



FLORIDA STATEWIDE REGIONAL EVACUATION STUDY PROGRAM



EVACUATION TRANSPORTATION ANALYSIS

VOLUME 4-2

FLORIDA DIVISION OF
EMERGENCY MANAGEMENT

APALACHEE FLORIDA
REGIONAL COUNCIL

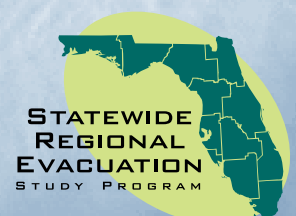
APALACHEE FLORIDA REGION



INCLUDES HURRICANE EVACUATION STUDY



2015





Volume 4-2 Evacuation Transportation Analysis

Prepared by the

**APALACHEE REGIONAL PLANNING COUNCIL
AND
CDM SMITH**



CREDITS & ACKNOWLEDGEMENTS



Funding for the 2015 update to the Study was provided by the State of Florida Legislature through the Florida Division of Emergency Management (FDEM). Funding was also provided by the Federal Emergency Management Agency with all funds administered by FDEM. Local match was provided by Calhoun, Franklin, Gadsden, Gulf, Jackson, Jefferson, Leon, Liberty and Wakulla counties.

The Council acknowledges and extends its appreciation to the following agencies and people for their cooperation and assistance in development of this Study:

National Oceanic and Atmospheric Administration (NOAA/TPC-NHC) for the SLOSH numerical storm surge model developed by the late Chester L. Jelesnianski, the development of the 2013 Apalachee Bay Basin under the management of Jaime Rhome, and for the storm tide computation and interpretation provided by the NOAA Storm Surge Modeling team.

Florida Division of Emergency Management

Bryan Koon, Director
Andrew Sussman, Hurricane Program Manager
Richard Butgereit, GIS Manager

Florida Emergency Preparedness Association

For their support of this statewide effort

National Oceanic and Atmospheric Administration

Jamie Rhome, National Hurricane Center

County Emergency Management Agencies

Angie Smith, Calhoun County
Pamela Brownell, Franklin County
Shawn Wood, Gadsden County
Marshall Nelson, Gulf County
Rodney Andreason, Jackson County
Carol Ellerbe, Jefferson County
Kevin Peters, Leon County
Rhonda Lewis, Liberty County
Scott Nelson, Wakulla County



Table of Contents

Executive Summary

A. Background and Purpose	ES-1
B. Study Area	ES-1
C. Input and Coordination.....	ES-1
D. Evacuation Modeling Methodology and Framework	ES-2
E. Regional Model Implementation	ES-2
F. TIME User Interface	ES-13
G. Vulnerable Population.....	ES-13
H. Evacuation Model Scenarios	ES-19
I. Clearance Time Results	ES-22
J. Maximum Evacuating Population Clearances.....	ES-27
K. Summary and Conclusions	ES-29

Chapter I – Introduction

A. Background and Purpose	I-1
B. Study Area	I-1
C. Input and Coordination.....	I-3
D. Study Comparisons	I-3

Chapter II – Evacuation Modeling Methodology and Framework

A. Behavioral Assumptions.....	II-1
B. Zone System and Highway Network.....	II-3
C. Background Traffic.....	II-6
D. Evacuation Traffic	II-8
E. Dynamic Traffic Assignment.....	II-11
F. Prototype Model Development	II-13

Chapter III – Regional Model Implementation

A. Regional Model Network	III-1
B. Regional Zone System	III-1
C. Regional Demographic Characteristics.....	III-6
D. Planned Roadway Improvements	III-8
E. Behavioral Assumptions.....	III-9
F. Shelters	III-14
G. Evacuation Zones.....	III-14
H. TIME User Interface	III-16

Chapter IV – Transportation Analysis

A. Vulnerable Population.....	IV-1
B. Clearance Time Definitions.....	IV-6
C. Evacuation Model Scenarios	IV-7
D. Base Scenarios	IV-7
E. Base Scenario Results	IV-10
F. Operational Scenarios.....	IV-39
G. Operational Scenario Results.....	IV-41

H. Maximum Evacuating Population Clearances.....	IV-70
I. Sensitivity Analysis.....	IV-70
J. Summary and Conclusions.....	IV-73

List of Figures

	<u>Page</u>
ES-1 – Apalachee Regional Model Network.....	ES-3
ES-2 – Apalachee Regional Model Transportation Evacuation Zone (TEZ) System	ES-4
ES-3 – Evacuating Participation Rates: Franklin County – Site-Built Homes.....	ES-11
ES-4 – Evacuating Participation Rates: Franklin County – Mobile Homes	ES-11
ES-5 – Evacuating Participation Rates: Gulf County – Site-Built Homes	ES-12
ES-6 – Evacuating Participation Rates: Gulf County – Mobile Homes.....	ES-12
ES-7 – Evacuating Participation Rates: Jefferson County – Site-Built Homes	ES-13
ES-8 – Evacuating Participation Rates: Jefferson County – Mobile Homes	ES-13
ES-9 – Evacuating Participation Rates: Leon County – Site-Built Homes	ES-14
ES-10 – Evacuating Participation Rates: Leon County – Mobile Homes.....	ES-14
ES-11 – Evacuating Participation Rates: Wakulla County – Site-Built Homes	ES-15
ES-12 – Evacuating Participation Rates: Wakulla County – Mobile Homes.....	ES-15
I-1 – Apalachee Regional Planning Council	I-2
II-1 – Nine Hour Response Curve	II-2
II-2 – Percent of Available Capacity for Coastal Counties	II-7
II-3 – Percent of Available Capacity for Other Counties	II-7
II-4 – General Model Flow	II-8
III-1 – Apalachee Regional Model Area	III-2
III-2 – Apalachee Regional Model Network.....	III-3
III-3 – Apalachee Regional Model Transportation Evacuation Zone (TEZ) System	III-5
III-4 – Evacuating Participation Rates: Franklin County – Site-Built Homes.....	III-9
III-5 – Evacuating Participation Rates: Franklin County – Mobile Homes	III-10
III-6 – Evacuating Participation Rates: Gulf County – Site-Built Homes	III-10
III-7 – Evacuating Participation Rates: Gulf County – Mobile Homes.....	III-11
III-8 – Evacuating Participation Rates: Jefferson County – Site-Built Homes.....	III-11
III-9 – Evacuating Participation Rates: Jefferson County – Mobile Homes	III-12
III-10 – Evacuating Participation Rates: Leon County – Site-Built Homes	III-12
III-11 – Evacuating Participation Rates: Leon County – Mobile Homes.....	III-13
III-12 – Evacuating Participation Rates: Wakulla County – Site-Built Homes	III-13
III-13 – Evacuating Participation Rates: Wakulla County – Mobile Homes.....	III-14
III-14 – Apalachee Regional Evacuation Zones	III-18
IV-1 – Critical Roadway Segments 2015 Base Scenario 1	IV-18
IV-2 – Critical Roadway Segments 2015 Base Scenario 2.....	IV-19
IV-3 – Critical Roadway Segments 2015 Base Scenario 3.....	IV-20
IV-4 – Critical Roadway Segments 2015 Base Scenario 4.....	IV-21
IV-5 – Critical Roadway Segments 2015 Base Scenario 5.....	IV-22
IV-6 – Critical Roadway Segments 2020 Base Scenario 6.....	IV-23
IV-7 – Critical Roadway Segments 2020 Base Scenario 7.....	IV-24
IV-8 – Critical Roadway Segments 2020 Base Scenario 8.....	IV-25
IV-9 – Critical Roadway Segments 2020 Base Scenario 9.....	IV-26
IV-10 – Critical Roadway Segments for 2020 Base Scenario 5	IV-27

	<u>Page</u>
IV-11 – Clearance Time to Shelter Base Scenarios	IV-36
IV-12 – In-County Clearance Times Base Scenarios.....	IV-37
IV-13 – Out of County Clearance Times Base Scenarios	IV-38
IV-14 – Critical Roadway Segments for 2020 Operational Scenario 1	IV-49
IV-15 – Critical Roadway Segments for 2020 Operational Scenario 2	IV-50
IV-16 – Critical Roadway Segments for 2020 Operational Scenario 3	IV-51
IV-17 – Critical Roadway Segments for 2020 Operational Scenario 4	IV-52
IV-18 – Critical Roadway Segments for 2020 Operational Scenario 5	IV-53
IV-19 – Critical Roadway Segments for 2020 Operational Scenario 6	IV-54
IV-20 – Critical Roadway Segments for 2020 Operational Scenario 7	IV-55
IV-21 – Critical Roadway Segments for 2020 Operational Scenario 8	IV-56
IV-22 – Critical Roadway Segments for 2020 Operational Scenario 9	IV-57
IV-23 – Critical Roadway Segments for 2020 Operational Scenario 10	IV-58
IV-24 – Clearance Time to Shelter Operational Scenarios.....	IV-67
IV-25 – In-County Clearance Times Operational Scenarios.....	IV-68
IV-26 – Out of County Clearance Times Operational Scenarios	IV-69

List of Tables

	<u>Page</u>
ES-1 – Apalachee Demographic Characteristic Summary.....	ES-5
ES-2 – Apalachee Region Roadway Improvements, 2011 – 2015.....	ES-6
ES-3 – Apalachee Region Roadway Improvements, 2016 – 2020.....	ES-6
ES-4 – Vulnerable Population in the Apalachee Region for 2015	ES-14
ES-5 – Vulnerable Population in the Apalachee Region for 2020	ES-15
ES-6 – Vulnerable Population by Destination for 2015	ES-16
ES-7 – Vulnerable Population by Destination for 2020	ES-17
ES-8 – Vulnerable Shadow Evacuation Population	ES-18
ES-9 – Base Scenarios	ES-20
ES-10 – Operational Scenarios	ES-21
ES-11 – 2015 Clearance Times for Base Scenario.....	ES-23
ES-12 – 2020 Clearance Times for Base Scenario.....	ES-24
ES-13 – 2015 Clearance Times for Operational Scenarios	ES-25
ES-14 – 2020 Clearance Times for Operational Scenarios	ES-26
ES-15 – Maximum Evacuating Population by Time Interval for 2015	ES-28
ES-16 – Maximum Evacuating Population by Time Interval for 2020	ES-29
II-1 – Out of County Trip Destinations by Region.....	II-10
III-1 – Apalachee Demographic Characteristics.....	III-7
III-2 – Apalachee Region Roadway Improvements, 2015.....	III-8
III-3 – Apalachee Region Roadway Improvements, 2020.....	III-8
IV-1 – Vulnerable Population in the Apalachee Region for 2015.....	IV-1
IV-2 – Vulnerable Population in the Apalachee Region for 2020.....	IV-2
IV-3 – Vulnerable Population by Destination for 2015	IV-3
IV-4 – Vulnerable Population by Destination for 2020	IV-5
IV-5 – Vulnerable Shadow Evacuation Population.....	IV-6
IV-6 – Base Scenarios	IV-9

	<u>Page</u>
IV-7 – Evacuating Population by Base Scenario for 2015	IV-11
IV-8 – Evacuating Population by Base Scenario for 2020	IV-12
IV-9 – Shelter Demand by Base Scenario	IV-13
IV-10 – Evacuating Vehicles by Base Scenario for 2015	IV-15
IV-11 – Evacuating Vehicles by Base Scenario for 2020	IV-16
IV-12 – Total Evacuating Vehicles for Base Scenarios	IV-17
IV-13 – Evacuating Vehicles Exiting the County by Evacuation Route for the 2015 Base Scenario	IV-29
IV-14 – Evacuating Vehicles Exiting the County by Evacuation Route for the 2020 Base Scenario	IV-30
IV-15 – Evacuating Vehicles Entering the County by Evacuation Route for the 2015 Base Scenario	IV-31
IV-16 – Evacuating Vehicles Entering the County by Evacuation Route for the 2020 Base Scenario	IV-32
IV-17 – 2015 Clearance Times for Base Scenario	IV-34
IV-18 – 2020 Clearance Times for Base Scenario	IV-35
IV-19 – Operational Scenarios	IV-40
IV-20 – Evacuating Population by Operational Scenario for 2015	IV-42
IV-21 – Evacuating Population by Operational Scenario for 2020	IV-44
IV-22 – Shelter Demand by Operational Scenario	IV-44
IV-23 – Evacuating Vehicles by Operational Scenario for 2015	IV-46
IV-24 – Evacuating Vehicles by Operational Scenario for 2020	IV-47
IV-25 – Total Evacuating Vehicles for Operational Scenarios	IV-48
IV-26 – Evacuating Vehicles Exiting the County by Evacuation Route for the 2015 Operational Scenarios	IV-60
IV-27 – Evacuating Vehicles Exiting the County by Evacuation Route for the 2015 Operational Scenarios	IV-61
IV-28 – Evacuating Vehicles Entering the County by Evacuation Route for the 2015 Operational Scenarios	IV-62
IV-29 – Evacuating Vehicles Entering the County by Evacuation Route for the 2020 Operational Scenarios	IV-63
IV-30 – 2015 Clearance Times for Operational Scenarios	IV-65
IV-31 – 2020 Clearance Times for Operational Scenarios	IV-66
IV-32 – Maximum Evacuating Population by Time Interval for 2015	IV-70
IV-33 – Maximum Evacuating Population by Time Interval for 2020	IV-71

EXECUTIVE SUMMARY

The evacuation transportation analysis discussed in this volume documents the methodology, analysis, and results of the transportation component of the Statewide Regional Evacuation Study Program (SRESP). Transportation analysis is probably one of the most important components required for the development of the SRESP. Due to the complex calculations involved to look at various factors including the transportation network and evacuation population as well as the 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.

A. Background and Purpose

One of the objectives of the SRESP is to create consistent and integrated regional evacuation data and mapping, and by doing so, to facilitate knowledge sharing between state, regional, county, and local partners. Over the years, different planning agencies have used different modeling approaches including differing data requirements and approaches with varying degrees of complexity and mixed success. To achieve this objective, it is important for all Regional Planning Councils to adopt the same data format and to use the same modeling methodologies for their transportation analyses. The primary purpose of the transportation component of the SRESP is to develop a unified evacuation transportation modeling framework that can be implemented with the data collected by the Regional Planning Councils.

B. Study Area

The study area for this analysis includes the nine counties in the Apalachee Regional Planning Council area. The transportation modeling methodology includes some processes that are performed at the statewide level, in order to determine the impacts of evacuations from other regions impacting the evacuation clearance times in the Apalachee region. While the impact of other regions is included in the Apalachee analysis, it is important to note that the results of the transportation analysis presented in this document are only reported for the nine counties included in the Apalachee region. Transportation analysis results for other regions and counties are reported in the corresponding Volume 4 report for those regions.

C. Input and Coordination

The SRESP transportation methodology and framework was developed during 2008 and 2009 in coordination with all eleven regional planning councils in Florida, along with the Division of Emergency Management, Department of Transportation, Department of Economic Opportunity (formerly the Department of Community Affairs), and local county emergency management teams with CDM Smith serving as the transportation consultant.

During the update of this study two meetings were held at the local and regional level to receive updated input from local county emergency management and the regional planning council.

D. Evacuation Modeling Methodology and Framework

The evacuation modeling methodology and framework was developed during 2008 and 2009 in coordination with all eleven Regional Planning Councils and the Division of Emergency Management. The methodology used in the Apalachee region Evacuation Transportation Analysis is identical to the methodology used for all eleven Regional Planning Councils and includes the following components:

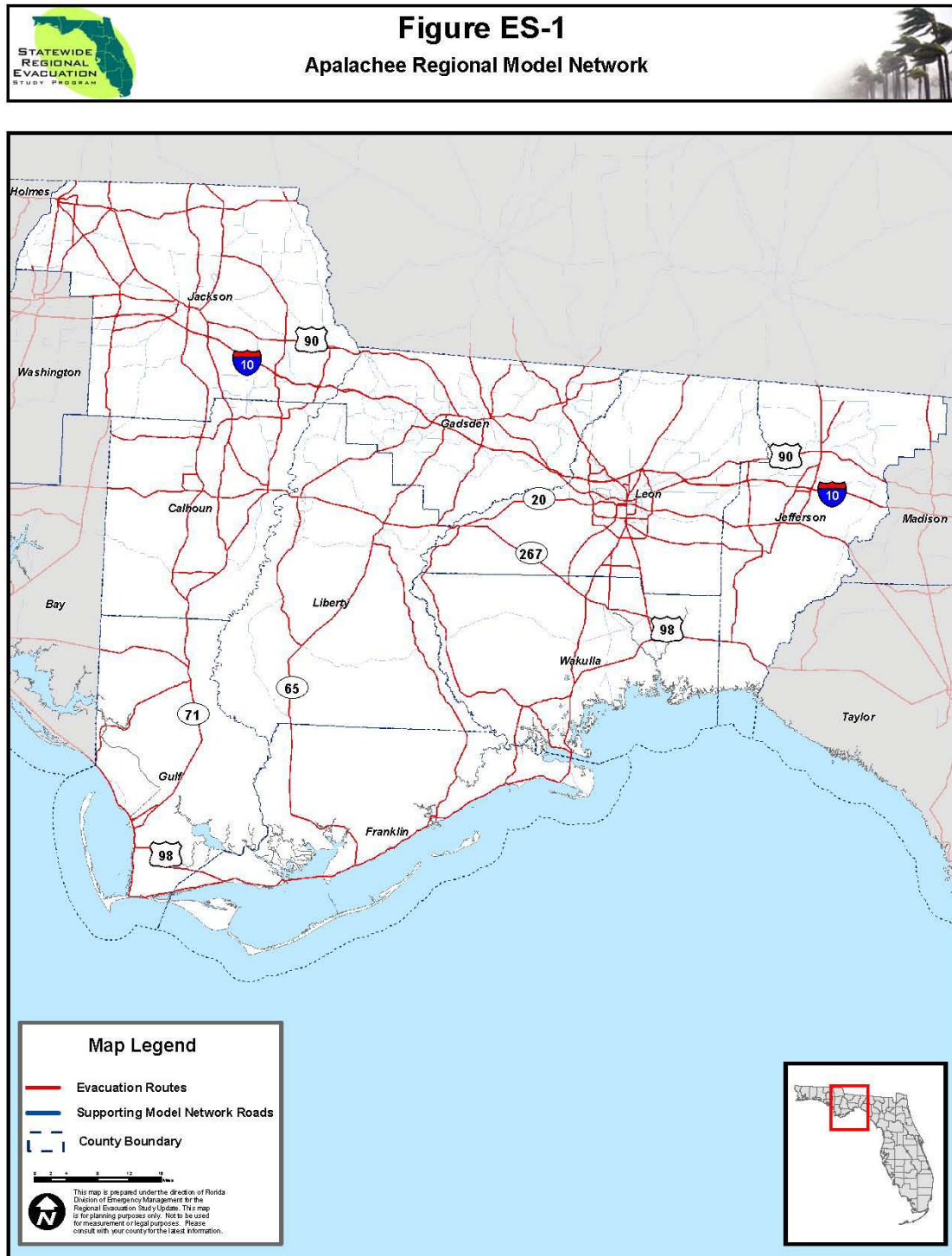
- Behavioral Assumptions
- Zone System and Highway Network
- Background Traffic
- Evacuation Traffic
- Dynamic Traffic Assignment
- Prototype Model Development

Additional information regarding these components can be found in Chapter II of this volume.

E. Regional Model Implementation

The regional model developed for the Apalachee region used a series of input data provided by the RPC, including the following:

- **Regional Model Network** - The regional model network consists of the RPC designated evacuation routes as well as a supporting roadway network that facilitates movement of evacuation traffic. Figure ES-1 identifies the model network and evacuation routes for the Apalachee region. County level details of the regional model network are provided in the Volume 5-2 report.
- **Regional Zone System** - The regional zone system is based on Traffic Evacuation Zones (TEZ) and contains the regional demographic information, which includes housing and population data that is essential to modeling evacuation traffic. There are 224 zones located within the nine county Apalachee region, as illustrated in Figure ES-2.
- **Regional Demographic Characteristics** - Demographic data were developed for the following years: 2010, 2015, and 2020. A snapshot of the key demographic data for each county in the ARPC for 2010, 2015, and 2020 is summarized in Table ES-1.



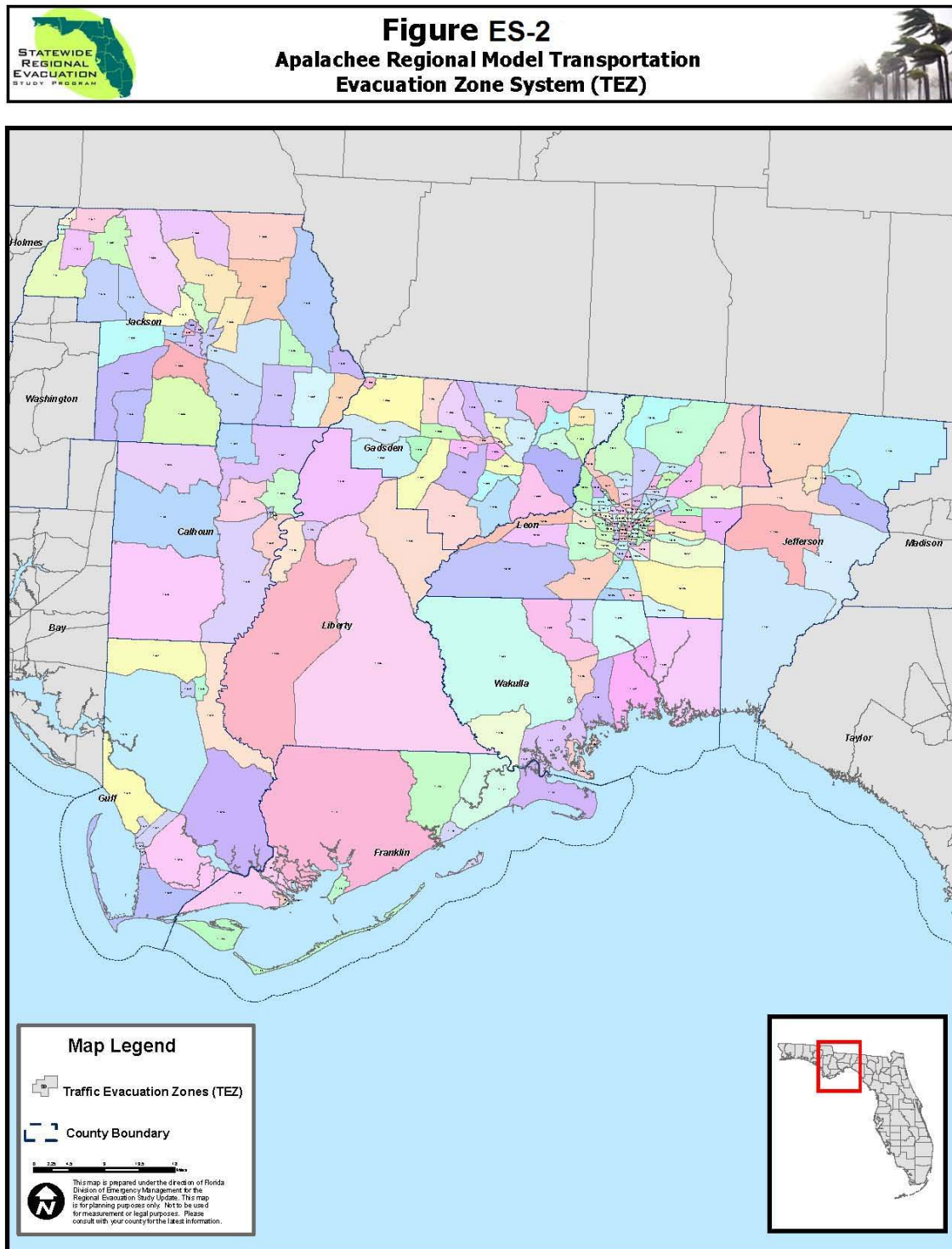


Table ES-1 – Apalachee Demographic Characteristics

County	Characteristic	Year		
		2010	2015	2020
Calhoun	Occupied site-built homes	3,419	3,491	3,634
	Population in site-built homes	8,345	8,515	8,869
	Occupied mobile homes	1,642	1,677	1,746
	Population in mobile home	4,389	4,483	4,665
	Hotel/motel units	24	24	24
Franklin	Occupied site-built homes	3,191	3,306	3,306
	Population in site-built homes	7,418	7,686	7,689
	Occupied mobile homes	1,063	1,102	1,102
	Population in mobile home	2,303	2,386	2,386
	Hotel/motel units	457	457	457
Gadsden	Occupied site-built homes	12,250	12,579	12,804
	Population in site-built homes	30,602	31,420	31,975
	Occupied mobile homes	4,702	4,826	4,913
	Population in mobile home	13,626	13,990	14,242
	Hotel/motel units	456	456	456
Gulf	Occupied site-built homes	4,224	4,251	4,286
	Population in site-built homes	9,075	9,134	9,208
	Occupied mobile homes	1,111	1,116	1,125
	Population in mobile home	3,338	3,353	3,380
	Hotel/motel units	160	160	160
Jackson	Occupied site-built homes	12,755	12,810	12,858
	Population in site-built homes	30,679	30,809	30,930
	Occupied mobile homes	4,662	4,684	4,700
	Population in mobile home	11,073	11,124	11,162
	Hotel/motel units	829	829	829
Jefferson	Occupied site-built homes	3,716	3,701	3,826
	Population in site-built homes	7,878	7,846	8,113
	Occupied mobile homes	1,930	1,919	1,983
	Population in mobile home	5,54	5,513	5,697
	Hotel/motel units	197	197	197
Leon	Occupied site-built homes	101,411	104,813	109,845
	Population in site-built homes	237,554	245,528	257,296
	Occupied mobile homes	9,534	9,859	10,332
	Population in mobile home	22,939	23,727	24,865
	Hotel/motel units	5,990	5,990	6,000
Liberty	Occupied site-built homes	1,590	1,760	1,866
	Population in site-built homes	3,428	3,794	4,024
	Occupied mobile homes	935	1,034	1,096
	Population in mobile home	3,055	3,381	3,584
	Hotel/motel units	12	12	12
Wakulla	Occupied site-built homes	6,769	7,057	7,663
	Population in site-built homes	17,997	18,763	20,375
	Occupied mobile homes	3,721	3,879	4,212
	Population in mobile home	9,351	9,747	10,584
	Hotel/motel units	205	205	205

Source: Apalachee Regional Planning Council

- Planned Roadway Improvements** - The base 2010 network and two future year networks to correspond to the 2015 demographic data and the 2020 demographic data was developed. The 2010 base model network was updated to reflect roadway capacity improvement projects completed between 2011 and 2015 to create the 2015 network. The 2015 network was then updated to reflect planned roadway capacity improvement projects expected to be implemented between 2016 and 2020 to create the 2020 network.

Table ES-2 identifies capacity improvement projects completed between 2011 and 2015 that were included in the 2015 network. Likewise, Table ES-3 identifies capacity improvement projects planned for implementation between 2016 and 2020. The tables identify each roadway that will be improved as well as the extent of the improvement.

It is important to note that Tables ES-2 and ES-3 are not intended to be all inclusive of every transportation improvement project completed within the region. The tables only identify key capacity improvement projects that impact the evacuation model network and are anticipated to have an impact on evacuation clearance times.

Table ES-2 – Apalachee Region Roadway Improvements, 2011 – 2015

County	Roadway	From	To	Number of Lanes
Leon	Gaines St	Monroe St	Bradford Rd	2
	Franklin Blvd	Lafayette St	Tennessee St	2
	Capital Circle NW	I-10	Blountstown Hwy	6
	Mahan Dr/US Hwy 90	Dempsey Mayo Rd	I-10	4

Sources: FDOT SIS First Five Year Plan, FDOT SIS Second Five Year Plan, Apalachee Regional Planning Council

Note: Projects included in this table are roadway improvement projects completed between 2011 and 2015 on roadways that are included in the regional transportation model network. Only projects which added roadway capacity, such as additional through lanes, were included. The list is not intended to be all inclusive of every transportation improvement project completed within the region. A list of historical projects completed during the last five years was included in this report because the base regional network developed for the study, along with the base demographic data, is for the year 2010.

Table ES-3 – Apalachee Region Planned Roadway Improvements, 2016–2020

County	Roadway	From	To	Number of Lanes
Leon	Capital Circle SW	Crawfordville Rd	Blountstown Hwy	6
	Woodville Hwy	Capital Circle	Gaile Ave	4
	FAMU Way	Wahnish Way	Lake Bradford Rd	2
Wakulla	Crawfordville Hwy	East Ivan Rd	Leon County Line	4

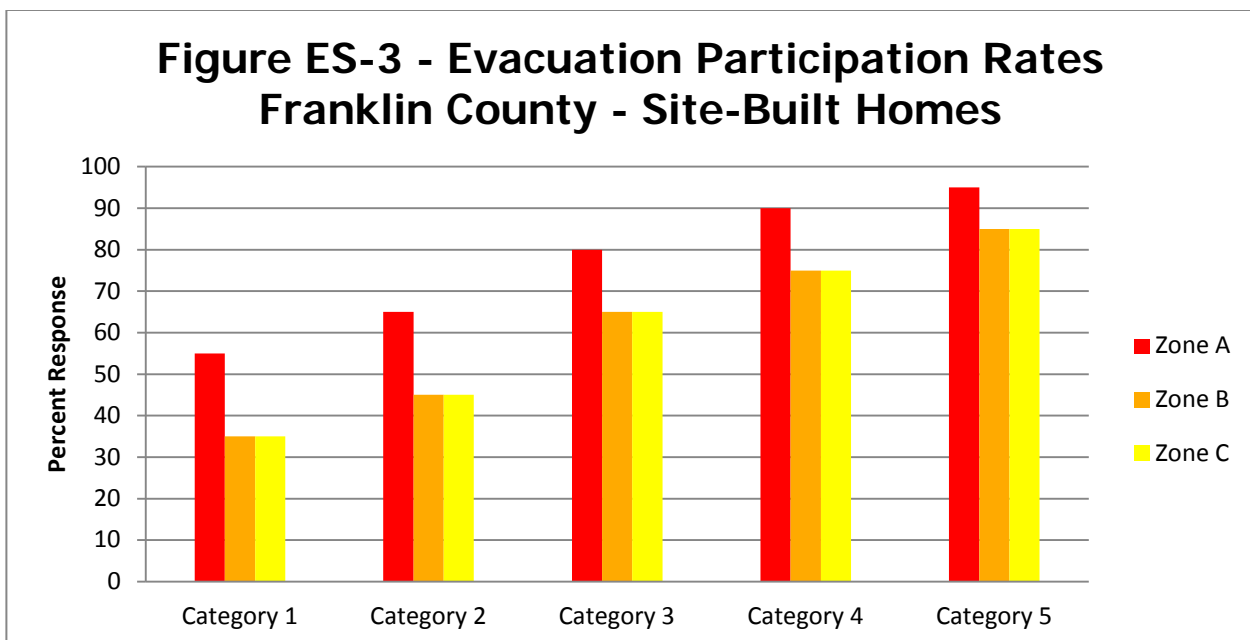
Sources: FDOT SIS First Five Year Plan, FDOT SIS Second Five Year Plan, Apalachee Regional Planning Council

Note: Projects included in this table are roadway improvement projects planned for completion between 2016 and 2020 on roadways that are included in the regional transportation model network. Only projects which are planned to add roadway capacity, such as additional through lanes, were included. The list is not intended to be all inclusive of every transportation improvement project planned for completion within the region.

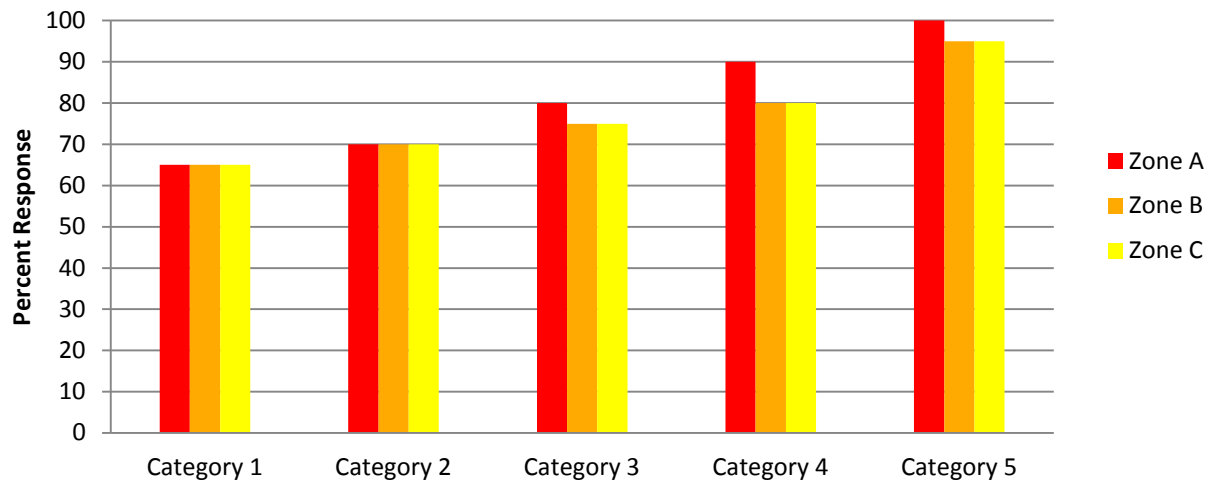
- **Behavioral Assumptions** – For the Apalachee region, evacuation rates for site-built homes and mobile/manufactured homes are provided by county and summarized in Figures ES-3 through ES-12. Other rates, such as out of county trip rates, vehicle use rates, public shelter use rates, friend/relative refuge use rates, hotel/motel refuge use rates, and other refuge use rates, are detailed by county, storm threat and evacuation zone in Volume 5-2.

Please note that the original behavioral response rates provided by SRESP in Volume 2-2 were modified to fit the evacuation zones created by each of the counties. The original rates were based on a five zone system; however, the evacuation zones for the Apalachee region range from two to four zones depending upon the county. The evacuation zone systems for the Apalachee region are listed below:

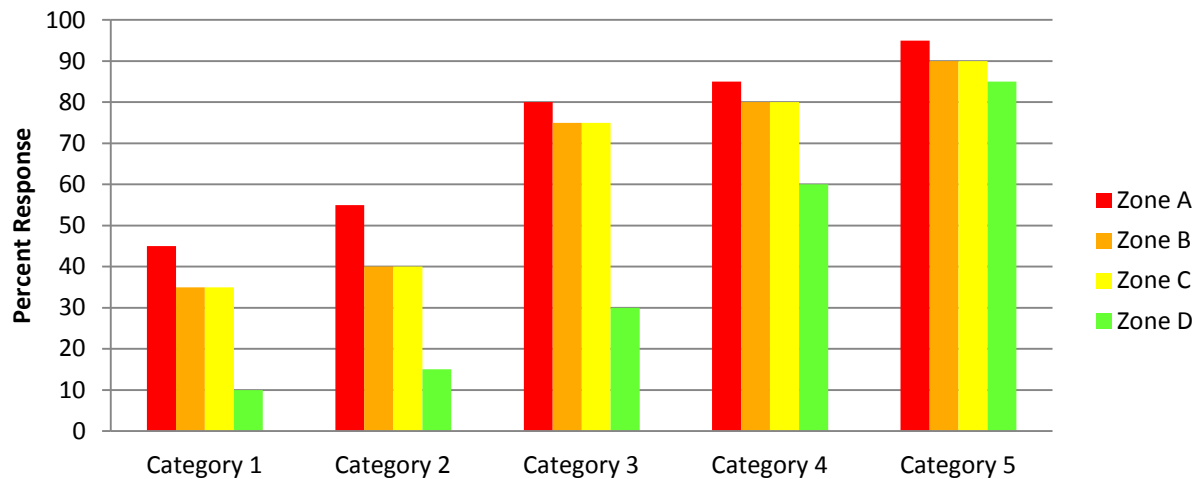
- Gulf – 4 zones: Zone A, Zone B, Zone C, Zone D;
- Franklin – 2 zones: Zone A, Zone B;
- Jefferson – 4 zones: Zone A, Zone B, Zone C, Zone D;
- Leon – 2 zones: Zone C, Zone D;
- Wakulla – 3 zones: Zone A, Zone B, Zone C.



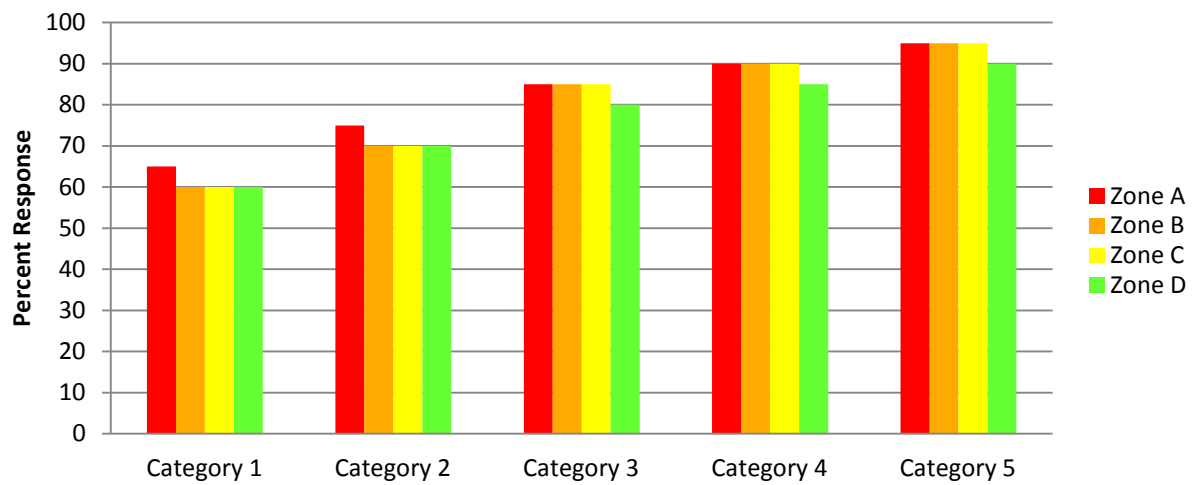
**Figure ES-4 - Evacuation Participation Rates
Franklin County - Mobile Homes**



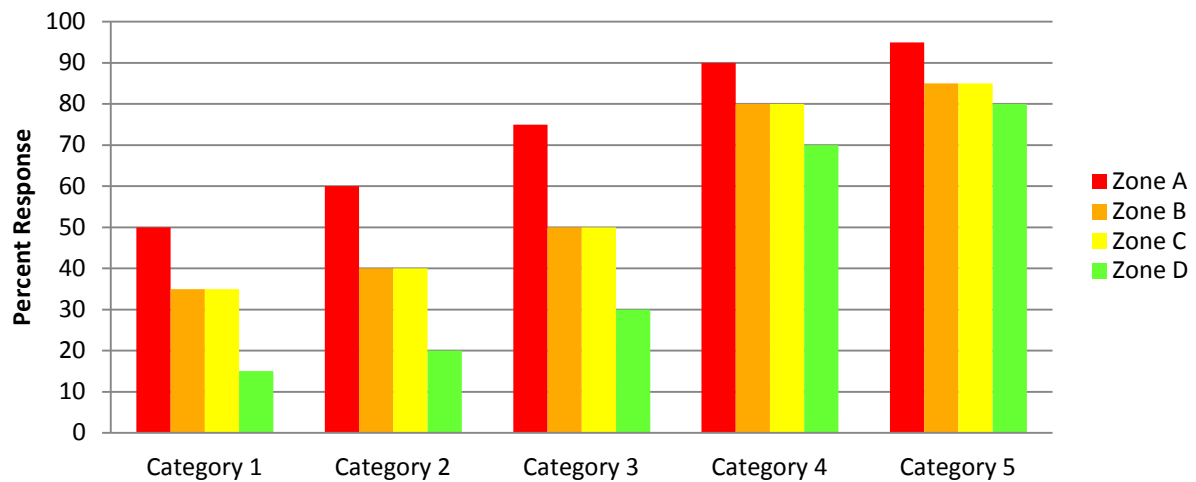
**Figure ES-5 - Evacuation Participation Rates
Gulf County - Site-Built Homes**



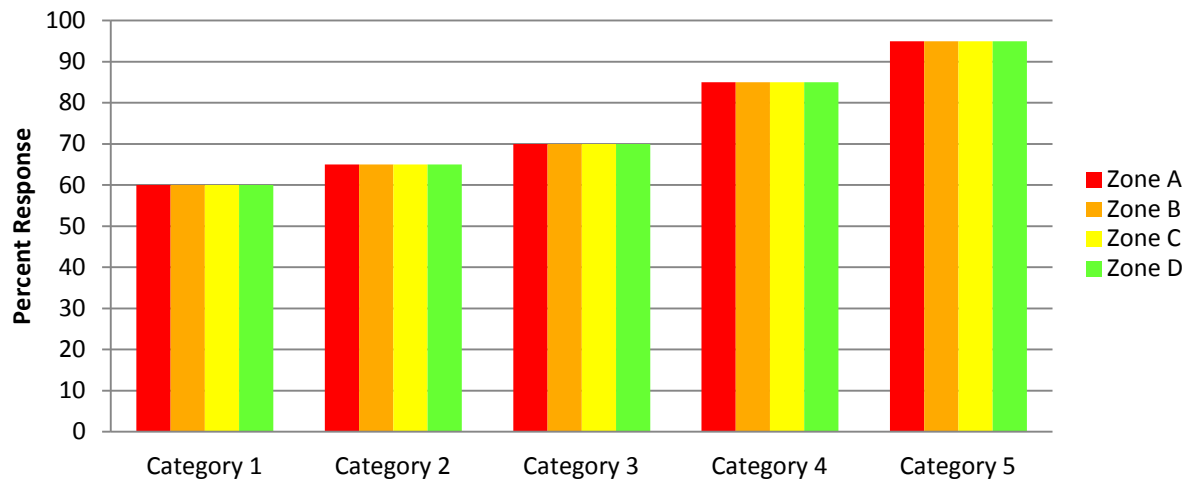
**Figure ES-6 - Evacuation Participation Rates
Gulf County - Mobile Homes**



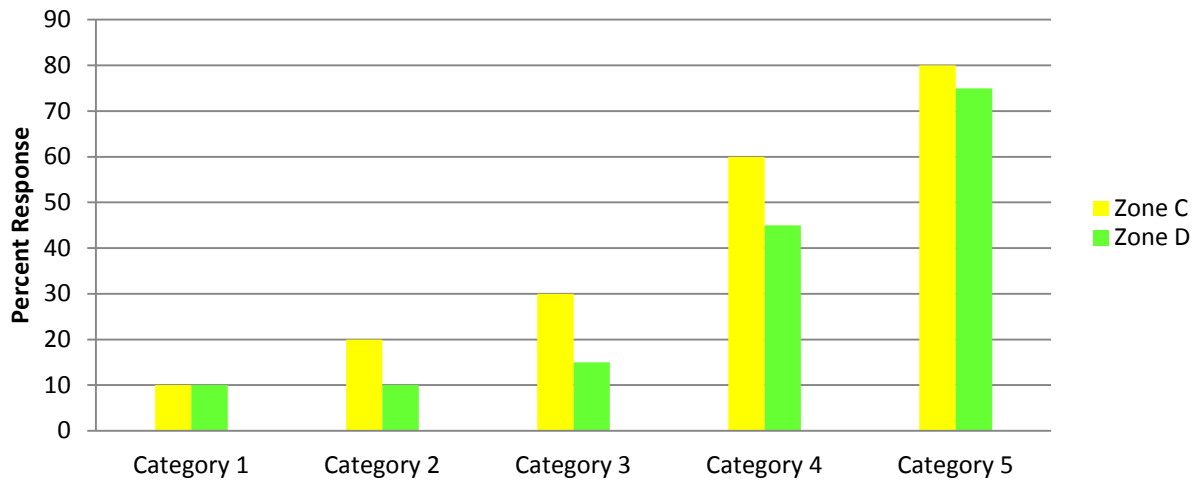
**Figure ES-7 - Evacuation Participation Rates
Jefferson County - Site-Built Homes**



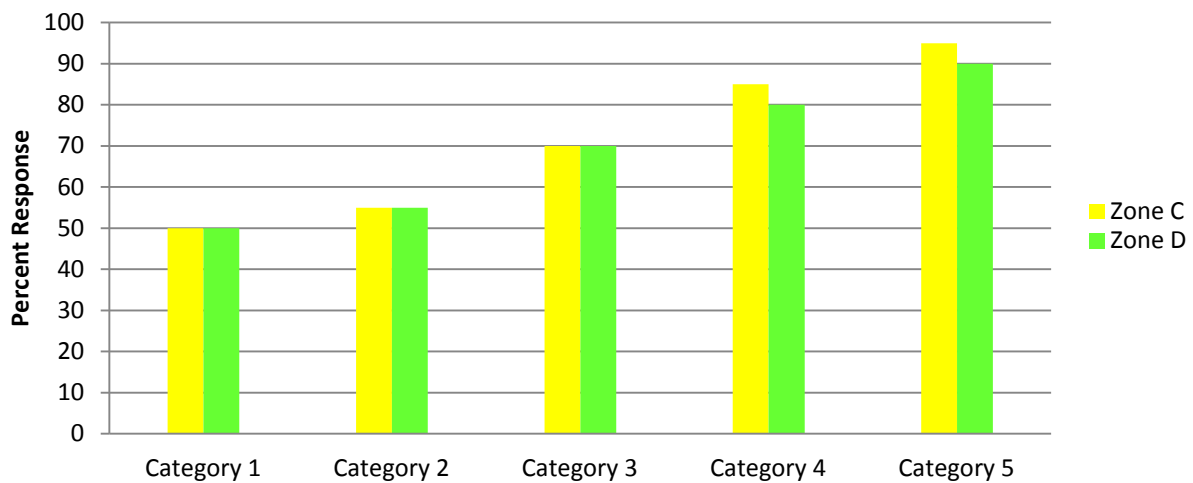
**Figure ES-8 - Evacuation Participation Rates
Jefferson County - Mobile Homes**



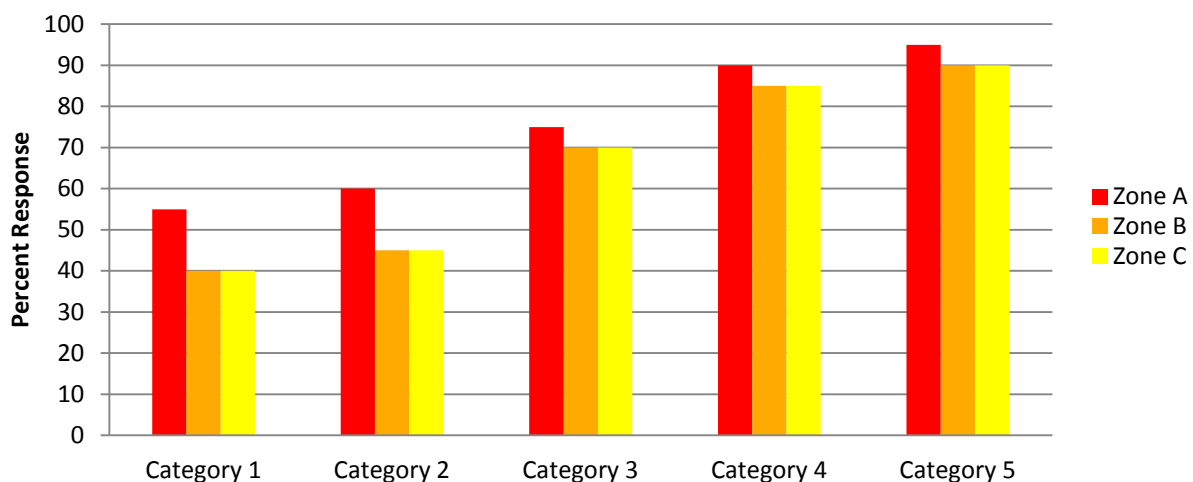
**Figure ES-9 - Evacuation Participation Rates
Leon County - Site-Built Homes**

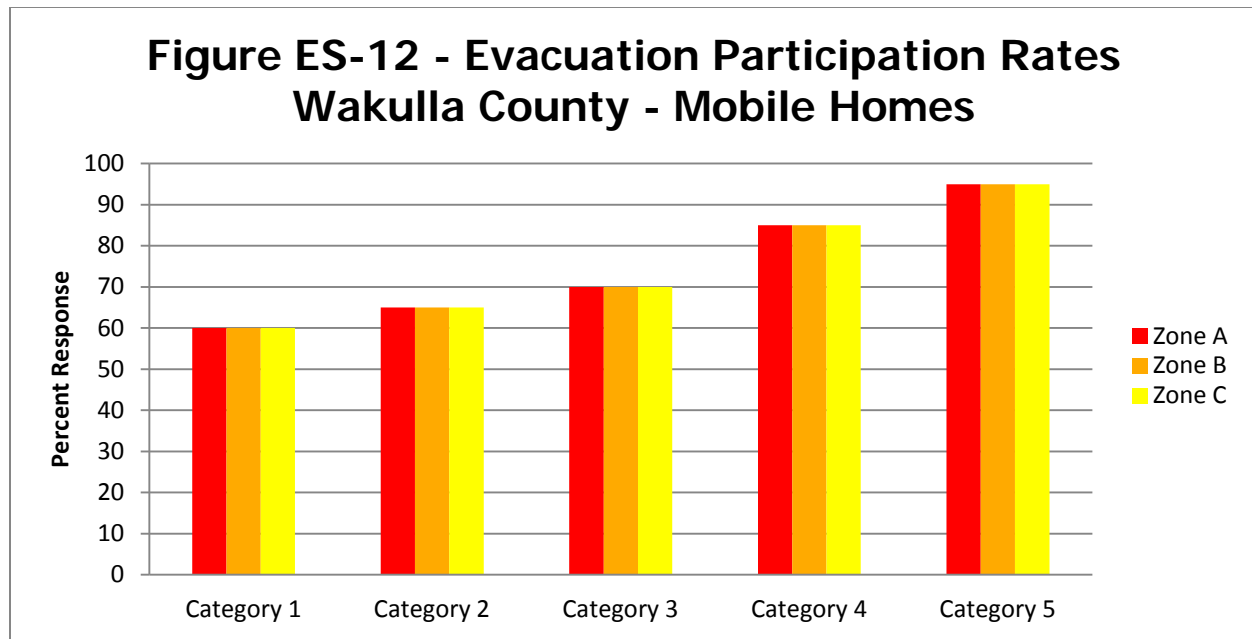


**Figure ES-10 - Evacuation Participation Rates
Leon County - Mobile Homes**



**Figure ES-11 - Evacuation Participation Rates
Wakulla County - Site-Built Homes**





- Shelters** - In order for the transportation model to accurately assign public shelter trips to the correct location, a complete list of available public shelters needs to be available. The Apalachee region compiled the list of available primary shelters using information provided by the local county emergency managers. In the nine county Apalachee region, there is a total of 27 primary shelters as listed below:

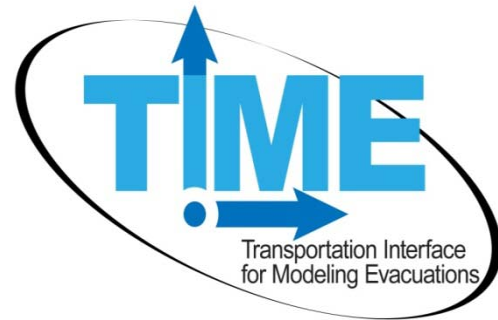
- | | |
|----------------|-----------------|
| • Calhoun – 1 | • Jefferson – 1 |
| • Franklin – 0 | • Leon – 15 |
| • Gadsden – 2 | • Liberty – 1 |
| • Gulf – 2 | • Wakulla – 2 |
| • Jackson – 3 | |

These shelters have the capacity to host more than 38,000 evacuees during an emergency event. Detailed lists of the available public shelters by county are included in Volume 5-2.

- Evacuation Zones** - The final input variable that is needed to complete the transportation evacuation model is the delineation of evacuation zones for all coastal counties. Local county emergency managers have the responsibility of identifying and defining evacuation zones for their county. Within the Apalachee region five counties, Franklin, Gulf, Jefferson, Leon and Wakulla, have updated evacuation zones based on the results of the new data and information collected as part of the SRESP update in 2014. Evacuation zones for the Apalachee region and county level evacuation zone maps are included in Chapter III.

F. TIME User Interface

CDM Smith 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.

G. Vulnerable Population

Using a combination of the demographic data, behavioral assumptions, and evacuation zones, the vulnerable population in each county could be determined by evacuation level. For the purposes of the transportation analysis, the vulnerable population, or population-at-risk, is defined as the total population living within the county designated evacuation zones for each evacuation level. This population is living in an area that is at risk for severe flooding during a storm event. The vulnerable population for the Apalachee region for 2015 is identified in Table ES-4, summarized by evacuation zone and split between site-built homes and mobile/manufactured homes. Vulnerable population for 2020 is summarized in Table ES-5.

Table ES-4 – Vulnerable Population in the Apalachee Region for 2015

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Total
Franklin County					
Site-built Homes	3,699	3,857	N/A		
Mobile/Manuf. Homes	929	1,431	N/A		
TOTAL	4,628	5,288	N/A		9,916
Gulf County					
Site-built Homes	1,818	3,228	2,240	189	
Mobile/Manuf. Homes	201	263	1,224	84	
TOTAL	2,019	3,491	3,464	274	9,248
Jefferson County					
Site-built Homes	104	65	150	265	
Mobile/Manuf. Homes	116	72	166	278	
TOTAL	220	137	316	543	1,216
Leon County					
Site-built Homes	N/A		2,772	2,408	
Mobile/Manuf. Homes	N/A		2,981	1,831	
TOTAL	N/A		5,753	4,241	9,994
Wakulla County					
Site-built Homes	5,934	2,653	6,835	N/A	
Mobile/Manuf. Homes	1,645	834	5,306	N/A	
TOTAL	7,578	3,486	12,141	N/A	23,205

Note: Vulnerable population was determined using SRESP small area data and county provided evacuation zones. Vulnerable population numbers are not inclusive, for example, vulnerable population listed for Evacuation Zone B does not include vulnerable population listed for Evacuation Zone A. Refer to the Evacuation Zone map in Chapter III.

Table ES-5 – Vulnerable Population in the Apalachee Region for 2020

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Total
Franklin County					
Site-built Homes	3,700	3,859	N/A		
Mobile/Manuf. Homes	929	1,431	N/A		
TOTAL	4,629	5,290	N/A		9,919
Gulf County					
Site-built Homes	1,833	3,254	2,261	191	
Mobile/Manuf. Homes	202	264	1,232	84	
TOTAL	2,035	3,518	3,493	275	9,321
Jefferson County					
Site-built Homes	108	67	155	274	
Mobile/Manuf. Homes	120	75	172	288	
TOTAL	228	142	327	562	1,259
Leon County					
Site-built Homes	N/A		2,907	2,524	
Mobile/Manuf. Homes	N/A		3,122	1,921	
TOTAL	N/A		6,029	4,445	10,474
Wakulla County					
Site-built Homes	6,444	2,880	7,420	N/A	
Mobile/Manuf. Homes	1,785	905	5,765	N/A	
TOTAL	8,229	3,785	13,185	N/A	25,199

Note: Vulnerable population was determined using SRESP small area data and county provided evacuation zones. Vulnerable population numbers are not inclusive, for example, vulnerable population listed for Evacuation Zone B does not include vulnerable population listed for Evacuation Zone A. Refer to the Evacuation Zone map in Chapter III.

In addition, based on the demographic data, behavioral assumptions, and evacuation zones, the planned destinations of vulnerable population in each county can be determined by evacuation zones. Destinations include friends and family, hotel/motel, public shelter, and other locations. Vulnerable population destinations for the Apalachee region are identified in Table ES-6 for 2015 and in Table ES-7 for 2020.

Table ES-6 – Vulnerable Population by Destination for 2015

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Total
Franklin County					
To Friends and Family	2,407	2,787	N/A		
To Hotel/Motel	1,110	1,251	N/A		
To Public Shelter	148	308	N/A		
To Other Destinations	962	943	N/A		
Total	4,627	5,279			9,906
Gulf County					
To Friends and Family	1,151	1,972	2,150	167	
To Hotel/Motel	475	833	682	56	
To Public Shelter	107	182	210	22	
To Other Destinations	287	503	422	29	
Total	2,022	3,490	3,464	274	9,250
Jefferson County					
To Friends and Family	143	89	206	353	
To Hotel/Motel	22	14	32	54	
To Public Shelter	28	17	40	68	
To Other Destinations	27	17	39	68	
Total	220	137	317	543	1,217
Leon County					
To Friends and Family	N/A		3,601	2,636	
To Hotel/Motel	N/A		853	665	
To Public Shelter	N/A		437	304	
To Other Destinations	N/A		863	636	
Total			5,754	4,241	9,995
Wakulla County					
To Friends and Family	4,926	2,266	7,892	N/A	
To Hotel/Motel	1,055	481	1,556	N/A	
To Public Shelter	379	174	607	N/A	
To Other Destinations	1,219	565	2,086	N/A	
Total	7,579	3,486	12,141		23,206

Note: Vulnerable population was determined using SRESP small area data and county provided evacuation zones. Vulnerable population numbers are not inclusive, for example, vulnerable population listed for Evacuation Zone B does not include vulnerable population listed for Evacuation Zone A. Refer to the Evacuation Zone map in Chapter III.

Table ES-7 – Vulnerable Population by Destination for 2020

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Total
Franklin County					
To Friends and Family	2,407	2,788	N/A		
To Hotel/Motel	1,111	1,251	N/A		
To Public Shelter	148	308	N/A		
To Other Destinations	962	943	N/A		
Total	4,628	5,2790			9,918
Gulf County					
To Friends and Family	1,160	1,988	2,167	169	
To Hotel/Motel	478	840	688	56	
To Public Shelter	107	182	210	22	
To Other Destinations	289	507	425	29	
Total	2,034	3,517	3,490	276	9,317
Jefferson County					
To Friends and Family	147	92	213	365	
To Hotel/Motel	23	14	33	56	
To Public Shelter	28	17	40	68	
To Other Destinations	28	18	40	70	
Total	226	141	326	559	1,252
Leon County					
To Friends and Family	N/A		3,773	2,763	
To Hotel/Motel	N/A		894	697	
To Public Shelter	N/A		458	318	
To Other Destinations	N/A		904	667	
Total			6,029	4,445	10,474
Wakulla County					
To Friends and Family	5,349	2,460	8,570	N/A	
To Hotel/Motel	1,145	523	1,689	N/A	
To Public Shelter	379	174	607	N/A	
To Other Destinations	1,324	613	2,266	N/A	
Total	8,197	3,770	13,132		25,099

Note: Vulnerable population was determined using SRESP small area data and county provided evacuation zones. Vulnerable population numbers are not inclusive, for example, vulnerable population listed for Evacuation Zone B does not include vulnerable population listed for Evacuation Zone A. Refer to the Evacuation Zone map in Chapter III.

The vulnerable shadow population is provided in Table ES-8 for both 2015 and 2020. The vulnerable shadow population was determined using the behavioral assumptions for evacuating shadow population and is based on storm category not evacuation zone.

Table ES-8 – Vulnerable Shadow Evacuation Population

	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane	Category 4 Hurricane	Category 5 Hurricane
2015					
Calhoun County	4,901	5,327	6,178	6,603	7,029
Franklin County	3,138	808	797	804	810
Gadsden County	17,127	18,696	20,265	21,834	23,403
Gulf County	5,190	4,075	2,208	2,235	2,318
Jackson County	12,682	14,223	17,303	18,844	20,384
Jefferson County	5,864	6,153	6,316	6,375	6,738
Leon County	36,166	48,561	75,881	85,484	97,637
Liberty County	3,574	3,779	4,163	4,363	4,576
Wakulla County	12,173	10,625	2,616	2,783	2,951
Total	100,815	112,247	135,727	150,325	165,846
2020					
Calhoun County	5,109	5,553	6,441	6,886	7,330
Franklin County	3,136	806	795	802	808
Gadsden County	17,440	19,038	20,636	22,235	23,833
Gulf County	5,230	4,104	2,222	2,246	2,329
Jackson County	12,725	14,271	17,364	18,910	20,456
Jefferson County	6,076	6,374	6,542	6,599	6,974
Leon County	37,870	50,847	79,457	89,508	102,234
Liberty County	3,798	4,016	4,424	4,637	4,863
Wakulla County	13,211	11,531	2,814	2,996	3,177
Total	104,595	116,540	140,695	154,819	172,004

Note: Vulnerable shadow population determined using SRESP behavioral data and county provided evacuation zones. Vulnerable population numbers used for this table are inclusive, meaning population numbers listed for a higher category of storm are included in the lower category. For example, vulnerable population listed for Category 2 does include vulnerable population listed for Category 1. The resulting numbers are then subtracted from the evacuating population as reported in the modeling results to provide the vulnerable shadow evacuation population amount by county, per category of storm.

H. Evacuation Model Scenarios

For the purposes of this analysis, two distinct sets of analyses were conducted using the SRESP evacuation transportation model, including one set of analysis for growth management purposes and one set of analysis for emergency management purposes. The two sets of analysis include the following:

- **Base Scenarios** – The base scenarios were developed to estimate a series of worst case scenarios and are identical for all eleven RPCs across the State. These scenarios assume 100 percent of the vulnerable population evacuates and includes impacts from counties outside of the RPC area. The base scenarios for the Apalachee region are identified in Table ES-9; and,
- **Operational Scenarios** – The operational scenarios were developed by the RPCs in coordination with local county emergency managers and are designed to provide important information to emergency management personnel to plan for different storm events. The operational scenarios for the Apalachee region are identified in Table ES-10.

Because of the numerous possible combinations of variables that can be applied in the model, the evacuation transportation model is available for use through the ARPC to continue testing combinations of options and provide additional information to emergency managers.

Table ES-9 – Base Scenarios

	Category 1 Scenario 1 2015	Category 2 Scenario 2 2015	Category 3 Scenario 3 2015	Category 4 Scenario 4 2015	Category 5 Scenario 5 2015
Demographic Data	2015	2015	2015	2015	2015
Highway Network	2015	2015	2015	2015	2015
One-Way Operations	None	None	None	None	None
University Population	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring
Tourist Rate	Default	Default	Default	Default	Default
Shelters Open	Primary	Primary	Primary	Primary	Primary
Response Curve	12-hour	12-hour	12-hour	12-hour	12-hour
Evacuation Phasing	None	None	None	None	None
Behavioral Response	100%	100%	100%	100%	100%
Counties Evacuating	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla
	Category 1 Scenario 6 2020	Category 2 Scenario 7 2020	Category 3 Scenario 8 2020	Category 4 Scenario 9 2020	Category 5 Scenario 10 2020
Demographic Data	2020	2020	2020	2020	2020
Highway Network	2020	2020	2020	2020	2020
One-Way Operations	None	None	None	None	None
University Population	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring
Tourist Rate	Default	Default	Default	Default	Default
Shelters Open	Primary	Primary	Primary	Primary	Primary
Response Curve	12-hour	12-hour	12-hour	12-hour	12-hour
Evacuation Phasing	None	None	None	None	None
Behavioral Response	100%	100%	100%	100%	100%
Counties Evacuating	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla

Table ES-10 – Operational Scenarios

	Scenario 1 2015	Scenario 2 2015	Scenario 3 2015	Scenario 4 2015	Scenario 5 2015
Demographic Data	2015	2015	2015	2015	2015
Highway Network	2015	2015	2015	2015	2015
One-Way Operations	None	None	I-10	None	None
University Population	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring
Tourist Rate	Default	Default	Default	Default	Default
Shelters Open	Primary	Primary	Primary	Primary	Primary
Response Curve	18-hour	18-hour	12-hour	12-hour	12-hour
Evacuation Phasing	None	None	None	None	None
Behavioral Response	Planning	Planning	Planning	Planning	Planning
Evacuation Zone	A	B	B and C	B - D	D
Counties Evacuating	Bay Franklin Gulf Taylor Wakulla Shadow – Calhoun Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty
	Scenario 6 2020	Scenario 7 2020	Scenario 8 2020	Scenario 9 2020	Scenario 10 2020
Demographic Data	2020	2020	2020	2020	2020
Highway Network	2020	2020	2020	2020	2020
One-Way Operations	None	None	None	None	I-10
University Population	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring
Tourist Rate	Default	Default	Default	Default	Default
Shelters Open	Primary	Primary	Primary	Primary	Primary
Response Curve	18-hour	18-hour	12-hour	12-hour	12-hour
Evacuation Phasing	None	None	None	None	None
Behavioral Response	Planning	Planning	Planning	Planning	Planning
Evacuation Zone	A	B	B and C	B - D	D
Counties Evacuating	Bay Franklin Gulf Taylor Wakulla	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty

I. Clearance Time Results

Each of the ten base scenarios and ten operational scenarios were modeled for the Apalachee region using the regional evacuation model. Results were derived from the model to summarize the evacuating population, evacuating vehicles, clearance times, and critical congested roadways. Detailed results are discussed in Chapter IV. Clearance times are presented in this executive summary since the determination of clearance time is one of the most important outcomes from the evacuation transportation analysis.

Calculated clearance times are used by county emergency managers as one input to determine when to recommend an evacuation order. This calculation can include the population-at-risk, shadow evacuees, as well as evacuees from other counties anticipated to pass through the county. Clearance time is developed to include the time required for evacuees to secure their homes and prepare to leave, the time spent by all vehicles traveling along the evacuation route network, and the additional time spent on the road caused by traffic and road congestion. Clearance time does not relate to the time any one vehicle spends traveling along the evacuation route network, nor does it guarantee vehicles will safely reach their destination once outside the County. The four clearance times that are calculated as part of the evacuation transportation analysis include: 1) Clearance Time to Shelter, 2) In-County Clearance Time, 3) Out of County Clearance Time, and 4) Regional Clearance Time. Definitions for these clearance times are found in Chapter IV of this volume.

Clearance times for each of the base scenarios are summarized in Table ES-11 and ES-12, while clearance times for each of the operational scenarios are summarized in Table ES-13 and Table ES-14.

Table ES-11 – Clearance Times for Base Scenario 2015

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Clearance Time to Shelter					
Calhoun County	12.5	12.5	12.5	12.5	13.0
Franklin County	8.5	8.5	8.5	8.5	8.5
Gadsden County	13.0	13.0	13.5	13.5	14.0
Gulf County	12.5	12.5	12.5	12.5	12.5
Jackson County	12.5	12.5	12.5	12.5	12.5
Jefferson County	12.5	12.5	12.5	12.5	12.5
Leon County	12.5	12.5	13.5	13.5	13.5
Liberty County	12.5	12.5	12.5	12.5	13.0
Wakulla County	13.0	13.0	13.0	13.0	13.0
In-County Clearance Time					
Calhoun County	13.0	13.0	13.0	13.0	13.5
Franklin County	13.0	13.0	13.0	13.5	13.5
Gadsden County	13.5	13.5	14.0	14.0	14.5
Gulf County	13.0	13.0	13.0	13.0	13.0
Jackson County	13.0	13.0	13.0	13.0	13.0
Jefferson County	14.0	14.0	14.0	15.5	16.5
Leon County	13.0	13.0	14.0	14.0	16.0
Liberty County	13.0	12.5	12.5	12.5	13.0
Wakulla County	13.5	14.0	14.0	15.0	15.5
Out of County Clearance Time					
Calhoun County	14.0	14.0	14.0	14.0	14.0
Franklin County	13.0	13.0	13.0	13.5	13.5
Gadsden County	14.5	14.5	14.5	15.5	16.0
Gulf County	13.0	13.0	13.0	13.0	13.5
Jackson County	15.0	15.0	15.0	15.0	15.0
Jefferson County	15.0	15.0	15.0	16.0	16.5
Leon County	14.5	14.5	15.0	15.5	16.5
Liberty County	14.0	14.0	14.0	14.5	15.0
Wakulla County	14.0	14.0	14.0	15.0	15.5
Regional Clearance Time					
Apalachee	15.0	15.0	15.0	16.0	16.5

Table ES-12 – Clearance Times for Base Scenario 2020

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Clearance Time to Shelter					
Calhoun County	12.5	12.5	12.5	13.0	13.5
Franklin County	8.5	8.5	8.5	8.5	8.5
Gadsden County	12.5	13.0	13.0	13.5	14.0
Gulf County	12.5	12.5	12.5	12.5	12.5
Jackson County	12.5	12.5	12.5	12.5	12.5
Jefferson County	12.5	12.5	12.5	12.5	12.5
Leon County	12.5	13.0	13.0	13.5	13.5
Liberty County	12.5	12.5	13.0	13.0	13.0
Wakulla County	13.0	13.0	13.0	13.0	13.0
In-County Clearance Time					
Calhoun County	13.0	13.0	13.0	13.5	14.0
Franklin County	13.0	13.0	13.0	13.5	13.5
Gadsden County	13.0	13.5	13.5	14.0	14.5
Gulf County	13.0	13.0	13.0	13.0	13.0
Jackson County	13.0	13.0	13.0	13.0	13.0
Jefferson County	14.0	14.0	14.0	15.0	17.0
Leon County	13.0	13.5	14.0	14.0	16.5
Liberty County	13.0	13.0	13.0	13.0	13.0
Wakulla County	14.0	14.0	14.0	15.0	16.0
Out of County Clearance Time					
Calhoun County	14.0	14.0	14.0	14.5	14.0
Franklin County	13.0	13.0	13.0	13.5	13.5
Gadsden County	14.5	14.5	15.0	15.5	16.5
Gulf County	13.0	13.5	13.5	13.5	13.5
Jackson County	14.5	14.5	14.5	14.5	14.5
Jefferson County	15.0	15.0	15.5	16.0	17.0
Leon County	14.5	14.5	15.0	16.0	16.5
Liberty County	14.0	14.0	14.0	14.5	15.5
Wakulla County	14.0	14.0	14.0	15.0	16.0
Regional Clearance Time					
Apalachee	15.0	15.0	15.5	16.0	17.0

Table ES-13 – 2015 Clearance Times for Operational Scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Clearance Time to Shelter					
Calhoun County	18.5	18.5	18.5	18.5	18.5
Franklin County	4.5	4.5	4.5	4.5	4.5
Gadsden County	0.0	18.5	18.5	18.5	18.5
Gulf County	18.5	18.5	18.5	18.5	18.5
Jackson County	0.0	18.5	18.5	18.5	18.5
Jefferson County	18.5	18.5	18.5	18.5	18.5
Leon County	18.5	18.5	18.5	18.5	18.5
Liberty County	18.5	18.5	18.5	18.5	18.5
Wakulla County	18.5	18.5	18.5	18.5	18.5
In-County Clearance Time					
Calhoun County	19.0	19.0	19.0	19.0	19.0
Franklin County	19.0	19.0	19.0	19.0	19.0
Gadsden County	0.0	19.0	19.0	19.0	19.0
Gulf County	19.0	18.5	18.5	19.0	19.0
Jackson County	0.0	19.0	19.0	19.0	19.0
Jefferson County	20.0	20.0	20.0	21.0	21.0
Leon County	19.0	20.0	20.0	20.5	20.5
Liberty County	19.0	18.5	18.5	18.5	18.5
Wakulla County	20.0	20.0	20.0	20.0	20.0
Out of County Clearance Time					
Calhoun County	20.0	19.5	19.5	20.0	20.0
Franklin County	19.0	19.0	19.0	19.0	19.0
Gadsden County	20.5	20.5	20.5	20.5	20.5
Gulf County	19.0	19.0	19.0	19.5	19.5
Jackson County	20.5	20.5	20.5	21.0	21.0
Jefferson County	20.5	21.0	21.0	21.0	21.0
Leon County	20.5	20.5	20.5	20.5	20.5
Liberty County	19.5	20.0	20.0	20.0	20.0
Wakulla County	20.0	20.0	20.0	20.0	20.0
Regional Clearance Time					
Apalachee	20.5	21.0	21.0	21.0	21.0

Table ES-14 – 2020 Clearance Times for Operational Scenarios

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Clearance Time to Shelter					
Calhoun County	18.5	18.5	18.5	18.5	18.5
Franklin County	4.5	4.5	4.5	4.5	4.5
Gadsden County	0.0	18.5	18.5	18.5	18.5
Gulf County	18.5	18.5	18.5	18.5	18.5
Jackson County	0.0	18.5	18.5	18.5	18.5
Jefferson County	18.5	18.5	18.5	18.5	18.5
Leon County	18.5	18.5	18.5	18.5	18.5
Liberty County	18.5	18.5	18.5	18.5	18.5
Wakulla County	18.5	18.5	18.5	18.5	18.5
In-County Clearance Time					
Calhoun County	19.0	19.0	19.0	19.0	19.0
Franklin County	19.0	19.0	19.0	19.0	19.0
Gadsden County	0.0	19.0	19.0	19.0	19.0
Gulf County	19.0	18.5	18.5	19.0	19.0
Jackson County	0.0	19.0	19.0	19.0	19.0
Jefferson County	20.0	20.0	20.0	21.0	21.0
Leon County	19.0	20.0	20.0	20.5	20.5
Liberty County	19.0	18.5	18.5	18.5	18.5
Wakulla County	20.0	20.0	20.0	20.0	19.5
Out of County Clearance Time					
Calhoun County	20.0	21.5	19.5	20.0	20.0
Franklin County	19.0	19.0	19.0	19.0	19.0
Gadsden County	20.5	20.0	20.5	20.5	20.5
Gulf County	19.0	19.0	19.0	19.0	19.0
Jackson County	20.5	20.5	20.5	20.5	21.0
Jefferson County	20.5	21.0	21.0	21.0	21.0
Leon County	20.5	20.5	20.5	20.5	20.5
Liberty County	20.0	21.0	20.0	20.0	20.0
Wakulla County	20.0	20.0	20.0	20.0	19.5
Regional Clearance Time					
Apalachee	20.5	21.5	21.0	21.0	21.0

Clearance times reported for all scenarios reflect impacts from changes in population from the 2000 and 2010 U.S. Census. The 2010 SRESP study used 2000 U.S. Census data for its base and forecasts using characteristics from American Community Survey for 2006, 2010, and 2015. For this update, data from the 2010 U.S. Census was used. There was not a significant enough change in the population to greatly impact clearance times.

Base Scenarios

In-county clearance times for the base scenarios range from 12.5 to 16.5 hours depending on the scenario. The Clearance Time to Shelter shows a similar pattern, with clearance times for ranging from 8.5 to 14 hours depending on the scenario. In 2020, the projection for in-county and out of county clearance times are identical, between 13 and 17 hours depending on the scenario. Regional clearance times range from 15 hours to 16.5 hours in 2015 and from 15 to 17 hours in 2020.

Operational Scenarios

In-county clearance times for the operational scenarios range from 18.5 to 20 hours depending on the scenario. The clearance time to shelter varies greatly with Franklin County having a 4.5 clearance time while most other counties have a 18.5 clearance time. The regional clearance times range is consistent between 2015 and 2020 at 21 hours. Clearance times for the operational scenarios are higher than the base scenarios because they were run using an 18-hour response curve.

J. Maximum Evacuating Population Clearances

From an emergency management standpoint, it is important to get an understanding of the maximum proportion of the evacuating population that can be expected to evacuate at various time intervals during an evacuation. Using the base scenarios, which assume 100% of the vulnerable population is evacuating, along with shadow evacuations and evacuations from adjacent counties, an estimate was made of the evacuating population actually able to evacuate out of each county by the time intervals of 12, 18, 24, and 36 hours. The estimated maximum evacuating population by time interval for 2015 is identified in Table ES-15 and for 2020 in Table ES-16.

It is important to note that these estimates take into account many variables, including roadway capacity, in-county evacuating trips, out of county evacuating trips, evacuating trips from other counties, and background traffic that is impeding the evacuation trips. For this reason, the maximum evacuation population by time interval will vary slightly between evacuation level and either increase or decrease from one evacuation level to the next.

Table ES-15 – Maximum Evacuating Population by Time Interval for 2015

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Estimated Evacuating Population Clearing Calhou County					
12-Hour	4,201	4,566	5,295	5,660	6,025
18-Hour	4,901	5,327	6,178	6,603	7,029
Estimated Evacuating Population Clearing Franklin County					
12-Hour	7,168	9,870	9,889	9,529	9,534
18-Hour	7,765	10,692	10,713	10,720	10,726
Estimated Evacuating Population Clearing Gadsden County					
12-Hour	14,174	15,473	16,771	16,904	17,552
18-Hour	17,127	18,696	20,265	21,834	23,403
Estimated Evacuating Population Clearing Gulf County					
12-Hour	6,654	8,848	10,322	10,599	10,280
18-Hour	7,209	9,585	11,182	11,482	11,565
Estimated Evacuating Population Clearing Jackson County					
12-Hour	10,146	11,378	13,842	15,075	16,307
18-Hour	12,682	14,223	17,303	18,844	20,384
Estimated Evacuating Population Clearing Jefferson County					
12-Hour	4,867	5,208	5,592	5,694	5,785
18-Hour	6,084	6,510	6,990	7,592	7,955
Estimated Evacuating Population Clearing Leon County					
12-Hour	29,930	40,188	60,705	69,465	74,093
18-Hour	36,166	48,561	75,881	89,725	101,878
Estimated Evacuating Population Clearing Liberty County					
12-Hour	3,063	3,239	3,568	3,611	3,661
18-Hour	3,574	3,779	4,163	4,363	4,576
Estimated Evacuating Population Clearing Wakulla County					
12-Hour	16,929	18,591	22,133	20,791	20,251
18-Hour	19,751	21,690	25,822	25,989	26,157

Note: These estimates take into account many variables, including roadway capacity, in-county evacuating trips, out of county evacuating trips, evacuating trips from other counties, and background traffic that is impeding the evacuation trips. For this reason, the maximum evacuation population by time interval will vary between evacuation level and either increase or decrease from one evacuation level to the next.

Table ES-16 – Maximum Evacuating Population by Time Interval for 2020

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Estimated Evacuating Population Clearing Calhou County					
12-Hour	4,379	4,760	5,521	5,699	6,283
18-Hour	5,109	5,553	6,441	6,886	7,330
Estimated Evacuating Population Clearing Franklin County					
12-Hour	7,168	9,870	9,889	9,529	9,534
18-Hour	7,765	10,692	10,713	10,720	10,726
Estimated Evacuating Population Clearing Gadsden County					
12-Hour	14,433	15,756	16,509	17,214	17,333
18-Hour	17,440	19,038	20,636	22,235	23,833
Estimated Evacuating Population Clearing Gulf County					
12-Hour	6,706	8,584	10,015	10,282	10,356
18-Hour	7,265	9,657	11,267	11,567	11,650
Estimated Evacuating Population Clearing Jackson County					
12-Hour	10,531	11,810	14,370	15,650	16,929
18-Hour	12,725	14,271	17,364	18,910	20,456
Estimated Evacuating Population Clearing Jefferson County					
12-Hour	5,043	5,395	5,604	5,894	5,812
18-Hour	6,304	6,744	7,239	7,858	8,233
Estimated Evacuating Population Clearing Leon County					
12-Hour	31,341	42,080	63,566	70,465	77,585
18-Hour	37,870	50,847	79,457	93,953	106,679
Estimated Evacuating Population Clearing Liberty County					
12-Hour	3,255	3,442	3,792	3,838	3,765
18-Hour	3,798	4,016	4,424	4,637	4,863
Estimated Evacuating Population Clearing Wakulla County					
12-Hour	18,377	20,181	24,011	22,556	21,282
18-Hour	21,440	23,545	28,013	28,195	28,376

Note: These estimates take into account many variables, including roadway capacity, in-county evacuating trips, out of county evacuating trips, evacuating trips from other counties, and background traffic that is impeding the evacuation trips. For this reason, the maximum evacuation population by time interval will vary between evacuation level and either increase or decrease from one evacuation level to the next.

K. Summary and Conclusions

Through a review of the results of the 20 different scenarios (10 base and 10 operational), several conclusions could be reached regarding the transportation analysis, including the following:

- Critical transportation facilities within the ARPC region include US 319, SR 79, US 98, and I-10. For large storm events, such as category 4 and 5 hurricanes, other state facilities also play an important role in evacuations, such as SR 20;
- Given the rural nature of many of the counties within the ARPC, many two-lane state and US highways play a major role during the evacuation process. State and County officials should coordinate personnel resources to provide sufficient traffic control at

major intersections along these routes;

- The Florida Department of Transportation should continue to work with local counties on implementing intelligent transportation system (ITS) technology, which will provide enhanced monitoring and notification systems to provide evacuating traffic with up to date information regarding expected travel times and alternate routes;
- The State can use the data and information provided in this report (specifically the evacuating vehicle maps in Volume 5-2) to estimate fuel and supply requirements along major evacuation routes to aid motorists during the evacuation process;
- For major evacuation routes that have signalized traffic control at major intersections, traffic signal timing patterns should be adjusted during the evacuation process to provide maximum green time for evacuating vehicles in the predominate directions. This is especially important in Leon County along US 319 (Capital Circle); and,
- The counties within the Apalachee region are encouraged to test additional transportation scenarios beyond what has been provided in this study. Each model run will provide additional information for the region to use in planning for an evacuation. Counties interested in testing various response curves for each scenario can easily do so using the TIME interface to calculate clearance times for different evacuation conditions, such as different evacuation levels, different behavioral response assumptions, and different response curves.

CHAPTER I

INTRODUCTION

The evacuation transportation analysis discussed in this volume 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.

A. Background and Purpose

Over the years, different planning agencies have used different modeling approaches with varying degrees of complexity and mixed success. Some have used full-blown conventional transportation models such as the standard Florida model FSUTMS; others have used a combination of a simplified conventional model and a spreadsheet program, such as the Abbreviated Transportation Model (ATM). These models have different data requirements, use different behavioral assumptions, employ different traffic assignment algorithms, and produce traffic analysis results with different levels of detail and accuracy. These differences make it difficult for planning agencies to share information and data with each other. They also may produce undesirable conditions for staff training and knowledge sharing.

One of the objectives of the SRESP is to create consistent and integrated regional evacuation data and mapping, and by doing so, to facilitate knowledge sharing between state, regional, county, and local partners. To achieve this objective, it is important for all Regional Planning Councils to adopt the same data format and to use the same modeling methodologies for their transportation analyses. The primary purpose of the transportation component of the SRESP is to develop a unified evacuation transportation modeling framework that can be implemented with the data collected by the Regional Planning Councils.

B. Study Area

The study area for this analysis includes the nine county Apalachee Regional Planning Council (ARPC) area, as illustrated in Figure I-1. The transportation modeling methodology includes some processes that are performed at the statewide level, in order to determine the impacts of evacuations from other regions impacting the evacuation clearance times in the Apalachee region. While the impact of other regions is included in the Apalachee analysis, it is important to note that the results of the transportation analysis presented in this document are only reported for the nine counties included in the ARPC. Transportation analysis results for other regions and counties are reported in the corresponding Volume 4 report for those regions.



Figure I-1
Apalachee Regional Planning Council



C. Input and Coordination

The SRESP transportation methodology and framework was developed during 2008 and 2009 in coordination with all eleven regional planning councils in Florida, along with the Division of Emergency Management, Department of Transportation, Department of Economic Opportunity (formerly the Department of Community Affairs), and local county emergency management teams with CDM Smith serving as the transportation consultant.

During the updates to SRESP in 2015, two meetings were held at the local and regional level to receive updated input from local county emergency management and the regional planning council. The two meetings held in the region included the following:

Regional Meeting No. 1 – Scenario Development Update Meeting

The first regional meeting for the Apalachee region was held on February 24, 2015. The purpose of the scenario development update meeting was to discuss the base scenarios for the region for growth management purposes and discuss and receive input on the operational scenarios to be evaluated for emergency management purposes.

Regional Meeting No. 2 – Transportation Analysis Update Meeting

The second and final regional meeting for the Apalachee region was held on August 25, 2015. The purpose of the transportation analysis meeting was to review the draft results of the transportation analysis and receive feedback on the draft final report.

D. Study Comparisons

It is important to note that this study contains updates and revisions in comparison to the 2010 SRESP study for the Apalachee region. These revisions include updates to population projections based on the 2010 census, new evacuation zones based on updated storm surge maps, modifications to the roadway network due to recently completed and planned construction projects and changes to the location and size of available shelters.

CHAPTER II

EVACUATION MODELING METHODOLOGY AND FRAMEWORK

The overall evacuation modeling methodology and framework was developed during 2008 and 2009 in coordination with the eleven Regional Planning Councils and the Florida Division of Emergency Management. The methodology used in the ARPC Evacuation Transportation Analysis was updated to accommodate new versions of Cube Voyager and Cube Avenue software and is summarized in the following sections.

A. Behavioral Assumptions

In 2008, the Statewide Regional Evacuation Study Program (SRESP) commissioned a survey of Florida residents. The purpose of this survey was to develop an understanding of the behavior of individuals when faced with the prospect of an impending evacuation. These data were used to develop a set of “planning assumptions” that describe the way people respond to an order to evacuate and are an important input to the SRESP Evacuation Model. The behavioral data provides insights into how people respond to the changing conditions leading up to and during an evacuation.

The primary application of the survey data was to help anticipate how people would respond with respect to five behaviors:

- How many people would evacuate?
- When they would leave?
- What type of refuge they would seek?
- Where they would travel for refuge?
- How many vehicles would they use?

These evacuation behaviors are distinguished based on several descriptive variables as listed below:

- Type of dwelling unit (site-built home versus mobile home);
- The evacuation zone in which the evacuee reside; and,
- The intensity of the evacuation that has been ordered.

How many people?

The evacuation rate indicates the percent of residents who will leave their homes to go someplace safer in each storm threat scenario. The evacuation rates are based on the following assumptions: that the storm track passes very close to the area being evacuated; and officials order evacuation for surge evacuation zones corresponding to storm category. Under the 100 percent response scenario, this rate will default to 100 percent.

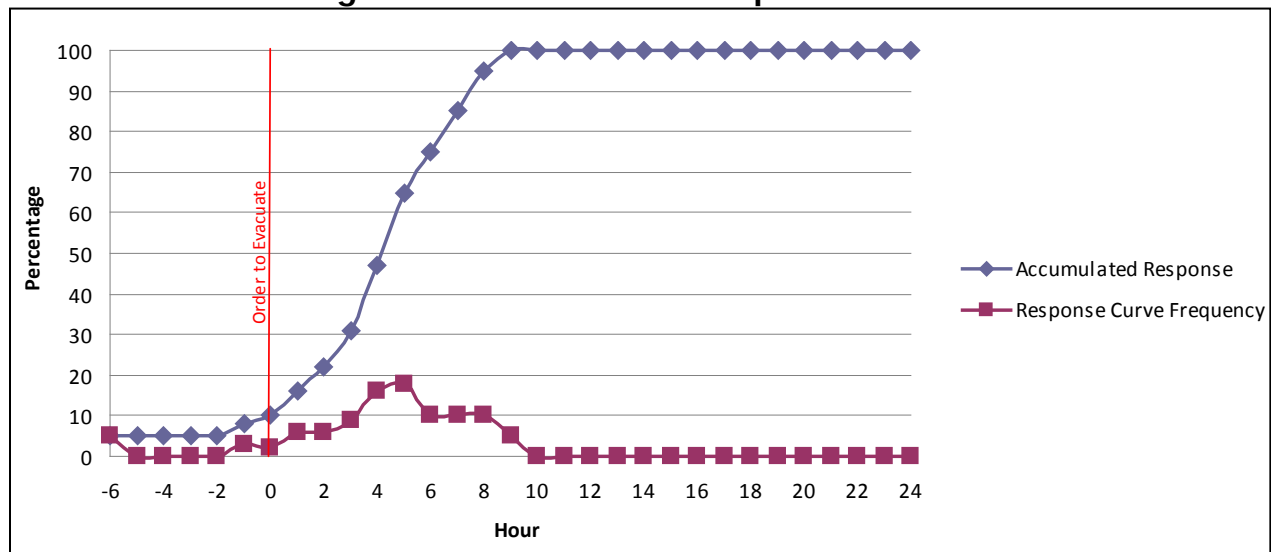
When will they leave?

Consistent with behavior observed in past evacuations, evacuees do not begin their journey toward safety all at the same time. Rather, evacuees each begin their trips at different times based on their unique characteristics and constraints. Some individuals will prefer to evacuate

soon after an order is given. Others may need to spend time securing personal property or seeing to the welfare of their relatives before they feel comfortable evacuating. Yet others will underestimate the threat posed to them by an oncoming storm and may not evacuate until very late. A set of evacuation response curves show the proportion of evacuation by increment of time for evacuation orders that were issued.

Each curve represents a different assumption on the amount of time it will take for an evacuating population to fully mobilize. The curves reflect the sense of urgency with which the population perceives the impending evacuation. Faster curves represent more urgent circumstances and slower curves represent less urgent circumstances. These curves are used by the model to divide the total number of evacuating trips into segments representing each hour that evacuating trips begin their journey. For example, a nine hour curve will place a certain number of evacuating trips in the first segment. These trips will represent those evacuees leaving in the first hour of an evacuation. The curve will then place another number of trips in the second segment representing the number of people leaving in the second hour of an evacuation. This process continues until all evacuees have begun their journey, which in a nine hour curve occurs during the ninth segment. All of the curves developed for the SRESP assume that some portion of the evacuating population leave before an order to evacuate is given. Typically, this is ten percent of the evacuating population. The nine hour response curve used in the model is depicted in Figure II-1. Response curves are available in the model to evaluate six, nine, twelve, eighteen, twenty-four, and thirty-six hour responses.

Figure II-1 – Nine Hour Response Curve



What type of refuge would be sought?

The survey data identified four types of refuge sought by evacuees. Specific rates were developed that identified the number of evacuees seeking shelter at each of these following different types of refuge:

- Friends and family;
- Hotel or motel;
- Public shelter; and,

- Other types of refuge not covered elsewhere in the list including, but not limited to, office space, churches, civic organization halls, and club houses.

Where will they travel?

The behavior survey distinguishes between trips that leave the county where an evacuation journey begins and trips that stay within the county. The out-of-county trip rate indicates the percent of evacuees who will seek refuge outside their county of residence. The in-county trip rate will determine how many of the evacuating trips are destined to remain within the county.

How many vehicles are used?

The vehicle use rate indicates the percentage of vehicles available to the evacuating household(s) that will be used in evacuation in each storm threat scenario. This rate ultimately determines the number of vehicles on the highways during an evacuation.

B. Zone System and Highway Network

The SRESP evacuation model relies upon data that covers the entire State of Florida as well as areas covering the States of Georgia, Alabama, Mississippi, South Carolina, North Carolina, and Tennessee. While the primary focus of the model is with evacuation behavior within Florida, areas outside of the state had to be considered in order to allow a more precise routing of evacuation traffic. This allows the model to measure the flow of traffic across the state line if needed.

Zone System

The data included in this system contain the demographic information crucial to modeling evacuation traffic. The demographic information is labeled as “small area data”. These data provide population and dwelling unit information that will identify where the individuals in the region reside. The planning assumptions developed from the behavioral analysis conducted for this study were applied to these demographic data. The result is a set of evacuation trips generated by the evacuation model. The number of these trips will vary depending on the hazard conditions that prompt the evacuation. The small area data was developed using Census 2010 geography. Data were developed for 2015 and 2020.

Traffic Evacuation Zones (TEZ)

Small area data geographies were aggregated into larger units known as Traffic Evacuation Zones (TEZ). These TEZ form the basic unit of analysis in the evacuation model similar to how traffic analysis zones form the basic unit of analysis in a standard travel demand model. The TEZ system was developed so that the small area geographies will nest completely within one TEZ or another. This eliminates any potential for split data and will ensure that data in the TEZ system can always be updated with relative ease.

The final TEZ system for the State of Florida has 8,829 zones. This number provides sufficient detail to accurately accommodate the assignment of evacuation trips onto an evacuation network. Furthermore, additional roadway segments have been included in the model's highway network to facilitate the movement of evacuation trips onto and off of the evacuation network. Each TEZ has a unique identification number that will be used by the model to connect evacuation trip generation to the evacuation highway network.

Highway Network

A highway network is used to represent the roads that evacuees travel along as they journey toward safety. Various datasets were used to develop the highway network database as follows:

- Florida Statewide Model Network – The 2005 base year statewide model (latest model available) was used as a basis for developing the evacuation model. The statewide model was obtained from the Florida Department of Transportation (FDOT) Systems Planning Office;
- Evacuation Routes – Evacuation routes in each Regional Planning Council (RPC) area were obtained from the RPCs themselves. The RPCs relied on their constituent counties to provide them with information on which roads were to be included as evacuation routes;
- Florida Highway Data Software (FHD) – The 2006 Florida Highway Data software was obtained from FDOT. This software was used to view and query data extracted from the Roadway Characteristics Inventory (RCI) which includes number of lanes, facility types, speed limits, etc.;
- FDOT Quality/Level of Service Handbook – The 2002 FDOT Quality/Level of Service Handbook (QLOS) and the 2007 LOS Issue Papers (2002 FDOT QLOS addendum) were obtained from the FDOT Systems Planning Office website. The QLOS handbook and the LOS tables were used to establish roadway capacities for evacuation purposes; and,
- Microsoft and Google aerials and maps – These aerial maps were used to identify and clarify roadway alignments. Whenever questions concerning the existence of particular facilities, their characteristics, or their alignments arose, aerials were referenced.

Changes to the Florida Statewide Model Network

Some modifications to the Florida Statewide Model network were necessary in order to make the data usable for evacuation modeling purposes:

- The original database, which was coded for a 2005 base year, was updated to 2010 conditions to correspond to the SRESP base year;
- Additional facilities had to be added to the network to accommodate evacuation traffic behavior;
- Many attributes from the original data set were removed and new ones were added specifically tailored for trip activity for evacuation modeling purposes;
- Based on RPC input, any missing facilities instrumental for evacuations were coded into the highway network database;
- The highway network database was extensively reviewed for the correct coding of one-way links;
- The 2006 FHD software was used to verify the highway network database number of lanes for the state roads, US highways, and major county roads. For other roads Microsoft and Google aerial maps were used;
- The area type and facility type attributes for each roadway segment were verified for their consistency with existing conditions; and,

- The network attributes were modified to the specific needs of evacuation modeling and reporting purposes. The evacuation routes designated by the RPC were flagged for reporting purposes. The County name attribute and the RPC number attributes were checked and modified accordingly.

Capacities

Network capacities for the evacuation model are based on facility type and area type. The network facility type classification and the area type classification were retained from the existing Florida Statewide Model highway network database.

FDOT's 2002 Quality/Level of Service (QLOS) generalized level of service volume tables were used for estimating the link capacity for each combination of functional class and area type. The generalized level of service volume tables were generated from conceptual planning software which is based on the 2000 edition of the Highway Capacity Manual (HCM). Using statewide default values for each of these roadway characteristics, the generalized LOS volume tables were developed from the conceptual planning software.

The peak hour volume represents the most critical period for traffic operations and has the highest capacity requirements. Many urban routes are filled to capacity during each peak hour, and variation is therefore severely constrained. The peak hour directional volumes at LOS E, closely represent the maximum volume (capacity) that can be accommodated through a given roadway. In some cases the Peak Hour Two-Way LOS tables do not show the maximum services volumes at the LOS E. For example, the four-lane Class I arterial service volumes are only shown from LOS A to LOS D. This indicates that the maximum volume thresholds (capacity) are reached at LOS D and these volumes represent the capacity of the roadway.

A lookup table was created with facility type, area type, number of lanes, and capacities by comparing model network characteristics to the roadway characteristics in the QLOS manual. The lookup table is shown in **the Transportation Supplemental Data Report**. The capacity attribute in the network was automatically assigned for any given link with a specific facility type, area type and number of lanes during the network preparation process.

Speeds

The existing highway network database link speeds were verified for their reasonableness and their suitability for evacuation modeling purpose. The speed values of the existing statewide model database were reasonable and therefore retained in for evacuation modeling.

Roadway Attributes

The roadway attributes contain the highway characteristics for each link in the highway network. Some of the attributes like DISTANCE, FTYPE, ATYPE, etc., were retained from the highway network database and other attributes like DENSITY and EVAC_RTE are specific to the evacuation modeling and were included in the network.

Reverse Lane Operations

Additional changes were also made in order to accommodate reverse lane operations in an evacuation scenario. Most of the facilities that would be subject to a reverse lane operations scenario were coded as a pair of one-way links. Additional attributes were added to the network in order to allow for the correct calculation of capacity in the reverse lane direction. The

configurations of reverse lane facilities reflect the reverse lane operations plans established by the State.

C. Background Traffic

The traffic that consumes the roadway capacity of a transportation system during an evacuation can be divided into two groups. The first group is the evacuation traffic itself. Once the evacuation demand is determined, this information is converted into a number of vehicles evacuating over time. These evacuation trips are then placed on a representation of the highway network by a model. The model determines the speed at which these trips can move and proceeds to move the evacuation trips accordingly. The result is a set of clearance times.

The second group of traffic is known as background traffic. Background traffic, as its name implies, is not the primary focus of an evacuation transportation analysis and is accounted for primarily to impede the movement of evacuation trips through the network. These trips represent individuals going about their daily business mostly unconcerned with the evacuation event. For the most part, background traffic represents trips that are relatively insensitive to an order to evacuate and are thus said to be occurring in the “background.” Even though background traffic is relatively insensitive to evacuation orders, it is important to account for background traffic since it can have a dramatic impact on available roadway capacity. This in turn can severely affect evacuation clearance times.

Methodology used to Account for Background Traffic

There are two dynamics at work when evacuation traffic and background traffic interact with one another. The first is the effect of background traffic displacing evacuation traffic as background traffic attempts to use the same roads as the evacuation traffic. The second is the effect of evacuation traffic displacing background traffic. As vehicles move along the network and try to get onto certain roads they leave less room for other vehicles to use those same roads. As background traffic builds up there is less room for evacuation traffic to move, and vice versa. While the effect that evacuation traffic has on background traffic may be of some interest to those who are concerned with disruptions in daily trip making behavior during an evacuation event, for the purposes of this study we are much more interested in the effect that background traffic has on evacuation clearance times.

The effect that background traffic has on evacuation traffic can be stated in terms of available capacity. The more background traffic there is on a segment of road, the less capacity is available for evacuation traffic to use. Following this logic, it becomes apparent that by causing the available capacity to fluctuate throughout the evacuation event, one is able to sufficiently account for the impact of background traffic. FDOT’s Florida Traffic Information DVD was used to develop average peaking characteristics for various functional classes of roadways throughout the state. These characteristics were analyzed to determine how much capacity is available throughout a given day during an evacuation.

Two sets of curves were developed, one for coastal evacuating counties that represent lower background traffic and one for all other counties representing greater background traffic. The model then adjusts capacities up and down consistent with these curves as it simulates the evacuation.

Figure II-2 illustrates the set of curves showing the percentage of available capacity throughout

a 24 hour period for a coastal evacuating county after the model accounts for background traffic. Figure II-3 illustrates the set of curves showing the percentage of available capacity throughout a 24 hour period for all other counties after the model accounts for background traffic.

Figure II-2 – Percent of Available Capacity for Coastal Counties

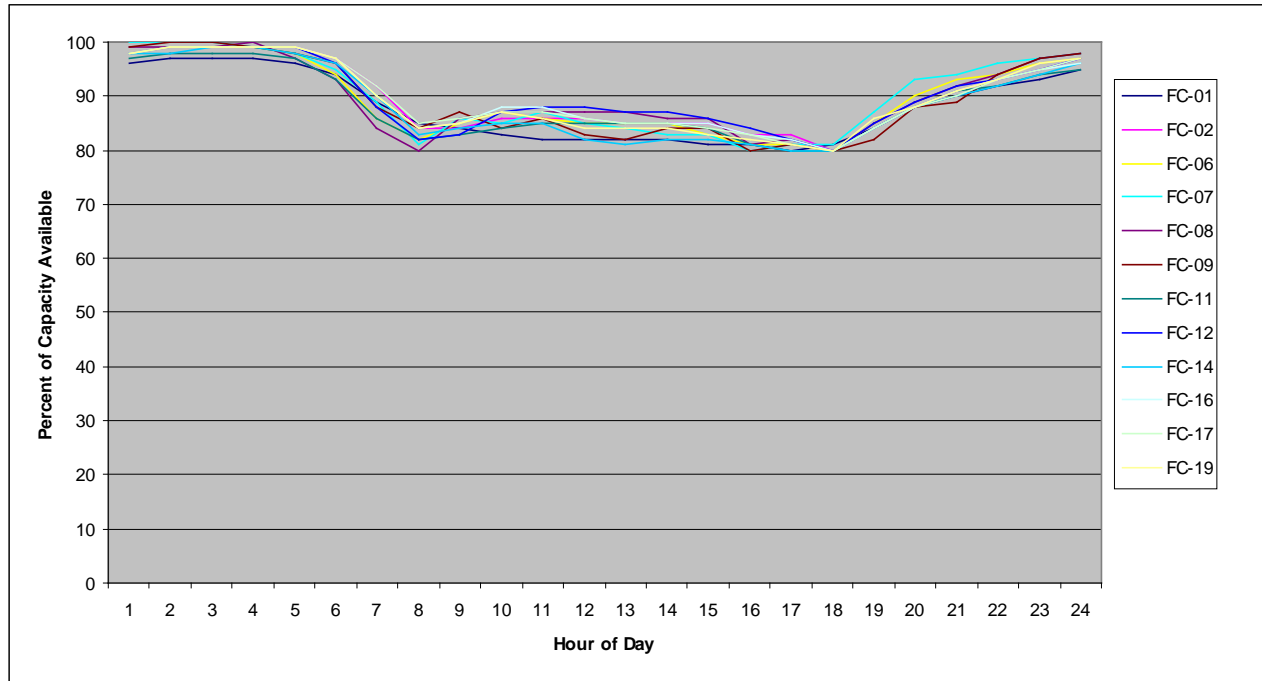
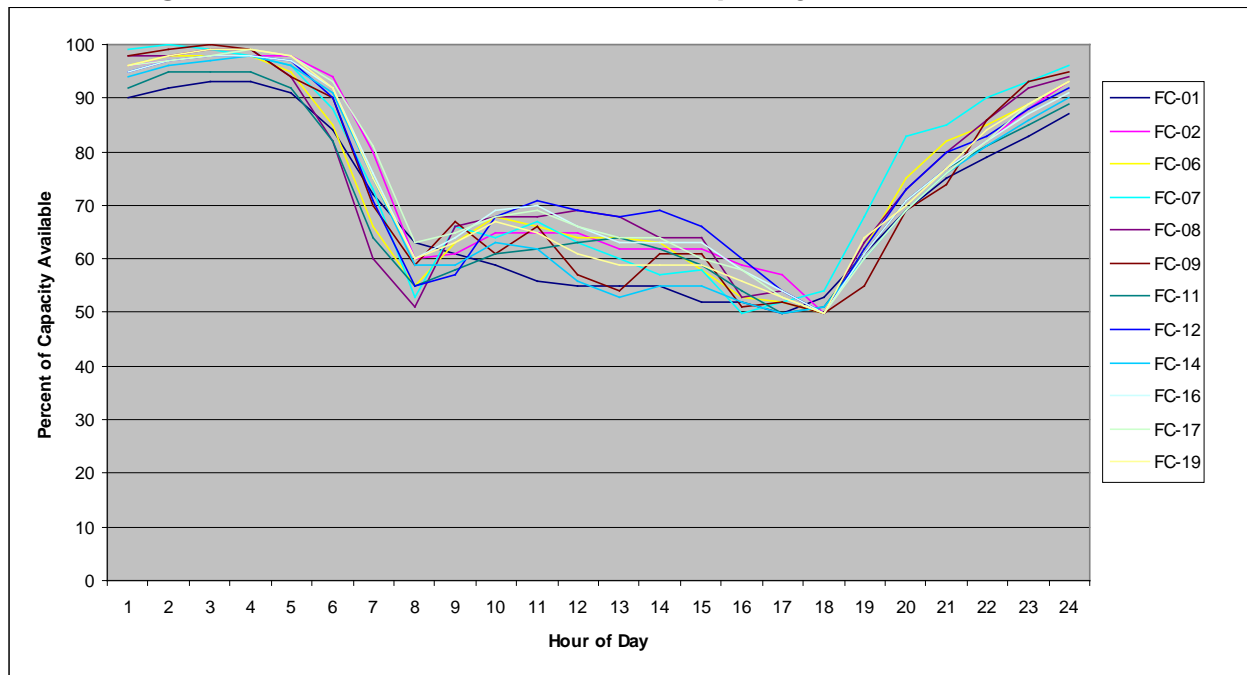


Figure II-3 – Percent of Available Capacity for Other Counties

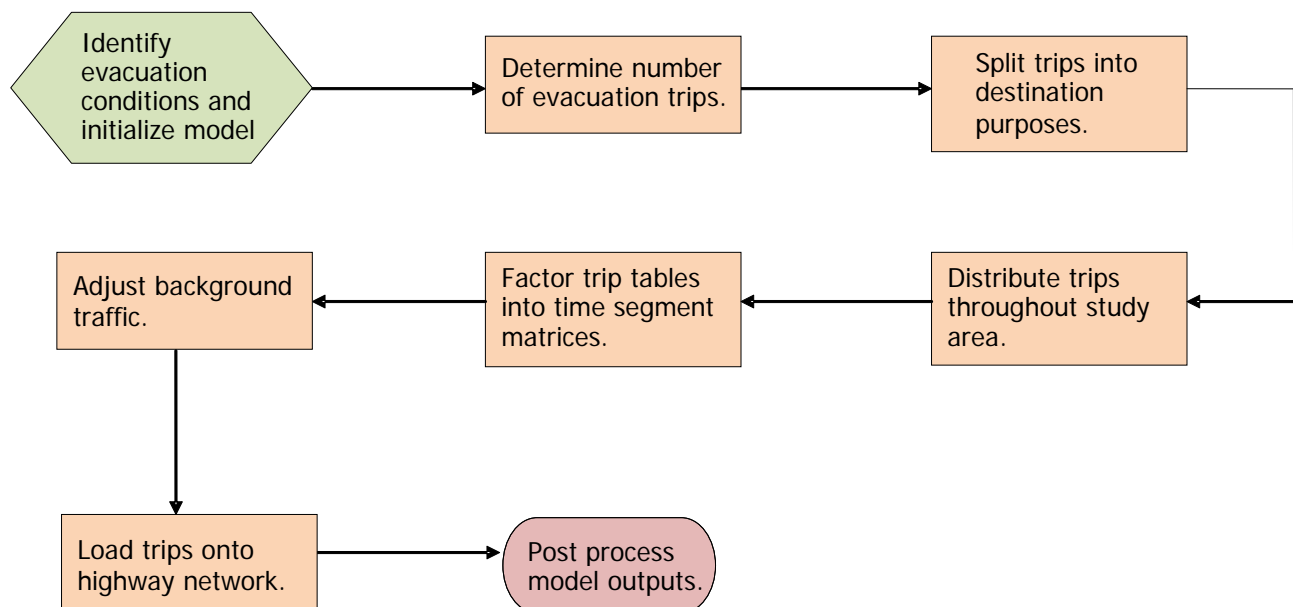


D. Evacuation Traffic

The model flow for the evacuation model is divided into a total of eight modeling steps. The following eight steps are represented graphically in the flowchart in Figure II-4:

1. Identify evacuation conditions and initialize model;
2. Determine number of evacuation trips;
3. Split trips into destination purposes;
4. Distribute trips throughout study area;
5. Factor trip tables into time segment matrices;
6. Adjust background traffic;
7. Load trips onto highway network; and,
8. Post process model outputs.

Figure II-4 - General Model Flow



Initializing the Model

At the beginning of the model flow, the model will need to determine the hazard conditions representing the particular scenario that will be analyzed. This will allow the model to accurately identify the areas that will be subject to evacuation and to determine the intensity of the evacuation event. This process will then establish the appropriate rates that will be used to determine the number of evacuation trips that will be generated.

Number of Evacuating Trips

After the model has finished initializing it will begin to calculate the number of evacuation trips that are generated. Estimating an appropriate number of trips is essential to ensuring that the behavior expressed on the highway network during trip assignment is reflective of likely conditions during a real world evacuation event.

The planning assumptions developed by the behavioral analysis were translated into a master rates file that can be referenced by the model in order to determine the number of evacuation trips that a particular scenario can be expected to generate.

Production Ends

Every trip has two ends. One end represents where a trip begins its journey and is typically referred to as the production end. The other end represents where a trip finishes its journey and is typically referred to as the attraction end. The calculation of the production end of each evacuation trip in the model is driven by the master rates file mentioned above.

Attraction Ends

The other end of an evacuation trip, the attraction end, is calculated using a much more simplified methodology. Public shelters have clearly defined capacities. For hotels and motels, each room will be designated as an attraction. Trips destined to shelter with friends and family or in other unspecified destinations will have an attraction generated at each non-evacuating household in the model. This will ensure that these trips are evenly distributed around the area with some clumping occurring in highly residential areas.

Splitting Trips into Destination Purposes

Once the number of evacuation trips has been determined it will be necessary to divide the trips into various trip purposes. These purposes are based on the type of destination that an evacuee is headed to and the relative location of that destination. There are four types of destinations and two relative locations for a total of eight trip purposes, as identified below:

- Friends & Family – In County;
- Public Shelter – In County;
- Hotel/Motel – In County;
- Other – In County;
- Friends & Family – Out of County;
- Public Shelter – Out of County;
- Hotel/Motel – Out of County; and,
- Other – Out of County.

The same behavioral analysis that establishes the evacuation and vehicle use rates used to determine the number of evacuation trips that are being generated by the model is also a source of data for determining the various destinations where these evacuation trips are heading.

Trip End Balancing

Once the model has finished splitting the trip ends into their respective purposes, it will commence the process of balancing trip ends. The balancing of trip ends is critical so that the trip distribution process which is to follow this step will be able to tie every trip production to every trip attraction. A surplus or deficit of one trip end or the other may cause complications in the evacuation model that can lead to overestimating the model, underestimating the model, or aborting the model process.

In County Balancing - The trip balancing procedure begins by considering each purpose individually. If the trip purpose under consideration is an In County purpose the model compares the number of productions to the number of attractions. If the number of attractions is greater than the number of productions, the model will simply apply a universal adjustment of all attraction trip ends in the county down to the number of productions. The end result should be an equal number of In County productions and attractions.

If, on the other hand, the productions should exceed attractions the excess productions are shifted over to the corresponding Out of County purposes. For example, if the model estimates using the behavioral planning assumptions that there will be 3,000 evacuees destined In County to Hotel/Motel destinations, but there are only 2,500 Hotel/Motel attraction ends available in the county, the excess 500 trips will become Out of County Hotel/Motel trips.

Out of County Balancing - If the purpose under consideration is an Out of County purpose the model will balance the attractions regionally. Using data derived from the behavioral study, a certain percentage of each out of county trip will be destined to a particular region. If a particular region is prohibited by the model from receiving evacuation trips, the model will reallocate the portion of evacuation trips originally destined for that regional equally among all other regions. Table II-1 identifies the percentages of out of county trips destined from each region and to each region. When the model has finished balancing the evacuation productions and attractions, the model will then proceed with trip distribution.

Table II-1 – Out of County Trip Destinations by Region

To From	Apalachee	Central	East Central	North Central	Northeast	South	Southwest	Tampa Bay	Treasure Coast	West	Withla- coochie	Out- of- State
Apalachee	31.2%	0.1%	1.1%	2.3%	2.1%	0.0%	0.1%	0.7%	0.3%	3.5%	0.8%	57.8%
Central	5.9%	9.8%	13.0%	4.4%	4.7%	0.0%	4.2%	5.9%	5.4%	0.7%	1.7%	44.2%
East Central	2.5%	1.7%	27.1%	5.4%	5.9%	1.5%	2.6%	6.7%	0.8%	1.4%	3.1%	41.2%
North Central	5.2%	0.7%	3.6%	15.2%	6.3%	0.3%	0.3%	3.1%	0.2%	1.3%	2.0%	61.8%
Northeast	3.7%	0.7%	4.2%	6.6%	10.3%	0.6%	0.6%	1.8%	0.2%	1.9%	2.0%	67.4%
South	2.0%	3.4%	20.9%	2.1%	3.4%	24.5%	5.7%	2.1%	9.0%	0.5%	3.1%	23.4%
Southwest	1.4%	5.2%	15.9%	3.9%	3.3%	4.6%	11.0%	8.4%	3.2%	0.8%	5.4%	37.0%
Tampa Bay	3.2%	3.7%	14.1%	2.8%	4.5%	2.2%	1.3%	15.7%	2.0%	0.5%	7.3%	42.6%
Treasure Coast	2.8%	1.5%	22.8%	3.0%	4.4%	4.5%	4.0%	9.4%	11.5%	0.2%	2.0%	34.0%
West	6.3%	0.2%	2.1%	0.9%	3.5%	0.4%	0.1%	0.3%	0.3%	8.7%	0.8%	76.4%
Withla- coochie	2.4%	1.7%	12.4%	7.4%	3.3%	1.0%	0.7%	6.5%	0.5%	1.2%	15.0%	48.0%

Source: Derived from SRESP Behavioral Data and Planning Assumptions

Trip Distribution

After the model has determined how many evacuation trips there will be in a given scenario, split those trips into purposes, and balanced the trip ends for those purposes, it will be necessary for the model to perform a trip distribution. The trip distribution step in the model connects each production end to a unique attraction end. The end result is a trip table containing origins and destinations for each trip in the model. Typically, origin zones are referred to by the letter I and destination zones are referred to by the letter J. An Origin-

Destination matrix, also known as an OD matrix, is one of the principal inputs into trip assignment. This matrix tells the model where each trip is coming from and where it is going to.

The trip distribution process begins by looping through each trip purpose and determining whether the purpose is In County or Out of County. In County trips are restricted to destination TEZs within the same county as the trip origin. Out of County trips are restricted to TEZs not in the same county as the trip origin. The trip distribution is conducted using a gravity model that relies on distances as the chief measure of impedance.

Time Segmentation

The final step of the model prior to initiating the trip assignment sequence is to segment the trip table into discreet time periods. This segmentation determines at what point in time each trip begins its evacuation. The model is set up to process a set of evacuation response curves with a period resolution of one-half hour. The model uses a set of factors developed from the behavioral response curves to divide the evacuation trip tables into the different segments.

The model makes the following assumptions. Due to limitations in the model, these assumptions cannot be adjusted. The analyst should keep these assumptions in mind when using results developed by the model:

- All evacuations begin when an order to evacuate has been issued;
- All evacuations begin during the first hour of daylight, approximately 7:00 AM;
- All evacuations begin during an average weekday;
- Some portion of evacuation trips, typically ten percent, leaves prior to the beginning of an evacuation; and,
- Those evacuation trips that leave prior to the beginning of an evacuation leave no later than the previous evening and have already cleared the network by the time an evacuation order is given.

E. Dynamic Traffic Assignment

Dynamic traffic assignment (DTA) was utilized because it is sensitive to individual time increments. DTA works by assigning a certain number of vehicles to the highway network in a given interval of time. The model then tracks the progress of these trips through the network over the interval. Another set of vehicles is assigned during the following time interval. The model then tracks the progress of these trips through the network along with the progress of the trips loaded in the previous time interval. As vehicles begin to arrive at the same segments of roadway, they interact with one another to create congestion. When vehicles that were loaded to the network in subsequent intervals of time arrive at the congested links, they contribute to the congestion as well. This results in a slowing down of the traffic and eventually spill-backs and queuing delays.

It is this time dependent feature of DTA that makes it well suited to evacuation modeling. By dynamically adjusting the travel times and speeds of the vehicles moving through the network as they respond to congestion the model is able to do the following:

- The evacuation model is able to estimate the critical clearance time statistics needed for this study;

- The model takes into account the impact of compounded congestion from multiple congestion points;
- The model is able to adjust the routing of traffic throughout the network as a function of congestion as it occurs throughout the evacuation; and,
- The model is capable of adjusting its capacities from time segment to time segment, making it possible to represent such phenomena as reverse lane operations and background traffic.

Parameters of the Evacuation Assignment

The DTA for the evacuation model makes use of certain parameters which dictate how the assignment will function. The parameters that were established are:

- **Capacity** - The SRESP evacuation model uses hourly lane capacities derived from the Florida Department of Transportation Quality/Level-of-Service Handbook. These capacities are initially set to represent Level-of-Service E conditions. These capacities are then further increased by an additional 20 percent for freeway links and 10 percent for non-freeway links. These increases in capacity are meant to reflect high volume usage typically found during an evacuation, optimal green timing of traffic signals and traffic control typically controlled during an evacuation by law enforcement personnel, and the use of shoulder and emergency lanes;
- **Storage** - Storage determines how many vehicles can remain standing on a length of roadway at any moment in time. The evacuation model assumes that storage is set to 250 vehicles per lane per mile. This assumes approximately 21 feet of space are "occupied" by any given vehicle. Given the mix of vehicles on a roadway network (including compacts, SUVs, trailers, and trucks) this spacing appears to be reasonable for stand-still traffic;
- **Time Intervals** - In order to properly implement a DTA model, the assignment process needs to be segmented according to a set of time intervals. Half-hour intervals provide sufficient detail to satisfy the planning needs of both emergency management and growth management concerns. The model calculates vehicle assignments over 192 such intervals for a 96 hour model period. This is sufficient to capture all evacuation activity during an event and allows sufficient time for the evacuation traffic to clear at both the county and regional level; and,
- **One-Way Evacuation Operation** - The State of Florida has recently published a series of one-way evacuation operation plans for major corridors throughout the state. The intention of these plans is to fully maximize the available capacity on a freeway by using all lanes to move evacuees away from danger. The model will emulate one-way operations by simultaneously increasing the capacity of links headed away from the threatened area and eliminating the capacity of links headed toward the threatened area. The capacity of links headed away from the threatened area will increase by 66 percent, which is consistent with capacity increases used by Florida's Turnpike Enterprise. Past experience of reverse lane operations have shown that capacities do not double, as is commonly assumed, but increase by a lower percentage of about two thirds.

F. Prototype Model Development

CDM Smith developed the prototype model to test the modeling methodology used to calculate evacuation clearance times. The prototype model demonstrated the viability of the methodology developed for this study. This included the use of dynamic traffic assignment, background traffic curves, regional sub-area trip balancing, the use of survey rates, the use of 100% participation rates, response curves, and county-by-county phasing of evacuations.

The prototype model served as the backbone for all regional evacuation models that have been developed for this study. The models implemented for each RPC use a structure similar to the prototype with identical methodology.

The SRESP evacuation model relies upon data that covers the entire State of Florida as well as areas covering the States of Georgia, Alabama, Mississippi, South Carolina, North Carolina, and Tennessee. While the primary focus of the model is with evacuation behavior within Florida, areas outside of the state had to be considered in order to allow a more precise routing of evacuation traffic. This allows the model to measure the flow of traffic across the state line if needed.

CHAPTER III

REGIONAL MODEL IMPLEMENTATION

The evacuation transportation model discussed in Chapter II includes several components that are completed using a statewide dataset (determine number of evacuation trips, split trips into destination purposes, and distribute trips throughout state) and several components that can only be completed at the regional level (factor trip tables into time segment matrices, adjust background traffic, and load trips onto the highway network) due to computer run time limitations with the model software. Thus, for the regional level steps, each RPC throughout the State needed to decide on a regional model network to complete the analysis in their region. For the Apalachee region, the regional model network includes the nine counties within the Apalachee region plus 13 other counties surrounding the region, as illustrated in Figure III-1.

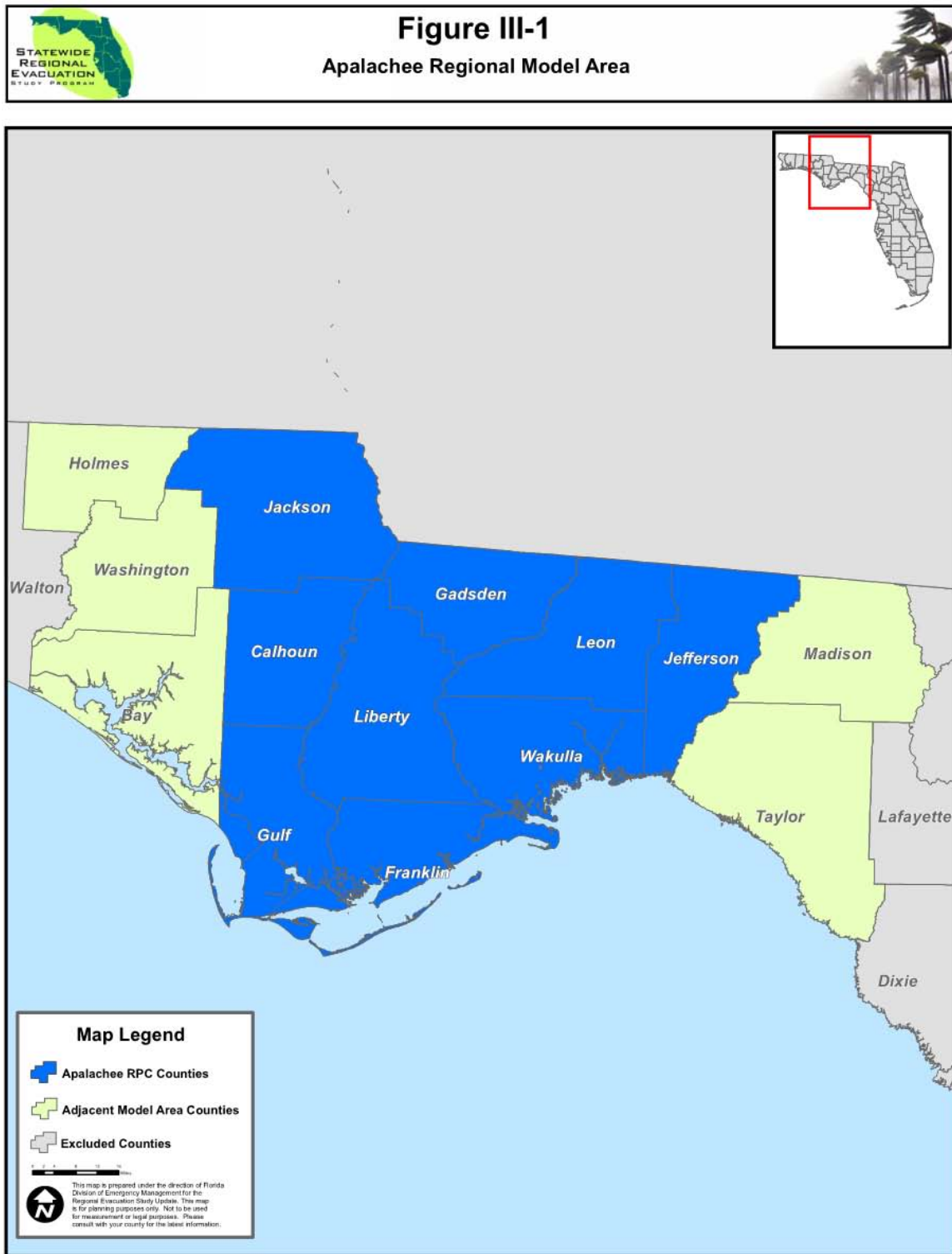
This chapter discusses the input data used in evaluating evacuation transportation conditions for the Apalachee region. It is important to note that the input data discussed in this chapter is included only for the counties within the Apalachee region, as these are the counties that the Apalachee region has direct responsibility for the data. Data for the adjacent counties included in the Apalachee region model were provided by the corresponding RPC in which the counties belong. The model data for these counties is discussed in the corresponding Volume 4 report for those respective RPCs.

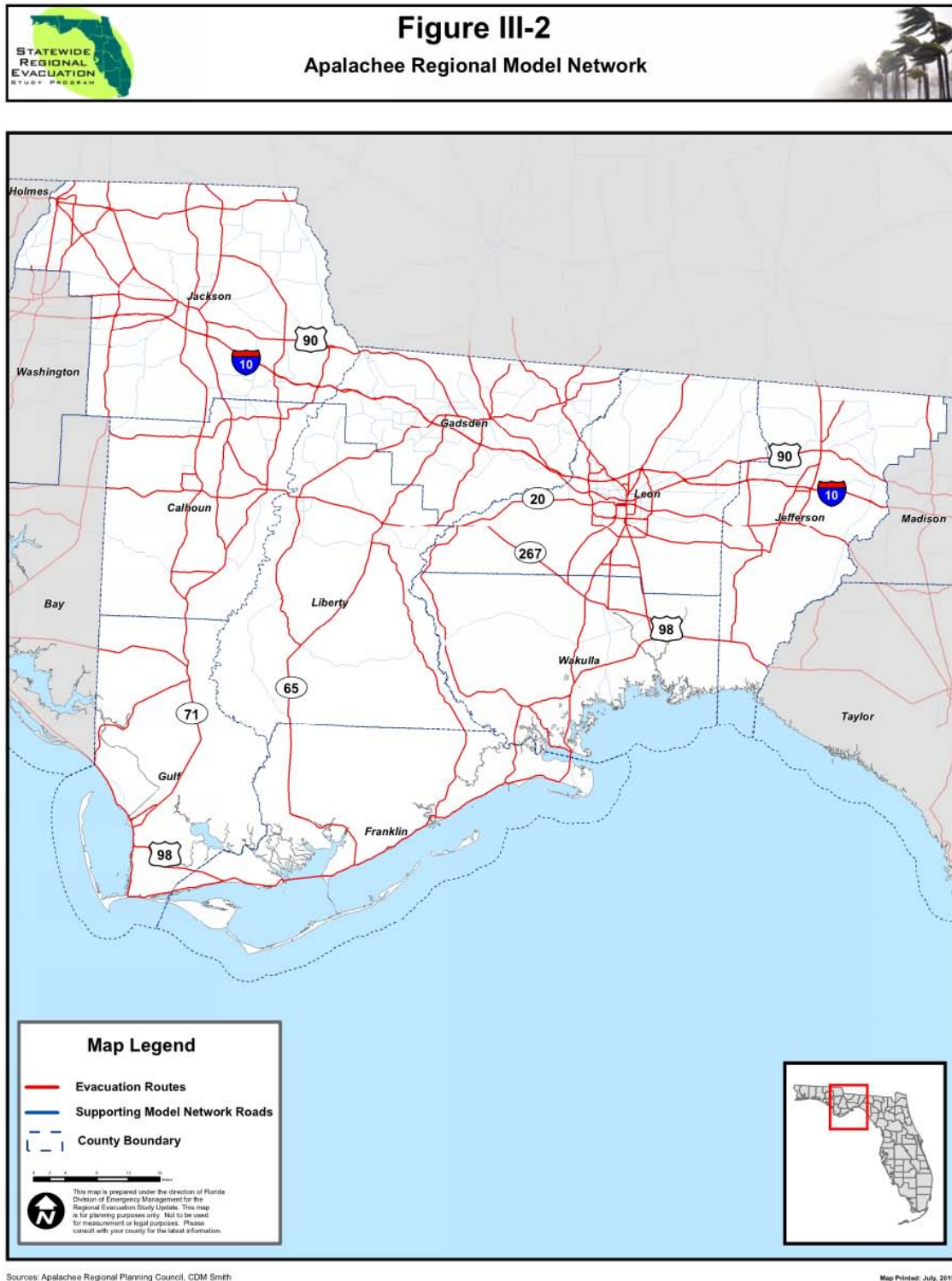
A. Regional Model Network

The road network is a key component of the evacuation model. The roadway variables in the network include area type, functional class, number of through lanes, capacity, speed, and several others. The regional model network consists of the RC designated evacuation routes as well as a supporting roadway network that facilitates movement of evacuation traffic. The 2015 Florida Department of Transportation (FDOT) Statewide Model Network (the latest model available) was used as a basis for developing the regional model network, while the evacuation routes were obtained from the ARPC. The ARPC worked with county emergency managers to determine which roads were to be included as evacuation routes. The resulting model network was updated to 2010 conditions and is referred to as the base model network. Figure III-2 identifies the model network and evacuation routes for the Apalachee region. County level details of the regional model network are provided in the Volume 5 report. The regional model network for the Apalachee region includes key roadways within the nine county region, including I-10, US 231, US 27, US 98, US 90, US 19, US 319, SR 71, SR 20, SR 65, SR 61, SR 363 and SR 59.

B. Regional Zone System

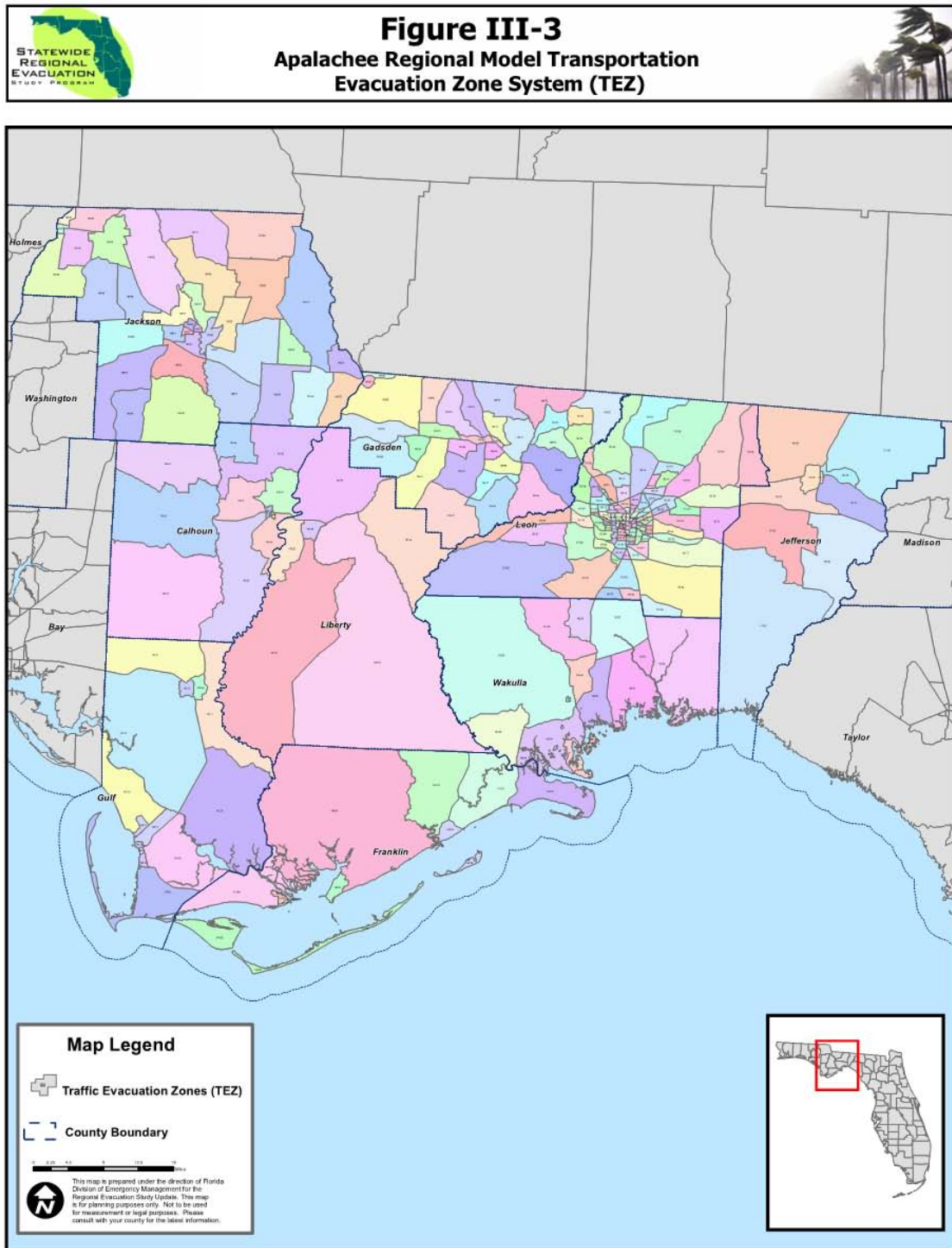
The regional zone system is based on Traffic Evacuation Zones (TEZ) and contains the regional demographic information, which includes housing and population data that is essential to modeling evacuation traffic, as discussed in Chapter II. The regional demographic characteristics identify where the individuals in the region reside, as well as where the vulnerable populations are located. The TEZs are aggregations of the smaller small area data geographies provided by the RC. Each traffic evacuation zone has a unique identification number that is used by the model to connect evacuation trip generation to the evacuation highway network. There is a buffer in zone numbering between counties to allow for future growth in each county.





The final TEZ system for the State of Florida has 8,829 zones. Of the total number of zones in Florida, 224 of the zones are located within the nine county Apalachee region, as illustrated in Figure III-3. In the Apalachee region, Leon County has the largest number of TEZs with 97 and Jackson County follows with 35 TEZs. Liberty, Franklin and Jefferson Counties have the lowest number of TEZs within the RPC with 6 and 10 TEZs, respectively. The larger number of TEZs generally reflects counties with denser urban form and higher population densities. The number of TEZs for each county in the region is listed below:

- Calhoun – 11
- Franklin – 10
- Gadsden – 31
- Gulf – 13
- Jackson – 35
- Jefferson – 10
- Leon – 97
- Liberty – 6
- Wakulla – 11



C. Regional Demographic Characteristics

As discussed in Chapter II, the evacuation model uses the demographic information as input for generating a set of evacuation trips. The demographic data were developed for the following years: 2010, 2015, and 2020.

A snapshot of the key demographic data for each county in the Apalachee region for 2010, 2015 and 2020 is summarized in Table III-1. The tables list the number of occupied dwelling units for site built homes, the permanent population in site-built homes, as well as the number of occupied dwelling units for mobile homes and the permanent population in mobile homes. The mobile home category includes RVs and boats and the permanent population in those housing options. The demographic characteristics summary also includes hotels and motels because many of these units are in vulnerable areas, and the proportion of seasonal units and hotel/motel units that are occupied at any point in time will have an important impact on the total population that may participate in an evacuation. Detailed demographic data for each individual TEZ within the region is included in Volume 5.

Leon County has the largest population in the region and is expected to reach approximately 300,000 people by 2020. Gadsden and Jackson Counties have the second and third largest populations in the region. Liberty County has the least population in the region and is projected to have less than 10,000 people in 2020. Leon County has the highest population numbers for mobile home residents for all three time periods; however this only represents approximately 8% of the population. In contrast, almost 47% of Liberty County residents reside in mobile homes while 37% of Wakulla County residents do as well.

Table III-1 - Apalachee Demographic Characteristics

County	Characteristic	Year		
		2010	2015	2020
Calhoun	Occupied site-built homes	3,419	3,491	3,634
	Population in site-built homes	8,345	8,515	8,869
	Occupied mobile homes	1,642	1,677	1,746
	Population in mobile home	4,389	4,483	4,665
	Hotel/motel units	24	24	24
Franklin	Occupied site-built homes	3,191	3,306	3,306
	Population in site-built homes	7,418	7,686	7,689
	Occupied mobile homes	1,063	1,102	1,102
	Population in mobile home	2,303	2,386	2,386
	Hotel/motel units	457	457	457
Gadsden	Occupied site-built homes	12,250	12,579	12,804
	Population in site-built homes	30,602	31,420	31,975
	Occupied mobile homes	4,702	4,826	4,913
	Population in mobile home	13,626	13,990	14,242
	Hotel/motel units	456	456	456
Gulf	Occupied site-built homes	4,224	4,251	4,286
	Population in site-built homes	9,075	9,134	9,208
	Occupied mobile homes	1,111	1,116	1,125
	Population in mobile home	3,338	3,353	3,380
	Hotel/motel units	160	160	160
Jackson	Occupied site-built homes	12,755	12,810	12,858
	Population in site-built homes	30,679	30,809	30,930
	Occupied mobile homes	4,662	4,684	4,700
	Population in mobile home	11,073	11,124	11,162
	Hotel/motel units	829	829	829
Jefferson	Occupied site-built homes	3,716	3,701	3,826
	Population in site-built homes	7,878	7,846	8,113
	Occupied mobile homes	1,930	1,919	1,983
	Population in mobile home	5,544	5,513	5,697
	Hotel/motel units	197	197	197
Leon	Occupied site-built homes	101,411	104,813	109,845
	Population in site-built homes	237,554	245,528	257,296
	Occupied mobile homes	9,534	9,859	10,332
	Population in mobile home	22,939	23,727	24,865
	Hotel/motel units	5,990	5,990	6,000
Liberty	Occupied site-built homes	1,590	1,760	1,866
	Population in site-built homes	3,428	3,794	4,024
	Occupied mobile homes	935	1,034	1,096
	Population in mobile home	3,055	3,381	3,584
	Hotel/motel units	12	12	12
Wakulla	Occupied site-built homes	6,769	7,057	7,663
	Population in site-built homes	17,997	18,763	20,375
	Occupied mobile homes	3,721	3,879	4,212
	Population in mobile home	9,351	9,747	10,584
	Hotel/motel units	205	205	205

Source: Apalachee Regional Council

D. Planned Roadway Improvements

To correspond to the three different sets of demographic data, three model networks were ultimately developed. The base 2010 network, discussed in section A, and two future year networks to correspond to the 2015 demographic data and the 2020 demographic data. The 2010 base model network was updated to reflect roadway capacity improvement projects completed between 2011 and 2015 to create the 2015 network. The 2015 network was then updated to reflect planned roadway capacity improvement projects expected to be implemented between 2016 and 2020 to create the 2020 network.

The planned roadway improvements that were added to the network generally include only capacity improvement projects such as additional through lanes. Table III-2 identifies capacity improvement projects completed between 2011 and 2015 that were included in the 2015 network. Likewise, Table III-3 identifies capacity improvement projects planned for implementation between 2016 and 2020. The tables identify each roadway that will be improved as well as the extent of the improvement.

It is important to note that Tables III-2 and III-3 are not intended to be all inclusive of every transportation improvement project completed within the region. The tables only identify key capacity improvement projects that impact the evacuation model network and are anticipated to have an impact on evacuation clearance times.

Table III-2 - Apalachee Region Roadway Improvements, 2015

County	Roadway	From	To	Number of Lanes
Leon	Gaines St	Monroe St	Bradford Rd	2
	Franklin Blvd	Lafayette St	Tennessee St	2
	Capital Circle NW	I-10	Blountstown Hwy	6
	Mahan Dr/US Hwy 90	Dempsey Mayo Rd	I-10	4

Sources: FDOT SIS First Five Year Plan, FDOT SIS Second Five Year Plan, Apalachee Regional Planning Council

Note: Projects included in this table are roadway improvement projects completed between 2011 and 2015 on roadways that are included in the regional transportation model network. Only projects which added roadway capacity, such as additional through lanes, were included. The list is not intended to be all inclusive of every transportation improvement project completed within the region. A list of historical projects completed during the last five years was included in this report because the base regional network developed for the study, along with the base demographic data, is for the year 2010.

Table III-3 – Apalachee Region Planned Roadway Improvements, 2020

County	Roadway	From	To	Number of Lanes
Leon	Capital Circle SW	Crawfordville Rd	Blountstown Hwy	6
	Woodville Hwy	Capital Circle	Gaile Ave	4
	FAMU Way	Wahnish Way	Lake Bradford Rd	2
Wakulla	Crawfordville Hwy	East Ivan Rd	Leon County Line	4

Sources: FDOT SIS First Five Year Plan, FDOT SIS Second Five Year Plan, Apalachee Regional Planning Council

Note: Projects included in this table are roadway improvement projects planned for completion between 2016 and 2020 on roadways that are included in the regional transportation model network. Only projects which are planned to add roadway capacity, such as additional through lanes, were included. The list is not intended to be all inclusive of every transportation improvement project planned for completion within the region.

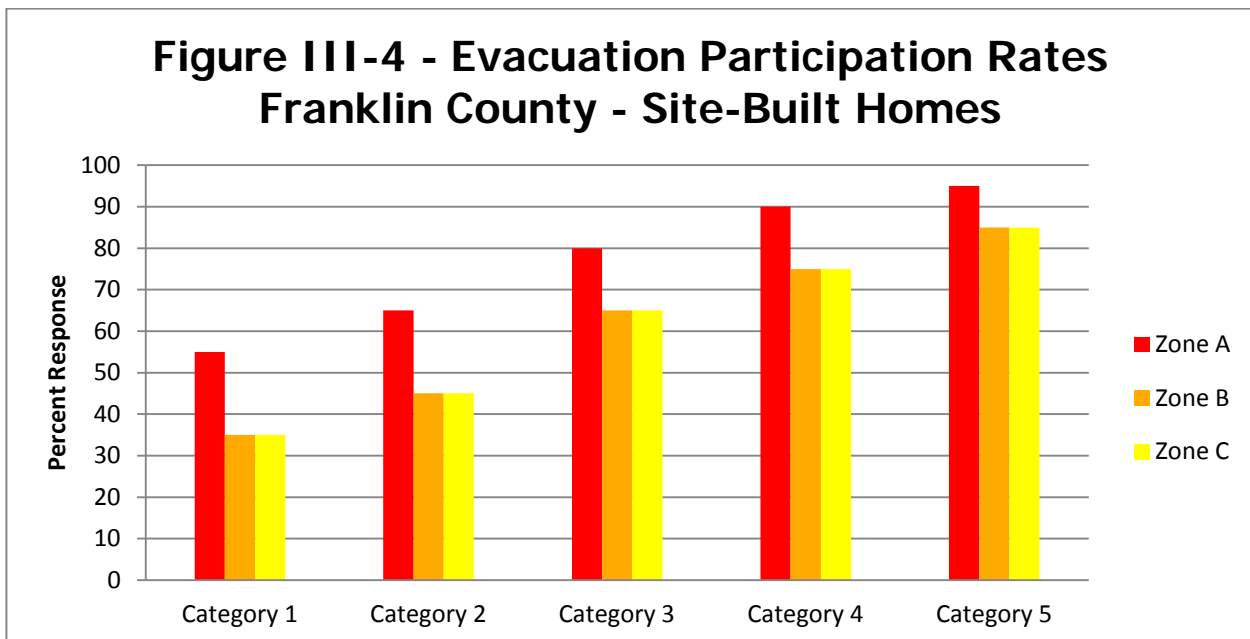
E. Behavioral Assumptions

The behavioral assumptions provide important information on the way people respond to an evacuation order and are an important input to the SRESP transportation evacuation model. For the Apalachee region, evacuation rates for site-built homes and mobile/manufactured homes are provided by county and summarized in Figure III-4 through Figure III-13. Other rates, such as out of county trip rates, vehicle use rates, public shelter use rates, friend/relative refuge use rates, hotel/motel refuge use rates, and other refuge use rates, are detailed by county, storm threat and evacuation zone in Volume 5-2.

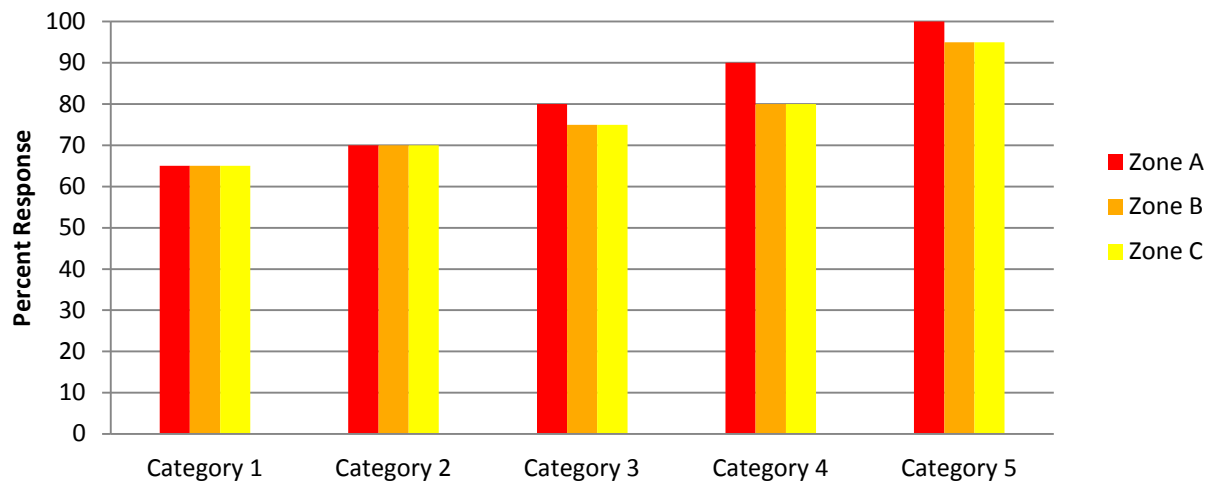
A review of the evacuation rates for the Apalachee region illustrates that evacuation participation rates increase as the evacuation level increases, and participation rates for persons living in mobile/manufactured homes are generally higher than for persons living in site-built homes. It should be noted that a certain percentage of the population evacuates, even when they are not living in an area that is ordered to evacuate. These people are commonly referred to as shadow evacuees. Shadow evacuation rates are also included in Figure III-4 through Figure III-13.

Please note that the original behavioral response rates provided by SRESP in Volume 2-2 were modified to fit the evacuation zones created by each of the counties. The original rates were based on a five zone system; however, the evacuation zones for the Apalachee region range from two to four zones depending upon the county. The evacuation zone systems for the Apalachee region are listed below:

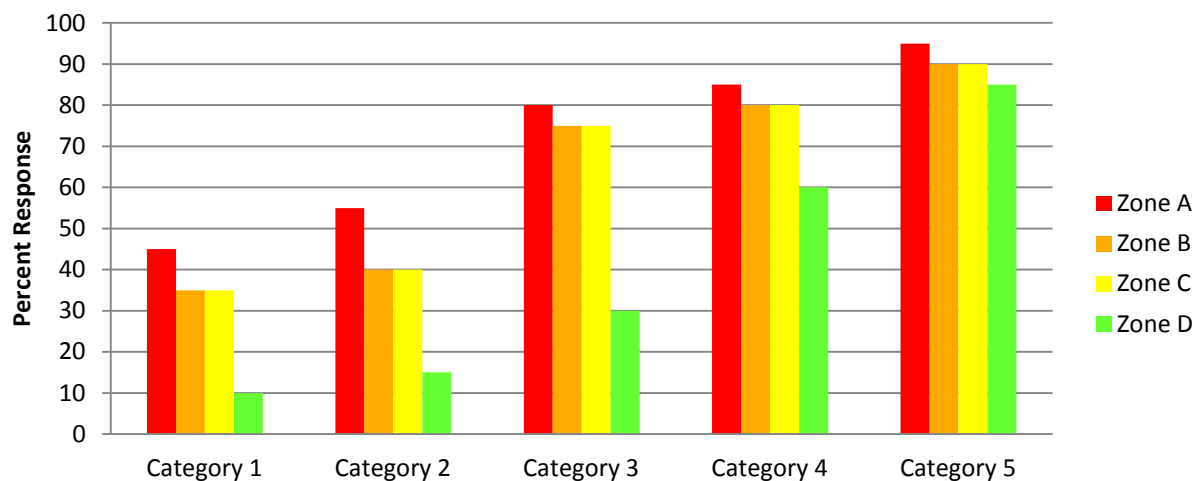
- Gulf – 4 zones: Zone A, Zone B, Zone C, Zone D;
- Franklin – 2 zones: Zone A, Zone B;
- Jefferson – 4 zones: Zone A, Zone B, Zone C, Zone D;
- Leon – 2 zones: Zone C, Zone D;
- Wakulla – 3 zones: Zone A, Zone B, Zone C.



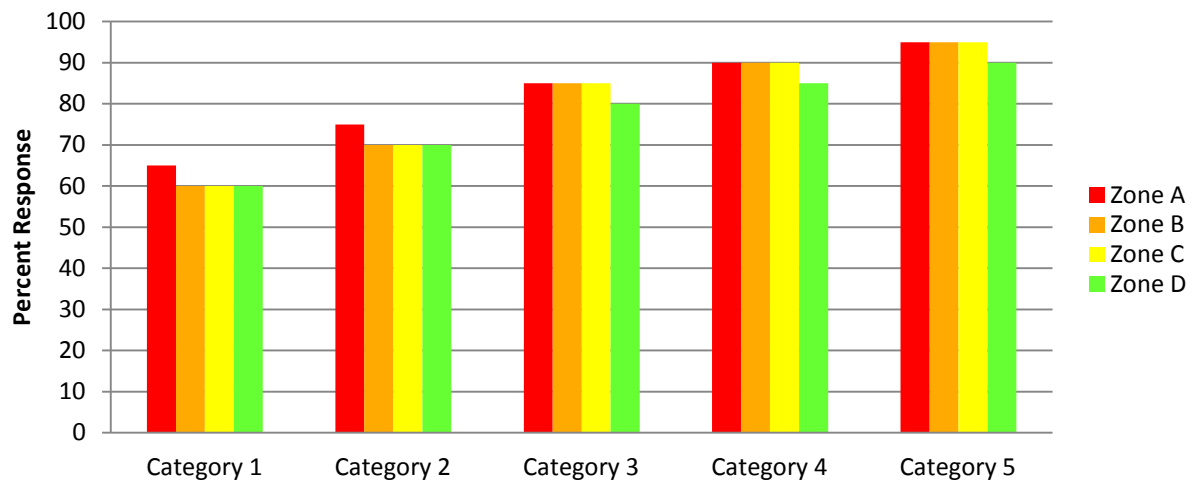
**Figure III-5 - Evacuation Participation Rates
Franklin County - Mobile Homes**



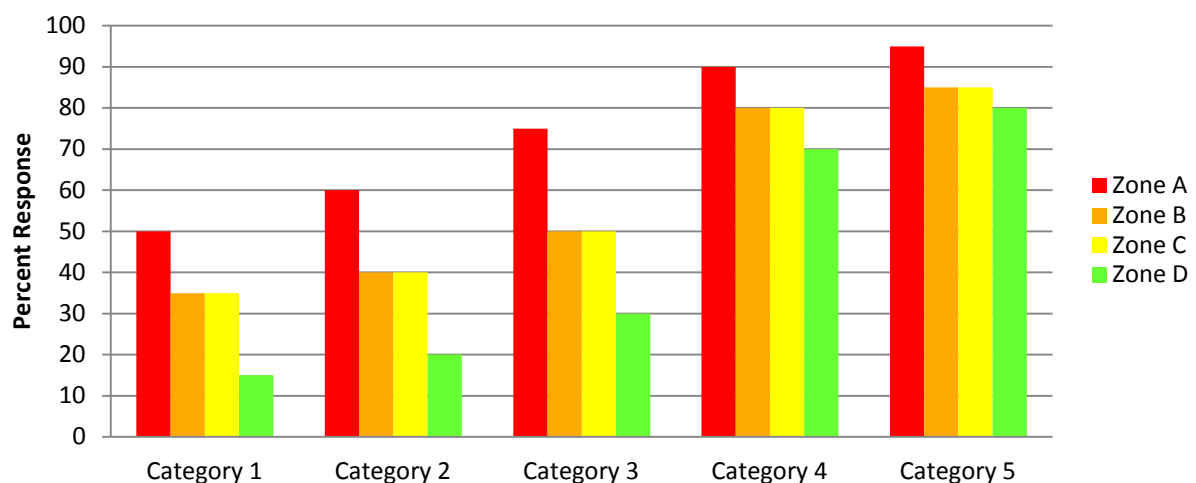
**Figure III-6 - Evacuation Participation Rates
Gulf County - Site-Built Homes**



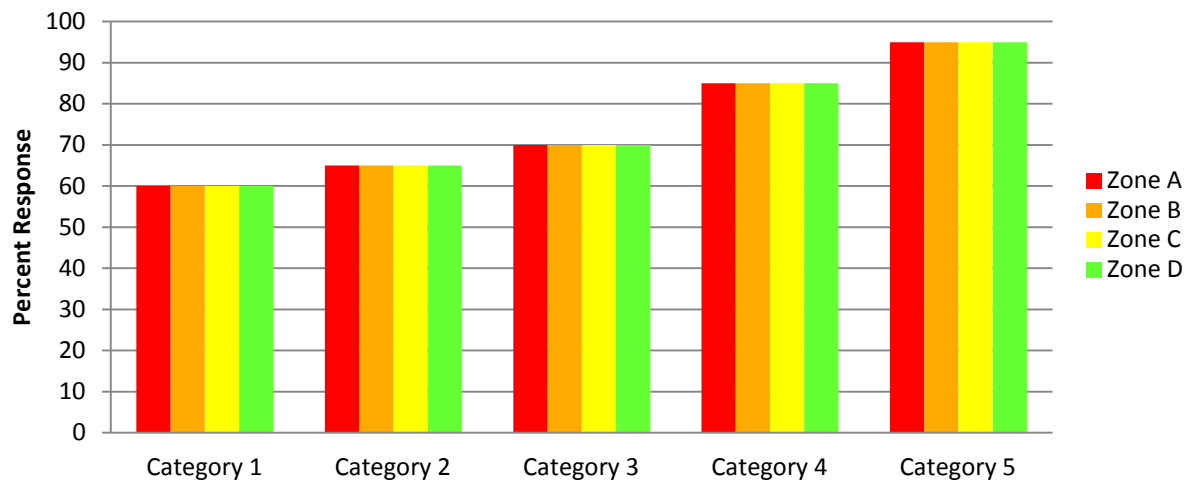
**Figure III-7 - Evacuation Participation Rates
Gulf County - Mobile Homes**



**Figure III-8 - Evacuation Participation Rates
Jefferson County - Site-Built Homes**



**Figure III-9 - Evacuation Participation Rates
Jefferson County - Mobile Homes**



**Figure III-10 - Evacuation Participation Rates
Leon County - Site-Built Homes**

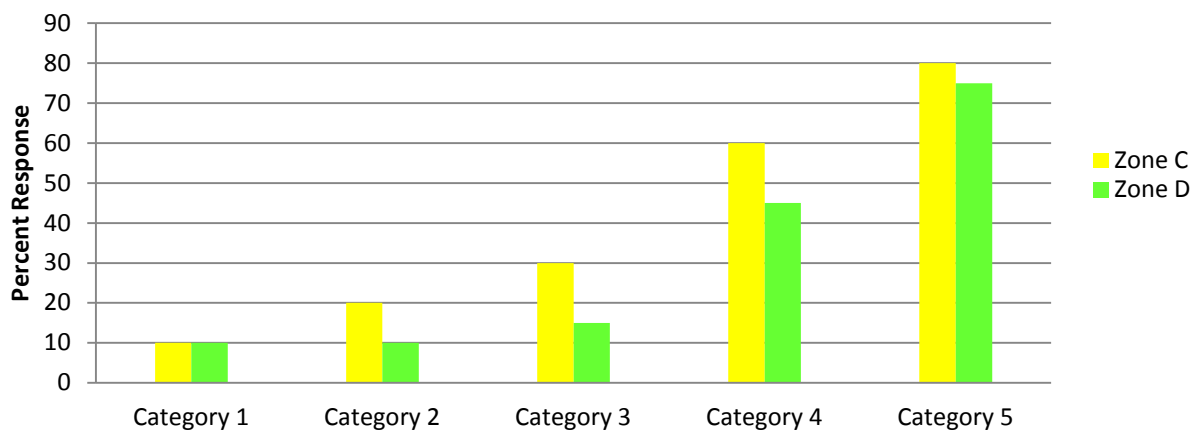


Figure III-11 - Evacuation Participation Rates
Leon County - Mobile Homes

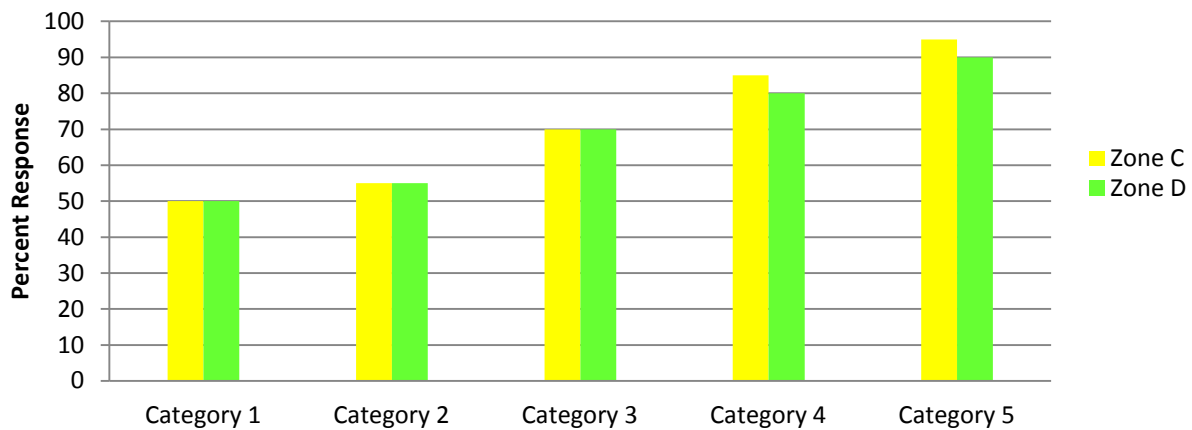
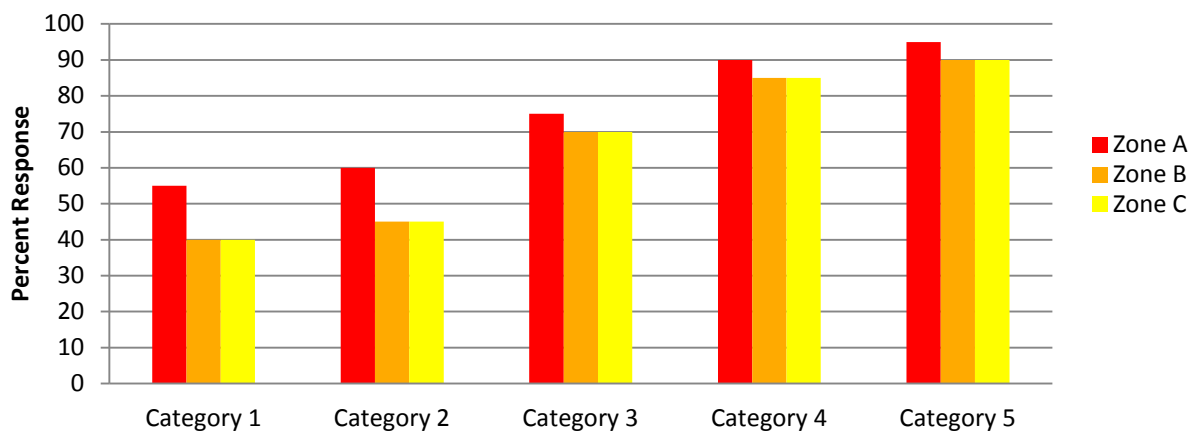
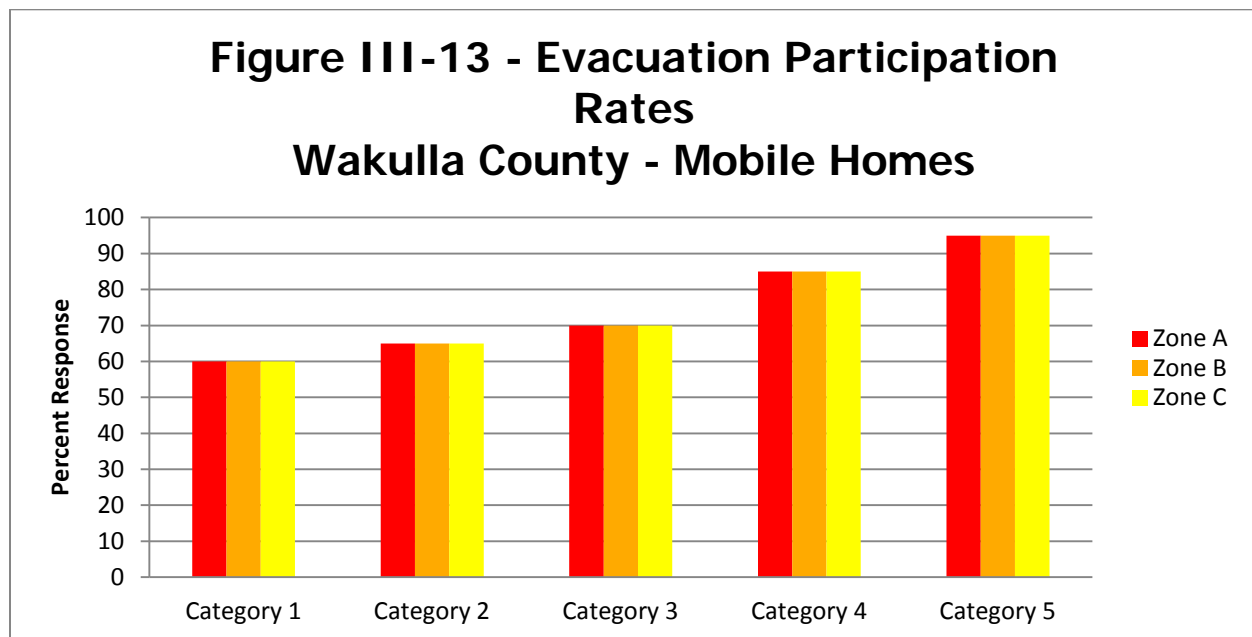


Figure III-12 - Evacuation Participation Rates
Wakulla County - Site-Built Homes





F. Shelters

In order for the transportation model to accurately assign public shelter trips to the correct location, a complete list of available public shelters needs to be available. The Apalachee region compiled the list of available primary shelters using information provided by the local county emergency managers. In the nine county Apalachee region, there is a total of 27 primary shelters as listed below:

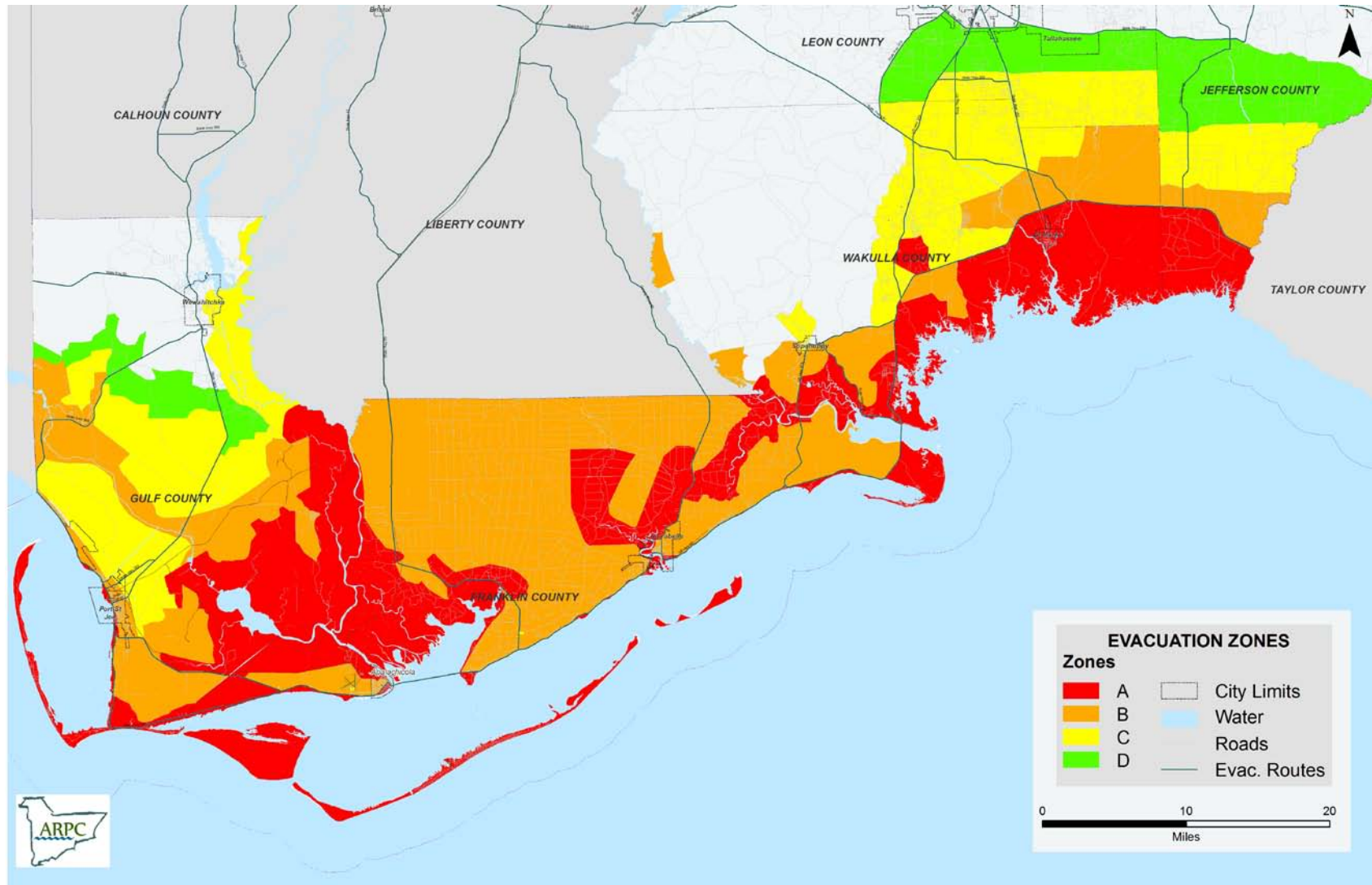
- Calhoun – 1
- Franklin – 0
- Gadsden – 2
- Gulf – 2
- Jackson – 3
- Jefferson – 1
- Leon – 15
- Liberty – 1
- Wakulla – 2

These shelters have the capacity to host more than 38,000 evacuees during an emergency event. Detailed lists of the available public shelters by county are included in Volume 5-2.

G. Evacuation Zones

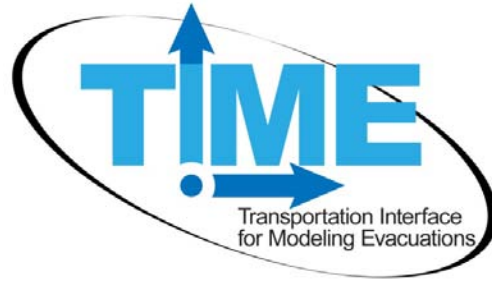
The final input variable that is needed to complete the transportation evacuation model is the delineation of evacuation zones for all coastal counties. Local county emergency managers have the responsibility of identifying and defining evacuation zones for their county. Within the Apalachee region five counties, Franklin, Gulf, Jefferson, Leon and Wakulla, have updated evacuation zones based on the results of the new data and information collected as part of the SRESP update in 2014. Evacuation zones for the Apalachee region are illustrated in Figure III-14. County level evacuation zone maps are also included in Volume 5-2.

Figure III-14 – Apalachee Region Evacuation Zone Map



H. TIME User Interface

CDM Smith 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** - The first input variable is the evacuation analysis time period. The time period selections include 2010, 2015 and 2020. The time period determines which set of demographic data and which version of the model network will be used.
- **Highway network** - Once the time period is selected, the user must pick either the default highway network or a modified network. The default includes the network corresponding to the selected time period and also incorporates planned highway improvement projects from the Florida Department of Transportation Work Program. In the case that there are any new projects or changes need to be taken into account, the modified network would be chosen. These changes could include possible road or bridge closures because of storm conditions or any managed traffic diversions or traffic control measures.
- **Behavioral response** - The next variable is behavioral response, which is a set of “planning assumptions” that describe the way people respond to an order to evacuate and are an important input to the SRESP Evacuation Model. A user may choose 100% or the survey response. The 100% response indicates that 100% of people in evacuation zones will evacuate, while the survey response uses the percentage of people from the behavioral planning assumptions corresponding to the evacuation level for each county.
- **One-way evacuation operations** - Another variable for consideration is whether to allow one-way evacuation operations or not. One-way evacuation operations allow take into account the FDOT one-way evacuation operations plans for major facilities, including I-10.
- **University population** - The model permits the user to incorporate the university housing data. The default assumption is that the region’s universities are at the maximum housing capacity housing during the Fall/Spring semester. The other options available are the summer university population, which is typically much less than the fall or spring, and an option for no school in session.

- **Tourist occupancy rates** - The RPC has the option to choose the default rates or to modify those rates based on any special circumstance they may have for tourist rates since there are different tourist seasons, sectors and special events. For example, the Apalachee RC may want to take into account additional traffic that would be generated by visitors for a large sporting event. If modified rates are desired, then the user may select no tourist occupancy or modify the rates on a county by county basis.
- **Shelters** - When choosing which shelters are open to the public during an evacuation event, the user may select either primary shelters or other shelters, both primary and other shelters, and/or modified. In many situations, the shelters category may need to be modified because of availability or capacity changes.
- **Counties evacuating** - The evacuating counties are the counties within the geographic extent of Apalachee's model network and include both coastal and inland counties. The coastal counties in Florida include Nassau, Duval, Flagler, St. Johns, Volusia, and Brevard Counties; Georgia coastal counties include Camden and Glynn. The inland counties in Florida are Baker, Clay, Putnam, Madison, Suwannee, Lafayette, Columbia, Union, Bradford, Alachua, Marion, Lake, Seminole, Orange, and Osceola Counties. The inland counties in Georgia are Brantley, Charlton, Ware, Clinch, Echols, and Lowndes Counties. The user has the opportunity to pick which of the counties in the network actually evacuate.
- **Evacuation level** - Once the evacuating counties are chosen, the evacuation level is designated. The evacuation levels range from A to E and represent the evacuation zones that are ordered to evacuate (with an exception with zone F). The user may also select "none", which assumes that no evacuations are made within the selected county; only regular background traffic will occur.
- **Response curve hours** – The user must define which evacuation response curve will be applied to each evacuating county in the area. The evacuation response curves show the proportion of evacuation by increment of time for evacuation orders that were issued. There are six different curves from which to choose: a 6-hour curve, 9-hour curve, 12-hour curve, 18-hour curve, 24-hour curve, and a 36-hour curve. The faster curves represent more urgent circumstances and slower curves represent less urgent circumstances.
- **Evacuation Phasing** – The phase selection indicates when an evacuation would begin in a given county. There are ten different options beginning in hour 1 and extending to hour 27. After hour 3, the other phasing options follow in 3 hour increments.

CHAPTER IV

TRANSPORTATION ANALYSIS

The transportation analysis brings together key factors such as evacuation level, transportation network, shelters, and evacuation population, and explicitly links people's behavioral responses to the regional evacuation infrastructure. The results of this analysis help to formulate effective and responsive evacuation policy options. Two distinct sets of analyses were conducted using the SRESP evacuation transportation model, including one set of analysis for growth management purposes and one set of analysis for emergency management purposes. The results of this analysis are discussed in this chapter.

A. Vulnerable Population

Using a combination of the demographic data, behavioral assumptions, and evacuation zones, the vulnerable population in each county was determined by evacuation zone. For the purposes of the transportation analysis, the vulnerable population, or population-at-risk, is defined as the total population living within the county designated evacuation zones for each evacuation level. This population is living in an area that is at risk for severe flooding during a storm event. The vulnerable population for the Apalachee region for 2015 is identified in Table IV-1, summarized by evacuation zone and split between site-built homes and mobile/manufactured homes. Vulnerable population for 2020 is summarized in Table IV-2.

Table IV-1 – Vulnerable Population in the Apalachee Region for 2015

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Total
Franklin County					
Site-built Homes	3,699	3,857	N/A		
Mobile/Manuf. Homes	929	1,431	N/A		
TOTAL	4,628	5,288	N/A		9,916
Gulf County					
Site-built Homes	1,818	3,228	2,240	189	
Mobile/Manuf. Homes	201	263	1,224	84	
TOTAL	2,019	3,491	3,464	274	9,248
Jefferson County					
Site-built Homes	104	65	150	265	
Mobile/Manuf. Homes	116	72	166	278	
TOTAL	220	137	316	543	1,216
Leon County					
Site-built Homes	N/A		2,772	2,408	
Mobile/Manuf. Homes	N/A		2,981	1,831	
TOTAL	N/A		5,753	4,241	9,994
Wakulla County					
Site-built Homes	5,934	2,653	6,835	N/A	
Mobile/Manuf. Homes	1,645	834	5,306	N/A	
TOTAL	7,578	3,486	12,141	N/A	23,205

Note: Vulnerable population was determined using small area data and county evacuation zones and is not inclusive.

Table IV-2 – Vulnerable Population in the Apalachee Region for 2020

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Total
Franklin County					
Site-built Homes	3,700	3,859	N/A		
Mobile/Manuf. Homes	929	1,431	N/A		
TOTAL	4,629	5,290	N/A		9,919
Gulf County					
Site-built Homes	1,833	3,254	2,261	191	
Mobile/Manuf. Homes	202	264	1,232	84	
TOTAL	2,035	3,518	3,493	275	9,321
Jefferson County					
Site-built Homes	108	67	155	274	
Mobile/Manuf. Homes	120	75	172	288	
TOTAL	228	142	327	562	1,259
Leon County					
Site-built Homes	N/A		2,907	2,524	
Mobile/Manuf. Homes	N/A		3,122	1,921	
TOTAL	N/A		6,029	4,445	10,474
Wakulla County					
Site-built Homes	6,444	2,880	7,420	N/A	
Mobile/Manuf. Homes	1,785	905	5,765	N/A	
TOTAL	8,229	3,785	13,185	N/A	25,199

Note: Vulnerable population was determined using small area data and county evacuation zones and is not inclusive. The population listed for Evacuation Zone B does not include the population listed for Evacuation Zone A. Refer to the Evacuation Zone map in Chapter III.

In addition, based on the demographic data, behavioral assumptions, and evacuation zones, the planned destinations of vulnerable population in each county can be determined by evacuation zones. Destinations include friends and family, hotel/motel, public shelter, and other locations. Vulnerable population destinations for the Apalachee region are identified in Table IV-3 for 2015 and in Table IV-4 for 2020.

Table IV-3 – Vulnerable Population by Destination for 2015

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Total
Franklin County					
To Friends and Family	2,407	2,787	N/A		
To Hotel/Motel	1,110	1,251	N/A		
To Public Shelter	148	308	N/A		
To Other Destinations	962	943	N/A		
Total	4,627	5,279			9,906
Gulf County					
To Friends and Family	1,151	1,972	2,150	167	
To Hotel/Motel	475	833	682	56	
To Public Shelter	107	182	210	22	
To Other Destinations	287	503	422	29	
Total	2,022	3,490	3,464	274	9,250
Jefferson County					
To Friends and Family	143	89	206	353	
To Hotel/Motel	22	14	32	54	
To Public Shelter	28	17	40	68	
To Other Destinations	27	17	39	68	
Total	220	137	317	543	1,217
Leon County					
To Friends and Family	N/A		3,601	2,636	
To Hotel/Motel	N/A		853	665	
To Public Shelter	N/A		437	304	
To Other Destinations	N/A		863	636	
Total			5,754	4,241	9,995
Wakulla County					
To Friends and Family	4,926	2,266	7,892	N/A	
To Hotel/Motel	1,055	481	1,556	N/A	
To Public Shelter	379	174	607	N/A	
To Other Destinations	1,219	565	2,086	N/A	
Total	7,579	3,486	12,141		23,206

Note: Vulnerable population was determined using small area data and county evacuation zones. Vulnerable population numbers are not inclusive, for example, vulnerable population listed for Evacuation Zone B does not include vulnerable population listed for Evacuation Zone A. Refer to the Evacuation Zone map in Chapter III.

Table IV-4 – Vulnerable Population by Destination for 2020

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Total
Franklin County					
To Friends and Family	2,407	2,788	N/A		
To Hotel/Motel	1,111	1,251	N/A		
To Public Shelter	148	308	N/A		
To Other Destinations	962	943	N/A		
Total	4,628	5,2790			9,918
Gulf County					
To Friends and Family	1,160	1,988	2,167	169	
To Hotel/Motel	478	840	688	56	
To Public Shelter	107	182	210	22	
To Other Destinations	289	507	425	29	
Total	2,034	3,517	3,490	276	9,317
Jefferson County					
To Friends and Family	147	92	213	365	
To Hotel/Motel	23	14	33	56	
To Public Shelter	28	17	40	68	
To Other Destinations	28	18	40	70	
Total	226	141	326	559	1,252
Leon County					
To Friends and Family	N/A		3,773	2,763	
To Hotel/Motel	N/A		894	697	
To Public Shelter	N/A		458	318	
To Other Destinations	N/A		904	667	
Total			6,029	4,445	10,474
Wakulla County					
To Friends and Family	5,349	2,460	8,570	N/A	
To Hotel/Motel	1,145	523	1,689	N/A	
To Public Shelter	379	174	607	N/A	
To Other Destinations	1,324	613	2,266	N/A	
Total	8,197	3,770	13,132		25,099

Note: Vulnerable population was determined using SRESP small area data and county provided evacuation zones. Vulnerable population numbers are not inclusive, for example, vulnerable population listed for Evacuation Zone B does not include vulnerable population listed for Evacuation Zone A. Refer to the Evacuation Zone map in Chapter III.

The vulnerable shadow population is provided in Table IV-5 for both 2015 and 2020. The vulnerable shadow population was determined using the behavioral assumptions for evacuating shadow population and is based on storm category not evacuation zone.

Table IV-5 – Vulnerable Shadow Evacuation Population

	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane	Category 4 Hurricane	Category 5 Hurricane
2015					
Calhoun County	4,901	5,327	6,178	6,603	7,029
Franklin County	3,138	808	797	804	810
Gadsden County	17,127	18,696	20,265	21,834	23,403
Gulf County	5,190	4,075	2,208	2,235	2,318
Jackson County	12,682	14,223	17,303	18,844	20,384
Jefferson County	5,864	6,153	6,316	6,375	6,738
Leon County	36,166	48,561	75,881	85,484	97,637
Liberty County	3,574	3,779	4,163	4,363	4,576
Wakulla County	12,173	10,625	2,616	2,783	2,951
Total	100,815	112,247	135,727	150,325	165,846
2020					
Calhoun County	5,109	5,553	6,441	6,886	7,330
Franklin County	3,136	806	795	802	808
Gadsden County	17,440	19,038	20,636	22,235	23,833
Gulf County	5,230	4,104	2,222	2,246	2,329
Jackson County	12,725	14,271	17,364	18,910	20,456
Jefferson County	6,076	6,374	6,542	6,599	6,974
Leon County	37,870	50,847	79,457	89,508	102,234
Liberty County	3,798	4,016	4,424	4,637	4,863
Wakulla County	13,211	11,531	2,814	2,996	3,177
Total	104,595	116,540	140,695	154,819	172,004

Note: Vulnerable shadow population determined using SRESP behavioral data and county provided evacuation zones. As opposed to Tables IV-1 through IV-4, vulnerable population numbers used for this table are inclusive, meaning population numbers listed for a higher category of storm are included in the lower category. For example, vulnerable population listed for Category 2 does include vulnerable population listed for Category 1. The resulting numbers are then subtracted from the evacuating population as reported in the modeling results to provide the vulnerable shadow evacuation population amount by county, per category of storm.

B. Clearance Time Definitions

The determination of clearance time is one of the most important outcomes from the evacuation transportation analysis. Calculated clearance times are used by county emergency managers as one input to determine when to recommend an evacuation order. This calculation can include the population-at-risk, shadow evacuees, as well as evacuees from other counties anticipated to pass through the county. Clearance time is developed to include the time required for evacuees to secure their homes and prepare to leave, the time spent by all vehicles traveling along the evacuation route network, and the additional time spent on the road caused by traffic and road congestion. Clearance time does not relate to the time any one vehicle spends traveling along the evacuation route network, nor does it guarantee vehicles will safely reach their destination once outside the County. The four clearance times that are calculated as part of the evacuation transportation analysis include the following:

- **Clearance Time to Shelter** - The time necessary to safely evacuate vulnerable residents and visitors to a “point of safety” within the county based on a specific hazard, behavioral assumptions and evacuation scenario. Calculated from the point in time when the evacuation order is given to the point in time when the last vehicle reaches a point of safety within the county. Key points to remember for clearance time to shelter include:
 - All in-county trips reach their destination within the county; and,
 - This definition does not include any out of county trips.
- **In-County Clearance Time** - The time required from the point an evacuation order is given until the last evacuee can either leave the evacuation zone or arrive at safe shelter within the county. This does not include those evacuees leaving the county on their own. Key points to remember for in-county clearance time include:
 - All in-county trips reach their destination within the county;
 - All out of county trips exit the evacuation zone, but may still be located in the county; and,
 - This definition does not include out-of-county pass-through trips from adjacent counties, unless they evacuate through an evacuation zone.
- **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. Key points to remember for out of county clearance time include:
 - The roadway network within the county is clear;
 - All out of county trips exit the county, including out of county pass-through trips from adjacent counties; and,
 - All in-county trips reach their destination.
- **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 last vehicle assigned an external destination exits the region. Key points to remember for regional clearance time include:

- The roadway network within the RPC is clear;
- All out of county trips exit the RPC, including out of county pass-through trips from adjacent counties;
- All in-county trips reach their destination; and,
- Regional clearance time is equal to the largest out of county clearance time for a given scenario for any of the counties within the RPC, since the out of county clearance time includes out of county pass through trips from adjacent counties.

C. Evacuation Model Scenarios

There are literally thousands of possible combinations of variables that can be applied using the evacuation transportation model, which will result in thousands of possible outcomes. For the purposes of this analysis, two distinct sets of analyses were conducted using the SRESP evacuation transportation model, including one set of analysis for growth management purposes and one set of analysis for emergency management purposes. The two sets of analysis include the following:

- **Base Scenarios** – The base scenarios were developed to estimate a series of worst case scenarios and are identical for all eleven RPCs across the State. These scenarios assume 100 percent of the vulnerable population evacuates and includes impacts from counties outside of the RPC area. These scenarios are generally designed for growth management purposes, in order to ensure that all residents that choose to evacuate during an event are able to do so; and,
- **Operational Scenarios** – The operational scenarios were developed by the RPCs in coordination with local county emergency managers and are designed to provide important information to emergency management personnel to plan for different storm events. These scenarios are different from region to region and vary for each category of hurricane.

Because of the numerous possible combinations of variables that can be applied in the model, the evacuation transportation model is available for use through the ARPC to continue testing combinations of options and provide additional information to emergency managers.

D. Base Scenarios

A total of ten base scenarios were developed through discussions with the SRESP Statewide Work Group and are identical for all eleven RPCs. Using a consistent set of base scenarios for all regions across the State provides a consistent background between regions. The base scenarios also allow the results to be used consistently from region to region for other purposes, such as growth management. It is important to note that evacuation zones were not used to determine evacuating population. The ten base scenarios were developed to include the following assumptions:

- **Analysis Time Period** – Five scenarios for the 2015 time period and five scenarios for the 2020 time period. The five scenarios for each time period include one for each of the five categories of hurricanes 1, 2, 3, 4 and 5.
- **Highway Network** – The five 2015 scenarios use the 2015 network and the five 2020 scenarios use the 2020 network, which includes planned roadway capacity improvement

projects expected to be implemented by 2020;

- **One-Way Evacuation Operations** – The base scenarios do not include implementation of any one-way evacuation operations;
- **University Population** – The base scenarios use the fall/spring semester data to estimate evacuation trips by the student population. This data was provided by each RPC as part of the demographic small area data;
- **Tourist Occupancy Rates** – The base scenarios use the default hotel/motel occupancy rates to estimate tourist evacuation trips. This data was provided by each RPC as part of the demographic small area data;
- **Shelters** – The base scenarios assume all designated primary shelters within each county in the model network are open. The base scenarios do not include shelters that are designated as other shelters, only primary shelters;
- **Response Curve** – The 12-hour response curve is used for all ten base scenarios;
- **Evacuation Phasing** - All counties that are evacuating begin at same time, within 1 hour of the evacuation order being given;
- **Behavioral Response** - For five categories of hurricanes (1, 2, 3, 4 or 5) in both the 2015 and 2020 time periods, the behavioral response for the base scenarios includes the following:
 - 100% response in evacuation zones for both mobile homes and site built homes for the counties in the Apalachee region, plus one coastal county on either side of the region (includes Bay, Franklin, Gulf, Jefferson, Leon, Taylor and Wakulla Counties);
 - 100% response for mobile homes in inland areas for the counties in the Apalachee region, plus one coastal county on either side of the region (includes Bay, Calhoun, Franklin, Gadsden, Gulf, Jackson, Jefferson, Leon, Liberty, Taylor and Wakulla Counties);
 - Planning Assumption response (shadow evacuation) for site built homes in inland areas for the counties in the Apalachee region plus one coastal county on either side of the region (includes Bay, Calhoun, Franklin, Gadsden, Gulf, Jackson, Jefferson, Leon, Liberty, Taylor and Wakulla Counties);
 - For the remaining counties in the Apalachee region model network, no evacuations are assumed, including shadow evacuations.

The ten base scenarios are summarized below in Table IV-6.

Table IV-6 – Base Scenarios

	Category 1 Scenario 1 2015	Category 2 Scenario 2 2015	Category 3 Scenario 3 2015	Category 4 Scenario 4 2015	Category 5 Scenario 5 2015
Demographic Data	2015	2015	2015	2015	2015
Highway Network	2015	2015	2015	2015	2015
One-Way Operations	None	None	None	None	None
University Population	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring
Tourist Rate	Default	Default	Default	Default	Default
Shelters Open	Primary	Primary	Primary	Primary	Primary
Response Curve	12-hour	12-hour	12-hour	12-hour	12-hour
Evacuation Phasing	None	None	None	None	None
Behavioral Response	100%	100%	100%	100%	100%
Counties Evacuating	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla
	Category 1 Scenario 6 2020	Category 2 Scenario 7 2020	Category 3 Scenario 8 2020	Category 4 Scenario 9 2020	Category 5 Scenario 10 2020
Demographic Data	2020	2020	2020	2020	2020
Highway Network	2020	2020	2020	2020	2020
One-Way Operations	None	None	None	None	None
University Population	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring
Tourist Rate	Default	Default	Default	Default	Default
Shelters Open	Primary	Primary	Primary	Primary	Primary
Response Curve	12-hour	12-hour	12-hour	12-hour	12-hour
Evacuation Phasing	None	None	None	None	None
Behavioral Response	100%	100%	100%	100%	100%
Counties Evacuating	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla	Bay Calhoun Franklin Gadsden Gulf Jackson Jefferson Leon Liberty Taylor Wakulla

E. Base Scenario Results

Each of the ten base scenarios was modeled for the Apalachee region using the regional evacuation model. Results were derived from the model to summarize the evacuating population, evacuating vehicles, clearance times, and critical congested roadways. These results are discussed in the following sections.

Evacuating Population

It is important to determine the evacuating population for each of the base scenarios in order to understand the magnitude of the evacuation effort, including estimated population that is evacuating and the potential demand for shelter space. Evacuating population as reported from the modeling results for the base scenarios is summarized by county for 2015 in Table IV-7 and for 2020 in Table IV-8.

Within the nine county region, total evacuating population ranges from just over 115,000 persons for a base scenario Category 1 Hurricane evacuation to more than 210,000 for a base scenario Category 5 Hurricane evacuation in 2015.

Table IV-7 – Evacuating Population by Base Scenario for 2015

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun County					
Site-built Homes	425	851	1,702	2,127	2,553
Mobile/Manuf. Homes	4,476	4,476	4,476	4,476	4,476
Tourists	0	0	0	0	0
TOTAL	4,901	5,327	6,178	6,603	7,029
Franklin County					
Site-built Homes	5,055	7,555	7,576	7,583	7,589
Mobile/Manuf. Homes	2,384	2,384	2,384	2,384	2,384
Tourists	326	753	753	753	753
TOTAL	7,765	10,692	10,713	10,720	10,726
Gadsden County					
Site-built Homes	3,138	4,707	6,276	7,845	9,414
Mobile/Manuf. Homes	13,989	13,989	13,989	13,989	13,989
Tourists	0	0	0	0	0
TOTAL	17,127	18,696	20,265	21,834	23,403
Gulf County					
Site-built Homes	3,851	6,080	7,621	7,921	8,004
Mobile/Manuf. Homes	3,358	3,358	3,358	3,358	3,358
Tourists	0	147	203	203	203
TOTAL	7,209	9,585	11,182	11,482	11,565
Jackson County					
Site-built Homes	1,540	3,081	6,161	7,702	9,242
Mobile/Manuf. Homes	11,142	11,142	11,142	11,142	11,142
Tourists	0	0	0	0	0
TOTAL	12,682	14,223	17,303	18,844	20,384
Jefferson County					
Site-built Homes	582	1,008	1,488	2,037	2,400
Mobile/Manuf. Homes	5,502	5,502	5,502	5,502	5,502
Tourists	0	0	0	53	53
TOTAL	6,084	6,510	6,990	7,592	7,955
Leon County					
Site-built Homes	12,394	24,789	52,109	65,947	78,100
Mobile/Manuf. Homes	23,772	23,772	23,772	23,772	23,772
Tourists	0	0	0	6	6
TOTAL	36,166	48,561	75,881	89,725	101,878
Liberty County					
Site-built Homes	199	404	788	988	1,201
Mobile/Manuf. Homes	3,375	3,375	3,375	3,375	3,375
Tourists	0	0	0	0	0
TOTAL	3,574	3,779	4,163	4,363	4,576
Wakulla County					
Site-built Homes	9,922	11,860	15,796	15,963	16,131
Mobile/Manuf. Homes	9,766	9,766	9,766	9,766	9,766
Tourists	63	64	260	260	260
TOTAL	19,751	21,690	25,822	25,989	26,157

Table IV-8 – Evacuating Population by Base Scenario for 2020

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Calhoun County					
Site-built Homes	444	888	1,776	2,221	2,665
Mobile/Manuf. Homes	4,665	4,665	4,665	4,665	4,665
Tourists	0	0	0	0	0
TOTAL	5,109	5,553	6,441	6,886	7,330
Franklin County					
Site-built Homes	5,055	7,555	7,576	7,583	7,589
Mobile/Manuf. Homes	2,384	2,384	2,384	2,384	2,384
Tourists	326	753	753	753	753
TOTAL	7,765	10,692	10,713	10,720	10,726
Gadsden County					
Site-built Homes	3,197	4,795	6,393	7,992	9,590
Mobile/Manuf. Homes	14,243	14,243	14,243	14,243	14,243
Tourists	0	0	0	0	0
TOTAL	17,440	19,038	20,636	22,235	23,833
Gulf County					
Site-built Homes	3,879	6,124	7,678	7,978	8,061
Mobile/Manuf. Homes	3,386	3,386	3,386	3,386	3,386
Tourists	0	147	203	203	203
TOTAL	7,265	9,657	11,267	11,567	11,650
Jackson County					
Site-built Homes	1,546	3,092	6,185	7,731	9,277
Mobile/Manuf. Homes	11,179	11,179	11,179	11,179	11,179
Tourists	0	0	0	0	0
TOTAL	12,725	14,271	17,364	18,910	20,456
Jefferson County					
Site-built Homes	601	1,041	1,536	2,102	2,477
Mobile/Manuf. Homes	5,703	5,703	5,703	5,703	5,703
Tourists	0	0	0	53	53
TOTAL	6,304	6,744	7,239	7,858	8,233
Leon County					
Site-built Homes	12,978	25,955	54,565	69,055	81,781
Mobile/Manuf. Homes	24,892	24,892	24,892	24,892	24,892
Tourists	0	0	0	6	6
TOTAL	37,870	50,847	79,457	93,953	106,679
Liberty County					
Site-built Homes	211	429	837	1,050	1,276
Mobile/Manuf. Homes	3,587	3,587	3,587	3,587	3,587
Tourists	0	0	0	0	0
TOTAL	3,798	4,016	4,424	4,637	4,863
Wakulla County					
Site-built Homes	10,775	12,879	17,151	17,333	17,514
Mobile/Manuf. Homes	10,602	10,602	10,602	10,602	10,602
Tourists	63	64	260	260	260
TOTAL	21,440	23,545	28,013	28,195	28,376

Shelter Demand

Shelter demand is another critical piece of the evacuating population. The shelter demand estimates by county are summarized for each of the base scenarios in Table IV-9. Shelter demand is the population in each county who will seek public shelter during their evacuation, either at an in-county shelter or an out of county shelter. Shelter demand is calculated by applying a percentage derived from the behavioral study to the evacuating population. The transportation model first calculates the number of households participating in the evacuating and then calculates the number of vehicles being used in the evacuation. The model then assigns a certain percentage of those evacuating vehicles to public shelters. These vehicles are then multiplied by 1.85, which is the average auto occupancy of an evacuating vehicle, to determine the number of people traveling to a public shelter.

Public shelter demand in the nine county region ranges from just over 10,000 persons for Scenario 1 in 2015 to more than 17,000 persons for Scenario 5. By 2020, the public shelter demand is not expected to increase significantly.

Table IV-9 – Shelter Demand by Base Scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2015					
Calhoun County	797	860	984	1,047	1,110
Franklin County	394	531	533	533	533
Gadsden County	2,535	2,877	3,219	3,561	3,904
Gulf County	455	592	703	733	740
Jackson County	781	1,005	1,452	1,678	1,900
Jefferson County	747	792	844	901	942
Leon County	2,777	3,417	4,688	5,395	6,025
Liberty County	570	603	673	707	742
Wakulla County	1,034	1,140	1,349	1,358	1,367
Total	10,090	11,816	14,445	15,912	17,262
	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
2020					
Calhoun County	831	895	1,025	1,090	1,154
Franklin County	394	531	533	533	533
Gadsden County	2,584	2,932	3,282	3,630	3,978
Gulf County	459	598	709	738	746
Jackson County	783	1,008	1,458	1,684	1,909
Jefferson County	775	821	873	934	975
Leon County	2,908	3,578	4,910	5,648	6,307
Liberty County	605	642	714	751	788
Wakulla County	1,123	1,236	1,465	1,474	1,484
Total	10,462	12,241	14,968	16,482	17,873

Note: Shelter demand is the population in each county who will seek public shelter during their evacuation, either at an in-county shelter or an out of county shelter.

Evacuating Vehicles

From a transportation standpoint, the number of evacuating vehicles is more important than the evacuating population. Evacuating vehicles for the base scenarios is summarized by county for 2015 in Table IV-10 and for 2020 in Table IV-11.

The total number of evacuating vehicles within the nine county region for the base scenarios also varies by scenario. A total of more than 60,000 vehicles evacuate from the Apalachee region during a Category 1 Hurricane in 2015, and this number increases to approximately 112,000 evacuating vehicles for a Category 5 Hurricane in 2015.

Table IV-10 – Evacuating Vehicles by Base Scenario for 2015

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun					
Site-built Homes	225	450	900	1,125	1,350
Mobile/Manuf. Homes	1,987	1,987	1,987	1,987	1,987
Tourists	0	0	0	0	0
TOTAL	2,212	2,437	2,887	3,112	3,337
Franklin					
Site-built Homes	3,058	4,308	4,320	4,324	4,328
Mobile/Manuf. Homes	1,502	1,502	1,502	1,502	1,502
Tourists	122	282	282	282	282
TOTAL	4,682	6,092	6,104	6,108	6,112
Gadsden					
Site-built Homes	1,849	2,774	3,699	4,623	5,548
Mobile/Manuf. Homes	6,671	6,671	6,671	6,671	6,671
Tourists	0	0	0	0	0
TOTAL	8,520	9,445	10,370	11,294	12,219
Gulf					
Site-built Homes	2,421	3,830	4,930	5,126	5,178
Mobile/Manuf. Homes	1,545	1,545	1,545	1,545	1,545
Tourists	0	55	76	76	76
TOTAL	3,966	5,430	6,551	6,747	6,799
Jackson					
Site-built Homes	807	1,615	3,229	4,037	4,844
Mobile/Manuf. Homes	6,023	6,023	6,023	6,023	6,023
Tourists	0	0	0	0	0
TOTAL	6,830	7,638	9,252	10,060	10,867
Jefferson					
Site-built Homes	322	568	840	1,145	1,360
Mobile/Manuf. Homes	2,481	2,481	2,481	2,481	2,481
Tourists	0	0	0	23	23
TOTAL	2,803	3,049	3,321	3,649	3,864
Leon					
Site-built Homes	6,929	13,858	27,601	35,222	42,036
Mobile/Manuf. Homes	11,545	11,545	11,545	11,545	11,545
Tourists	0	0	0	2	2
TOTAL	18,474	25,403	39,146	46,769	53,583
Liberty					
Site-built Homes	124	248	496	620	744
Mobile/Manuf. Homes	1,447	1,447	1,447	1,447	1,447
Tourists	0	0	0	0	0
TOTAL	1,571	1,695	1,943	2,067	2,191
Wakulla					
Site-built Homes	5,588	6,710	8,912	9,008	9,104
Mobile/Manuf. Homes	5,575	5,575	5,575	5,575	5,575
Tourists	24	24	97	97	97
TOTAL	11,187	12,309	14,584	14,680	14,776

Table IV-11 – Evacuating Vehicles by Base Scenario for 2020

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Calhoun					
Site-built Homes	234	469	938	1,172	1,407
Mobile/Manuf. Homes	2,068	2,068	2,068	2,068	2,068
Tourists	0	0	0	0	0
TOTAL	2,302	2,537	3,006	3,240	3,475
Franklin					
Site-built Homes	3,058	4,308	4,320	4,324	4,328
Mobile/Manuf. Homes	1,502	1,502	1,502	1,502	1,502
Tourists	122	282	282	282	282
TOTAL	4,682	6,092	6,104	6,108	6,112
Gadsden					
Site-built Homes	1,884	2,826	3,767	4,709	5,651
Mobile/Manuf. Homes	6,800	6,800	6,800	6,800	6,800
Tourists	0	0	0	0	0
TOTAL	8,684	9,626	10,567	11,509	12,451
Gulf					
Site-built Homes	2,439	3,859	4,968	5,166	5,218
Mobile/Manuf. Homes	1,558	1,558	1,558	1,558	1,558
Tourists	0	55	76	76	76
TOTAL	3,997	5,472	6,602	6,800	6,852
Jackson					
Site-built Homes	811	1,621	3,242	4,053	4,863
Mobile/Manuf. Homes	6,047	6,047	6,047	6,047	6,047
Tourists	0	0	0	0	0
TOTAL	6,858	7,668	9,289	10,100	10,910
Jefferson					
Site-built Homes	333	586	866	1,182	1,403
Mobile/Manuf. Homes	2,570	2,570	2,570	2,570	2,570
Tourists	0	0	0	23	23
TOTAL	2,903	3,156	3,436	3,775	3,996
Leon					
Site-built Homes	7,255	14,509	28,898	36,876	44,010
Mobile/Manuf. Homes	12,089	12,089	12,089	12,089	12,089
Tourists	0	0	0	2	2
TOTAL	19,344	26,598	40,987	48,967	56,101
Liberty					
Site-built Homes	131	263	526	657	789
Mobile/Manuf. Homes	1,539	1,539	1,539	1,539	1,539
Tourists	0	0	0	0	0
TOTAL	1,670	1,802	2,065	2,196	2,328
Wakulla					
Site-built Homes	6,068	7,287	9,678	9,782	9,887
Mobile/Manuf. Homes	6,056	6,056	6,056	6,056	6,056
Tourists	24	24	97	97	97
TOTAL	12,148	13,367	15,831	15,935	16,040

Congested Roadways

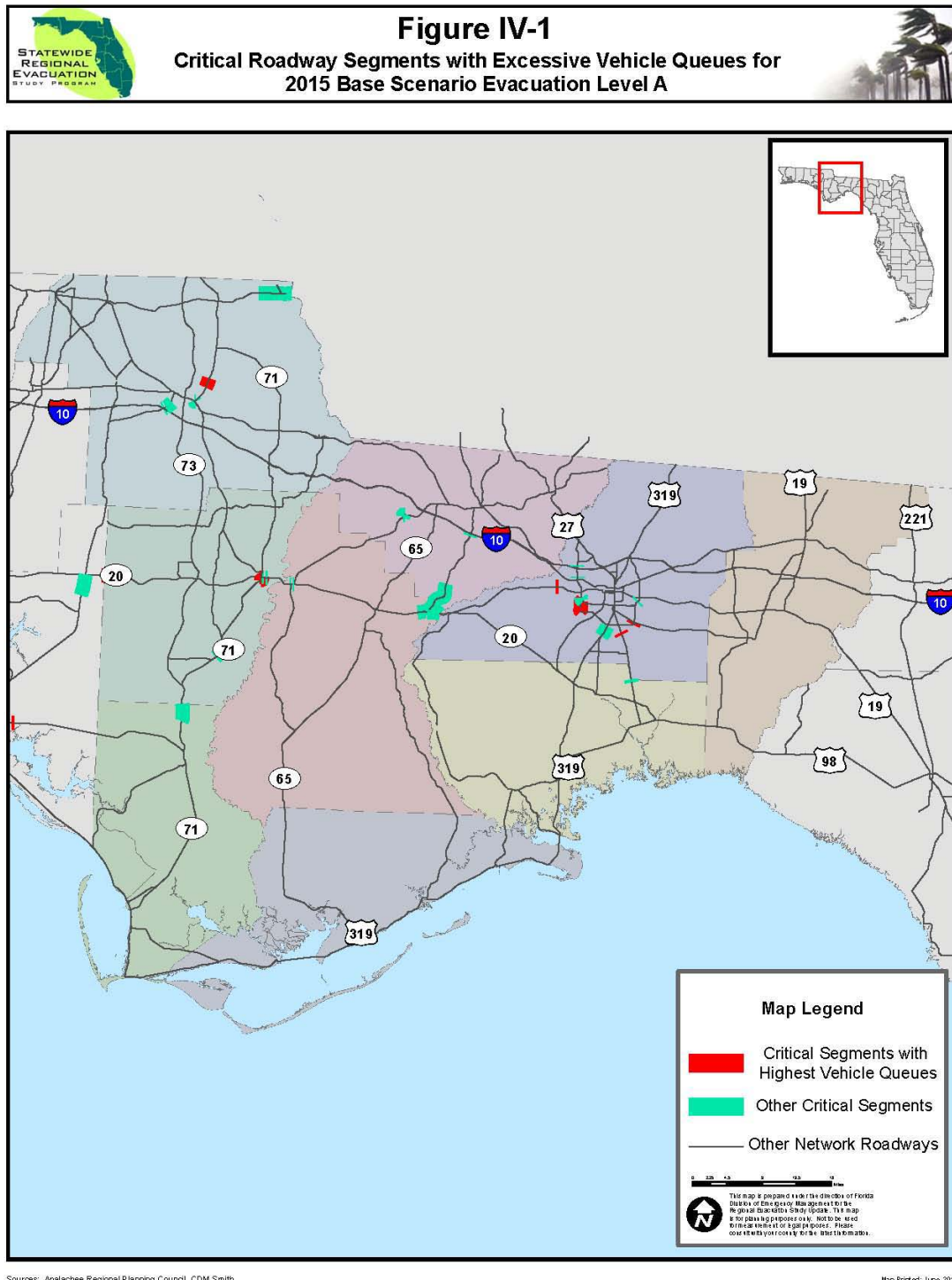
Another important component of the transportation analysis is the identification of critical roadway segments for evacuation traffic. This analysis includes a review of vehicle flows during the evacuation period, along with excessive vehicle queues. A summary of the total number of evacuating vehicles for each of the base scenarios is presented in Table IV-12. It is important to note that the total number of evacuating vehicles in the table below includes vehicles evacuating from the two coastal counties on either side of the RPC, Bay and Taylor, in addition to the nine counties within the Apalachee region, for a total of 11 evacuating counties.

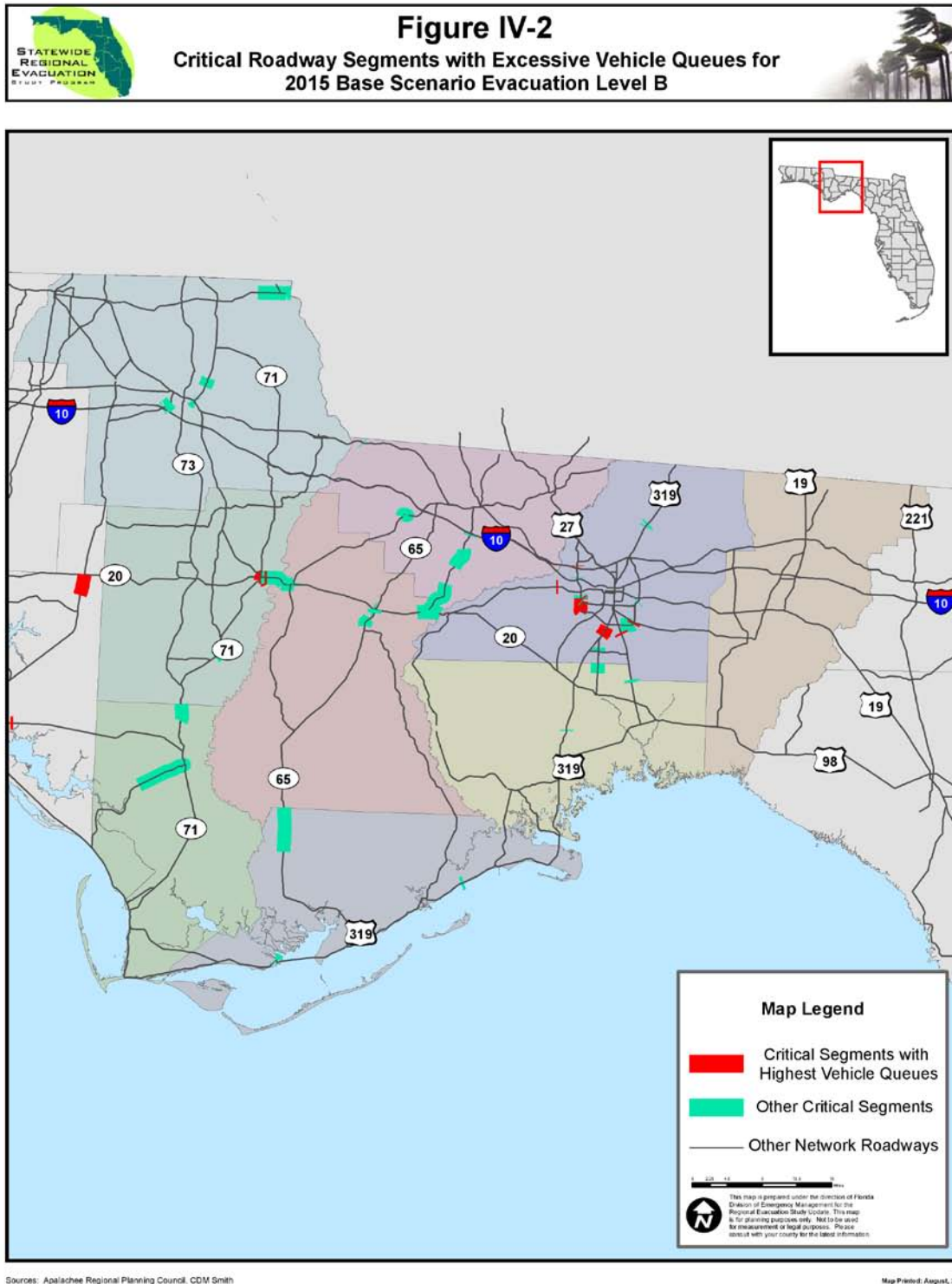
Table IV-12 – Total Evacuating Vehicles for Base Scenarios
Includes ALL Counties Listed in the Base Scenario

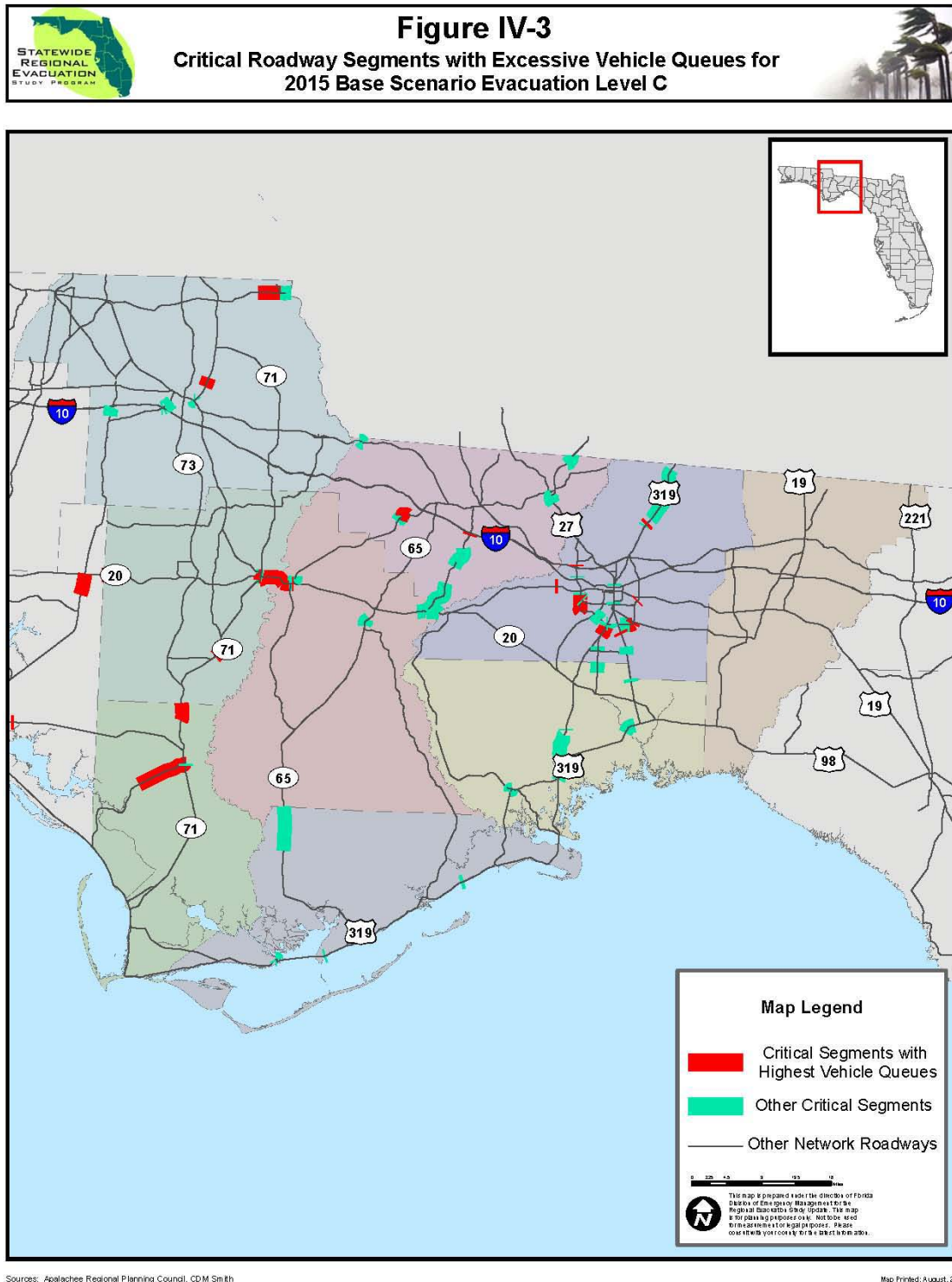
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2015	101,923	123,951	150,342	171,231	189,915
	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
2020	106,561	129,519	157,070	178,956	198,501

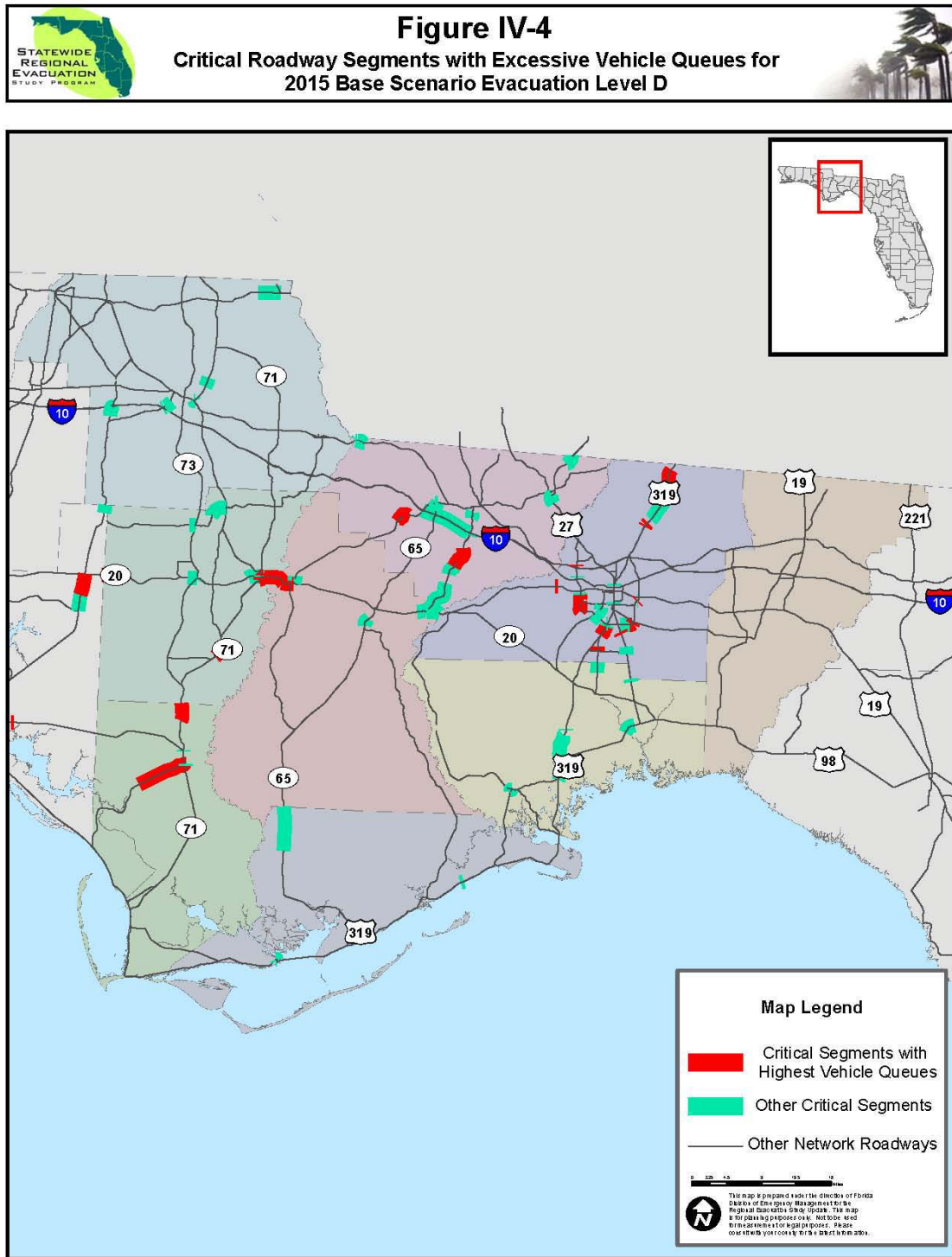
The identification of critical roadways in the evacuation network is also important to assist emergency managers with identifying roadways that have the greatest impact on clearance times. Critical roadways were identified by reviewing roadways in the model network that have the highest vehicle queues for extended periods of time during an evacuation. Due to the nature of a major evacuation in general, nearly all roadway facilities will have extended vehicle queues at some point during the evacuation process. The point of this analysis is to identify those roadway facilities that have vehicle queues for the longest time periods during each of the evacuation scenarios. Critical roadway segments for the Apalachee region are identified in Figures IV-1 through IV-10 for each of the base scenarios for 2015 and 2020.

Through a review of the critical roadway segment figures and vehicle flows, it is clear that in addition to I-10, US 319 in Wakulla and Leon Counties, US 98 in Wakulla County, SR 71 in Gulf County and portions of SR 20 throughout the region are critical during an evacuation. For a Category 1 Hurricane evacuation scenario, the heavily traveled roadways are primarily US and State highways. In contrast, for a Category 5 Hurricane evacuation scenario, heavily traveled roadways include lesser used roads such as SR 231.



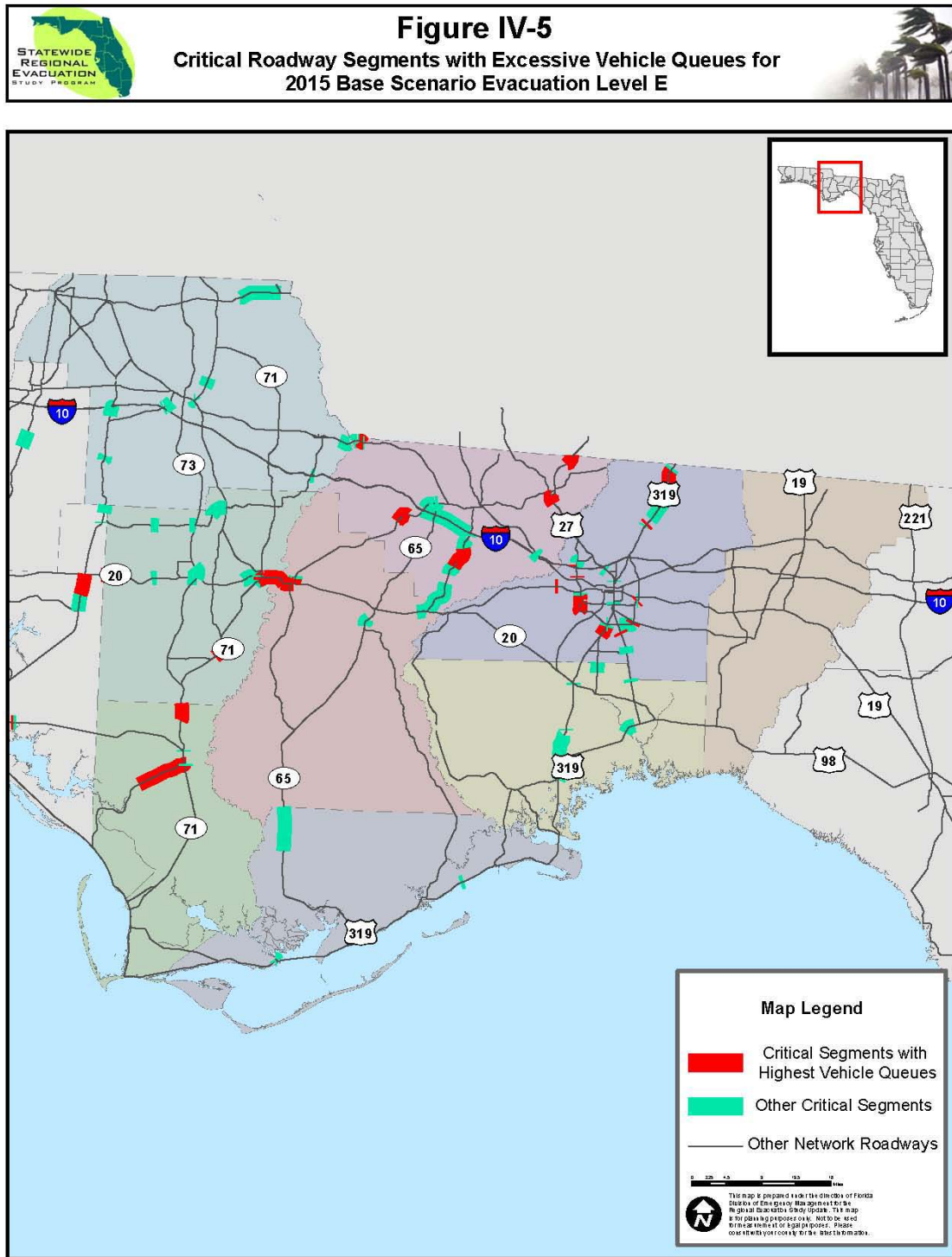






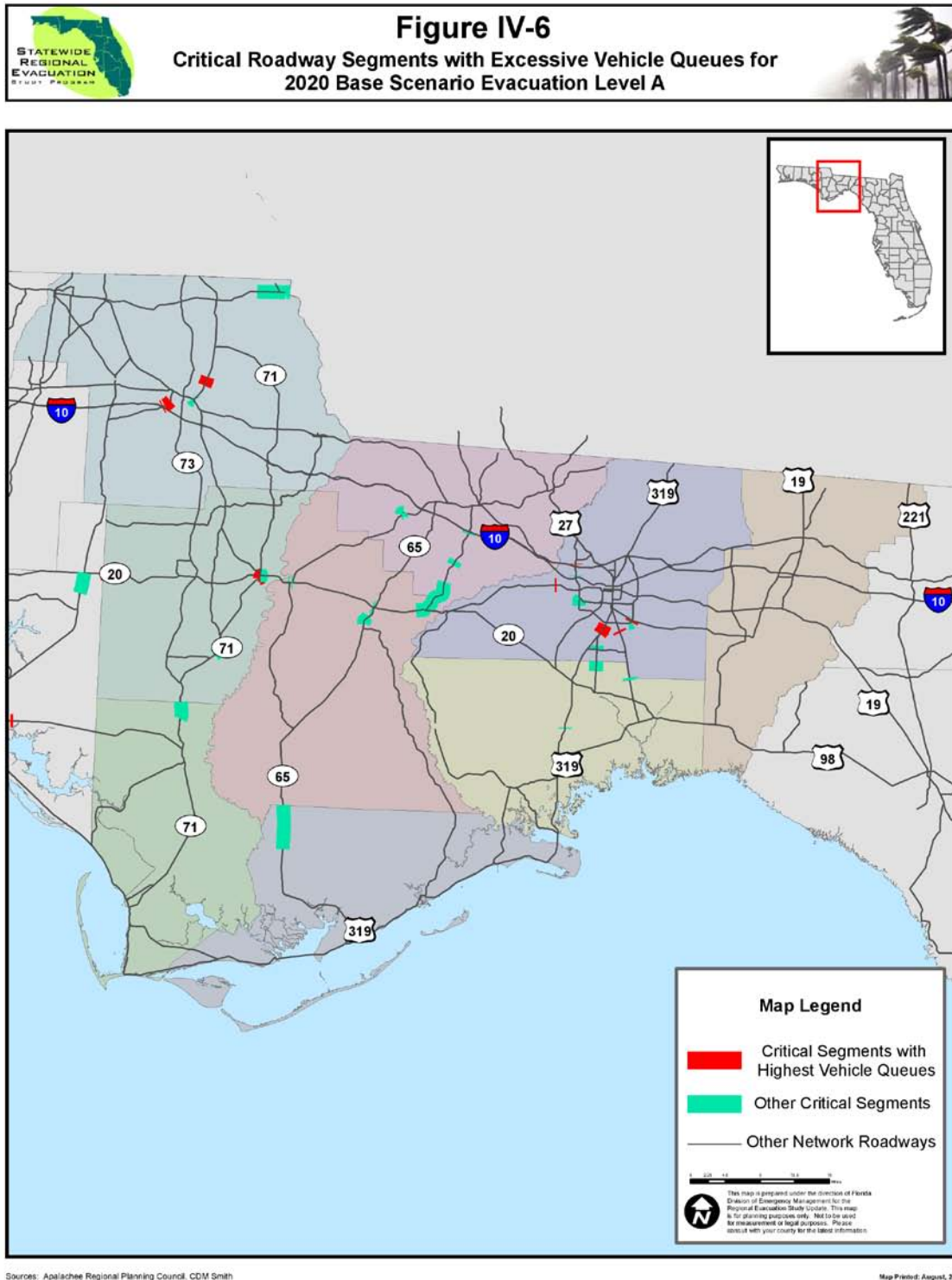
Sources: Apalachee Regional Planning Council, CDM Smith

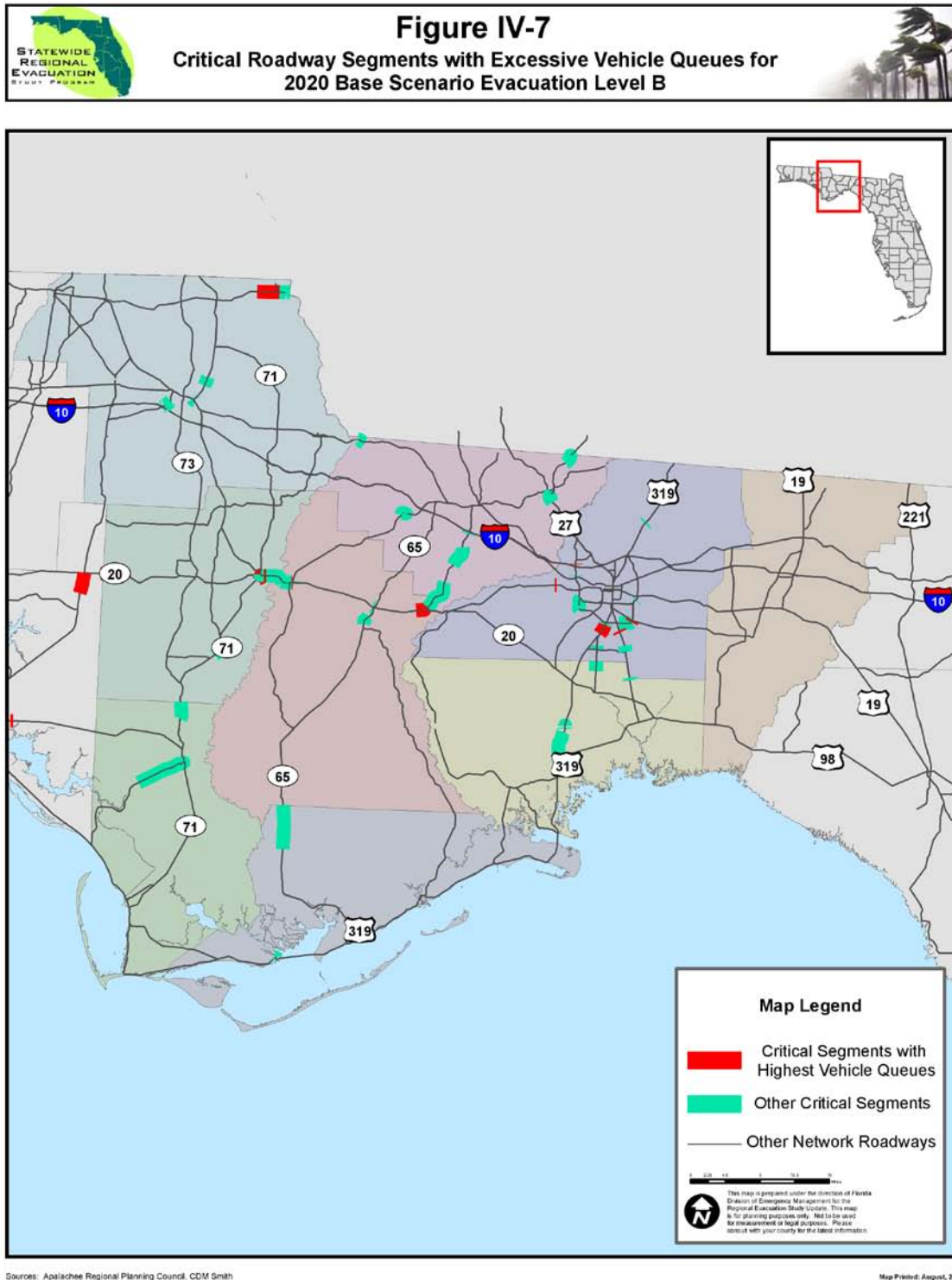
Map Printed: August, 2015

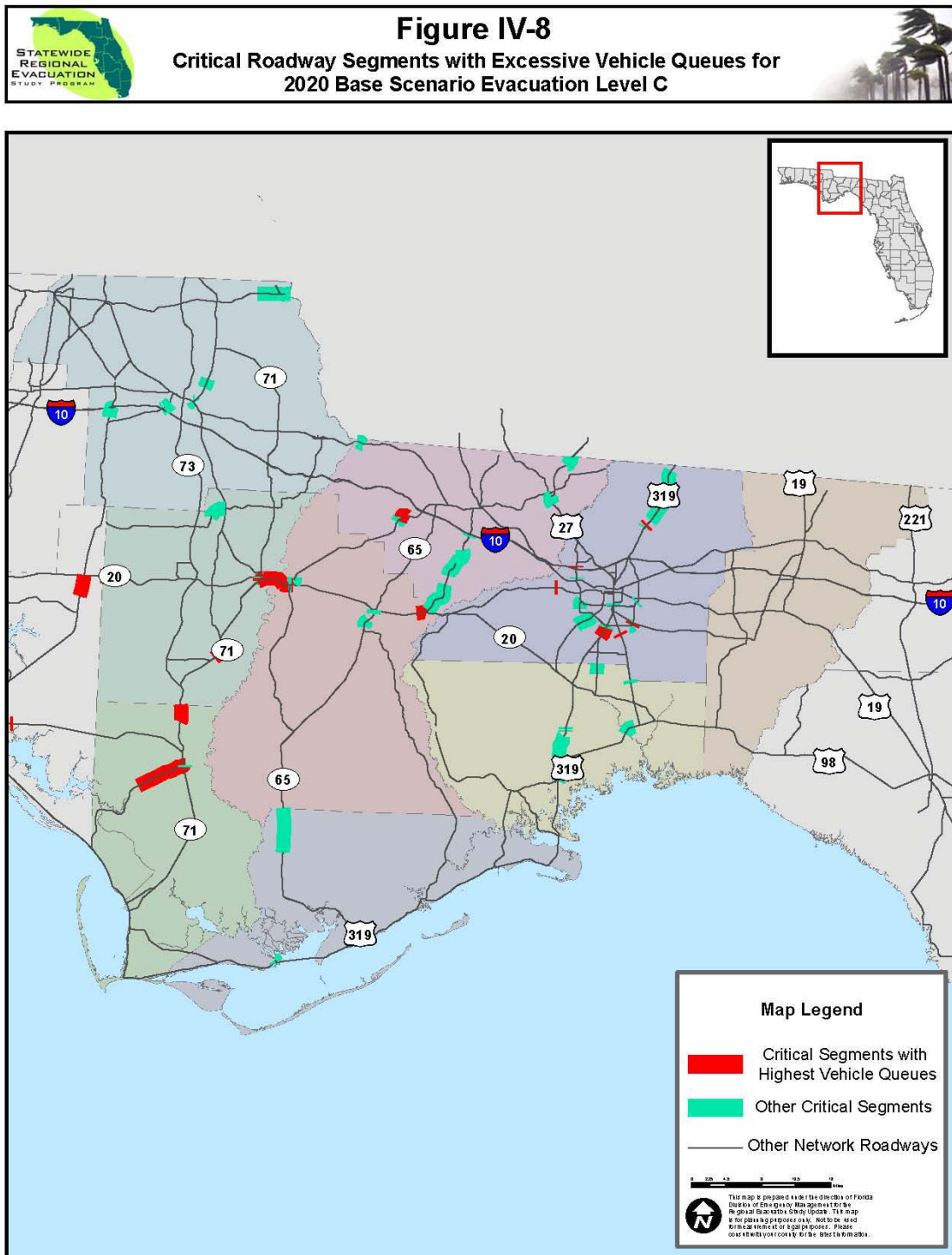


Sources: Apalachee Regional Planning Council, CDM Smith

Map Printed: June, 2015

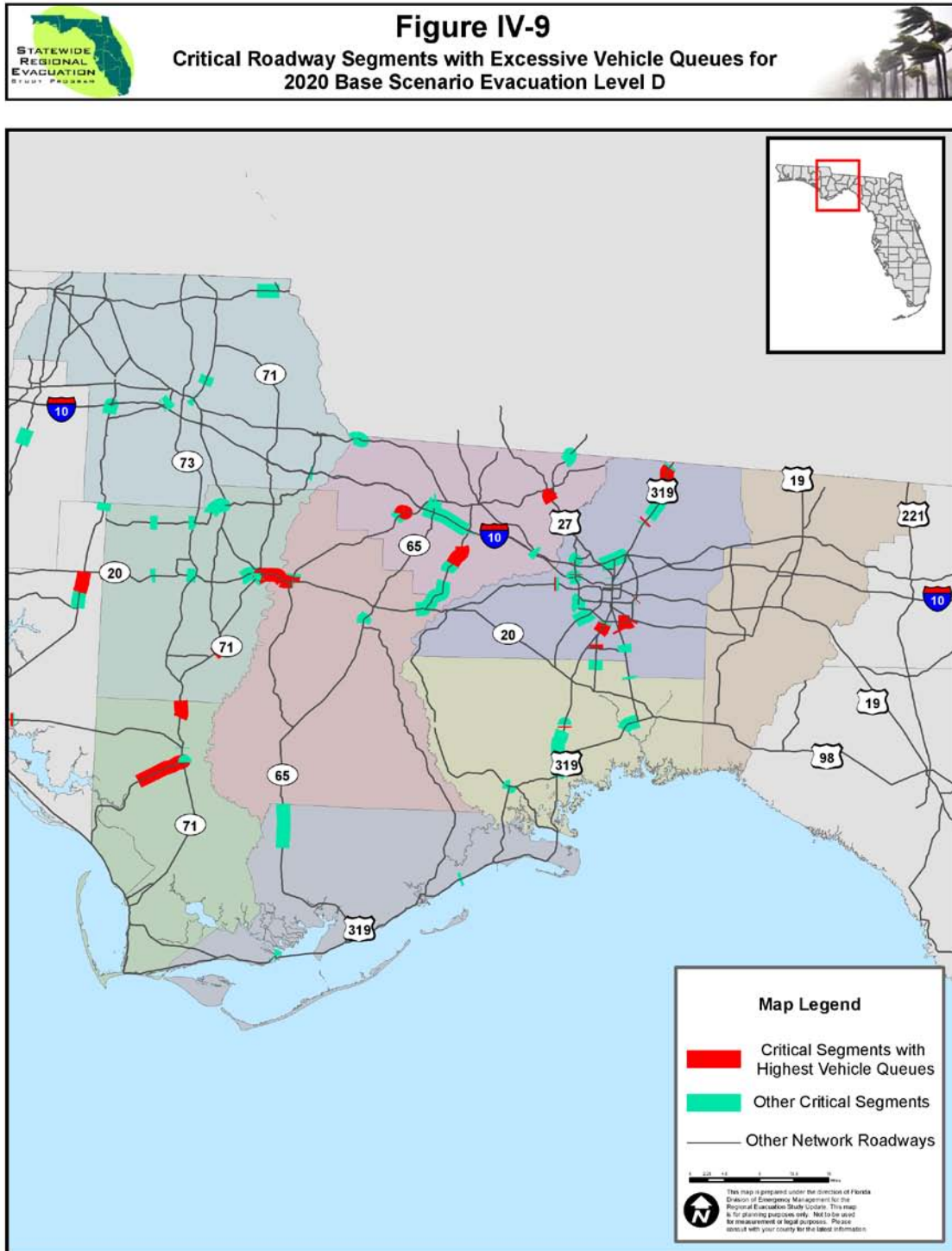


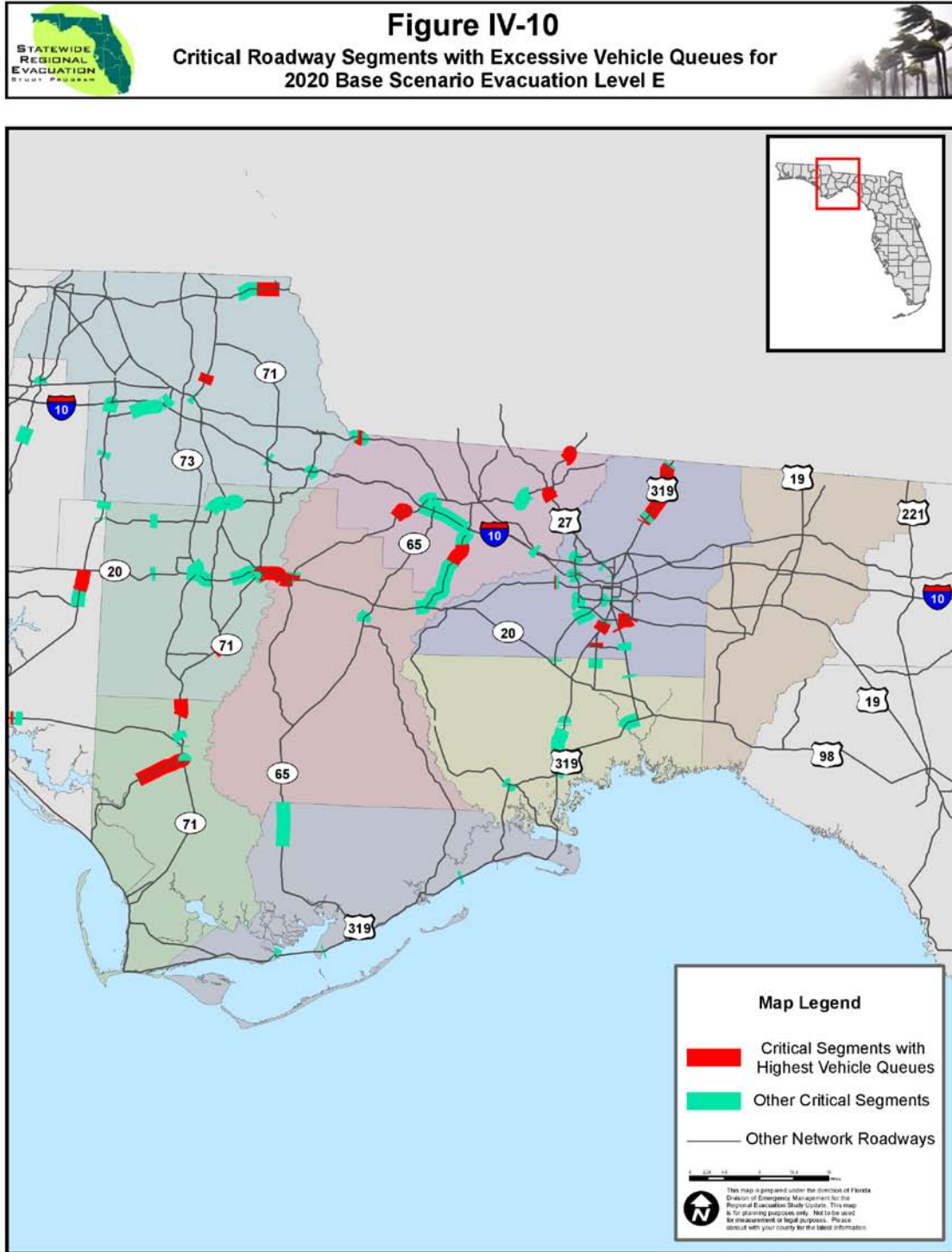




Sources: Apalachee Regional Planning Council, CDM Smith

Map Printed: June, 2015





In addition to the identification of critical roadway segments, the total number of evacuating vehicles entering and exiting each county based on the base evacuation scenario was also determined. Evacuating vehicles exiting each county by major evacuation route are identified in Table IV-13 for 2015 and Table IV-14 for 2020. In addition, evacuating vehicles entering each county by major evacuation route are identified in Table IV-15 for 2015 and Table IV-16 for 2020. Detailed volume figures for all evacuation routes in the Apalachee region for each base scenario are included in Volume 5-4.

The number of vehicles entering and exiting each county during an evacuation varies widely depending upon the scenario, roadway, and county. As expected, major interstates and state highways generally carry larger volumes of evacuating traffic. The vehicle flows into and out of each county also generally follow the same pattern as the critical segment figures, as locations with higher queues and congestion generally have higher traffic volumes.

**Table IV-13 – Evacuating Vehicles Exiting the County by Evacuation Route
2015 Base Scenario**

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun					
SR 20 Westbound	200	300	400	500	600
SR 71 Northbound	300	400	400	500	500
SR 20 Eastbound	5,800	6,500	7,000	7,600	8,000
Franklin					
US 98 Eastbound	100	100	100	100	100
SR 65 Northbound	1,500	1,900	1,900	1,900	1,900
US 98 Westbound	500	600	600	500	500
Gadsden					
US 90 Eastbound	100	100	100	100	200
I-10 Eastbound	6,900	8,800	10,700	12,400	13,900
US 27 Southbound	400	400	500	600	600
US 27 Northbound	2,900	3,300	4,700	5,300	5,700
I-10 Westbound	2,000	2,700	3,700	4,300	4,800
US 90 Westbound	100	100	100	100	100
Gulf					
US 98 Westbound	1,300	1,700	2,200	2,100	2,100
US 98 Eastbound	100	200	300	400	400
SR 71 Northbound	2,600	3,400	4,100	4,300	4,400
Jackson					
I-10 Westbound	1,800	2,200	2,900	3,200	3,500
US 231 Northbound	4,500	6,000	6,700	8,100	8,500
I-10 Eastbound	3,100	5,200	7,500	10,500	13,300
US 90 Eastbound	200	700	1,000	1,400	1,700
SR 2 Eastbound	5,700	5,900	6,000	5,700	5,900
Jefferson					
I-10 Westbound	1,500	1,600	1,900	2,100	2,300
I-10 Eastbound	4,200	5,700	7,700	9,100	10,300
SR 55 Northbound	200	200	200	300	300
Leon					
SR 20 Westbound	1,500	1,600	1,800	2,000	2,100
US 90 Westbound	1,400	1,600	1,700	1,900	2,100
I-10 Westbound	3,800	5,200	7,700	9,000	10,200
SR 319 Northbound	4,100	5,600	7,100	7,700	8,100
I-10 Eastbound	2,600	3,600	5,100	6,500	7,800
US 27 Northbound	2,300	2,600	4,100	4,700	5,100
Liberty					
SR 20 Westbound	700	800	1,000	1,100	1,200
SR 12 Northbound	3,300	4,300	5,100	5,700	6,300
SR 267 Northbound	4,600	4,800	4,700	4,700	4,600
SR 20 Eastbound	100	100	200	200	100
SR 65 Northbound	1,000	1,200	1,200	1,200	1,200
Wakulla					
SR 319 Northbound	3,700	4,400	5,000	5,000	5,100
SR 61 Northbound	1,500	1,500	1,700	1,600	1,600
SR 363 Northbound	1,300	1,600	1,900	1,900	2,000
US 98 Eastbound	1,700	2,400	2,900	3,100	3,100

**Table IV-14 – Evacuating Vehicles Exiting the County by Evacuation Route
2020 Base Scenario**

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun					
SR 20 Westbound	200	400	400	500	600
SR 71 Northbound	400	400	400	500	600
SR 20 Eastbound	6,000	6,600	7,200	7,800	8,200
Franklin					
US 98 Eastbound	100	100	100	100	100
SR 65 Northbound	1,500	1,900	1,900	1,900	1,900
US 98 Westbound	500	600	600	500	500
Gadsden					
US 90 Eastbound	100	100	100	200	200
I-10 Eastbound	7,300	9,100	11,400	13,000	14,500
US 27 Southbound	400	400	600	600	600
US 27 Northbound	3,500	4,200	5,300	5,700	5,900
I-10 Westbound	2,200	2,600	3,900	4,600	5,100
US 90 Westbound	100	100	100	100	100
Gulf					
US 98 Westbound	1,300	1,700	2,200	2,100	2,100
US 98 Eastbound	100	200	400	400	400
SR 71 Northbound	2,700	3,500	4,200	4,300	4,500
Jackson					
I-10 Westbound	1,900	2,300	3,000	3,400	3,900
US 231 Northbound	4,800	6,400	7,200	8,100	8,500
I-10 Eastbound	3,500	5,700	8,300	11,400	14,500
US 90 Eastbound	300	800	1,100	1,500	1,600
SR 2 Eastbound	5,600	5,900	5,900	5,900	6,100
Jefferson					
I-10 Westbound	1,500	1,600	1,800	2,200	2,400
I-10 Eastbound	4,300	5,600	7,700	9,100	10,600
SR 55 Northbound	200	200	300	300	300
Leon					
SR 20 Westbound	1,400	1,600	1,800	1,800	2,000
US 90 Westbound	1,700	1,900	2,400	2,600	2,700
I-10 Westbound	4,100	5,500	8,300	9,800	10,800
SR 319 Northbound	4,100	5,600	7,200	7,900	8,300
I-10 Eastbound	2,800	3,700	5,600	6,800	8,300
US 27 Northbound	2,700	3,200	4,400	4,800	5,100
Liberty					
SR 20 Westbound	700	900	1,000	1,200	1,200
SR 12 Northbound	3,500	4,400	5,300	6,000	6,500
SR 267 Northbound	4,600	4,800	4,800	4,500	4,600
SR 20 Eastbound	100	100	100	200	100
SR 65 Northbound	900	1,200	1,200	1,200	1,200
Wakulla					
SR 319 Northbound	3,900	4,600	5,200	5,200	5,300
SR 61 Northbound	1,700	1,800	2,000	1,900	1,800
SR 363 Northbound	1,600	1,900	2,100	2,100	2,200
US 98 Eastbound	1,700	2,100	2,700	2,800	2,900

**Table IV-15 – Evacuating Vehicles Entering the County by Evacuation Route
2015 Base Scenario**

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun					
SR 20 Westbound	700	800	1,000	1,100	1,200
SR 71 Northbound	2,600	3,400	4,100	4,300	4,400
Franklin					
US 98 Eastbound	100	200	300	400	400
Gadsden					
I-10 Eastbound	3,100	5,200	7,500	10,500	13,300
US 90 Eastbound	200	700	1,000	1,400	1,700
SR 12 Northbound	3,300	4,300	5,100	5,700	6,300
SR 267 Northbound	4,600	4,800	4,700	4,700	4,600
US 90 Westbound	1,400	1,600	1,700	1,900	2,100
I-10 Westbound	3,800	5,200	7,700	9,000	10,200
SR 65 Northbound	1,000	1,200	1,200	1,200	1,200
US 27 Northbound	2,300	2,600	4,100	4,700	5,100
Gulf					
US 98 Westbound	500	600	600	500	500
Jackson					
SR 71 Northbound	300	400	400	500	500
I-10 Westbound	2,000	2,700	3,700	4,300	4,800
US 90 Westbound	100	100	100	100	100
Jefferson					
I-10 Eastbound	2,600	3,600	5,100	6,500	7,800
US 98 Eastbound	1,700	2,400	2,900	3,100	3,100
Leon					
SR 20 Eastbound	100	100	200	200	100
US 90 Eastbound	100	100	100	100	200
I-10 Eastbound	6,900	8,800	10,700	12,400	13,900
US 27 Southbound	400	400	500	600	600
SR 319 Northbound	3,700	4,400	5,000	5,000	5,100
SR 61 Northbound	1,500	1,500	1,700	1,600	1,600
SR 363 Northbound	1,300	1,600	1,900	1,900	2,000
I-10 Westbound	1,500	1,600	1,900	2,100	2,300
Liberty					
SR 20 Eastbound	5,800	6,500	7,000	7,600	8,000
SR 20 Westbound	1,500	1,600	1,800	2,000	2,100
SR 65 Northbound	1,500	1,900	1,900	1,900	1,900
Wakulla					
US 98 Eastbound	0	0	0	0	0

**Table IV-16 – Evacuating Vehicles Entering the County by Evacuation Route
2020 Base Scenario**

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Calhoun					
SR 20 Westbound	700	900	1,000	1,200	1,200
SR 71 Northbound	2,700	3,500	4,200	4,300	4,500
Franklin					
US 98 Eastbound	100	200	400	400	400
Gadsden					
I-10 Eastbound	3,500	5,700	8,300	11,400	14,500
US 90 Eastbound	300	800	1,100	1,500	1,600
SR 12 Northbound	3,500	4,400	5,300	6,000	6,500
SR 267 Northbound	4,600	4,800	4,800	4,500	4,600
US 90 Westbound	1,700	1,900	2,400	2,600	2,700
I-10 Westbound	4,100	5,500	8,300	9,800	10,800
SR 65 Northbound	900	1,200	1,200	1,200	1,200
US 27 Northbound	2,700	3,200	4,400	4,800	5,100
Gulf					
US 98 Westbound	500	600	600	500	500
Jackson					
SR 71 Northbound	400	400	400	500	600
I-10 Westbound	2,200	2,600	3,900	4,600	5,100
US 90 Westbound	100	100	100	100	100
Jefferson					
I-10 Eastbound	2,800	3,700	5,600	6,800	8,300
US 98 Eastbound	1,700	2,100	2,700	2,800	2,900
Leon					
SR 20 Eastbound	100	100	100	200	100
US 90 Eastbound	100	100	100	200	200
I-10 Eastbound	7,300	9,100	11,400	13,000	14,500
US 27 Southbound	400	400	600	600	600
SR 319 Northbound	3,900	4,600	5,200	5,200	5,300
SR 61 Northbound	1,700	1,800	2,000	1,900	1,800
SR 363 Northbound	1,600	1,900	2,100	2,100	2,200
I-10 Westbound	1,500	1,600	1,800	2,200	2,400
Liberty					
SR 20 Eastbound	6,000	6,600	7,200	7,800	8,200
SR 20 Westbound	1,400	1,600	1,800	1,800	2,000
SR 65 Northbound	1,500	1,900	1,900	1,900	1,900
Wakulla					
US 98 Eastbound	0	0	0	0	0

Clearance Times

Calculated clearance times are used by county emergency managers as one input to determine when to recommend an evacuation order. Clearance times for each of the base scenarios are summarized in Tables IV-17 and IV-18, as well as Figures IV-11 - IV-13. Clearance time includes several components, including the mobilization time for the evacuating population to prepare for an evacuation (pack supplies and personal belongs, load their vehicle, etc.), the actual time spent traveling on the roadway network, and the delay time caused by traffic congestion.

In-county clearance times for the base scenarios range from 12.5 to 16.5 hours depending on the scenario. The Clearance Time to Shelter shows a similar pattern, with clearance times for ranging from 8.5 to 14 hours depending on the scenario. In 2020, the projection for in-county and out of county clearance times are identical, between 13 and 17 hours depending on the scenario. Regional clearance times range from 15 hours to 16.5 hours in 2015 and from 15 to 17 hours in 2020.

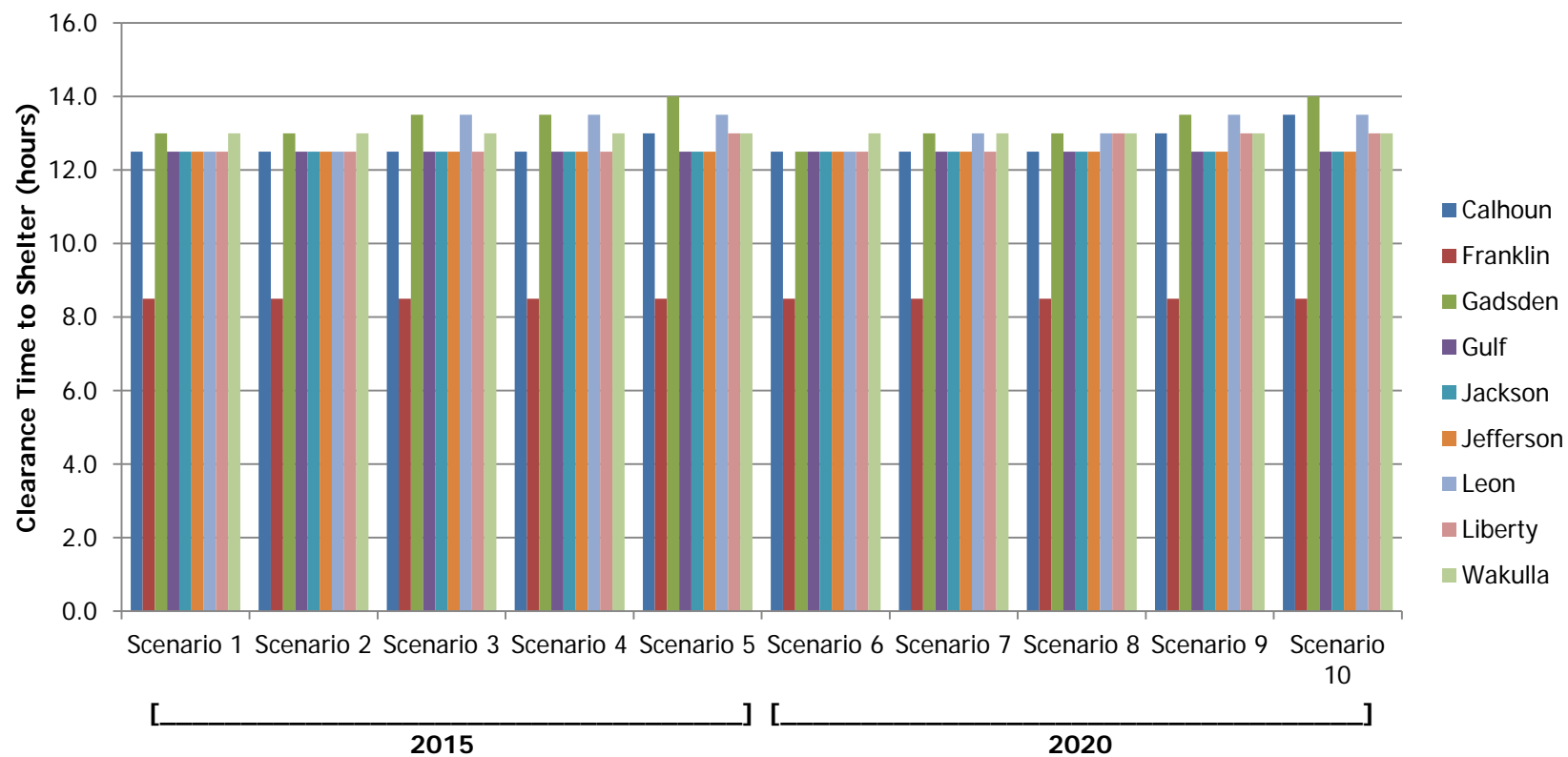
Table IV-17 – Clearance Times for Base Scenario 2015

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Clearance Time to Shelter					
Calhoun County	12.5	12.5	12.5	12.5	13.0
Franklin County	8.5	8.5	8.5	8.5	8.5
Gadsden County	13.0	13.0	13.5	13.5	14.0
Gulf County	12.5	12.5	12.5	12.5	12.5
Jackson County	12.5	12.5	12.5	12.5	12.5
Jefferson County	12.5	12.5	12.5	12.5	12.5
Leon County	12.5	12.5	13.5	13.5	13.5
Liberty County	12.5	12.5	12.5	12.5	13.0
Wakulla County	13.0	13.0	13.0	13.0	13.0
In-County Clearance Time					
Calhoun County	13.0	13.0	13.0	13.0	13.5
Franklin County	13.0	13.0	13.0	13.5	13.5
Gadsden County	13.5	13.5	14.0	14.0	14.5
Gulf County	13.0	13.0	13.0	13.0	13.0
Jackson County	13.0	13.0	13.0	13.0	13.0
Jefferson County	14.0	14.0	14.0	15.5	16.5
Leon County	13.0	13.0	14.0	14.0	16.0
Liberty County	13.0	12.5	12.5	12.5	13.0
Wakulla County	13.5	14.0	14.0	15.0	15.5
Out of County Clearance Time					
Calhoun County	14.0	14.0	14.0	14.0	14.0
Franklin County	13.0	13.0	13.0	13.5	13.5
Gadsden County	14.5	14.5	14.5	15.5	16.0
Gulf County	13.0	13.0	13.0	13.0	13.5
Jackson County	15.0	15.0	15.0	15.0	15.0
Jefferson County	15.0	15.0	15.0	16.0	16.5
Leon County	14.5	14.5	15.0	15.5	16.5
Liberty County	14.0	14.0	14.0	14.5	15.0
Wakulla County	14.0	14.0	14.0	15.0	15.5
Regional Clearance Time					
Apalachee	15.0	15.0	15.0	16.0	16.5

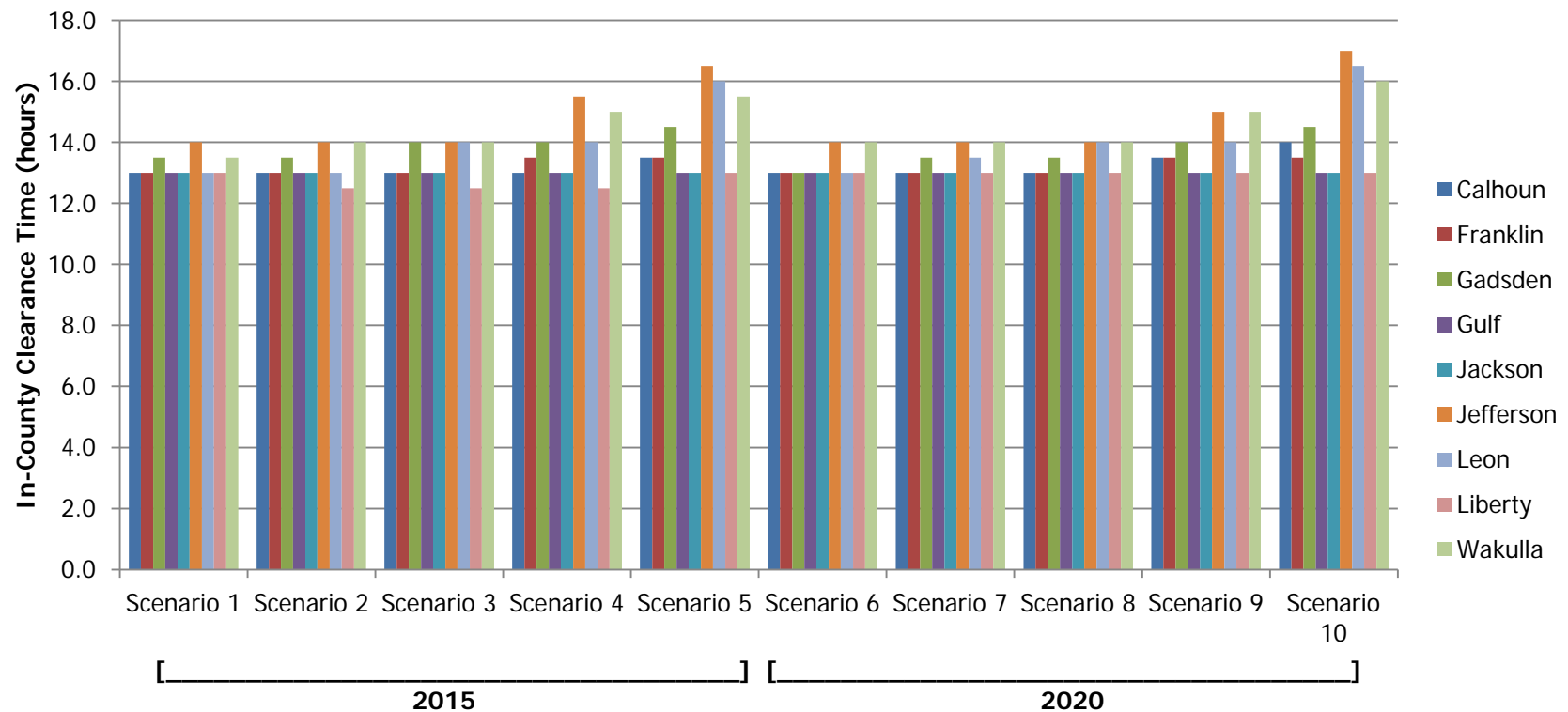
Table IV-18 – Clearance Times for Base Scenario 2020

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Clearance Time to Shelter					
Calhoun County	12.5	12.5	12.5	13.0	13.5
Franklin County	8.5	8.5	8.5	8.5	8.5
Gadsden County	12.5	13.0	13.0	13.5	14.0
Gulf County	12.5	12.5	12.5	12.5	12.5
Jackson County	12.5	12.5	12.5	12.5	12.5
Jefferson County	12.5	12.5	12.5	12.5	12.5
Leon County	12.5	13.0	13.0	13.5	13.5
Liberty County	12.5	12.5	13.0	13.0	13.0
Wakulla County	13.0	13.0	13.0	13.0	13.0
In-County Clearance Time					
Calhoun County	13.0	13.0	13.0	13.5	14.0
Franklin County	13.0	13.0	13.0	13.5	13.5
Gadsden County	13.0	13.5	13.5	14.0	14.5
Gulf County	13.0	13.0	13.0	13.0	13.0
Jackson County	13.0	13.0	13.0	13.0	13.0
Jefferson County	14.0	14.0	14.0	15.0	17.0
Leon County	13.0	13.5	14.0	14.0	16.5
Liberty County	13.0	13.0	13.0	13.0	13.0
Wakulla County	14.0	14.0	14.0	15.0	16.0
Out of County Clearance Time					
Calhoun County	14.0	14.0	14.0	14.5	14.0
Franklin County	13.0	13.0	13.0	13.5	13.5
Gadsden County	14.5	14.5	15.0	15.5	16.5
Gulf County	13.0	13.5	13.5	13.5	13.5
Jackson County	14.5	14.5	14.5	14.5	14.5
Jefferson County	15.0	15.0	15.5	16.0	17.0
Leon County	14.5	14.5	15.0	16.0	16.5
Liberty County	14.0	14.0	14.0	14.5	15.5
Wakulla County	14.0	14.0	14.0	15.0	16.0
Regional Clearance Time					
Apalachee	15.0	15.0	15.5	16.0	17.0

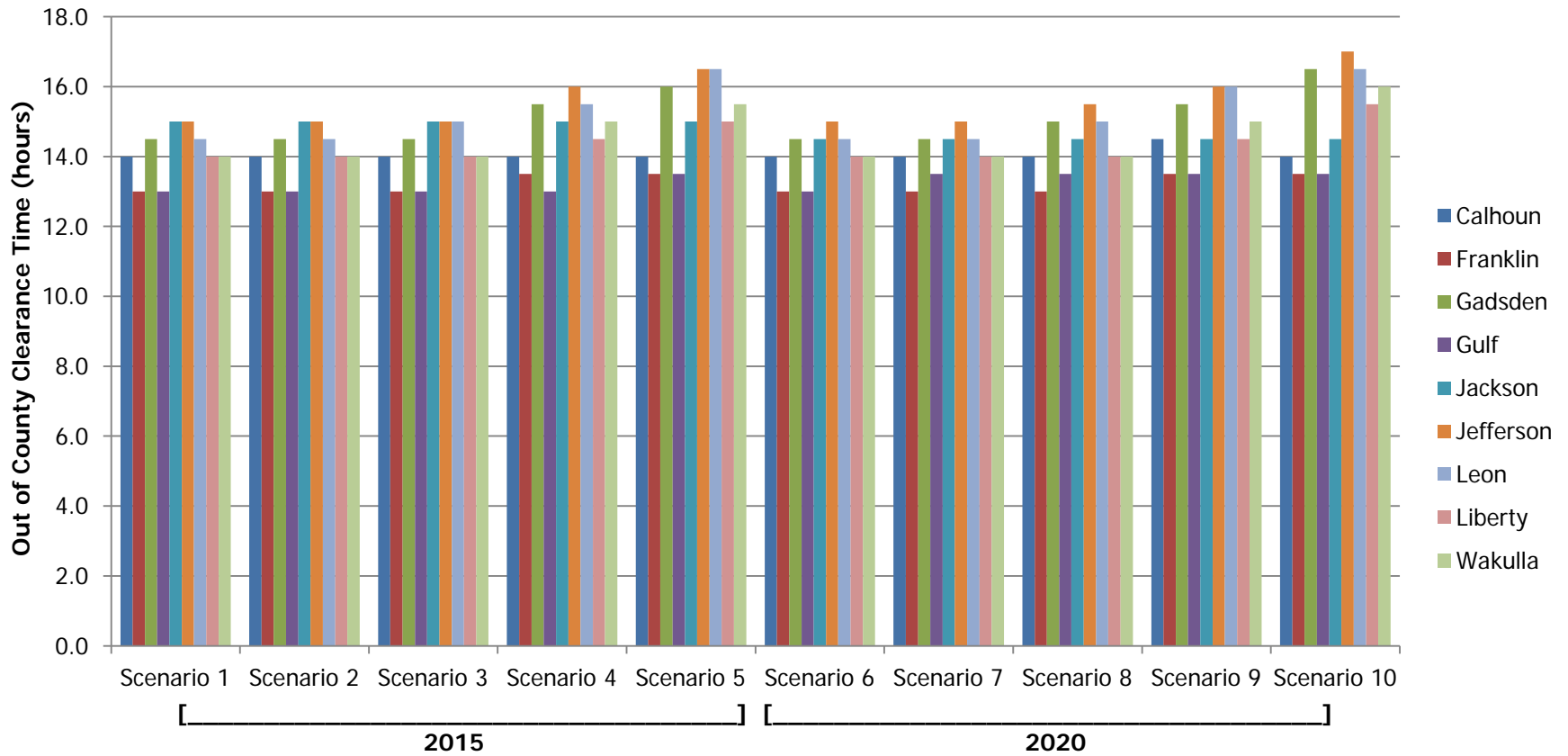
**Figure IV-11 - Clearance Time to Shelter
Base Scenarios**



**Figure IV-12 - In-County Clearance Times
Base Scenarios**



**Figure IV-13 - Out of County Clearance Times
Base Scenarios**



F. Operational Scenarios

The transportation analysis also included ten region wide operational scenarios selected by the county emergency managers and RPC staff for the Apalachee region. While the base scenarios required that the basic assumptions were consistent between scenarios except for the year and the evacuation level, this is not the case for the operational scenarios. The ten operational scenarios selected for analysis in the Apalachee region are illustrated in Table IV-19. Due to its geographic location, the Apalachee region is not greatly impacted by evacuations in other parts of the State, with the exception of some impacts from the West Florida region immediately to the west. For this reason, the ARPC and local county emergency managers selected operational scenarios similar to the base scenarios, with the only exceptions being the use of the behavioral planning assumptions instead of the 100 percent behavioral assumptions, and 18-hour response curve. Counties evacuating also were identical to the base scenarios and included the nine counties within the Apalachee region plus Bay and Taylor counties.

Table IV-19 – Operational Scenarios

	Scenario 1 2015	Scenario 2 2015	Scenario 3 2015	Scenario 4 2015	Scenario 5 2015
Demographic Data	2015	2015	2015	2015	2015
Highway Network	2015	2015	2015	2015	2015
One-Way Operations	None	None	I-10	None	None
University Population	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring
Tourist Rate	Default	Default	Default	Default	Default
Shelters Open	Primary	Primary	Primary	Primary	Primary
Response Curve	18-hour	18-hour	12-hour	12-hour	12-hour
Evacuation Phasing	None	None	None	None	None
Behavioral Response	Planning	Planning	Planning	Planning	Planning
Evacuation Zone	A	B	B and C	B - D	D
Counties Evacuating	Bay Franklin Gulf Taylor Wakulla Shadow – Calhoun Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty
	Scenario 6 2020	Scenario 7 2020	Scenario 8 2020	Scenario 9 2020	Scenario 10 2020
Demographic Data	2020	2020	2020	2020	2020
Highway Network	2020	2020	2020	2020	2020
One-Way Operations	None	None	None	None	I-10
University Population	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring	Fall/Spring
Tourist Rate	Default	Default	Default	Default	Default
Shelters Open	Primary	Primary	Primary	Primary	Primary
Response Curve	18-hour	18-hour	12-hour	12-hour	12-hour
Evacuation Phasing	None	None	None	None	None
Behavioral Response	Planning	Planning	Planning	Planning	Planning
Evacuation Zone	A	B	B and C	B - D	D
Counties Evacuating	Bay Franklin Gulf Taylor Wakulla	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty	Bay Franklin Gulf Jefferson Taylor Wakulla Shadow – Calhoun Gadsden Jackson Leon Liberty

G. Operational Scenario Results

Each of the ten operational scenarios were modeled for the Apalachee region using the regional evacuation model. Results were derived from the model to summarize the evacuating population, evacuating vehicles, clearance times, and critical congested roadways. The results are discussed in the following sections.

Evacuating Population

Similar to the base scenarios, the evacuating population was estimated for the nine county region. Evacuating population as reported from the modeling results for the operational scenarios is summarized by county for 2015 in Table IV-20 and for 2020 in Table IV-21.

Within the nine county region, total evacuating population ranges from just over 115,000 persons for a base scenario Category 1 Hurricane evacuation to more than 210,000 for a base scenario Category 5 Hurricane evacuation in 2015.

Table IV-20 – Evacuating Population by Operational Scenario for 2015

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun County					
Site-built Homes	425	851	2,127	2,553	2,553
Mobile/Manuf. Homes	2,238	2,462	3,357	3,804	3,804
Tourists	0	0	0	0	0
TOTAL	2,663	3,313	5,484	6,357	6,357
Franklin					
Site-built Homes	3,392	4,149	5,483	6,246	6,824
Mobile/Manuf. Homes	1,548	1,668	1,833	1,999	2,310
Tourists	326	753	753	753	753
TOTAL	5,266	6,570	8,069	8,998	9,887
Gadsden					
Site-built Homes	0	4,707	7,845	9,414	9,414
Mobile/Manuf. Homes	0	7,694	11,191	11,890	11,890
Tourists	0	0	0	0	0
TOTAL	0	12,401	19,036	21,304	21,304
Gulf					
Site-built Homes	2,845	3,312	5,884	6,473	7,335
Mobile/Manuf. Homes	2,025	2,281	2,692	2,859	3,027
Tourists	0	147	203	203	203
TOTAL	4,870	5,740	8,779	9,535	10,565
Jackson					
Site-built Homes	0	3,081	6,161	9,242	9,242
Mobile/Manuf. Homes	0	6,128	7,800	9,471	9,471
Tourists	0	0	0	0	0
TOTAL	0	9,209	13,961	18,713	18,713
Jefferson					
Site-built Homes	928	1,355	1,904	2,310	2,310
Mobile/Manuf. Homes	3,576	3,851	4,677	5,227	5,227
Tourists	0	0	53	53	53
TOTAL	4,504	5,206	6,634	7,590	7,590
Leon					
Site-built Homes	12,394	49,336	62,212	74,847	74,847
Mobile/Manuf. Homes	10,392	14,549	16,719	17,850	17,850
Tourists	0	0	6	6	6
TOTAL	22,786	63,885	78,937	92,703	92,703
Liberty					
Site-built Homes	185	370	925	1,110	1,110
Mobile/Manuf. Homes	1,652	1,817	2,643	2,808	2,808
Tourists	0	0	0	0	0
TOTAL	1,837	2,187	3,568	3,918	3,918
Wakulla					
Site-built Homes	7,244	8,017	11,455	13,942	14,882
Mobile/Manuf. Homes	5,860	6,348	6,836	8,301	9,278
Tourists	63	64	260	260	260
TOTAL	13,167	14,429	18,551	22,503	24,420

Table IV-21 – Evacuating Population by Operational Scenario for 2020

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Calhoun County					
Site-built Homes	444	888	2,221	2,665	2,665
Mobile/Manuf. Homes	2,332	2,566	3,499	3,965	3,965
Tourists	0	0	0	0	0
TOTAL	2,776	3,454	5,720	6,630	6,630
Franklin					
Site-built Homes	3,392	4,149	5,483	6,246	6,824
Mobile/Manuf. Homes	1,548	1,668	1,833	1,999	2,310
Tourists	326	753	753	753	753
TOTAL	5,266	6,570	8,069	8,998	9,887
Gadsden					
Site-built Homes	0	4,795	7,992	9,590	9,590
Mobile/Manuf. Homes	0	7,833	11,394	12,106	12,106
Tourists	0	0	0	0	0
TOTAL	0	12,628	19,386	21,696	21,696
Gulf					
Site-built Homes	2,866	3,336	5,927	6,520	7,388
Mobile/Manuf. Homes	2,042	2,300	2,714	2,883	3,053
Tourists	0	147	203	203	203
TOTAL	4,908	5,783	8,844	9,606	10,644
Jackson					
Site-built Homes	0	3,092	6,185	9,277	9,277
Mobile/Manuf. Homes	0	6,148	7,825	9,502	9,502
Tourists	0	0	0	0	0
TOTAL	0	9,240	14,010	18,779	18,779
Jefferson					
Site-built Homes	957	1,398	1,965	2,383	2,383
Mobile/Manuf. Homes	3,707	3,992	4,848	5,418	5,418
Tourists	0	0	53	53	53
TOTAL	4,664	5,390	6,866	7,854	7,854
Leon					
Site-built Homes	12,978	51,658	65,140	78,370	78,370
Mobile/Manuf. Homes	10,885	15,239	17,513	18,697	18,697
Tourists	0	0	6	6	6
TOTAL	23,863	66,897	82,659	97,073	97,073
Liberty					
Site-built Homes	197	393	983	1,179	1,179
Mobile/Manuf. Homes	1,755	1,931	2,808	2,984	2,984
Tourists	0	0	0	0	0
TOTAL	1,952	2,324	3,791	4,163	4,163
Wakulla					
Site-built Homes	7,866	8,706	12,438	15,138	16,159
Mobile/Manuf. Homes	6,361	6,891	7,421	9,011	10,072
Tourists	63	64	260	260	260
TOTAL	14,290	15,661	20,119	24,409	26,491

Shelter Demand

Shelter demand estimates by county are summarized for each of the operational scenarios in Table IV-22. Shelter demand is the population in each county who will seek public shelter during their evacuation, either at an in-county shelter or an out of county shelter.

Public shelter demand in the nine county region ranges from just over 4,000 persons for Scenario 1 in 2015 to more than 16,000 persons for Scenario 5. By 2020, the public shelter demand is not expected to increase significantly.

Table IV-22 – Shelter Demand by Operational Scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2015					
Calhoun County	429	529	864	999	999
Franklin County	278	326	394	438	492
Gadsden County	0	2,046	3,191	3,626	3,626
Gulf County	311	363	555	609	675
Jackson County	0	755	1,288	1,819	1,819
Jefferson County	546	625	786	899	899
Leon County	1,709	4,048	4,932	5,700	5,700
Liberty County	302	364	599	662	662
Wakulla County	690	755	968	1,177	1,277
Total	4,265	9,811	13,577	15,929	16,149
	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
2020					
Calhoun County	448	551	899	1,040	1,040
Franklin County	278	326	394	438	492
Gadsden County	0	2,083	3,252	3,694	3,694
Gulf County	313	364	559	614	681
Jackson County	0	757	1,291	1,826	1,826
Jefferson County	564	646	814	931	931
Leon County	1,791	4,238	5,165	5,966	5,966
Liberty County	322	385	638	703	703
Wakulla County	749	820	1,051	1,277	1,386
Total	4,465	10,169	14,064	16,489	16,718

Note: Shelter demand is the population in each county who will seek public shelter during their evacuation, either at an in-county shelter or an out of county shelter.

Evacuating Vehicles

From a transportation standpoint, the number of evacuating vehicles is more important than the evacuating population. Evacuating vehicles for the operational scenarios are summarized by county for 2015 in Table IV-23 and for 2020 in Table IV-24.

The total number of evacuating vehicles within the nine county region for the base scenarios also varies by scenario. A total of more than 60,000 vehicles evacuate from the Apalachee region during a Category 1 Hurricane in 2015, and this number increases to approximately 112,000 evacuating vehicles for a Category 5 Hurricane in 2015.

By 2020, the number of evacuating vehicles is expected to increase to more than 236,120 vehicles for the operational scenario level A evacuation and slightly more than 594,100 evacuating vehicles for the operational scenario level E evacuation.

Table IV-23 – Evacuating Vehicles by Operational Scenario for 2015

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun					
Site-built Homes	225	450	1,125	1,350	1,350
Mobile/Manuf. Homes	993	1,093	1,490	1,689	1,689
Tourists	0	0	0	0	0
TOTAL	1,218	1,543	2,615	3,039	3,039
Franklin					
Site-built Homes	2,054	2,364	3,126	3,561	3,891
Mobile/Manuf. Homes	975	1,051	1,154	1,258	1,455
Tourists	122	282	282	282	282
TOTAL	3,151	3,697	4,562	5,101	5,628
Gadsden					
Site-built Homes	0	2,774	4,623	5,548	5,548
Mobile/Manuf. Homes	0	3,669	5,337	5,670	5,670
Tourists	0	0	0	0	0
TOTAL	0	6,443	9,960	11,218	11,218
Gulf					
Site-built Homes	1,830	2,127	3,800	4,180	4,738
Mobile/Manuf. Homes	932	1,054	1,247	1,324	1,401
Tourists	0	55	76	76	76
TOTAL	2,762	3,236	5,123	5,580	6,215
Jackson					
Site-built Homes	0	1,615	3,229	4,844	4,844
Mobile/Manuf. Homes	0	3,313	4,216	5,120	5,120
Tourists	0	0	0	0	0
TOTAL	0	4,928	7,445	9,964	9,964
Jefferson					
Site-built Homes	528	774	1,080	1,315	1,315
Mobile/Manuf. Homes	1,613	1,737	2,109	2,357	2,357
Tourists	0	0	23	23	23
TOTAL	2,141	2,511	3,212	3,695	3,695
Leon					
Site-built Homes	6,929	27,601	34,761	41,805	41,805
Mobile/Manuf. Homes	5,772	8,081	9,282	9,905	9,905
Tourists	0	0	2	2	2
TOTAL	12,701	35,682	44,045	51,712	51,712
Liberty					
Site-built Homes	124	248	620	744	744
Mobile/Manuf. Homes	724	796	1,158	1,230	1,230
Tourists	0	0	0	0	0
TOTAL	848	1,044	1,778	1,974	1,974
Wakulla					
Site-built Homes	4,085	4,521	6,463	7,867	8,399
Mobile/Manuf. Homes	3,345	3,624	3,902	4,739	5,296
Tourists	24	24	97	97	97
TOTAL	7,454	8,169	10,462	12,703	13,792

Table IV-24 – Evacuating Vehicles by Operational Scenario for 2020

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Calhoun					
Site-built Homes	234	469	1,172	1,407	1,407
Mobile/Manuf. Homes	1,034	1,137	1,551	1,757	1,757
Tourists	0	0	0	0	0
TOTAL	1,268	1,606	2,723	3,164	3,164
Franklin					
Site-built Homes	2,054	2,364	3,126	3,561	3,891
Mobile/Manuf. Homes	975	1,051	1,154	1,258	1,455
Tourists	122	282	282	282	282
TOTAL	3,151	3,697	4,562	5,101	5,628
Gadsden					
Site-built Homes	0	2,826	4,709	5,651	5,651
Mobile/Manuf. Homes	0	3,740	5,440	5,780	5,780
Tourists	0	0	0	0	0
TOTAL	0	6,566	10,149	11,431	11,431
Gulf					
Site-built Homes	1,844	2,143	3,829	4,212	4,775
Mobile/Manuf. Homes	940	1,063	1,257	1,335	1,413
Tourists	0	55	76	76	76
TOTAL	2,784	3,261	5,162	5,623	6,264
Jackson					
Site-built Homes	0	1,621	3,242	4,863	4,863
Mobile/Manuf. Homes	0	3,326	4,233	5,140	5,140
Tourists	0	0	0	0	0
TOTAL	0	4,947	7,475	10,003	10,003
Jefferson					
Site-built Homes	545	799	1,114	1,357	1,357
Mobile/Manuf. Homes	1,670	1,799	2,184	2,441	2,441
Tourists	0	0	23	23	23
TOTAL	2,215	2,598	3,321	3,821	3,821
Leon					
Site-built Homes	7,255	28,898	36,394	43,769	43,769
Mobile/Manuf. Homes	6,044	8,462	9,719	10,372	10,372
Tourists	0	0	2	2	2
TOTAL	13,299	37,360	46,115	54,143	54,143
Liberty					
Site-built Homes	131	263	657	789	789
Mobile/Manuf. Homes	769	846	1,231	1,308	1,308
Tourists	0	0	0	0	0
TOTAL	900	1,109	1,888	2,097	2,097
Wakulla					
Site-built Homes	4,436	4,910	7,019	8,543	9,121
Mobile/Manuf. Homes	3,634	3,937	4,239	5,148	5,753
Tourists	24	24	97	97	97
TOTAL	8,094	8,871	11,355	13,788	14,971

Congested Roadways

A summary of the total number of evacuating vehicles for each of the operational scenarios is presented in Table IV-25. It is important to note that the total number of evacuating vehicles in the table below includes vehicles evacuating from all of the counties included in the operational scenario, as identified in Table IV-19.

Table IV-25 – Total Evacuating Vehicles for Operational Scenarios

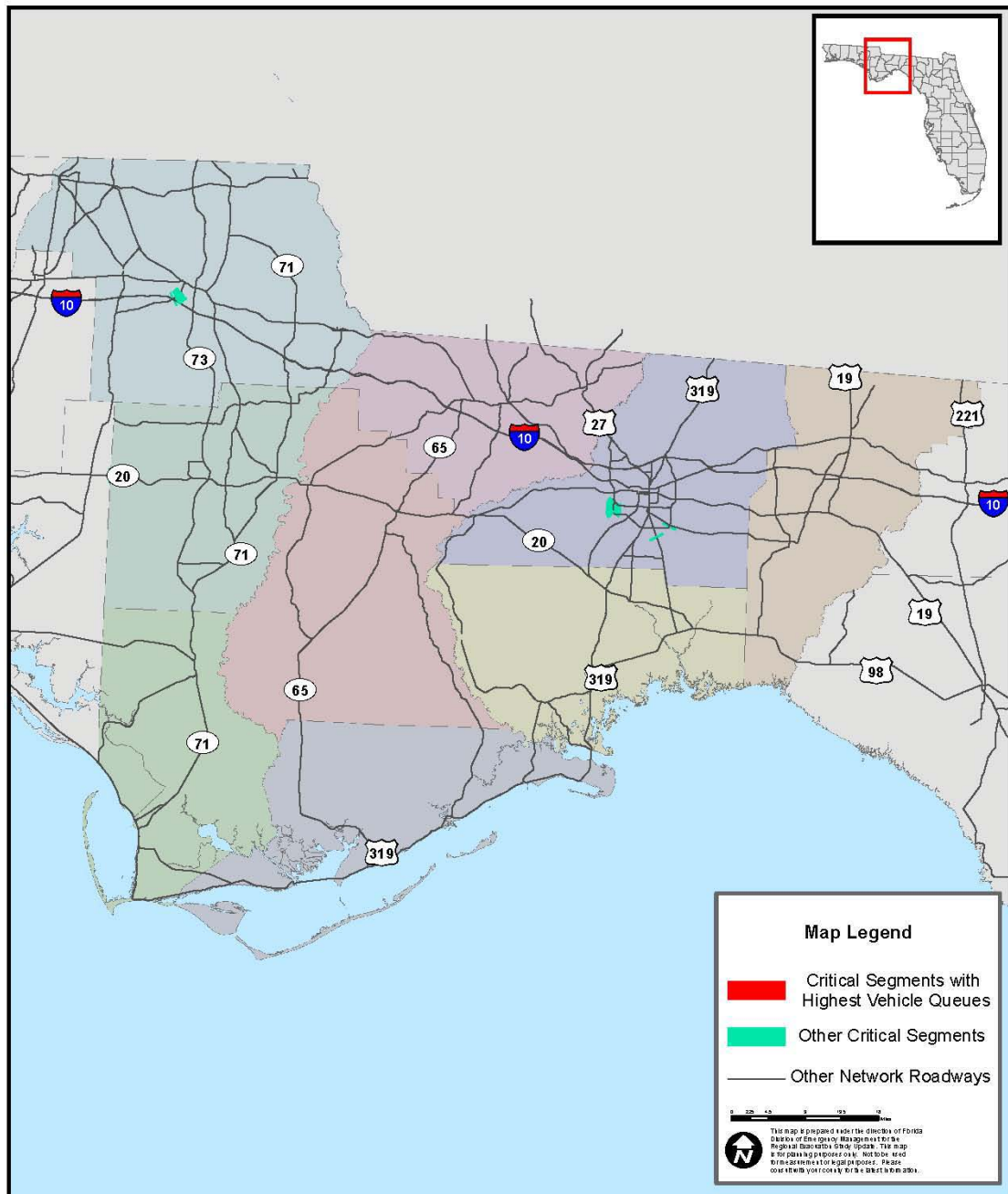
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2015	55,736	102,420	125,425	142,468	145,807
	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
2020	58,559	107,063	130,884	148,596	152,062

Similar to the base scenarios, critical roadways were identified by reviewing roadways in the model network that have the highest vehicle queues for extended periods of time during an evacuation. Due to the nature of a major evacuation in general, nearly all roadway facilities will have extended vehicle queues at some point during the evacuation process. The point of this analysis is to identify those roadway facilities that have vehicle queues for the longest time periods during each of the evacuation scenarios. Critical roadway segments for the Apalachee region Florida region are identified in Figures IV-14 through IV-23 for each of the operational scenarios for 2015 and 2020.

Through a review of the critical roadway segment figures and vehicle flows, it is clear that in addition to I-10, US 319 in Wakulla and Leon Counties, US 98 in Wakulla County, SR 71 in Gulf County and portions of SR 20 throughout the region are critical during an evacuation. For a Category 1 Hurricane evacuation scenario, the heavily traveled roadways are primarily US and State highways. In contrast, for a Category 5 Hurricane evacuation scenario, heavily traveled roadways include lesser used roads such as SR 231.



Figure IV-14
Critical Roadway Segments with Excessive Vehicle Queues
for 2015 Operational Scenario 1

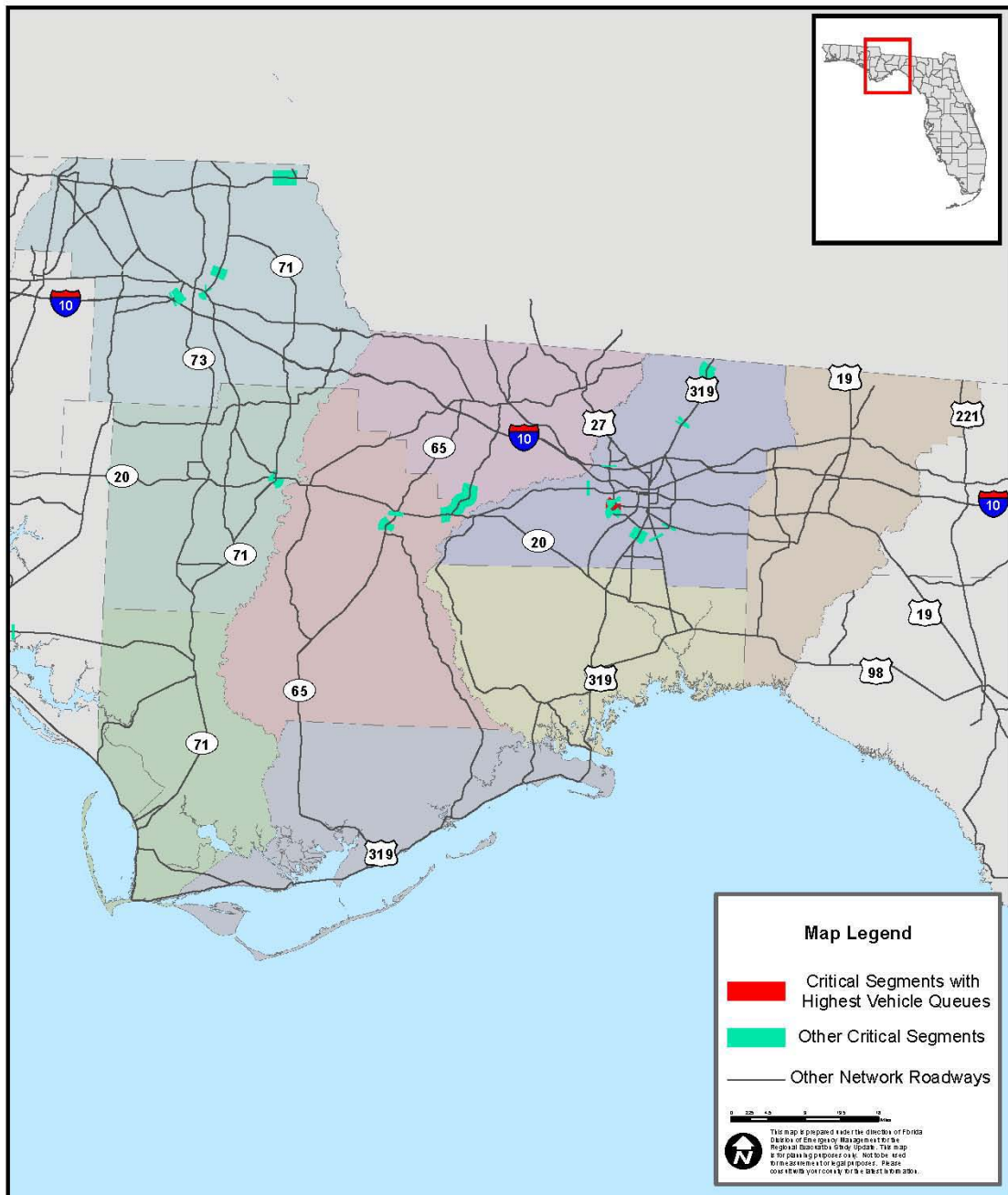


Sources: Apalachee Regional Planning Council, CDM Smith

Map Printed: August, 2015

Figure IV-15

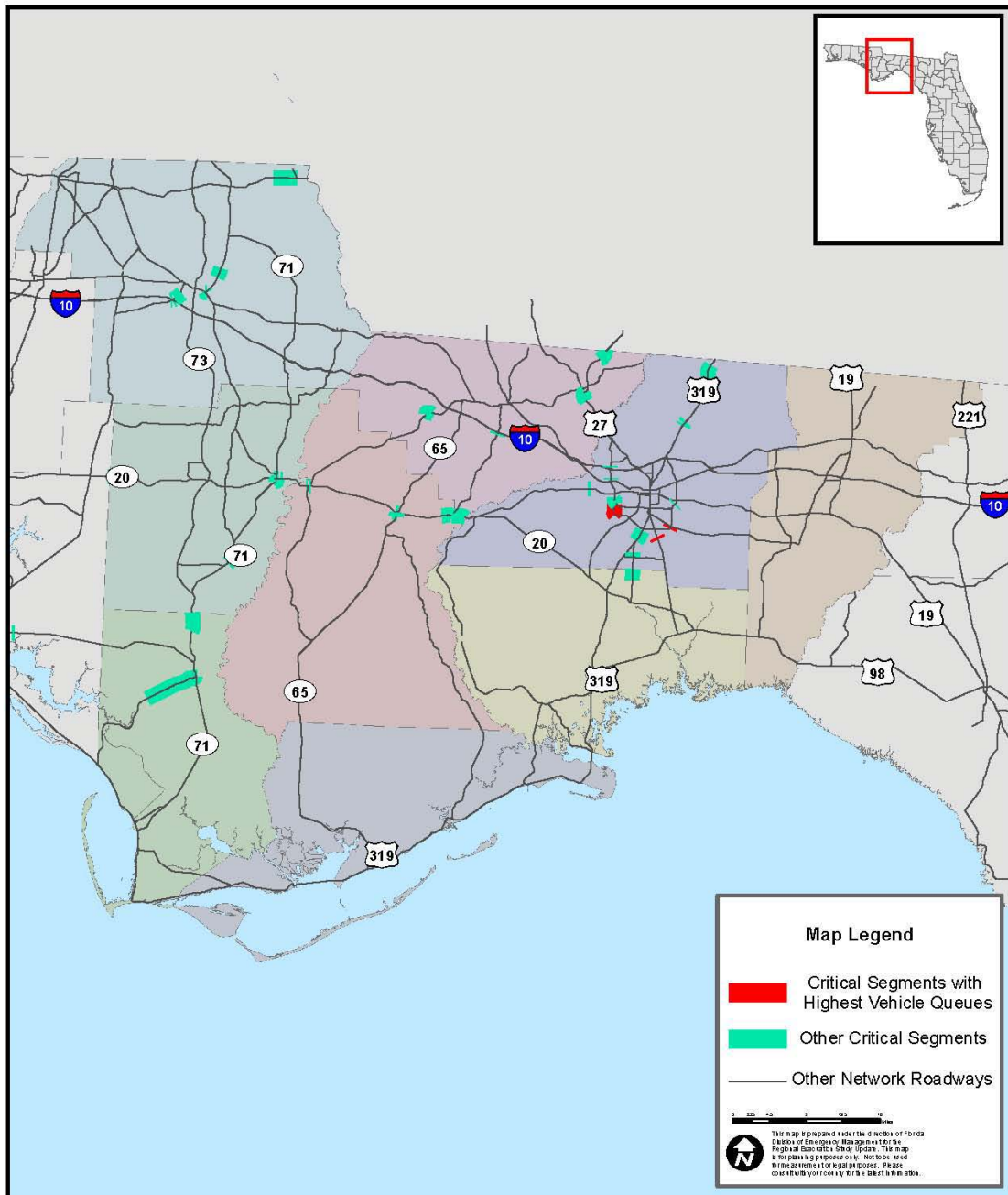
Critical Roadway Segments with Excessive Vehicle Queues for 2015 Operational Scenario 2



Sources: Apalachee Regional Planning Council, CDM Smith

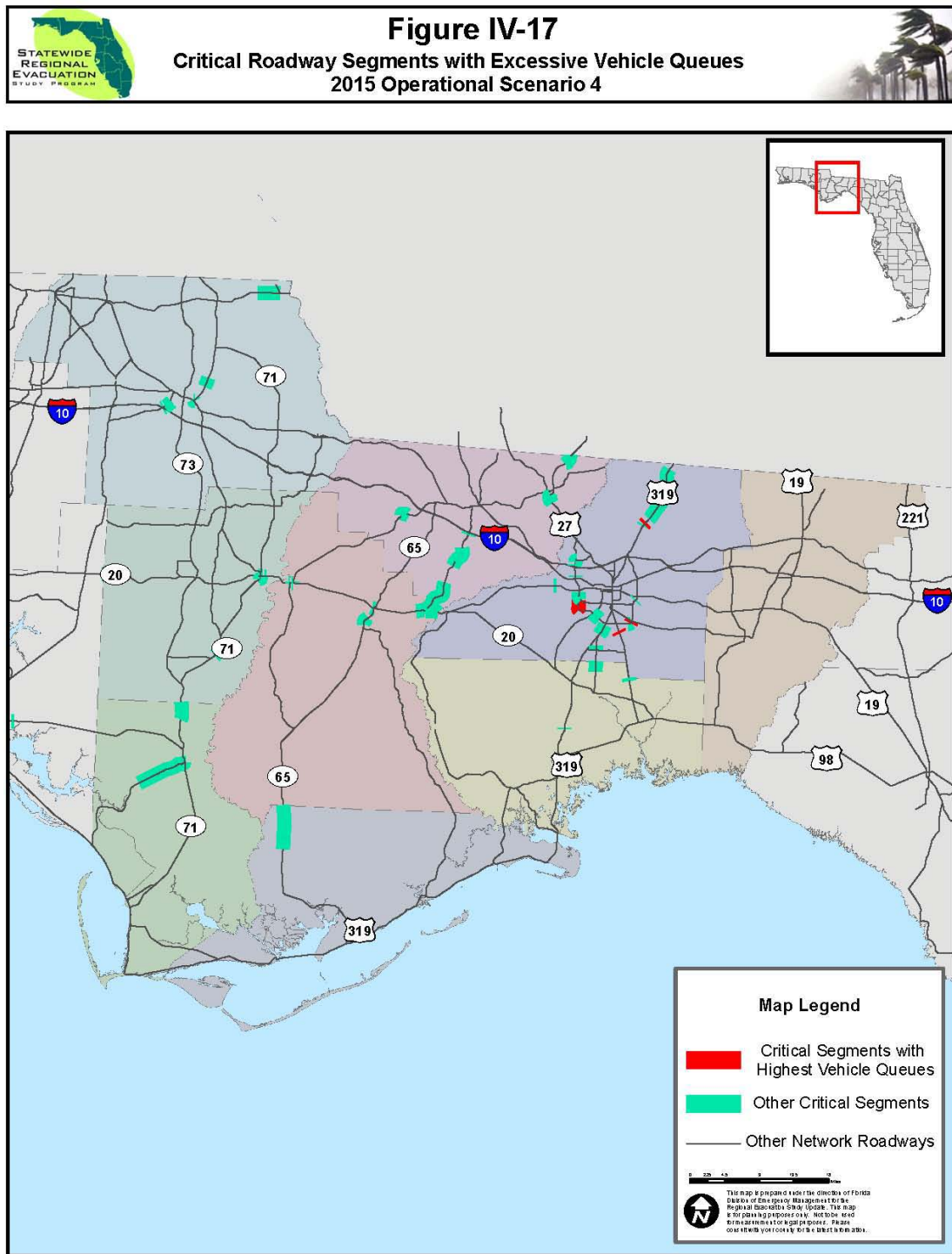
Map Printed: August, 2015

Figure IV-16
Critical Roadway Segments with Excessive Vehicle Queues
for 2015 Operational Scenario 3



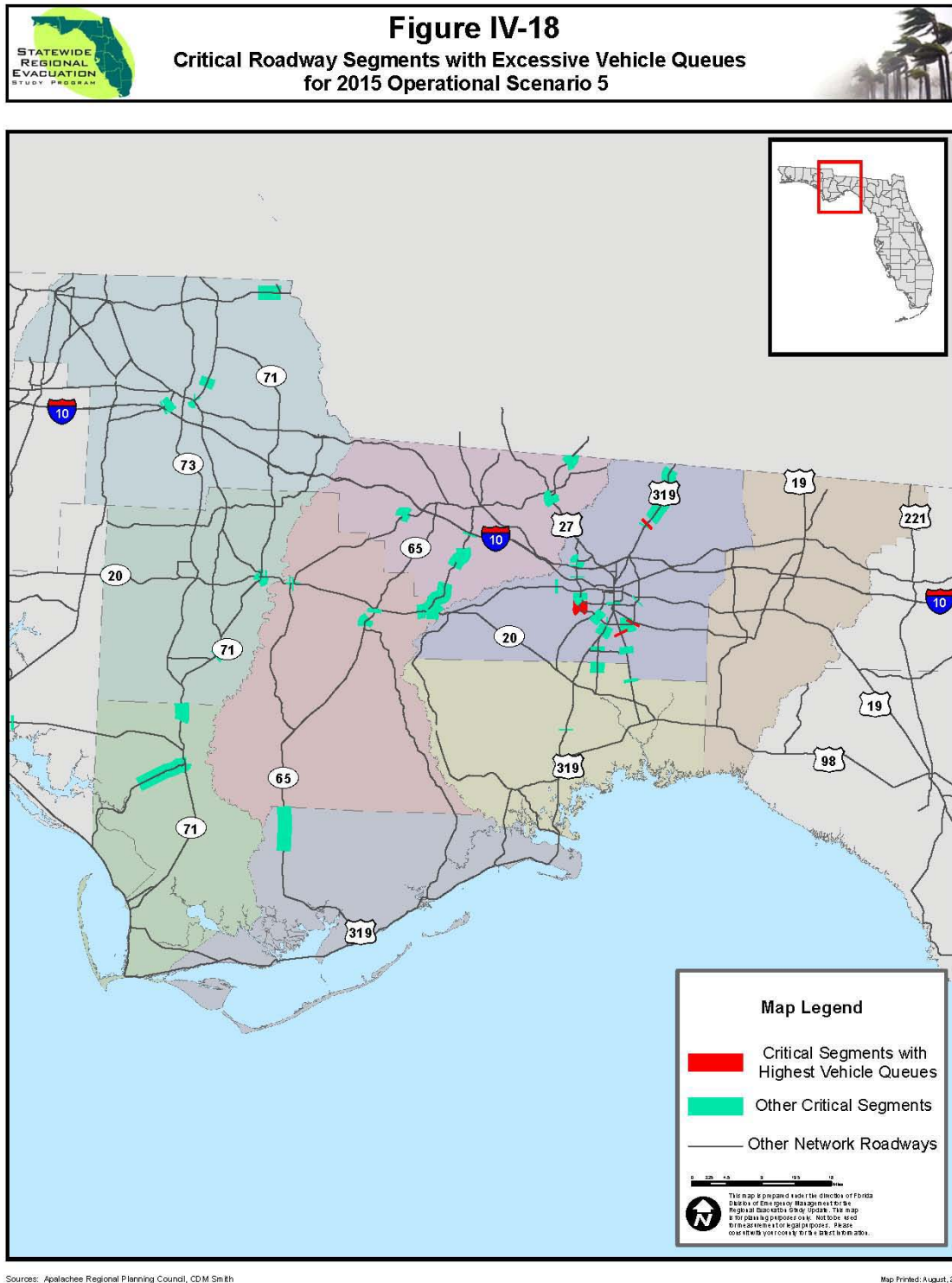
Sources: Apalachee Regional Planning Council, CDM Smith

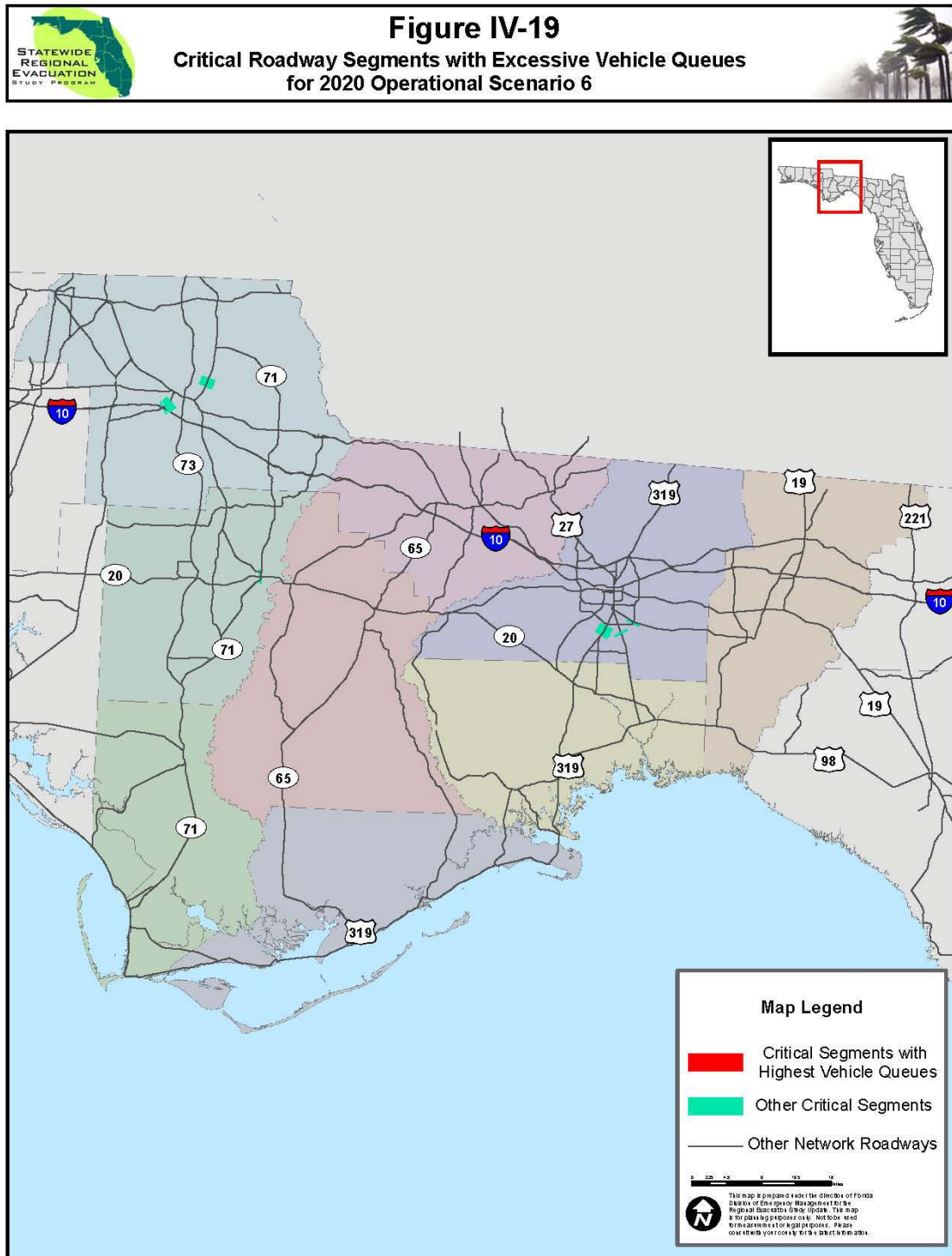
Map Printed: August, 2015



Sources: Apalachee Regional Planning Council, CDM Smith

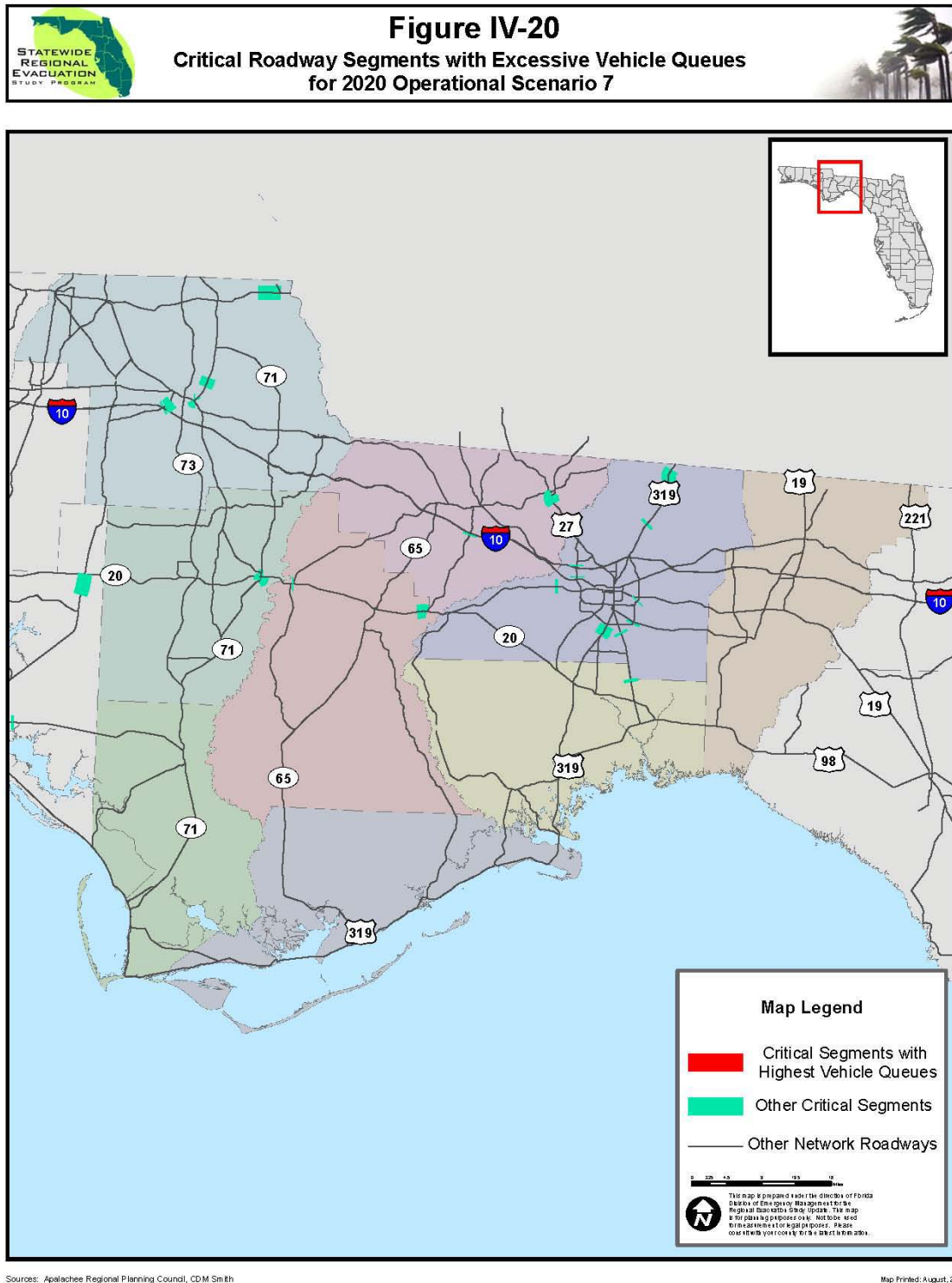
Map Printed: August, 2015

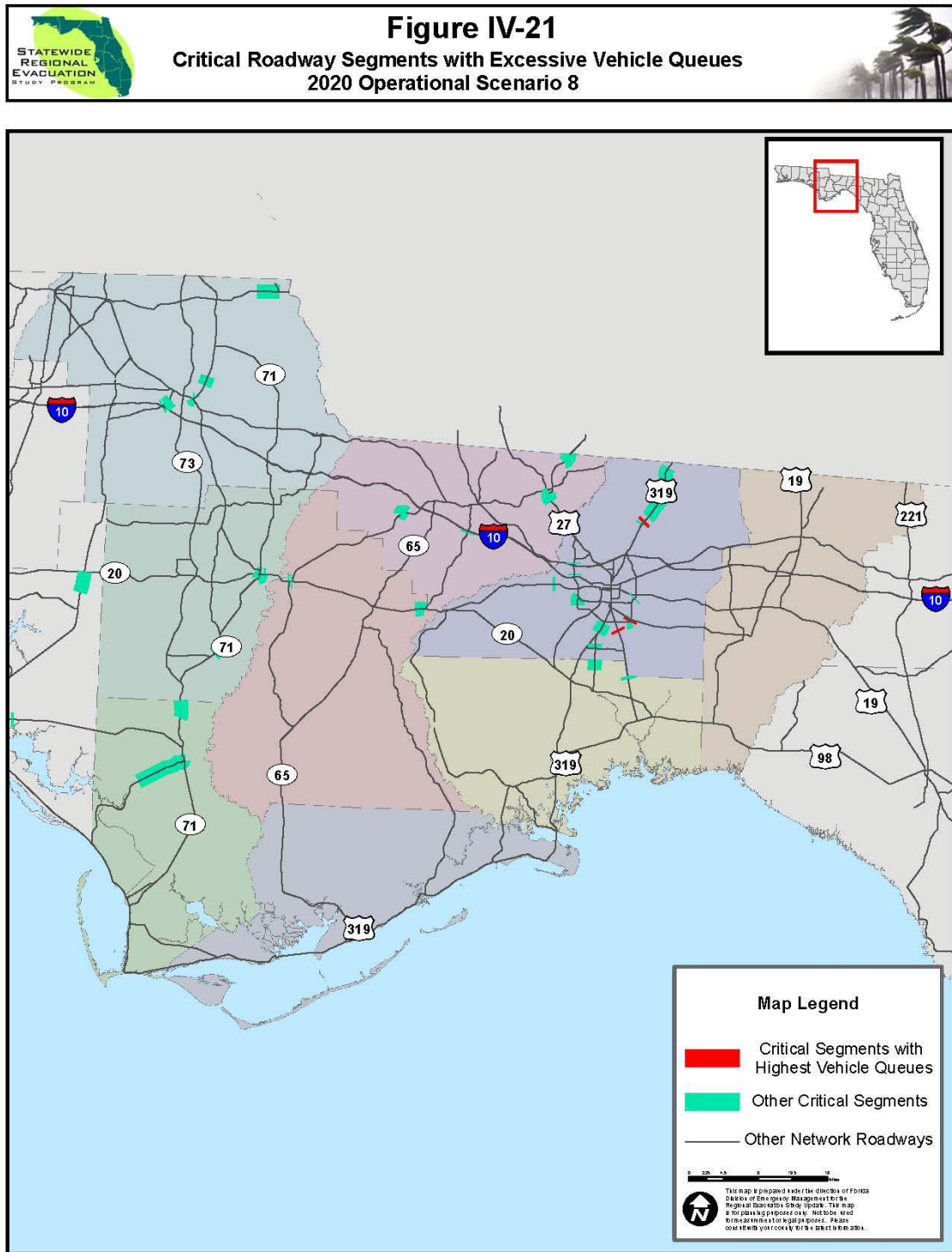




Sources: Apalachee Regional Planning Council, CDM Smith

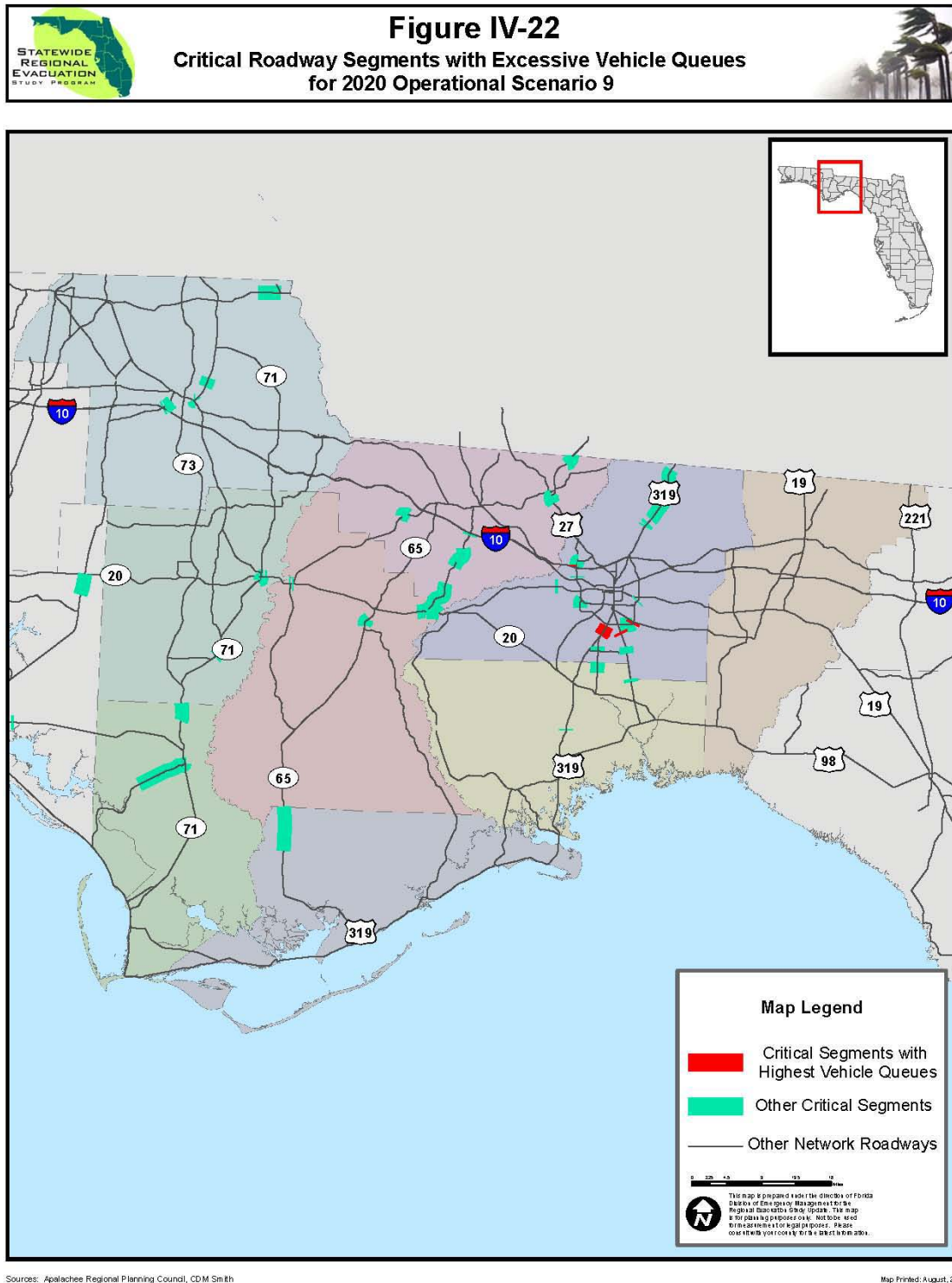
Map Printed: August, 2015

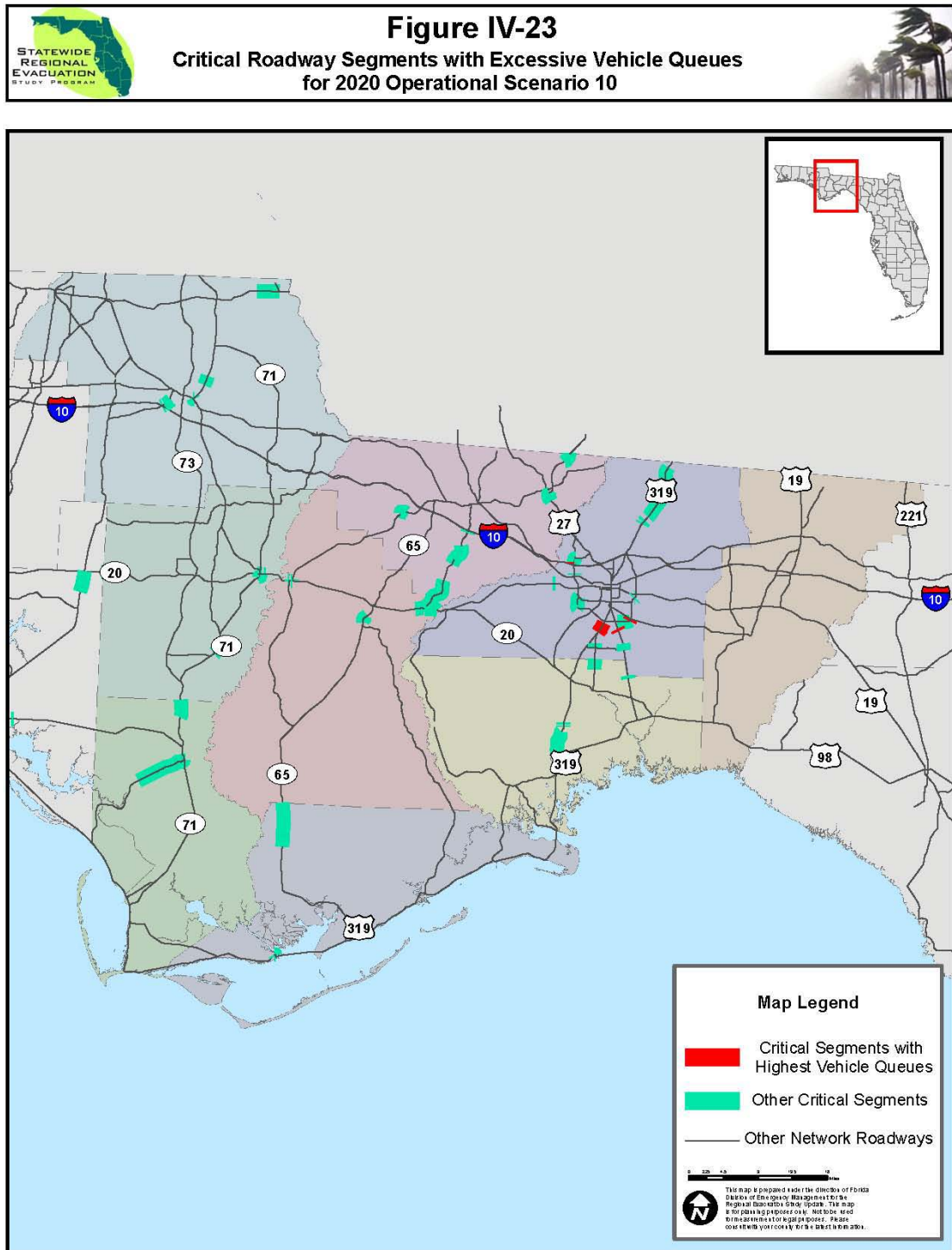




Sources: Apalachee Regional Planning Council, CDM Smith

Map Printed: August, 2015





Source: Apalachee Regional Planning Council, CDM Smith

Map Printed: August, 2015

In addition to the identification of critical roadway segments, the total number of evacuating vehicles entering and exiting each county by evacuation scenario was also determined. Evacuating vehicles exiting each county by major evacuation route are identified in Table IV-26 for 2015 and Table IV-27 for 2020. In addition, evacuating vehicles entering each county by major evacuation route are identified in Table IV-28 for 2015 and Table IV-29 for 2020. Detailed volume figures for all evacuation routes in the Apalachee region for each operational scenario are included in Volume 5-4.

The number of vehicles entering and exiting each county during an evacuation varies widely depending upon the scenario, roadway, and county. As expected, major interstates and state highways generally carry larger volumes of evacuating traffic. The vehicle flows into and out of each county also generally follow the same pattern as the critical segment figures, as locations with higher queues and congestion generally have higher traffic volumes.

**Table IV-26 – Evacuating Vehicles Exiting the County by Evacuation Route
2015 Operational Scenarios**

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun					
SR 20 Westbound	100	200	300	400	400
SR 71 Northbound	200	200	300	400	500
SR 20 Eastbound	3,900	5,900	6,700	6,800	7,000
Franklin					
US 98 Eastbound	100	100	100	100	100
SR 65 Northbound	800	900	1,200	1,400	1,600
US 98 Westbound	300	300	500	400	400
Gadsden					
US 90 Eastbound	0	0	100	200	100
I-10 Eastbound	2,900	6,700	8,800	10,100	10,200
US 27 Southbound	0	400	600	600	600
US 27 Northbound	1,900	3,700	5,200	5,800	5,900
I-10 Westbound	1,100	2,900	3,600	4,700	4,800
US 90 Westbound	0	0	0	0	100
Gulf					
US 98 Westbound	900	1,000	1,700	1,700	1,900
US 98 Eastbound	100	100	200	200	300
SR 71 Northbound	1,600	1,900	3,100	3,400	3,800
Jackson					
I-10 Westbound	700	1,900	2,500	3,300	3,400
US 231 Northbound	1,300	2,200	2,500	2,700	2,700
I-10 Eastbound	500	1,900	3,100	4,400	4,400
US 90 Eastbound	0	100	100	100	100
SR 2 Eastbound	4,500	6,400	7,000	7,400	7,500
Jefferson					
I-10 Westbound	900	1,400	1,800	2,100	2,100
I-10 Eastbound	2,200	4,300	5,700	7,000	7,300
SR 55 Northbound	200	200	200	300	300
Leon					
SR 20 Westbound	700	800	1,200	1,500	1,700
US 90 Westbound	700	1,200	1,400	1,500	1,500
I-10 Westbound	2,600	6,600	8,100	10,200	10,300
SR 319 Northbound	2,800	7,000	8,300	9,200	9,300
I-10 Eastbound	1,300	3,300	4,400	5,200	5,400
US 27 Northbound	1,700	3,300	4,700	5,200	5,300
Liberty					
SR 20 Westbound	300	600	700	900	1,000
SR 12 Northbound	1,900	3,100	4,000	4,100	4,400
SR 267 Northbound	3,300	4,300	4,800	5,100	5,300
SR 20 Eastbound	100	100	100	200	200
SR 65 Northbound	500	500	600	800	800
Wakulla					
SR 319 Northbound	2,600	3,300	4,200	4,900	5,200
SR 61 Northbound	1,000	1,200	1,400	1,800	1,800
SR 363 Northbound	1,000	1,200	1,400	1,700	1,900
US 98 Eastbound	700	600	1,200	1,700	2,100

**Table IV-27 – Evacuating Vehicles Exiting the County by Evacuation Route
2020 Operational Scenarios**

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Calhoun					
SR 20 Westbound	100	200	300	400	500
SR 71 Northbound	100	200	300	400	500
SR 20 Eastbound	4,100	6,100	6,900	7,100	7,200
Franklin					
US 98 Eastbound	100	100	100	100	100
SR 65 Northbound	900	1,000	1,200	1,500	1,600
US 98 Westbound	300	300	400	400	400
Gadsden					
US 90 Eastbound	0	100	100	200	100
I-10 Eastbound	3,100	7,000	9,200	10,700	10,700
US 27 Southbound	0	400	600	700	600
US 27 Northbound	2,000	4,100	5,400	6,200	6,300
I-10 Westbound	1,100	2,800	3,900	4,600	4,700
US 90 Westbound	0	0	0	0	100
Gulf					
US 98 Westbound	900	1,100	1,700	1,700	1,900
US 98 Eastbound	100	100	200	200	300
SR 71 Northbound	1,600	1,900	3,100	3,500	3,800
Jackson					
I-10 Westbound	800	2,000	2,900	3,400	3,500
US 231 Northbound	1,300	2,300	2,600	2,900	2,900
I-10 Eastbound	500	2,100	3,400	4,500	4,500
US 90 Eastbound	0	100	100	100	100
SR 2 Eastbound	4,700	6,500	7,200	7,500	7,600
Jefferson					
I-10 Westbound	1,100	1,400	1,900	2,100	2,200
I-10 Eastbound	2,300	4,700	6,000	7,400	7,700
SR 55 Northbound	100	200	200	300	300
Leon					
SR 20 Westbound	700	800	1,200	1,500	1,700
US 90 Westbound	800	1,200	1,600	2,000	2,100
I-10 Westbound	2,700	6,800	8,900	10,400	10,600
SR 319 Northbound	3,000	7,300	8,500	9,600	9,600
I-10 Eastbound	1,400	3,700	4,800	5,800	5,900
US 27 Northbound	1,900	3,600	4,800	5,500	5,600
Liberty					
SR 20 Westbound	300	500	800	900	1,100
SR 12 Northbound	2,000	3,200	4,200	4,400	4,500
SR 267 Northbound	3,300	4,400	4,800	5,200	5,400
SR 20 Eastbound	100	100	100	100	100
SR 65 Northbound	500	500	600	800	800
Wakulla					
SR 319 Northbound	2,800	3,400	4,500	5,200	5,600
SR 61 Northbound	1,100	1,300	1,600	1,900	2,100
SR 363 Northbound	1,000	1,300	1,600	2,000	2,100
US 98 Eastbound	800	700	1,200	1,700	2,000

**Table IV-28 – Evacuating Vehicles Entering the County by Evacuation Route
2015 Operational Scenario**

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Calhoun					
SR 20 Westbound	300	600	700	900	1,000
SR 71 Northbound	1,600	1,900	3,100	3,400	3,800
Franklin					
US 98 Eastbound	100	100	200	200	300
Gadsden					
I-10 Eastbound	500	1,900	3,100	4,400	4,400
US 90 Eastbound	0	100	100	100	100
SR 12 Northbound	1,900	3,100	4,000	4,100	4,400
SR 267 Northbound	3,300	4,300	4,800	5,100	5,300
US 90 Westbound	700	1,200	1,400	1,500	1,500
I-10 Westbound	2,600	6,600	8,100	10,200	10,300
SR 65 Northbound	500	500	600	800	800
US 27 Northbound	1,700	3,300	4,700	5,200	5,300
Gulf					
US 98 Westbound	300	300	500	400	400
Jackson					
SR 71 Northbound	200	200	300	400	500
I-10 Westbound	1,100	2,900	3,600	4,700	4,800
US 90 Westbound	0	0	0	0	100
Jefferson					
I-10 Eastbound	1,300	3,300	4,400	5,200	5,400
US 98 Eastbound	700	600	1,200	1,700	2,100
Leon					
SR 20 Eastbound	100	100	100	200	200
US 90 Eastbound	0	0	100	200	100
I-10 Eastbound	2,900	6,700	8,800	10,100	10,200
US 27 Southbound	0	400	600	600	600
SR 319 Northbound	2,600	3,300	4,200	4,900	5,200
SR 61 Northbound	1,000	1,200	1,400	1,800	1,800
SR 363 Northbound	1,000	1,200	1,400	1,700	1,900
I-10 Westbound	900	1,400	1,800	2,100	2,100
Liberty					
SR 20 Eastbound	3,900	5,900	6,700	6,800	7,000
SR 20 Westbound	700	800	1,200	1,500	1,700
SR 65 Northbound	800	900	1,200	1,400	1,600
Wakulla					
US 98 Eastbound	100	100	100	100	100

**Table IV-29 – Evacuating Vehicles Entering the County by Evacuation Route
2020 Operational Scenario**

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Calhoun					
SR 20 Westbound	300	500	800	900	1,100
SR 71 Northbound	1,600	1,900	3,100	3,500	3,800
Franklin					
US 98 Eastbound	100	100	200	200	300
Gadsden					
I-10 Eastbound	500	2,100	3,400	4,500	4,500
US 90 Eastbound	0	100	100	100	100
SR 12 Northbound	2,000	3,200	4,200	4,400	4,500
SR 267 Northbound	3,300	4,400	4,800	5,200	5,400
US 90 Westbound	800	1,200	1,600	2,000	2,100
I-10 Westbound	2,700	6,800	8,900	10,400	10,600
SR 65 Northbound	500	500	600	800	800
US 27 Northbound	1,900	3,600	4,800	5,500	5,600
Gulf					
US 98 Westbound	300	300	400	400	400
Jackson					
SR 71 Northbound	100	200	300	400	500
I-10 Westbound	1,100	2,800	3,900	4,600	4,700
US 90 Westbound	0	0	0	0	100
Jefferson					
I-10 Eastbound	1,400	3,700	4,800	5,800	5,900
US 98 Eastbound	800	700	1,200	1,700	2,000
Leon					
SR 20 Eastbound	100	100	100	100	100
US 90 Eastbound	0	100	100	200	100
I-10 Eastbound	3,100	7,000	9,200	10,700	10,700
US 27 Southbound	0	400	600	700	600
SR 319 Northbound	2,800	3,400	4,500	5,200	5,600
SR 61 Northbound	1,100	1,300	1,600	1,900	2,100
SR 363 Northbound	1,000	1,300	1,600	2,000	2,100
I-10 Westbound	1,100	1,400	1,900	2,100	2,200
Liberty					
SR 20 Eastbound	4,100	6,100	6,900	7,100	7,200
SR 20 Westbound	700	800	1,200	1,500	1,700
SR 65 Northbound	900	1,000	1,200	1,500	1,600
Wakulla					
US 98 Eastbound	100	100	100	100	100

Clearance Times

Clearance times for each of the operational scenarios are summarized in Tables IV-30 and IV-31, as well as Figures IV-24 through IV-26. Clearance time includes several components, including the mobilization time for the evacuating population to prepare for an evacuation (pack supplies and personal belongs, load their vehicle, etc.), the actual time spent traveling on the roadway network, and the delay time caused by traffic congestion.

In-county clearance times for the operational scenarios range from 18.5 to 20 hours depending on the scenario. The clearance time to shelter varies greatly with Franklin County having a 4.5 clearance time while most other counties have a 18.5 clearance time. The regional clearance times range is consistent between 2015 and 2020 at 21 hours. Clearance times for the operational scenarios are higher than the base scenarios because they were run using an 18-hour response curve.

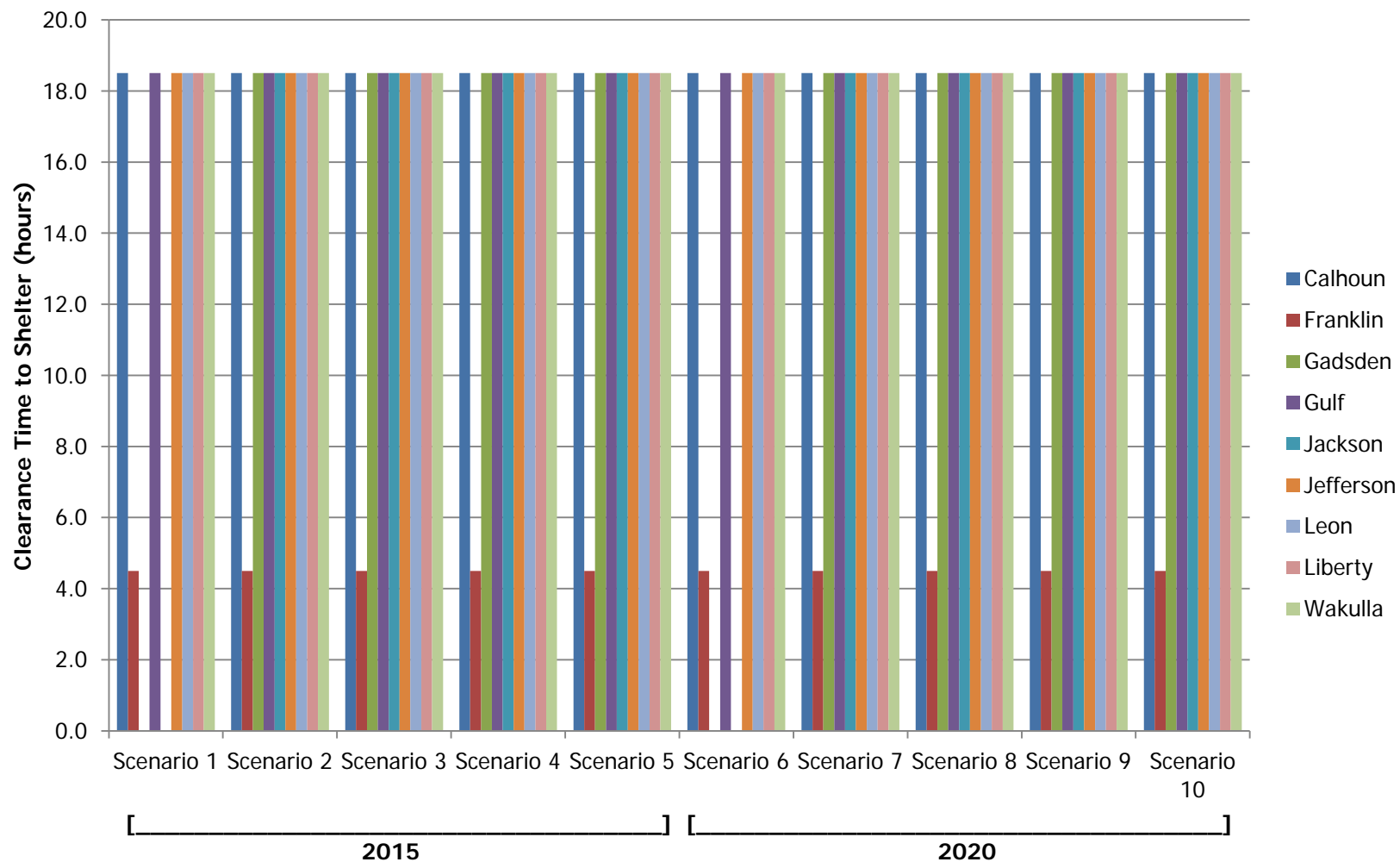
Table IV-30 – 2015 Clearance Times for Operational Scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Clearance Time to Shelter					
Calhoun County	18.5	18.5	18.5	18.5	18.5
Franklin County	4.5	4.5	4.5	4.5	4.5
Gadsden County	0.0	18.5	18.5	18.5	18.5
Gulf County	18.5	18.5	18.5	18.5	18.5
Jackson County	0.0	18.5	18.5	18.5	18.5
Jefferson County	18.5	18.5	18.5	18.5	18.5
Leon County	18.5	18.5	18.5	18.5	18.5
Liberty County	18.5	18.5	18.5	18.5	18.5
Wakulla County	18.5	18.5	18.5	18.5	18.5
In-County Clearance Time					
Calhoun County	19.0	19.0	19.0	19.0	19.0
Franklin County	19.0	19.0	19.0	19.0	19.0
Gadsden County	0.0	19.0	19.0	19.0	19.0
Gulf County	19.0	18.5	18.5	19.0	19.0
Jackson County	0.0	19.0	19.0	19.0	19.0
Jefferson County	20.0	20.0	20.0	21.0	21.0
Leon County	19.0	20.0	20.0	20.5	20.5
Liberty County	19.0	18.5	18.5	18.5	18.5
Wakulla County	20.0	20.0	20.0	20.0	20.0
Out of County Clearance Time					
Calhoun County	20.0	19.5	19.5	20.0	20.0
Franklin County	19.0	19.0	19.0	19.0	19.0
Gadsden County	20.5	20.5	20.5	20.5	20.5
Gulf County	19.0	19.0	19.0	19.5	19.5
Jackson County	20.5	20.5	20.5	21.0	21.0
Jefferson County	20.5	21.0	21.0	21.0	21.0
Leon County	20.5	20.5	20.5	20.5	20.5
Liberty County	19.5	20.0	20.0	20.0	20.0
Wakulla County	20.0	20.0	20.0	20.0	20.0
Regional Clearance Time					
Apalachee	20.5	21.0	21.0	21.0	21.0

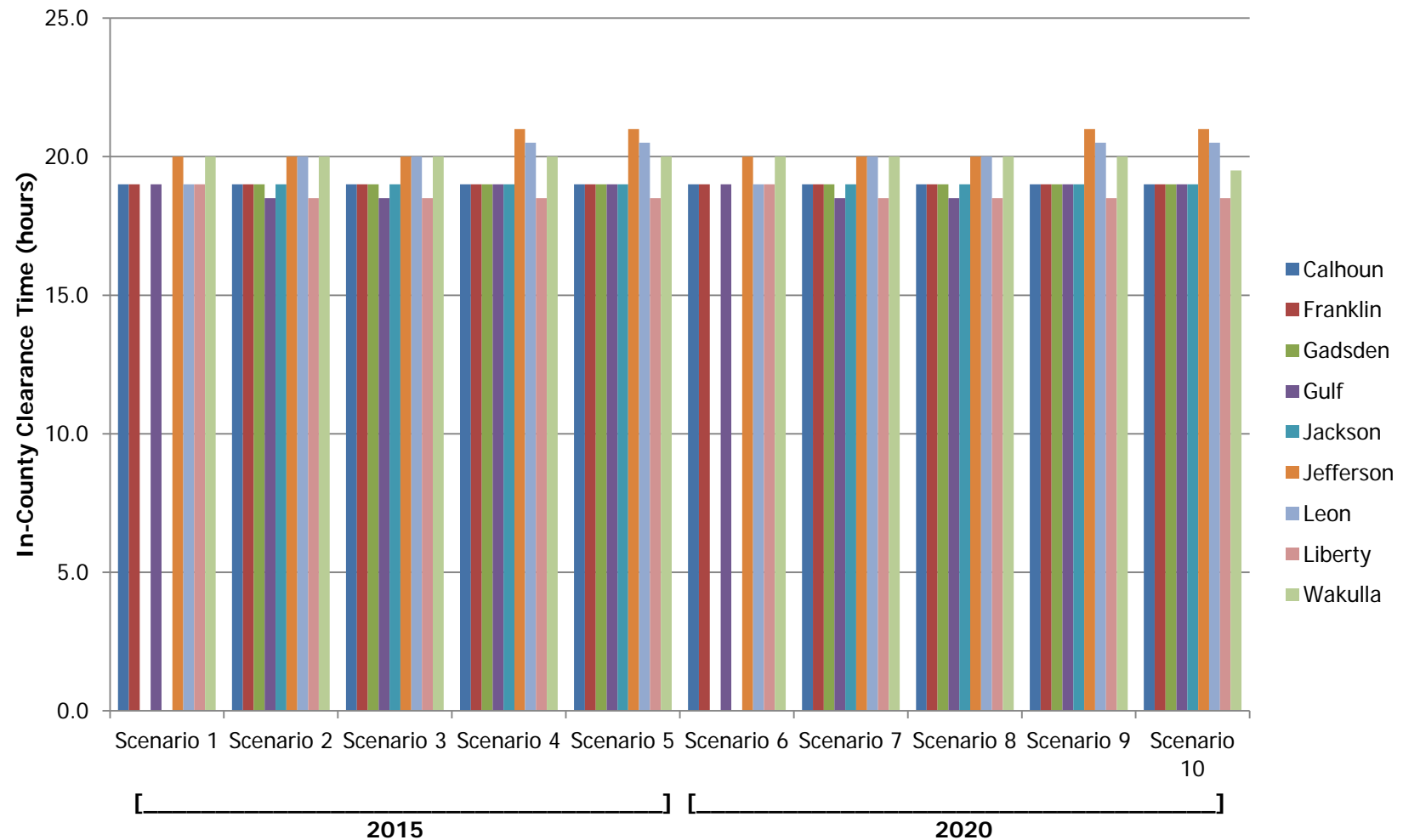
Table IV-31 – 2020 Clearance Times for Operational Scenarios

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Clearance Time to Shelter					
Calhoun County	18.5	18.5	18.5	18.5	18.5
Franklin County	4.5	4.5	4.5	4.5	4.5
Gadsden County	0.0	18.5	18.5	18.5	18.5
Gulf County	18.5	18.5	18.5	18.5	18.5
Jackson County	0.0	18.5	18.5	18.5	18.5
Jefferson County	18.5	18.5	18.5	18.5	18.5
Leon County	18.5	18.5	18.5	18.5	18.5
Liberty County	18.5	18.5	18.5	18.5	18.5
Wakulla County	18.5	18.5	18.5	18.5	18.5
In-County Clearance Time					
Calhoun County	19.0	19.0	19.0	19.0	19.0
Franklin County	19.0	19.0	19.0	19.0	19.0
Gadsden County	0.0	19.0	19.0	19.0	19.0
Gulf County	19.0	18.5	18.5	19.0	19.0
Jackson County	0.0	19.0	19.0	19.0	19.0
Jefferson County	20.0	20.0	20.0	21.0	21.0
Leon County	19.0	20.0	20.0	20.5	20.5
Liberty County	19.0	18.5	18.5	18.5	18.5
Wakulla County	20.0	20.0	20.0	20.0	19.5
Out of County Clearance Time					
Calhoun County	20.0	21.5	19.5	20.0	20.0
Franklin County	19.0	19.0	19.0	19.0	19.0
Gadsden County	20.5	20.0	20.5	20.5	20.5
Gulf County	19.0	19.0	19.0	19.0	19.0
Jackson County	20.5	20.5	20.5	20.5	21.0
Jefferson County	20.5	21.0	21.0	21.0	21.0
Leon County	20.5	20.5	20.5	20.5	20.5
Liberty County	20.0	21.0	20.0	20.0	20.0
Wakulla County	20.0	20.0	20.0	20.0	19.5
Regional Clearance Time					
Apalachee	20.5	21.5	21.0	21.0	21.0

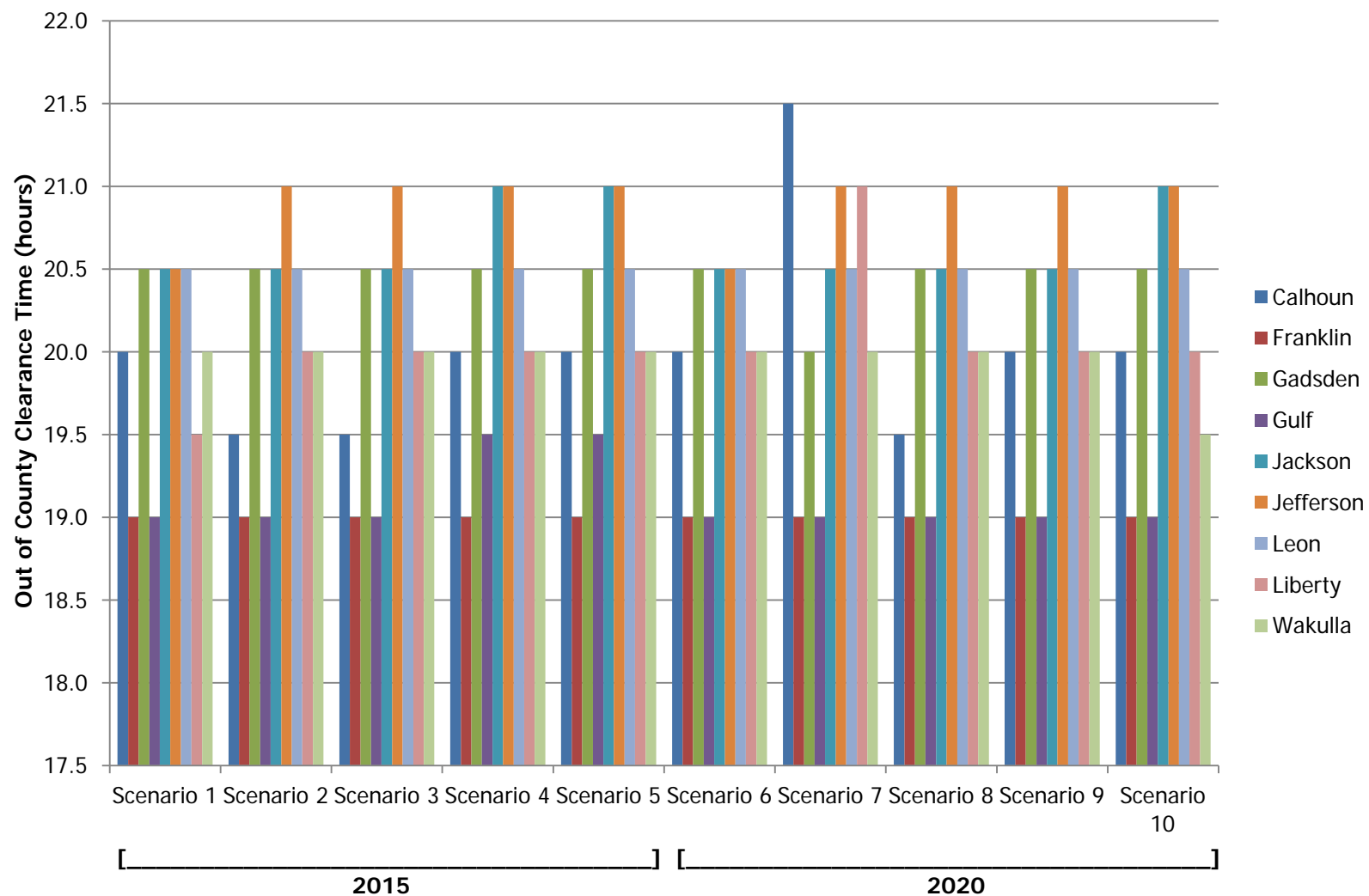
**Figure IV-24 - Clearance Time to Shelter
Operational Scenarios**



**Figure IV-25 - In-County Clearance Times
Operational Scenarios**



**Figure IV-26 - Out of County Clearance Times
Operational Scenarios**



H. Maximum Evacuating Population Clearances

From an emergency management standpoint, it is important to get an understanding of the maximum proportion of the evacuating population that can be expected to evacuate at various time intervals during an evacuation. Should storm conditions change during an evacuation, emergency managers will need to be able to estimate what portion of the evacuating population is estimated to still remain within the county trying to evacuate.

Using the base scenarios, which assume 100% of the vulnerable population is evacuating, along with shadow evacuations and evacuations from adjacent counties, an estimate was made of the evacuating population actually able to evacuate out of each county by the time intervals of 12, 18, 24, and 36 hours. The estimated maximum evacuating population by time interval for 2015 is identified in Table IV-32 and for 2020 in Table IV-33.

It is important to note that these estimates take into account many variables, including roadway capacity, in-county evacuating trips, out of county evacuating trips, evacuating trips from other counties, and background traffic that is impeding the evacuation trips. For this reason, the maximum evacuation population by time interval will vary slightly between evacuation level and either increase or decrease from one evacuation level to the next.

I. Sensitivity Analysis

As discussed previously, there are literally thousands of possible combinations of variables that can be applied using the evacuation transportation model, which will result in thousands of possible outcomes. As part of the analysis process, a sensitivity analysis was conducted using the prototype model to evaluate the effect of different response curves on the calculated evacuation clearance times. Calculated clearance times will never be lower than the designated response time, since some evacuating residents will wait to evacuate until near the end of the response time window. For example, using a 12-hour response curve in the analysis means that all residents will begin their evacuation process within 12-hours, and some residents will choose to wait and begin evacuating more than 11.5 hours from when the evacuation was ordered. This will generate a clearance time of more than 12 hours.

The sensitivity analysis identified that clearance times will vary by scenario and by any of the numerous parameters that can be chosen in a particular scenario model run (demographics, student population, tourist population, different counties that are evacuating, response curve, phasing, shadow evacuations, etc.). A few general rules of thumb did emerge from the sensitivity analysis that can provide some guidance to the region regarding the sensitivity of the response curve to the calculated clearance times:

- For smaller evacuations, such as those outlined in scenarios 1 and 2, the clearance time will vary by as much as 40 percent depending on the response curve. Low evacuation levels have fewer evacuating vehicles that can be accommodated more easily on the transportation network. In most cases, clearance times typically exceed the response curve by one to two hours. Thus, a 12 hour response curve may yield a clearance time of 13 or 14 hours while an 18 hour response curve may yield a clearance time of 19 or 20 hours. This leads to a higher level of variability than larger evacuations;

Table IV-32 – Maximum Evacuating Population by Time Interval for 2015

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Estimated Evacuating Population Clearing Calhou County					
12-Hour	4,201	4,566	5,295	5,660	6,025
18-Hour	4,901	5,327	6,178	6,603	7,029
Estimated Evacuating Population Clearing Franklin County					
12-Hour	7,168	9,870	9,889	9,529	9,534
18-Hour	7,765	10,692	10,713	10,720	10,726
Estimated Evacuating Population Clearing Gadsden County					
12-Hour	14,174	15,473	16,771	16,904	17,552
18-Hour	17,127	18,696	20,265	21,834	23,403
Estimated Evacuating Population Clearing Gulf County					
12-Hour	6,654	8,848	10,322	10,599	10,280
18-Hour	7,209	9,585	11,182	11,482	11,565
Estimated Evacuating Population Clearing Jackson County					
12-Hour	10,146	11,378	13,842	15,075	16,307
18-Hour	12,682	14,223	17,303	18,844	20,384
Estimated Evacuating Population Clearing Jefferson County					
12-Hour	4,867	5,208	5,592	5,694	5,785
18-Hour	6,084	6,510	6,990	7,592	7,955
Estimated Evacuating Population Clearing Leon County					
12-Hour	29,930	40,188	60,705	69,465	74,093
18-Hour	36,166	48,561	75,881	89,725	101,878
Estimated Evacuating Population Clearing Liberty County					
12-Hour	3,063	3,239	3,568	3,611	3,661
18-Hour	3,574	3,779	4,163	4,363	4,576
Estimated Evacuating Population Clearing Wakulla County					
12-Hour	16,929	18,591	22,133	20,791	20,251
18-Hour	19,751	21,690	25,822	25,989	26,157

Note: These estimates take into account many variables, including roadway capacity, in-county evacuating trips, out of county evacuating trips, evacuating trips from other counties, and background traffic that is impeding the evacuation trips. For this reason, the maximum evacuation population by time interval will vary between evacuation level and either increase or decrease from one evacuation level to the next.

Table IV-33 – Maximum Evacuating Population by Time Interval for 2020

	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Estimated Evacuating Population Clearing Calhou County					
12-Hour	4,379	4,760	5,521	5,699	6,283
18-Hour	5,109	5,553	6,441	6,886	7,330
Estimated Evacuating Population Clearing Franklin County					
12-Hour	7,168	9,870	9,889	9,529	9,534
18-Hour	7,765	10,692	10,713	10,720	10,726
Estimated Evacuating Population Clearing Gadsden County					
12-Hour	14,433	15,756	16,509	17,214	17,333
18-Hour	17,440	19,038	20,636	22,235	23,833
Estimated Evacuating Population Clearing Gulf County					
12-Hour	6,706	8,584	10,015	10,282	10,356
18-Hour	7,265	9,657	11,267	11,567	11,650
Estimated Evacuating Population Clearing Jackson County					
12-Hour	10,531	11,810	14,370	15,650	16,929
18-Hour	12,725	14,271	17,364	18,910	20,456
Estimated Evacuating Population Clearing Jefferson County					
12-Hour	5,043	5,395	5,604	5,894	5,812
18-Hour	6,304	6,744	7,239	7,858	8,233
Estimated Evacuating Population Clearing Leon County					
12-Hour	31,341	42,080	63,566	70,465	77,585
18-Hour	37,870	50,847	79,457	93,953	106,679
Estimated Evacuating Population Clearing Liberty County					
12-Hour	3,255	3,442	3,792	3,838	3,765
18-Hour	3,798	4,016	4,424	4,637	4,863
Estimated Evacuating Population Clearing Wakulla County					
12-Hour	18,377	20,181	24,011	22,556	21,282
18-Hour	21,440	23,545	28,013	28,195	28,376

Note: These estimates take into account many variables, including roadway capacity, in-county evacuating trips, out of county evacuating trips, evacuating trips from other counties, and background traffic that is impeding the evacuation trips. For this reason, the maximum evacuation population by time interval will vary between evacuation level and either increase or decrease from one evacuation level to the next.

- For mid-level evacuations such as scenarios 3 and sometimes 4, clearance times varied by as much as 25 percent during the sensitivity analysis. The number of evacuating vehicles is considerably higher than for scenarios 1 and 2, and lower response curves tend to load the transportation network faster than longer response curves. The variability in clearance times is less in these cases than for low evacuation levels; and,
- For high-level evacuations such as in scenarios 4 and 5, clearance time variability is reduced to about 10 to 15 percent. Large evacuations involve large numbers of evacuating vehicles, and the sensitivity test identified that clearance times are not as dependent on the response curve as lower level evacuations since it takes a significant amount of time to evacuate a large number of vehicles.

The counties within the Apalachee region are encouraged to test additional scenarios beyond what has been provided in this study. Each model run will provide additional information for the region to use in determining when to order an evacuation. Due to advancements in computer technology and the nature of the developed transportation evacuation methodology, this study includes a more detailed and time consuming analysis process than used in previous years studies. Counties interested in testing various response curves for each scenario can easily do so using the TIME interface to calculate clearance times for different response curves.

J. Summary and Conclusions

Through a review of the results of the 20 different scenarios (10 base and 10 operational), several conclusions could be reached regarding the transportation analysis, including the following:

- Critical transportation facilities within the ARPC region include US 319, SR 79, US 98, and I-10. For large storm events, such as category 4 and 5 hurricanes, other state facilities also play an important role in evacuations, such as SR 20;
- Given the rural nature of many of the counties within the ARPC, many two-lane state and US highways play a major role during the evacuation process. State and County officials should coordinate personnel resources to provide sufficient traffic control at major intersections along these routes;
- The Florida Department of Transportation should continue to work with local counties on implementing intelligent transportation system (ITS) technology, which will provide enhanced monitoring and notification systems to provide evacuating traffic with up to date information regarding expected travel times and alternate routes;
- The State can use the data and information provided in this report (specifically the evacuating vehicle maps in Volume 5-2) to estimate fuel and supply requirements along major evacuation routes to aid motorists during the evacuation process;
- For major evacuation routes that have signalized traffic control at major intersections, traffic signal timing patterns should be adjusted during the evacuation process to provide maximum green time for evacuating vehicles in the predominate directions. This is especially important in Leon County along US 319 (Capital Circle); and,
- The counties within the Apalachee region are encouraged to test additional transportation scenarios beyond what has been provided in this study. Each model run will provide additional information for the region to use in planning for an evacuation. Counties interested in testing various response curves for each scenario can easily do so using the TIME interface to calculate clearance times for different evacuation conditions, such as different evacuation levels, different behavioral response assumptions, and different response curves.