains a list of existing policies from the community's Comprehensive Plan and local ordinances that govern or are related to hazard mitigation. Coastal counties frequently include policies from their PDRPs.

Mitigation Initiatives. This component identifies and prioritizes structural and non-structural initiatives that can reduce hazards vulnerability. Proposals for amendments to

Comprehensive Plans, land development regulations, and building codes are often included. Structural projects typically address public facilities and infrastructure, and buy-outs of private structures that are repetitively damaged by flood. Many of these qualify as capital improvement projects based on the magnitude of their costs and may also be included in the capital improvements elements of the counties' and cities' Comprehensive Plans.

The Putnam County LMS (adopted in 2004) was assessed to determine if the hazard analysis and vulnerability assessment (i.e., surge, flood, and wildfire; sinkhole was deemed by the LMS committee to pose a low risk) data can support comprehensive planning, whether the guiding principles include a comprehensive list of policies for the county and municipalities, and whether the LMS goals and objectives support comprehensive planning goals, objectives, and policies (GOP). Future updates to the assessment will include working with Putnam County to determine if the county's capital improvement projects are included in the LMS hazard mitigation project list.

Hazard Analysis and Vulnerability Assessment (LMS, pp. 24 – 53)

The strengths and weaknesses of the Hazard Analysis and Vulnerability Assessment are as follows:

Strengths:

- Provides information about demographic, income, and special needs population
- Provides county property values for occupancy classes.
- Provides a hazards analysis and a qualitative vulnerability assessment.
- Includes maps for each of the hazards.
- Includes a list of types and map of critical facilities.
- Provides a list and map of repetitive losses.
- Includes a qualitative risk assessment for each hazard (Table A-1. Hazards Identification Information Table)

Weaknesses:

- Does not include data for population and property exposure to storm surge, flood, or wildfire.
- Does not provide a clear description of geographic areas exposed to each of the hazards that the community is most susceptible to.
- Hazard maps do not include data layers to illustrate population (i.e., density) or property (i.e., value) exposure.
- Does not include a future land use maps that include hazard data layers to illustrate which future land use categories are susceptible to each hazard.
- Does not include loss estimates by land use.
- Does not include a quantitative risk assessment for existing and future development (i.e., loss estimates) or specific critical facilities. However, the LMS Committee is planning on including this information in the future.

Incorporating land use and population data into the risk assessment of the LMS provides a better source of data for planners to use in policy making and policy evaluation of the local comprehensive plan. The LMS also sets a standard for the quality of data that should be used in determining risk and thereby used to determine mitigation policies.

Guiding Principles

The Putnam County LMS Guiding Principles section contains a list of policies for the county and each municipality. Table 1 in the Putnam County LMS includes the mitigation category (e.g., flood, hazardous materials, hurricane), guiding policy, source (e.g., comprehensive plan,

Northeast Florida Strategic Regional Policy Plan), and notes (none are listed). The Guiding Principles section is found in most counties' LMSs and is useful in providing the different jurisdictions ideas for enhancing their own plans or providing the LMS committee an analysis of where there may be weaknesses in implementing mitigation strategies.

LMS Goals and Objectives

The Putnam County LMS has goals that support mitigation principles that are found in the comprehensive plan. A list of the LMS goals and objectives pertaining to comprehensive planning can be found in **Attachment F**. An assessment of whether the LMS goals and objectives are reflected in the comprehensive plan (and vice versa) is provided in **Table 5.1** as part of the preliminary recommendations. Final recommendations will result from a collaborative process between DCA, Putnam County, and PBS&J. The following is a summary of the LMS goals that support comprehensive plan GOPs: Goal 1 refers to the protection of vital utilities such as water, power and communications; Goal 3 emphasizes the protection of vital transportation infrastructure in order to maintain public safety and the local economy.

Maintaining consistent language for outlining goals and objectives in both the LMS and comprehensive plan presents a united front on decreasing risk in the county. While the LMS may not be able to regulate land use as the comprehensive plan does, having these common goals and objectives increases the likelihood of the jurisdictions of Putnam County adopting and implementing corresponding policies that are legally enforceable.

Comprehensive Emergency Management Plan (CEMP)

The Putnam County CEMP references the LMS in the Mitigation Annex. The CEMP notes that all pre-disaster mitigation priorities and projects are generated through the LMS. Post-disaster mitigation priorities consider the LMS analyses and project lists, in addition to damage assessment reports and the County Emergency Management Director's expertise. The CEMP discusses hazard mitigation in the context of standard operating procedures, activities, responsibilities and available programs. This includes the post-disaster implementation of the Hazard Mitigation Grant Program and related disaster mitigation, response and recovery assistance programs, as well as pre-disaster mitigation programs such as the National Flood Insurance Program.

Though the identification of mitigation opportunities lies predominately with the County Emergency Management Director and the LMS working group, the document lists numerous activities and supporting agencies to assist in supporting mitigation in the County. In general, the CEMP can be used as a tool for planners to outline collaborative procedures for working with emergency managers to reduce vulnerability from hazards. The CEMP indicates that the county planning department and building officials will serve as a primary/secondary support agencies to the Division of Emergency Management. However, the CEMP does not currently outline specific activities for planners to collaborate with emergency managers on (e.g., pre-storm vulnerability assessment, or post-storm damage assessment for mitigation project identification/prioritization).

Post-Disaster Redevelopment Plan (PDRP)

A PDRP for Putnam County was not available for review at the time that this profile was developed. If the County has a current PDRP, it will be obtained and reviewed for the final version of this document.

National Flood Insurance Program/Community Rating System

Putnam County (unincorporated areas) as well as the municipalities of Crescent City, Interlachen, Palatka, and Pomona Park currently participate in the National Flood Insurance Program (NFIP).

The municipality of Welaka does not participate in the NFIP. Neither Putnam County nor any of its municipalities participate in the NFIP Community Rating System (CRS).

4. Comprehensive Plan Review

Purpose and Intent

The Putnam County Comprehensive Plan (Adopted December 1991) was reviewed in order to assess what steps Putnam County has taken to integrate hazard mitigation initiatives from their Local Mitigation Strategy (LMS), and hazard mitigation initiatives in general, into the local planning process. Each Element of the Plan was evaluated to establish the extent to which the principles from the LMS were incorporated into the objectives and policies of the existing Comprehensive Plan.

Approach

This review includes an assessment of the storm surge, flooding and wildfire hazards. The Putnam County LMS notes that although Putnam County is located inland, it does have storm surge associated with the St. John's River and its associated tributaries. Sinkholes were discussed in the LMS, but the potential for occurrence was considered to be very low for the entire county. Therefore, the Putnam County Comprehensive Plan elements were not reviewed for policies pertaining to surge and sinkhole hazards. A preliminary list of objectives and policies currently contained in the Plan that pertain to hazard mitigation and any policies related to these hazards is found in **Attachment G**. The following is a discussion of the extent to which the Plan appears to address each of the hazards. Recent policy amendments may not have been available for review, or proposed policies might be in the process of creation, which address these hazards. As a result, this assessment is considered preliminary and subject to input from the local government.

Summary of Findings

For the review of hazard mitigation measures, the Putnam County Comprehensive Plan focuses on the protection of natural features such as waterfront and floodplains through development controls and stormwater management, for general natural resource protection purposes and those specifically geared towards hazard mitigation for the 100-year floodplain. The Comprehensive Plan has many policies related to the protection of natural drainage features, wetlands, and floodplains. However, references to emergency management are limited in the Plan.

Putnam County is not a coastal county, so policies are not geared toward coastal management and coastal resource protection. In fact, the Comprehensive Plan expressly states that a Coastal Management Element is not required for the Plan. However, the eastern portion of the County is situated on the St. Johns River and Crescent Lake, and is vulnerable to both flooding and in some areas, storm surge hazard. According to the Putnam County Local Mitigation Strategy, in the event of a hurricane the County is vulnerable to storm surge from the St. Johns River.

The Plan promotes intergovernmental coordination as required by 9J-5.015, F.A.C. The Plan states that the County shall, through available state and federal programs promote the acquisition of floodplains along the St. Johns and Ocklawaha Rivers. Additionally, the County will coordinate with the St. Johns River Water Management District (SJRWMD) and the Florida Department of Environmental Protection (FDEP) to identify stormwater drainage from County maintained facilities that is causing degradation of the St. Johns River and its tributaries. Upon identification, the County will apply for state and federal funds to improve stormwater management and restore degraded aquatic ecosystems.

Flooding

Flooding is addressed from two vantage points, the protection and restoration of natural resources, and protection of vulnerable populations and properties. There are several policies directed at minimizing flooding and stormwater runoff, and protecting waterfront areas from potential development impacts. There are many design standards and development controls in place to minimize the impact of new development on riverfront and lakefront properties. Design standards and development controls for waterfront development include: density; setback of sanitary sewer drain field (septic tank) from the mean high water line or the ordinary water line and a 50-foot setback required between building site and water body.

Stormwater and flooding are addressed through the requirement for a Countywide Stormwater Master Drainage Plan. There are also extensive policies to prevent the exacerbation of stormwater issues brought on by new development. For example, there is a policy in place to ensure that post-development stormwater runoff is no greater than pre-development stormwater runoff. There are additional buffering and filtering requirements for existing and proposed developments aimed at mitigating for and preventing stormwater runoff.

Flood hazard related policies include elevation requirements within the 100-year floodplain. Non-residential structures in all areas of special flood hazard must either be elevated one (1) foot above base flood elevation, or flood-proofed as certified by a registered professional engineer or architect.

Hurricane Evacuation

As stated in the previous Section, Putnam County is not a coastal county, so policies are not geared toward coastal management and coastal resource protection. However, in the event of a hurricane the County is vulnerable to storm surge. Although Putnam County is not required to complete a Coastal Element as part of the Comprehensive Plan, it could be beneficial to address storm surge and hurricane related issues within another Plan Element.

As with many inland counties in Florida, in the event of a hurricane, the County may receive evacuees from coastal counties, and face a County-wide shelter deficit. According to Florida's Statewide Emergency Shelter Plan, Putnam County had a shelter deficit of 7,462 people in 2004. The opportunity exists to construct new facilities to standards that will allow them to serve as shelters, and to construct future public facilities outside of floodplain areas.

Wildfire

The Conservation Element includes a policy for Putnam County to coordinate with the North Florida Prescribed Burn Council and other appropriate entities including the U.S. Forest Service, the Florida Division of Forestry, SJRWMD, and the Nature Conservancy, to promote prescribed burns on public lands. Promotional efforts are to include developing a public education program for local governments and the public to inform them about the importance of conducting periodic prescribed burns. Educational brochures must be made available to the public at City Halls, the County Courthouse, Agricultural Extension offices etc., and periodic workshops and seminars will be held prior to each burning season.

5. Data Sources

County Overview:

Florida Statistical Abstract – 2004 (38th Edition). Bureau of Economic and Business Research, Warrington College of Business, University of Florida. Gainesville, Florida.

State and County QuickFacts. U.S. Census Bureau. Data derived from 2000 Census of Population and Housing.

Hazard Vulnerability:

Florida Repetitive Loss List March 05. Florida Department of Community Affairs, Division of Emergency Management, Flood Mitigation Assistance Office. March 2005.

Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS). Florida Department of Community Affairs, Division of Emergency Management.
<http://lmsmaps.methaz.org/lmsmaps/>

Protecting Florida's Communities – Land Use Planning Strategies and Best Development Practices for Minimizing Vulnerability to Flooding and Coastal Storms. Florida Department of Community Affairs, Division of Community Planning and Division of Emergency Management. September 2004.

State of Florida 2004 Statewide Emergency Shelter Plan. Florida Department of Community Affairs, Division of Emergency Management.

GIS Data:

Flood Zone

Source: FEMA FIRM GIS coverages (1996), supplied by University of Florida GeoPlan Center Florida Geographic Data Library Version 3.0.

- Areas with an "A_", "V_", "FPQ", "D", "100IC", or "FWIC" value in the "Zone" field in these coverages were considered to be in the 100-year flood zone, and were used in the mapping/analysis.

Hurricane Evacuation Zone/Coastal High-Hazard Area (Category 1 Hurricane Evacuation Zone)

Source: GIS coverage of hurricane zones compiled by Florida Department of Community Affairs/Division of Emergency Management (2003), from GIS data collected from county emergency management agencies in the State of Florida.

- Areas shown/analyzed are those areas in the above-referenced GIS coverage where the value in the field "Evac_cat" is equal to "Zone TS", "Zone A/1", "Zone B/2", or "Zone C/3", in the maps/tables for the Hurricane Vulnerability Zone.
- Areas shown/analyzed are those areas in the above-referenced GIS coverage where the value in the field "Evac_cat" is equal to "Zone TS" or "Zone A/1", in the maps/tables for the Coastal Hazards Zone.

Hurricane Storm Surge Zone GIS Data

Source: GIS coverage of storm surge zones compiled by Florida Department of Community Affairs/Division of Emergency Management (2004), from various storm surge studies performed by regional planning councils and the U.S. Army Corps of Engineers.

- Areas shown/analyzed are those areas in the above-referenced GIS coverage where the value in the field "Category" is equal to "Tropical Storm" or "Category 1".

Sinkhole Hazard GIS Data

Source: Kinetic Analysis Corporation (2005)

- Areas shown/analyzed are those areas in the "Rawsink1.shp" GIS coverage supplied by KAC, where the value in the field "Gridcode" is 3 to 6, representing "High", or Very High", "Extremely High", or "Adjacent", based on the classification system used in the sinkhole hazard maps available at:

http://lmsmaps.methaz.org/lmsmaps/final_cty/

Wildfire Susceptibility GIS Data

Source: Florida Department of Agriculture and Consumer Services/Division of Forestry, Florida Fire Risk Assessment System (FRAS) data, 2004.

- Areas shown as "wildfire susceptible areas" and that were analyzed are those areas with a "Wildfire Susceptibility Index" value of greater than 10,000 (in north Florida counties) or greater than 0.1 (in south Florida counties)*, based on the FRAS model, and that are also within areas of forest or shrub vegetation or "low impact urban" land cover, based on the Florida Fish and Wildlife Conservation Commission "Florida Vegetation and Land Cover - 2003" GIS data.
- * The rating scale in the "Wildfire Susceptibility Index" GIS coverages has a range of 0 to 100,000 in north Florida counties, and a range of 0 to 1.0 in south Florida counties.

Municipal Boundaries

Source: Boundaries of municipalities were extracted from the U.S. Census 2000 "Places" GIS coverage for the State of Florida.

**ATTACHMENT A
Maps of the Existing and Future Land Uses within Coastal Hazards Zone**

ATTACHMENT B
Maps of the Existing and Future Land Uses within Hurricane Vulnerability Zone

**ATTACHMENT C
Maps of the Existing and Future Land Uses within the 100-year Floodplain**

**ATTACHMENT D
Maps of the Existing and Future Land Uses within Wildfire Susceptible Areas**

**ATTACHMENT E
Maps of the Existing and Future Land Uses within Sinkhole Susceptible Areas**

Attachment F
Local Mitigation Strategy
Goals and Objectives Pertaining to Comprehensive Planning

Putnam County's LMS includes the following goals and objectives that are directly related to local comprehensive planning and growth management:

- **Goal 1** – *Protect the vital utilities such as water, power and communications.*

- **Goal 3** – *Protect vital transportation infrastructure in order to maintain public safety and the local economy.*

ATTACHMENT G
Putnam County Comprehensive Plan Excerpts Pertaining to Hazard Mitigation

FUTURE LAND USE ELEMENT

Objective A.1.1 Upon Plan adoption, in order to achieve maximum utilization of land by reducing sprawl and thereby providing the opportunity for improved use of resources (both man-made and natural), the County shall coordinate future land uses with the appropriate topography, adjacent land uses, soil conditions and the availability of facilities and services through implementing the following policies:

A.1.1.1 Putnam County shall use the latest version of the Flood Insurance Rate Maps provided by FEMA to determine the location of areas of special flood hazard which include the 100-year floodplain and floodways within the 100-year floodplain. The County shall provide specifications for regulating development and land use activities within these areas in its Land Development Regulations. The specifications will include the following which will be in effect upon Plan adoption:

A. Development and land use activities listed below shall be allowed in areas of special flood hazard and are subject to meeting the requirements provided in Sections B and C below.

1. New residential development shall be limited to the lowest density of the future land use category in which the property is located except for lots existing on December 19, 1991 at 5pm which cannot meet this requirement. These lots will be considered lots of record and may be developed with one residence. The following may be permitted in land use categories that allow such non-residential development or land use activity:

- a. Resource-based recreational facilities such as trails, boardwalks, piers and boat ramps.
- b. Water dependent components of commercial development such as port facilities, marinas, fish camps, and commercial fishing and shellfishing operations.
- c. General Agriculture shall protect wetlands and water bodies by following the BMPS as provided in Policies A.1.4.9 and E.1.3.5 and E.1.28.
- d. Silviculture shall follow the most recent editions of the best management practices and management guideline manuals of the Florida Department of Agriculture and Consumer Services, Division of Forestry as provided in Policy A.1.4.9 and identical Policy E.1.3.5.
- e. Mining activities shall be located a minimum of 500 feet from a water body as currently required by Section 24-5 of the County Zoning Ordinance 88-1, as amended by Ordinance 91-31.
- f. Essential public services.

3. The following uses shall be prohibited in areas of special flood hazard:

- a. Land uses requiring the storage, disposal, generation or use of hazardous waste.
- b. Landfills
- c. Underground storage of toxic materials
- d. Auto salvage yards
- e. Junkyards;

B. The County will incorporate the existing Flood Control Ordinance 87-1 into the Land Development Regulations which includes the following requirements in compliance with FEMA regulations:

1. Residential structures in all areas of special flood hazard must be elevated one (1) foot about the base flood elevation.
2. Non-residential structures in all areas of special flood hazard must either be elevated one (1) foot above the base flood elevation or flood-proofed as certified by a registered professional engineer or architect.
3. New construction, fill, and other improvements are prohibited in the floodway unless certification (with supporting technical data) by a registered professional engineer is provided demonstrating that encroachments shall not result in any increase in flood levels of the base flood discharge.;

C. Development in areas of special flood hazard shall comply with the following:

1. Applications for subdivision approval shall include a soils map indicating the location on the property of soil types identified by U.S. Soil Conservation Service descriptions and a map showing any portions of the property located in areas of special flood hazard as currently required by Ordinance 83-9, County Subdivision Regulations.
2. Development proposals for sites larger than 5 acres or greater than 50 lots shall provide base flood elevation data as currently required by federal regulations and County Flood Control Ordinance 87-1.
3. Dredging and filling of land within floodplains shall not be permitted to adversely impact upon the natural functions of the 100-year floodplain, and shall be carried out, only in strict accordance with state or federal permits.
4. All proposed development shall be located or clustered on the portions of the site outside areas of special flood hazard wherever possible.
5. No hazardous waste shall be generated, stored, or disposed of within the 100-year floodplain;
6. Use of septic tanks in the 10-year floodplain and floodways will be restricted by the County Health Department in compliance with Sec. 10D-6.0471, F.A.C.

A.1.1.4 The County Subdivision and Zoning Code shall be reviewed and where necessary revised to address drainage and stormwater issues as identified in the Public Facility Element; open space requirements as addressed in the Recreation and Open Space Element; and, on-site traffic flow and vehicle parking as addressed in the Traffic Circulation Element.

- A. Drainage and stormwater management will identify interim measures to be adopted until a County-wide Stormwater Master Drainage Plan is adopted.
- B. Open space requirements will meet the LOS adopted in the Recreation and Open Space Element.
- C. On-site traffic will, at a minimum, require that adjacent commercial, high-density/, medium density (or combinations thereof) properties provide interconnections to reduce requirements for road trips.
- D. Parking requirements shall be specified in terms of number of parking space units per type and size of facility.

Objective A.1.3 Upon plan adoption, Putnam County shall act to eliminate or reduce land uses inconsistent with the uses identified on the Future Land Use Map and associated adopted Goals, Objectives and Policies through implementing the following policies:

A.1.3.3 The County's Subdivision regulation and Zoning Code shall be reviewed and where necessary revised to ensure that land use categories are regulated in accordance with the Future Land Use Map and that controls are adopted for the regulation of subdivisions and the use of land in areas of special flood hazard consistent with the requirements of Policy A.1.1.1 and identical Policy E.1.2.17.

Objective A.1.4 Upon Plan adoption Putnam County shall manage natural resources through implementing the following policies.

A.1.4.7 Land development regulations shall specify on-site erosion control practices during new construction which will reduce soil erosion from wind and water. Controls shall include such technique as spreading hay or other mulch materials over potential erosion areas, lining drainage swales with sand, sod or burlap, spraying non-polluting materials over the site, etc.

A.1.4.11 The County shall adopt and enforce regulations that require the preservation or restoration of a vegetated upland buffer or filter for any waterfront development. The buffer strip shall provide for sheet flow of the surface runoff, and shall be a minimum of 50 feet in width, except as provided below. Development and land use activities excepted below in Sections B through G shall be allowed only when permitted by the land use designation; site characteristics are such that impacts cannot be avoided; the impacts are limited to the minimum necessary to allow the permitted use of the property; and the site development or use is in compliance with HRS, DEP, WMD, and COE regulations for permitting and mitigation.

A. It is certified that either the existing condition or a buffer has been established which meets the USDA SCS specifications in the Code 393 Field Office Technical Guide, Florida Supplement dated January, 1988, for a minimum design width of: 1. 15 feet in area of less than four and one-half percent slope where the vegetation is ground cover species or mixed woody (trees and shrubs) and ground cover species. 2. 25 feet in areas of four and one-half percent slope where the vegetation is ground cover species or mixed woody (trees and shrubs) and ground cover species. 3. 30 feet in areas of less than four and one-half percent slope where the vegetation is only woody species (trees and shrubs). 4. 50 feet in areas of four and one-half percent or greater slope where the vegetation is only woody species (trees and shrubs).

B. Resource-based recreational facilities such as trails, boardwalks, piers, and boat ramps.

C. Water dependent components of commercial development such as port facilities, marinas, fish camps, and commercial fishing and shellfishing operations.

G. Essential public services.

A.4.12 Subsequent to Plan adoption development in and adjacent to wetland and water bodies shall be subject to the following:

A. All applicable state and federal regulations for permitting and mitigation must be met prior to the County issuing any construction permits. This will be enforced through the site plan review process required by Policy A.1.1.2.

B. The county through its subdivision regulations shall require all new lots to have adequate area to meet the 20 foot wetland buffer requirements of policy D.1.6.4 and the water body buffer requirements of policy A.1.4.12 and identical Policy E.1.2.5. In addition if the new lot will be serviced by an onsite septic system it must comply with the following: 1. The usable land requirements and wetland and water body setbacks of Chapter 10D-6 of the Florida Administrative Code must be met. If the new lot is within 500 feet of the mean water or ordinary high water line of a water body, it must have 100 feet of frontage along the water body; and when developed, the septic system must meet the special design standards currently provided in Ordinance 87-5 which will be incorporated into the land development regulations.

C. The County shall ensure the protection of wetlands by requiring structures and other site improvements to be located outside of wetlands and the 20 foot buffer required by Policy D.1.6.4 except as provided below. All exceptions are applicable only when the land use designation on the property permits the development of a land use activity listed below; site characteristics are such that wetland impacts cannot be avoided; the impacts are limited to the minimum necessary to allow the permitted use of the property; and the site development or use complies with HRS, DEP, WMD and OE regulations for permitting and mitigation. 1. Residential lots of record existing on, or before the adoption of the comprehensive plan on December 19, 1991 at 5:00pm which do not contain sufficient uplands to permit development of a residence without encroaching into wetlands, may be developed with one residential dwelling. 2. resource-based recreational facilities such as trails, boardwalks, piers, and boat ramps. 3. Water dependent components of commercial development such as port facilities, marinas, fish camps, and commercial fishing and shellfish operations. 4. General Agriculture shall maintain the natural hydrology and function of wetland areas in accord with the most recent version of USDA SCS guidelines established in the 1985 Food Securities Act and amended in 1990; and by following the BMPs as provided in Policies A.1.4.9 and E.1.3.5 and E.1.2.8. 5. Silviculture shall follow the most recent editions of the best management practices and management guideline manuals of the Florida Department of Agriculture and Consumer Services, Division of Forestry as provided in Policy A.1.4.9 and identical Policy E.1.3.5. 6. Mining activities shall be located a minimum of 500 feet from a water body as currently required by Section 24-5 of the County Zoning Ordinance 88-1, as amended by Ordinance 91-31. 7. Essential public services.

D. Transfer of density from wetlands to the upland portion of a site shall be permitted through approval of appropriate Planned Unit Development (PUD) Zoning applications and by establishing flexibility in the lot area requirements in the various zoning districts established in the Land Development Regulations. The wetland area will be included in calculating the gross density applicable to a property. Wetland and water body protection shall be considered when the County evaluates variance requests for setback modifications that would move development away from wetlands and water bodies.

F. Development in the area adjacent to water bodies shall be limited according to vegetative buffer and use restrictions of Policy A.1.4.12 and the 50 foot building setback required by Policy A.1.4.17. Development in water bodies shall be allowed only for uses permitted by DEP and COE.

A.1.4.13 By June, the County shall adopt an interim storm water management ordinance which will regulate the quality and quantity of stormwater run-off for all development. Upon Plan adoption, the criteria contained in policy D.1.2.3 shall be enforced.

A.1.4.14 By 1999, the County shall initiate the development of a Master Stormwater Management Plan.

A.1.4.17 The County shall, through available state and federal programs promote the acquisition of floodplains along the St. Johns and Ocklawaha Rivers.

INFRASTRUCTURE ELEMENT

Objective D.1.2 Upon Plan Adoption, the County shall maximize the use of existing infrastructure, coordinate the extension of, or increase the capacity of, potable water, sanitary sewer, solid waste and drainage facilities to meet future needs.

D.1.2.3 The following level of service standards for drainage facilities shall be used as the basis for determining the availability of facility capacity and the demand generated by a development. Stormwater Management Facilities shall be designed to accommodate the 25-year frequency, 24-hour duration design storm to meet the standards that follow: Water Quantity- Peak post-development run-off rates shall not exceed peak pre-development run-off rates. Water Quality- Stormwater treatment shall be required for all new development and redevelopment to provide a level of treatment which meets the standards of Chapter 40C-42.025, F.A.C.; Wetland Stormwater Discharge- Permits for wetland stormwater discharge shall follow Rule 17-25.042, F.A.C.; Stormwater Discharge Facilities- Permits for construction of new stormwater discharge facilities shall follow Rule 17-25.040, F.A.C.; Closed Conduits- 10-year frequency, 24-hour duration; IDF curve Zone 5, DOT Drainage Manual 1987; Open Channels- 25 year frequency, 24-hour duration; IDF curve Zone 5, DOT Drainage manual 1987; Level of Service- Shall meet DER Stormwater Drainage Rule 17-25 (retain the first inch of stormwater for drainage basins over 100 acres; the first one-half inch of stormwater for drainage basins under 100 acres).

Objective D.1.6 Upon plan adoption, the County shall take specific flood protection measures, which will protect all surface water bodies from pollutants.

D.1.6.1 The County shall adopt as a land development regulation the level of service standards of Policy D.1.2.3 for stormwater management as required by Section 163.3202, F.S. By 1999 the county will develop a drainage master plan for enactment as a stormwater management ordinance. Upon approval by the Putnam County Board of County Commissioners, the Drainage Master Plan shall be incorporated in a stormwater management ordinance and be made part of the Public Facilities Element through the amendment process presented in Section 163.3187, F.S.

D.1.6.6 The County shall adopt Land Development Regulations which require that surface water runoff from new construction sites be retained on-site to permit no greater runoff than existed prior to construction activities. Exempted from this policy are subdivisions with an approved master drainage plan and construction associated with a DRI.

D1.6.8 The County shall ask the St. Johns River Water Management District and the Florida Department of Environmental Protection to identify the stormwater drainage from County maintained roads and facilities that is causing degradation of the St. Johns River and its tributaries. Upon identification, the County shall apply for state and federal funds to improve stormwater management and restore degraded aquatic ecosystems.

CONSERVATION ELEMENT

Objective E.1.2 [9J-5.013(2)(b)2]: The County shall implement the following policies that are to conserve, appropriately use and protect the quality and quantity of current and projected water sources.

E.1.2.4 New waterfront development shall be designed so that stormwater runoff and erosion are retained on site or are channeled so as not to degrade ambient water quality of adjacent waters.

E.1.2.5 The County shall adopt and enforce regulations that require the preservation or restoration of a vegetated upland buffer or filter for any waterfront development. The buffer strip shall provide for sheet flow of the surface runoff, and shall be a minimum of 50 feet in width, except as provided below. Development and land use activities excepted below in Sections B through G shall be allowed only when permitted by the land use designation; site characteristics are such that impacts cannot be avoided; the impacts are limited to the minimum necessary to allow the permitted use of the property; and the site development or use is in compliance with HRS, DEP, WMD, and COE regulations for permitting and mitigation. A. It is certified that either the existing condition or a buffer has been established which meets the USDA SCS specifications in the Code 393 Field Office Technical Guide, Florida Supplement dated January, 1988, for a minimum design width of: 1. 15 feet in area of less than four and one-half percent slope where the vegetation is ground cover species or mixed woody (trees and shrubs) and ground cover species. 25 feet in areas of four and one-half percent slope where the vegetation is ground cover species or mixed woody (trees and shrubs) and ground cover species. 3. 30 feet in areas of less than four and one-half percent slope where the vegetation is only woody species (trees and shrubs). 4. 50 feet in areas of four and one-half percent or greater slope where the vegetation is only woody species (trees and shrubs). B. Resource-based recreational facilities such as trails, boardwalks, piers, and boat ramps. C. Water dependent components of commercial development such as port facilities, marinas, fish camps, and commercial fishing and shellfishing operations. D. General Agriculture shall follow BMPs as provided in Policies A.1.4.9 and E.1.3.5 and E.1.2.8. E. Silviculture shall follow the most recent editions of the best management practices and management guideline manuals of the Florida Department of Agriculture and Consumer Services, Division of Forestry, as provided in Policy A.1.4.9 and identical Policy E.1.3.5. F. Mining activities shall be located a minimum of 500 feet from a water body as currently required by Section 24-5 of the County Zoning Ordinance 88-1, as amended by Ordinance 91-31. G. Essential public services.

E.1.2.17 [Rev. 93-19; 9J-5.013(2)(c)6; identical to Policy A.1.1.1]: Putnam County shall use the latest version of the Flood Insurance Rate Maps provided by FEMA to determine the location of areas of special flood hazard which include the 100-year floodplain and floodways within the 100-year floodplain. The County shall provide specifications for regulating development and land use activities within these areas in its Land Development Regulations Code. The specifications will include the following minimum standards:

A. Development and land use activities listed below shall be allowed in areas of special flood hazard and are subject to meeting the requirements provided in Sections B and C below. 1. New residential development shall be limited to the lowest density of the future land use category in which the property is located except for lots existing on December 19, 1991 at 5:00 p.m. which cannot meet this requirement. These lots will be considered lots of record and may be developed with one residence. 2. The following may be permitted in land use categories that allow nonresidential development or land use activity: a. Resource-based recreational facilities such as trails, boardwalks, piers, and boat ramps. Private water-related facilities such as boathouses, docks and bulkheads as permitted by

the applicable Federal, State, and local agencies. b. Water dependent components of commercial development such as port facilities, marinas, fish camps, and commercial fishing and shellfishing operations. c. General Agriculture shall protect wetlands and water bodies by following BMPs as provided in Policies A.1.4.9 and E.1.3.5 and E.1.2.8. d. Silviculture shall follow the most recent editions of the best management practices and management guideline manuals of the Florida Department of Agriculture and Consumer Services, Division of Forestry as provided in Policy A.1.4.9 and identical Policy E.1.3.5. e. Mining activities shall be located a minimum of 500 feet from a water body as required by Land Development Regulations. f. Essential public services. 3. The following uses shall be prohibited in areas of special flood hazard: a. Land uses requiring the storage, disposal, generation or use of hazardous waste. b. Landfills; c. Underground storage of toxic materials; d. Auto salvage yards; and e. Junkyards.

B. The County will incorporate the following requirements into the Land Development Regulations Code in compliance with FEMA regulations: 1. Residential structures in all areas of special flood hazard must be elevated one (1) foot above the base flood elevation. 2. Non-residential structures in all areas of special flood hazard must either be elevated one (1) foot above the base flood elevation or flood-proofed as certified by a registered professional engineer or architect. 3. New construction, fill, and other improvements are prohibited in the floodway unless certification (with supporting technical data) by a registered professional engineer is provided demonstrating that encroachments shall not result in any increase in flood levels of the base flood discharge. C. Development in areas of special flood hazard shall comply with the following: 1. Applications for subdivision approval shall include a soils map indicating the location on the property of soil types identified by U.S. Soil Conservation Service, descriptions and a map showing any portions of the property located in areas of special flood hazard as required by Land Development Regulations Code. 2. Development proposals for sites larger than 5 acres or greater than 50 lots shall provide base flood elevation data as currently required by federal regulations and the County's Land Development Regulations Code. 3. Dredging and filling of lands within floodplains shall not be permitted to adversely impact upon the natural functions of the 100-year floodplain, and shall be carried out, only in strict accordance with state or federal permits. 4. All proposed development shall be located or clustered on the portions of the site outside areas of special flood hazard wherever possible. 5. No hazardous waste shall be generated, stored, or disposed of within the 100-year floodplain. 6. Use of septic tanks in the 100-year floodplain and floodways will be restricted 6. Use of septic tanks in the 100-year floodplain and floodways will be restricted by the County Health Department in compliance with Department of Health Onsite Sewage Treatment and Disposal System standards.

D. Requests for land use changes in the 100 year floodplain shall demonstrate that the proposed use will not result in any increase in flood levels of the base flood discharge or reduce other water resources related benefits of the floodplain.

Objective E.1.3 [9J-5.013(2)(b)3]: The County shall implement the following policies that are to conserve, appropriately use, and protect minerals, soils, and native vegetation communities including forests.

E.1.3.9. Putnam County shall coordinate with the North Florida Prescribed Burn Council and other appropriate entities including the U.S. Forest Service, the Florida Division of Forestry, the St. Johns River Water Management District, and the Nature Conservancy, in promoting prescribed burns on public lands. Promotional efforts shall include developing a public education program for local governments and the public to inform them about the importance of conducting periodic prescribed burns. Educational brochures shall be made available to the public at City Halls, the County Courthouse, Agricultural Extension offices etc., and periodic workshops and seminars shall be held prior to each burning season.

CAPITAL IMPROVEMENTS ELEMENT

Objective H.5.1 Upon plan adoption, the County shall enforce Level of Service (LOS) standards against which the adequacy and deficiencies of infrastructure facilities shall be measured for the purposes of concurrency management.

H.5.1.5 The following level of service standards for drainage facilities shall be used as the basis for determining the availability of facility capacity and the demand generated by a development. Stormwater management facilities shall be designed to accommodate the 25-year frequency, 24-hour duration design storm to meet the standards that follow: Water Quantity - Peak post-development run-off rates shall not exceed peak pre-development run-off rates.