



Evaluation and Analysis of Post-Disaster Re-Entry in Megaregions – A Pilot Study

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16. Abstract This study attempts to address the deficit of the limited research that has been conducted on re-entry. Through a comprehensive literature review there were a total of six publications that addressed re-entry with nearly all of the research focused on the individual evacuee and not the decision-making process on initiating re-entry. This study also examines State and country re-entry plans to look for commonality and best practices of existing re-entry operations. Finally, emergency managers were asked to complete a survey to identify priorities and ideal capacity of 25 different infrastructure categories using an infrastructure assessment tool developed by the Army and converted to civilian disaster operations.			
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Chapter 1. Introduction

Quarantelli described an evacuation as “the mass physical movement of people, of a temporary nature, that collectively emerges in coping with community threats, damages or disruptions.”¹ As described, this movement is meant to be temporary, which suggests that at some point there is a return-movement to the disaster-stricken area. There has been little research completed on return migration or “re-entry” into communities after a disaster. The literature on disaster-based displacement has been primarily focused on the outward movement—evacuation. The overall goal of this research was to develop an understanding of the re-entry process through a review of current practices at the state, county and municipal government levels. In an effort to develop a base level of knowledge of the re-entry process, this study established the following objectives:

Objective 1: Investigate the current state of re-entry research to determine the existing body of knowledge on the decision making process used by emergency managers in deciding when the re-entry should be authorized for the residents and how the determination is made.

Objective 2: Investigate and understand the types of re-entry programs currently implemented by state and local governments. Some states utilize a phased approach that grants essential personnel priority for re-entry prior to authorizing the re-entry of the population. Gaining knowledge on the different programs currently in place will facilitate the development of a comprehensive framework for re-entry for essential personnel and evacuees.

Objective 3: Investigate the current use of the Security, Water, Electricity, Accessibility, Telecommunications (SWEAT) Infrastructure Assessment tool during the response and initial recovery phases of a disaster in order to assess the applicability of SWEAT serving as the basis for a re-entry framework. Conduct surveys of experienced emergency managers to determine which areas of the SWEAT assessment have the most influence on determining the suitability for re-entry of essential personnel and evacuees.

¹ Quarantelli, E.L. (1980). Evacuation Behavior and Problems: Findings and Implications from the Research Literature. *Disaster Research Center, University of Delaware*.

This study is partially focused on Louisiana due to its recent history of major evacuations that have caused significant problems for re-entry. The goal is to develop a better understanding of re-entry issues encountered in a major metropolitan area within the Gulf Coast Megaregion, so the information can be extrapolated and used for subsequent studies that can help planners better prepare for an event that may result in a major evacuation for some of the more populated areas within the Gulf Coast Megaregion.

Chapter 2. Re-Entry Literature Review

The research team compiled articles based on certain key term searches. Key terms included: re-entry, return entry, return migration, disaster, post-disaster and emergency management. Following the compilation of the articles, each article was reviewed for noted themes that occurred throughout the articles. Each theme was then utilized in the literature review. The literature provided insight to the fact that there are not many—if any—articles that assess the re-entry process and the way decisions are made by emergency management personnel.

Some of the broader themes in the limited previous research on re-entry following a disaster event included: social vulnerability, risk communication, and predicted versus experienced re-entry behavior. By compiling these themes, an understanding of the gaps remaining in the literature surrounding re-entry can be gained for future research.

The ability to understand re-entry planning and behavior requires knowledge of risk perception, risk communication and re-entry compliance. These factors have been investigated in detail for evacuation research, but as Quarantelli notes, “to ignore the directed and round-trip nature of the evacuation process is to miss much of what must be dealt with in practical terms.”² Therefore, it is important to examine these processes from the standpoint of re-entry as well.

2.1. Risk Perception and Re-Entry

To completely comprehend the status of individuals and households during the evacuation and re-entry process, it is essential to understand the difference between an evacuee and returnee. Siebeneck and Cova note that “...any person who undertakes a protective action movement by leaving the area immediately threatened by a disaster is considered an evacuee. Any person or household who returns to an evacuation zone after a hazard event—whether permanently or temporarily—is a returnee”³. These distinctions are used in Siebeneck and Cova’s³ research on

² Quarantelli, E.L. (1984). Evacuation Behavior and Problems: Findings and Implications from the Research Literature. *Disaster Research Center*.

³ Siebeneck, L. K. and T. J. Cova. (2012). Spatial and Temporal Variation in Evacuee Risk Perception Throughout the Evacuation and Return-Entry Process. *Risk Analysis*

risk perception following the Cedar Rapids, Iowa Flood in 2008. To understand how risk perception affects return entry decisions, Siebeneck and Cova³ looked into how proximity to the hazard influences risk perception, how risk perception influences compliance with re-entry orders, and how social characteristics shape perception and re-entry decision making. The results of their research showed that the main effect of between-subjects variables (100 year vs. 500 year vs. outside the 500 year flood zone) was significant. The main effect of the within-subjects variables (risk perception) for time was also significant. When testing for the interaction between the location of the respondent and the risk perceptions throughout the evacuation and re-entry process, the results showed that the interaction is significant at a 95 percent confidence level. However, using simple effects tests, Siebeneck and Cova³ found that there was no significant relationship throughout the evacuation and return entry processes of respondents from the 100-year and 500-year floodplain. Interestingly, significant differences were found between risk perception of evacuees from the 100-year and 500-year floodplain and between risk perception of evacuees from the 500-year and beyond the 500-year floodplain at time-steps four and five, which were the time-steps allocated specifically for re-entry³.

Another interesting finding in Siebeneck and Cova's³ work was that 66% of evacuees did not return with the same groups with which they initially evacuated. This may indicate that risk perception may vary from person to person in any particular evacuation group. Evacuating groups with children, elderly, or disabled persons may find the risks of re-entry as too high for the entire group to re-enter as a singular group³.

2.2. Communication Channels and Information Sources

Compared to communication surrounding evacuation messages, communication of re-entry messages has not been studied as often. In a study of re-entry issues after Hurricane Rita made landfall in 2005, it was found that only about 55% of the evacuees received the re-entry information message, and only 20% were aware of re-entry plans provided by the Texas Department of Transportation, which gave specific return dates⁴. To add to this research gap,

⁴ Siebeneck, L. K. and T. J. Cova. (2008). An Assessment of the Return-Entry Process for Hurricane Rita 2005. *International Journal of Mass Emergencies and Disasters*

Siebeneck and Cova conducted a study of communication following the 2008 Cedar River Flood⁵. Evacuees were asked which sources they used to learn about re-entry plans for their community. The results showed that individuals learned of the re-entry plans from local media, local authorities, peers, the internet, national news media or a combination of the sources. However, over a quarter of the respondents stated that they did not receive the re-entry information. The results also showed that receiving re-entry information is a function of evacuation destination. Individuals who evacuated to family and friends' homes were more likely to receive re-entry information compared to those who stayed at hotels, shelters, or other places. In terms of information sources and distance, there was a significant relationship between distance and reliance on the internet—as individuals traveled further, their reliance on the internet increased. However, that was the only information source that showed a significant relationship with distance traveled⁵.

There are conflicting results between some scholars on demographic characteristics and reliance on particular information sources. Research done by Lin et al. on information sources following Hurricane Ike⁶ and Siebeneck and Cova⁵ in their flood research, both found that there were no significant relationships between re-entry information and age and home ownership status. However, Siebeneck and Cova⁵ found that females were more likely than males to rely on local authorities, whereas Lin et al.⁶ found no significant relationship between gender and information sources. Also, while Siebeneck and Cova⁵ found no significant relationship between ethnicity and information sources, Lin et al.⁶ found that that whites were less likely than other ethnicities to rely on national news media.

2.3. Compliance with Re-Entry Orders

In Siebeneck and Cova's³ research on risk perception and compliance during the 2008 Cedar River Flood, participants in the study were asked to rate their levels of risk perception and whether they complied with re-entry plans during the re-entry process. Findings showed that there was not a

⁵ Siebeneck, L. K. and T. J. Cova. (2014). Risk Communication after Disaster: Return Entry Following the 2008 Cedar River Flood. *Natural Hazards Review*

⁶ Lin, C.C., L. K. Siebeneck, M.K. Lindell, C.S. Prater, H.C. Wu, S.K. Huang. (2014). Evacuees' Information Sources and Reentry Decision Making in the Aftermath of Hurricane Ike. *Natural Hazards*

statistically significant relationship between self-reported compliance and risk perception. However, there was an alternative measure of compliance that used the date in which individuals returned matched with when they were allowed to re-enter. This measure was created in order to counteract fear of reporting compliance with re-entry orders. Using the alternative measure, there was a significant relationship between compliance and risk perception as returnees that complied with return orders reported a higher perception of risk when making the return decision³. However, when looking at risk perception and compliance following Hurricane Ike, Siebeneck et al. found no significant relationship between risk perception and re-entry compliance⁷. Similar findings to those made following the 2008 Cedar River Flood were made by Lin et al.⁶ following Hurricane Ike with a similar measure used for self-reported compliance. It was found that self-reported compliance and actual compliance with re-entry orders were strongly correlated and those who reported non-compliance were nearly 90% more likely to show actual non-compliance.

Siebeneck and Cova⁵ also found that there was a statistically significant relationship between receiving re-entry information and returning prior to the scheduled return date—meaning those who received the information were more likely to return following the scheduled date—compared with individuals who did not receive the information. However, in the research completed by Lin et al.⁶, there was no significant relationship found between receipt of re-entry information and compliance following Hurricane Ike. It was also found that reliance on information provided by local news media, local authorities, and the internet increased the likelihood that individuals returned after the scheduled re-entry date provided by emergency management⁵. Compliance and information sources differed following Hurricane Ike, as reliance on local authorities was the only statistically significant relationship with reported compliance⁶.

Following Hurricane Ike, Lin et al.⁶ asked respondents about whether the receipt of the re-entry plans for the community affected compliance, satisfaction with re-entry plans, and their understanding of the re-entry plans. The results showed that individuals who did not receive the re-entry information were more likely to have difficulty understanding the plans and those who

⁷ Siebeneck, L. K., M.K. Lindell, C.S. Prater, H.C. Wu, S.K. Huang. (2013). Evacuees' Reentry Concerns and Experiences in the Aftermath of Hurricane Ike." *Natural Hazards*

found it more difficult to understand the information were more likely to be dissatisfied with the re-entry process.

2.4. Trust of Authorities and Re-Entry

During the recovery process after a disaster event, there must be a “holistic approach that entails addressing the immediate needs of victims, devising and communicating a new vision of the recovered community, planning an economic comeback, and rebuilding social networks among residents”⁸. Following a disaster event, the rate of re-entry after an evacuation tends to be lower for blacks compared to other races. Reinhardt attributes this lower rate of re-entry to a lack of political trust⁹. This lack of political trust could play a role in the lower re-entry rates because governments in charge of the “holistic approach” that Kim and Oh⁸ mentioned, may not have the trust of the individuals in the communities they serve. In Reinhardt’s⁹ research, results using ordinary least squares (OLS) predictions show that blacks are 4 percent less likely to return than others. Three other models using political trust at the local, state, and national levels showed that trust in local officials and federal officials were 16 percent and 4 percent less than for other evacuees, respectively. Assessing the mediating effect of political trust on re-entry shows that without political trust, the black population has a 4 percent lower chance of re-entry compared to other races. However, when political trust is added, the 4 percent difference between races is eliminated. These results show that political trust can be seen as a causal mechanism for return migration and race⁹.

2.5. Re-Entry Concerns and Experiences

The decision to re-enter the city of origin following a disaster event is often shaped by either concerns about the process or prior experience with the re-entry process. Research completed by Dash and Morrow¹⁰ examined future evacuation decisions¹⁰ based on delays experienced with

⁸ Kim, J. and S.S. Oh. 2014. The Virtuous Circle in Disaster Recovery: Who Returns and Stays in Town after Disaster Evacuation?. *Journal of Risk Research*.

⁹ Reinhardt, G.Y. (2015). Race, Trust, and Return Migration: The Political Drivers of Post-Disaster Research. *Political Research Quarterly*.

¹⁰ Dash, N. and B.H. Morrow. 2000. Return Delays and Evacuation Order Compliance: The Case of Hurricane Georges and The Florida Keys. *Environmental Hazards*.

Hurricane Georges in the Florida Keys. Results from survey data show that of the people that evacuated from Monroe County and expressed concern about delayed re-entry, only 38% stated that it would affect their decision to evacuate for future storms. However, in the same county, those who did not evacuate noted that based on knowledge from media or second-hand sources, they would factor delays into the decision-making process. Sixty-eight percent stated that the delayed re-entry would affect their plans to leave for future storms.

In research following Hurricane Ike, Siebeneck et al.¹¹ surveyed households in the Houston-Galveston study area, which included Brazoria, Chambers, Galveston, Harris, and Jefferson counties. Respondents were asked about re-entry concerns and experiences when making the decision to return home after Hurricane Ike. Results showed that at the time individuals were deciding to return they were most concerned about “lack of utilities, followed by protecting their home from looters, being stuck in traffic upon the return trip home, physical risk from damaged structures, and losing income while away from work”¹¹. Upon re-entry, the largest issue individuals faced was “lack of utilities, followed by lack of information about the reconstruction process, lost income while away from work, traffic jams on the way home, and looting”¹¹.

Following the respondents’ reported concerns and experiences, paired samples *t* tests were run to determine if there were statistically significant differences between what respondents expected versus what they actually experienced. Results show that the participants expected more problems than they experienced. There were significant differences between the expected and experienced issues surrounding looting, income loss, and traffic upon re-entry¹¹. There were also significant differences among population groups in terms of re-entry expectations and experiences. Results showed that “...60% of the correlations between the demographic items (Var1-Var9) and the re-entry concerns (Var11-Var15) were statistically significant—with minorities (Var3) and lower income (Var8) residents having greater concerns about all five of the re-entry issues¹¹. Results also pointed to older residents, less educated residents, and residents who have larger households as having greater levels of concern regarding re-entry issues. It was also found that concerns about

¹¹ Siebeneck, L. K., et al. (2013). Evacuees’ Reentry Concerns and Experiences in the Aftermath of Hurricane Ike. *Natural Hazards*

physical risk and income loss were the variables with the greatest differences among population groups.

Correlations between actual re-entry experiences were also significantly intercorrelated. However, it was noted by Siebeneck et al.¹¹ that “only 31% of the correlations between the demographic items (Var1-Var9) and the experienced problems items (Var16-Var20) were statistically significant—about half as many significant correlations with demographic variables as was the case for the re-entry concern variables”. Compared to the re-entry concerns variables, minorities and low income individuals experienced more re-entry problems. However, in contrast with the concerns variables, the significant correlations for ethnicity and income were only significant for 60% of the re-entry problems¹¹.

2.6. Social Vulnerability

Vulnerable populations must be taken into account when conducting research on the effects of hazards on individuals and their ability (or lack thereof) to evacuate then re-enter their communities following a hazard event. According to Bradshaw, social vulnerability has become a major aspect of understanding why natural hazard events become “disasters” for some groups in a population¹². Cutter et al. identified social characteristics that most often influence social vulnerability, which included gender, age, race, socioeconomic status, and ability including the differently abled, non-English speaking immigrants, and the homeless¹³. Because of the social stratification in society by these characteristics, women, the elderly, racial and ethnic minorities, low-income, and persons with access and functional needs are more likely to be impacted and also have slower recoveries from disasters. Fussell et al. supports this notion by stating that “...disasters exacerbate pre-existing inequalities, by socioeconomic status, race and age. Minorities and the poor tend to suffer the worst outcomes as a result of natural disasters due to predisposing factors, their actual experiences during and in the aftermath of the disasters, and their limited capacity to recover”¹⁴.

¹² Bradshaw, Sarah. (2013). *Gender, Development and Disasters*. Edward Elgar Publishing Inc.

¹³ Cutter, S.L., B.J. Boruff, and W.L. Shirley. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*

¹⁴ Fussell, Elizabeth; Sastry, Narayan; and Landingham, Mark Van. (2010). Race, socioeconomic status, and return migration to New Orleans after Hurricane Katrina. *Population Environment*.

Emergency management has integrated social vulnerability into evacuation planning, such as special transportation planning for persons with access and functional needs. Yet, theoretically it is expected that social vulnerability also affects re-entry. Demographic research supports the fact that racial and ethnic communities are at greater risk to facing obstacles to disaster preparedness and that there is typically uneven recovery across communities due to vulnerabilities extending from pre-disaster event¹¹. This uneven recovery due to social vulnerabilities leads to populations disproportionately returning to cities following a disaster event. According to Green, Bates, and Smyth following Hurricane Katrina, “the white population of New Orleans metropolitan area has increased from 59 percent to 73 percent and the median income increased from \$55,000 to \$64,000, indicating that white, affluent residents are disproportionately returning to the city”¹⁵. This disproportional influx of white, affluent citizens following a disaster can be attributed to the difficulties experienced during the re-entry process for the most vulnerable populations and how post-disaster contexts can influence re-entry decisions, communication, and capacity to travel.

2.7. Post-Disaster Contexts and Return Entry

According to Asad, there are three contexts that occur following a disaster that can influence return entry decisions for individuals displaced by a disaster¹⁶. The first context Asad describes is institutional, which is:

The degree to which vulnerable individuals (a) can access local-level institutional support in origin or destination; (b) perceive these institutions as conducive to their resettlement and recovery in origin or destination; and, (c) experience institutional discrimination in origin or destination.

An example of an institutional factor making an individual more likely to return to their original city would be the perception of discrimination based on the individual being an evacuee. Whereas an example of an institutional factor making an individual less likely to return would be the belief that the individual’s post-disaster living situation is better than prior to the evacuation.

¹⁵ Green, R., L. Bates, and A. Smyth. (2007). Impediments to Recovery in New Orleans’ Upper and Lower Ninth Ward: One Year after Hurricane Katrina. *Disasters*

¹⁶ Asad, A.L. (2014). Contexts of Reception, Post-Disaster Migration, and Socioeconomic Mobility. *Population and Environment*

The second context described by Asad is that of the labor market. Asad states:

The extent to which members of a vulnerable population (a) can enter the labor market in origin or destination; (b) perceive themselves as employable in positions commensurate with their qualifications in origin or destination; and, (c) experiences with discrimination in origin or destination.

An example of a labor market factor making an individual more likely to return to their city of origin would be the perception that their city of origin is the only place that finding a job and earning money is possible; whereas an example of a labor market factor making an individual less likely to return would be the perception that the destination city has a better opportunity for labor advancement and greater chance for upward mobility than the city of origin.

The final, and perhaps most important, context noted by Asad is the social context. Asad writes:

The extent to which vulnerable individuals (a) perceive locals in destination as ambivalent or amenable to their presence; (b) can freely compete with locals for economic attainment in destination; and (c) experience micro-level discrimination or stigmatization post-disaster that limit opportunities for mobility.

An example of a social factor making an individual more likely to return to their city of origin would be the feeling of discomfort because of the move and feeling stigmatized due to being a refugee; whereas an example of a social factor making an individual less likely to return would be the creation of a social network of individuals that were also forced to evacuate due to the hazard event ¹⁵.

These post-disaster contexts provided by Asad¹⁵ can help explain why vulnerable individuals and populations choose to return home after evacuating due to a hazard event. However, those vulnerable individuals and populations often face preventative measures that make it more difficult to re-enter following the disaster.

2.8. Preventative Measures of Re-Entry for Vulnerable Populations

For individuals that evacuate due to an imposing disaster event, the ability to re-enter the community following the event may be difficult due to circumstances exacerbated by social vulnerability. During Hurricane Katrina, the socially vulnerable displaced residents of New Orleans may not have had a true choice of whether or not to return due to the constraint of “place-specific capital a person has available in the city, such as a habitable home, employment and an intact social network.”¹⁷ Additionally, Tizon and Smith noted that low-income residents of post-Katrina New Orleans often relied on “institutional evacuation or post-storm rescue”¹⁸. These residents often settled farther outside of the city than wealthier individuals that had the ability to rely on their own resources. The increased distance from their homes and the lack of resources made it difficult for these individuals to return and repair their homes¹⁶.

The inability for residents to return to their city of origin following a disaster event affects the city as a whole as well. As socially vulnerable individuals are unable to return to the city, labor shortages slowed business recovery as well as shortages in construction labor. Understaffed hospitals and schools may also play a role in the inability for residents to return following a disaster event. These factors directly affect two notable vulnerable populations: children and the elderly. Families with children are less likely to return because of schooling reasons due to understaffed schools, long waiting lists, and out-of-neighborhood commutes. For the elderly, understaffed hospitals and increased insurance loads may play a significant role in re-entry to a city following a disaster event¹⁴. Keeping these factors in mind, research has shown that pre-disaster vulnerable populations experience vast differences in return-rates compared to populations that are not vulnerable prior to the disaster event.

2.9. Vulnerable Populations Return Rates

Multiple reasons and different experiences influence evacuees’ decisions to return to their city of origin following a disaster event. Hunter notes that the decision to return migrate to one’s city

¹⁷ Fussell, Elizabeth; Sastry, Narayan; and Landingham, Mark Van. (2010). Race, socioeconomic status, and return migration to New Orleans after Hurricane Katrina. *Popul Environ*

¹⁸ Tizon, T.A. and D. Smith. (2005). Evacuees of Hurricane Katrina Resettle Along a Racial Divide." *Los Angeles Time*

following a disaster event is shaped by demographic and socioeconomic characteristics¹⁹. Fussell et al.¹⁴ analyzed return-entry behavior of New Orleans residents following Hurricane Katrina by looking at disparities in race and socioeconomic status, using education as the indicator for the latter. For the entire sample, they found that a quarter of the pre-Katrina residents of New Orleans returned within two months of the hurricane and half of the residents returned by month seven post-storm. By the end of their study period (14 months), only slightly greater than half of the residents had returned. In their analysis, Fussell et al. found that race and socioeconomic status were strongly related to how long residents were displaced.

...One quarter of white residents had returned to the city within 2 months of Hurricane Katrina, whereas it took an additional month for one-quarter of the black residents to return. The durations at which half of the pre-hurricane population of blacks and whites returned to New Orleans differ greatly. In particular, half of white residents had returned within 3 months of the storm; on the other hand, fewer than half of black residents had returned by the time of the survey which occurred 14 months after the hurricane.¹⁴

Education—the indicator of socioeconomic status used—also showed a strong relationship in duration of displacement.

In addition to these findings, Fussell et al. ran another model: a hazard model regression analysis of return migration. Their first two models within the regression analysis show the effect of race and education alone, both of which are statistically significant as lone variables. The third model shows the two variables simultaneously. Within this model, the effect of education declines and is no longer statistically significant. The effect of race on return migration also declines but is still statistically significant. The final model in their research added a housing damage variable. This model showed that there was a strong association between housing damage and return migration and the effect of race diminished and was no longer significant. However, it should be noted that within the sample housing damage was significantly higher for blacks than for non-blacks. This allowed for the conclusion that housing damage was the major factor in slowing the return of residents to New Orleans following Katrina especially among black residents and those with low

¹⁹ Hunter, L.M. 2005. Migration and environmental hazards. *Population and environment*.

socioeconomic status. The research done by Fussell et al. helps conceptualize the factors behind socially vulnerable populations such as racial and ethnic minorities and the difficulties re-entering their city of origin following a disaster event. However, there have been some disparities between ethnic minority groups when it comes to the ability to return migrate.

2.10. Differences Between Ethnic Minorities in Re-Entry

Prior research on return migration to New Orleans following Hurricane Katrina has shown differences in likelihood to return to the city between racial and ethnic minorities, with Vietnamese Americans being more likely to return than African Americans^{11,20,21}. Li et al. has similar findings in research done on return migration of African Americans and Vietnamese Americans in an eastern New Orleans neighborhood²². It was found that Vietnamese Americans within the study area returned both earlier and in greater capacity than African Americans in the study area. It was also shown that the intended return rate was higher for Vietnamese Americans when compared to African Americans in the study area¹⁷. The researchers noted that one of the key reasons for the earlier return for Vietnamese Americans was due to the social ties derived from the church, which also functioned as the center for all of the rebuilding logistics. These social ties within the community extend to post-Katrina confidence about the perceptions of their neighborhoods, as African American women ranked lowest on this particular measure (47.8%) and African American men being the next lowest (57.2%). Conversely, Vietnamese American women and men ranked far higher (79.6% and 80.4%, respectively). The increased confidence and tighter social networks may have contributed to the higher return rates for the Vietnamese Americans after Katrina¹⁷.

²⁰ Elliott, J.R. and Pais, J. (2006). Race, class, and Hurricane Katrina: Social differences in human responses to disaster. *Social Science Research*

²¹ Groen, J.A., & Polivka, A. (2008). Hurricane Katrina evacuees: Who they are, where they are, and how they are faring. *Monthly Labor Review*.

²² Li, W., C.A. Airriess, A.C. Chen, K.J. Leong, and V. Keith. (2010). "Katrina and Migration: Evacuation and Return by African Americans and Vietnamese Americans in an Eastern New Orleans Suburb." *The Professional Geographer*

Chapter 3: Review of Existing State and County/Parish Re-Entry Plans

3.1. Re-Entry Plan Review Method

A sample size of 15 plans were acquired based on availability through published re-entry plans on the Internet. A total of four State re-entry plans and 11 county-level plans were selected and reviewed. Plans were selected based on location, with emphasis being placed on coastal areas due to the recurring requirement to issue evacuation orders in advance of hurricanes making landfall. In addition, two west coast plans, as well as one mid-west plan, were included to ensure some geographic dispersion and account for exposure to hazards other than hurricanes. Each plan was reviewed with emphasis placed on structure, credentialing, individuals or groups responsible for making decision regarding re-entry, criteria used on the decision making processes, phased levels of re-entry, vehicle placards, and other aspects of re-entry that may be of value to emergency managers.

3.2. Re-Entry Plans Structure

The re-entry plans reviewed followed to some extent the basic format established in the Comprehensive Preparedness Guide 101 published by FEMA²³. They are all operational plans that provide an overall description of the plan's purpose (15 plans), roles and responsibilities (10), situations and assumptions (13), and concept of operations (13). After reviewing all plans, it was clear that some plans borrowed content from other plans as the structure and wording were very similar. This is actually a sound practice and encouraged by the National Incident Management System (NIMS), where the sharing of best practices is very common.

²³ FEMA. (2010). Developing and Maintaining Emergency Operations Plans: Comprehensive Preparedness Guide (CPG) 101. Version 2.0. *DHS*.

3.3. Credentialing

Two of the four State plans reviewed (Georgia and Washington) maintained their own credentialing system at the State level. Georgia’s credentialing system, named the “Georgia Critical Workforce Disaster Re-Entry Permits”, issues credentials to critical infrastructure owners and operators based on recommendations from the County. Businesses requesting access to the credentials must have a regional or statewide responsibility with emphasis placed on energy supply and distribution; water and waste water; and wholesale and retail food supply and distribution. The State of Washington has a similar program called “Business Re-Entry Registration.” Similar to Georgia, credentials are issued based on recommendations from the local counties. The criteria is based on their business being designated as one of the 16 recognized critical infrastructure sections by the U.S. Department of Homeland Security, insurance providers, and any business with a justifiable need to access infrastructure to preserve critical business functions.

One of the more developed credentialing programs is operated by Jefferson Parish in Louisiana. Following Hurricane Katrina, the parish developed the JumpStart Jefferson Business Continuity System that allows businesses to register their information, be assigned a tier level for re-entry access, and receive an authorized placard. Jefferson Parish has over 30,000 businesses, and many of them have joined the program. Following Hurricane Gustav in 2008, the parish implemented their re-entry plan for registered businesses within 24 hours with resounding enthusiasm from the participants²⁴. Nueces County in Texas also has a credentialing system; however, it is geared towards essential personnel pre-identified to access the county once the re-entry process has been initiated.

3.4. Re-Entry Authorization Decision

Plans were examined to determine if they identified a person or group that is ultimately responsible for making the determination to authorize re-entry. Four of the plans (Horry County, SC; Larimer County, CO; Vance County, VA; San Diego County, CA) identified the group responsible for making the decision. In all four plans, the unified command group, or similar policy making body,

²⁴ GovTech. (2011). Re-Entry Plans Aid Repopulation. www.govtech.com

is authorized to initiate the re-entry plan. The other 11 plans did not mention specifically who makes that decision. In identifying the group responsible for the decision, the plans failed to mention all the criteria that will be used in how the decision will be determined and made.

3.5. Re-Entry Decision Criteria

Six of the plans reviewed provided some guidance on what factors need to be considered when making a determination on when to authorize re-entry. Two of the State plans (Louisiana and Washington) establish criteria for consideration, as do four of the county plans (Charleston County, SC; Larimer County, CO; San Diego County, CA; Dorchester County, SC). All six plans identify the accessibility of roads as being a major consideration. The primary issue with the roads is focused on debris and making sure areas open for re-entry are traversable and safe for those being authorized access. The second most identified criteria is to ensure there are no threats to public health, which five of the plans use as part of their criteria. A criteria integrated into three of the plans is the stabilization or ceasing of search and rescue operations. The primary consideration with search and rescue is to ensure those being allowed to re-enter do not interfere or impede search and rescue operations. Other considerations include removal of the threat to include flooding (three plans) and wildfires (two plans); status of utilities and sufficient services to sustain the population (three plans); no threats to public safety (two plans); availability of food for remaining and authorized citizens for re-entry (two plans) and status of public works (one plan). While identifying criteria to consider, the plans fail to establish a baseline for using the criteria of the identified system to make the determination on re-entry.

3.6. Phased Levels of Re-Entry

Recognizing that some functions and capabilities have higher priorities over others, most of the plans that have been reviewed have a tiered re-entry process. Of the 15 examined, only three of the plans (Vance County, VA; State of Virginia; and San Diego, CA) did not identify a tiered process to determine priority on re-entry. However, of those three, San Diego authorizes the unified command to establish a phased process for re-entry. In doing so, it provides a sequential list of five priorities that should be taken into consideration when making the decision to establish

a phased re-entry: 1) Safety; 2) Security; 3) Damage Assessment; 4) Restoration of Services; and 5) Communication of Information.

Generally speaking, most of the plans reviewed have three phases that they authorize for re-entry. The FEMA course on Evacuation and Re-Entry Planning identifies the three phases as Closed; Limited; and Open. Based on the review of the 15 plans, that is a fair assessment. The first phase, described as “closed”, usually includes emergency operations, such as search and rescue and restoration of critical services such as electricity. The second phase, which is considered “limited,” authorizes access to residents, businesses, medical staff, insurance agents, and disaster relief workers. Finally, the third phase, also called “open”, allows access to the disaster area with few restrictions. This can include contractors and repair services.

While the majority of the 15 plans included three phases, four of the plans (Charleston, SC; Larimer County, CO; Nueces County, TX and Dorchester, SC) have pre-reentry teams. The pre-reentry team’s primary focus is to clear access to critical facilities. The four plans identify law enforcement officials as part of the pre-reentry for security, as well as power crews, public works, EMS and fire personnel. One plan, Nueces County, has pre-reentry exclusively for search and rescue; while Jefferson Parish doesn’t have a dedicated pre-reentry phase, the parish authorizes immediate and unrestricted access to search and rescue personnel as soon as the conditions permit for safe operations.

For Phase 1, there are a total of 22 different classes of personnel that are authorized to proceed with re-entry. The most common personnel authorized include infrastructure restoration and utilities repair (12); damage assessment teams (11); search and rescue (6); public works (5); fire personnel (4); debris removal (4); state and local response teams (3); medical staff (3); facility and industry pre-identified emergency response teams (3); and disaster relief personnel providing mass care services (2). Phase 2 identifies 36 different classes, with the most predominant groups being disaster relief workers (8); medical personnel (7); insurance agents (6); large box stores (6); fuel distributors (6); financial institutions (6); food suppliers and distributors (6); commodity points of distribution teams (5); hotel/motel staff (4); and utility restoration (4). Phase 3 personnel include businesses not authorized access in Phase 2 (8); and residents and property owners (5). Finally,

one plan (State of Georgia) includes a Phase 4 which is limited to the general public with limited access. While the other plans do not identify a Phase 4, essentially once a mandatory evacuation is rescinded, the jurisdiction is open to the general public.

3.7. Placards

Placards represent unique identifiers that are placed in the window of a vehicle to provide proof that the individual in the vehicle is authorized access within their designated phase of re-entry. In order to acquire access to the placard, businesses are required to pre-register with the jurisdiction. Five of the plans reviewed required placards to be issued to pre-registered businesses or emergency personnel. Recognizing that some businesses may have a presence in more than one jurisdiction, Jefferson Parish, along with its counterpart parishes in the Greater New Orleans area (Orleans, Plaquemines, and St. Bernard) also provides a regional placard for businesses with multiple locations.

3.8. Other Considerations for Re-Entry

In reviewing the re-entry plans, in addition to the elements identified above, some of the plans included aspects of re-entry that may be relevant for other jurisdictions. Jefferson Parish includes a policy called “Look and Leave.” This was actually implemented after Hurricane Katrina, and it authorized citizens to enter the parish shortly after Hurricane Katrina in order to assess the damages to their homes, as well as pick up any items that they wanted to retrieve from their residences. Another element of interest is that some of the plans (3) limit the phased re-entry to daylight hours only, while others include provisions for implementing curfew (6).

Chapter 4: Integration of the Security, Water, Electricity, Accessibility, Telecommunications (SWEAT) Infrastructure Assessment Tool

4.1. SWEAT Background Information

The SWEAT Infrastructure Assessment tool traces its origins back to Operation Enduring Freedom and Operation Iraqi Freedom. As combat operations transitioned to stability and support operations, the military was tasked with winning the hearts and minds of the Afghani and Iraqi people. One of the methods to facilitate the winning over the populace, in addition to providing security, is to restore and improve infrastructure capabilities of the towns and villages that the military was engaging. Combatant commanders needed to understand the infrastructure capacity of each village in order to make decisions and allocate resources on improving the infrastructure in areas of their responsibility. To assist combatant commanders, the U.S. Army Corps of Engineers devised the SWEAT tool (which was the common name), or Infrastructure Reconnaissance (correct military name)²⁵. The tool provided commanders with a quick overview of the infrastructure for each town and village for which they had responsibility.

The SWEAT tool initially stood for Sewage, Water, Electricity, Academics, and Trash. Each of the five areas were assessed on a color code of black (indicating no capability or capacity), red (indicating very limited capability), amber (indicating functioning but not at full capacity), and green (indicating a function capability). These assessments enabled combatant commanders to quickly establish situational awareness of the towns and villages within their area of operations.

4.2. Transitioning SWEAT to U.S. Domestic Operations

Hurricane Katrina made landfall on the coast of Louisiana during the morning of 29 August 2005. By 30 August 2005, the Secretary of Defense authorized the use of Title 10 forces (active duty soldiers) to support the Department of Homeland Security and the Federal Emergency Management Agency. In response, the U.S. Northern Command stood up Joint Task Force –

²⁵ U.S. Army Engineer School. (2005). The SWEAT/IR Book Version 2.1. *Army Corps of Engineers*.

Katrina (JTF-Katrina) to provide disaster relief efforts associated with Hurricane Katrina in order to save lives, mitigate human suffering and restore critical services²⁶.

Since their mission included the requirement to “restore critical services,” JTF-Katrina needed a way to understand the status of infrastructure in Louisiana, Mississippi and Alabama. Having integrated the SWEAT tool in Afghanistan and Iraq, combat veterans in the task force quickly adopted and modified the tool to support domestic civilian operations. They adjusted the SWEAT acronym from “Academics” to “Accessibility” so they could assess the status of roads. They also changed the “Trash” element to “Telecommunications” in order to track the ability to restore land and cellular services. In addition, they added an “M” (SWEAT-M) to represent “Medical Emergency Services.” The adaptation and adoption of SWEAT was regarded as a successful demonstration of using a military application and transitioning it to support civilian operations. The SWEAT tool was adopted by FEMA and began being integrated into its normal operations. At the conclusion of response operations from Hurricanes Katrina and Rita, SWEAT was recognized as a best practice and lesson learned²⁷. The Initial Response Hotwash indicates that the SWEAT tool was being used by the FEMA Principle Federal Official by September 13, 2005 in New Orleans. By this time, the SWEAT acronym had been adjusted again to reflect “S” being transitioned from “Sewage” to “Security.”

4.3. Integration of SWEAT into Re-Entry Decisions in Louisiana

Hurricane Katrina presented significant challenges to Federal, State and local emergency managers, not only in the affected area but also in the non-affected areas. Traditionally, when evacuations are ordered, host cities have expectations of providing sheltering and relief to evacuees for 36 to 48 hours. After Hurricane Katrina, New Orleans’ infrastructure was devastated. Most of the city was without power, its health care infrastructure was inoperable and its housing inventory was significantly impacted, with 71.5% of the city’s housing units damaged and 55.9% of those

²⁶ Honore, R. a. (2006). Joint Task Force Katrina: "See First - Understand First - Act First.". *Journal of the Department of Operational Art and Campaigning*

²⁷ FEMA. (2006). DHS/FEMA Initial Response Hotwash: Hurricane Katrina in Louisiana, DR-1603-LA. *FEMA*.

categorized as major or severely damaged²⁸²⁹. With New Orleans unable to accept evacuees back into the city, host cities were left struggling with the large influx of evacuees being cared for in shelters that were meant to be for a short duration. This was further hampered by the fact that some of the facilities being used to house evacuees were revenue generating facilities for the host cities. In Baton Rouge, evacuees were being housed in the River Center, a major conference site for the city. Evacuees remained there until 15 October 2005, over six weeks after Hurricane Katrina made landfall. In addition to the loss of \$100,000 in revenues for cancelled events, Baton Rouge had to invest over \$500,000 to restore the facility before it could be used again to support revenue generating events³⁰.

This also led the State of Louisiana to establish a shelter depopulation plan to augment re-entry into the evacuated areas. The State now establishes a priority for closing shelters, with the primary emphasis being placed on returning evacuees from out of state. For in-state shelters, the priority of depopulation is focused on: 1) revenue generating facilities; 2) universities and schools; and 3) non-revenue generating state supported facilities. This new plan was tested three years later when Hurricane Gustav initiated, for the first time, an evacuation order of the entire Louisiana Gulf Coast. While the evacuation was considered a success, issues with re-entry surfaced when the City of New Orleans wanted to delay the return of its citizens. Concerned about the capacity of its infrastructure, including limited medical facilities and power outages, the city wanted to delay re-entry as long as possible. Neighboring parishes began allowing re-entry two days before New Orleans publicly declared a re-entry date, and all of the parishes in the region were allowing re-entry a full day before New Orleans. Eventually, under immense pressure, the City relented and allowed everyone to re-enter the city at the same time as its adjacent parishes (Carr, 2008).

Because of the inability of parishes within the Greater New Orleans area to come to an agreement on a coordinated and planned re-entry process, the State of Louisiana adjusted its plans to establish criteria and situational awareness for each parish that evacuated their citizens. They implemented a plan that operated on the assumption that it would become increasingly difficult for a parish to

²⁸ U.S. Department of Homeland Security. (2006). Current Housing Unit Damage Estimates: Hurricanes Katrina, Rita and Wilma. *www.huduser.org*

²⁹ Associated Press. (2005). Some New Orleans Residents Can Return Home. *NBC News*

³⁰ Maggi, L. (2005). River Center Shelter Slated to Close this Week. *NOLA.com*

prevent re-entry after 72 hours of non-hazard conditions. The State established four Mission Levels in which a parish can report its capacity to accept evacuees. Parishes in Black status are unable to initiate re-entry due to ongoing lifesaving missions and/or possible extreme danger exists. To help make the determination in regard to the status of infrastructure, the State adopted a modified version of SWEAT, called SWET. SWET represents sewerage, water, electricity and telephone. The State developed infrastructure status boards in the resource request/situation awareness tool called WebEOC through which parishes can report their infrastructure status. This marks the first time that SWET was integrated as a decision tool for re-entry. Parishes in a Red status may be conducting lifesaving missions and life sustaining missions. Re-entry for these parishes will be limited to essential personnel. Parishes in Yellow status are expected to be in life sustaining and recovery operations, and approving the return of general population evacuees. Finally, in Green status, parishes are able to accept Critical Transportation Needs (CTN) evacuees within 12 hours. CTN evacuees represent individuals who are unable to evacuate themselves due to financial constraints, vehicle constraints or physical constraints³¹. While not a full integration of SWEAT as a decision tool, this represents a significant step forward to providing jurisdictions with a situational awareness tool to help articulate the current status of its infrastructure and its ability to initiate re-entry operations.

4.4. Establishing a Baseline for the SWEAT Assessment Tool to be used as a Decision Support Tool for Re-Entry Scenarios

4.4.1. Method

The SWEAT analysis tool is currently being used to help decision makers understand infrastructure conditions for jurisdictions impacted by disasters. FEMA used it in Louisiana during the August 2016 floods in the Greater Baton Rouge and Lafayette areas, and it routinely appears in exercises that FEMA participates in to assist exercise players in understanding notional damages to their jurisdictions for the event. While the SWEAT tool is being leveraged for post damage assessments following a disaster, it's not being fully utilized to determine the suitability of a jurisdiction to initiate re-entry operations. To develop a baseline on infrastructure capacity and

³¹ Dawson, A. (2018). Interview with Operations Branch Manager. *B. Mitchell*

capabilities using SWEAT as a tool, this research reached out to 38 full-time, experienced, state and local emergency managers in Louisiana to seek their input on the criticality of each category in the SWEAT tool, and at which capacity level it should be functioning at prior to making the decision to allow re-entry back into a jurisdiction. Twenty-three responses were received and used for analysis. The survey asked each recipient if they have been involved with the issuance of an evacuation order within the last five years. It also asked about their knowledge of the SWEAT assessment tool. The survey then asked them to rate the criticality of each of the SWEAT categories in its expanded form, which included 25 categories. This question used a 5 point Likert scale, with 5 being very important; 4 being important; 3 being fairly important; 2 being slightly important, and 1 being not important. The recipients were also asked to rank the same 25 categories using a FEMA scale of Emergency Status, Warning Status, or Good Status. Emergency Status represents infrastructure at very limited or not capacity; Warning Status represents infrastructure at reduced capacity; and Good Status representing infrastructure at full capacity. Finally, the survey asked each recipient to rate each category as a percentage of minimum functioning capacity at which the infrastructure should be operating in order to allow re-entry. Because this question provides an actual status of capacity, it is being relied on for post survey analysis. The last two questions were converted to numerical values so that a quantitative analysis could be conducted and each of the categories ranked based on the responses provided by the participants.

4.4.2. Survey Results

Table 1: Results from survey of State and local emergency managers in the State of Louisiana with each value representing the average score for each of the infrastructure categories in the SWEAT Critical Infrastructure Assessment Tool.

Major Category	Function	Importance 1 to 5 Scale	FEMA Categories 1 to 3 Scale	Capacity as a Percentage 1 to 5 Scale
Security	Police	4.94	2.81	4.50
	Fire	4.94	2.81	4.50
	Hospitals	4.81	2.50	4.06
	EMS	4.93	2.81	4.38
	EOC	4.75	2.56	4.06
Water	Water Systems	4.31	2.19	3.63
	Sewage	4.38	2.31	3.75
Electricity	Electricity	4.00	2.13	3.19
	Fuel	4.00	2.00	3.31
Accessibility	Pipelines	2.81	1.44	2.00
	Airports	2.43	1.38	1.69
	Marine Traffic	2.47	1.25	1.69
	Transit	2.71	1.44	1.88
	Road & Bridges	4.63	2.44	3.81
	Rail	2.13	1.50	1.75
	Schools	2.75	1.63	2.56
	Government Offices	3.25	2.00	2.63
	Commercial Buildings	3.00	1.94	2.50
	Shelters	3.67	2.31	3.31
	Debris	4.25	2.31	3.56
	Telecommunications	Landlines	2.38	1.69
Cellular		4.13	2.31	3.56
9-1-1		4.94	2.81	4.31
Broadcast Radio		3.81	2.06	3.31
Broadcast TV		3.69	1.94	2.88

4.4.3. Analysis

Based on the input provided by the professional emergency management community in Louisiana, the following observations were made:

Observation 1: Emergency managers place security as a very high priority. In terms of infrastructure, security also represents public safety and ensuring the well-being of citizens once they return back to their homes. Ensuring that a jurisdiction has the ability to provide emergency services is a critical function, and establishes that emergency managers want to ensure that they have the capacity to respond to any type of emergency to ensure the well-being of their citizenry.

Observation 2: Accessibility as a whole is the least critical function that needs to be fully restored post disaster in order to facilitate re-entry. Many of the functions within the accessibility category are related to the private sector, which doesn't necessarily have a significant impact on the ability of the parish to sustain its populations. As expected, roads and bridges garnered the highest criticality in the group, followed by debris removal. Both of these functions have been identified as critical in the re-entry process from the review of the re-entry plans.

Observation 3: Water and sewer system functionality are rated very high by the emergency managers. Being able to provide drinkable / potable water is critical to allowing the resumption of normal activity. Having a functional sewage system is even more critical. Based on the score for the importance of these functions, they don't necessarily translate into capacity requirements, as the emergency managers indicated they are willing to be at reduced capacity to allow their citizenry to return.

Observation 4: The telecommunications function is deemed to be fairly critical for emergency managers, with 9-1-1 services being an essential function. Radio being more highly regarded than TV is interesting, considering that TV usually reaches a larger audience. Cellular services being significantly higher than landlines is not surprising as landline use continues to decline. This also demonstrates the heavy reliance on cellular phones and data to which the citizenry has become accustomed. Only one county (Fairfax, VA) mentioned cellular companies by name as critical in allowing re-entry access. Based on the shifting habits of the citizenry, jurisdictions may want to place more emphasis on working with the private sector vendors to ensure they have the access they need to begin restoration of their infrastructure post disaster.

Observation 5: Electricity capacity for both electricity and fuel appear to be a little low. Nearly all of the re-entry plans identify electricity restoration at the very top of their re-entry plans. It's worth noting that these values represent the minimal capacity levels in which the emergency managers would allow re-entry to begin, so not having them at full capacity can be partially explained.

Observation 6: For all but one of the functions, the importance value is higher than the percent of capacity, with landlines being the lone standout. This can be interpreted as that while they believe that particular function is very important for purposes of re-entry, it doesn't have to be functioning at full capacity in order for a decision to be made regarding the initiation of re-entry.

Observation 7: While not captured in the table, in regards to the question of whether or not Emergency Managers are familiar with the SWEAT assessment tool, nearly all the state based emergency managers were familiar with the SWEAT tool; however, only one parish emergency manager was familiar with it. When asked how they knew about SWEAT, the parish emergency manager stated that they were an Engineer in the Army National Guard and was familiar with it through the military. This indicates a potential breakdown in the State's re-entry plan, as the parishes do not appear to be fully educated about their plan and its concept.

Observation 8: When the functions are placed in descending order, the top ten functions when using the percentage of functioning capacity rates are as follows: 1) Police; 2) Fire; 3) EMS; 4) 9-1-1; 5) Hospitals; 6) EOC; 7) Road and Bridges; 8) Sewage; 9) Water; and 10) Debris. With the potential exception of Hospitals and EMS, these are areas that emergency managers have the ability to influence through the request of resources via mutual aid and/or State assistance. While these are the most critical functions, these are also the functions that the emergency manager is most likely going to be able to prioritize and re-constitute. Being able to quickly assess these capabilities in order to determine their status will be critical in facilitating the re-entry process.

Chapter 5. Conclusion and Recommendations

This study began with three objectives:

Objective 1: Determine the current state of re-entry research in the academic community through an investigation of existing research.

Objective 2: Investigate and understand the types of re-entry programs currently in practice through a thorough review of existing re-entry operation annexes at the State and local levels of government.

Objective 3: Investigate the current use of the SWEAT Infrastructure Assessment tool during the response and initial recovery phases of a disaster in order to assess the applicability of SWEAT serving as the basis for a framework for re-entry.

Through the research, it has been determined that there exists no research assessing the decision making process for re-entry following an evacuation. The limited research that exists is focused primarily on the evacuating family and the understanding of their risk perception, how they receive re-entry communication from the jurisdiction they evacuated from, information sources and trusted authorities regarding re-entry, and vulnerabilities within socially vulnerable groups. While this information is very useful to an emergency manager in the development of messaging to reach their evacuees, it does not provide an understanding about the criteria and the process that is used to ultimately make the decision to issue a return entry order.

The review of 15 existing re-entry plans was very helpful in understanding the approach that State and local jurisdictions are taking in regards to re-entry. These provided valuable insights on the resources that emergency managers prioritize, and what emergency functions are critical in returning jurisdictions to a sustainable state that will support their populations. The information gathered through this research can be leveraged to develop a model re-entry plan that jurisdictions can use to update their current plan or write and adopt their first re-entry plan.

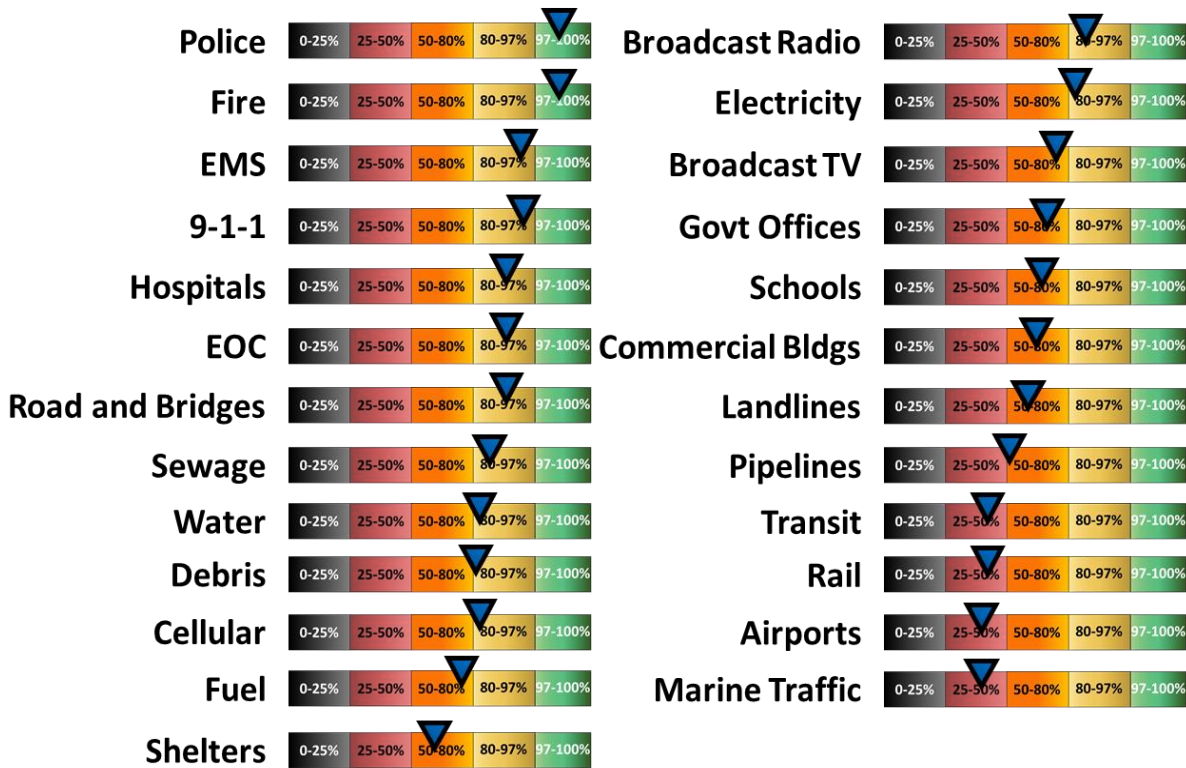


Figure 1 Recommended Priority of Effort and Target Operational Capacity Levels for each infrastructure function.

Finally, a review of the evolution of SWEAT as a tool used by Combatant Commands in combat zones to a tool that has been fully integrated into disaster management practices lends itself to the further implementation of the SWEAT infrastructure assessment to enhance decision making capabilities post-disaster. While this research has just scratched the surface on integrating this tool for emergency managers in the re-entry process, with additional research and enhancements, it can be used as a guide to help emergency managers systemically think through the re-entry process while having a priority of effort already established, along with a target to achieve prior to authorizing re-entry. Figure 1 reflects a summary of the survey results ranking the functions by criticality. They also provide a target outcome of what capacity each function should be operating at prior to re-entry.

This study represents an initial step forward a beginning to understand and evaluate the decision making process and operational concepts of the re-entry process. While by no means it is comprehensive, it does attempt to address a gap that the currently exists within the disaster management community from a practitioner and research perspective. While the path forward has begun, additional research is needed to make this a complete product.

Recommendation 1: The review of re-entry plans needs to be expanded to ensure a more comprehensive understanding of the existing practices. Current plans are heavily focused on coastal states, and any future reviews should include states located in the mid-west, as well as additional states on the west coast where wildfires are a more prevalent threat and produce their own unique challenges in regards to re-entry.

Recommendation 2: With an expansion of the plan review and more integration of jurisdictions faced with a wildfire hazard, data compiled from a future review should be leveraged to build a comprehensive model re-entry plan. The plans reviewed for this project indicate there is no consistent format, although many have been clearly borrowing content and concepts from other emergency managers. Developing consistency through a model plan would help ensure better integration and better preparation as everyone will be operating off of similar concepts.

Recommendation 3: Surveys of additional emergency managers need to be included to capture a broader representation of the profession. This study focused on Louisiana because of experience, as well as accessibility; however, in order to be a resource that the entire community can leverage, it will need to be more engaging of other areas throughout the United States.

Recommendation 4: Based on the plans reviewed, it was clear that many jurisdictions place high value on certain businesses that are necessary to expedite the recovery. However, when the emergency managers rated the importance of commercial buildings, it appeared in the bottom 30% of the functions. This category needs to be better defined in order to reflect the criticality of Big Box Stores, food suppliers and distributors, commercial contractors and other businesses that are essential in helping jurisdictions recover.

Recommendation 5: Based on the plan reviews, over 75% of the participating jurisdictions incorporated a phased re-entry. The capacity of each function needs to be reviewed, and a minimum baseline established, for each of the three phases normally observed in current re-entry plans.

Recommendation 6: To be more useful to emergency managers, each of the 25 functions needs to be defined, and definitions established on what operational capacity means for each function. This will greatly enable emergency managers to better plan for restoration and identify any gaps that may be present in trying to restore a particular function.

Recommendation 7: In the last three years, there have been several major disasters that have allowed emergency managers to gather operational experience in evacuation and re-entry. During Hurricane Irma, 62 counties issued evacuation orders in Florida; in Texas, 33 counties issued evacuation orders during Hurricane Harvey. There have also been several major evacuations issued for wildfires, including California in December 2018 and Tennessee in 2016 when Gatlinburg was nearly burned down. These emergency managers will have great insight, and their opinions and lessons learned will be critical in better understanding the re-entry process.

Appendix A: Re-entry Survey

The Stephenson Disaster Management Institute at LSU is conducting a survey of Emergency Managers to determine how decisions are made for Return Entry (Re-Entry) post evacuations. The title of the survey is “Infrastructure Assessment Tool to assist Decision Makers in making Re-Entry Decisions.” There are no risks and there are no benefits for participating in the study. For this survey, you may refuse to answer any question or end the survey at any time. Any information you provide will not be attributed to you and you will remain anonymous. In any written research/publication you will only be referred to by the level of government you represent (ex: a local government emergency manager indicated....) or by the type of agency you represent (a member of the National Guard indicated...). This survey will take approximately 10 minutes to complete.

If you are willing to participate, please proceed with the survey.

1. Name of Emergency Manager: _____
2. What is the name of your jurisdiction? _____
3. What is the name of your agency? _____
4. What is your current employment status for your organization?
 - a. Full-Time
 - b. Part-Time
 - c. Volunteer
5. How many year of experience do you have in Emergency Management?
 - a. 0 to 5 Years
 - b. 6 to 10 Years
 - c. 10 to 20 Years
 - d. 20 or more Years
6. Which form of government do you represent:
 - a. Federal Government
 - b. State Government
 - c. Parish/County Government
 - d. Municipal Government

****If Parish/County or Municipal Government, please proceed to question 7. If State or Federal, please proceed to question 14.****

7. Has your jurisdiction issued an evacuation order in the last five years for a natural disaster?
 - a. Yes

b. No

****If Yes, please proceed to question 8. If no, please proceed to question 14.****

8. How many evacuation orders for natural disasters were issued in your jurisdiction over the last five years?

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5 or more

9. For each order issued, please describe the type of event (flood, hurricane, tornado, or other) and the type of evacuation issued (voluntary or mandatory)

- a. Evacuation 1: _____
- b. Evacuation 2: _____
- c. Evacuation 3: _____
- d. Evacuation 4: _____
- e. Evacuation 5: _____

10. For each evacuation order that has been issued, did your jurisdiction issue a return entry (re-entry) order?

- a. Evacuation 1: _____
- b. Evacuation 2: _____
- c. Evacuation 3: _____
- d. Evacuation 4: _____
- e. Evacuation 5: _____

11. When the order for re-entry was given, was there any damage to infrastructure in your jurisdiction?

- a. Yes
- b. No

12. Who in your jurisdiction made the determination of when to authorize re-entry?

- a. Emergency Manager
- b. Parish/County President
- c. Mayor
- d. Sheriff
- e. Other: _____

13. Would you be willing to answer additional questions specific to the evacuation and re-entry process for evacuations issued in your jurisdiction?

- a. Yes
- b. No

14. Are you familiar with the Security, Water, Energy, Accessibility, and Telecommunications (SWEAT) Infrastructure assessment tool used to provide an operational assessment of major infrastructure within a jurisdiction?
- Yes
 - No
15. Has your jurisdiction ever incorporated the SWEAT tool in analyzing post-disaster status of infrastructure in your jurisdiction?
- Yes
 - No

16. On a scale of 1 to 5, please indicate how important having each of the following infrastructure categories at or near full capacity is in influencing the decision to allow citizens to return from an evacuation order. For the purpose of ranking each category, please use the following definitions for each value:

- 5 = Very Important
- 4 = Important
- 3 = Fairly Important
- 2 = Slightly Important
- 1 = Not Important

a. Security – Police	1	2	3	4	5
b. Security – Fire	1	2	3	4	5
c. Security – Hospitals	1	2	3	4	5
d. Security – EMS	1	2	3	4	5
e. Security – EOC	1	2	3	4	5
f. Water – Water Systems	1	2	3	4	5
g. Water – Sewage	1	2	3	4	5
h. Energy – Electricity	1	2	3	4	5
i. Energy – Fuel	1	2	3	4	5
j. Energy – Pipeline	1	2	3	4	5
k. Accessibility – Airports	1	2	3	4	5
l. Accessibility – Marine Traffic	1	2	3	4	5
m. Accessibility – Transit	1	2	3	4	5
n. Accessibility – Roads & Bridges	1	2	3	4	5

o. Accessibility – Rail	1	2	3	4	5
p. Accessibility – Schools	1	2	3	4	5
q. Accessibility – Govt Offices	1	2	3	4	5
r. Accessibility – Commercial Building	1	2	3	4	5
s. Accessibility – Shelters	1	2	3	4	5
t. Accessibility – Debris	1	2	3	4	5
u. Telecom – Landlines	1	2	3	4	5
v. Telecom – Cellular	1	2	3	4	5
w. Telecom – 9-1-1	1	2	3	4	5
x. Telecom – Broadcast Radio	1	2	3	4	5
y. Telecom – Broadcast TV	1	2	3	4	5

17. FEMA has used the SWEAT Infrastructure Assessment Tool in previous events to provide an overall assessment for jurisdictions post-disaster. When assessing each category of infrastructure, FEMA uses a broad classification of Emergency, Warning, or Good. Each classification can be loosely defined as the following:

Emergency: very limited or no capacity/capability exists to provide this function

Warning: Reduced capacity/capability exists to provide this function

Good: Adequate or full capacity/capability exists to provide this function

Based on the above definition of Emergency, Warning, and Good, please indicate for each infrastructure category, what is the minimal level of capacity/capability that would need to be in place in a jurisdiction prior to authorizing evacuated citizens re-entry?

a. Security – Police	Emergency	Warning	Good
b. Security – Fire	Emergency	Warning	Good
c. Security – Hospitals	Emergency	Warning	Good
d. Security – EMS	Emergency	Warning	Good
e. Security – EOC	Emergency	Warning	Good
f. Water – Water Systems	Emergency	Warning	Good
g. Water – Sewage	Emergency	Warning	Good
h. Energy – Electricity	Emergency	Warning	Good
i. Energy – Fuel	Emergency	Warning	Good
j. Energy – Pipeline	Emergency	Warning	Good

k. Accessibility – Airports	Emergency	Warning	Good
l. Accessibility – Marine Traffic	Emergency	Warning	Good
m. Accessibility – Transit	Emergency	Warning	Good
n. Accessibility – Roads & Bridges	Emergency	Warning	Good
o. Accessibility – Rail	Emergency	Warning	Good
p. Accessibility – Schools	Emergency	Warning	Good
q. Accessibility – Govt Offices	Emergency	Warning	Good
r. Accessibility – Commercial Building	Emergency	Warning	Good
s. Accessibility – Shelters	Emergency	Warning	Good
t. Accessibility – Debris	Emergency	Warning	Good
u. Telecom – Landlines	Emergency	Warning	Good
v. Telecom – Cellular	Emergency	Warning	Good
w. Telecom – 9-1-1	Emergency	Warning	Good
x. Telecom – Broadcast Radio	Emergency	Warning	Good
y. Telecom – Broadcast TV	Emergency	Warning	Good

18. Finally, similar to the previous question but focused more specifically on operational capacity expressed as a percentage, please indicate what is the minimal level of capacity/capability that would need to be in place in a jurisdiction prior to authorizing evacuated citizens re-entry?

a. Security – Police 97-100%	0–25%	25-50%	50–80%	80-97%
b. Security – Fire 97-100%	0–25%	25-50%	50–80%	80-97%
c. Security – Hospitals 97-100%	0–25%	25-50%	50–80%	80-97%
d. Security – EMS 97-100%	0–25%	25-50%	50–80%	80-97%
e. Security – EOC 97-100%	0–25%	25-50%	50–80%	80-97%
f. Water – Water Systems 97-100%	0–25%	25-50%	50–80%	80-97%

g. Water – Sewage 97-100%	0–25%	25-50%	50–80%	80-97%
h. Energy – Electricity 97-100%	0–25%	25-50%	50–80%	80-97%
i. Energy – Fuel 97-100%	0–25%	25-50%	50–80%	80-97%
j. Energy – Pipeline 97-100%	0–25%	25-50%	50–80%	80-97%
k. Accessibility – Airports 97-100%	0–25%	25-50%	50–80%	80-97%
l. Accessibility – Marine Traffic 97-100%	0–25%	25-50%	50–80%	80-97%
m. Accessibility – Transit 97-100%	0–25%	25-50%	50–80%	80-97%
n. Accessibility – Roads & Bridges 97-100%	0–25%	25-50%	50–80%	80-97%
o. Accessibility – Rail 97-100%	0–25%	25-50%	50–80%	80-97%
p. Accessibility – Schools 97-100%	0–25%	25-50%	50–80%	80-97%
q. Accessibility – Govt Offices 97-100%	0–25%	25-50%	50–80%	80-97%
r. Accessibility – Commercial Building 97-100%	0–25%	25-50%	50–80%	80-97%
s. Accessibility – Shelters 97-100%	0–25%	25-50%	50–80%	80-97%
t. Accessibility – Debris 97-100%	0–25%	25-50%	50–80%	80-97%
u. Telecom – Landlines 97-100%	0–25%	25-50%	50–80%	80-97%

v. Telecom – Cellular 97-100%	0-25%	25-50%	50-80%	80-97%
w. Telecom – 9-1-1 97-100%	0-25%	25-50%	50-80%	80-97%
x. Telecom – Broadcast Radio 97-100%	0-25%	25-50%	50-80%	80-97%
y. Telecom – Broadcast TV 97-100%	0-25%	25-50%	50-80%	80-97%

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