EXECUTIVE SUMMARY

This Executive Summary is provided to state and local governments, volunteer organizations, the media and interested residents to highlight the results of the ***Statewide Regional Evacuation Study for the North Central Florida Region*** (SRES) and to quantify and to illustrate the challenges of evacuation response in the North Central Florida Region.

A. DEMOGRAPHIC AND LAND USE ANALYSIS

The North Central Florida region is approximately 7,000 square miles and contains one Florida's longest stretches of undeveloped shoreline on the Gulf of Mexico. The area calls itself "Natural North Florida."

The region consists of eleven counties: Alachua, Bradford, Columbia, Dixie, Gilchrist, Hamilton, Lafayette, Madison, Suwannee, Taylor and Union. It is bounded on west by the Gulf of Mexico, on the north by Georgia, to the east by the Northeast Region and to the south by the Withlacoochee Region. The two coastal counties, Dixie and Taylor, are sparsely populated. Half of the population lives relatively far away from the coast in Alachua County.

Chapter I provides a demographic profile of the region and the counties themselves. Specific socio-economic characteristics that may have an impact on evacuation vulnerability, response and mass care were identified using Census data including recent American Community Survey data. Information presented includes:

- Overall Population
- Group Quarters Population
- Housing Units by Type
- Occupied Housing Units (Households)
- Household Size
- Seasonal Dwelling Units
- Vehicles per Household
- Age Composition
- Race / Ethnicity
- Place of Birth and Citizenship
- Linguistic Isolation
- Labor Force
- Poverty Status
- Small Area Dwelling Unit and Population Data (TAZ)

The North Central Florida Region Future Land Use Map is presented on Map I-3. There are eleven land use categories identified which represent a consolidation of land use categories identified by the local government comprehensive plans and the Regional Planning Council (See Table I-17).

Future land use categories include:

- RL Residential Lo (higher than AG < 1DU)
- RH Residential High (more than RM and > 12DU)
- RM Residential Medium (more than RL, < 13DU)
- CITY Municipal
- CONS Conservation, natural and protected
- PUB Public/Semi-Public, government, institutional
- AG Agriculture - rural land, farms (< 0.5DU)
- REC Recreation/Open Space
- COM Commercial, office, tourism, marina
- MU Mixed Use, activity centers, urban village
- IND Industrial, extractive, transportation

B. REGIONAL HAZARDS ANALYSIS

Chapter II, the Regional Hazards Analyses is the first step in the development of the regional evacuation study. The Hazards Analysis identifies type, extent and probability of those hazards which may confront our region and necessitate a regional evacuation. The Statewide Regional Evacuation Study took an "all-hazards" approach to this evacuation study. The hazards which could necessitate an evacuation at a regional level were identified as (1) tropical storms and hurricanes, (2) flooding, (3) hazardous materials and (4) wildfire.

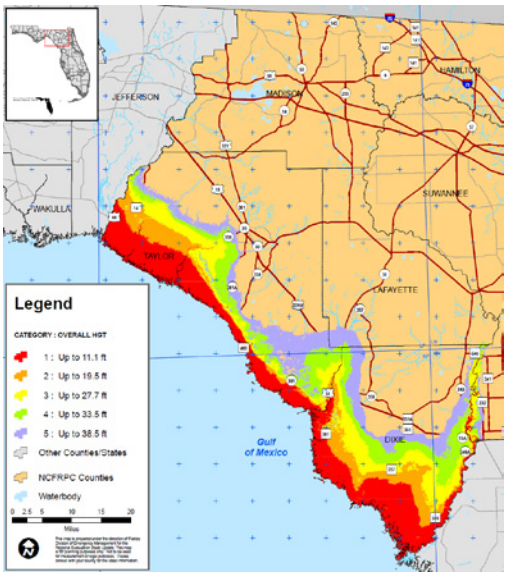
1. Tropical Storms and Hurricanes

Risks from tropical storms and hurricanes include storm surge, high winds, tornadoes and inland flooding. Storm surge, considered the most deadly hazard, was quantified using the National Oceanic and Atmospheric Administration (NOAA) numerical storm surge model, SLOSH[1]. The SLOSH modeling system consists of the model source code and model basin or grid. SLOSH model grids must be developed for each specific geographic coastal area individually incorporating the unique local coastal and river configuration, water depths, bridges, roads and other physical features. In addition to open coastline heights, one of the most valuable outputs of the SLOSH model for evacuation planning is its predictions of surge heights over land which predicts the degree of propagation of the surge into inland areas.

SLOSH provides the maximum amount of surge expected at approximately 40,000 points in the region considering different parameters of 12,180

[1]SLOSH stands for Sea, Lake and Overland Surges from Hurricanes

hypothetical storms (strength, track, size and forward speed) and the topography and the bathymetry of the North Central Florida basin.



The newest generation of the SLOSH model basin incorporated in the ***2010 Statewide Regional Evacuation Study*** reflects major improvements, including higher resolution basin data and grid configurations. Faster computer speeds allowed additional hypothetical storms to be run for creation of the MOMs (maximum potential storm surge) values for each category of storm. Storm tracks were run in ten different directions. And for each set of tracks in a specific direction storms were run at forward speeds of 5, 10, 15 and 25 mph. And, for each direction, at each speed, storms were run at two different sizes (20 statute mile radius of maximum winds and 35 statute miles radius of maximum winds.) Finally, each scenario was run at both mean tide and high tide. Both tide levels are now referenced to North American Vertical Datum of 1988 (NAVD88) as opposed to the National Geodetic Vertical Datum of 1929 (NGVD29).

SLOSH and SLOSH related products reference storm surge heights relative to the model vertical datum, in this case NAVD88. In order to determine the inundation depth of surge flooding at a particular location the ground elevation at that location must be subtracted from the potential surge height. As part of the Statewide Regional Evacuation Study, coastal areas as well as areas surrounding Lake Okeechobee were mapped using remote-sensing laser terrain mapping (LIDAR[2]) providing the most comprehensive, accurate and precise topographic data for this analysis. As a general rule, the vertical accuracy of the laser mapping is within a 15 centimeter tolerance.

The LIDAR data was incorporated into the SLOSH basin data and used to subtract the land elevation from the storm surge height to develop the storm tide limits. The result of this storm surge hazard analysis is graphically portrayed in the Storm Tide Atlas which illustrates the storm tide limits based on the maximum storm surge for landfalling categories 1, 2, 3, 4 and 5.

While all residents would be susceptible to some extent from the affects of hurricane-force winds, mobile home residents are far more vulnerable than residents in site-built homes. Mobile home and RV Park data was updated using information from the State of Florida Department of Health, census data, property appraiser data and other county data.

[2] Light Imaging Detection and Ranging

Tornadoes are another hazard of tropical storm activity. Because it is impossible to identify where a tornado imbedded in hurricane wind bands will strike, evacuation does not consider tornado activity, per se. It is recognized, however, that mobile home residents are much more vulnerable to this severe weather event. Therefore, with the evacuation of mobile homes for hurricane winds, it is anticipated that severe injury will also be reduced from any tornado activity. In addition, the public information campaign will include a recommendation that tornado safe rooms be considered by residents.

While inland flooding had not been considered to be life-threatening in the past, it had, over the last twenty years, become a leading cause of hurricane-related deaths until Hurricane Katrina in 2005. The 100-year flood zone, as designated by the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP), is identified and addressed separately under the Flooding Hazard.

While in Florida counties do not typically evacuate for inland flooding for a hurricane, it is recognized that this may become a major problem during a hurricane evacuation, after a tropical storm passes or after prolonged rainfall. Evacuation routes within the flood zone are identified in an effort to find alternative routes, if necessary. Public information will stress that after the storm (1) residents do NOT attempt to drive on flooded roadways and (2) children are NOT permitted to swim or play in flood waters.

2. Flooding

Both coastal and inland flooding are addressed through the Federal Emergency Management Agency National Flood Insurance Program. The 100-year and 500-year floodplain was identified within the region to illustrate the regional and county-level vulnerability to the flood hazard. In addition, communities with repetitive loss properties were identified by building type to provide an overall assessment of the risk. The areas' risk, historical frequency and estimated population at risk were identified in the hazards and vulnerability analyses. Also identified were dams which could pose a risk to the population which lives below them.

3. Wildfires and the Urban Interface

Florida is home to millions of residents who enjoy the state's beautiful scenery and warm climate. But few people realize that these qualities also create severe wildfire conditions. Each year, thousands of acres of wildland and many homes are destroyed by fires that can erupt at any time of the year from a variety of

causes, including arson, lightning and debris burning. Adding to the fire hazard is the growing number of people living in new communities built in areas that were once wildland. This growth places even greater pressure on the state's wildland firefighters. As a result of this growth, fire protection becomes everyone's responsibility.

A wildfire is any fire occurring in the wildlands (i.e., grasslands, forest, brush land, etc). Wildfires have burned across the woodlands of Florida for centuries and are part of the natural management of much of Florida's ecosystems. (*Statewide Hazard Mitigation Plan*, 2009)

The risk of potential wildfire to the region's population was identified using the data provided by the Florida Division of Forestry and the population living in the high/very high risk areas was estimated.

4. Hazardous Materials

A hazardous material is generally considered as any item or agent (biological, chemical, or physical) which has the potential to cause harm to humans, animals or the environment when unintentionally released from its container. Almost every community deals with hazardous materials on a daily basis through transport, use, storage and/or disposal. The benefits chemicals bring into our lives through their designed uses have become vital to our standard of living. Although major chemical emergencies are infrequent, there always remains a chance that one will occur and they have to potential to threaten a large area.

In the State of Florida, the county emergency management agencies plan for hazardous material incidents and coordinate regionally for response through Local Emergency Planning Committees (LEPCs). Facilities with extremely hazardous materials are identified and mapped. Detailed evacuation planning for incidents involving hazardous materials is addressed in the *Local Emergency Planning Committee Regional Hazardous Material Emergency Response Plan.*

No specific emergency sequence can be isolated as the model for which to plan because each emergency could have different consequences, both in nature and degree. As an alternative to defining a specified emergency, the regional plan identifies various parameters for planning which are based upon knowledge of the possible consequences, timing, and release characteristics of a spectrum of emergencies.

The *Regional Hazardous Materials Emergency Response Plan* establishes the appropriate response for each facility covered by plan. Therefore, the Statewide Regional Evacuation Study did not try to present ever changing vulnerable zones for hazardous material incidents.

C. VULNERABILITY ANALYSIS & POPULATION-AT-RISK

Depending upon the strength of the storm, the regional evacuation study calls for the complete evacuation of successively more surge-vulnerable zones inland in addition to all mobile home residents. Using information from the 2000 Census and the local planning departments, the population, dwelling unit counts and vehicle data for each zone was developed (see Chapter IV, Regional Vulnerability and Population Analysis). County/ Regional population-at-risk for the years 2010 and 2015 are presented in Tables ES-1 and ES-2 below.

Table ES-1 Population-at-Risk from Hurricanes by Evacuation Level, 2010

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Evacuation Zone E
Dixie County per Evacuation Zone					
Site-built Homes	2,157	521	92	1,773	1,043
Mobile/Manuf. Homes	1,099	490	20	1,929	987
TOTAL	3,256	1,011	112	3,702	2,030
Taylor County per Evacuation Zone					
Site-built Homes	1,813	54	119	777	896
Mobile/Manuf. Homes	1,818	47	91	512	537
TOTAL	3,630	101	210	1,288	1,433
Inland Counties Totals					
Alachua	27,931	27,931	27,931	27,931	27,931
Bradford	8,067	8,067	8,067	8,067	8,067
Columbia	22,076	22,076	22,076	22,076	22,076
Gilchrist	7,519	7,519	7,519	7,519	7,519
Hamilton	5,218	5,218	5,218	5,218	5,218
Lafayette	2,300	2,300	2,300	2,300	2,300
Madison	6,965	6,965	6,965	6,965	6,965
Suwannee	16,867	16,867	16,867	16,867	16,867
Union	5,170	5,170	5,170	5,170	5,170

Note: Vulnerable population determined for Dixie and Taylor Counties using SRESP behavioral data and county provided evacuation zones. Vulnerable population numbers are not inclusive, meaning population numbers listed for a higher zone are not included in the lower zone. For example, for Dixie and Taylor Counties, vulnerable population listed for Evacuation Zone B does not include vulnerable population listed for Evacuation Zone A.

Table ES-2 Population-at-Risk from Hurricanes by Evacuation Level, 2015

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Evacuation Zone E
Dixie County per Evacuation Zone					
Site-built Homes	2,498	604	107	2,054	1,208
Mobile/Manuf. Homes	1,099	490	20	1,929	987
TOTAL	3,597	1,094	127	3,983	2,195
Taylor County per Evacuation Zone					
Site-built Homes	1,930	57	127	827	954
Mobile/Manuf. Homes	1,818	47	91	512	537
TOTAL	3,748	105	218	1,338	1,491
Inland Counties Totals					
Alachua	27,931	27,931	27,931	27,931	27,931
Bradford	8,067	8,067	8,067	8,067	8,067
Columbia	22,076	22,076	22,076	22,076	22,076
Gilchrist	7,519	7,519	7,519	7,519	7,519
Hamilton	5,218	5,218	5,218	5,218	5,218
Lafayette	2,300	2,300	2,300	2,300	2,300
Madison	6,965	6,965	6,965	6,965	6,965
Suwannee	16,867	16,867	16,867	16,867	16,867
Union	5,170	5,170	5,170	5,170	5,170

Note: Vulnerable population determined for Dixie and Taylor Counties using SRESP behavioral data and county provided evacuation zones. Vulnerable population numbers are not inclusive, meaning population numbers listed for a higher zone are not included in the lower zone. For example, for Dixie and Taylor Counties, vulnerable population listed for Evacuation Zone B does not include vulnerable population listed for Evacuation Zone A.

Post-hurricane behavioral studies conducted along the Atlantic and Gulf coasts illustrate that many people ordered to evacuate will not and, conversely, people who live in site-built homes far outside the coastal areas will pack up and try to "outrun" the storm (*"shadow evacuation")*. Due to the small populations of the two coastal counties in the Region, shadow evacuation is not an issue like it is in the populous coastal counties. This study used the general response models as well as the surveys conducted in 2009 (see Chapter III, Regional Behavioral Analysis Summary) to determine how people are likely to respond to various hurricanes. Volume 2 of the Statewide Regional evacuation Study Program provides the Regional Behavioral Assumptions based upon the General Response Model and the survey results presented in Volume 3, Behavioral Survey Report

Two sets of behavioral assumptions were made in the Statewide Regional Evacuation Study (SRES) to determine the Evacuation Populations. The first is considered the ***Base Scenario***, which represents 100% participation of the population-at-risk plus "*shadow evacuation*". The Base Scenario is considered the "planning scenario", which will also be used for growth management planning purposes. Tables ES-3 and ES-4 present these evacuation population estimates for 2010 and 2015.

A second set of assumptions is termed the ***Operational Scenario***. The county planning assumptions as presented in Chapter III and in more detail in Volume 2 of this report were used in the calculations for the evacuation population under the Operational Scenario. Unlike most of the rest of Florida, the impacts from a storm striking an adjacent densely populated urban area (Tampa Bay, Jacksonville or even Tallahassee) are used as the basis for the Operational Scenarios.

The traffic leaving a threatened Tampa Bay is more of a regional concern than a few hundred shadow evacuees from the two coastal counties in this region. Tables ES-5 and ES-6 present the evacuation population estimates and projections for 2010 and 2015.

Table ES-3 Hurricane Evacuation Population by Evacuation Level, Base Planning Scenario 2010

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Alachua County					
Site-built Homes	10,632	21,264	42,527	53,159	63,791
Mobile/Manuf. Homes	27,945	27,945	27,945	27,945	27,945
Tourists	0	0	0	0	0
TOTAL	38,577	49,209	70,472	81,104	91,736
Bradford County					
Site-built Homes	1,088	2,176	3,264	5,440	6,529
Mobile/Manuf. Homes	8,065	8,065	8,065	8,065	8,065
Tourists	0	0	0	0	0
TOTAL	9,153	10,241	11,329	13,505	14,594
Columbia County					
Site-built Homes	2,342	4,684	9,367	11,709	14,051
Mobile/Manuf. Homes	22,080	22,080	22,080	22,080	22,080
Tourists	0	0	0	0	0
TOTAL	24,422	26,764	31,447	33,789	36,131
Dixie County					
Site-built Homes	3,084	3,386	4,068	6,049	7,155
Mobile/Manuf. Homes	7,439	7,439	7,439	7,439	7,439
Tourists	156	172	172	172	229
TOTAL	10,679	10,997	11,679	13,660	14,823
Gilchrist County					
Site-built Homes	556	1,113	1,669	2,225	2,781
Mobile/Manuf. Homes	7,506	7,506	7,506	7,506	7,506
Tourists	0	0	0	0	0
TOTAL	8,062	8,619	9,175	9,731	10,287

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Hamilton County					
Site-built Homes	981	1,472	1,962	2,453	2,943
Mobile/Manuf. Homes	5,221	5,221	5,221	5,221	5,221
Tourists	0	0	0	0	0
TOTAL	6,202	6,693	7,183	7,674	8,164
Lafayette County					
Site-built Homes	614	614	920	1,534	1,841
Mobile/Manuf. Homes	2,295	2,295	2,295	2,295	2,295
Tourists	0	0	0	0	0
TOTAL	2,909	2,909	3,215	3,829	4,136
Madison County					
Site-built Homes	1,359	2,038	2,718	3,397	4,077
Mobile/Manuf. Homes	6,968	6,968	6,968	6,968	6,968
Tourists	0	0	0	0	0
TOTAL	8,327	9,006	9,686	10,365	11,045
Suwannee County					
Site-built Homes	1,333	2,665	3,198	5,330	6,663
Mobile/Manuf. Homes	16,855	16,855	16,855	16,855	16,855
Tourists	0	0	0	0	0
TOTAL	18,188	19,520	20,053	22,185	23,518
Taylor County					
Site-built Homes	3,141	3,195	4,683	6,573	8,141
Mobile/Manuf. Homes	7,616	7,616	7,616	7,616	7,616
Tourists	246	246	246	246	246
TOTAL	11,003	11,057	12,545	14,435	16,003
Union County					
Site-built Homes	627	1,254	1,881	3,135	3,762
Mobile/Manuf. Homes	5,175	5,175	5,175	5,175	5,175
Tourists	0	0	0	0	0
TOTAL	5,802	6,429	7,056	8,310	8,937

Table ES-4 Hurricane Evacuation Population by Evacuation Level, Base Planning Scenarios, 2015

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Alachua County					
Site-built Homes	11,322	22,643	45,285	56,607	67,928
Mobile/Manuf. Homes	29,787	29,787	29,787	29,787	29,787
Tourists	0	0	0	0	0
TOTAL	41,109	52,430	75,072	86,394	97,715
Bradford County					
Site-built Homes	1,158	2,315	3,473	5,788	6,945
Mobile/Manuf. Homes	8,065	8,065	8,065	8,065	8,065
Tourists	0	0	0	0	0
TOTAL	9,223	10,380	11,538	13,853	15,010
Columbia County					
Site-built Homes	2,611	5,222	10,445	13,056	15,667
Mobile/Manuf. Homes	22,080	22,080	22,080	22,080	22,080
Tourists	0	0	0	0	0
TOTAL	24,691	27,302	32,525	35,136	37,747
Dixie County					
Site-built Homes	3,569	3,918	4,709	7,003	8,285
Mobile/Manuf. Homes	7,439	7,439	7,439	7,439	7,439
Tourists	156	172	172	172	229
TOTAL	11,164	11,529	12,320	14,614	15,953
Gilchrist County					
Site-built Homes	658	1,316	1,973	2,631	3,289
Mobile/Manuf. Homes	7,506	7,506	7,506	7,506	7,506
Tourists	0	0	0	0	0
TOTAL	8,164	8,822	9,479	10,137	10,795
Hamilton County					
Site-built Homes	1,030	1,545	2,059	2,574	3,089
Mobile/Manuf. Homes	5,221	5,221	5,221	5,221	5,221
Tourists	0	0	0	0	0
TOTAL	6,251	6,766	7,280	7,795	8,310
Lafayette County					
Site-built Homes	664	664	996	1,660	1,992
Mobile/Manuf. Homes	2,295	2,295	2,295	2,295	2,295
Tourists	0	0	0	0	0
TOTAL	2,959	2,959	3,291	3,955	4,287

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Madison County					
Site-built Homes	1,439	2,159	2,879	3,598	4,318
Mobile/Manuf. Homes	6,968	6,968	6,968	6,968	6,968
Tourists	0	0	0	0	0
TOTAL	8,407	9,127	9,847	10,566	11,286
Suwannee County					
Site-built Homes	1,528	3,056	3,667	6,112	7,640
Mobile/Manuf. Homes	16,855	16,855	16,855	16,855	16,855
Tourists	0	0	0	0	0
TOTAL	18,383	19,911	20,522	22,967	24,495
Taylor County					
Site-built Homes	3,343	3,400	4,984	6,996	8,665
Mobile/Manuf. Homes	7,616	7,616	7,616	7,616	7,616
Tourists	246	246	246	246	246
TOTAL	11,205	11,262	12,846	14,858	16,527
Union County					
Site-built Homes	669	1,337	2,006	3,343	4,011
Mobile/Manuf. Homes	5,175	5,175	5,175	5,175	5,175
Tourists	0	0	0	0	0
TOTAL	5,844	6,512	7,181	8,518	9,186

Table ES-1 Hurricane Evacuation Population by Evacuation Level, Operational (Out of Region Impact/Evacuees) Scenarios, 2010

	Evacuation Level A Operational Scenario	Evacuation Level B Operational Scenario	Evacuation Level C Operational Scenario	Evacuation Level D Operational Scenario	Evacuation Level E Operational Scenario
Alachua County					
Site-built Homes	0	0	10,632	10,632	42,527
Mobile/Manuf. Homes	0	0	16,767	16,767	20,959
Tourists	0	0	0	0	0
TOTAL	0	0	27,399	27,399	63,486
Bradford County					
Site-built Homes	0	0	1,088	0	1,088
Mobile/Manuf. Homes	0	0	4,033	0	4,033
Tourists	0	0	0	0	0
TOTAL	0	0	5,121	0	5,121
Columbia County					
Site-built Homes	0	0	2,342	2,342	2,342
Mobile/Manuf. Homes	0	0	13,248	13,248	13,248
Tourists	0	0	0	0	0
TOTAL	0	0	15,590	15,590	15,590
Dixie County					
Site-built Homes	2,219	2,554	0	2,219	6,406
Mobile/Manuf. Homes	4,769	5,221	0	4,769	7,001
Tourists	156	172	0	156	229
TOTAL	7,144	7,947	0	7,144	13,636
Gilchrist County					
Site-built Homes	556	556	0	556	1,669
Mobile/Manuf. Homes	4,129	4,129	0	4,129	5,630
Tourists	0	0	0	0	0
TOTAL	4,685	4,685	0	4,685	7,299
Hamilton County					
Site-built Homes	0	981	0	981	981
Mobile/Manuf. Homes	0	2,872	0	2,872	2,872
Tourists	0	0	0	0	0
TOTAL	0	3,853	0	3,853	3,853
Lafayette County					
Site-built Homes	614	614	0	614	1,534
Mobile/Manuf. Homes	1,262	1,262	0	1,262	1,950
Tourists	0	0	0	0	0
TOTAL	1,876	1,876	0	1,876	3,484

	Evacuation Level A Operational Scenario	Evacuation Level B Operational Scenario	Evacuation Level C Operational Scenario	Evacuation Level D Operational Scenario	Evacuation Level E Operational Scenario
Madison County					
Site-built Homes	1,359	2,038	0	0	1,359
Mobile/Manuf. Homes	3,833	4,181	0	0	3,833
Tourists	0	0	0	0	0
TOTAL	5,192	6,219	0	0	5,192
Suwannee County					
Site-built Homes	0	1,333	0	1,333	1,333
Mobile/Manuf. Homes	0	9,270	0	9,270	9,270
Tourists	0	0	0	0	0
TOTAL	0	10,603	0	10,603	10,603
Taylor County					
Site-built Homes	2,416	2,632	0	2,416	7,646
Mobile/Manuf. Homes	4,814	5,288	0	4,814	7,098
Tourists	246	246	0	246	246
TOTAL	7,476	8,166	0	7,476	14,990
Union County					
Site-built Homes	0	0	627	0	627
Mobile/Manuf. Homes	0	0	3,105	0	3,105
Tourists	0	0	0	0	0
TOTAL	0	0	3,732	0	3,732

Table ES-6 Hurricane Evacuation Population by Evacuation Level, Operational (Out of Region Impact/Evacuees) Scenarios, 2015

	Evacuation Level A Operational Scenario	Evacuation Level B Operational Scenario	Evacuation Level C Operational Scenario	Evacuation Level D Operational Scenario	Evacuation Level E Operational Scenario
Alachua County					
Site-built Homes	11,322	0	0	22,643	45,285
Mobile/Manuf. Homes	17,872	0	0	19,362	22,340
Tourists	0	0	0	0	0
TOTAL	29,194	0	0	42,005	67,625
Bradford County					
Site-built Homes	1,158	0	0	2,315	1,158
Mobile/Manuf. Homes	4,033	0	0	4,033	4,033
Tourists	0	0	0	0	0
TOTAL	5,191	0	0	6,348	5,191
Columbia County					
Site-built Homes	0	0	0	2,611	2,611
Mobile/Manuf. Homes	0	0	0	13,248	13,248
Tourists	0	0	0	0	0
TOTAL	0	0	0	15,859	15,859
Dixie County					
Site-built Homes	0	2,568	4,175	2,568	7,418
Mobile/Manuf. Homes	0	4,769	5,690	4,769	7,001
Tourists	0	156	172	156	229
TOTAL	0	7,493	10,037	7,493	14,648
Gilchrist County					
Site-built Homes	0	0	1,316	658	1,973
Mobile/Manuf. Homes	0	0	4,504	4,129	5,630
Tourists	0	0	0	0	0
TOTAL	0	0	5,820	4,787	7,603
Hamilton County					
Site-built Homes	0	0	1,545	1,030	1,030
Mobile/Manuf. Homes	0	0	3,133	2,872	2,872
Tourists	0	0	0	0	0
TOTAL	0	0	4,678	3,902	3,902
Lafayette County					
Site-built Homes	0	0	664	664	1,660
Mobile/Manuf. Homes	0	0	1,377	1,262	1,950
Tourists	0	0	0	0	0
TOTAL	0	0	2,041	1,926	3,610

	Evacuation Level A Operational Scenario	Evacuation Level B Operational Scenario	Evacuation Level C Operational Scenario	Evacuation Level D Operational Scenario	Evacuation Level E Operational Scenario
Madison County					
Site-built Homes	0	0	2,879	1,439	1,439
Mobile/Manuf. Homes	0	0	4,878	3,833	3,833
Tourists	0	0	0	0	0
TOTAL	0	0	7,757	5,272	5,272
Suwannee County					
Site-built Homes	0	0	3,056	1,528	1,528
Mobile/Manuf. Homes	0	0	10,113	9,270	9,270
Tourists	0	0	0	0	0
TOTAL	0	0	13,169	10,798	10,798
Taylor County					
Site-built Homes	0	2,572	4,652	2,572	8,139
Mobile/Manuf. Homes	0	4,814	5,699	4,814	7,098
Tourists	0	246	246	246	246
TOTAL	0	7,632	10,597	7,632	15,483
Union County					
Site-built Homes	669	0	0	1,337	669
Mobile/Manuf. Homes	3,105	0	0	3,364	3,105
Tourists	0	0	0	0	0
TOTAL	3,774	0	0	4,701	3,774

Chapter IV also presents the vulnerability of critical facilities within the region to (1) tropical storms and hurricanes; (2) flooding (100-year and 500-year); and wildfire (high and very high). The County Appendices provide more detailed data and maps for selected critical facilities including health care facilities (hospitals, nursing homes, etc.), assisted living facilities (ALFs), fire and police stations, and other identified facilities.

D. PUBLIC SHELTER DEMAND

As part of the regional evacuation study, the anticipated demand for public shelter was quantified. The public shelter inventories and the capacities within each county were identified and a comparison was made to determine the status within both the county and the region.

The general response model, post-hurricane behavioral surveys of residents in the North Central Florida region and past experience was used to determine public shelter demand. The number of evacuees who choose public shelter as their evacuation destination is based on demographic characteristics of the population including income and age, risk area and housing (mobile home vs. site built homes). The planning assumptions regarding anticipated shelter use were presented in the Regional Behavioral

Analysis (See Chapter III, Appendices III-A III-K), and were applied to the projected Hurricane Evacuation Population estimates for both the *Base Planning Scenarios* as well as the *Operational Scenarios*.

As discussed in Chapter IV, the Base Planning Scenarios assume 100% compliance of the vulnerable populations (surge-vulnerable and mobile home residents) plus the "shadow evacuation". The Operational Scenarios use the participation rates from the behavioral analysis to determine the evacuation rates.

Table ES-7
Public Shelter Demand for Hurricane Evacuation
Base Scenarios 2010

County	Capacity	A	B	C	D	E
Alachua	3,804	5,744	7,315	10,456	12,027	13,596
Bradford	1,533	1,012	1,104	1,197	1,382	1,476
Columbia	2,597	3,345	3,530	3,900	4,085	4,270
Dixie	2,051	1,273	1,286	1,349	1,552	1,650
Gilchrist	3,243	820	866	914	960	1,006
Hamilton	1,701	797	849	901	953	1,003
Lafayette	238	424	424	463	537	574
Madison	4,311	1,067	1,129	1,191	1,252	1,314
Suwannee	1,175	2,457	2,575	2,623	2,812	2,930
Taylor	2,424	1,204	1,208	1,325	1,469	1,595
Union	312	616	696	775	932	1,012
Region	23,389	18,759	20,982	25,094	27,961	30,426

Table ES-8
Public Shelter Demand for Hurricane Evacuation
Base Scenarios 2015

County	Capacity	A	B	C	D	E
Alachua	3,804	6,120	7,790	11,133	12,804	14,476
Bradford	1,533	1,019	1,117	1,217	1,413	1,513
Columbia	2,597	3,365	3,572	3,985	4,192	4,399
Dixie	2,051	1,295	1,308	1,382	1,617	1,730
Gilchrist	3,243	827	882	940	993	1,049
Hamilton	1,701	803	857	912	964	1,019
Lafayette	238	431	431	470	551	592
Madison	4,311	1,075	1,141	1,204	1,269	1,336
Suwannee	1,175	2,473	2,610	2,664	2,882	3,017
Taylor	2,424	1,217	1,219	1,345	1,497	1,630
Union	312	622	707	792	960	1,043
Region	23,389	19,247	21,634	26,044	29,142	31,804

Table ES-9
Public Shelter Demand for Hurricane Evacuation
Operational (Out of Region Impact/Evacuees) Scenarios 2010

County	Capacity	A	B	C	D	E
Alachua	3,804	0	0	4,076	4,076	9,413
Bradford	1,533	0	0	553	0	553
Columbia	2,597	0	0	2,081	2,081	2,081
Dixie	2,051	845	923	0	845	1,519
Gilchrist	3,243	472	472	0	472	720
Hamilton	1,701	0	485	0	485	485
Lafayette	238	268	268	0	268	485
Madison	4,311	642	751	0	0	642
Suwannee	1,175	0	1,404	0	1,404	1,404
Taylor	2,424	801	873	0	801	1,493
Union	312	0	0	401	0	401
Region	23,389	3,028	5,176	7,111	10,432	19,196

Table ES-10
Public Shelter Demand for Hurricane Evacuation
Operational (Out of Region Impact/Evacuees) Scenarios 2015

County	Capacity	A	B	C	D	E
Alachua	3,804	4,340	0	0	6,235	10,021
Bradford	1,533	559	0	0	657	559
Columbia	2,597	0	0	0	2,102	2,102
Dixie	2,051	0	860	1,103	860	1,589
Gilchrist	3,243	0	0	574	481	746
Hamilton	1,701	0	0	579	490	490
Lafayette	238	0	0	290	274	500
Madison	4,311	0	0	921	651	651
Suwannee	1,175	0	0	1,674	1,423	1,423
Taylor	2,424	0	810	1,075	810	1,528
Union	312	407	0	0	518	407
Region	23,389	5,306	1,670	6,216	14,501	20,016

Using the behavioral assumptions based on the General Response Model has a significant impact on the potential shelter demand calculations. As noted in Chapter III, Regional Behavioral Analysis, the use of public shelters for residents in site built homes ranges from 5% - 10% depending on age and income. Traditionally, a public shelter use rate of between 10%- 25% was used for planning purposes. However, the trend for less

reliance on public shelters has been recognized in past evacuations throughout the Gulf and Atlantic states.

Recognizing the trend toward a reduced reliance on public shelters, the emergency management community remains concerned that the assumption of such as drastic reduction in anticipated need does not take into consideration that many vulnerable residents will choose not to evacuate until there is no longer sufficient time to reach other destinations. This could logically result in a surge of evacuees to the public shelters in the closing hours of the evacuation. In addition if a major hurricane were to impact the region, there would be less capacity in public shelters for those residents who have no home to which to return.

In terms of community resiliency, without the requirement of EHPA standards, new schools may not be built to standards which would insure the schools would survive the hit of major hurricane. In addition the need for more special needs shelters must also be addressed in both State and local plans.

Therefore, local emergency management may use different assumptions for both public and special needs shelters within the operational plans as reflected in the County Comprehensive Emergency Management Plans (CEMPs).

E. EVACUATION TRANSPORTATION ANALYSIS

The evacuation transportation analysis discussed in Chapter VI documents the methodology, analysis, and results of the transportation component of the Statewide Regional Evacuation Study Program (SRESP). Among the many analyses required for the SRESP study, transportation analysis is probably one of the most important components in the process. By bringing together storm intensity, transportation network, shelters, and evacuation population, transportation analysis explicitly links people's behavioral responses to the regional evacuation infrastructure and helps formulate effective and responsive evacuation policy options. Due to the complex calculations involved and numerous evacuation scenarios that need to be evaluated, the best way to conduct the transportation analysis is through the use of computerized transportation simulation programs, or transportation models.

The development of the transportation methodology and framework required coordination and input from all eleven regional planning councils in Florida, along with the Division of Emergency Management, Department of Transportation, Department of Community Affairs, and local county emergency management teams. At the statewide level, the transportation consultant, Wilbur Smith Associates, participated in SRESP Work Group Meetings which were typically held on a monthly basis to discuss the development of the transportation methodology and receive feedback and input from the State agencies and RPCs.

At the local and regional level, Wilbur Smith Associates conducted a series of four regional meetings to coordinate with and receive input from local county emergency management, the regional planning council, local transportation planning agencies and groups, as well as other interested agencies.

1. Transportation Methodology

The methodology used in the North Central Florida RPC Evacuation Transportation Analysis is identical to the methodology used for all eleven Regional Planning Councils and includes the following components:

- Behavioral Assumptions
- Zone System and Highway Network
- Background Traffic
- Evacuation Traffic
- Dynamic Traffic Assignment

The regional model developed for the North Central Florida Region used a series of input data provided by the RPC, including the following:

- Regional Model Network
- Regional Zone System
- Regional Demographic Characteristics

2. Clearance Times

Based on the analysis, the Clearance Times for the Base Planning Scenario and Operational Scenarios for 2010 and 2015 are provided below.

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

- **In-County Clearance Time:** The time required from the point an evacuation order is given until the last evacuee can either leave the evacuation zone or arrive at safe shelter within the County. This does not include those evacuees leaving the County, on their own.

- **Out of County Clearance Time:** The time necessary to safely evacuate vulnerable residents and visitors to a "point of safety" within the county based on a specific hazard, behavioral assumptions and evacuation scenario. Calculated from the point

an evacuation order is given to the point in time when the last vehicle assigned an external destination exits the county.

- **Regional Clearance Time**: The time necessary to safely evacuate vulnerable residents and visitors to a “point of safety” within the (RPC) region based on a specific hazard, behavioral assumptions and evacuation scenario. Calculated from the point in time when the evacuation order is given to the point in time when the last vehicle assigned an external destination exits the region.

Table ES-11 – 2010 Clearance Times for Base Scenario

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Clearance Time to Shelter					
Alachua County	12.5	12.5	12.5	12.5	12.5
Bradford County	11.5	11.5	11.0	11.5	11.0
Columbia County	12.0	12.0	12.0	12.0	12.5
Dixie County	11.0	11.0	11.0	11.5	11.5
Gilchrist County	11.0	11.0	11.0	11.0	11.0
Hamilton County	7.5	6.5	8.0	7.0	8.0
Lafayette County	10.0	9.5	9.5	9.5	10.5
Madison County	10.5	10.5	11.0	11.0	11.0
Suwannee county	12.0	12.0	12.0	12.0	12.0
Taylor County	11.5	11.5	12.5	12.5	12.0
Union County	11.0	11.0	11.0	11.0	11.0
In-County Clearance Time					
Alachua County	13.0	13.0	13.0	13.0	13.0
Bradford County	13.0	12.5	12.5	12.5	12.5
Columbia County	13.0	13.0	13.0	13.0	13.0
Dixie County	11.5	11.5	11.5	12.5	12.5
Gilchrist County	12.5	12.5	12.5	12.5	12.5
Hamilton County	11.0	11.0	12.5	11.0	11.0
Lafayette County	12.5	11.5	12.0	12.5	12.5
Madison County	12.5	12.5	12.5	12.5	12.5
Suwannee county	13.0	13.0	13.0	13.0	13.0
Taylor County	12.5	12.5	12.5	13.0	13.0
Union County	12.5	12.5	12.5	12.5	12.5
Out of County Clearance Time					
Alachua County	13.5	13.5	14.0	13.5	13.5
Bradford County	12.5	12.5	13.0	12.5	13.0
Columbia County	13.5	13.5	13.5	13.5	13.5
Dixie County	12.0	12.0	12.0	12.5	13.0
Gilchrist County	13.0	13.0	12.5	13.0	13.0
Hamilton County	13.5	13.5	13.5	13.5	13.5
Lafayette County	12.0	12.5	12.0	12.5	12.5
Madison County	13.5	13.5	13.5	13.5	13.5
Suwannee county	13.5	13.5	13.5	13.5	13.5
Taylor County	13.5	13.5	13.0	13.5	13.5
Union County	11.5	11.5	12.0	12.5	12.0
Regional Clearance Time					
North Central	14.0	14.0	14.0	14.0	14.0

Table ES-12 – 2015 Clearance Times for Base Scenario

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Clearance Time to Shelter					
Alachua County	12.5	12.5	12.5	12.5	12.5
Bradford County	11.0	11.5	11.5	11.0	11.5
Columbia County	12.0	12.0	12.0	12.0	12.0
Dixie County	11.0	11.0	11.5	11.5	12.0
Gilchrist County	11.0	11.0	11.0	11.0	11.0
Hamilton County	7.0	10.0	9.5	9.5	7.0
Lafayette County	10.5	10.0	9.0	10.5	9.0
Madison County	11.0	10.0	11.0	11.0	11.0
Suwannee county	12.0	12.0	12.0	12.0	12.0
Taylor County	12.5	12.5	12.0	12.5	13.0
Union County	11.0	11.0	11.0	11.0	11.0
In-County Clearance Time					
Alachua County	13.0	13.0	13.0	13.0	13.0
Bradford County	12.5	12.5	12.5	12.5	12.5
Columbia County	13.0	13.0	13.0	13.0	13.0
Dixie County	11.5	11.5	11.5	11.5	12.5
Gilchrist County	12.5	12.5	12.5	12.5	12.5
Hamilton County	11.0	12.0	11.5	11.5	10.5
Lafayette County	12.5	12.5	11.5	12.5	11.0
Madison County	12.0	11.5	12.5	12.5	12.5
Suwannee county	13.0	13.0	13.0	13.0	13.0
Taylor County	13.0	13.0	12.5	13.0	13.0
Union County	12.5	12.5	12.5	12.5	12.5
Out of County Clearance Time					
Alachua County	13.5	13.5	13.5	13.5	14.0
Bradford County	12.5	13.0	12.5	13.5	13.5
Columbia County	13.5	13.5	13.5	13.5	13.5
Dixie County	12.0	12.0	12.5	12.5	13.0
Gilchrist County	12.5	13.0	13.0	13.0	13.0
Hamilton County	13.5	13.5	13.5	13.5	13.5
Lafayette County	12.5	12.0	12.5	12.5	12.5
Madison County	13.5	13.5	13.5	13.5	13.5
Suwannee county	13.5	13.5	13.5	13.5	13.5
Taylor County	13.5	13.5	13.5	13.5	13.5
Union County	11.5	11.5	12.0	12.5	12.5
Regional Clearance Time					
North Central	14.0	14.0	14.0	14.0	14.0

Table ES-13 – 2010 Clearance Times for Operational Scenarios

	Evacuation Level A Operational Scenario	Evacuation Level B Operational Scenario	Evacuation Level C Operational Scenario	Evacuation Level D Operational Scenario	Evacuation Level E Operational Scenario
Clearance Time to Shelter					
Alachua County	0.0	0.0	12.0	12.0	9.5
Bradford County	0.0	0.0	10.5	0.0	9.0
Columbia County	0.0	0.0	11.0	11.0	9.0
Dixie County	11.0	11.0	0.0	11.0	9.5
Gilchrist County	6.5	7.5	0.0	6.0	9.0
Hamilton County	0.0	4.5	0.0	2.5	5.0
Lafayette County	5.0	6.5	0.0	7.0	8.5
Madison County	9.0	9.5	0.0	0.0	7.0
Suwannee county	0.0	11.0	1.5	11.5	8.5
Taylor County	11.5	12.0	0.0	11.5	9.5
Union County	0.0	0.0	9.5	0.0	8.5
In-County Clearance Time					
Alachua County	0.0	0.0	13.0	13.0	10.0
Bradford County	0.0	0.0	12.5	0.0	9.5
Columbia County	0.0	0.0	12.5	12.5	9.5
Dixie County	14.0	11.0	0.0	22.0	21.5
Gilchrist County	11.0	10.5	0.0	10.5	9.5
Hamilton County	0.0	10.0	0.0	9.5	8.5
Lafayette County	10.5	11.0	0.0	11.0	9.5
Madison County	11.5	11.5	0.0	0.0	9.5
Suwannee county	0.0	13.0	9.0	13.0	9.5
Taylor County	15.0	12.0	0.0	21.5	21.5
Union County	0.0	0.0	12.0	0.0	9.5
Out of County Clearance Time					
Alachua County	15.0	12.0	18.5	33.5	25.0
Bradford County	14.0	0.5	17.0	32.5	24.5
Columbia County	16.0	12.0	22.5	33.5	26.0
Dixie County	14.5	11.5	0.5	22.5	21.5
Gilchrist County	14.5	11.5	7.0	20.5	15.5
Hamilton County	15.5	13.0	20.0	34.5	25.5
Lafayette County	13.0	12.0	13.0	19.5	15.5
Madison County	16.0	13.0	22.0	33.5	26.5
Suwannee county	16.0	13.0	22.5	34.0	26.0
Taylor County	15.5	12.5	13.5	23.5	25.5
Union County	2.0	0.5	15.0	16.0	24.5
Regional Clearance Time					
North Central	16.5	13.0	23.5	35.0	26.5

Table ES-14 – 2015 Clearance Times for Operational Scenarios

	Evacuation Level A Operational Scenario	Evacuation Level B Operational Scenario	Evacuation Level C Operational Scenario	Evacuation Level D Operational Scenario	Evacuation Level E Operational Scenario
Clearance Time to Shelter					
Alachua County	12.5	0.0	0.0	12.5	18.5
Bradford County	10.0	0.0	0.0	11.5	11.0
Columbia County	0.0	0.0	0.0	11.0	17.0
Dixie County	0.0	11.0	11.5	11.0	16.0
Gilchrist County	0.0	0.0	8.0	6.0	9.5
Hamilton County	0.0	0.0	6.0	3.0	3.5
Lafayette County	0.0	0.0	6.5	7.0	10.0
Madison County	0.0	0.0	10.5	9.5	10.0
Suwannee county	0.0	0.0	11.5	11.0	16.5
Taylor County	0.0	11.5	12.0	12.0	18.5
Union County	10.0	0.0	0.0	10.0	11.0
In-County Clearance Time					
Alachua County	13.0	0.0	0.0	13.0	19.0
Bradford County	12.5	0.0	0.0	12.5	16.5
Columbia County	0.0	0.0	0.0	12.5	18.0
Dixie County	0.0	16.5	11.5	16.5	21.0
Gilchrist County	0.0	0.0	11.5	10.5	16.0
Hamilton County	0.0	0.0	11.0	9.5	11.0
Lafayette County	0.0	0.0	11.0	11.0	16.5
Madison County	0.0	0.0	12.5	12.5	15.0
Suwannee county	0.0	0.0	13.0	13.0	18.0
Taylor County	0.0	15.5	12.5	15.5	21.5
Union County	12.5	0.0	0.0	12.0	16.5
Out of County Clearance Time					
Alachua County	16.5	18.5	13.5	25.0	21.5
Bradford County	14.5	16.5	9.5	23.5	21.0
Columbia County	17.0	18.5	13.0	34.0	22.0
Dixie County	0.5	17.0	12.0	17.0	21.0
Gilchrist County	6.0	15.0	12.5	18.5	20.5
Hamilton County	14.5	18.5	13.5	34.5	22.0
Lafayette County	9.5	14.0	12.5	20.5	20.0
Madison County	15.0	18.5	13.0	34.5	22.0
Suwannee county	14.5	18.5	13.5	34.5	22.0
Taylor County	11.0	17.5	13.5	20.5	22.5
Union County	12.5	1.0	0.5	24.0	18.5
Regional Clearance Time					
North Central	17.5	19.5	14.0	35.5	22.5

4. TIME User Interface

Wilbur Smith Associates developed the Transportation Interface for Modeling Evacuations (TIME) to make it easier for RPC staff and transportation planners to use the model and implement the evacuation methodology. The TIME interface is based on an ArcGIS platform and is essentially a condensed transportation model, which provides a user friendly means of modifying input variables that would change the clearance times for various evacuation scenarios.

The evacuation model variables include a set of distinguishing characteristics that could apply to evacuation scenarios as selection criteria. These following variables may be selected using the TIME interface and allow the user to retrieve the best results from various evacuation alternatives:

- Analysis time period;
- Highway network;
- Behavioral response;
- One-way evacuation operations;
- University population;
- Tourist occupancy rates;
- Shelters;
- Counties evacuating;
- Evacuation level;
- Response curve hours; and,
- Evacuation Phasing.

It is anticipated that the regional planning council and local governments will be able to use the TIME User Interface to simulate additional scenarios varying behavioral assumptions, reflecting proposed growth in coastal areas, new transportation improvements, etc.

F. GLOSSARY

The Glossary at the back of the Technical Data Report contains the definitions of the terms used throughout the document. In many cases, it represents the legal consensus of the definition of terms in statute pertaining to growth management. The Statewide Regional Evacuation Study Program represents a consistent and coordinated approach to provide tools for both the emergency management as well as the planning community in the State of Florida.

G. CONCLUSIONS AND RECOMMENDATIONS

Obviously, the implementation of a successful hurricane evacuation in the North Central Florida Region will be complex and challenging. It will require a team effort - not just on the part of the emergency management and response personnel - but of the entire

community. We have come to a point in this metropolitan coastal region that complacency and apathy will have dire consequences.

The update of the *North Central Florida Region Hurricane Evacuation Study* illustrates that there have been improvements in hurricane evacuation planning including increased public shelter capacity, assistance for the transit dependent, alternatives for evacuees with pets, special needs shelters, route improvements and growth management mitigation strategies helping to reduce the population-at-risk. However, there remain serious challenges in this region if we are to avoid the loss of life and property and human suffering witnessed in the 2005 hurricane season in Mississippi, Louisiana and Texas.

Over the past 30 years, North Central Florida Regional Planning Council (NCFRPC), the State of Florida, County Emergency Management agencies, the American Red Cross and many other agencies have worked together to prepare regionally for a disaster – not just the inevitable strike of a hurricane but the impacts of flooding, hazardous material incidents and terrorist attack.

Recent events have tragically demonstrated the power of nature and the horrific results if government and citizens fail to respond appropriately. As public servants and elected officials, it is imperative to address the concerns of our citizens and leaders regarding our ability to manage a major disaster.

1. Public Education

Our citizens' knowledge and understanding of personal risk and appropriate evacuation response remains a serious challenge. The behavioral surveys indicated that many residents – even those in the most surge-vulnerable areas and mobile homes – believe their home would be safe in a major hurricane, do not have a family disaster plan, and many will not evacuate regardless of the intensity of the storm or government actions. This fact means that those who choose to stay behind in mobile homes and areas vulnerable to storm surge and velocity wave action might not survive a storm.

In turn, many residents - well inland of storm surge and in site-built homes - responded that they will try to evacuate -- many out of the region or state. Because of the "shadow evacuation," resulting clearance times are exceedingly high necessitating the planning of refuge shelters along critical evacuation routes, reverse laning of Interstate systems and the potential of evacuation problems seen in Houston, Texas, with Hurricane Rita (2005).

In order to elicit an immediate evacuation response, the population-at-risk must be clearly and conclusively convinced that (1) they are indeed residing in a vulnerable area and (2) that a decision not to leave could well mean their loss of life or injury. Post-hurricane studies have shown that the most vital piece of information is the information received from the emergency management personnel and local officials. For the most part, people will respond based upon the urgency and seriousness of the threat as conveyed by the emergency response personnel (HMG, 1999 and 2006).

Three key messages have been identified:

- Know your risk (evacuation zone/ mobile homes)
- Make a family plan.
- Obtain emergency supplies for at least 3-5 days.

The accurate formulation and comprehensive dissemination of these critical pieces of information to the public in a simple and understandable form is essential for implementation of an effective hurricane evacuation plan.

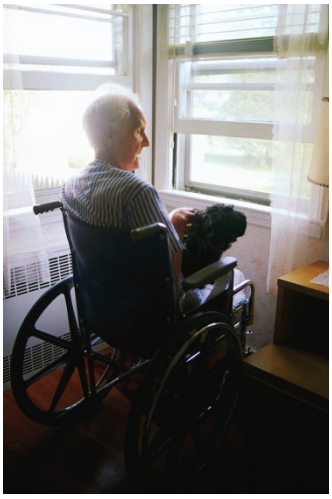
Hopefully, irrational emergency decision-making on the part of the population can be decreased if they determine their vulnerability to a hurricane before the emergency occurs. Residents in the North Central Florida region are encouraged to become familiar with the county plans for evacuation and to make their "family plans" and business plans ahead of time. The State of Florida has partnered with the Florida Broadcasting Association to encourage the "culture of preparedness" including PSAs and billboards. Partnering at the local level is also needed.

Additional notification procedures (of evacuation level) is implemented and repeated throughout the season. The local governments in the region do have programs which provide these services to their residents so it is unclear why so many residents do not know their evacuation level or understand their risk.

- Notification on utility bills (zone designation)
- Notification on tax bills (zone designation)
- Special mailings and deliveries
- Interactive Web sites (zone look up)
- Citizen Information lines (zone look up)

Perhaps the answer lies in a continued strengthen initiative to partner with all levels of government, the private sector, civic and business associations and non-profit/volunteer agencies and the media to "get the word out" about preparedness and mitigation. Businesses have been increasingly active in developing continuity plans and providing information to their employees. Churches and civic associations, neighborhood associations, crime watch and Community Emergency Response Teams (CERT) can provide direct contact and face-to-face communication.

2. Special Needs



Providing shelter for residents with special needs is a critical issue. Partners including the Dept. of Health, home health agencies, hospitals and skilled nursing facilities, to name just a few, must work with local agencies to (1) register and determine the appropriate level of care and appropriate shelter alternative for each resident and (2) provide the facility, staff, equipment and supplies and transportation assistance in an effective manner in a disaster situation.

Again, we need to develop strong partnerships with those entities in the community that work with our citizens with special needs on a daily basis to ensure they receive the information and support they need before, during and after a disaster.

3. Mitigation Message

As identified, the results of the ***Statewide Regional Evacuation Study for the North Central Florida Region*** highlight the challenges of the emergency management community in a metropolitan coastal area such as North Central Florida. If people do not respond correctly when an evacuation order is given, there will be serious implications on the entire emergency response. For example, if residents who live in low-lying surge vulnerable areas or mobile homes do not evacuate, they are putting their safety at risk. Conversely, if residents who live in site-built homes outside the surge-vulnerable areas try to evacuate in significant numbers - as they did during the 1999 Hurricane Floyd evacuation and for Hurricane Rita in 2005 - the resulting traffic congestion may prevent anyone from reaching safety.

The answer is comprehensive consistent public education which focuses on encouraging our residents to do the following (1) know their risk, and (2) plan ahead. Again, key messages include:

- Individual Responsibility – Be disaster resilient. Know your risk, plan ahead and obtain needed supplies.
- Encourage residents to *"Flee from Flood; Hide from Wind".* Obviously, coastal residents in surge vulnerable areas and mobile home residents must evacuate; however, the key message is to seek refuge within "tens of miles, not hundreds of miles."

- Strongly encourage all residents who live in site-built homes outside the surge vulnerable areas to call and invite friends or relatives who must evacuate to come and stay with them if there is a hurricane threat. Once they have committed by inviting their friends or relatives, we will also encourage residents to prepare their homes and mitigate for the potential winds, i.e. window and door protection, braced gable end roofs, and garage doors.
- It is assumed if inland residents take action to protect their homes from wind, they will be less likely to try to "outrun" a hurricane.

4. The Coastal High Hazard Area (CHHA)

In 2006 the Florida Legislature passed a bill changing the definition of the coastal high hazard area (CHHA) from the evacuation zone to the "area defined by the SLOSH model to be inundated from a category one hurricane." This change was welcome as the definition was more defensible tying the land use regulations to a scientific model rather than the zone delineated by roadways and familiar landmarks. However, the limitations of the model must be recognized by the local governments now responsible for its regulation.

As discussed, the SLOSH model does not address wave height and other local processes. It also does not incorporate the danger of isolation in areas surrounded by storm surge with limited access such as barrier islands. These two issues are of serious concern and it is recommended that local governments address them within their comprehensive plans and land development regulations.

H. Use of SRES Data in Growth Management

While this study is primarily designed for the local emergency management agencies to utilize in the preparation of emergency response, evacuation, sheltering and mitigation plans, Chapter 163.3178 of the Florida Statutes directs growth management planners to this study to identify exceedances when determining the impacts of growth on the safety of the public. Therefore, this study is also designed with many features to address growth management issues. Key items included are Coastal High Hazard Areas (CHHA), clearance times, shelter capacity, and tools for determining impacts of growth.

1. Storm Tide Limits and the Coastal High Hazard Area

The Statewide Regional Evacuation Study (SRES) contains data which is directly referenced in growth management legislation in the State of Florida and coastal/conservation elements of the Local Government Comprehensive Plans. The **Storm Tide Atlas** (*Volume 7*) and the storm tide limits it portrays for each county define the Coastal High Hazard Area (CHHA)[3]. Section 163.3178(9)(c), Florida Statutes requires local governments to amend their future land use map and coastal management element to include the new definition of the Coastal High Hazard Area and to depict the CHHA on the County's Future Land Use Map.

As indicated in the Hazards Analysis chapter (*Volume 1: Technical Data Report, Chapter II*), the ultimate amount of storm surge at any given coastal location is determined by a number of factors. It has been demonstrated that storm parameters including the wind speed and profiles, angle of approach, size of radii of maximum winds and the forward speed of the system will have a complex and inter-related affect on the amount of surge at a particular site. For example, Hurricane Ike which struck the Galveston area in 2008 was classified as a Category 2 hurricane on the Saffir Simpson Hurricane Wind Scale yet it produced a 24 – 26 foot storm surge (often associated with a Category 5 Hurricane) due to its large wind field (radius of maximum winds) and angle of approach.

2. Storm Tide Limits and Evacuation Zones

Emergency management officials use many factors in determining County Evacuation Zones, with storm tide limits being a major component. However, it is important to note that the storm tide boundaries are not the only data used in this determination. Local officials use their knowledge of the area and other data such as: areas of repetitive loss, surge depth, freshwater flooding, isolation issues, and debris hazards, and typically choose known landmarks to identify boundaries for public warning and information.

As a result, the Evacuation zones largely correspond to the storm tide limits of the Category 1 – 5 hurricanes on the Saffir-Simpson Wind Scale. However, the degree to which any specific zone corresponds to storm tide limits is directly related to the affect other data factors have on the final determination of County Evacuation Zones by local officials. These factors may lead local officials to consolidate zones, add additional zones, expand or contract zones to ensure those threatened by the hazards are appropriately included.

The 2010 SRES introduces alphabetic Evacuation Zones/Levels (A-E) across the State for the first time. A map (Figure IV-2) of these zones is located in Chapter IV: Regional Population and Vulnerability Analysis found in Volume 1 of the Study. For purposes of growth management planning, the reference to areas to be evacuated from a Category 1 hurricane should use Evacuation Zone/Level A, reference to evacuation areas to be evacuated in advance of a Category 2 hurricane should use Evacuation Zone/Level B, and reference to areas to be evacuated from a Category 3 hurricane should use Evacuation Zone/Level C. Similarly, in policies which refer to evacuation areas from a Category 4 or 5 hurricane, Evacuation Zones/Levels D or E should be used respectively. Where there are

[3] Section 163.3178(2) (h), F.S. "the area below the elevation of the Category 1 storm surge line as established by a Sea, Lake and Overland Surge from Hurricanes (SLOSH) computerized storm surge model."

consolidated zones or evacuation levels please refer to the detailed reference information (*Chapter IV: Regional Population and Vulnerability Analysis of Volume 1*).

Table ES- 15: Potential Storm Tide Heights by County*

(In feet above NAVD88)

*Storm Strength	Dixie	Taylor	Gilchrist	Lafayette
Category 1	Up to 10.6	Up to 11.1	Up to 5.7	Up to 5.4
Category 2	Up to 17.4	Up to 19.5	Up to 14.9	Up to 8.5
Category 3	Up to 23.6	Up to 27.7	Up to 21.7	Up to 19.3
Category 4	Up to 29.3	Up to 33.5	Up to 26.5	Up to 28.1
Category 5	Up to 34.2	Up to 38.5	Up to 31.8	Up to 33.8

3. Transportation

Two types of scenarios (Base scenarios and Operational scenarios) were defined in the Evacuation Transportation Analysis (*Volume 4*) for use in the Regional Evacuation Model to derive the evacuating population, evacuation vehicles, clearance times and critical congested roadways. Most pertinent to Growth Management are the base scenarios, which were developed to estimate a worst case scenario in which 100% of the vulnerable population (those found in evacuation zones) evacuate plus the addition of "shadow evacuation". The standard assumptions utilized as the baseline were identified by the Division of Community Planning (DCP) as best suited for use in growth management analysis. The Base Scenarios (Table VI-9, Chapter VI: Evacuation Transportation Analysis Summary in Volume One) are provided to supply the anticipated time needed to evacuate all vulnerable populations (*clearance times are found in tables VI-11 and VI-12, Chapter VI: Evacuation Transportation Analysis Summary in Volume One*).The Base Scenarios also supply the baseline data for planning purposes (*maximum evacuation population found in tables VI-15 and VI-16, Chapter VI: Evacuation Transportation Analysis Summary in Volume One*) . This allows for the evaluation of growth management strategies and provides a consistent statewide measure for clearance time calculations.

The ability to alter scenarios is also available, allowing a planner to increase or decrease population, roadway capacities, shelter availability and more; then measure the variations to determine impacts of population, land use or infrastructure changes. The Transportation Interface for Modeling Evacuations (TIME) is the tool developed to allow users to run further scenarios. Built on the Cube Voyager and Cube Avenue software, this interface is a user- friendly interface which provides the ability to run variations on the transportation scenario, without being transportation planners. If needed, a transportation planner familiar with the model's underlying software can provide a more complex analysis.

4. Definitions

In addition to the data provided, the SRES also defines terms (*Volume One: Technical Data Report, Glossary*) that are referenced in Florida legislation including various Evacuation Clearance Times (Clearance Time to Shelter, In-County Clearance Time, Out-of-County Clearance Time and Regional Clearance Time). These Clearance Time definitions better clarify the criterion in determining the compliance of Comprehensive Plan Amendments with State coastal high hazard provisions as prescribed in Section 163.3178(9), Florida Statutes. Using the uniform assumptions from the Base Scenarios, the SRES supplies the information to provide a consistent statewide methodology to assess current conditions as well as quantify impacts that may need to be mitigated.

5. Sheltering

As indicated in the Hurricane Preparedness Policy Rule (Rule 9J-2.0256 (4), F.A.C.), shelter space surplus and deficits are utilized to determine impacts of Developments of Regional Impacts (DRI). *Chapter 5: Regional Shelter Analysis of Volume One* provides general information on sheltering (general population, special needs and pet friendly), listings of all county shelters and their capacity as well as specific public shelter demand (Table V-9 through V-12). Shelter surplus and deficits are outlined in these tables as well.

Important to note: shelters listed in the study are divided in two categories, 'primary' and 'other' shelters. Primary shelters are ARC 4496 compatible and may meet other requirements as well (Enhanced Hurricane Protection Areas). It is these primary shelters in which the assessment of a County's shelter deficit is based upon. Each study may list 'other shelter resources' that are within each County, but these shelters may or may not be utilized during an event.