2011 SOUTH CAROLINA HURRICANE EVACUATION BEHAVIORAL STUDY

FINAL REPORT

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I. INTRODUCTION

The state of South Carolina is presently updating its 2000 Hurricane Evacuation Study (HES) to account for broad demographic changes in the coastal and near-coastal counties. These changes influence evacuation-timing scenarios, routes, and published maps, which are out of date at present. Updating existing evacuation plans requires a behavioral study of coastal residents to provide quantitative data on mass behavior during hurricane threats. Such data are useful for shelter planning, transportation modeling, guidance for evacuation decision making, and public awareness efforts by federal, state, and local agencies. The United States Army Corps of Engineers (USACE) and the South Carolina Emergency Management Division (SCEMD) contracted with the Hazard and Vulnerability Research Institute at the University of South Carolina to provide the social science hazards expertise to develop, administer, and analyze coastal residents' experience, past behavior, and intended behavior in response to a hurricane event. The results of the study provide the basis for the behavioral element in the SC Hurricane Evacuation Study.

II. METHODOLOGY

The goal of the project was to gather and analyze information from South Carolina coastal residents on their past and potential evacuation behavior in response to a hurricane. The target population was located in counties in the three Coastal Hurricane Conglomerates used for planning and response: Northern (Horry and Georgetown); Central (Charleston, Berkeley, and Dorchester) and Southern (Beaufort, Colleton, and Jasper). In a departure from previous hurricane behavioral studies, we used a mailed questionnaire rather than phone interviews. This provided two advantages: 1) a more detailed questionnaire; and 2) more specific geo-referencing of respondents. A significant contribution of this study is the geo-referencing of the responses into storm surge evacuation zones—minor hurricanes (Category 1 and 2 together, Category 2 separate[1]), major hurricanes (Category 3, 4, and 5 together), and a shadow evacuation zone (where there is no risk of storm surge, but where residents might also heed evacuation warnings).

A. QUESTIONNAIRE

The survey instrument utilizes a combination of descriptive and exploratory questioning to gain an understanding of evacuation intentions and behavior, as well as those personal and demographic factors influencing decision making (e.g. personal safety, information sources, life orientation, risk perception, age, socioeconomic status). The survey is a combination of multiple choice, Likert-scale rating (degree of agreement/disagreement style questions), and open

[1] South Carolina's coastline contains areas, notably back bays, where surge models project inundation from Category 2 storms, but not from Category 1. Since behavior in the Category 2 zone may differ from the combined Category 1 and 2 zones, we report these findings separately.

response questions. The open response questions elicit the source of preparedness information, factors encouraging or discouraging evacuation, and the major transportation routes used. This approach is slightly different from other evacuation surveys as it aims to reduce bias and allow the survey taker to produce their own responses. Other hurricane evacuation studies tend to offer a range of options from which a respondent can choose, which may inadvertently influence their responses. We developed the survey in conjunction with USACE, SCEMD, and county emergency managers, all of whom contributed content. It was submitted to the US Office of Management and Budget (OMB) for approval (and was approved with minor changes) and then submitted to the University of South Carolina's Institutional Review Board (IRB) for approval as well.

The survey instrument (see Appendix A) contains questions that fall into eight broad categories: demographics, hurricane preparedness, evacuation behavior, evacuation history, evacuation intentions, home and personal safety, information sources, and personal risk assessment.

B. SAMPLING PLAN

The sample population size was determined by applying a population-weighted multi-level stratification to South Carolina's coastal counties in all of the Coastal Hurricane Conglomerates and surge evacuation zones. This required a stratified sample from seven different geographic representations of the study area (North, Central, and South Conglomerates and Category 1-2, Category 2, Category 3-5, and Shadow evacuation zones) in order to maintain statistical confidence in the survey results. The shadow zone includes households within five linear miles of the current South Carolina Evacuation Zones (Figure 1). The figure shows, for example, in Colleton County substantial areas should evacuate during Category 1 and 2 storms while Horry County contains some areas that only need to evacuate during a Category 5 storm. To reach our targeted sample size (with a 3% confidence interval, and assuming a 25% return rate, or 3902 surveys), we mailed 15,608 surveys to a randomly selected set of addresses within each evacuation zone within the eight coastal counties. We used a commercial product, *Info USA Group,* to derive our random sample of addresses for the mailed questionnaire.

The sampling methodology employed a modified Dillman (1978) method. In this case the survey, including cover letter, questionnaire, and postage-paid return envelope were mailed to the sample population, followed two weeks later by a reminder postcard, and followed one week later by a second mail survey (cover letter, questionnaire, and return envelope). The cover letter included information about the study and confidentiality. While address data were generated in geographic information systems (GIS)-compatible formats, responses were subsequently aggregated to the block or block group levels to maintain confidentiality.

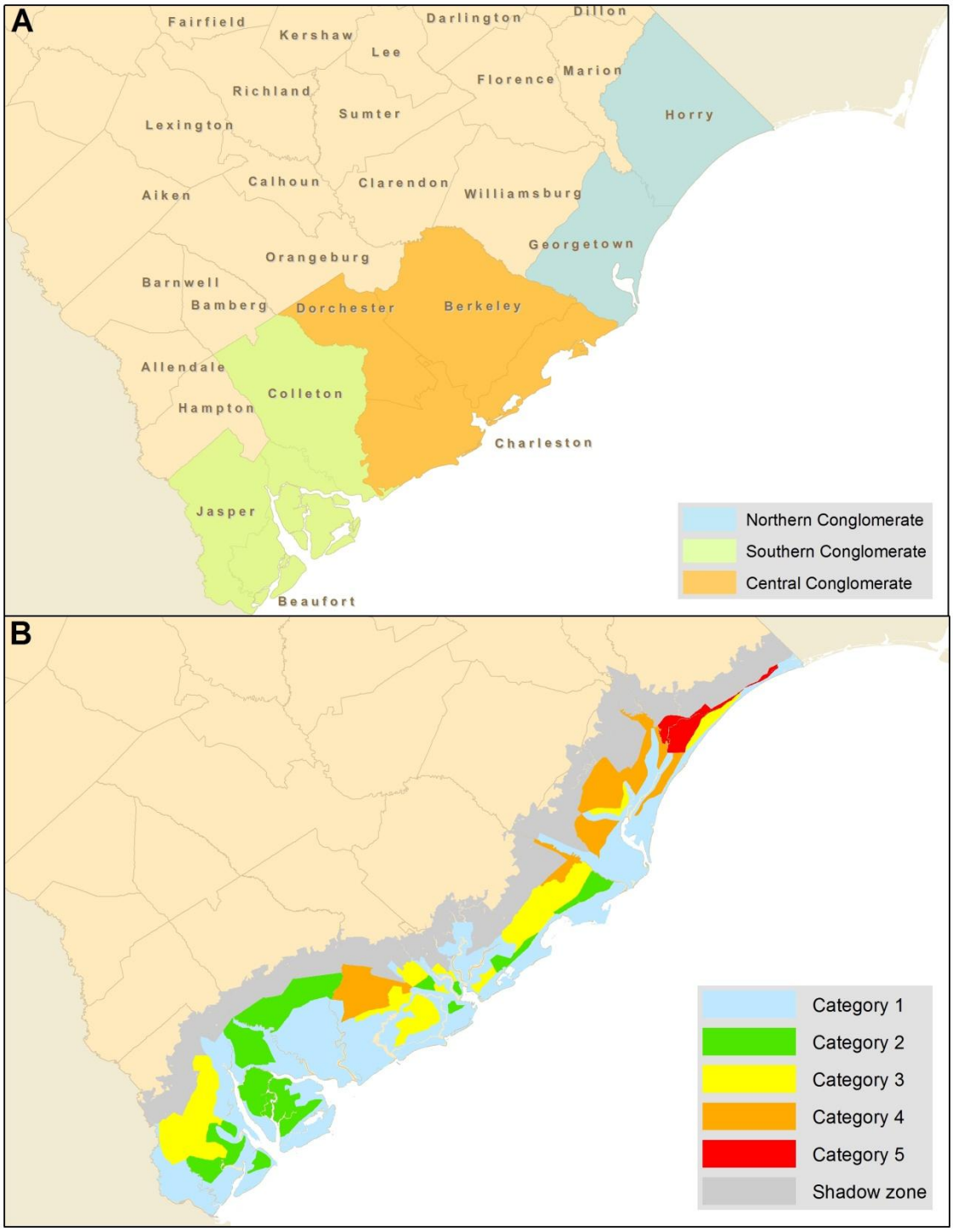

Figure 1. A) Emergency Management Conglomerates, B). Hurricane Evacuation Zones.

The eight-county study area is divided into evacuation zones based on a storm's Saffir-Simpson size/strength rating. For example, Beaufort County (lower left) contains Category 1, 2, and 3 evacuation zones. In the light blue (category 1 zones) residents would evacuate for every category storm whereas in the yellow areas (category 3 zones) residents would be prompted to evacuate for a category 3 or stronger hurricane. The Shadow zone is a 5-mile buffer around the current evacuation zones and represents another source of potential evacuees. The five-mile buffer was based on population density and distance from the coast.

C. OVERALL ACCURACY AND CONFIDENCE IN SURVEY RESULTS

The initial round of surveys was mailed the week of March 7, 2011. The Hazards and Vulnerability Research Institute received 3,272 questionnaires by the cut-off date of May 31, 2011. Most surveys were returned by the end of March, with a secondary return "bump" in mid-late April following the reminder postcards and the secondary survey mailing. A total of 54 surveys were returned after the May 31, 2011 cut-off and are not included in this report. Although less than our target size, the sample return rate (21%) provides sufficient statistical confidence to allow generalizations to Conglomerates and surge inundation zones.

The statistical confidence in the sample responses (Table 1) provides the breakdown by county, surge zone, and regional Conglomerate. For each, the number of mailed surveys, the number returned surveys, the percent return rate, and the confidence interval are listed. The margin of error of our responses is +/- 1.7% for the entire study area. In examining the results by surge zone, we are confident that the reported hurricane evacuation behaviors of the respondents can be extrapolated to the general population in each evacuation zone with an error margin of between +/- 2.71 to 4.52%. For the regional Conglomerates, the statistical validity is about the same (+/- 2.92 to 3.03%). Our confidence in the individual county responses is less than for the overall sample and range from the best of +/-3.12 and 3.22% (Beaufort and Horry, respectively) to a low of +/-12.49 and 13.42% (Jasper and Colleton, respectively). For this reason we only report out the results by Conglomerate region.

Table 1. Confidence Levels and Return Rates by Region, Storm Surge Zone, and County

Classification	Targeted Number of Surveys	Number of Returned Surveys	Return Rate	Confidence Interval (based on 95% level)
South Carolina Study Region	15608	3272	21.0%	+/- 1.71%
By Conglomerate Region				
Northern	5058	1117	22.1%	+/- 2.92%
Central	6136	1120	18.3%	+/- 2.92%
Southern	4414	1035	23.4%	+/- 3.03%
By Storm Surge Evacuation Zone				
Category 1-2	2760	669	24.2%	+/- 3.78%
Category 2	1917	462	24.1%	+/- 4.52%
Category 3-5	5610	1208	21.5%	+/- 2.71%
Shadow Zone	5321	933	17.5%	+/- 3.19%
By Individual County				
Beaufort	3528	921	25.3%	+/- 3.21%
Berkeley	1356	221	16.2%	+/- 6.57%
Charleston	3651	674	18.0%	+/- 3.76%
Colleton	436	53	11.7%	+/- 13.42%
Dorchester	1129	225	19.9%	+/- 6.50%
Georgetown	1075	204	18.6%	+/- 6.83%
Horry	3983	913	22.6%	+/- 3.22%
Jasper	450	61	11.3%	+/- 12.49%

D. DEMOGRAPHIC COMPARISONS

To compare the sample with the demographic characteristics of the region we used data from the U.S. Census' American Community Survey and supplemented with the 2010 Census where possible (Table 2).

Table 2. Demographic Comparisons, Coastal Population versus Survey Sample

Demographic Characteristic	Coastal South Carolina*	Sample
Highest Level of Education		
Grade School	1.5%	0.7%
Some High School	13.4%	5.6%
High School Graduate	15.9%	22.6%
Some College or Vocational	20.3%	11.8%
College Graduate	22.0%	29.7%
Graduate Degree	7.5%	29.6%
Gender		
Male	49.5%	50.7
Female	50.5%	49.3
Age		
18-30	24.5%	2.0%
31-45	28.6%	10.4%
46-60	27.6%	26.6%
Over 60	24.9%	61.0%
Household Income**		
$22,000 or less	27.4%	11.2%
$22,000-$43,999	23.0%	22.9%
$44,000-$65,999	13.8%	21.8%
$66,000-$87,999	9.8%	14.2%
$88,000 or more	25.9%	29.9%
Race		
White	64.7%	87.8%
African-American	29.7%	9.4%
Other	5.6%	2.8%
Housing Tenure		
Owner occupied	71.1%	92.1%
Renter	30.1%	7.9%
Household has children under 12	33.0%	17.6%
Household has person over 65	26.7%	55.8%
Households without private vehicle	7.2%	1.8%
Households with internet	n/a	87.1%
Households with cell phones	n/a	89.1%
Households with land lines	93.4%	84.4%
Households registered with government alert or notification system	n/a	10.6%

*Derived from the US Census American Community Survey; ** Census categories are slightly different <$24,999, $25,000-$44,999, $45,000-$59,999, $60,000-$74,999, >$75,000 but still comparable.

Compared to the overall South Carolina coastal population, the survey sample is more educated, wealthy, older, white, and owns their residences. The sample contains comparatively fewer African Americans than the region. Finally, the number of respondents owning their homes is higher than what is normally the case for the coastal region as a whole. Because this survey methodology used geographic stratification, the primary concern was to ensure the

statistical representativeness of the opinions by location rather than insuring the representativeness of the demographic characteristics of the respondents in the sample to the region.

Given the advancements in communication media over the past decade, it comes as no surprise that the internet and cell phones are becoming more pervasive. Yet, the majority of households still have both a cell phone and landline. The significance of cell phone usage is in warning communication as only 11% of the respondents with a cell phones responded that they registered with ReachSC (the South Carolina alert and notification system).

III. FINDINGS

The findings describe various aspects of the behavior of South Carolina coastal residents related to hurricane evacuation. These include prior experience, assessment of risk, preparedness, evacuation decision-making, the evacuation itself, and recovery. We report findings for the entire coast, by regional Conglomerate, and by storm surge zone and use tables and figures to convey the information. Reference to the specific item on the survey instrument (e.g. Q13) enables comparison with the questionnaire itself (Appendix 1). Lastly, we include limited references to some of the research literature that supports the importance of some of the factors influencing evacuation behavior. These are neither inclusive nor exhaustive.

A. PRIOR EXPERIENCE

One of the most significant predictors of evacuation behavior is the household's prior experience with hurricanes and/or evacuations from hurricanes, which influences behavior positively (Dash and Gladwin 2007; Adeola 2008; Solis et al. 2010) and negatively (Arlikatti et al. 2006). **Seventy-five percent of the respondents indicated previous experience with a hurricane** (Q35)**.** There was some variation by region with more experience in the Central Conglomerate (84%) — probably due to Hurricanes Hugo and Floyd — than in the other two regions. The lowest levels of experience are in the Southern Conglomerate (64%).

We also specifically asked about participation in a hurricane evacuation (Q36). **Prior evacuation experience in the study area is divided with 51% saying they have not evacuated before, and 48% replying they had.** These differences are not statistically significant. Within the regions there are distinct differences in prior evacuation experience (53% in the Southern, 51% in the Central, and only 41% in the Northern) responding yes they had. **As expected, location by storm surge inundation zone is related to previous evacuation experience.** Residents in Category 1 and 2 (58%) and Category 2 (55%) surge zones have participated in an evacuation more than those who live outside this zone (47%). Interestingly, (41%) of residents living outside designated storm surge areas (shadow evacuation zone) have also evacuated before.

B. RISK ASSESSMENT

A common motivation of protective behaviors in the face of hurricanes is the individual perception and assessment of risk (Kim and Kang 2010; Burnside et al. 2002; Lindell et al. 2005; Peacock et al. 2005). For example, fear of losing one's life or endangering one's family by

staying promotes evacuation behavior. When asked, "How concerned are you about the threat of a hurricane?" **the majority of our survey respondents (52%) said they were somewhat to very concerned, but a significant percentage (35%) was ambivalent or neutral in their opinions**. As expected, there was more concern registered by survey respondents in Category 1 and 2 zones (56% somewhat or very concerned). However, one interesting finding was that residents in the shadow evacuation zone also had high levels of concern (53% somewhat or very concerned).

Another question probed individual risk perception and asked survey respondents how much they agreed or disagreed with the following statement: "I am afraid of hurricanes". **Overall, nearly half of respondents reported some fear of hurricanes** with 26% strongly agreeing and another 23% somewhat in agreement with the statement. Of note are the consistent reports of fear of hurricanes in each surge zone (44-50%). By region, there was also strong agreement with the statement with the Central Conglomerate (52%), showing largest agreement, with the remaining two regions at 47% concurrence.

Knowledge about the location of one's residence in relation to hurricane surge zones and FEMA-designated flood zones is an important component of individual risk perception. Similarly, the perceived likelihood of damages from wind, water, or both also influences the intent to evacuate.

Of the 2,270 **survey respondents who live in a storm surge zone, two-thirds recognize that they live in this evacuation zone** (Q12). However, 9% believed they did not live in a storm surge zone, and 27% were not sure. Residents in a Category 1-2 zone are the most knowledgeable (76% correctly answer), followed by Category 2 (76%), and Category 3-5 residents (51.9%). The most common response by shadow zone residents was that they were unsure (45.6%). **What is significant, however, is the relatively large percentage of survey respondents who don't know if they live in a surge zone** (20% in Category 1-2; 19% in Category 2; 34.7% in Category 3-5). This suggests needed education outreach for citizen awareness in the region. Respondent perceptions within specific Coastal Hurricane Conglomerates are especially noteworthy. Between 5-17% of respondents within the Northern Conglomerate and between 5-13% in the Central Conglomerate believe that they do not live in an evacuation zone when in fact they do. The percentages of people who do not know are quite high in both regions (26-42% in the Central Conglomerate, and 22-37% in the Northern. Residents in the Southern Conglomerate are more knowledgeable of their location relative to surge zones (2-7% claiming they do not live in one when they do; and between 13-23% not knowing). **Nearly 40% of the survey respondents claimed they did not live in a FEMA-designated flood zone** (Q13) (Table 3).

Table 3. Knowledge of Location Relative to Region and Hazard Zones

Region	Located in a Surge Zone			Located in FEMA-Flood Zone		
	Yes	No	Unknown	Yes	No	Unknown
Entire Study Area	52.6	14.9	32.6	29.8	39.0	32.3
Northern	42.2	21.6	36.2	13.9	49.5	36.6
Central	42.9	16.3	40.9	27.1	40.8	32.1
Southern	74.1	6.1	19.7	49.9	25.6	24.6

Assessments of the likelihood of damage to homes from hurricanes are varied (Q2, Q3) (Table 4). **More than half the respondents reported that damage to homes from hurricanes was somewhat to very likely with the exception of residents in the Northern Conglomerate, Category 3-5 zone, and the shadow evacuation zones who reported lower estimates of the likelihood** (43.9%, 48.3%, and 45.7% respectively) (Table 4). Residents felt wind or tree damage was more likely than water or flooding damage, with 44% suggesting that water damage to their homes was unlikely. Residents in the Southern Conglomerate felt wind damage was likely (56.2%) more than their Central (53.8%), or Northern (43.3%) counterparts. However, when examining the responses by surge evacuation zone, we found that respondents in the Category 1 and 2 zones (45%) and in the Category 2 only zone (41%) felt serious damage from flooding and surge was somewhat or very likely. There is regional variation in responses with residents in the Southern Conglomerate assuming a greater likelihood of water-related damages (41%) than those in the Central or Northern areas (24%).

Table 4. Knowledge of Damage Relative to Area and Hazard Zones

Conglomerate/ Zone	Home would be damaged in a hurricane (Q4*)		Home would be seriously damaged by winds or tree damage (Q2)		Home would be seriously damaged by hurricane-related floods or surge (Q3)	
	Likely	Unlikely	Likely	Unlikely	Likely	Unlikely
Study area	53.1%	15.2%	51.0%	14.5%	29.8%	44.3%
Northern	43.9%	19.4%	43.3%	19.3%	24.1%	51.2%
Central	54.3%	13.6%	53.8%	12.2%	24.9%	49.1%
Southern	61.8%	12.4%	56.2%	11.7%	41.1%	31.8%
Category 1-2 zone	64.8%	9.3%	61.6%	5.0%	45.4%	28.8%
Category 2 zone	63.8%	10.1%	56.7%	8.5%	41.2%	29.4%
Category 3-5 zone	48.3%	18.2%	46.7%	17.0%	27.3%	44.8%
Shadow zone	45.7%	18.2%	46.1%	17.4%	16.0%	62.2%

* scale reversed on the question.

C. PREPAREDNESS

Throughout the entire study area, respondents reported being well–prepared for hurricanes. **Most coastal residents have discussed evacuation plans as a family** (Q9) (76% responding yes). However, there is a relationship between family planning for evacuation and proximity to the hazard zone. Specifically, less than 70% of households within the shadow zone have made family evacuation plans a priority (Figure 2). Other preparedness measures include supplies. In the entire sample, **nearly 75 percent claimed they had enough supplies to sustain their household for three days or more** (Q11)**.** More than 34% reported that they had supplies

to last their household five days or more. Surprisingly, 81% of respondents in the shadow evacuation zone stated that they had supplies to last three days or more.

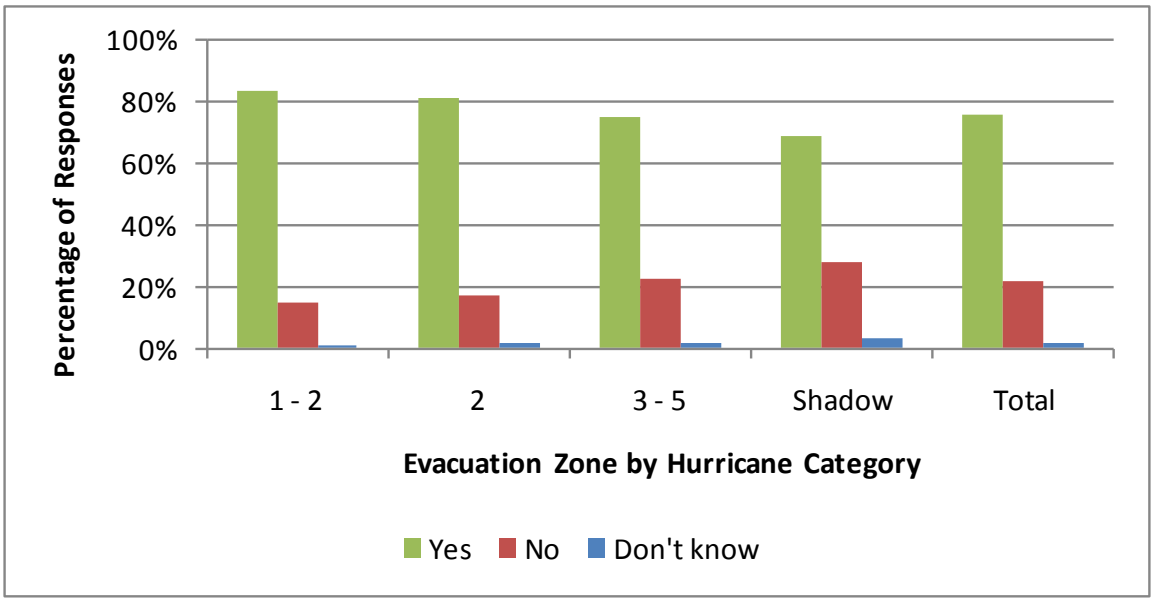

Figure 2. Family Discussions on Evacuation Plans

Respondents' choices for hurricane preparation activities (Q10) varied, with most households creating a disaster supply kit (74%) and preparing or reviewing a hurricane evacuation plan (53%). Having materials on hand to secure the household in the event of a hurricane was also a common activity (46%). Residents called local agencies for information about hurricane preparedness (13% in the entire sample) in small numbers. Responses across Coastal Hurricane Conglomerates were similar to the larger sample.

D. EVACUATION DECISION-MAKING

There are many factors influencing household decisions to prepare for and respond to hurricanes. These include the characteristics of the storm, sources of warning information, and the actions of friends and neighbors, among others.

Respondents were asked three separate questions about warning information. The first question (Q14) was "which state or local government agencies would you rely on for preparedness information prior to hurricane season?" Generally, households across the study area look first toward their county-level emergency management officials for information pertaining to preparedness, followed by municipal agencies. However, in the shadow zone a different trend is apparent. Here residents use information delivered from media outlets, followed by county emergency management agencies. **These results indicate that local populations tend to rely less on state or federal emergency management partners, law enforcement, or the Red Cross as sources for preparedness information.** However, these agencies often prepare the information and give it to county and municipal agencies for distribution.

The remaining two questions addressed sources of information prior to (Q15), during, and after (Q16) a hurricane. **More than 90% of households within the coastal study area utilize**

local television for evacuation notices, storm updates prior to a hurricane's landfall, and updates during and after a hurricane. The Weather Channel is second on the list of information sources for coastal residents. This pattern varies little by Conglomerate (Figure 3).

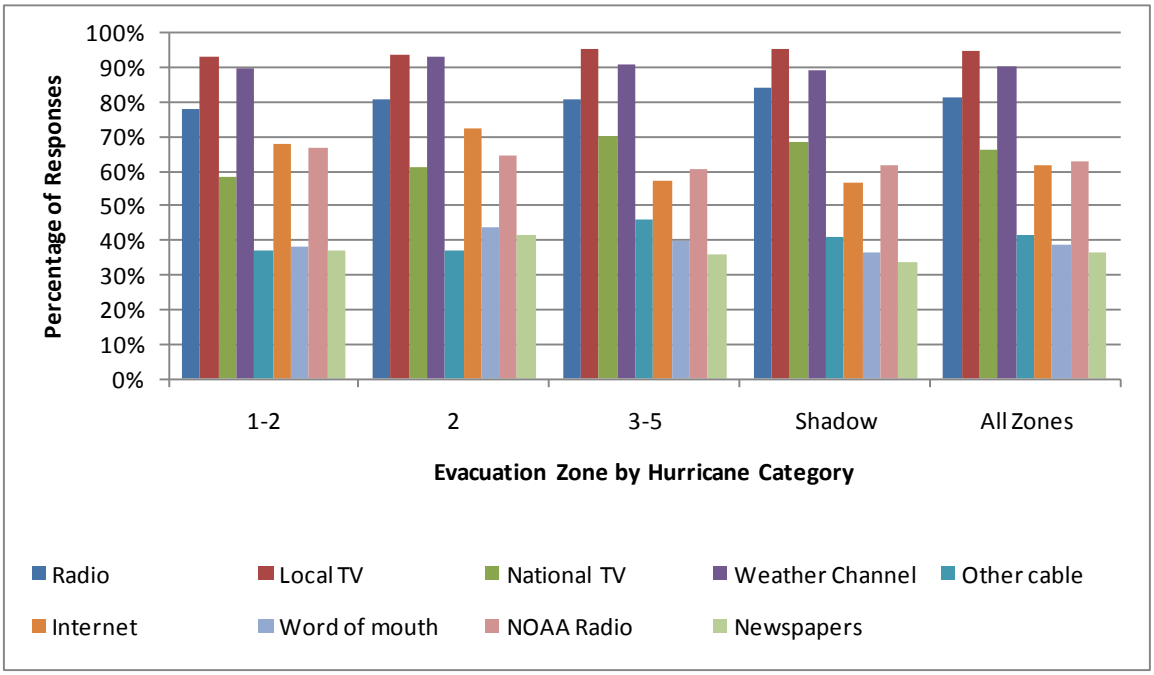

Figure 3. Sources of Information for Evacuation Notices and Storm Updates before Landfall

The actions of friends and neighbors also influence evacuation decision-making (Dow and Cutter 2000, 2002). Residents were asked how strongly they agreed with the following statement, "I would be more likely to evacuate if I saw my neighbors leaving" (Q6a). Thirty percent of the residents strongly agreed with the statement, and another 22% somewhat agreed. There was no difference by Conglomerate or storm surge zone, with slightly more than half the respondents somewhat or strongly agreeing.

The other social influence is the consultation with others (especially family and friends outside the household, generally referred to as "milling" in the literature (Mileti and Darlington 1997). This consultation (in addition to the actions of neighbors) often plays a significant role in the decision to stay or leave. In our study (Q6d), a slight majority indicated they would consult others (44%), but a minority said they would not (35%). Residents in Category 3-5 and the shadow evacuation zones are more likely to consult others (47-48% somewhat or strongly agreeing with the statement). Residents in the Southern Conglomerate are the least likely to consult with others (43% somewhat to strongly disagree with the statement).

Social influences appear to partially influence the decision to stay or evacuate for coastal residents. Other factors assume more importance in the decision making. Residents volunteered in an open-ended format those factors that would encourage or discourage their evacuation (Q17). Overwhelmingly, the most influential factor in deciding to evacuate is the strength or category of the hurricane (32%) (Figure 4). In addition to the hurricane's strength,

residents also mentioned the direction of the hurricane track (10%) and advice from officials (12%) as the top three factors encouraging their evacuation. There is little variation by storm surge zone or Conglomerate.

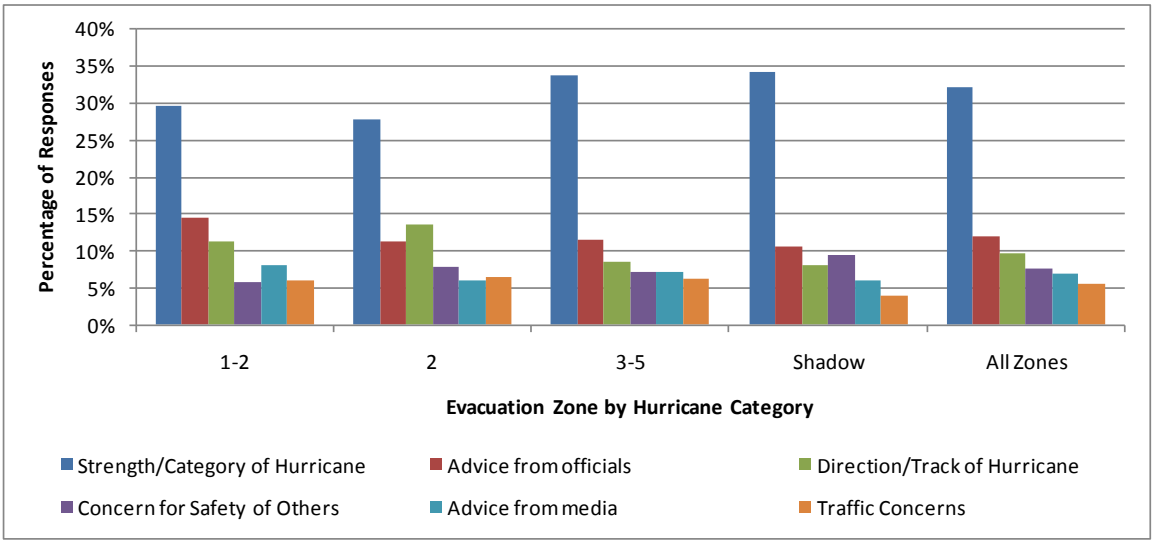

Figure 4. Top Factors Encouraging Evacuation Ahead of a Hurricane

The primary reasons for not evacuating (Q18) include the strength of the storm (24%) and storm path/direction (8%), traffic (10%), and concern for property (4%). These factors are consistent across Conglomerates and within surge zone categories.

In some of the previous evacuation studies one of the factors influencing non-evacuation was the inability to return to the area quickly once the storm passed. We asked, "Would you still evacuate for a hurricane knowing that you would be unable to return until three days later, one week later, or two weeks later?" (Q19). **With a shorter evacuation period (three days), there is a higher degree of willingness to evacuate.** However, as the evacuation period extends to a week, and then two weeks, the willingness drops off considerably (Table 5).

Table 5. Willingness to Evacuate Knowing You Would be Unable to Return Until…

	3 Days Later		One Week Later		Two Weeks Later	
	% Yes	% No	% Yes	% No	% Yes	% No
Statewide	74.0	8.0	54.9	16.5	45.2	20.8
Conglomerates						
Northern	65.0	11.8	36.3	22.4	34.3	26.7
Central	74.4	8.2	53.6	18.6	40.0	24.0
Southern	83.3	4.7	70.7	8.1	61.9	11.2
Surge Inundation Zone						
Category 1-2	81.7	4.6	67.6	9.6	59.0	12.9
Category 2	82.5	5.6	66.4	11.2	54.9	15.9
Category 3-5	69.7	10.2	50.9	19.4	41.5	23.3
Shadow	69.6	10.0	45.0	20.6	34.5	26.0

E. EVACUATION INTENTIONS

A primary purpose of the survey was to provide information on the intent of residents to evacuate in advance of a hurricane. We describe these in terms of the strength of the storm, the influence of hurricane watches and warnings, and the influence of voluntary versus mandatory evacuation orders on the intent to evacuate. The last part of this section examines the relative differences in evacuation intent by region and surge zone.

1. BY HURRICANE CATEGORY

Research has shown that storm-specific attributes (e.g. wind speeds, storm surge, flooding) are key influences on evacuation behavior (Baker 1991, 2009; Smith and McCarty 2009; FEMA and USACE 2005a, b; NHSP 2006). To examine this, we developed two hypothetical scenarios and asked respondents about their likelihood of evacuation.

For the whole region, **76.6% of respondents stated their intention (very to somewhat likely) to evacuate for a major hurricane** (Category 3 or higher) (Q7). The largest stated intention for evacuation is in the Southern Conglomerate (85.7% either very likely or somewhat likely) with smaller rates in the Central (74.2%) and Northern (70.7%) Conglomerates (Figure 5 top). Interestingly, residents living in the shadow evacuation zone also were likely to leave (68.6%) as well, with more than 42.3% saying they were very likely to leave.

The **evacuation intent is just the opposite with a weaker hurricane** (Q8) (Figure 5 bottom). Here only **21% of respondents indicated they were very or somewhat likely to leave** their homes. There was some geographic variation, however, with residents in the Southern Conglomerate expressing more willingness to leave (32%) than their counterparts in the Central

(18%) and Northern Conglomerates (12%). Residents in CAT 1-2 zones are more likely to leave than those in CAT 3-5 or in the shadow zone.

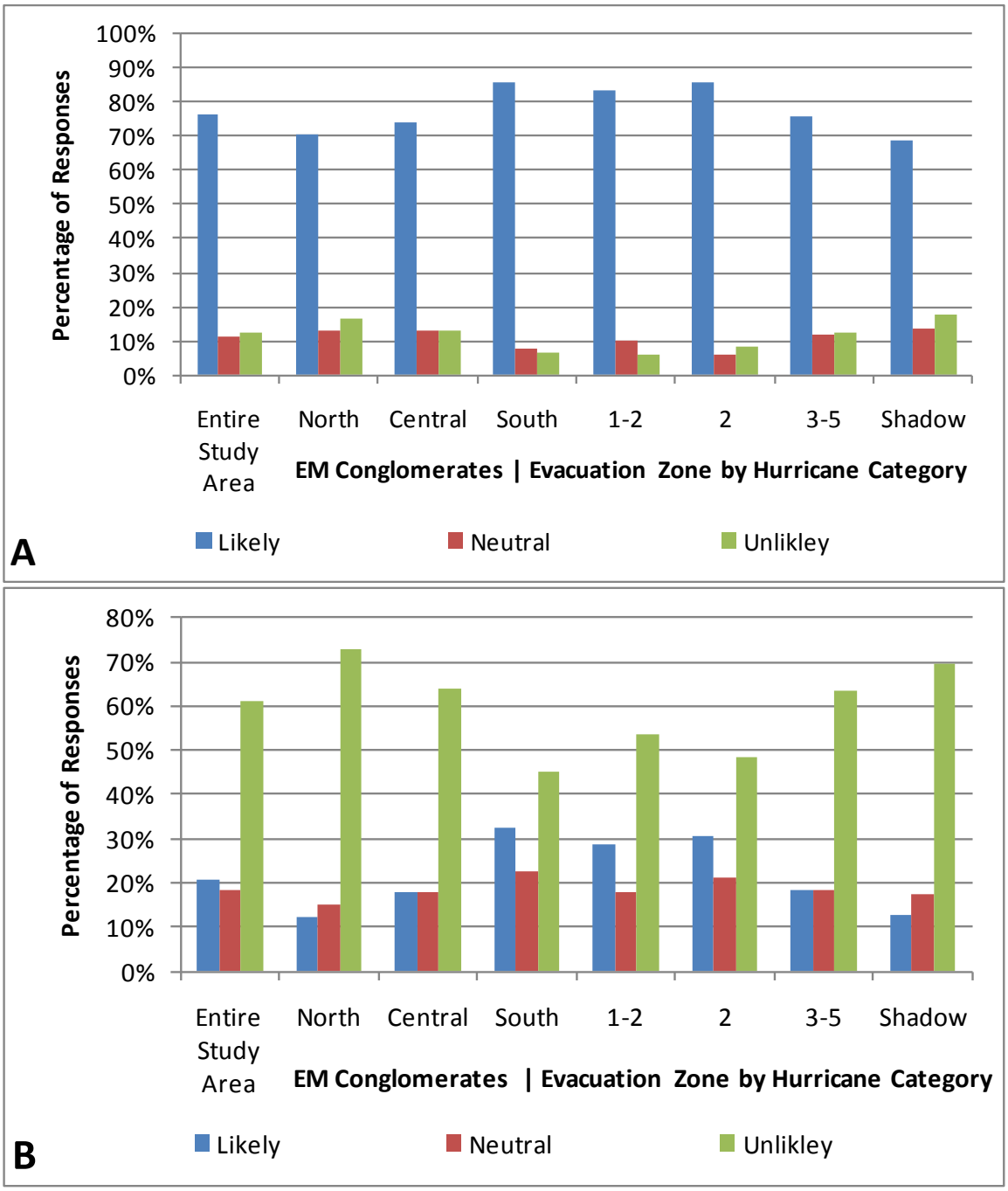

Figure 5. Likelihood of Evacuation for a Major Hurricane (Category 3 or higher) (A) and for a Minor Hurricane (Category 1-2); (B) by Conglomerate and Surge Zone

2. WATCHES OR WARNINGS

Residents are more likely to heed hurricane warnings (Q7b, Q8b) than watches (Q7a, Q7b) in their evacuation decision making, irrespective of the storm category. **More significantly, more than half the respondents replied that it was unlikely that they would leave their homes for either a hurricane watch or warning for a weaker hurricane (CAT 1 or CAT 2).** Regionally, a significant majority of residents are unlikely to evacuate in response to a hurricane warning (60% in Southern, 74% in Central, 81% in Northern) for a weaker hurricane. With a major hurricane, there is more likelihood of evacuation, but still roughly one-quarter of the residents say it is unlikely to prompt them to evacuate.

3. RECOMMENDED OR ORDERED

For an official hurricane advisory recommendation or a mandatory evacuation order 75-90% of the population will likely evacuate for a major hurricane (Q7c, Q7d) (Figure 6). Mandatory orders are more effective. For minor hurricanes (Q8c, Q8d), the likelihood is much less with 75% of residents likely to evacuate with a mandatory order, but only 50% with a recommendation (Figure 7).

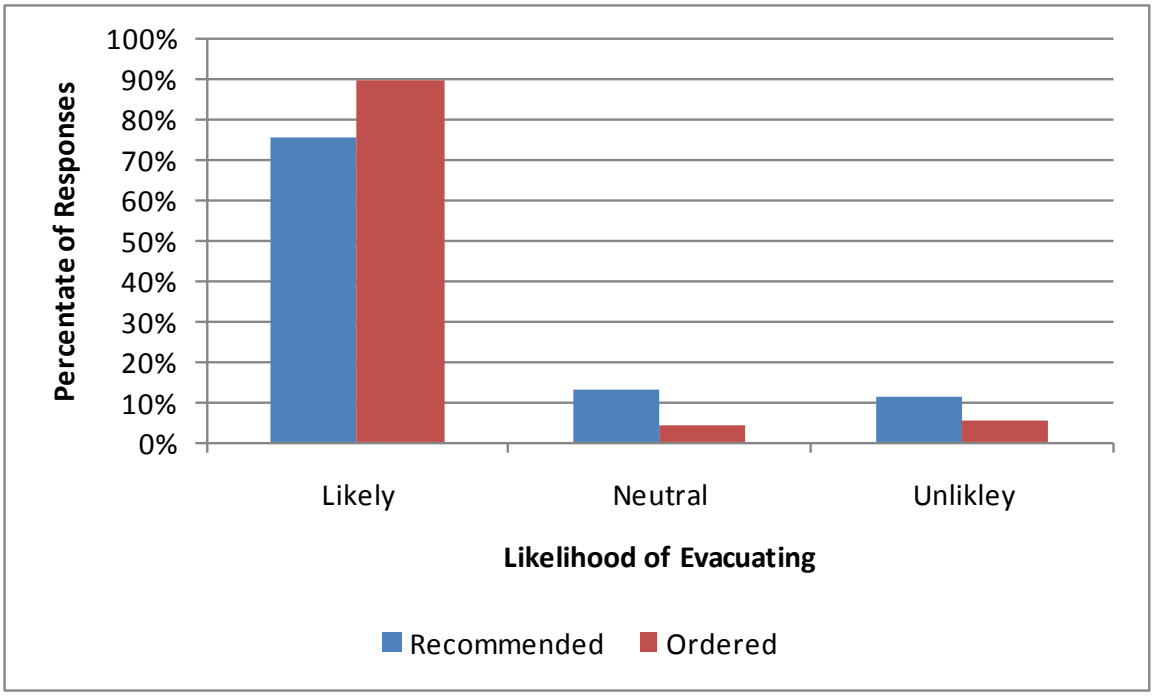

Figure 6. Major Hurricane and Likelihood of Leaving if Recommended or Ordered

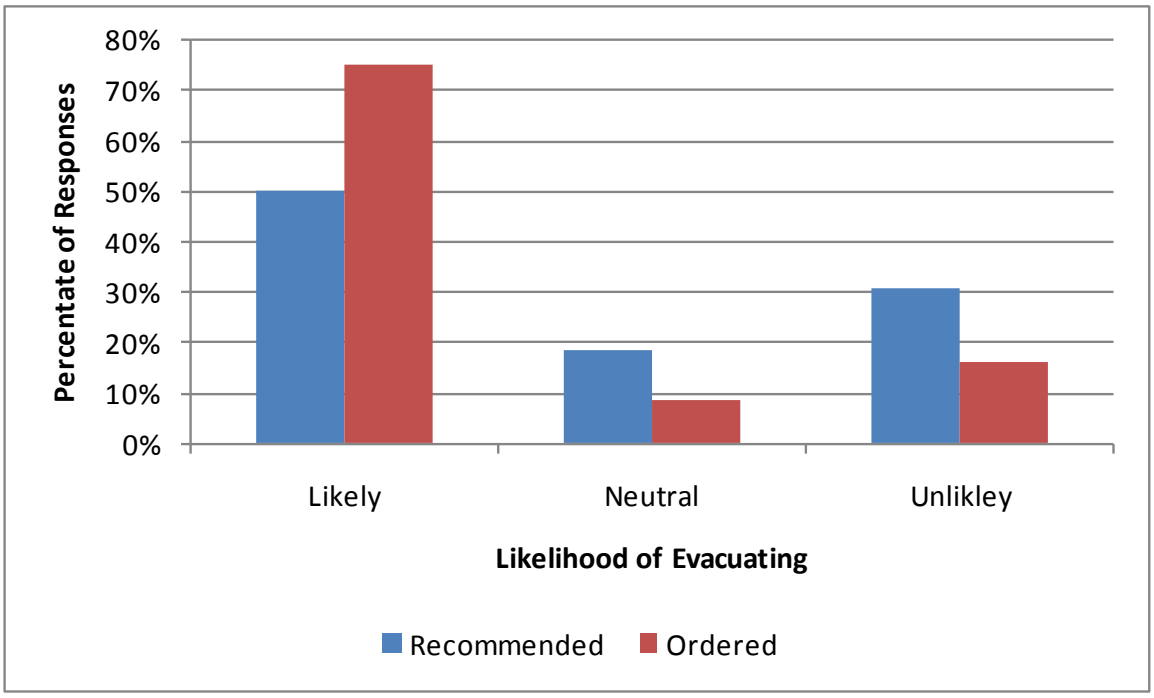

Figure 7. Minor Hurricane and Likelihood of Leaving if Recommended or Ordered

There is significant regional variation with greater likelihoods of evacuation based on mandatory orders versus recommended evacuations in the Southern Conglomerate; these potential actions decrease as one moves northward along the coast (Table 6).

Table 6. Role of Evacuation Orders/Advisories and Intent to Evacuate by Region

	Major Hurricane (CAT 3+)		Minor Hurricane (CAT 1 or CAT 2)	
	Evacuation Ordered	Evacuation Recommended	Evacuation Ordered	Evacuation Recommended
State	90.0	75.7	75.2	50.4
Northern	87.0	69.2	67.8	40.5
Central	90.3	76.8	74.7	49.6
Southern	93.1	81.5	83.6	62.0

The likelihood of evacuation relates to location in the surge zone. For example, residents in Category 1-2 surge zones are more likely to evacuate than those in a designated Cat 3-5 area or in the shadow zone (Figure 8). In the case of a major hurricane, the use of a mandatory order only slightly increases the likelihood. There is significantly less likelihood of evacuation under conditions of a minor hurricane with 13-31% of the respondents saying they would likely evacuate. However, with the implementation of a mandatory evacuation order for a Category 1 or 2 hurricane, the likely intent to evacuate increases significantly for all surge zone locations.

This suggests that the use of mandatory evacuation orders for less than Category 2 hurricanes will significantly improve the likelihood of citizens evacuating, regardless of their location.

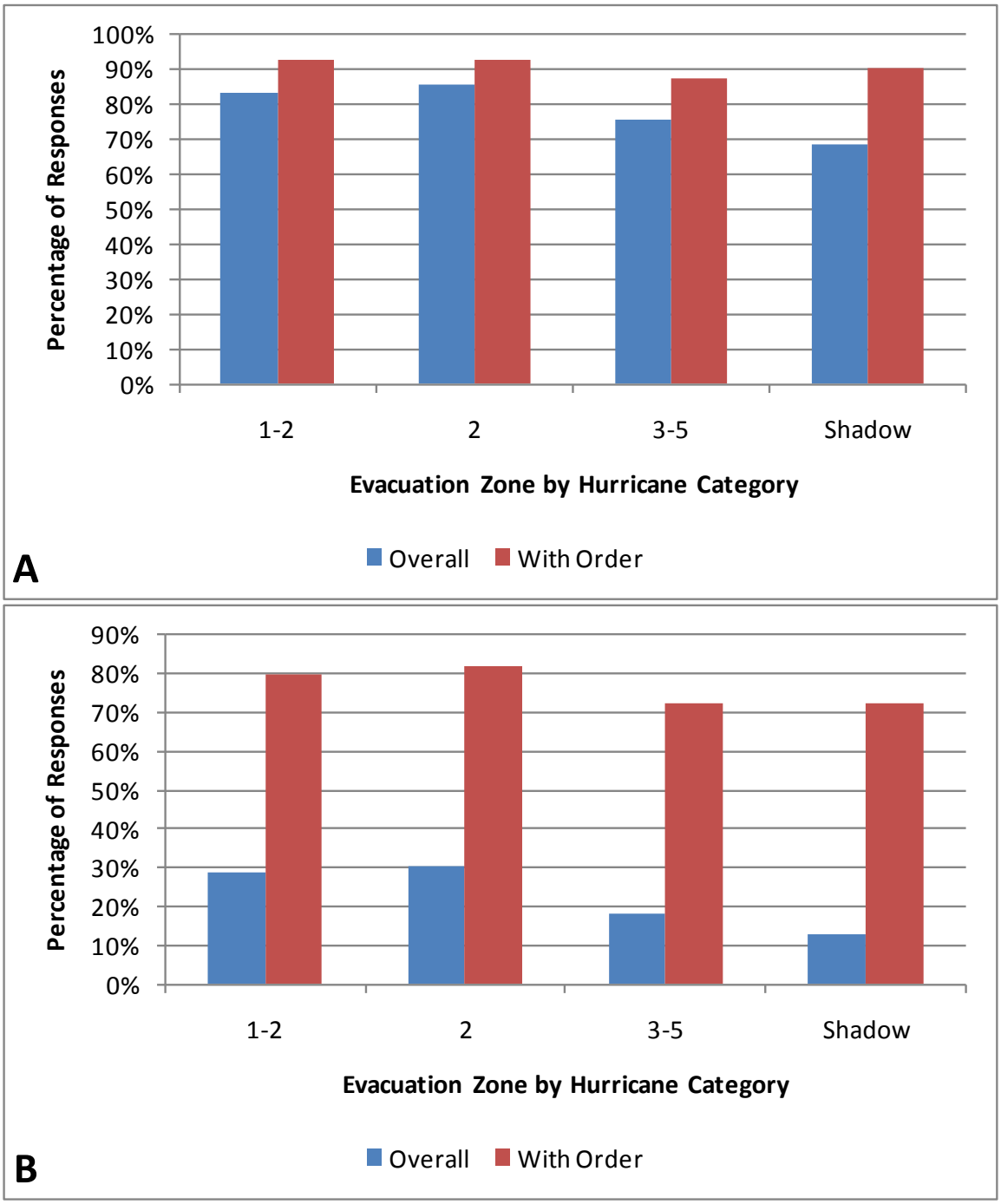

Figure 8. Evacuation Likelihood for (A) Major Hurricane (CAT 3+) and (B) Minor Hurricane (CAT 1 or 2), overall, and with a mandatory order by surge zone

F. EVACUATION CONDITIONS

There are many different elements in managing evacuations including how people would leave, how many would need special assistance, where would they go, what sheltering options would they seek and so forth. The most important of these are described below.

1. WHO WOULD LEAVE

In a hurricane evacuation scenario, respondents were asked how many in their household would leave and if any members of their family would stay for any reason. In the overall study area, 54.40% (+/- 1.71%) respondents stated that their household evacuation would include two people (Q20). This response was fairly consistent throughout the Conglomerates, ranging from to 46-57% of households reporting two people would evacuate. **Only 11% of households reported that a member of the household might stay behind and shelter in place during an evacuation scenario** (Q21) with another 7% not knowing. Importantly, roughly 8% of the survey respondents in Category 1 or 2 surge zones would shelter in place. Regionally, there is also a small number of residents who would shelter in place within each of the Conglomerates (6.6% in the Southern, 13.2% in the Central, and 12.6% in the Northern), even if other people in the household were leaving.

2. SPECIAL ASSISTANCE

Special assistance populations are often difficult to determine. When asked about special assistance required or transportation needs for their household (Q25), **nearly 90% (+/-1.71%) of households from the overall sample stated they would not need any additional help to vacate** their homes. Conglomerate responses were similar to the overall response. Of those that responded yes, special care was the type of assistance most cited (43%) followed by access to transporation (36%) in the entire study region (Q26) (Figure 9).

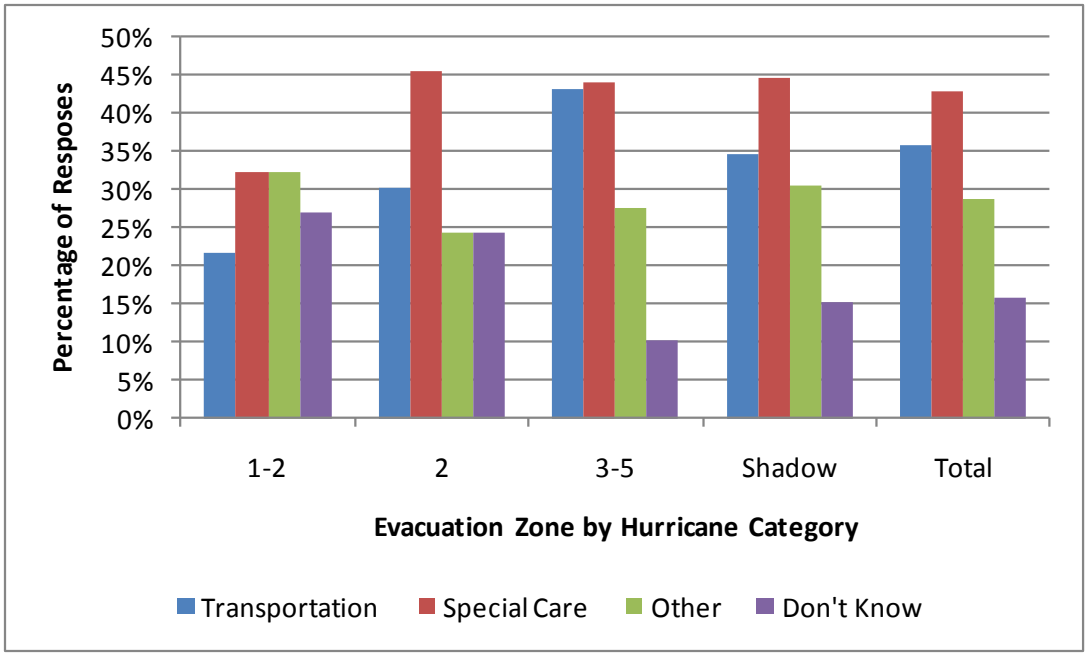

Figure 9. Type of Need Assistance Required for Evacuation

3. PETS

The presence of pets in a household reduces evacuation (Edmonds and Cutter 2008; Heath et al. 2001) unless pets are adequately included in household evacuation planning. Half (50.7%) of the respondents had pets, or about 1.2 pets per household. Most households responding to this question had dogs more so than any other pet type; this was also true for each Conglomerate and each surge zone (Q27) (Figure 10). **As for preparation, only 4.7% of respondents stated that they would NOT evacuate with their pet, suggesting that the majority of respondents with pets would bring them along** (Q28). This potential evacuation action was highest in the Central Conglomerate . Those evacuating their pets were most commonly prepared to bring food (93.6% of the overall sample) (Q28). Many respondents said that their pets had current immunization records (Q29) (87.79% of the overall sample, with similar response proportions in the Conglomerates) and a majority (58.65%) stated that their pets were crate-trained (Q30).

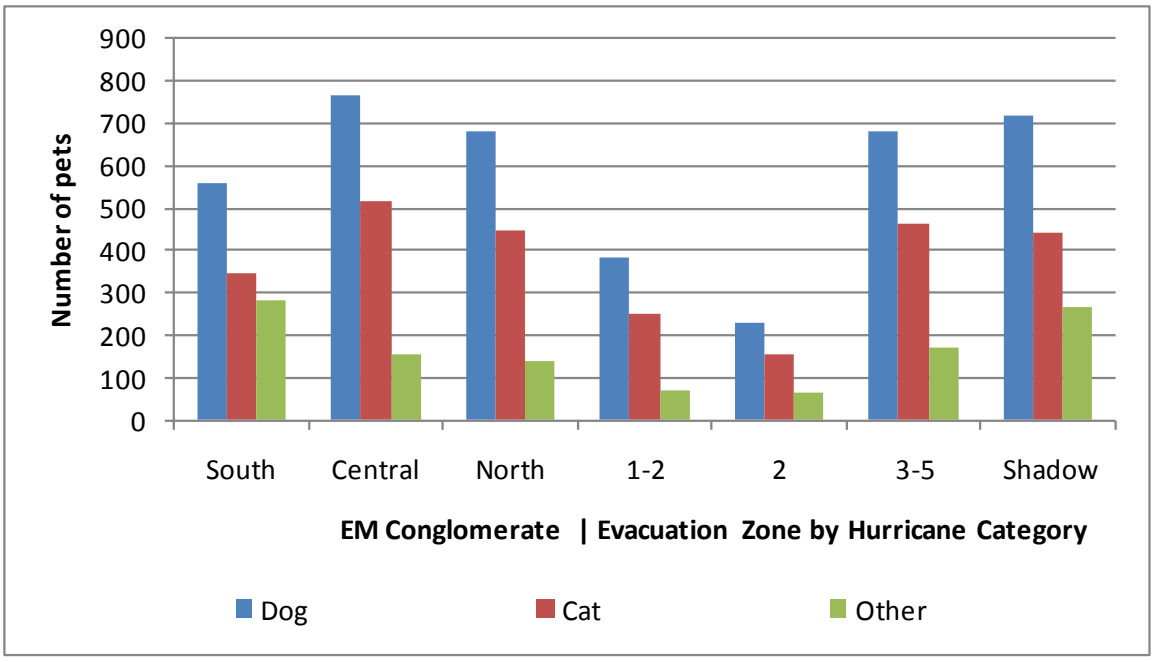

Figure 10. Pet Type by Conglomerate and By Surge Zone

4. VEHICLES

Nearly half of our sample reports having two cars, with another 30% reporting only one car in the household. Around 18% stated they had three or more cars. When asked about the number of vehicles their household would take in an evacuation(Q22), **most respondents stated that they would only take one car** (65.2 % +/- 1.71%), with fewer than half that number in the overall sample stating that they would take two or more vehicles (32.4% +/- 1.71%). These same proportions of single car and multiple vehicles are found by surge zone and by Conglomerate. In addition to automobiles, boats and trailers were the most often cited as being part of a household's evacuation (27.27% and 28.28%, respectively) (Q23). Of those households taking additional types of vehicles, they would take an average of roughly one non-automobile vehicle with them in addition to their automobiles.

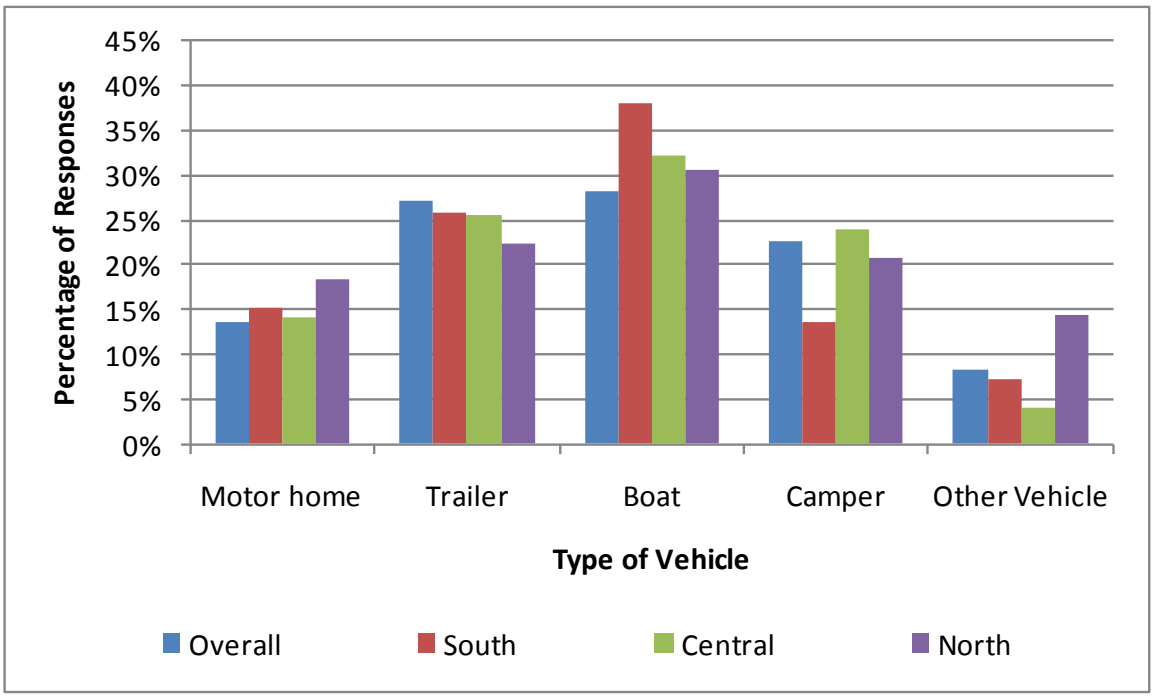

Figure 11. Type of Vehicles Likely to be Taken in a Hurricane Evacuation in Addition to an Automobile

5. TRAVEL ROUTE

Respondents were asked to write in all the major highways they would use to evacuate from their homes ahead of a hurricane (Q24). In the Southern Conglomerate, the most common highway cited was Interstate 95 (found in 317 responses, or 64% of Southern responses). For the Central Conglomerate, Interstate 26 was the most commonly cited (526 responses, 82.57%). Respondents in the Northern Conglomerate mainly named US Route 501 (362 responses, 66.42%) (Table 8).

Table 7. Likely Evacuation Routes by Coastal Hurricane Conglomerate

Popular Responses to What Major Highways Would You Use to Evacuate from the Area							
Overall	**Percent**	**North**	**Percent**	**Central**	**Percent**	**South**	**Percent**
I-26	36.3	US-501	55.2	I-26	71.7	I-95	52.8
US-17	31.3	US-17	37.5	US-17	33.8	US-278	32.9
I-95	24.5	I-95	13.8	I-95	9.1	I-26	24.2
US-501	22.1	I-26	12.0	US-52	8.4	US-17	21.9
US-278	11.5	SC-9	9.8	US-501	5.7	SC-170	8.2
SC-9	3.8	SC-544	9.1	US-78	5.7	US-21	7.8
SC-544	3.7	SC-22	7.3	I-526	4.5	I-16	6.3
US-52	3.5	SC-31	7.1	SC-61	4.4	SC-278	4.5
SC-170	2.9	I-20	4.6	SC-41	4.1	US-501	4.2
I-20	2.8	US521	3.5	US-176	3.0	US-321	3.9
Responses	**3035**		1038		1043		954

6. TRAVEL TIME AND COST

The average length of time respondents are willing to drive in an evacuation is six hours (Q33). Respondents living in the Northern Conglomerate were most often only willing to drive four hours or less to evacuate, while those in the South were more willing to drive 5-8 hours (Figure 12). There was some slight variation by surge zone with the majority in Category 1 and 2, and Category 2 willing to drive between 5-8 hours.

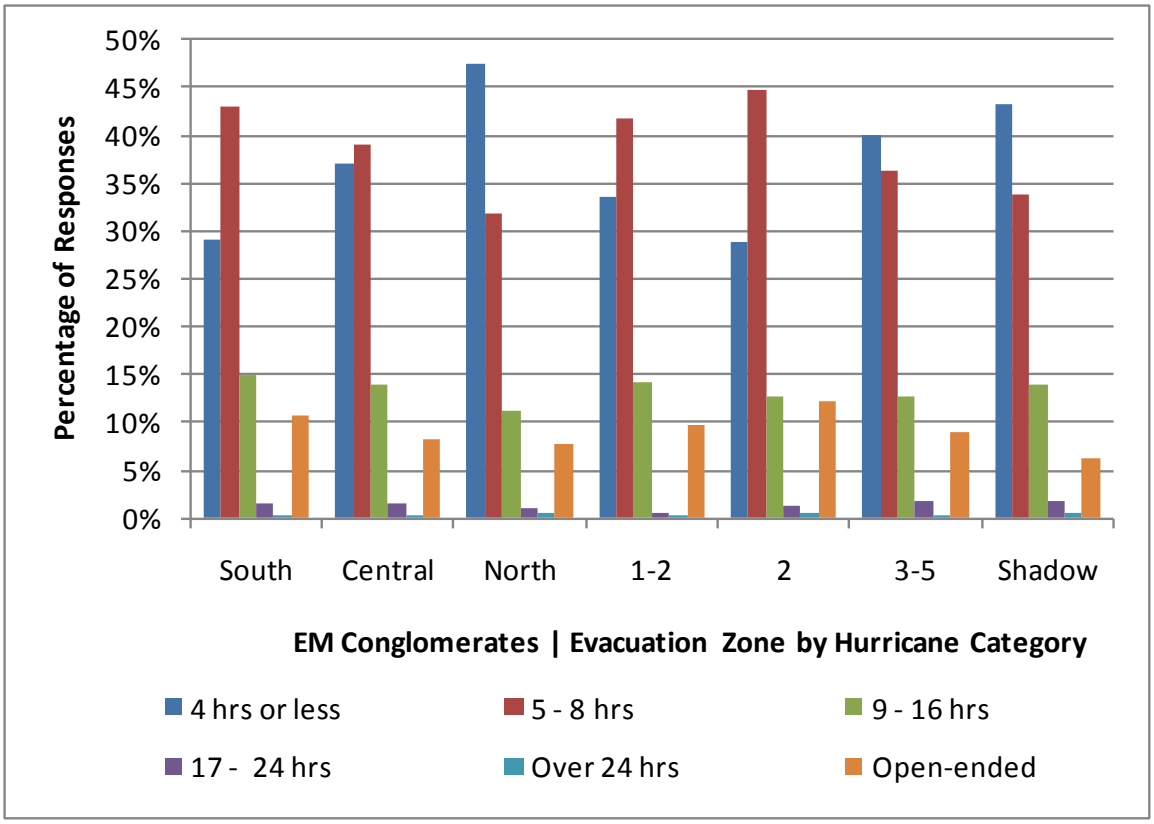

Figure 12. Length of Time Willing to Drive in an Evacuation in Hours

In terms of cost,the median value for the entire study region suggests a willingness on the part of residents to spend roughly $100 per day on evacuation-related costs (Q34). Median values showed no variation by Conglomerate, with all three reporting a median spending value around $100. Residents in the Category 1 and 2 zones were willing, on average, to spend $120 per day on evacuation-related costs. In every case (Conglomerate and surge zone), the majority of repondents would only be willing to spend $51 to $100 (Figure 13).

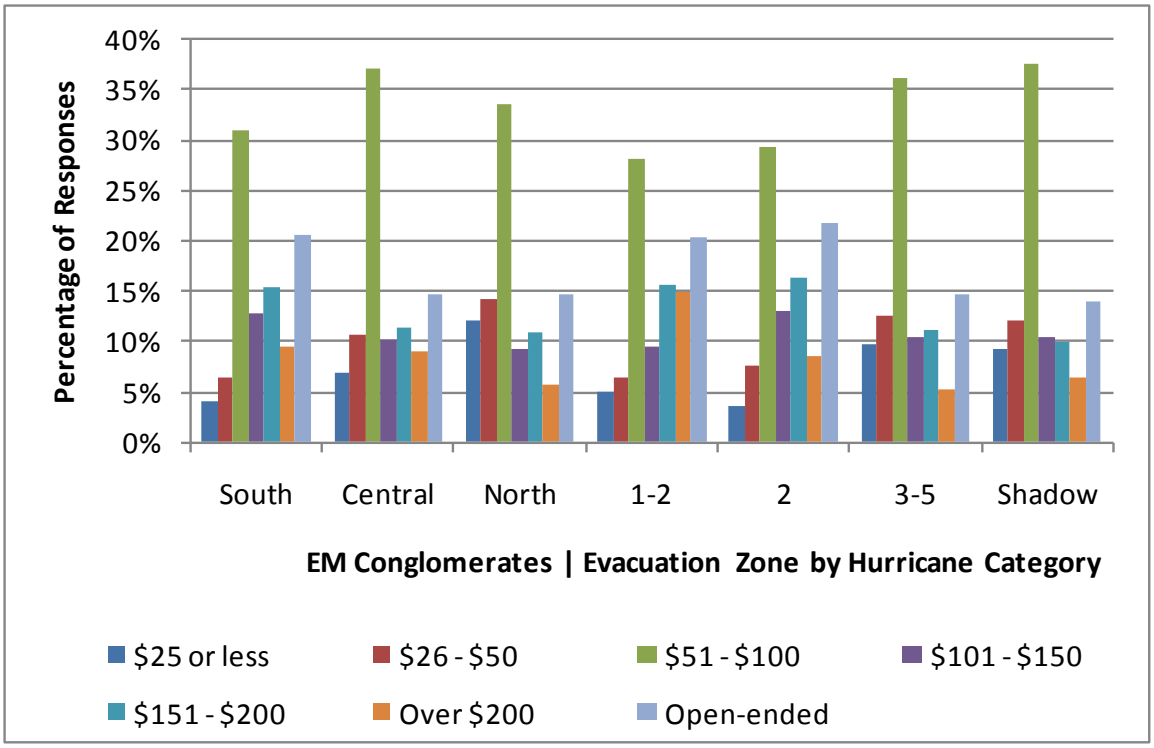

Figure 13. Money Willing to Spend on an Evacuation.

7. TYPE OF EVACUATION REFUGE AND DESTINATION

The first choice for sheltering in an evacuation is the home of friends or relatives (41%), followed by hotel/motel (29%)(Q31) (Table 8). The other category includes options such as second homes or campgrounds. Both the Central and Northern Conglomerates show a similar pattern of preference. However, in the Southern Conglomerate, the first choice shelter option is hotel/motel (42%), followed by homes of relatives/friends (37%). **Of particular interest is the limited preference for public shelters (8%) or pet-friendly public shelters (9%) among all residents.** Regionally, however, there is more interest in public shelters and pet-friendly shelters in the Northern (10%, 13%) and Central (10%, 9%) Conglomerate than in the Southern (5%, 6%).

Table 8. Preference for Potential Evacuation Shelter Options as First Choice by Conglomerate

	State	Southern	Central	Northern
Public shelter (or Red Cross shelter)	8.4%	4.7%	10.0%	10.1%
Pet-friendly public shelter	9.4%	6.2%	9.0%	12.6%
Church or place of worship	6.4%	3.8%	6.3%	8.8%
Home of friend or relative	40.7%	37.4%	43.1%	41.3%
Hotel or motel	29.9%	42.1%	25.7%	23.3%
Workplace	2.31%	1.4%	3.1%	2.4%
Other	2.9%	4.5%	2.8%	1.6%

The destination of evacuees (Q32) is quite mixed with the **majority of those sampled from the entire study area going to another state (35%), followed by another county (21%), and then another city (19%).** This response pattern is similar for all Conglomerates (Figure 14) with out-of-state the primary destination location. It is important to note that a small minority of residents would shelter in the same town (14%) or same county (11%) as their residence but this does vary by Conglomerate—Southern (5% in same town, 6% in same county), Central (18% in same town, 8% in same county), Northern (19% same town, 19% same county).

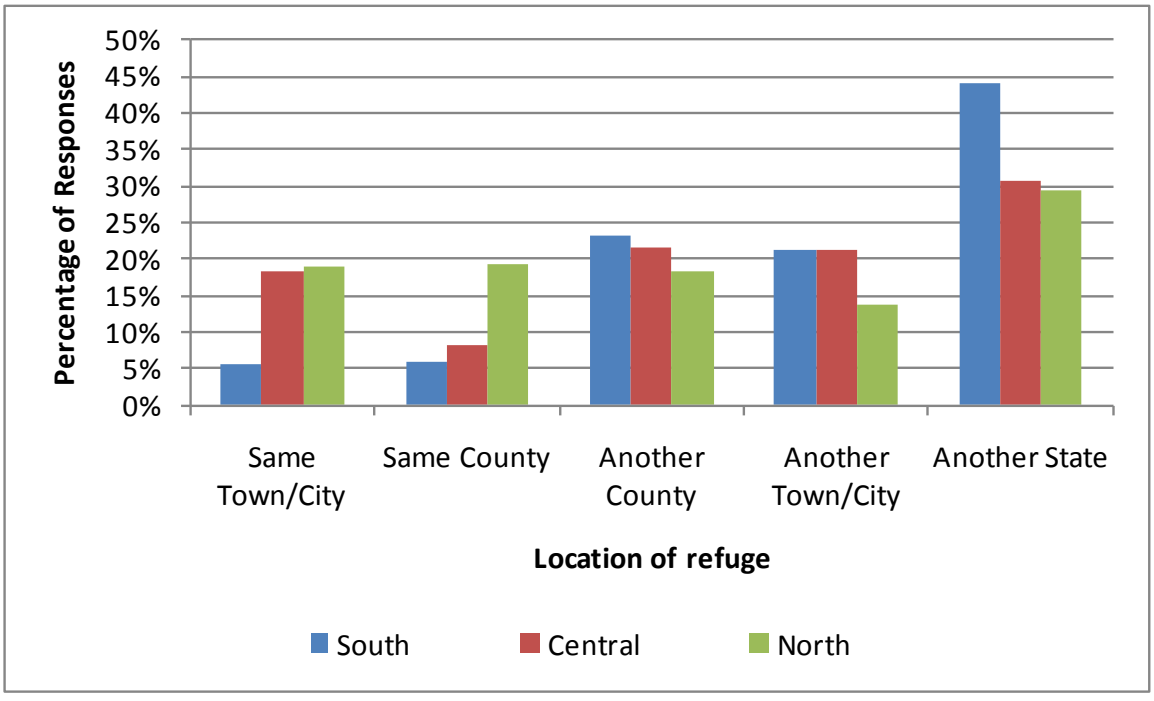

Figure 14. Location of First-Choice Shelter Option by Conglomerate

G. RECOVERY

One of the least understood aspects of hurricane evacuation behavior is the post-disaster relief and recovery phase. We know little about residents' views on responsibility for disaster relief and who (themselves, government, organizations) residents rely on for help after the disaster.

1. RESPONSIBILITY

Two questions probed the issue of responsibility for disaster relief and asked respondents to agree or disagree with the following two statements: "I believe disaster relief is the responsibility of government" (Q6o) and "I believe disaster relief is my personal responsibility" (Q6p). The sample divides on the question of government responsibility with 34.5% in agreement and 33.5% in disagreement with the statement. The remainder did not agree or disagree. There is no real difference between the Conglomerates. **Nearly half the survey respondents agree with the statement that disaster relief is a personal responsibility** (49.7%) although there are some regional differences. Residents in the Southern and Central Conglomerates are in greater agreement (54% and 52% respectively) with the statement than those in the Northern Conglomerate, where only 44% agree.

When examined by socioeconomic characteristics, our findings confirm the trends evident in previous evacuation studies: lower income and the elderly populations are more likely to view disaster relief as the government's responsibility than are higher income and non-elderly populations**. Nearly half of the participants earning less than $22,000 per year agreed that it is the responsibility of the government to provide disaster relief**. Forty three percent of survey takers in the **highest earning bracket strongly disagreed with this statement and instead agreed that disaster relief was a personal responsibility (55%).**The data show that race and ethnic backgrounds are different in assigning responsibility for disaster relief. For example, African American respondents agreed it was a government responsibility (46%) while White (52%) and Asian (55%) respondents agreed that disaster relief is a personal responsibility. Hispanic respondents diverge in their views, with 24% agreeing with the statement on government responsibility, and 26% agreeing on personal responsibility.

2. SOCIAL NETWORKS

Many citizens will choose to rely on their own social networks for help after a disaster. Social networks can be comprised of church, social, service, or neighborhood organizations (Airriess et al, 2008). Two questions probed the influence of social networks on recovery. This survey looked at the number of organizations people belonged to (Q55) and how likely they would be to rely on that organization for help in the event of a disaster (Q57)**.** The major organization listed were places of religious worship. **For the entire sample, nearly 28% replied that were likely to rely on the organization for assistance after a disaster**. There was little variation in this by Conglomerate (24-29%) or by surge zone (22-26%). It was interesting, however, that respondents in the shadow evacuation zone replied with a greater likelihood percentage (36%) that they would rely on social or religious organizations for post-disaster help. **In responding to the likelihood that residents would rely on family and friends post-disaster (Q60), the majority claimed that was somewhat to very likely (56%).** Again, there was little

variation by Conglomerate (53-58%) or by surge zone (51-59%). Finally, 30% of survey respondents were somewhat to very likely to rely on government after a disaster (Q61). Again, there was little variation by region (27-32%) or storm surge zone (26-31%).

IV. DISCUSSION OF RESULTS

This study summarizes the findings of a random sample of South Carolina coastal residents on their knowledge, attitudes, and likely behaviors in response to a hurricane. The findings provide specific behavioral information for use in evacuation planning for both transportation and emergency management officials. We report the results by Coastal Hurricane Conglomerate to insure the statistical confidence of the findings. However, we do provide a short narrative for each of the eight participating counties in the particularly with respect to the intent to evacuate.

The survey suggests a major issue with non-evacuation among coastal residents for minor hurricanes. **Close to two-thirds (61%) of the sample is *unlikely* to evacuate in advance of a Category 1 or Category 2 hurricane**. This is particularly worrisome as more than half of the residents live in a Category 1-2 zone, and 48% percent of residents in a Category 2 zone stated they would not evacuate. We estimate that in the Northern Conglomerate, the unlikely percentage reaches 73%. The Southern Conglomerate shows a higher intention to evacuate in a Category 1 or 2 hurricane (29%-35%). Beaufort County will likely have the largest participation in an evacuation (31%-36% of residents based on our sample), and Horry County the least (8%-15%)(Table 9). For those residents in an evacuation zone, we estimate that between 173,100-204,300 people are likely to evacuate from minor hurricanes.

For major hurricanes, the anticipated behavior is better, with 77% of the coastal residents in the survey saying they will leave. This translates into approximately 914,000-955,000 residents (out of 1.2 million people) that would be evacuating the coastal area for a hurricane evacuation (Table 10). However, if you only examine those residents in the designated storm surge zones, then the numbers vary between 686,000-719,000 likely evacuees. The responses vary by regions with the Southern Conglomerate showing the highest intentions to evacuate (85.7%) and the Northern the lowest (70.7%). The consistent finding for the Northern Conglomerate is worrisome, given the large numbers of potential non-evacuees (44,800-64,000), mostly in Horry County that could complicate the evacuation management.

Table 9. Likely Evacuee Estimates for a Minor Hurricane (CAT 1 or CAT 2)

Conglomerate or County	Pct. Error Estimation (+/-)	% Likely to Evacuate	Likely Evacuation Population for Region*	Likely Evacuation Population in Hazard Zone*	% Unlikely to Evacuate	Unlikely Evacuation Population for Region*
State	**1.7**	**20.6**	**230,500-272,100**	**173,100-204,300**	**61.0**	**723,400-765,000**
Southern	**3.0**	**32.4**	**66,400-80,000**	**57,800-69,700**	**45.0**	97,100-108,500
Beaufort	3.2	33.4	48,900-59,400	49,900-59,400	43.4	65,200-75,700
Colleton	13.4	24.5	4,300-14,800	1,200-4,400	66.0	20,400-30,900
Jasper	12.5	25.4	3,100-9,400	2,900-8,800	50.8	9,400-15,700
Central	**2.9**	**17.9**	**99,600-138,300**	**70,800-98,300**	**64.1**	**406,700-445,300**
Berkeley	6.6	14.7	14,400-37,900	5,800-15,300	65.1	104,000-127,600
Charleston	3.8	19.7	55,600-80,800	54,600-80,800	62.5	205,500-232,200
Dorchester	6.5	15.9	12,800-30,600	5,300-12,800	68.2	84,200-102,100
Northern	**2.9**	**12.4**	**31,200-37,800**	**23,400-37,800**	**72.7**	**229,900-249,100**
Georgetown	6.8	15.3	5,100-12,400	4,700-12,400	70.0	38,000-46,300
Horry	3.2	11.8	23,100-28,700	16,400-28,700	73.3	188,700-206,100

* Based on county population totals

Table 10. Likely Evacuee Estimates for a Major Hurricane (CAT 3 or higher)

Conglomerate/ County	Pct. Error Estimation (+/-)	% Likely to Evacuate	Likely Evacuation Population for Region*	Likely Evacuation Population in Hazard Zone*	% Unlikely to Evacuate	Unlikely Evacuation Population for Region*
State	**1.7**	**76.7**	**914,000-957,000**	**686,900-718,100**	**12.1**	**126,800-168,400**
Southern	**3.0**	**85.7**	**186,800-200,300**	**162,800-174,700**	**6.6**	8,100-21,700
Beaufort	3.2	88.1	137,700-148,100	137,700-148,200	4.9	2,700-13,200
Colleton	13.4	64.2	19,700-30,200	5,800-9,000	28.3	5,700-16,300
Jasper	12.5	70.0	14,200-20,500	13,200-19,100	13.3	100-6,400
Central	**2.9**	**74.2**	**473,800-512,500**	**336,800-364,200**	**12.8**	65,700-104,400
Berkeley	6.6	69.0	110,900-134,500	44,700-54,300	14.2	13,500-37,000
Charleston	3.8	76.1	253,200-274,800	248,500-274,800	11.9	28,300-55,000
Dorchester	6.5	73.7	45,500-91,800	38,100-45,600	14.3	10,600-28,500
Northern	**2.9**	**70.7**	**223,300-242,500**	**167,100-181,500**	**16.5**	**44,800-64,000**
Georgetown	6.8	74.1	40,400-45,200	37,500-45,200	13.9	4,200-12,500
Horry	3.2	69.9	179,600-196,900	127,200-139,500	17.1	27,400-54,700

* Based on county population totals

Shadow evacuations are a concern. For minor hurricanes, between 8.6-12.0% of the population in the shadow evacuation zones are very likely to evacuate, thus adding between 5,800-21,500 people to the management needs. For a major hurricane (Category 3 or higher) the shadow evacuees will be significant (Table 11), with 41.1-47.5% saying they would very likely leave. This will complicate emergency management and could add upwards of another 100,000 evacuees leaving the coastal areas, statewide. Regionally, the complications added by these potential evacuees vary with lower bound estimates suggesting—6,500 in the Southern Conglomerate, 66,000 in the Central Conglomerate, and 27,000 in the Northern Conglomerate. These estimates only include residents living in our designated shadow zone (within 5 miles of a designated evacuation zone). In all likelihood, there will be even greater participation in the evacuation from residents outside of our designated study area.

Table 11. Estimates of Potential Evacuees by Surge Zone Based on Very Likely Intentions to Evacuate

		Category 1 or 2 Hurricane		Category 3 or higher Hurricane	
Evacuation Zone	**Population**	**% Very Likely to Evacuate**	**Number of Evacuees**	**% Very Likely to Evacuate**	**Number of Evacuees**
Category 1-2 (+/-3.78%)	**289,001**	**11.1-18.7**	**32,079-54,043**	**63.8-71.4**	**184,383-206,347**
Category 2 (+/-4.52%)	**150,389**	**11.5-20.5**	**17,294-30,830**	**60.1-69.1**	**90,384-103,919**
Category 3-5 (+/-2.71%)	**232,060**	**6.6-12.0**	**15,316-27,847**	**52.5-57.9**	**121,833-134,410**
Shadow (+/-3.19%)	**244,445**	**2.4-8.7**	**5,867-21,267**	**41.1-47.5**	**100,467-116,113**
TOTAL (+/-1.71%)	**915,897**	**8.6-12.0**	**78,950-114,418**	**54.2-57.7**	**497,057-528,198**

V. IMPLICATIONS AND RECOMMENDATIONS FOR SOUTH CAROLINA

- Prior hurricane experience plays an important yet sometimes uneven role in evacuation decision-making. As South Carolina's population grows, especially via external migration, it is likely that fewer residents will have prior experience with hurricanes. Officials cannot assume that residents will understand their local hurricane risk on the basis of past experience alone.

- Large numbers of residents are uncertain about their location in or out of a storm surge or FEMA flood zone. The state needs stronger and continuous public education programs about the location of their address relative to these zones and the likely threat differences among them.

- More than half the respondents report that damage to their home is likely during a hurricane. This leaves a substantial number who may be underestimating the likelihood of damage and, as a result, carrying insufficient insurance coverage or an unrealistically high deductible.

- While most respondents report having an evacuation plan and household supplies to last several days, continued education on what constitutes a good plan and disaster supply kit should be maintained.

- Local information dissemination is key. Respondents rely more heavily on county and municipal sources for preparedness information. Other providers (the state, Red Cross, charities, etc.) should establish relationships that partner at the local level.

- Local television and radio are among the top three information sources for evacuation notices and storm updates. Consistent messages by local officials, trusted because of their local knowledge, can provide actionable information that supplement "bigger picture" information provided by national media, such as the Weather Channel.

- As expected, evacuation intent diminishes farther from the coast. Education about the wind hazard is needed for inland residents; while storm surge is spatially constrained, hurricane-strength winds create damages far from the shoreline.

- Mandatory evacuation orders are more effective in spurring action than recommendations. Officials must carefully consider when a mandatory evacuation is needed and whether the public finds the issuing source as credible.

- Respondents report a willingness to travel longer distances and stay in accommodations such as campgrounds and hotels, which diverges from the relatively low amount of money they are willing to spend. This may suggest an overly optimistic – or unrealistic – expectation about how long evacuees may be unable to return to their primary residence.

- Social organizations are important for post-disaster recovery. Where possible, interested religious, social, and service organizations should partner with local agencies to augment, not duplicate, existing services.

- Although not surveyed here, the tourist population is highest along the coast during hurricane season and may confound some of these findings. Evacuation times, chosen routes, and the number of vehicles driven, among other factors, will vary from those reported by full-time coastal residents. Continued hurricane education via fliers and pamphlets in hotels and tourist destinations can provide needed information to this relatively uninformed group.

- A significant percentage of evacuating households will take pets with them. An increase in the number of pet-friendly public shelters would accommodate this need. Also, additional education and outreach about what shelters will and will not accept pets is needed.

- Planning for shadow evacuation populations (residents outside of designated evacuation zones who evacuate anyway) should be included. These residents can pose significant issues for emergency managers, especially in response to a major hurricane.

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APPENDIX A – SURVEY INSTRUMENT

South Carolina
Hurricane Evacuation Survey
2011

This is an official study conducted by the Hazards and Vulnerability Research Institute at the University of South Carolina on behalf of the US Army Corps of Engineers and the South Carolina Emergency Management Division. It is quick and easy to fill out, and your answers are confidential and protected.

For the questions below, please check the box that best describes where you fall on the range of possible attitudes between the two endpoints.

1. How concerned are you about the threat of a hurricane?
   Very concerned ☐☐☐☐☐ *Not concerned at all*
2. How likely is it that your home would ever be seriously damaged or destroyed by hurricane winds or tree damage from winds?
   Very likely ☐☐☐☐☐ *Not likely at all*
3. How likely is it that your home would ever be seriously damaged or destroyed by hurricane-related floods or storm surge?
   Very likely ☐☐☐☐☐ *Not likely at all*
4. How likely is it that your home would NOT be damaged in a hurricane?
   Very likely ☐☐☐☐☐ *Not likely at all*
5. How likely is it that your neighbors' homes would NOT be damaged in a hurricane?
   Very likely ☐☐☐☐☐ *Not likely at all*
6. Would you agree or disagree with the following statements?
   a. I am afraid of hurricanes.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   b. I worry more about my family's safety than my own.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   c. I would be more likely to evacuate if I saw my neighbors leaving.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   d. I would consult with family and friends outside my household before making a decision.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   e. In times of trouble I would need to rely on others.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   f. In uncertain times, I usually expect the best.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   g. It's easy for me to relax.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   h. If something can go wrong for me, it will.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   i. I'm always optimistic about my future.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   j. I enjoy my friendships a great deal.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   k. It's important for me to keep busy.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   l. I hardly expect things to go my way.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   m. I don't get upset too easily.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   n. I rarely count on good things happening to me.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   o. I believe disaster relief is the responsibility of government.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   p. I believe disaster relief is my personal responsibility.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
   q. Overall, I expect more good things to happen to me than bad.
      Strongly agree ☐☐☐☐☐ *Strongly disagree*
7. If a category 3 or stronger hurricane, a major hurricane, was threatening your community, how likely is it that you would leave your home?
   Very likely ☐☐☐☐☐ *Not likely at all*
   a. For the same storm, would you leave during a hurricane watch *(hurricane conditions possible in 48 hours)*?
      Very likely ☐☐☐☐☐ *Not likely at all*
   b. Would you leave for a hurricane warning *(hurricane conditions expected in 36 hours or less)*?
      Very likely ☐☐☐☐☐ *Not likely at all*
   c. Would you leave if officials recommended it?
      Very likely ☐☐☐☐☐ *Not likely at all*
   d. Would you leave if officials ordered it?
      Very likely ☐☐☐☐☐ *Not likely at all*
8. If a category 1 or a category 2 hurricane, a weaker hurricane, was threatening your community, how likely is it that you would leave your home?
   Very likely ☐☐☐☐☐ *Not likely at all*
   a. For the same storm, would you leave during a hurricane watch?
      Very likely ☐☐☐☐☐ *Not likely at all*
   b. Would you leave for a hurricane warning?
      Very likely ☐☐☐☐☐ *Not likely at all*
   c. Would you leave if officials recommended it?
      Very likely ☐☐☐☐☐ *Not likely at all*
   d. Would you leave if officials ordered it?
      Very likely ☐☐☐☐☐ *Not likely at all*

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9. **Has your household or family talked about what you might do if you had to evacuate your home for a hurricane?**
☐ Yes ☐ No ☐ Don't know

10. **What do you do to prepare for hurricane season? *(Check all that apply)***
☐ Make a disaster supply kit *(containing food, water, first aid supplies, and a flashlight)*
☐ Call local government agencies for hurricane information
☐ Prepare or review a family evacuation plan *(including plans for pets, if any)*
☐ Have appropriate materials to secure home for hurricane conditions *(for example, boards for windows)*
☐ Have made permanent home improvements to limit hurricane damage *(for example, truss strengthening)*
☐ Have purchased a NOAA weather radio
☐ I do not prepare for hurricane season
☐ Other *(please specify)*: _____

11. **How many days will the supplies in your disaster supply kit sustain your household?**

0	*1*	*2*	*3*	*4*	*5 or more*
☐	☐	☐	☐	☐	☐

12. **Is your address in a hurricane evacuation zone?**
☐ Yes ☐ No ☐ Don't know

13. **Is your address in a FEMA flood zone?**
☐ Yes ☐ No ☐ Don't know

14. **When preparing for hurricane season, which state or local government agencies would you rely on for preparedness information?**

_____

_____

_____

15. **Which of the following sources would you rely on for evacuation notices and storm updates prior to a hurricane's landfall, and to what extent?**

	Not at all	A little	Fair amount	Great deal
Local radio stations	☐	☐	☐	☐
Local TV stations	☐	☐	☐	☐
National news (e.g., Fox News, CNN)	☐	☐	☐	☐
Weather Channel	☐	☐	☐	☐
Other cable stations	☐	☐	☐	☐
Internet sources	☐	☐	☐	☐
Word of mouth	☐	☐	☐	☐
NOAA weather radio	☐	☐	☐	☐
Newspapers	☐	☐	☐	☐

16. **To what extent would you rely on the following sources for updates during and after a hurricane?**

	Not at all	A little	Fair amount	Great deal
Local radio stations	☐	☐	☐	☐
Local TV stations	☐	☐	☐	☐
National news	☐	☐	☐	☐
Weather Channel	☐	☐	☐	☐
Other cable stations	☐	☐	☐	☐
Internet sources	☐	☐	☐	☐
Word of mouth	☐	☐	☐	☐

17. **What are the top three factors that would encourage you to evacuate ahead of a hurricane?**
1. _____
2. _____
3. _____

18. **What are the top three factors that would discourage you from evacuating?**
1. _____
2. _____
3. _____

19. **Would you still evacuate for a hurricane knowing that you would be unable to return until…**

	Yes	No	Don't know
3 days later?	☐	☐	☐
1 week later?	☐	☐	☐
2 weeks later?	☐	☐	☐

20. **How many people in your household would need to evacuate, including yourself?**

_____

21. **Are there people in your household who would probably stay and shelter in place even if other people in the household are leaving?**
☐ Yes ☐ No ☐ Don't know

22. **How many automobiles would your household take in an evacuation?**
☐ 0 ☐ 1 ☐ 2 ☐ 3 or more

23. **Would you take any of the following types of vehicles in an evacuation? *(Check all that apply)***
☐ Motor home
☐ Trailer
☐ Boat
☐ Camper
☐ Other *(please specify)*: _____

24. **What major highways would you use to evacuate from the area?** ***(For example, Interstate 26: US-17; US-501; SC-174)***

_____

_____

_____

25. **Would anyone in your household need assistance from outside your family in order to evacuate or require any sort of special care in a shelter?**
☐ Yes ☐ No *(skip to question 27)* ☐ Don't know

26. **What kind of assistance would this person require?** ***(Check all that apply)***
☐ Transportation
☐ Special care
☐ Other *(please specify:* _____*)*
☐ Don't know

27. **Please specify the number of pets that you have.**

Dogs	*Cats*	*Other pets*
☐	☐	☐

☐ I don't have any pets *(skip to question 31)*

28. **If you plan on evacuating with your pet, what would you take?** ***(Check all that apply)***
☐ Proper identification and immunization records
☐ Food and water supply
☐ Carrier or cage
☐ Medications
☐ Muzzle, collar, and leash
☐ Toys and treats
☐ Don't plan on evacuating pets

29. **Do your pets have immunization records that are current?**
☐ Yes ☐ No ☐ Don't know

30. **Are your pets crate trained?**
☐ Yes ☐ No ☐ Don't know

31. **In an evacuation, which of the following potential shelters would be your 1st, 2nd, or 3rd choice?**

	1st	2nd	3rd
Public shelter (or Red Cross shelter)	☐	☐	☐
Pet-friendly public shelter	☐	☐	☐
Church or place of worship	☐	☐	☐
Home of friend or relative	☐	☐	☐
Hotel or motel	☐	☐	☐
Workplace	☐	☐	☐
Other (specify below)	☐	☐	☐
_____			
Don't know	☐	☐	☐

32. **How far away is your first-choice shelter from where you are now?**
☐ In the same town or community
☐ In the same county
☐ Another county in South Carolina *(please specify which one)*
_____
☐ Another city in South Carolina *(please specify which one)*
_____
☐ Another state *(please specify which one)*
_____
☐ Don't know

33. **How long would you be willing to travel to evacuate, in hours?**
_____

34. **How much are you willing or able to spend per day on evacuation related costs, in dollars?**
_____

35. **Have you experienced a hurricane before?**
☐ Yes ☐ No ☐ Don't know

36. **Have you evacuated for a hurricane before?**
☐ Yes ☐ No *(skip to question 39)* ☐ Don't know

37. **Where did you go?**
☐ Public shelter
☐ Home of family or friends in the county
☐ Home of family or friends outside the county
☐ Hotel or motel
☐ Workplace
☐ Other, please specify: _____
☐ Don't know *(skip to question 39)*

38. **In what city or county was that located?**
_____

39. **Including yourself, how many people live in your household?**
_____

40. **Of these people, how many are under 18?**
_____

41. **How many in your household are over the age of 65?**
_____

42. **How many automobiles do you have at your disposal?**
☐ 0 ☐ 1 ☐ 2 ☐ 3 or more

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43. During which months of the year do you most often stay at this address? *(Check all that apply)*
☐ *I live at this address all year*

Jan	Feb	Mar	Apr	May	June
☐	☐	☐	☐	☐	☐
July	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
☐	☐	☐	☐	☐	☐

44. How long have you lived at this address, in years? _____
45. Do you own or rent this address?
☐ Own ☐ Rent ☐ Don't know
46. Which of the following best describes your current address?
☐ Detached single family home
☐ Duplex or other multifamily structure
☐ Apartment building or condominium, less than 4 stories
☐ Apartment building or condominium, more than 4 stories
☐ Mobile home/manufactured housing
☐ Some other type of structure
☐ Don't know
47. How old is this structure, in years? _____
48. Which of the following best describes your total household income in 2010?
☐ Less than $22,000
☐ $22,000 - $43,999
☐ $44,000 - $65,999
☐ $66,000 - $87,999
☐ $88,000 or more
49. How old are you? _____
50. Are you currently married?
☐ Yes ☐ No
51. Do you have an internet connection in your home?
☐ Yes ☐ No
52. Which of the following phone services do you have available at this address?
☐ Landline ☐ Cellular ☐ Don't know
☐ I don't have phone service
53. If you have a cell phone, are you registered with the South Carolina Reverse 911 system (ReachSC)?
☐ Yes ☐ No ☐ Don't know
☐ Don't have a cell phone
54. Are you male or female?
☐ Male ☐ Female
55. How many church, social, service, or neighborhood organizations do you belong to?

_____ *(If zero, skip to question 58)*

56. In which one of the above are you most active?

_____

57. How likely are you to rely on this organization for help after a disaster?
Very likely ☐ ☐ ☐ ☐ ☐ *Not likely at all*
58. Which of the following best describes your area of employment?
☐ Construction
☐ Manufacturing
☐ Wholesale trade
☐ Retail and consumer services
☐ Transportation, shipping, and warehousing
☐ Utilities
☐ Professional, financial or IT services
☐ Education and health services
☐ Government
☐ Military
☐ Other, please specify: _____
☐ Retired
☐ Unemployed
☐ Don't know
59. What is the highest grade of school you've completed?
☐ Grade school
☐ Some high school
☐ High school graduate or equivalent (GED)
☐ Technical or vocational school
☐ College (undergraduate)
☐ College (graduate)
☐ Other advanced education
60. How likely are you to rely on friends and family after a disaster?
Very likely ☐ ☐ ☐ ☐ ☐ *Not likely at all*
61. How likely are you to rely on the government after a disaster?
Very likely ☐ ☐ ☐ ☐ ☐ *Not likely at all*
62. Do you consider yourself to be Hispanic or Latino?
☐ Yes ☐ No ☐ Don't know
63. What do you consider as your racial background?
☐ Black or African-American
☐ White
☐ Native Hawaiian or Other Pacific Islander
☐ Hispanic or Latino
☐ Asian
☐ American Indian or Alaska Native
☐ Other *(please specify)*: _____

Thank you for filling out our survey! Your answers will help to improve emergency management in South Carolina.

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