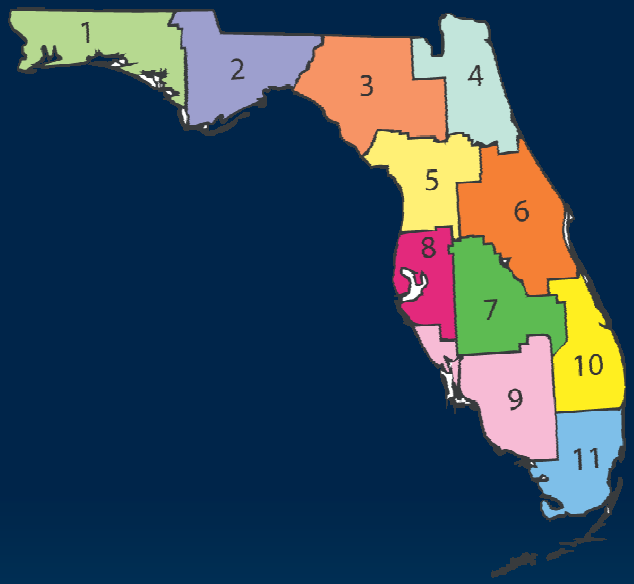
Florida's Statewide Regional Evacuation Study (SRES)

Florida Regions

1. West Florida
2. Apalachee
3. North Central Florida
4. Northeast Florida
5. Withlacoochee
6. East Central Florida
7. Central Florida
8. Tampa Bay
9. Southwest Florida
10. Treasure Coast
11. South Florida



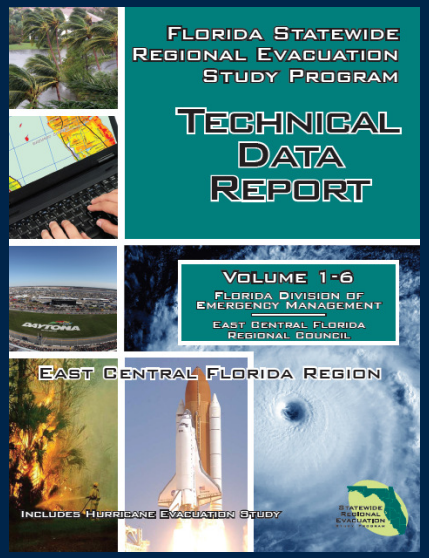
Release of the Statewide Regional Evacuation Study for the East Central Florida Region

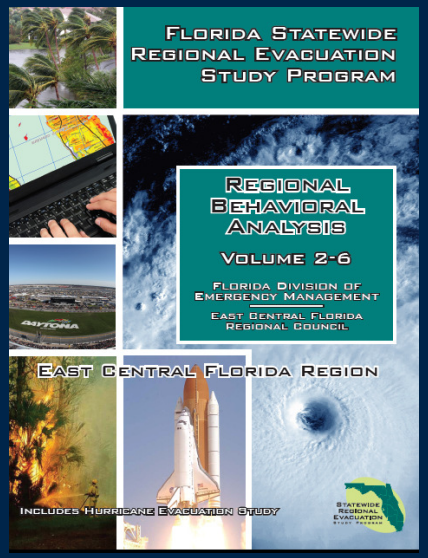
August 30, 2010

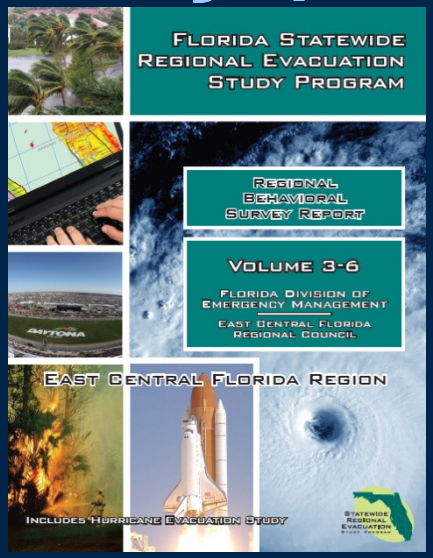
Tara M. McCue, AICP

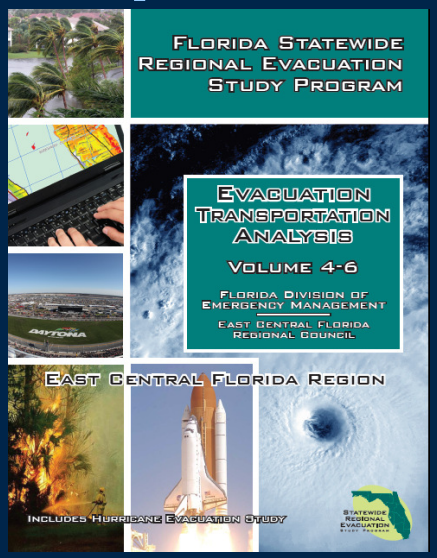
East Central Florida Regional Planning Council

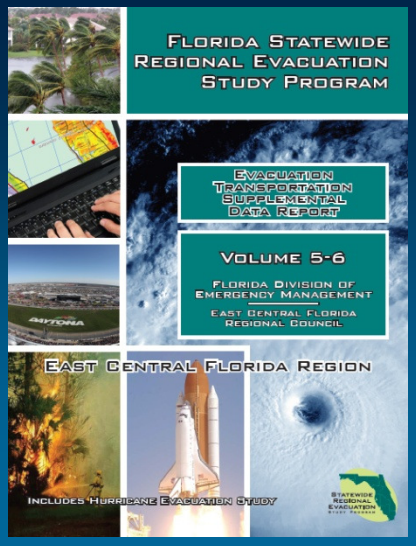
Florida's Statewide Regional Evacuation Study (SRES)

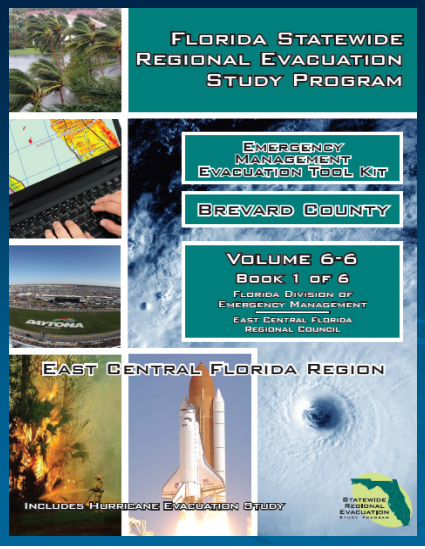


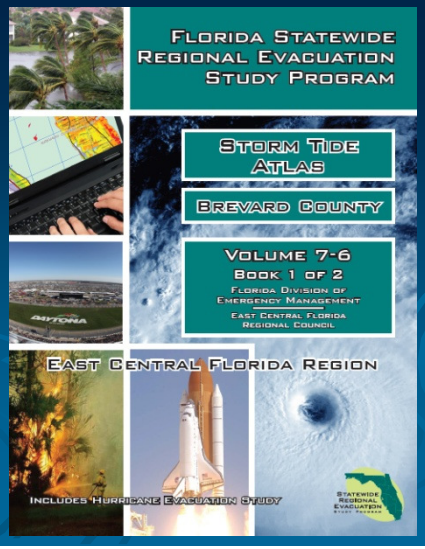


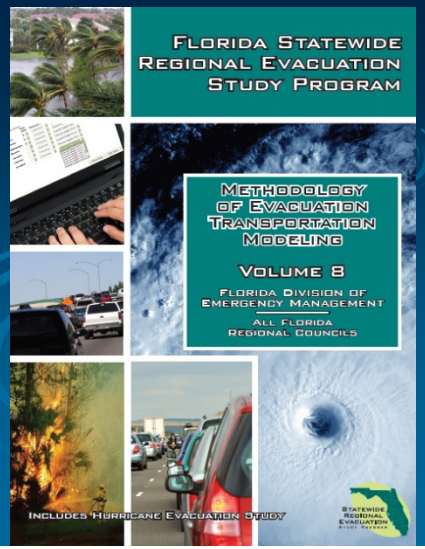












Volume 1: Technical Data Report

- Executive Summary
- Demographics and Land Use
- Hazards Analysis
- Behavioral Analysis
- Vulnerability Analysis
- Shelter Analysis
- Evacuation Transportation Analysis

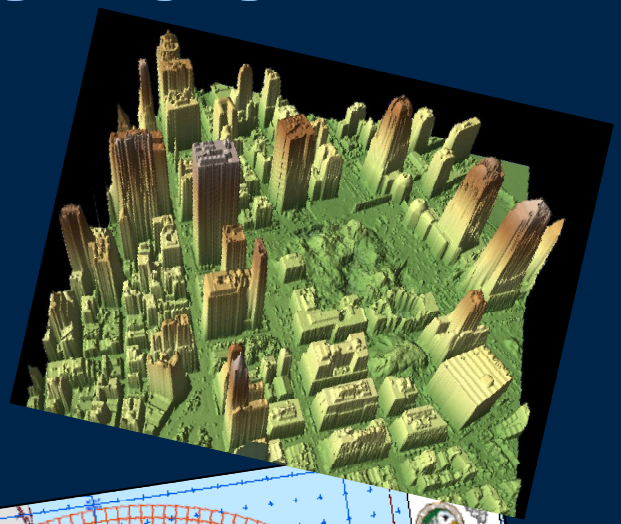
I. Demographics and Land Use

- County Profiles
  - Population
  - Socio-economic Characteristics
    - Income, Age, Linguistic Isolation, Transportation Dependent
  - Statewide Regional Future Land Use
  - Maps

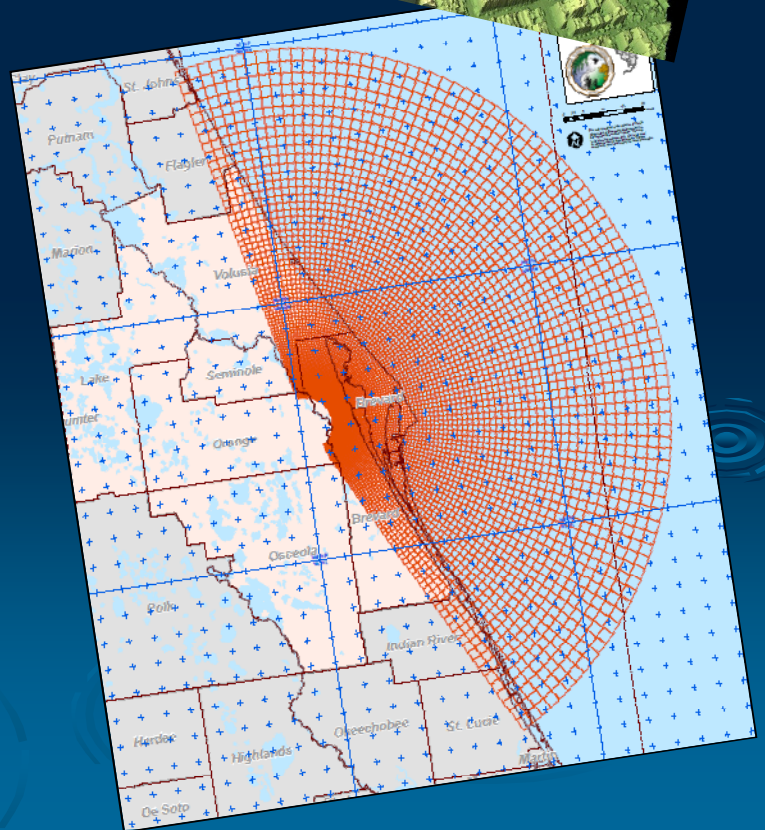
II. Regional Hazards Analysis

- All-Hazards Approach
  - Tropical Storms and Hurricanes
  - Flooding Events
  - Wildfire
  - Tornadoes

LIDAR & NOAA's SLOSH Model

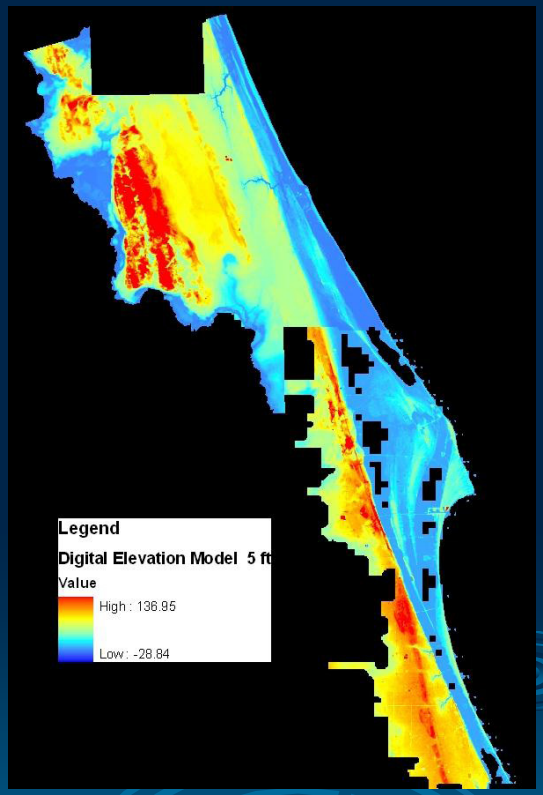


- LIDAR collected in coastal counties
- SLOSH Model updated
- Basin updated with LIDAR topography

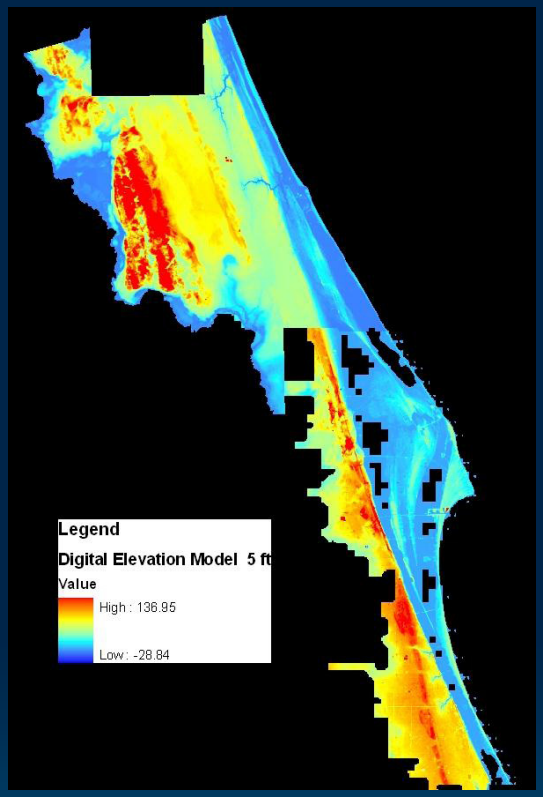


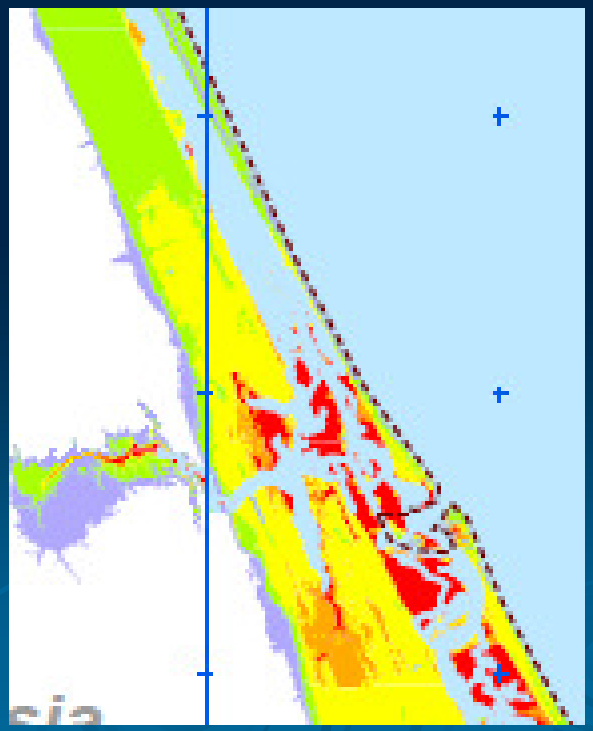
LIDAR & NOAA's SLOSH Model

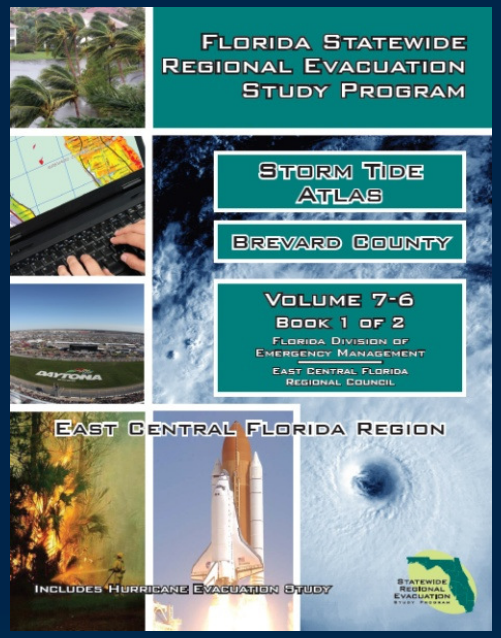
- Datum updated to NAVD88
- 12,180 hypothetical storms modeled with varying forward speed, size and astronomical tide



Storm Tide Analysis

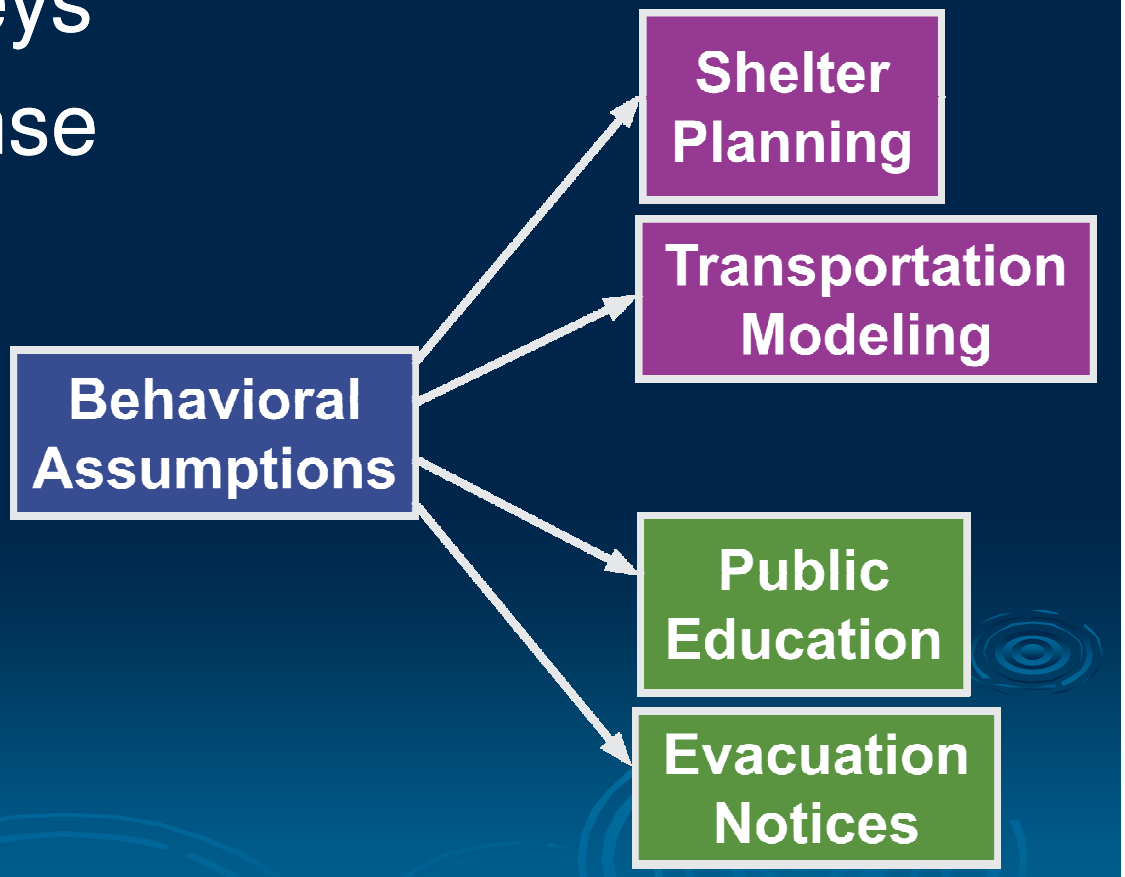






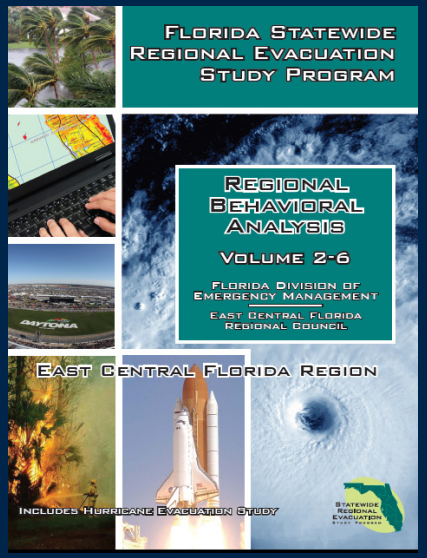
III. Behavioral Analysis

- Statewide Surveys
- General Response Model

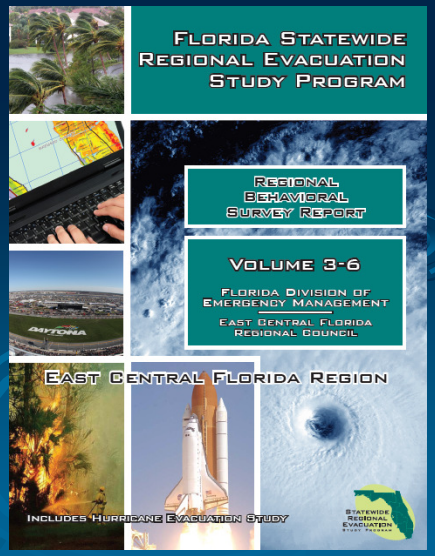


Behavioral Analysis

- Evacuation Participation Rate
- Evacuation Timing
- Evacuation Refuge
- Evacuation Destination
- Vehicle Use



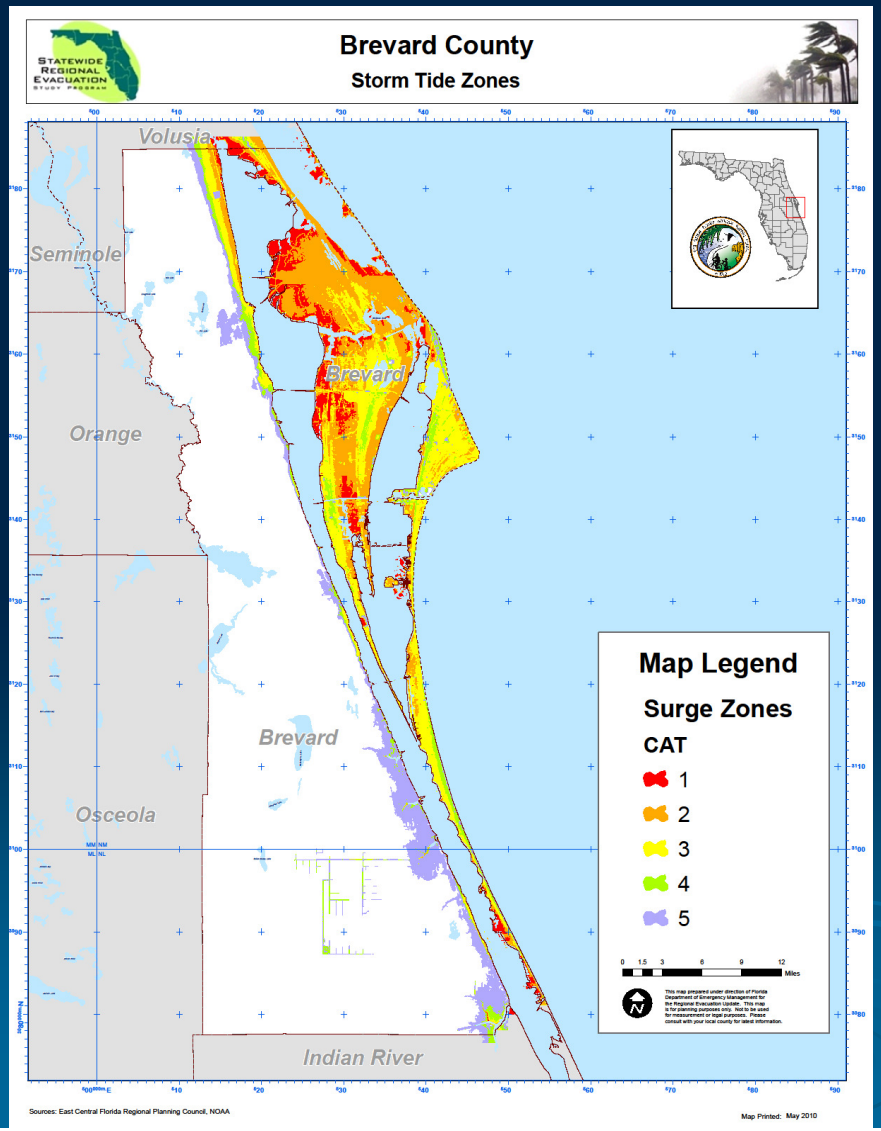
Volume 2: Behavioral Analysis
Volume 3: Behavioral Survey Report

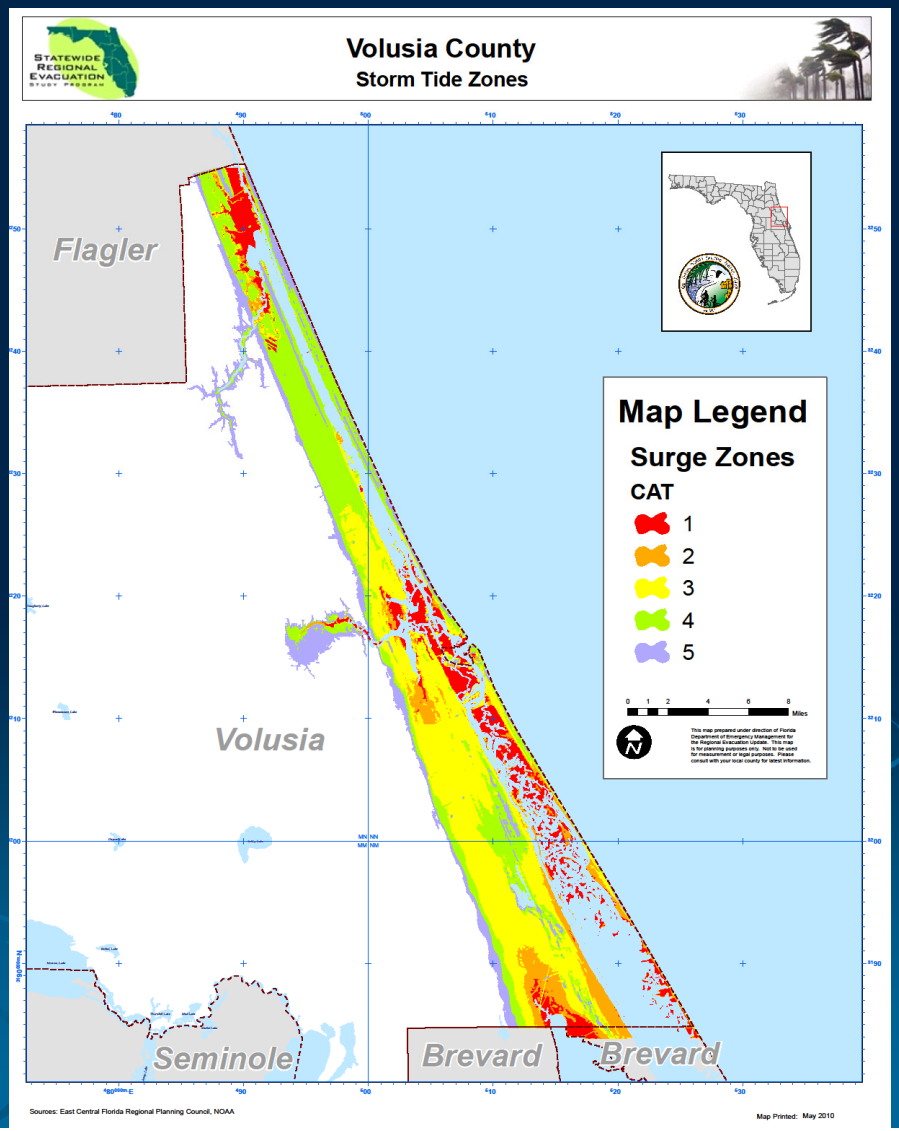


IV. Vulnerability and Population Analysis

- Evacuation zones
- Populations-at-risk
- Evacuation population
- Vulnerability of Critical Facilities

Surge Zones and Evacuation Zones





Population-at-Risk

Table VI- 4: Vulnerable Population in the East Central Region for 2010

	Evacuation Zone A	Evacuation Zone B	Evacuation Zone C	Evacuation Zone D	Evacuation Zone E
Brevard County					
Site-built Homes	127,138	2,488	12,056	19,579	52,015
Mobile/Manuf. Homes	6,326	732	2,535	3,237	9,077
TOTAL	133,464	3,220	14,591	22,816	61,092
Volusia County					
Site-built Homes	78,861	9,459	38,601	11,791	63,890
Mobile/Manuf. Homes	1,483	1,983	9,295	2,315	7,510
TOTAL	80,344	11,442	47,896	14,106	71,400

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

Critical Facilities Geo-Data Base

- Health Care Facilities
- Utilities Infrastructure (Water, Waste Water, Solid Waste)
- Law Enforcement, Fire, EMS, Schools and Shelters
- Hazardous Material Facilities
- Community Centers, Public Buildings, etc.
- Transportation (Airports, Ports, Heliports)
- Communications
- Energy
- PODs, LSAs, CSAs, EOCs
- Military

V. Regional Shelter Analysis

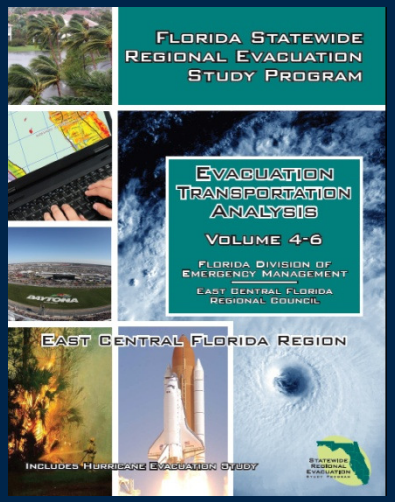
- Shelter criteria
- Risk shelter capacity and demand
- Pet Shelters
- Special Needs Shelters

Shelter Capacity and Demand

Table V- 9a: Public Shelter Demand for Hurricane Evacuation Base Scenarios 2010

County	Capacity*	A	B	C	D	E
Brevard	26,355	15,644	17,236	19,160	23,127	32,684
Lake	21,845	15,647	17,307	18,970	22,291	25,615
Orange	15,721	11,681	11,681	16,633	21,588	26,540
Osceola	13,230	2,605	3,789	4,975	6,159	7,346
Seminole	11,775	4,416	4,416	6,394	8,373	10,351
Volusia	25,061	15,712	18,232	23,245	28,077	38,249
Region	113,987	65,705	72,661	89,377	109,615	140,785

*Capacity based on Primary Risk ARC4496 Compliant shelters.

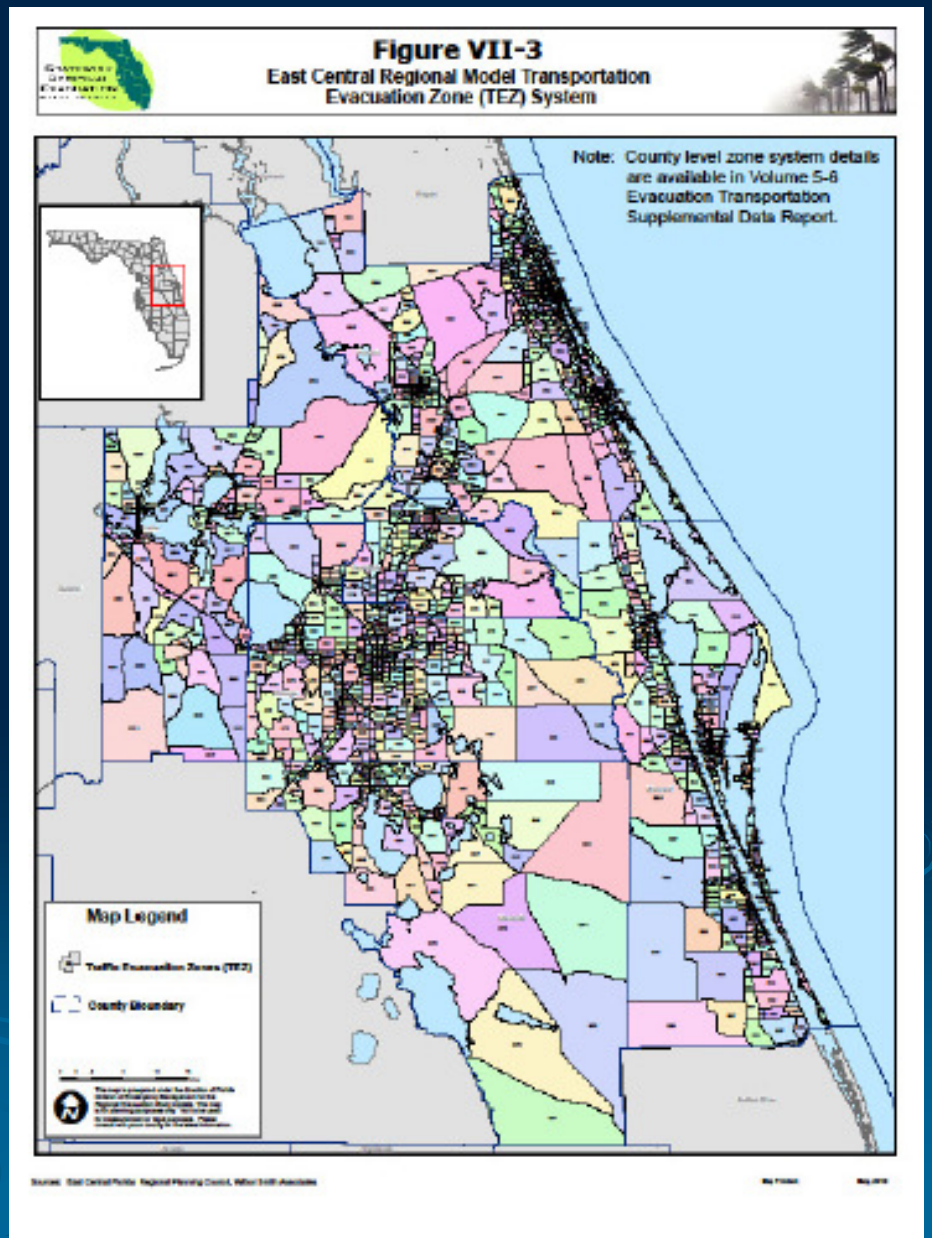


Volume 4: Evacuation Transportation Analysis

- Existing and Future Networks
- Base and Operational Scenarios
- Clearance Times
  - To Shelter
  - In-County
  - Out-of-County
  - Regional

Regional Evacuation Zone System

- TAZs
- TEZs



Base and Operational Scenarios

Table VI- 9: Base Scenarios

	Scenario 1 Level A 2010	Scenario 2 Level B 2010	Scenario 3 Level C 2010	Scenario 4 Level D 2010	Scenario 5 Level E 2010
Demographic Data	2010	2010	2010	2010	2010
Highway Network	2010	2010	2010	2010	2010
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%
Evacuation Zone	A	B	C	D	E
Counties Evacuating	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River
	Scenario 6 Level A 2015	**Scenario 7 Level B 2015**	**Scenario 8 Level C 2015**	**Scenario 9 Level D 2015**	**Scenario 10 Level E 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%
Evacuation Zone	A	B	C	D	E
Counties Evacuating	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River	Brevard Lake Orange Osceola Seminole Volusia Flagler Indian River

Base Scenarios for use for <u>planning purposes.</u>

Evacuating Population- 2010

Table IV-7 – Evacuating Population by Base Scenario for 2010

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Brevard County					
Site-built Homes	178,577	199,871	226,907	286,811	412,390
Mobile/Manuf. Homes	57,116	57,116	57,116	57,116	57,116
Tourists	9,468	9,468	11,507	11,586	13,830
TOTAL	245,161	266,455	295,530	355,513	483,336
Lake County					
Site-built Homes	25,147	37,720	50,293	75,440	100,586
Mobile/Manuf. Homes	66,977	66,977	66,977	66,977	66,977
Tourists	0	0	0	0	0
TOTAL	92,124	104,697	117,270	142,417	167,563
Orange County					
Site-built Homes	121,089	121,089	181,628	242,167	302,706
Mobile/Manuf. Homes	15,998	15,998	15,998	15,998	15,998
Tourists	0	0	0	0	0
TOTAL	137,087	137,087	197,626	258,165	318,704
Osceola County					
Site-built Homes	14,180	28,361	42,541	56,722	70,902
Mobile/Manuf. Homes	15,437	15,437	15,437	15,437	15,437
Tourists	0	0	0	0	0
TOTAL	29,617	43,798	57,978	72,159	86,339
Seminole County					
Site-built Homes	46,438	46,438	69,658	92,877	116,096
Mobile/Manuf. Homes	4,595	4,595	4,595	4,595	4,595
Tourists	0	0	0	0	0
TOTAL	51,033	51,033	74,253	97,472	120,691
Volusia County					
Site-built Homes	126,739	151,696	205,872	251,627	348,132
Mobile/Manuf. Homes	56,176	56,176	56,176	56,176	56,176
Tourists	33,880	34,077	34,649	34,796	36,683
TOTAL	216,795	241,949	296,697	342,599	440,991

Evacuating Vehicles- 2010

Table IV-9 – Evacuating Vehicles by Base Scenario for 2010

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Brevard County					
Site-built Homes	81,639	91,359	103,816	131,629	188,996
Mobile/Manuf. Homes	23,760	23,760	23,760	23,760	23,760
Tourists	3,787	3,787	4,603	4,634	5,531
TOTAL	109,186	118,906	132,179	160,023	218,287
Lake County					
Site-built Homes	11,973	17,959	23,946	35,918	47,891
Mobile/Manuf. Homes	33,310	33,310	33,310	33,310	33,310
Tourists	0	0	0	0	0
TOTAL	45,283	51,269	57,256	69,228	81,201
Orange County					
Site-built Homes	53,471	53,471	80,207	106,943	133,679
Mobile/Manuf. Homes	6,398	6,398	6,398	6,398	6,398
Tourists	0	0	0	0	0
TOTAL	59,869	59,869	86,605	113,341	140,077
Osceola County					
Site-built Homes	6,407	12,814	19,221	25,628	32,035
Mobile/Manuf. Homes	5,115	5,115	5,115	5,115	5,115
Tourists	0	0	0	0	0
TOTAL	11,522	17,929	24,336	30,743	37,150
Seminole County					
Site-built Homes	21,390	21,390	32,085	42,780	53,475
Mobile/Manuf. Homes	1,651	1,651	1,651	1,651	1,651
Tourists	0	0	0	0	0
TOTAL	23,041	23,041	33,736	44,431	55,126
Volusia County					
Site-built Homes	52,131	63,236	87,098	106,958	149,094
Mobile/Manuf. Homes	23,925	23,925	23,925	23,925	23,925
Tourists	13,552	13,631	13,860	13,919	14,673
TOTAL	89,608	100,792	124,883	144,802	187,692

Table IV-13 – Evacuating Vehicles Leaving Each County by Evacuation Route for the 2010 Base Scenarios

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Brevard County					
I-95 Southbound	3,200	3,600	4,600	6,200	13,700
SR 192 Westbound	2,900	3,700	5,100	6,600	10,800
SR 520 Westbound	2,600	3,300	4,100	6,400	9,000
SR 528 Westbound	18,800	19,800	21,500	23,200	31,900
SR 50 Westbound	1,400	2,600	4,600	8,100	13,600
SR 46 Westbound	800	1,300	2,600	3,800	5,800
I-95 Northbound	30,100	30,400	31,500	34,200	38,200
US 1 Northbound	700	2,000	3,400	5,400	5,900
Lake County					
SR 40 Westbound	2,000	2,900	4,400	5,400	7,200
US 27 Northbound	2,200	2,900	3,700	5,900	8,500
SR 44 Westbound	2,400	2,700	3,800	5,800	7,900
Turnpike Westbound	11,300	13,100	16,600	20,500	27,500
SR 50 Westbound	4,400	5,300	6,700	7,700	11,600
SR 50 Eastbound	800	1,600	1,200	1,700	2,400
Turnpike Eastbound	2,100	2,300	2,600	2,800	3,600
Orange County					
I-4 Southbound	11,600	12,900	1,900	24,900	33,400
US 192 Westbound	600	800	1,400	4,100	8,000
Turnpike NB	14,900	16,200	19,300	22,300	28,700
SR 50 Westbound	3,500	4,300	6,300	7,000	11,200
I-4 Northbound	4,600	5,000	6,600	8,400	10,700
FL 417 Northbound	2,300	2,400	2,700	3,000	4,100
Osceola County					
Turnpike SB	600	700	1,400	2,400	4,500
SR 60 Westbound	200	200	800	2,600	4,900
I-4 Westbound	11,700	14,400	22,500	30,200	38,300
Turnpike NB	6,400	9,700	14,200	18,000	29,400
Seminole County					
I-4 Northbound	10,100	10,300	12,500	15,000	17,900
I-4 Southbound	15,100	16,400	20,900	25,200	35,200
FL 417 Southbound	2,000	2,200	3,400	5,200	9,500
Volusia County					
I-95 Southbound	2,700	3,000	3,800	4,100	6,300
US 1 Northbound	11,300	12,900	17,100	25,000	25,300
SR 11 Northbound	1,300	1,800	4,600	6,600	12,400
SR 17 Northbound	500	1,200	2,400	3,000	4,900
SR 40 Westbound	2,200	3,100	4,600	6,000	7,900
I-4 Westbound	15,500	17,200	21,600	25,200	36,300
SR 46 Westbound	800	1,300	2,600	3,900	5,900

Table IV-15 – Evacuating Vehicles Entering Each County by Evacuation Route for the 2010 Base Scenarios

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Brevard County					
I-95 Northbound	3,200	3,600	4,600	6,200	13,700
US 1 Northbound	100	100	300	300	300
Lake County					
US 192 Westbound	600	800	1,400	4,100	8,000
Turnpike NB	14,900	16,200	19,300	22,300	28,700
SR 50 Westbound	3,500	4,300	6,300	7,000	11,200
SR 40 Westbound	2,200	3,100	4,600	6,000	7,900
Orange County					
SR 520 Westbound	2,900	3,700	5,100	6,600	10,800
SR 528 Westbound	18,800	19,800	21,500	23,200	31,900
SR 50 Westbound	1,400	2,600	4,600	8,100	13,600
SR 50 Eastbound	800	1,600	1,200	1,700	2,400
Turnpike Eastbound	2,100	2,300	2,600	2,800	3,600
Turnpike NB	6,400	9,700	14,200	18,000	29,400
I-4 Southbound	15,100	16,400	20,900	25,200	35,200
FL 417 Southbound	2,000	2,200	3,400	5,200	9,500
Osceola County					
SR 192 Westbound	2,900	3,700	5,100	6,600	10,800
I-4 Southbound	11,600	12,900	1,900	24,900	33,400
SR 60 Westbound	2,300	3,300	6,100	8,800	14,000
Turnpike NB	-	-	100	1,500	7,900
Seminole County					
I-4 Westbound	15,500	17,200	21,600	25,200	36,300
SR 46 westbound	800	1,300	2,600	3,900	5,900
I-4 Northbound	4,600	5,000	6,600	8,400	10,700
FL 417 Northbound	2,300	2,400	2,700	3,000	4,100
Volusia County					
I-4 Northbound	10,100	10,300	12,500	15,000	17,900
SR 46 Westbound	800	1,300	2,600	3,800	5,800
I-95 Northbound	30,100	30,400	31,500	34,200	38,200
US 1 Northbound	700	2,000	3,400	5,400	5,900

Clearance Time Definitions

- Clearance Time to Shelter
- In-County Clearance Time
- Out of County Clearance Time
- Regional Clearance Time

- **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.

New Clearance Times - 2010

Table VI- 11: 2010 Clearance Times for Base Scenario

	Evacuation Level A Base Scenario	Evacuation Level B Base Scenario	Evacuation Level C Base Scenario	Evacuation Level D Base Scenario	Evacuation Level E Base Scenario
Clearance Time to Shelter					
Brevard County	13.0	13.0	13.0	13.0	17.5
Lake County	13.0	13.0	13.5	14.5	16.5
Orange County	12.5	12.5	12.5	13.0	17.0
Osceola County	12.5	12.5	12.5	13.0	17.0
Seminole County	12.5	12.5	12.5	12.5	14.0
Volusia County	13.0	13.0	13.0	13.0	16.5
In-County Clearance Time					
Brevard County	13.0	13.0	13.0	13.5	17.5
Lake County	13.5	13.5	14.0	15.0	17.0
Orange County	13.0	13.0	13.0	13.5	17.5
Osceola County	13.0	13.0	13.0	13.5	17.5
Seminole County	13.0	13.0	13.0	13.0	14.5
Volusia County	14.0	14.0	14.5	15.5	18.0
Out of County Clearance Time					
Brevard County	13.5	14.0	14.0	14.0	17.5
Lake County	13.0	14.5	14.5	15.5	22.0
Orange County	12.5	14.0	14.0	14.0	18.0
Osceola County	12.0	14.0	14.0	14.5	18.0
Seminole County	12.0	13.5	13.5	14.0	17.5
Volusia County	14.0	14.5	14.5	15.5	24.0
Regional Clearance Time					
ECFRPC	14.5	14.5	14.5	15.5	24.0

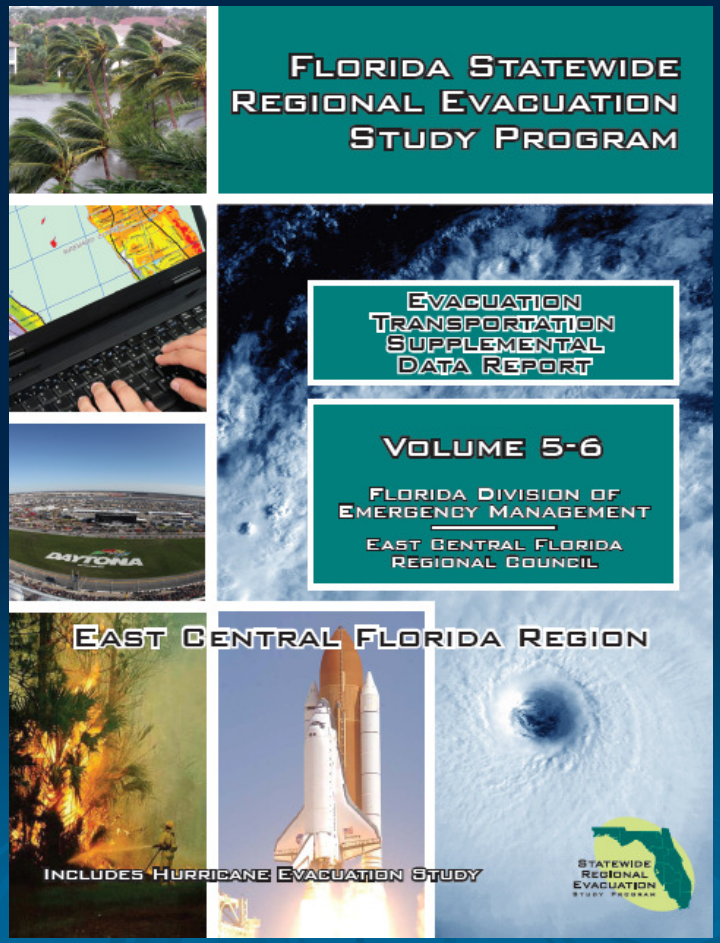
New Tool to Measure Impacts

- The Transportation Interface for Modeling Evacuations (TIME) is the tool used to run future scenarios.
- Built on the Cube Voyager & Cube Avenue software, this interface allows planners to run variations of the transportation scenario.

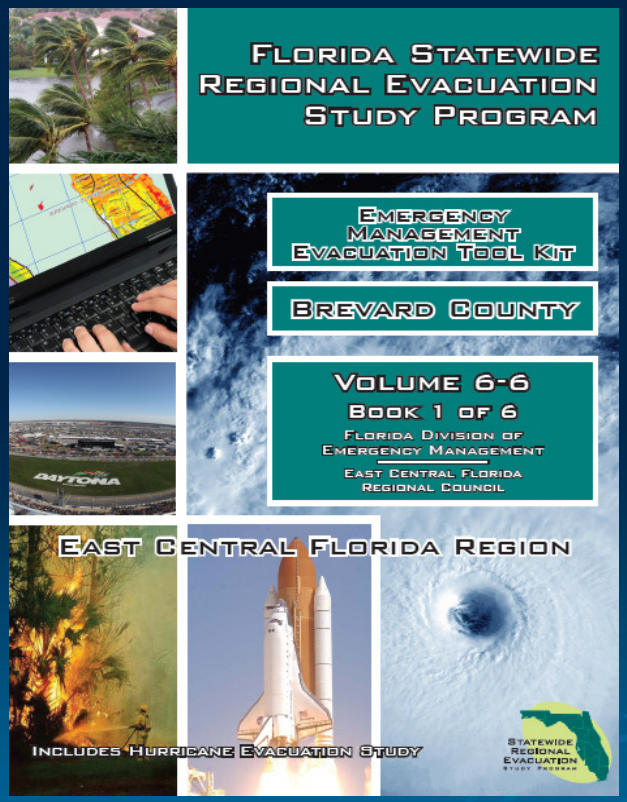
New Tool to Measure Impacts

- Adjust the scenario to increase or decrease population, roadway capacities, and shelter availability.
- Measure the variations to determine impacts of population or infrastructure changes.

Volume 5: Evacuation Transportation Supplemental Data Report

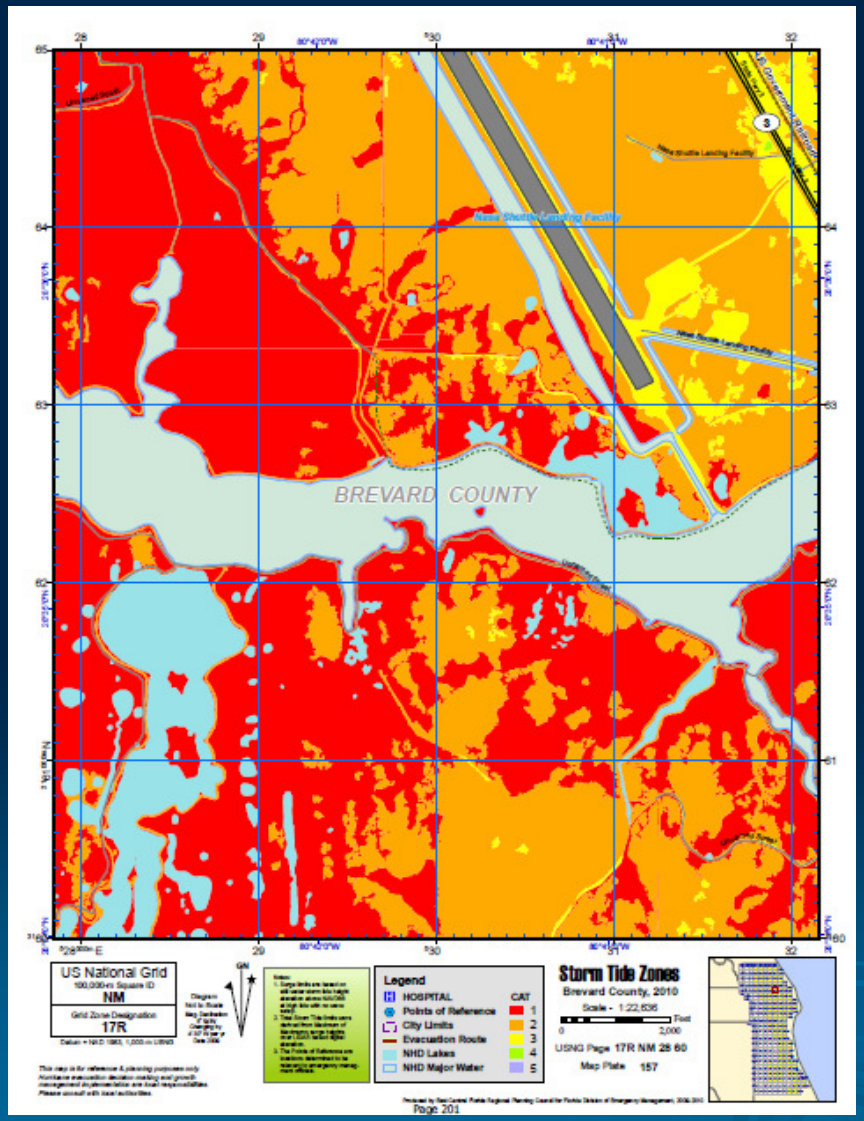


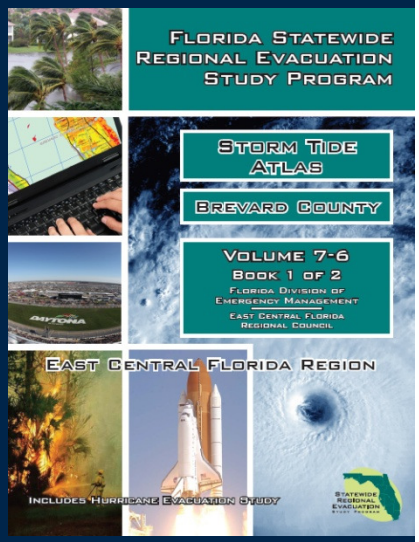
Volume 6: Emergency Management Evacuation Tool Kit



- Locally Selected Data, Tables, Charts, Maps
- Quick Reference Guide

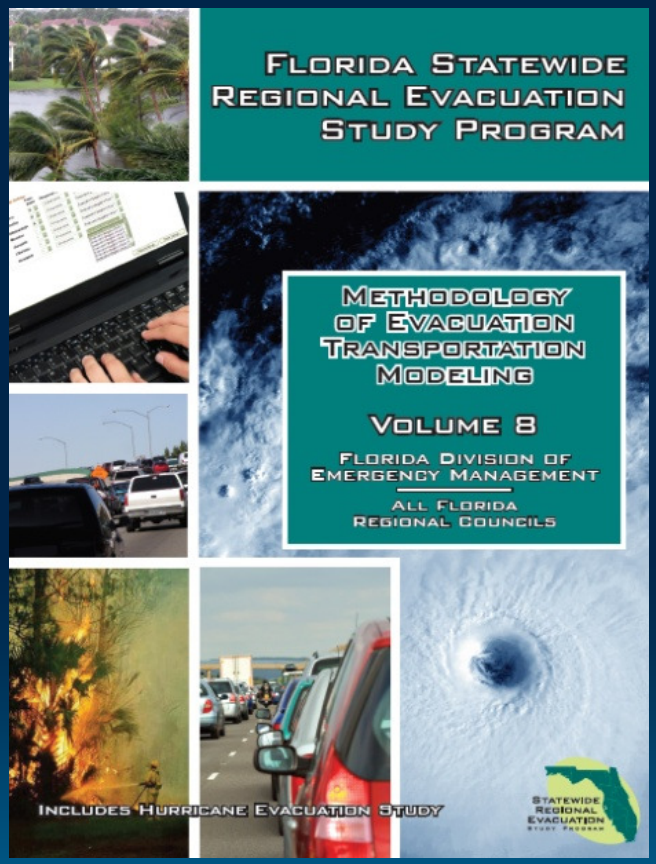
Volume 7: Storm Tide Atlas



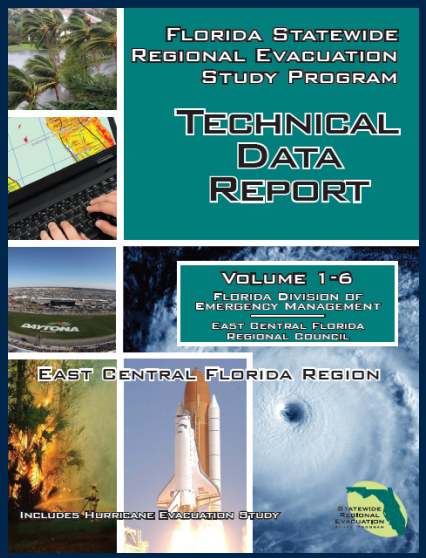


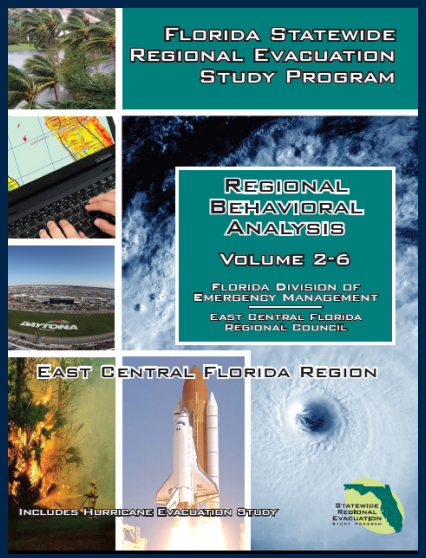
- Digital/ Hard Copy
- Geopdf enabled with links and data
- Text and Points of Reference Table

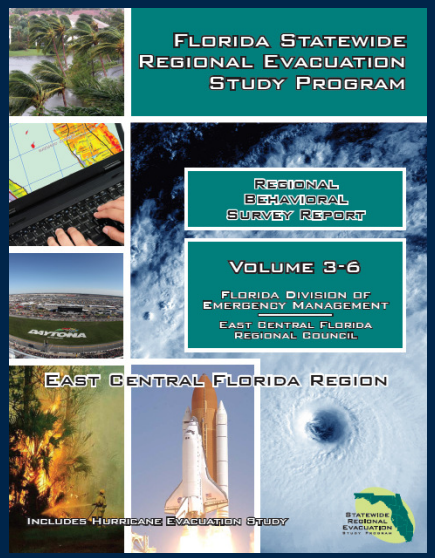
Volume 8: Methodology of Evacuation Transportation Modeling

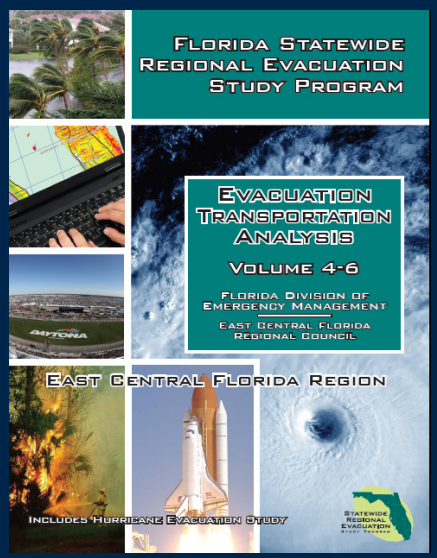


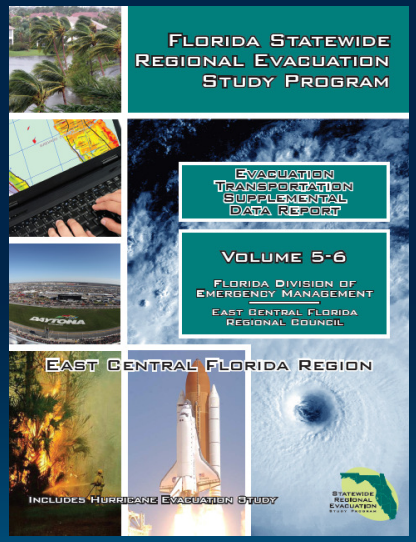
methodologies, model assumptions and the Transportation Interface for Modeling Evacuations (TIME) developed and utilized in the Statewide Regional Evacuation Study Program.

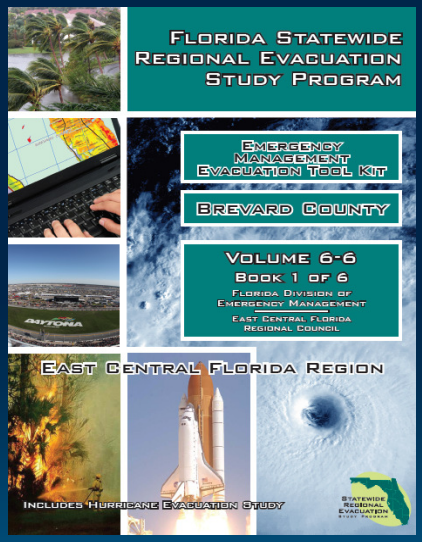


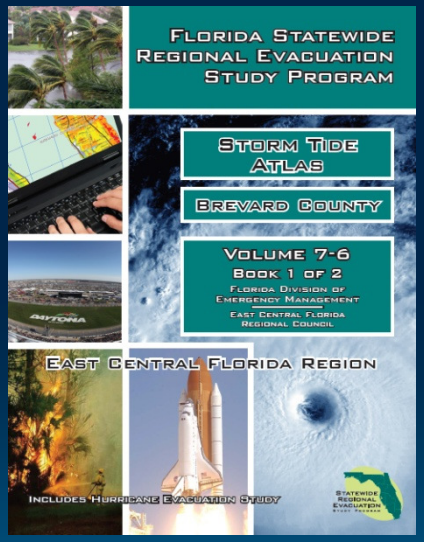


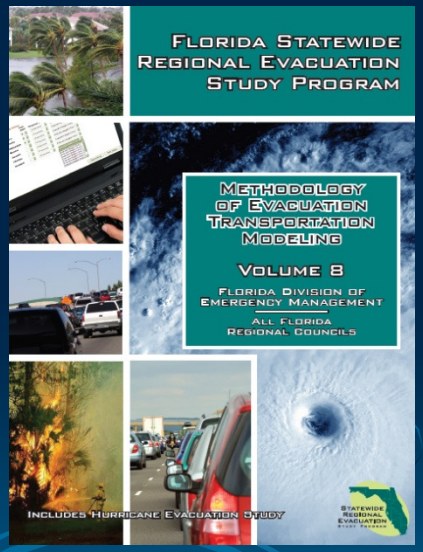












TIME
Transportation Interface for Modeling Evacuations

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Questions?

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