

Volume 1-4 Northeast Florida Region Technical Data Report

CHAPTER III

REGIONAL BEHAVIORAL ANALYSES SUMMARY



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CHAPTER III

REGIONAL BEHAVIORAL ANALYSIS SUMMARY

A. Background

For planners and emergency managers, one of the most elusive components of evacuation planning is anticipation of the behavior of our population. The behavioral analysis is one of the most important tasks in preparing hurricane evacuation plans. It includes the development of the necessary assumptions regarding the manner in which evacuees in and around the threatened area will react to the hurricane threat. Behavioral assumptions based on professional analysis of survey results are the final output of the behavioral component of this study. These assumptions regarding human behavior in an emergency become a critical tool in shelter planning, transportation modeling, and evacuation decision-making and public information efforts.

The public responses having the greatest impact upon an evacuation are listed below. These tendencies and choices of potential evacuees must be quantified in the behavioral analysis:

1. **Evacuation Rates**—The percentage of population in evacuated and non-evacuated areas that will evacuate during a threat;
2. **Evacuation Timing**—When the evacuation population would leave their residences in response to a hurricane warning, watch, a given evacuation order or recommendation, and landfall;
3. **Vehicle Use**—The number of vehicles evacuating households would use for evacuation;
4. **Type of Refuge**—The percentage of evacuees that will seek public shelter and other types of refuge such as the homes of friends and relatives, motels/hotels and other locations such as churches, workplaces, and second homes;
5. **Evacuation Destinations** —The location an evacuee travels to in the event of an evacuation. These destinations can include public shelters, homes of friends/relatives, hotels/motels, and destinations out of the region;
6. **Response by Vacationers**—The evacuation response by vacationers, including R.V. park visitors, encompassing evacuation rate, timing, public shelter use, and vehicle use.

As a result of the 2010 version of this study, Emergency Management in the State of Florida transitioned to an A-B-C evacuation zone enumeration system. This was primarily driven by the separation of the storm surge threat from the wind threat in the NOAA notification and scaling system. Another transition in evacuation planning is the creation of zones beyond “E” based on local threat. These “F” zones are areas previously aggregated into Category 1 evacuation zones or the “low lying areas known to flood”.

For the purposes of this 2013 study and associated transportation analysis, zone “F” has the behavioral characteristics of the former Category 1 zone. Subsequent studies will be designed to address zone designations beyond A-E and derive variations in behavior based on these designations. This trend of added zones is expected to continue as newer analysis of hazards

will also include directional threat scenarios. An example of this can be seen in Volume 1 Chapter 6 of the Regional Evacuation Study.

Final behavioral assumptions for each county in the region are included near the end of this summary. Further discussion and a detailed explanation of the analysis used to derive primary behavioral assumptions are included in Volume 2 of the Regional Evacuation Study.

B. Methodology

1. Survey Methodology

To begin the behavioral analysis for the Statewide Regional Evacuation Study program, new behavioral data was compiled from telephone responses to a survey instrument developed for the study by each regional planning council with input from local emergency managers. The wording of survey questions was further refined by Dr. Earl J. Baker of Hazards Management Group. Kerr-Downs Research Inc. administered the survey instrument via telephone interviews and assembled the results for each region as Volume 3 of the Statewide Regional Evacuation Study. Volume 3 constitutes a compiled and complete listing of survey results and regional findings from the unprecedented 2007-2008 survey of Florida residents. Further analysis and planning assumptions were developed from the survey results by Hazards Management Group.

The primary aim of the survey was to provide data to assist in deriving evacuation related behavioral assumptions for transportation and shelter analyses. The focus of the survey was hurricane evacuation, but questions were also asked about evacuation due to freshwater flooding, wildfires, hazardous material accidents, and nuclear power plant accidents. The survey instrument included questions important in developing accurate behavioral assumptions for transportation and shelter planning, but also incorporated questions deemed useful by county emergency management officials. Meetings were held with county and regional planning council representatives to discuss the questionnaire and related survey issues.

In each non-coastal county of the state, 150 interviews were conducted randomly by telephone; in each coastal county of the state 400 interviews were conducted. The interviews were allocated among aggregations of hurricane evacuation zones (e.g., category 1-2) in the respective counties. The aggregation of evacuation zones and allocations of interviews among the evacuation zones were determined after input from county and regional representatives, and varied among counties and regions. Respondents to the survey were selected to reflect aggregations of evacuation zones currently used operationally and in public information materials by counties and to provide appropriate distributions of data necessary to derive behavioral projections as required by the Statewide Regional Evacuation Study. Throughout the Northeast Florida region, responses from residents living in the Category 1 and Category 2 hurricane evacuation zones are aggregated. In order to ensure respondents resided in the evacuation zones of interest, addresses were selected first and then matched with telephone numbers. Only residences with landline telephones were called, as sampling was conducted by address. An overview of the survey sample and aggregation of responses is included below in **Table III-1**.

Table III-1
Sample Sizes for Counties in the Northeast Florida Region

	Site-built Homes	Mobile Homes	Total Homes
Baker	111	39	150
Clay Cat 1-2	94	6	100
Clay Cat 3-5	73	2	75
Clay Non-surge	63	12	75
Duval Cat 1-2	169	6	175
Duval Cat 3	94	6	100
Duval Cat 4-5	48	2	50
Duval Non-surge	73	2	75
Flagler Cat 1-2	189	11	200
Flagler 3-5	91	9	100
Flagler Non-surge	97	3	100
Nassau Cat 1	97	6	99
Nassau Cat 2-3	65	35	100
Nassau Cat 4-5	82	18	100
Nassau Non-surge	67	31	98
Putnam Cat 1-2	53	44	97
Putnam Cat 3-5	59	16	75
Putnam Non-surge	47	26	73
St. Johns Cat 1-2	165	10	175
St. Johns Cat 3	84	14	98
St. Johns Cat 4-5	50	23	73
St. Johns Non-surge	43	7	50
TOTAL	1910	328	2238

For hazards other than hurricanes, sample sizes are smaller. In most counties, one-third of the respondents were asked about freshwater flooding or wildfires or hazardous material accidents. In counties within the emergency planning zone for a nuclear power plant, one-fourth of the respondents were asked about one of the previously listed hazards or about nuclear power plants.

a. Storm Events

As stated previously, the behavioral survey for the Statewide Regional Evacuation Studies focused on the storm events of 2004-2005. Due to the varied impact area from the storm events, each of the 11 regional planning councils chose on which storms the survey for their region would be based. Most of the State of Florida was affected by Hurricanes Charley, Frances, and Jeanne in 2004, but other major storms in recent history such as Floyd (1999), Ivan (2004) and Wilma (2005) dealt regional impacts to other parts of the state. Allowing regions to choose which storm event to focus on lends greater confidence to the entire study. The relative value of survey results are strongly influenced by responses based on actual experience. Survey results from the Northeast Florida Region focus on experiences gained from Charley, Frances and Floyd.

Hurricane Floyd was an enormous Category 4 storm, threatening Florida's east coast from Nassau to Miami-Dade County. Floyd's unpredictable path led to the largest peacetime evacuation in U.S. history as over a million people sought refuge. Floyd did not make landfall in Florida, but created flooding, beach erosion, and resulted in nearly \$68 million in property damages. This hurricane was utilized in the Behavioral Survey, as it was the last hurricane that called for a significant evacuation in Northeast Florida.

Hurricane Charley was a fast-moving Category 4 storm that unexpectedly changed direction after leaving Cuba on August 13th. Charley made landfall on the southwest coast of Florida near Cayo Costa, just north of Captiva, with maximum sustained winds near 130 knots. Charley's eye passed over Punta Gorda and the eye wall struck that city and neighboring Port Charlotte with devastating results. Continuing north northeastward at a slightly faster forward speed, the hurricane traversed the central Florida peninsula, resulting in a swath of destruction across the state. The center passed near Kissimmee and Orlando on August 14, by which time the interaction with land caused the maximum sustained winds to decrease to around 75 knots. Charley was still of hurricane intensity, with maximum sustained winds of 65-70 knots, when the center moved off the northeast coast of Florida near Daytona Beach on August 14th.

Finally, Hurricane Frances took a more direct path along the northern Caribbean Islands and came ashore in Stuart, Florida, as a Category 2 hurricane. The eye of this storm was much larger with a larger area of wind damage. Residents in the region expected a decreased impact since the hurricane had travelled across the state. Predictions of the hurricane's path proved accurate and hurricane-force winds from Frances affected the southern half of the Northeast Florida Region.

Compared to other parts of Florida, the Northeast Florida Region has been significantly less impacted by hurricanes over the last few decades. Therefore, evacuation rates resulting from the storm events are, understandably, lower than high impact areas. However, evacuation orders were issued; flooding occurred; many trees were blown down and extended power outages were common. The effects of the three storms changed our collective attitudes about hurricanes statewide. Additional information on these three hurricanes (and more) can be found in the Hazards Analysis section of this Technical Data Report.

b. Regional Characteristics

The following is a brief description of the region intended to add greater context and meaning relative to the findings of the behavioral survey. Characterized by an abundance of natural resources and a diversity of habitats, the region's central feature is the Lower St. Johns River. With 140 miles of coastline and five barrier islands boasting some of the state's most magnificent, pristine beaches, Northeast Florida is truly "Florida's First Coast". Jacksonville in Duval County is the major urban center, boasting a good mix of industrial manufacturing, transportation, financial services, health care, and military employment. Jacksonville accounts for almost 55 percent of the region's population and is the employment hub for several communities in surrounding counties. Land-wise, it is the largest city in the contiguous U.S.

Surrounding counties are more rural in nature, relying on agriculture and service sectors, with a limited industrial base often focused on a single sector. They are, however, increasing their rate of urbanization and beginning to develop more economic diversity. From 2000-2010, Flagler

County was the fastest growing county in the region and in the state of Florida, with the greatest population concentration along its beaches

The region's land area covers a total of 4,428 square miles, with 5.8 percent dedicated to agriculture, 2.1 percent to industry and commercial use, and 14.1 percent urbanized. The total population for the region is 1,515,656 (BEBR, 2011), which includes 7 counties and 27 municipalities. Of the 27 municipalities, fifteen (15) have a population of less than 5,000 residents. The remaining municipalities are mid-sized, with populations around 10,000. The two largest cities in the Region after Jacksonville are Jacksonville Beach (21,362) in Duval County and Palm Coast (75,180) in Flagler County.

Like other parts of Florida, the Northeast Florida Region has multiple water bodies including a major river and wetland complexes prone to freshwater flooding. The St Johns River and its tributaries significantly affect the entire region. Flooding of low-lying areas near the St Johns River occurs periodically. Additional information regarding flood-prone areas is shown on the 100-year Floodplain Map and included in Chapter 2, Regional Hazards Analysis.

2. Deriving Behavioral Assumptions

Since each evacuation scenario is different and unique, behavioral analysis for evacuation is predictive. The final products of behavioral analyses are basic assumptions that form the best available predictive information regarding likely human behavior. Regardless of how detailed, formal, or quantitative an evacuation plan appears, it contains assumptions about behaviors such as those discussed throughout this study. Every time a clearance time is calculated to determine the length of time required to complete an evacuation under a defined scenario, the model simulations include quantitative assumptions regarding behavioral factors. Behavioral assumptions are also employed in an effort to predict the needed capacity of shelters to house an unknown number of residents that will evacuate to a public shelter. Behavioral assumptions will change over time based on the level of public education regarding evacuation or the level of evacuation experience of a population. The issue is not whether such assumptions are or should be made; but what the assumptions should be.

There is no simple one-rule-fits-all technique for deriving behavioral assumptions for planning. The more appropriate solution is to employ the best available mix of indicators for each behavior and scenario in question.

A detailed listing and discussion of behavioral assumptions is included in Volume 2 of this Statewide Regional Evacuation Study series. However, a few of the most fundamental and critical assumptions are included at the end of this summary.

C. Key Survey Findings for the Northeast Florida Region

1. Information and Awareness

Four out of five Northeast Florida region residents (82%) have access to the Internet. However, only one in four residents with internet access (26%) claims to have visited their county's website to search for information about hurricanes. Six out of ten residents (63%) of the Northeast Florida Region responded with a "yes" when asked, "Have you ever seen a map of your county showing areas that would need to evacuate in case of a hurricane?"

Approximately 23% of residents of the coastal counties in the Northeast Florida Region believe they live in an evacuation zone. Forty one percent (41%) of coastal county residents living in a category 1 evacuation zone knew they lived in an evacuation zone. Similar results were found for other evacuation zones, with fewer people having knowledge of the category 4 and category 5 zones. Overall, only 25% of coastal residents in Northeast Florida could correctly identify the evacuation zones in which they live. This finding illustrates the need for public information dissemination.

**Table III-2
Awareness of Evacuation Zones**

Evacuation Zone	Know Evacuation Zone in Which One Lives
Category 1	41%
Category 2	30%
Category 3	18%
Category 4	12%
Category 5	12%

The previous finding indicates a lack of knowledge of evacuation zones, and illustrates the need for dissemination of public information. However, a very high percentage of residents of coastal areas have confidence that Emergency Management officials will issue evacuation notices saying residents should leave their homes to seek safer locations when called for. Residents' confidence that emergency managers will issue evacuation notices rises for more severe storms. Response rates for non-surge and inland counties show a high confidence rate that evacuation orders will be issued when needed.

2. Evacuation Intent

Percentages of citizens who say they will follow mandatory evacuation notices vary depending on the strength of the storm. It makes sense that compliance with orders for evacuation increases linearly as hurricanes strengthen from category 1 or 2 to 3 to 5. (It should be noted that historically, respondents' intent to evacuate is consistently higher than actual evacuation rates. Due to the hypothetical nature of responses, the trend is pointed out but actual numbers are not provided in this summary).

**Table III-3
The Percentages of All Households That Evacuated and the Most Popular Types of Destinations**

Storm	Evacuated	Neighborhood	County	Elsewhere in Florida	Outside Florida
Charley	16%	1%	4%	5%	6%
Frances	11%	1%	3%	3%	4%
Floyd	29%	1%	5%	10%	10%

Hurricanes Charley, Frances and Floyd impacted the Northeast Florida Region as low intensity storms. Therefore, the evacuation participation rates are lower than other locations in Florida impacted more severely. The Northeast Florida Region has not been impacted by a major storm since Hurricane Dora (1964).

As discussed earlier, survey results for hypothetical situations are not consistent with real behavior. Evacuation rates are further analyzed and organized by county, for Hurricanes Charley, Frances and Floyd, and are included with analysis in Volume 2—Behavioral Analysis. The raw behavioral survey results and survey questionnaire are included in Volume 3—Behavioral Survey Report.

Significant percentages of residents say they intend to evacuate their homes even when the evacuation notice does not apply directly to them. The term “shadow evacuation” applies to those residents that evacuate without having been told to evacuate. Shadow evacuation occurs for a wide variety of reasons and is difficult to quantify. Nevertheless, assumptions for shadow evacuation rates must be made to assess and model evacuation traffic patterns. Understandably, shadow evacuation rates increase as storm strength increases. The survey results shown below illustrate that shadow evacuation rates are higher inland and in non-surge areas.

Table III-4
Residents That Say They Intend to Evacuate Their Homes Even When the Evacuation Notice Does Not Apply Directly to Them

Evacuation Zone	Evacuation Notice for Zones 1 and 2	Evacuation Notice for Zones 1, 2 and 3	Evacuation Notice for Zones 1,2,3,4 and 5
Category 1	74%	87%	96%
Category 2	75%	87%	96%
Category 3	76%	86%	93%
Category 4	78%	85%	94%
Category 5	78%	85%	94%
Non-Surge	74%	81%	92%
Inland	79%	88%	95%

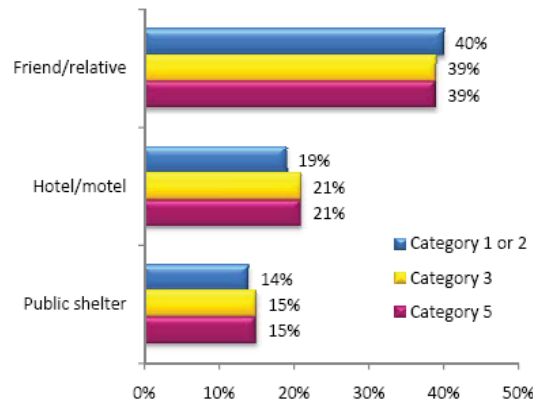
The table above reveals that non-surge vulnerable inland evacuees could represent a significant proportion of the overall evacuation population and will contribute to potential evacuation route congestion, fuel shortages, and shelter demand.

3. Evacuation Destination

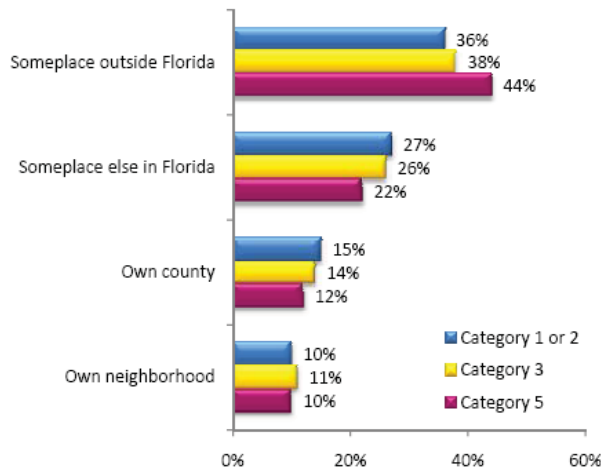
Regardless of the hurricane strength, pluralities of residents of the Northeast Florida Region intend to go to friends or relatives if they evacuate. Behavioral survey results indicated that approximately 39% of evacuees in a Category 3 or 5 storm intend to find safety in the households of friends and family. Approximately 20% of respondents indicated they would seek hotel/motel accommodations and 15% indicated they would seek public shelters. Minor changes in evacuation destinations occur as hurricanes strengthen.

About two in five residents intend to evacuate to locations outside of Florida regardless of hurricane strength. Percentages of residents who intend to evacuate outside Florida increases as hurricanes strengthen to a category 5. Most residents who intend to evacuate outside of Florida will go to Georgia. Specific information regarding evacuation destinations are shown in the following two figures.

**Figure III-1
Evacuation Destinations by Type**



**Figure III-2
Evacuation Destinations by Location**



Additional evacuation destination information is provided for each county in the Planning Assumptions tables at the end of this behavioral summary. More specific information regarding the analysis used to derive the planning assumptions is found in Volume 2—Behavioral Analysis. The behavioral survey results and survey questionnaire specifically detailing destination information are included in Volume 3—Behavioral Survey Report.

4. Obstacles to Evacuation

In order to determine why residents who are ordered to evacuate indicate that they will not, questions designed to identify any potential obstacles to evacuation were posed.

Seven percent (7%) of households contain an individual who requires assistance during evacuation. Only five percent (5%) of households in the Northeast Florida region have an individual who is disabled, has a medical condition, or requires some type of special assistance beyond transportation assistance. Two percent (2%) will require assistance from an outside agency. Therefore, the data indicates a need for county public education materials for evacuation to highlight special needs issues and encourage those needing evacuation assistance to register with the county.

Nearly six in ten households in the Northeast Florida region (57%) have pets: 88% of these residents plan to take their pets with them if they evacuate. Most residents with pets (86%) are aware that public shelters will not accept pets, and 4% of these residents claim they will not evacuate because of this fact.

Information on the location of pet friendly shelters should be disseminated with other public education materials. Pet owners need to include pets in their evacuation plans by actively seeking information on rules and procedures for sheltering pets.

**Table III- 5
Household Members Need Assistance to Evacuate**

Evacuation Zone	Number	Yes	No	Not Sure
NE Florida Region	2250	7%	92%	1%
Category 1	425	7%	91%	1%
Category 2	475	7%	92%	1%
Category 3	334	9%	91%	1%
Category 4	196	6%	94%	0%
Category 5	195	6%	94%	0%
Non-Surge	475	6%	94%	0%
Inland	150	11%	88%	1%

5. Evacuation Scenarios

Evacuation behavior can be affected by a variety of external factors as illustrated throughout the behavioral survey results. Several of the most significant factors and likely behavioral responses are discussed in this section.

a. Storm Characteristics

(1) Storm Severity

The 2007-2008 behavioral survey results for the Northeast Florida Region consistently show a marked difference in responses associated with hypothetical severe storms (Category 4 and Category 5). Storm severity also plays a significant role in evacuation destination especially with regard to out-of-county travel. In Florida, evacuation during Hurricane Floyd is one of the best examples of multi-regional, multi-state evacuation caused by a large hurricane. The setting for Hurricane Floyd in 1999 should be taken into account when attempting to understand the reaction of the populous. Floyd was a strong category 4 storm that had moved on a path directly toward South Florida for several days. The storm was ominous, but forecasters guardedly predicted that Floyd would veer off into the Atlantic and miss Florida. The storm continued to advance with huge press coverage and did not turn until finally, at the last safe distance, the storm altered its course and skirted the State. However, Floyd did make landfall in North Carolina as a category 2 storm, causing major damage along the Eastern Seaboard and initiating what Time magazine described as the largest evacuation in history. The point here is to give an idea of how public response can be affected by an extreme storm.

Evacuation rates in non-coastal counties during Floyd ranged from 12% in the East Central Florida region to 49% in the Charleston, SC region. The average non-coastal county evacuation rate for all 11 regions studied was about 24%. Keep in mind that Floyd was a major storm and every storm is different. However, because of the scale of the Floyd evacuation, the chance of reoccurrence must be recognized. Results for coastal and non-coastal county evacuation need to be continually evaluated and validated by behavioral studies from other storms.

In sum, the Hurricane Floyd Assessment clearly shows that, in a major storm, people will get in their car and leave their home county. In fact, the 7,000 surveys from the Hurricane Floyd Assessment inferred that 75% of the nearly 3 million evacuees left their county. As stated throughout this study, every storm presents a unique and different scenario. However, storm severity has consistently been shown to be a significant factor in making the decision to evacuate. Multi-region clearance times are provided in Volume 4—Transportation Analysis.

In fact, responses to questions regarding severe storms shown above in **Table III-4** indicate that well over 90% of the population intends to evacuate during a category 5 storm event, if ordered.

(2) Land falling, Paralleling, and Exiting Storm Paths

Storm path can have a significant effect on any evacuation scenario especially with respect to out-of-county evacuation destinations. A comparison of these three storm path scenarios serves as a reminder that every storm is different. Therefore, studies such as this one cannot predict operational decision-making. However, a general discussion of potential scenarios can provide useful information to emergency managers for decision-making.

- (a) Land falling storms are storms that impact the coastline directly. Generally, land falling storms precipitate the highest surge values and most destructive winds. With regard to evacuation, land falling storms allow for more alternative evacuation destinations. For example, a storm land falling in the Northeast Florida region would allow for evacuating populations to find safe destinations to the north or south of the storm path.
- (b) Paralleling storms, as the name suggests, typically travel along the coastline. On the Gulf Coast of Florida, paralleling storms are potentially more destructive than on the Atlantic coast due to the counterclockwise spin of a tropical cyclone. Evacuation patterns are typically to the north and away from the storm path.
- (c) Exiting storms, as the name also suggests, are storms that have made landfall and, after having travelled across land, are heading back to sea. In Florida, that typically means across the peninsula. Relative surge values and wind speeds are typically lower for exiting storms. However, Hurricanes Charley, Frances and Jeanne in 2004 demonstrated that evacuation of vulnerable areas during an exiting storm is often warranted due to the unpredictable nature of storm events. Each of the three storms created a different scenario with unique characteristics. Therefore, operational decisions cannot be made in advance. Discussion of storm scenarios only provides a theoretical frame of reference.

(3) Evacuation Timing

The timeframe in which people respond to an evacuation order varies. The terms long response and short response refer to the time it takes for evacuees to mobilize following an evacuation notice. Evacuation studies typically express the temporal nature of evacuation response in a "response curve" derived from response curves documented in actual evacuation. Traffic modelers, in turn, load the response curve into the model to calculate evacuating traffic counts and predict potentials for traffic congestion during a future evacuation event.

The most significant factor affecting a long or short response is the urgency of the evacuation order. Response curves are also affected by the media. If a storm changes course unexpectedly or intensifies it usually becomes necessary to hasten evacuation. Urgency is sometimes inherent due to the relatively inaccurate science of hurricane forecasting.

b. Phased Evacuation

In urban areas or in areas with large at-risk populations, staged evacuation is a tool to allow for a more orderly evacuation. In this scenario, specific areas are given a time window in which to

evacuate based on the capacity of the roadway to accommodate the expected flow. This also allows more vulnerable populations to clear bridges and causeways before mainland evacuations are ordered. Phased evacuation is commonly used in the Florida Keys due to the roadway characteristics linking this densely populated string of islands. The effectiveness of staged evacuation relies on accurate behavioral assumptions.

c. Reverse Lane Flow

Reverse lane flow is an evacuation scenario where authorities change the direction of highway lanes to direct all lanes to flow in the same direction. The purpose is to hasten the evacuation of people during a major disaster. When a major hurricane is expected to make landfall, the Highway Patrol will implement one-way evacuation operation upon an Executive Order from the Governor.

Currently, only a few highway segments are designated for potential one-way evacuation operation. The only one-way evacuation facility in the Northeast Florida region is 1-10 westbound from Jacksonville.

In situations where evacuation timing is critical and a few additional hours are needed for evacuation, reverse lane flow will speed up the evacuation of residents and tourists. However, reverse lane flow operations are counter-intuitive to the driving public and are only proposed to be implemented during daylight hours. Substantial numbers of public safety man-hours are needed to implement the traffic redirection at each interchange. Yet for all the preparation and man-hour resources needed for implementation, modeling efforts predict only a 33% increase in roadway capacity. Therefore, the applicability of reverse lane flow is limited to specific scenarios where the Governor recognizes the urgency for a temporary increase in evacuation route capacity.

6. Evacuation Behavior for Other Hazards

The behavioral survey administered for the Statewide Regional Evacuation Study Program included several questions regarding other disasters that may precipitate evacuation orders. Survey respondents were asked about their awareness of vulnerability and willingness to follow evacuation orders if issued. The following behavioral information is gathered from Volume 3—Behavioral Survey Report.

Survey findings included here regarding other evacuation related hazards represent an initial investigation into potential behaviors associated with the hazards examined below. These findings have not been validated through comparison and correlation with similar studies. Therefore, these findings should be considered as a starting point for future investigations and analysis.

a. Wildfire

The following questions were part of the survey. Responses and further discussion are below the question:

(1) Do you believe that your home might ever be threatened by a wildfire?

Nearly half of the residents in the Northeast Florida region (45%) believe their area may be threatened by wildfire at some point in the future. Inland county residents (65%) are more likely to believe that they may be threatened by

wildfires. Residents in Baker County (65%) are much more likely to feel threatened by wildfires, while residents of Duval County (15%) are considerably less concerned.

(2) If a wildfire threatened your community and public safety officials ordered you to evacuate, would you?

Nearly nine out of ten residents in the Northeast Florida region (90%) claim they intend to evacuate because of wildfire threats, if ordered to do so by public safety officials. Intent to evacuate, if ordered to do so, is lowest in evacuation zones 1 and 2 (71% and 79% respectively) and highest in the Category 3 evacuation zone (95%). Intent to evacuate varies somewhat across counties as 80% of Putnam County residents say they intend to evacuate because of wildfires if ordered to do so by public safety officials, while 94% of Duval County residents intend to evacuate.

(3) Where would you go if you evacuated because of a wildfire?

Just over one in ten residents (11%) intend to go to public shelters if there is a need to evacuate because of wildfires. A plurality of residents (48%) intends to evacuate to friends and relatives, while 22% plan to go to a hotel/motel. Inland residents (14%) are more likely to go to a public shelter. Responses to this question vary slightly across counties. For example, 15% of Flagler County residents say they intend to evacuate to a public shelter, while only 7% of Nassau County residents intend to. Two in three (67%) Nassau County residents say they will go to friends and relatives, while only 39% of Putnam County residents will do so.

(4) Since you've been living in this location, have you ever evacuated your home because of a wildfire?

Only 6% of residents in the Northeast Florida region say they have experienced a wildfire while living in this area. One resident, when asked in which years wildfires threatened their home mentioned 1984, 1985, 1987, 1988, 1991, 1994, 1995, 1996, 1998, 1999, 2001, 2003, 2004, 2005, 2006 and 2007.

b. Freshwater Flooding

Freshwater flooding in the Northeast Florida Region can occur for a variety of reasons including dam failure, riverine flooding, and seasonal flooding from rainfall events. Please refer to the Hazards Analysis of this Technical Data Report for a specific description of vulnerabilities. The questions below do not refer to any specific flooding scenario or situation.

(1) Do you believe that your home might ever be threatened by freshwater flooding?

One in four residents (25%) of the Northeast Florida region say their home(s) might be threatened by freshwater flooding at some point. Reactions vary across evacuation zones as 14% of inland county residents and 29% of residents in evacuation zones 1 and 2 believe their homes may be threatened by freshwater flooding. Only 14% of Baker County residents make this claim, while 30% of

Putnam County residents believe their homes may be threatened by freshwater flooding.

(2) If freshwater flooding threatened your community and public safety officials ordered you to evacuate, would you?

Four out of five residents in the Northeast Florida region (81%) maintain they will evacuate their homes if ordered to do so by public safety officials because of freshwater flooding. This percentage is fairly close to the 90% of residents who claim they will evacuate because of wildfires. Clay County residents (89%) are more likely to intend to evacuate because of freshwater flooding. Fewer residents of Flagler County (72%) say they will evacuate if ordered to do so because of freshwater flooding.

(3) Where would you go if you evacuated because of freshwater flooding?

A plurality of residents (40%) intends to evacuate to friends or relatives if ordered to evacuate by public officials because of freshwater flooding. One in ten residents (10%) maintains they will go to a public shelter with comparatively more residents in non-surge zones (17%) planning to do so. Residents of Nassau County (4%) are the least likely to seek out public shelters.

(4) Since you've been living in this location, have you ever evacuated your home because of freshwater flooding?

Very few residents of the Northeast Florida region (2%) indicate they have experienced freshwater flooding while living in this area. Neither Baker County nor Duval County indicated they had been evacuated because of freshwater flooding.

c. Hazardous Materials Spill

(1) Do you believe that your home might ever be threatened by a hazardous material accident?

One in four (23%) Northeast Florida region residents believe they will be threatened by a hazardous material accident. Concern for this type of accident is most prevalent in Category 4 and Category 5 zones (29%) and is non-existent in non-surge zones. Belief of future threats from a hazardous material accident is highest in Duval and Nassau Counties (27%) and lowest in St Johns County (18%).

(2) If a hazardous material accident threatened your community and public safety officials ordered you to evacuate, would you?

While few residents (23%) believe that they are threatened by a future hazardous material accident, a high percentage (92%) say they intend to evacuate their homes if public safety officials ask them to do so in response to this type of accident. Intention to evacuate in response to hazardous material accidents if told to do so by public safety officials peaks in St Johns County (98%) and is lowest in Baker County (83%).

(3) Where would you go if you evacuated because of a hazardous material accident?

Only 7% of residents in the Northeast Florida region say they intend to go to a public shelter if they evacuate from a hazardous material accident. A plurality of residents (39%) intends to go to friends or relatives. One in four (25%) intends to evacuate to a hotel or motel. Residents living inland (11%) and in non-surge areas (27%) are comparatively more likely to seek safety at public shelters. Baker County residents (27%) are more likely to go to public shelters, while only 3% of residents of Flagler, Nassau, and St Johns Counties residents say they will do so.

(4) Since you've been living in this location, have you ever evacuated your home because of a hazardous material accident?

Less than one percent (1%) of residents in the Northeast Florida region indicate they have evacuated due to a hazardous material accident in the region.

(5) Suppose there was a hazardous material accident but public safety officials advised you to close your windows and doors, turn off your air conditioner, and stay indoors rather than trying to evacuate. Would you stay indoors rather than trying to evacuate?

Four out of five residents in the Northeast Florida region (78%) claim they will follow public safety officials' instructions to stay indoors rather than trying to evacuate. Reaction to this question is highest in evacuation zone 2 (82%). Willingness to stay indoors following a hazardous material accident is highest in Putnam County (89%) and lowest in Baker County (59%).

d. Nuclear Power Plant Incident

This is not applicable to the Northeast Florida Region.

D. Use of Survey Findings

Responses to individual survey questions alone are not usually good indicators of how residents will respond in actual threats. A mix of the following indicators was used in deriving behavioral assumptions to use in planning:

- Intended responses
- Responses in past threats
- Responses in past threats in other locations
- Factors usually correlated with actual response

1. Intended Responses

Some of the survey questions asked respondents what they would do in certain situations – whether they would evacuate, where they would go, and so forth. Answers to those questions constitute intended responses and they provide a very straightforward indicator of behavior. Unfortunately, intended responses often do not match actual responses. That is, people often do not do what they said they would do. In some cases, there are statistical adjustments to

intended responses that result in much closer matches to actual behavior. For example, in most locations, actual use of public shelters is only about half the level indicated by intended response surveys.

2. Actual Responses

A number of survey questions asked interviewees how they responded in past hurricane threats. Survey participants from the Northeast Florida Region were asked about their evacuation behavior in Hurricanes Charley, Frances, and Floyd. Responses in past threats can be good predictors of future response, but only if the past threats are similar to future threats. In the Northeast Florida Region past threats from Hurricanes Charley, Frances, and Floyd did not result in evacuation responses as great as threats that could be posed by future storms. Therefore, the evacuation participation rates observed in those storms are not necessarily good indicators of what is reasonable to plan for in future threats. For other behaviors such as type of refuge and destination, past responses can be compared for consistency from one evacuation to another and can be used as a comparison with intended responses.

3. Past Response in Other Locations

Although all places are different, responses and patterns observed in one set of locations are often good indicators of what can occur elsewhere, when conditions are similar. This is particularly useful when planning for threats for which there is no reliable response data for similar threats for the region. As part of the Statewide Regional Evacuation Studies (SRES), twelve different hurricane threats were asked about in one county or another. In addition, public response has been documented in many other hurricane threats both in and out of Florida, some of which are relevant to planning in the Withlacoochee region. For example, in the great majority of evacuations fewer than 15% of evacuees leave on their own, prior to an evacuation notice being issued by public officials. Due to the consistency of that finding, it is reasonable to apply it to the counties in the Withlacoochee region.

4. Statistical Predictors

Data from other hurricane evacuation surveys like those described above have been analyzed statistically to identify factors that have been correlated with evacuation behavior. Certain variables have been found to predict actual response better than others. For example, perceived vulnerability, actual vulnerability (e.g., evacuation zone), housing type, and hearing evacuation orders are all good predictors of whether residents will evacuate. The Statewide Regional Evacuation Studies (SRES) survey measured perceived vulnerability, evacuation zone, housing type, and expectation of being told to evacuate, and those factors were combined to provide an indication of whether interviewees would evacuate in certain storm threats, from certain locations, and from certain types of housing. Other variables were used to provide an indication of other evacuation behaviors.

5. Combining Information

There is no simple one-rule-fits-all technique for using the above information in deriving behavioral assumptions for planning. The best solution is to employ the best available mix of indicators, relying most heavily on the best information available for each behavior and scenario in question, for a particular county and storm threat. When good, reliable actual response information was available for a certain storm threat scenario, it was relied on more than other

types of information. When actual response information was lacking, a combination of intended response, trends from other locations, and application of predictor variables was used.

6. Sample Size Considerations

SRES survey statistics were derived from the sample described previously in **Table III-1: Sample Sizes for Counties in the Northeast Florida Region**. The sample provides an estimate of values for the population of people from which the sample was drawn. For example, a sample of Duval County residents was interviewed for the purpose of estimating how the larger population of Duval County residents would respond to the same questions.

The sampling plan used in the SRES survey was designed to provide statistically useful county-level data, given budgetary constraints. However, sample estimates become less reliable statistically when the responses are disaggregated, as they were in the analyses conducted as part of the SRES. When responses are broken down by evacuation zone within a county and then by housing type, population-level differences among zones and between housing types are not always as large as they might appear in the sample. This is because sampling error increases when sample size decreases. Therefore, differences in the sample might not be large enough to support a conclusion that similar differences exist in the population from which the sample was selected, due to sampling error.

Aggregating results across counties helps overcome zonal and housing disaggregation problems. However, county variations—if they exist—are masked when results are aggregated at the regional level. The analysis looked at survey results at both the county and regional levels, relying on county-level data to the extent that sample sizes justified that level of analysis, but relying more on regional data when county-level sample sizes were too small.

This is especially true for actual response data. Many SRES respondents were not living in their current county when past storm threats occurred, so they were not asked about their response in those storms. If a resident was living in the area at the time but did not evacuate, that person could not be asked where he or she went (e.g., public shelter, out-of-county). Therefore, for certain actual response questions, regional statistics were more meaningful than county statistics.

E. Planning Assumptions

Specific Planning assumptions for residents are shown in the following tables. Appearing below each set of tables, there is a brief description of the content of the table. For a more in-depth analysis of the planning assumptions, refer to Volume 3—Behavioral Planning Assumptions.

For each coastal county there are 14 tables. In Northeast Florida, Putnam and Clay Counties, though inland, are treated as a coastal county because they do experience Storm Surge from the St. Johns River Basin.

1. Evacuation rate for site-built homes
2. Out-of-county trip rates for site-built homes
3. Percent of available vehicles to be used by site-built homes
4. Public shelter use rates for site-built homes
5. Friend and relative use rates for site-built homes
6. Hotel and motel use rates for site-built homes

7. Other refuge use rates for site-built homes
8. Evacuation rate for site-built homes
9. Out-of-county trip rates for mobile and manufactured homes
10. Percent of available vehicles to be used by mobile and manufactured homes
11. Public shelter use rates for mobile and manufactured homes
12. Friend and relative use rates for mobile and manufactured homes
13. Hotel and motel use rates for mobile and manufactured homes
14. Other refuge use rates for mobile and manufactured homes

For non-coastal counties (Baker County) there are seven tables. Data for site-built homes and mobile or manufactured homes are shown in the same tables for non-coastal counties because there are no surge-related evacuation zones. The tables for non-coastal counties are:

1. Evacuation rate for site-built homes and mobile or manufactured homes
2. Out-of-county trip rates for site-built homes and mobile or manufactured homes
3. Percent of available vehicles to be used by site-built homes and mobile or manufactured homes
4. Public shelter use rates for site-built homes and mobile or manufactured homes
5. Friend and relative use rates for site-built homes and mobile or manufactured homes
6. Hotel and motel use rates for site-built homes and mobile or manufactured homes
7. Other refuge use rates for site-built homes and mobile or manufactured homes

In each table for county, there are planning assumptions for six evacuation zones:

1. Areas needing to evacuate due to storm surge flooding from category 1 hurricanes
2. Areas needing to evacuate due to storm surge flooding from category 2 hurricanes
3. Areas needing to evacuate due to storm surge flooding from category 3 hurricanes
4. Areas needing to evacuate due to storm surge flooding from category 4 hurricanes
5. Areas needing to evacuate due to storm surge flooding from category 5 hurricanes
6. Areas not needing to evacuate due to storm surge flooding from hurricanes

Zones were defined relative to zones currently used by each county. In instances where counties currently aggregate zones, the planning assumptions were interpolated for intermediate zones. For example, if a county used zones 1-2, 3, and 4-5, trends across those zones were used to specify assumptions for zones 1, 2, 3, 4, and 5.

1. Evacuation Rates

Evacuation rates refer to the percentage of people who will leave their homes to go somewhere safer during a hurricane threat. This is a critical variable for planning because it drives the number of vehicles on the roadways during an evacuation. Responses will vary even for hurricanes of the same intensity, depending on how great the threat appears to be to one's specific location, as well as other factors. Evacuation rates on the periphery of warning areas tend to be lower than in areas closest to the projected path of a threatening storm. A strong category 4 hurricane which has maintained its intensity for a day or more prior to landfall will elicit greater response than one which intensifies from a 2 to a 4 just six hours prior to landfall or one which weakens from a 4 to a 2 twelve hours prior to landfall. Both media attention and actions by public officials will vary from one strong category 4 hurricane to another due to similar considerations. A large category 4 storm will receive greater attention from media and

officials than a small category 4 storm (e.g., Floyd, “Andrew’s Big Brother”). Actions by public officials have a great impact on evacuation rate. People are much more likely to evacuate, especially in strong storms, when they believe they have been ordered to evacuate than when they believe they have received a recommendation to evacuate or have not been told at all whether they should evacuate. A problem is that many people (often 30% in category 1 evacuation zones) fail to hear, comprehend, or believe that evacuation orders apply to them. The methods and aggressiveness used to disseminate evacuation notices affect evacuation rates.

The planning assumptions for evacuation rates are the maximum probable rates. They assume that a threatening storm of a given category poses its greatest threat to each county. That is,

- The storm’s forecast track is over the county early and throughout at least a full day of the threat.
- The storm has been at the specified intensity for at least a day of the threat and remains at that intensity until landfall.
- The storm makes landfall in the county.

These conditions are not met very often, and recent threats in the Northeast Florida region have not generated evacuation rates as high as those in some of the planning assumptions. In fact, in the 12 storms asked about as part of the SRES the highest evacuation rates observed for site-built homes in the category 1 evacuation zone in any county was 80% (Santa Rosa in Ivan and Nassau in Floyd). However, evacuation rates over 90% have been documented in other threats (e.g., Escambia in Frederic, parts of Pinellas in Elena, most of coastal Georgia and southern South Carolina in Floyd, and Galveston, Texas in Rita).

Applying the county planning assumptions to the entire region overstates evacuation rates for the region, because not every county in the region will meet the conditions. However, one does not know in advance the county to which they will apply, if any.

The planning assumptions assume that officials issue mandatory evacuation orders for surge-related evacuation zones for hurricanes of corresponding intensities (e.g., everyone in the category 1 evacuation zone is ordered to evacuate for a category 1 hurricane). It also assumes that all mobile homes and residents of manufactured housing are ordered to evacuate for hurricanes of all intensities.

The planning assumptions include shadow evacuation—people leaving from areas and structures not ordered by officials to evacuate. These assumptions can add substantially to the total number of people evacuating and generating shelter demand, but the phenomenon exists, particularly when conditions such as those enumerated above apply (storm is forecast for an extended period to strike the county, maintains its intensity, and makes landfall in the county). One reason shadow evacuation occurs is that many people have misconceptions about their vulnerability.

2. Out-of-County Trips

Many evacuees go farther than necessary to reach safety, and the planning assumptions indicate the percentage of evacuees who will go to destinations outside their own county. The Survey Data Report lists the actual destination (i.e., city) where intended evacuees said they

would go and where actual evacuees have gone in the past, if they said they would go or went beyond their own neighborhoods. Going out-of-county can increase evacuation clearance times but has occurred in the past and will in the future until officials are more successful at dissuading evacuees from doing so. Very few out-of-county evacuees seek refuge in public shelters. The great majority go to the homes of friends and relatives or to hotels and motels. Because evacuation rates were low in recent storms, out-of-county trip rates are based on the minority of residents who evacuated and might not be the same if evacuation rates had been greater.

3. Type of Refuge

There are separate tables for the percentage of evacuees who will go to public shelters, the homes of friends and relatives, hotels and motels, and other types of refuge (such as churches, workplaces, and second homes). Survey respondents tend to overstate their likelihood of using public shelters and understate their likelihood of going to the homes of friends and relatives. Actual refuge use is the best indicator, but in the Northeast Florida region, there have been too few evacuees in recent hurricane threats included in the survey to provide highly reliable estimates at the county level for future planning. The most recent evacuation in Northeast Florida was for Hurricane Floyd in 1999. While Floyd did not make landfall in Florida, it passed close enough to the East Coast to cause a statewide evacuation, including residents of Northeast Florida. Eighty (80) percent of those in Northeast Florida living in Category 1 evacuation zones complied with evacuation orders. Planning assumptions for the counties reflect a reduced value of the intended public shelter use figures unless actual response values were consistent with the intended behavior. The ability of evacuees actually to go to their intended refuge or to the places they have gone in the past will depend of the availability of those refuges in future threats.

4. Percent of Available Vehicles

Many evacuating households tend to take only a portion of the vehicles available to them, mainly to avoid separating the family more than necessary. The planning assumptions indicate the percentage of vehicles available to households that will be used in an evacuation. The Survey Data Report includes the number of vehicles available to evacuating households and the number they would take. The percent-of-available figures are derived from those data. Although planners could use the number of vehicles per household from the SRES survey and reported in the Survey Data Report, census data should provide better statistical estimates of the number of vehicles available to households, to which the percent-of-available multipliers can be applied. The SRES survey asked only about intended vehicle use, but a large number of post-storm surveys have asked about actual vehicle use, and the intended use figures tend to match the actual use figures well.

5. Evacuation Timing

Not all evacuees leave at the same time. Some leave before public officials issue evacuation notices, some leave very soon following issuance of evacuation notices, and some wait until shortly before they expect the threatening storm to arrive.

a. Evidence from Past Evacuations

Many surveys documenting response following hurricane evacuations have asked evacuees to indicate the time and date when they departed their homes. The responses have been graphed

to depict cumulative evacuation curves. The curves show how the evacuation (on the y-axis) grew over time (on the x-axis), typically, with a few people leaving early and then increasing to the point at which 100% of the evacuees had eventually departed. The curves indicate when vehicles enter the evacuation network as evacuating vehicles, not when they reached their destinations or when they made other trips in the network prior to evacuating.

In general, a graph of when evacuees depart often looks like the letter "S." In some evacuations the "S" is compressed laterally (i.e., over time) to appear thin and upright. Those curves occur when all departures occur in a relatively short period. They usually happen when evacuation notices were not issued early enough due to an unexpected change in a storm's track, forward speed, or intensity. By the time evacuation notices are issued, little time remains before anticipated landfall, so evacuees leave with a sense of urgency corresponding to the threat. This would be referred to as a relatively "fast" or "quick" response.

In other evacuations, the "S" is stretched laterally and covers more of the length of the line on which it appears, with departures being distributed over a longer length of time. It looks "flatter". In those cases evacuation notices were issued well in advance of anticipated landfall of the storm, and residents were aware that they had the luxury of waiting longer before departing if they chose to do so. Some evacuees do wait longer before leaving, but not all do. Departures are distributed over a longer period than in the first example. This might be referred to as a "slow" response.

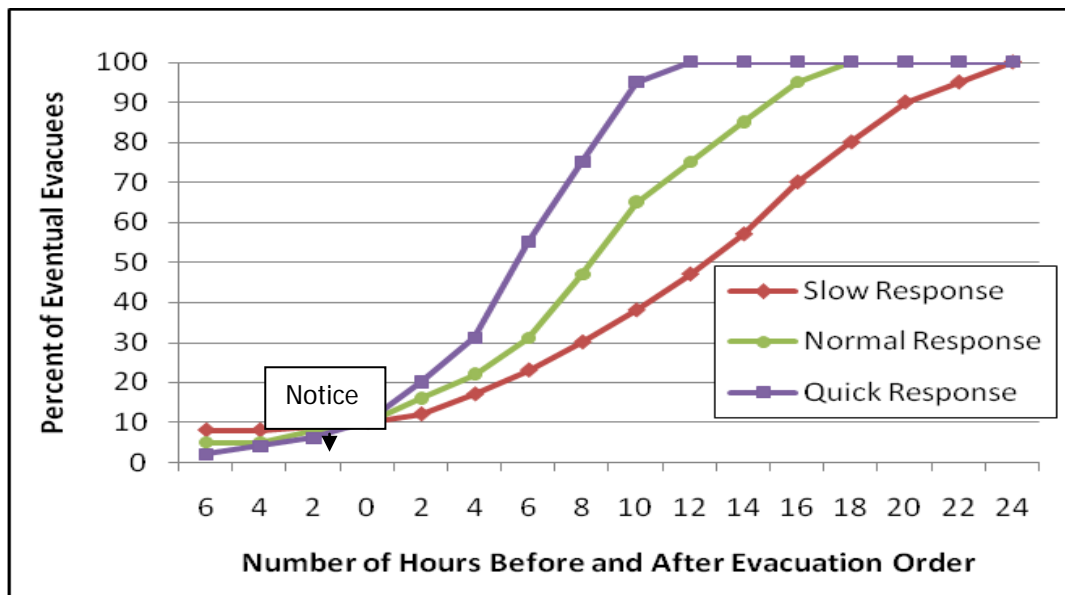
There are also evacuation-timing curves that fall between those two, resulting in an "S" that is less compressed than the first, but less stretched than the second. This sort of evacuation results when evacuation notices are issued earlier than in the first example, but not as early as in the second case.

In all three scenarios, evacuees collectively take as much time as they believe is available to them. Perceptions about the urgency of the evacuation account for variations in whether the evacuation is "quick", "slow", or in-between ("normal").

b. Response Curves for Planning

The three evacuation timing scenarios described above are depicted graphically in Figure III-3, reflecting the three versions of the letter "S." The slowest of the three curves assumes that evacuation notices were issued at least 24 hours before landfall. The fastest of the three assumes that evacuation notices were issued just 12 hours prior to the anticipated onset of hurricane conditions.

Figure III- 3
Response Curves for Evacuation Planning



c. Variations in the Curves

The haste in which evacuees depart is mainly a function of the perceived urgency of leaving sooner rather than later. Variations from storm to storm are usually a function of forecasts. If a forecast changes to indicate that landfall will occur sooner than previously anticipated, more people will start leaving. If intensity of a storm increases, indicating that additional areas of a community need to evacuate, departures from those areas will increase. These changes influence public response primarily through evacuation notices and instructions provided by local officials. Officials can significantly affect the distribution of departures by when they issue evacuation notices and how they word the notices and related announcements.

In each threat scenario occupants of less vulnerable areas (e.g., inland) will tend to wait longer to evacuate than those living in more hazardous locations (e.g., beaches). Variation in the curves is a function of variation in the perceived urgency of evacuating promptly, not demographics.

People prefer not to evacuate at night but will do so if necessary. Examples are Eloise, Elena, and Opal. Relatively few people leave prior to the issuance of evacuation notices by officials. People are willing to leave before watches and warnings are posted by the National Hurricane Center if asked to do so by local officials.

d. Examples of Actual Response Curves

Respondents to the SRES survey were not asked when they departed in past evacuations because too much time had passed between the evacuations and the interviews to trust the accuracy of recollections. The questions would also have made the interviews unacceptably lengthy. There are ample actual response curves that have been documented in other surveys.

(1) Two-day Evacuations

If officials issue evacuation notices more than 24 hours prior to anticipated landfall, evacuation departures will be distributed over a period longer than 24 hours. Some evacuees will leave shortly after the evacuation notice during daylight hours, then departures will essentially stop on the evening of the first day, and then resume on the morning of the second day.

Most of the recent evacuations in Florida and elsewhere have taken place over a period of more than 24 hours. This has been the result of evacuation notices having been issued more than 24 hours prior to arrival of the storms. Curves were constructed for 11 different coastal regions in Floyd, for example, including four regions in Florida, and all 11 curves were distributed over more than a 24-hour period. All four of the 2004 major hurricanes in Florida (Charley, Frances, Ivan, and Jeanne) had evacuations that covered more than 24 hours. Evacuation departures in Katrina in Mississippi and Louisiana and in Rita in Texas in 2005 occurred over a period of two days or more. The same was true of Bertha and Fran in South Carolina in 1996, Georges in Florida in 1998, Lili in Texas and Louisiana in 2002, and Isabel in Virginia and Maryland in 2003.

(2) One-day Evacuations

The prevalence of two-evacuations stems from good forecasts and a precautionary approach by public safety officials, particularly in stronger storms. If the National Hurricane Center goes forward with plans to extend the lead times for Hurricane Watches and Warnings by 12 hours, early issuance of evacuation notices will probably continue.

However, good early forecasts will not always be the case, or for other reasons evacuations notices will not be issued early enough to afford the luxury of having two days in which to evacuate. In those instances, evacuations in certain areas will need to be rushed to completion following issuance of evacuation notices, and the duration of evacuations will be less than two days. If the goal of clearance time calculations is to estimate the minimum amount of time necessary to complete an evacuation safely, response curves of duration shorter than two days should be assumed.

The quickest of the one-day curves assumes that all evacuees depart within 12 hours of an evacuation notice being issued, with just 10% having left prior to the evacuation notice. Examples of approximately 12-hour response curves are Broward and Miami-Dade Counties in Andrew in 1992, Pinellas County in Elena in 1985, and Escambia County in Frederic in 1979. Storms in which evacuation departures were distributed over a 12 to 18 hour period include David in Miami-Dade in 1979 and Opal in northwest Florida in 1995. Eloise in northwest Florida in 1975 is a rare example of evacuation departures occurring over a period of just six hours, but in some locations as little as 45% of the public evacuated.

F. Planning Assumptions for Vacationers

Compared to residents, there is relatively little data documenting how vacationers respond to hurricane threats, and no SRES survey was conducted with vacationers to ascertain their intentions. Recommendations for behavioral assumptions for tourists are derived from intended-response survey findings with visitors to other locations and from existing data on how vacationers have responded in other locations, including the Carolinas.

1. Evacuation Rates

There is no evidence that vacationers are reluctant to evacuate when a hurricane interrupts their visit to a coastal community. Based on observations of vacationer behavior in other locations and surveys in other locations concerning intended responses, it is reasonable to assume that 90% to 95% of vacationers will evacuate their accommodations if evacuation orders are issued.

2. Type of Refuge

Officials sometimes report a large number of vacationers in public shelters, but they represent a very small percentage of the total visitor population. Fewer than 5% of the evacuating vacationers will go to public shelters. Between 25% and 50% will seek inland hotels and motels. The remainder will return home or stay with friends and relatives in Florida, although the number returning home will depend on the distances traveled by tourists from home. Those most likely to return home live within a one-day drive of where they vacation.

3. Destinations

Up to 5% of tourist evacuees will stay within the county where their vacation accommodations were located or go to a nearby county to use a public shelter. At least half will go elsewhere in Florida to continue their vacation or wait out the storm. Up to half will return home, if they live within a one-day drive.

4. Vehicle Use

The great majority of tourists have a vehicle available to them when on vacation, often their own. Virtually all of the vehicles will be used in evacuating, to other either tourist destinations, home, or airports.

5. Evacuation Timing

Tourists leave at least as early as residents. The same curves used for residents should be used for tourists, unless officials order vacationers to evacuate earlier.

G. Planning Assumptions Tables

Planning assumptions for evacuation behavior form the final product of behavioral analysis and are subsequently used as inputs for the transportation modeling effort. Reasonable and accurate assumptions are an important element of any modeling process. Planning assumptions for the Statewide Regional Evacuation Studies program are derived using professional analysis of statewide survey results with a cross comparison of previous behavioral analyses. A more complete explanation of the methodology used to derive planning assumptions is in Volume II. A set of planning assumptions for each of the counties in the Northeast Florida Region is listed in this chapter's appendices.

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Flagler Friend/Relative Use (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		60	60	60	60	60
Cat 2 Surge Evacuation Zone		60	60	60	60	60
Cat 3 Surge Evacuation Zone		60	60	60	60	60
Cat 4 Surge Evacuation Zone		60	60	60	60	60
Cat 5 Surge Evacuation Zone		60	60	60	60	60
Inland of Surge Evacuation Zones		60	60	60	60	60

Friend/relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

Flagler Hotel/Motel Use Rate (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		20	20	20	20	20
Cat 2 Surge Evacuation Zone		20	20	20	20	20
Cat 3 Surge Evacuation Zone		20	20	20	20	20
Cat 4 Surge Evacuation Zone		20	20	20	20	20
Cat 5 Surge Evacuation Zone		20	20	20	20	20
Inland of Surge Evacuation Zones		20	20	20	20	20

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

Flagler Other Refuge Use Rate (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		15	15	15	15	15
Cat 2 Surge Evacuation Zone		12	12	12	12	12
Cat 3 Surge Evacuation Zone		10	10	10	10	10
Cat 4 Surge Evacuation Zone		10	10	10	10	10
Cat 5 Surge Evacuation Zone		10	10	10	10	10
Inland of Surge Evacuation Zones		8	8	8	8	8

Other refuge rate indicates the percent of evacuees from each zone who will seek refuge in locations such as churches, second homes, and workplaces, in each storm threat scenario.

Flagler Evacuation Rates (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		65	75	85	95	100
Cat 2 Surge Evacuation Zone		65	75	85	95	95
Cat 3 Surge Evacuation Zone		60	70	80	90	95
Cat 4 Surge Evacuation Zone		60	70	80	90	90
Cat 5 Surge Evacuation Zone		60	70	80	85	90
Inland of Surge Evacuation Zones		55	60	80	85	90

Evacuation rate indicates the percent of residents who will leave their homes to go somewhere safer from each zone in each storm threat scenario. Figures are based on the assumption that officials order evacuation for surge evacuation zones corresponding to storm category, plus all mobile homes and manufactured homes. Figures also assume that the actual storm track passes very close to the area being evacuated.

Flagler Out-of-county Trips (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	60	60	60	60	60
Cat 2 Surge Evacuation Zone	50	50	55	60	60
Cat 3 Surge Evacuation Zone	50	50	50	60	60
Cat 4 Surge Evacuation Zone	50	50	50	60	60
Cat 5 Surge Evacuation Zone	50	50	50	60	60
Inland of Surge Evacuation Zones	50	50	50	60	60

Out-of-county trip rate indicates the percent of evacuees from each zone who will seek refuge outside their own county of residence in each storm threat scenario.

Flagler Vehicle Use Rate (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	80	80	80	80	80
Cat 2 Surge Evacuation Zone	80	80	80	80	80
Cat 3 Surge Evacuation Zone	80	80	80	80	80
Cat 4 Surge Evacuation Zone	80	80	80	80	80
Cat 5 Surge Evacuation Zone	80	80	80	80	80
Inland of Surge Evacuation Zones	80	80	80	80	80

Vehicle use rate indicates of percentage of vehicles available to the evacuating household from each zone that will be used in evacuation in each storm threat scenario.

Flagler Public Shelter Use (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	8	8	8	8	8
Cat 2 Surge Evacuation Zone	12	12	12	12	12
Cat 3 Surge Evacuation Zone	12	12	12	12	12
Cat 4 Surge Evacuation Zone	12	12	12	12	12
Cat 5 Surge Evacuation Zone	12	12	12	12	12
Inland of Surge Evacuation Zones	15	15	15	15	15

Public shelter use rate indicates the percent of evacuees from each zone who will seek refuge in public shelters, in each storm threat scenario.

Flagler Friend/Relative Use Rate (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	60	60	60	60	60
Cat 2 Surge Evacuation Zone	60	60	60	60	60
Cat 3 Surge Evacuation Zone	60	60	60	60	60
Cat 4 Surge Evacuation Zone	60	60	60	60	60
Cat 5 Surge Evacuation Zone	60	60	60	60	60
Inland of Surge Evacuation Zones	60	60	60	60	60

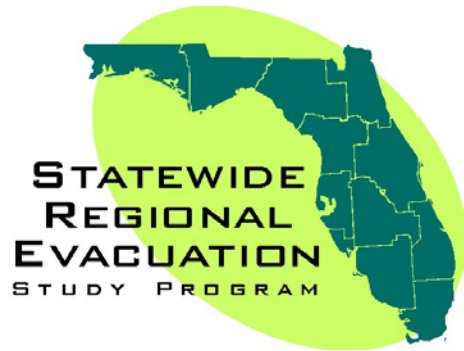
Friend/relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

Flagler Hotel/Motel Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		15	15	15	15	15
Cat 2 Surge Evacuation Zone		15	15	15	15	15
Cat 3 Surge Evacuation Zone		15	15	15	15	15
Cat 4 Surge Evacuation Zone		15	15	15	15	15
Cat 5 Surge Evacuation Zone		15	15	15	15	15
Inland of Surge Evacuation Zones		15	15	15	15	15

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

Flagler Other Refuge Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		17	17	17	17	17
Cat 2 Surge Evacuation Zone		13	13	13	13	13
Cat 3 Surge Evacuation Zone		13	13	13	13	13
Cat 4 Surge Evacuation Zone		13	13	13	13	13
Cat 5 Surge Evacuation Zone		13	13	13	13	13
Inland of Surge Evacuation Zones		10	10	10	10	10

Other refuge rate indicates the percent of evacuees from each zone who will seek refuge in locations such as churches, second homes, and workplaces, in each storm threat scenario.



APPENDIX III-E

Planning Assumptions for Nassau County

CHAPTER III

REGIONAL BEHAVIORAL ANALYSES SUMMARY

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Nassau Evacuation Rates (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		65	70	80	85	95
Cat 2 Surge Evacuation Zone		30	50	65	85	95
Cat 3 Surge Evacuation Zone		20	25	50	80	85
Cat 4 Surge Evacuation Zone		20	25	45	70	80
Cat 5 Surge Evacuation Zone		20	25	35	45	70
Inland of Surge Evacuation Zones		15	20	25	30	40

Evacuation rate indicates the percent of residents who will leave their homes to go somewhere safer from each zone in each storm threat scenario. Figures are based on the assumption that officials order evacuation for surge evacuation zones corresponding to storm category, plus all mobile homes and manufactured homes. Figures also assume that the actual storm track passes very close to the area being evacuated. Shaded cells indicate shadow evacuation – evacuation from areas not included in evacuation notices.

Nassau Out-of-county Trips (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		75	75	75	80	80
Cat 2 Surge Evacuation Zone		75	75	75	80	80
Cat 3 Surge Evacuation Zone		75	75	75	80	80
Cat 4 Surge Evacuation Zone		75	75	75	80	80
Cat 5 Surge Evacuation Zone		75	75	75	80	80
Inland of Surge Evacuation Zones		70	70	70	75	75

Out-of-county trip rate indicates the percent of evacuees from each zone who will seek refuge outside their own county of residence in each storm threat scenario.

Nassau Vehicle Use Rate (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		75	75	75	75	75
Cat 2 Surge Evacuation Zone		75	75	75	75	75
Cat 3 Surge Evacuation Zone		75	75	75	75	75
Cat 4 Surge Evacuation Zone		75	75	75	75	75
Cat 5 Surge Evacuation Zone		75	75	75	75	75
Inland of Surge Evacuation Zones		70	70	70	70	70

Vehicle use rate indicates of percentage of vehicles available to the evacuating household from each zone that will be used in evacuation in each storm threat scenario.

Nassau Public Shelter Use (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		5	5	5	5	5
Cat 2 Surge Evacuation Zone		5	5	5	5	5
Cat 3 Surge Evacuation Zone		5	5	5	5	5
Cat 4 Surge Evacuation Zone		5	5	5	5	5
Cat 5 Surge Evacuation Zone		5	5	5	5	5
Inland of Surge Evacuation Zones		5	5	5	5	5

Public shelter use rate indicates the percent of evacuees from each zone who will seek refuge in public shelters, in each storm threat scenario.

Nassau Friend/Relative Use Rate	Storm Threat Scenario				
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4
Cat 1 Surge Evacuation Zone	60	60	60	60	60
Cat 2 Surge Evacuation Zone	60	60	60	60	60
Cat 3 Surge Evacuation Zone	60	60	60	60	60
Cat 4 Surge Evacuation Zone	60	60	60	60	60
Cat 5 Surge Evacuation Zone	60	60	60	60	60
Inland of Surge Evacuation Zones	60	60	60	60	60

Friend/relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

Nassau Hotel/Motel Use Rate (%)	Storm Threat Scenario				
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4
Cat 1 Surge Evacuation Zone	25	25	25	25	25
Cat 2 Surge Evacuation Zone	25	25	25	25	25
Cat 3 Surge Evacuation Zone	25	25	25	25	25
Cat 4 Surge Evacuation Zone	25	25	25	25	25
Cat 5 Surge Evacuation Zone	25	25	25	25	25
Inland of Surge Evacuation Zones	25	25	25	25	25

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

Nassau Other Refuge Use Rate (%)	Storm Threat Scenario				
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4
Cat 1 Surge Evacuation Zone	10	10	10	10	10
Cat 2 Surge Evacuation Zone	10	10	10	10	10
Cat 3 Surge Evacuation Zone	10	10	10	10	10
Cat 4 Surge Evacuation Zone	10	10	10	10	10
Cat 5 Surge Evacuation Zone	10	10	10	10	10
Inland of Surge Evacuation Zones	10	10	10	10	10

Other refuge rate indicates the percent of evacuees from each zone who will seek refuge in locations such as churches, second homes, and workplaces, in each storm threat scenario.

Nassau Evacuation Rates (%)	Storm Threat Scenario				
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4
Cat 1 Surge Evacuation Zone	65	75	85	95	100
Cat 2 Surge Evacuation Zone	65	70	85	95	95
Cat 3 Surge Evacuation Zone	60	70	80	90	95
Cat 4 Surge Evacuation Zone	60	70	80	90	90
Cat 5 Surge Evacuation Zone	60	70	80	85	90
Inland of Surge Evacuation Zones	55	60	80	85	90

Evacuation rate indicates the percent of residents who will leave their homes to go somewhere safer from each zone in each storm threat scenario. Figures are based on the assumption that officials order evacuation for surge evacuation zones corresponding to storm category, plus all mobile homes and manufactured homes. Figures also assume that the actual storm track passes very close to the area being evacuated.

Nassau Out-of-county Trips (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	60	60	60	60	60
Cat 2 Surge Evacuation Zone	50	50	55	60	60
Cat 3 Surge Evacuation Zone	50	50	50	60	60
Cat 4 Surge Evacuation Zone	50	50	50	60	60
Cat 5 Surge Evacuation Zone	50	50	50	60	60
Inland of Surge Evacuation Zones	50	50	50	60	60

Out-of-county trip rate indicates the percent of evacuees from each zone who will seek refuge outside their own county of residence in each storm threat scenario.

Nassau Vehicle Use Rate (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	80	80	80	80	80
Cat 2 Surge Evacuation Zone	80	80	80	80	80
Cat 3 Surge Evacuation Zone	80	80	80	80	80
Cat 4 Surge Evacuation Zone	80	80	80	80	80
Cat 5 Surge Evacuation Zone	80	80	80	80	80
Inland of Surge Evacuation Zones	80	80	80	80	80

Vehicle use rate indicates of percentage of vehicles available to the evacuating household from each zone that will be used in evacuation in each storm threat scenario.

Nassau Public Shelter Use (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	8	8	8	8	8
Cat 2 Surge Evacuation Zone	12	12	12	12	12
Cat 3 Surge Evacuation Zone	12	12	12	12	12
Cat 4 Surge Evacuation Zone	12	12	12	12	12
Cat 5 Surge Evacuation Zone	12	12	12	12	12
Inland of Surge Evacuation Zones	15	15	15	15	15

Public shelter use rate indicates the percent of evacuees from each zone who will seek refuge in public shelters, in each storm threat scenario.

Nassau Friend/Relative Use Rate (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	65	65	65	65	65
Cat 2 Surge Evacuation Zone	65	65	65	65	65
Cat 3 Surge Evacuation Zone	65	65	65	65	65
Cat 4 Surge Evacuation Zone	65	65	65	65	65
Cat 5 Surge Evacuation Zone	65	65	65	65	65
Inland of Surge Evacuation Zones	65	65	65	65	65

Friend/relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

Nassau Hotel/Motel Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		15	15	15	15	15
Cat 2 Surge Evacuation Zone		15	15	15	15	15
Cat 3 Surge Evacuation Zone		15	15	15	15	15
Cat 4 Surge Evacuation Zone		15	15	15	15	15
Cat 5 Surge Evacuation Zone		15	15	15	15	15
Inland of Surge Evacuation Zones		15	15	15	15	15

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

Nassau Other Refuge Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		12	12	12	12	12
Cat 2 Surge Evacuation Zone		8	8	8	8	8
Cat 3 Surge Evacuation Zone		8	8	8	8	8
Cat 4 Surge Evacuation Zone		8	8	8	8	8
Cat 5 Surge Evacuation Zone		8	8	8	8	8
Inland of Surge Evacuation Zones		5	5	5	5	5

Other refuge rate indicates the percent of evacuees from each zone who will seek refuge in locations such as churches, second homes, and workplaces, in each storm threat scenario.



APPENDIX III-F

Planning Assumptions for Putnam County

CHAPTER III

REGIONAL BEHAVIORAL ANALYSES SUMMARY

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Putnam Evacuation Rates (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		40	50	65	80	90
Cat 2 Surge Evacuation Zone		15	45	50	75	85
Cat 3 Surge Evacuation Zone		15	20	45	70	80
Cat 4 Surge Evacuation Zone		10	10	30	65	75
Cat 5 Surge Evacuation Zone		10	10	25	35	65
Inland of Surge Evacuation Zones		10	10	20	25	35

Evacuation rate indicates the percent of residents who will leave their homes to go somewhere safer from each zone in each storm threat scenario. Figures are based on the assumption that officials order evacuation for surge evacuation zones corresponding to storm category, plus all mobile homes and manufactured homes. Figures also assume that the actual storm track passes very close to the area being evacuated. Shaded cells indicate shadow evacuation – evacuation from areas not included in evacuation notices.

Putnam Out-of-county Trips (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		60	60	60	60	60
Cat 2 Surge Evacuation Zone		60	60	60	60	60
Cat 3 Surge Evacuation Zone		60	60	60	60	60
Cat 4 Surge Evacuation Zone		60	60	60	60	60
Cat 5 Surge Evacuation Zone		60	60	60	60	60
Inland of Surge Evacuation Zones		60	60	60	60	60

Out-of-county trip rate indicates the percent of evacuees from each zone who will seek refuge outside their own county of residence in each storm threat scenario.

Putnam Vehicle Use Rate (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		70	70	70	70	70
Cat 2 Surge Evacuation Zone		70	70	70	70	70
Cat 3 Surge Evacuation Zone		70	70	70	70	70
Cat 4 Surge Evacuation Zone		70	70	70	70	70
Cat 5 Surge Evacuation Zone		70	70	70	70	70
Inland of Surge Evacuation Zones		75	75	75	75	75

Vehicle use rate indicates of percentage of vehicles available to the evacuating household from each zone that will be used in evacuation in each storm threat scenario.

Putnam Public Shelter Use (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		8	8	8	10	10
Cat 2 Surge Evacuation Zone		8	8	8	10	10
Cat 3 Surge Evacuation Zone		8	8	8	10	10
Cat 4 Surge Evacuation Zone		8	8	8	10	10
Cat 5 Surge Evacuation Zone		8	8	8	10	10
Inland of Surge Evacuation Zones		12	12	12	12	12

Public shelter use rate indicates the percent of evacuees from each zone who will seek refuge in public shelters, in each storm threat scenario.

Putnam Friend/Relative Use Rate (%)	Storm Threat Scenario				
Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	60	60	60	60	60
Cat 2 Surge Evacuation Zone	60	60	60	60	60
Cat 3 Surge Evacuation Zone	60	60	60	60	60
Cat 4 Surge Evacuation Zone	60	60	60	60	60
Cat 5 Surge Evacuation Zone	60	60	60	60	60
Inland of Surge Evacuation Zones	60	60	60	60	60

Friend/relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

Putnam Hotel/Motel Use Rate (%)	Storm Threat Scenario				
Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	20	20	20	20	20
Cat 2 Surge Evacuation Zone	20	20	20	20	20
Cat 3 Surge Evacuation Zone	20	20	20	20	20
Cat 4 Surge Evacuation Zone	20	20	20	20	20
Cat 5 Surge Evacuation Zone	20	20	20	20	20
Inland of Surge Evacuation Zones	20	20	20	20	20

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

Putnam Other Refuge Use Rate (%)	Storm Threat Scenario				
Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	12	12	12	12	12
Cat 2 Surge Evacuation Zone	12	12	12	12	12
Cat 3 Surge Evacuation Zone	12	12	12	12	12
Cat 4 Surge Evacuation Zone	12	12	12	12	12
Cat 5 Surge Evacuation Zone	12	12	12	12	12
Inland of Surge Evacuation Zones	8	8	8	8	8

Other refuge rate indicates the percent of evacuees from each zone who will seek refuge in locations such as churches, second homes, and workplaces, in each storm threat scenario.

Putnam Evacuation Rates (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	65	75	85	95	100
Cat 2 Surge Evacuation Zone	65	75	85	95	95
Cat 3 Surge Evacuation Zone	60	70	80	90	95
Cat 4 Surge Evacuation Zone	60	70	80	90	90
Cat 5 Surge Evacuation Zone	60	70	80	85	90
Inland of Surge Evacuation Zones	55	60	80	85	90

Evacuation rate indicates the percent of residents who will leave their homes to go somewhere safer from each zone in each storm threat scenario. Figures are based on the assumption that officials order evacuation for surge evacuation zones corresponding to storm category, plus all mobile homes and manufactured homes. Figures also assume that the actual storm track passes very close to the area being evacuated.

Putnam Out-of-county Trips (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		45	45	45	50	50
Cat 2 Surge Evacuation Zone		45	45	45	50	50
Cat 3 Surge Evacuation Zone		45	45	45	50	50
Cat 4 Surge Evacuation Zone		45	45	45	50	50
Cat 5 Surge Evacuation Zone		45	45	45	50	50
Inland of Surge Evacuation Zones		45	45	45	50	50

Out-of-county trip rate indicates the percent of evacuees from each zone who will seek refuge outside their own county of residence in each storm threat scenario.

Putnam Vehicle Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		75	75	75	75	75
Cat 2 Surge Evacuation Zone		75	75	75	75	75
Cat 3 Surge Evacuation Zone		75	75	75	75	75
Cat 4 Surge Evacuation Zone		75	75	75	75	75
Cat 5 Surge Evacuation Zone		75	75	75	75	75
Inland of Surge Evacuation Zones		70	70	70	70	70

Vehicle use rate indicates of percentage of vehicles available to the evacuating household from each zone that will be used in evacuation in each storm threat scenario.

Putnam Public Shelter Use (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		12	12	12	12	12
Cat 2 Surge Evacuation Zone		12	12	12	12	12
Cat 3 Surge Evacuation Zone		12	12	12	12	12
Cat 4 Surge Evacuation Zone		12	12	12	12	12
Cat 5 Surge Evacuation Zone		12	12	12	12	12
Inland of Surge Evacuation Zones		12	12	12	12	12

Public shelter use rate indicates the percent of evacuees from each zone who will seek refuge in public shelters, in each storm threat scenario.

Putnam Friend/Relative Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		60	60	60	60	60
Cat 2 Surge Evacuation Zone		60	60	60	60	60
Cat 3 Surge Evacuation Zone		60	60	60	60	60
Cat 4 Surge Evacuation Zone		60	60	60	60	60
Cat 5 Surge Evacuation Zone		60	60	60	60	60
Inland of Surge Evacuation Zones		60	60	60	60	60

Friend/relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

Putnam Hotel/Motel Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		15	15	15	15	15
Cat 2 Surge Evacuation Zone		15	15	15	15	15
Cat 3 Surge Evacuation Zone		15	15	15	15	15
Cat 4 Surge Evacuation Zone		15	15	15	15	15
Cat 5 Surge Evacuation Zone		15	15	15	15	15
Inland of Surge Evacuation Zones		15	15	15	15	15

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

Putnam Other Refuge Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		13	13	13	13	13
Cat 2 Surge Evacuation Zone		13	13	13	13	13
Cat 3 Surge Evacuation Zone		13	13	13	13	13
Cat 4 Surge Evacuation Zone		13	13	13	13	13
Cat 5 Surge Evacuation Zone		13	13	13	13	13
Inland of Surge Evacuation Zones		13	13	13	13	13

Other refuge rate indicates the percent of evacuees from each zone who will seek refuge in locations such as churches, second homes, and workplaces, in each storm threat scenario.



APPENDIX III-G

Planning Assumptions for St. Johns County

CHAPTER III

REGIONAL BEHAVIORAL ANALYSES SUMMARY

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St. Johns Evacuation Rates (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		50	60	75	85	95
Cat 2 Surge Evacuation Zone		30	50	60	85	95
Cat 3 Surge Evacuation Zone		20	20	50	80	85
Cat 4 Surge Evacuation Zone		15	20	40	70	80
Cat 5 Surge Evacuation Zone		10	15	25	40	70
Inland of Surge Evacuation Zones		10	15	20	30	40

Evacuation rate indicates the percent of residents who will leave their homes to go somewhere safer from each zone in each storm threat scenario. Figures are based on the assumption that officials order evacuation for surge evacuation zones corresponding to storm category, plus all mobile homes and manufactured homes. Figures also assume that the actual storm track passes very close to the area being evacuated. Shaded cells indicate shadow evacuation – evacuation from areas not included in evacuation notices.

St. Johns Out-of-county Trips (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		75	75	75	80	85
Cat 2 Surge Evacuation Zone		75	75	75	75	80
Cat 3 Surge Evacuation Zone		75	75	75	75	75
Cat 4 Surge Evacuation Zone		70	70	70	70	70
Cat 5 Surge Evacuation Zone		65	65	65	70	70
Inland of Surge Evacuation Zones		60	65	65	70	70

Out-of-county trip rate indicates the percent of evacuees from each zone who will seek refuge outside their own county of residence in each storm threat scenario.

St. Johns Vehicle Use Rate (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		70	70	70	70	70
Cat 2 Surge Evacuation Zone		70	70	70	70	70
Cat 3 Surge Evacuation Zone		70	70	70	70	70
Cat 4 Surge Evacuation Zone		70	70	70	70	70
Cat 5 Surge Evacuation Zone		70	70	70	70	70
Inland of Surge Evacuation Zones		70	70	70	70	70

Vehicle use rate indicates of percentage of vehicles available to the evacuating household from each zone that will be used in evacuation in each storm threat scenario.

St. Johns Public Shelter Use (%)	Storm Threat Scenario					
	Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		5	5	5	5	5
Cat 2 Surge Evacuation Zone		5	5	5	5	5
Cat 3 Surge Evacuation Zone		5	5	5	5	5
Cat 4 Surge Evacuation Zone		8	8	8	8	8
Cat 5 Surge Evacuation Zone		8	8	8	8	8
Inland of Surge Evacuation Zones		10	10	10	10	10

Public shelter use rate indicates the percent of evacuees from each zone who will seek refuge in public shelters, in each storm threat scenario.

St. Johns Friend/Relative Use Rate (%)	Storm Threat Scenario				
Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	55	55	55	55	55
Cat 2 Surge Evacuation Zone	55	55	55	55	55
Cat 3 Surge Evacuation Zone	55	55	55	55	55
Cat 4 Surge Evacuation Zone	55	55	55	55	55
Cat 5 Surge Evacuation Zone	55	55	55	55	55
Inland of Surge Evacuation Zones	55	55	55	55	55

Friend/relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

St. Johns Hotel/Motel Use Rate (%)	Storm Threat Scenario				
Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	25	25	25	25	25
Cat 2 Surge Evacuation Zone	25	25	25	25	25
Cat 3 Surge Evacuation Zone	25	25	25	25	25
Cat 4 Surge Evacuation Zone	25	25	25	25	25
Cat 5 Surge Evacuation Zone	25	25	25	25	25
Inland of Surge Evacuation Zones	20	20	20	20	20

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

St. Johns Other Refuge Use Rate (%)	Storm Threat Scenario				
Site-built Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	15	15	15	15	15
Cat 2 Surge Evacuation Zone	15	15	15	15	15
Cat 3 Surge Evacuation Zone	15	15	15	15	15
Cat 4 Surge Evacuation Zone	12	12	12	12	12
Cat 5 Surge Evacuation Zone	12	12	12	12	12
Inland of Surge Evacuation Zones	15	15	15	15	15

Other refuge rate indicates the percent of evacuees from each zone who will seek refuge in locations such as churches, second homes, and workplaces, in each storm threat scenario.

St. Johns Evacuation Rates (%)	Storm Threat Scenario				
Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone	65	75	85	95	100
Cat 2 Surge Evacuation Zone	65	70	85	95	95
Cat 3 Surge Evacuation Zone	60	70	80	90	95
Cat 4 Surge Evacuation Zone	60	70	50	90	90
Cat 5 Surge Evacuation Zone	60	70	80	85	90
Inland of Surge Evacuation Zones	55	60	80	85	90

Evacuation rate indicates the percent of residents who will leave their homes to go somewhere safer from each zone in each storm threat scenario. Figures are based on the assumption that officials order evacuation for surge evacuation zones corresponding to storm category, plus all mobile homes and manufactured homes. Figures also assume that the actual storm track passes very close to the area being evacuated.

St. Johns Out-of-county Trips (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		60	60	60	60	60
Cat 2 Surge Evacuation Zone		50	50	55	60	60
Cat 3 Surge Evacuation Zone		50	50	50	60	60
Cat 4 Surge Evacuation Zone		50	50	50	60	60
Cat 5 Surge Evacuation Zone		50	50	50	60	60
Inland of Surge Evacuation Zones		50	50	50	60	60

Out-of-county trip rate indicates the percent of evacuees from each zone who will seek refuge outside their own county of residence in each storm threat scenario.

St. Johns Vehicle Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		80	80	80	80	80
Cat 2 Surge Evacuation Zone		80	80	80	80	80
Cat 3 Surge Evacuation Zone		80	80	80	80	80
Cat 4 Surge Evacuation Zone		80	80	80	80	80
Cat 5 Surge Evacuation Zone		80	80	80	80	80
Inland of Surge Evacuation Zones		80	80	80	80	80

Vehicle use rate indicates of percentage of vehicles available to the evacuating household from each zone that will be used in evacuation in each storm threat scenario.

St. Johns Public Shelter Use (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		8	8	8	8	8
Cat 2 Surge Evacuation Zone		12	12	12	12	12
Cat 3 Surge Evacuation Zone		12	12	12	12	12
Cat 4 Surge Evacuation Zone		12	12	12	12	12
Cat 5 Surge Evacuation Zone		12	12	12	12	12
Inland of Surge Evacuation Zones		15	15	15	15	15

Public shelter use rate indicates the percent of evacuees from each zone who will seek refuge in public shelters, in each storm threat scenario.

St. Johns Friend/Relative Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		55	55	55	55	55
Cat 2 Surge Evacuation Zone		55	55	55	55	55
Cat 3 Surge Evacuation Zone		55	55	55	55	55
Cat 4 Surge Evacuation Zone		55	55	55	55	55
Cat 5 Surge Evacuation Zone		55	55	55	55	55
Inland of Surge Evacuation Zones		55	55	55	55	55

Friend/relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

St. Johns Hotel/Motel Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		20	20	20	20	20
Cat 2 Surge Evacuation Zone		20	20	20	20	20
Cat 3 Surge Evacuation Zone		20	20	20	20	20
Cat 4 Surge Evacuation Zone		20	20	20	20	20
Cat 5 Surge Evacuation Zone		20	20	20	20	20
Inland of Surge Evacuation Zones		20	20	20	20	20

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

St. Johns Other Refuge Use Rate (%)	Storm Threat Scenario					
	Mobile and Manufactured Homes	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Cat 1 Surge Evacuation Zone		17	17	17	17	17
Cat 2 Surge Evacuation Zone		13	13	13	13	13
Cat 3 Surge Evacuation Zone		13	13	13	13	13
Cat 4 Surge Evacuation Zone		13	13	13	13	13
Cat 5 Surge Evacuation Zone		13	13	13	13	13
Inland of Surge Evacuation Zones		10	10	10	10	10

Other refuge rate indicates the percent of evacuees from each zone who will seek refuge in locations such as churches, second homes, and workplaces, in each storm threat scenario.