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THESIS

**THE UNITED STATES COAST GUARD AND
SPONTANEOUS VOLUNTEERS: COLLABORATION OR
CHAOS DURING DISASTER RESPONSE**

by

Joshua R. Gilbert

June 2021

Co-Advisors:

Glen L. Woodbury
Lauren S. Fernandez (contractor)

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**THE UNITED STATES COAST GUARD AND SPONTANEOUS VOLUNTEERS:
COLLABORATION OR CHAOS DURING DISASTER RESPONSE**

Joshua R. Gilbert
Lieutenant, United States Coast Guard
BA, Ashford University, 2013

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June 2021**

Approved by: Glen L. Woodbury
Co-Advisor

Lauren S. Fernandez
Co-Advisor

Erik J. Dahl
Associate Professor, Department of National Security Affairs

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ABSTRACT

Spontaneous volunteers who conduct search and rescue (SAR) in the aftermath of major disasters are changing the emergency management landscape. This thesis explores ways in which the United States Coast Guard (USCG) could better engage organized spontaneous volunteers (OSV) who conduct maritime SAR during hurricane response operations. The research involves three exploratory case studies. In each case study, the organizational response of both the USCG and OSVs was examined according to the Disaster Research Center's four-fold typology of organized responses to disasters. The analysis identified specific factors of the USCG's organizational response that affected OSV engagement. Recommendations are made for the USCG to take on new or non-regular SAR tasks and to develop new organizational structures to respond effectively to maritime disasters. New organizational structures should also include OSV groups if the USCG desires to increase engagement during future hurricane response operations.

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LIST OF ACRONYMS AND ABBREVIATIONS

AMVER	Automated Mutual Assistance Vessel Rescue
CB	citizens band
CERT	citizen emergency response team
CHDS	Center for Homeland Defense and Security
COMSPAS	Space System for the Search of Vessels in Distress (Russian word)
DHS	Department of Homeland Security
DOD	Department of Defense
DoI	Department of Interior
DRC	Disaster Research Center
DSC	digital selective calling
ESF	emergency support function
FCDA	Federal Civil Defense Administration
FEMA	Federal Emergency Management Agency
GAO	Government Accountability Office
GEOINT	geospatial intelligence team
GIS	geographic information systems
HPD	Houston Police Department
ICAO	International Civil Aviation Organization
ICS	Incident Command System
IMO	International Maritime Organization
IMT	incident management team
MF/HF	medium frequency/high frequency
NFPA	National Fire Protection Association
NGA	National Geospatial-Intelligence Agency
NGO	non-governmental organization
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NPS	National Parks Service
NRF	National Response Framework
NRP	National Response Plan

NSP	National Search and Rescue Plan
NSS	National SAR Supplement
OGA	other governmental agencies
OpSail	Operation Sail
OSV	organized spontaneous volunteer
RCC	rescue coordination center
SAR	search and rescue
SARSAT	Search and Rescue Satellite-Aided Tracking
SMC	SAR mission coordinator
SRR	search and rescue region
SRU	search and rescue unit
UMIB	urgent marine information broadcast
US&R	urban search and rescue
USCG	United States Coast Guard
USNORTHCOM	U.S. Northern Command
VHF	very high frequency
VHF-FM	very high frequency-frequency modulated

EXECUTIVE SUMMARY

Spontaneous volunteers who conducted search and rescue (SAR) in the aftermath of major hurricanes, such as Katrina in 2005, Harvey and Irma in 2017, and Florence and Michael in 2018, are changing the emergency management landscape because they self-organize and conduct independent SAR operations. Additionally, organized spontaneous volunteer (OSV) groups are not well understood and official response organizations struggle to engage them effectively during disasters. These OSVs can and should be leveraged during disasters, as they provide a surge capacity to an already strained disaster response system. However, failure to understand how an official organization's response to disasters can affect the engagement and actions of spontaneous volunteers detracts from the overall disaster response effort, as official responders try to respond to the disaster itself and address the influx of spontaneous volunteers.

Spontaneous volunteers who emerge during disasters carry out many tasks that aid response and recovery operations. However, groups that self-organize and conduct independent SAR during hurricanes, such as the Cajun Navy, pose these same challenges for the United States Coast Guard (USCG) and other established SAR organizations. The USCG should embrace these challenges, learn from past events, and prepare for the ever-increasing influx of spontaneous volunteers by understanding how their own organizational response to disasters affects spontaneous volunteer engagement and actions to incorporate OSV groups better into future hurricane responses. Additionally, a surge in spontaneous volunteerism is not exclusive to hurricanes. Emergency management officials and emergency responders at all levels of government should be prepared for an influx of spontaneous volunteers during any disaster, and should also seek to understand how their own organizational response affects spontaneous volunteer engagement and actions.

While spontaneous volunteer motivations can vary, and an organized spontaneous volunteer response to disasters is often difficult to recognize and prepare for (especially as they embrace social media and other digital technologies to self-organize, communicate, and coordinate their actions), one thing is clear. Spontaneous volunteers are going to respond to disasters, yet spontaneous volunteer groups continue to be disregarded by

official response organizations, despite the value they may provide, or substantial effort is expended attempting to incorporate them into existing command and control systems.¹

Recent disaster research studies have highlighted that during disasters, a rigid top-down command and control process is routinely being substituted for a more collaborative model of response.² If official response organizations want to increase coordination efforts with spontaneous volunteers during future disaster response operations, they need a better understanding of how their own organizational response to disasters affects the coordination efforts and actions of spontaneous volunteers.

The research question for this thesis is: *How can the United States Coast Guard better engage organized spontaneous volunteers who conduct maritime search and rescue during hurricane response operations?*

To answer this research question, an exploratory case study methodology was used to analyze the organizational response of both the USCG and OSVs who conducted maritime SAR operations during Hurricane Katrina in 2005, Hurricane Harvey in 2017, and the Lower Manhattan Boat Lift on 9/11.

The studies were structured using the four tasks routinely carried out by the USCG during SAR missions: distress monitoring and communications, search planning and preparedness, SAR coordination, and SAR operations. Once SAR tasks were identified, an analysis was conducted to determine what factors contributed to or hindered the SAR response efforts of each organization. Additionally, the organizational response of both the USCG and OSVs was analyzed using the Disaster Research Center's (DRC's) four-fold

¹ Lauren M. Sauer et al., "The Utility of and Risks Associated with the Use of Spontaneous Volunteers in Disaster Response: A Survey," *Disaster Medicine and Public Health Preparedness* 8, no. 1 (February 2014): 65–69, <https://doi.org/10.1017/dmp.2014.12>; Joshua Whittaker, Blythe McLennan, and John Handmer, "A Review of Informal Volunteerism in Emergencies and Disasters: Definition, Opportunities and Challenges," *International Journal of Disaster Risk Reduction* 13 (September 2015): 358–68, <https://doi.org/10.1016/j.ijdrr.2015.07.010>.

² Russell R. Dynes, E. L. Quarantelli, and Dennis Wenger, *Individual and Organizational Response to the 1985 Earthquake in Mexico City, Mexico*, DRC Book and Monograph Series, no. 24 (Newark, DE: University of Delaware, Disaster Research Center, 1990), 115, <http://udspace.udel.edu/handle/19716/2259>; Nancy Casper, "Organizational Leadership's Impact on Emergent Behavior during Disaster Response and Recovery Operations" (master's thesis, Naval Postgraduate School, 2011), <http://hdl.handle.net/10945/5504>.

typology of organized responses to disasters. This analysis was used to identify specific factors of the USCG's organizational response that affected OSV engagement.

The DRC typology is a quadrant based on tasks (regular or non-regular tasks) and structures (existing or new). Based on the structures and tasks, Table 1 depicts four types of groups (established, extending, expanding, and emergent).

Table 1. DRC Typology of Organized Responses to Disasters.³

<u>Structures</u>	<u>Tasks</u>	
	Regular	Non-regular
Existing	Established	Extending
New	Expanding	Emergent

This DRC typology analysis was conducted by examining the SAR tasks identified in each case study to determine if they were regular or non-regular tasks for the organization carrying them out, as well as if the organizational structures used to carry out each SAR task were in place prior to the disaster, or if they were created as a result of the disaster itself. Ultimately, this DRC typology analysis led to a typology identification for each organization during each event. The intent of this analysis and typology identification was to ascertain if certain USCG organizational responses were more conducive than others were for engaging OSVs.

When the organizational response of both the USCG and OSVs was analyzed across all three case studies, several findings emerged:

³ Source: E. L. Quarantelli and Russell R. Dynes, *Different Types of Organizations in Disaster Responses and Their Operational Problems*, Preliminary Papers, No. 41 (Newark, DE: University of Delaware, Disaster Research Center, 1977), 2, <http://udspace.udel.edu/handle/19716/414>; Havidán Rodríguez, Joseph Trainor, and Enrico L. Quarantelli, "Rising to the Challenges of a Catastrophe: The Emergent and Prosocial Behavior Following Hurricane Katrina," *The ANNALS of the American Academy of Political and Social Science* 604, no. 1 (2006): 85, <https://doi.org/10.1177/0002716205284677>.

- Neither organization was able to respond to any of the disasters and perform maritime SAR functions as an established organization. This finding makes sense for OSV groups that do not conduct SAR tasks daily, where any SAR tasks undertaken are by default non-regular tasks for the group.
- OSV groups emerged as a direct result of the disasters themselves, which required their organizational structures to be developed on the spot, and according to the needs of each event.
- The fact that the USCG did not respond as an established organization to perform SAR tasks, which the organization conducts daily, during disaster response operations, was quite interesting. In all three case studies, the USCG had to take on non-regular tasks to carry out traditional SAR functions.
- The USCG took on new or non-regular tasks to carry out three of the four SAR tasks routinely carried out by the USCG during SAR missions, with the exception of search planning and preparedness, which the USCG conducted as a regular task prior to Hurricanes Katrina and Harvey.
- In two of the three cases studied, the USCG had to develop new organizational structures to carry out these non-regular tasks. According to the DRC typology of organized responses to disasters, if an organization takes on non-regular tasks and develops new organizational structures to carry out those tasks, it is then considered an emergent group. This finding is consistent with those of this research that identified the USCG as an emergent group during both the Lower Manhattan Boat Lift on 9/11 and Hurricane Harvey. However, what is unique is why the USCG became an emergent group during the lower Manhattan Boat Lift, by developing organizational structures external to the USCG and included OSVs, whereas during Hurricane Harvey, the USCG became an emergent group

by developing organizational structures internal to the USCG and did not include OSVs.

Ultimately, this research determined that the USCG is not able to respond effectively as an existing group to carry out SAR tasks during maritime disasters, and at a minimum, would need to conduct either new or non-regular tasks, or most likely, would need to create new structures to carry out new or non-regular tasks. The challenge is finding ways to integrate OSVs effectively into disaster response operations. The USCG can better engage OSVs who conduct maritime SAR during hurricane response operations by seeking out innovative and new ways to respond to disasters organizationally, with the goal of becoming an emergent group itself. As an emergent group, new organizational structures would be developed that include OSVs to carry out new or non-regular tasks as part of the emergent group transition process. While the notion of developing new organizational structures that include OSVs to enhance engagement during hurricane response operations seems simple, in reality, several barriers must still be overcome:

- First, the USCG responds to disasters as part of a national response strategy using the National Incident Management System. This system relies on the Incident Command System (ICS) to define roles and structures for responding organizations. The use of ICS is one of the major inhibitors of OSV engagement, and future studies should be conducted on the application and use of ICS during disaster response operations to develop strategies for incorporating OSVs outside of typical ICS structures.
- Another barrier is the ambiguity of the USCG's role during disasters that require maritime SAR operations in support of a national response strategy. To understand the USCG's role better during disasters that require maritime SAR, a comprehensive review of national response strategies should be conducted. This review should focus on addressing the USCG's role to support state and local agencies during disasters, yet

still fulfill its statutory requirements to conduct SAR missions as an independent SAR organization.

- Finally, the natural evolution of digital technologies, and specifically, the widespread adoption and use of social media, is affecting how individuals reach out for help during disasters. The USCG should work to develop policies and procedures for officially receiving distress notifications through social media, for both routine and disaster related operations, and should work to develop consistent mechanisms to collect and aggregate social media data effectively to create crowdsourced rescue maps during disasters.

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I. INTRODUCTION

Imagine you live in a coastal area susceptible to hurricanes and it has been a very active hurricane season. You have been tracking an approaching storm for days; however, you were not able to evacuate. Now imagine you weather the brunt of the storm, only to discover you are still in danger. High tropical storm force winds are not the only danger associated with hurricanes; these storms can also produce significant storm surges, heavy rainfall, and inland flooding.

You have survived the storm's direct impact, but are still faced with the threat of rising floodwaters. Water is already three feet deep throughout your first floor and continues to rise. You decide to call for help, but cannot reach anyone because emergency call centers are overloaded, and emergency response organizations are overtaxed and unable to deploy more resources. In a desperate attempt for help, you turn to social media, and discover a group of citizens with shallow water boats has emerged to help conduct rescue operations. You contact an individual from this group who sends a boat and team of volunteers to evacuate you and your family. Once rescued, and out of harm's way, you reflect on the following questions: does it matter that a government response organization was unable to rescue you? Should you have waited for official responders? Did this emergent group of volunteers make your situation worse by assisting in your time of need?

Although this story is fictitious, it illustrates the situation many individuals find themselves in immediately after a hurricane. The ability of emergency response organizations to deploy enough resources in response to a disaster is being outpaced by the ever-increasing numbers of individuals in peril. Examples can be seen in the 2017 hurricane season when three major storms made landfall in the United States (Harvey, Irma, and Maria) all within a short timeframe of one another, and in 2018, when Hurricanes Florence and Michael caused catastrophic damage along the eastern and gulf coasts of the United States. According to the National Oceanic and Atmospheric Administration (NOAA), "Hurricane Michael, at a Category 4 intensity, was the strongest hurricane on record to strike the Florida panhandle," and Hurricane Florence caused "catastrophic

flooding in portions of North and South Carolina” that shattered previous flooding records.¹

A. PROBLEM STATEMENT

Spontaneous volunteers conducting search and rescue (SAR) in the aftermath of major hurricanes—such as Katrina in 2005, Harvey and Irma in 2017, and Florence and Michael in 2018—is changing the emergency management landscape. SAR organizations, such as the United States Coast Guard (USCG), need to understand how their own organizational response to disasters affects spontaneous volunteer engagement and actions. Failing to understand how an organization’s response to disasters affects the engagement and actions of spontaneous volunteers can challenge the established disaster response system.

In the aftermath of a disaster, spontaneous volunteers are self-organizing and conducting independent SAR operations due to perceived or actual gaps in traditional SAR functions. For example, in the aftermath of Hurricane Katrina, hundreds of citizens formed an ad hoc group later dubbed the “Cajun Navy,” which conducted SAR operations throughout the flooded streets of New Orleans, and were credited with rescuing nearly 10,000 survivors.² While the Cajun Navy is probably the most widely known occurrence of spontaneous volunteerism in recent memory, groups of spontaneous volunteers emerging during disasters has been well documented throughout history, and will undoubtedly be present in future disasters.

¹ “Destructive 2018 Atlantic Hurricane Season Draws to an End: NOAA Services before, during, after Storms Saved Lives and Aided Recovery,” National Oceanic and Atmospheric Administration, News & Features, November 28, 2018, <https://www.noaa.gov/media-release/destructive-2018-atlantic-hurricane-season-draws-to-end>.

² Douglas Brinkley, *The Great Deluge: Hurricane Katrina, New Orleans, and the Mississippi Gulf Coast* (New York: Harper Perennial, 2007), 381; Eric Bonabeau and W. David Stephenson, “Expecting the Unexpected: The Need for a Networked Terrorism and Disaster Response Strategy,” *Homeland Security Affairs* 3, no. 1 (February 2007): 3, <https://www.hsaj.org/articles/151>; Nancy Casper, “Organizational Leadership’s Impact on Emergent Behavior during Disaster Response and Recovery Operations” (master’s thesis, Naval Postgraduate School, 2011), 2, <http://hdl.handle.net/10945/5504>; “How Citizens Turned into Saviors after Katrina Struck,” CBS News, August 29, 2015, <https://www.cbsnews.com/news/remembering-the-cajun-navy-10-years-after-hurricane-katrina/>; Kristopher Thornburg, “Disruptive Emergent Systems in Disaster Response” (master’s thesis, Naval Postgraduate School, 2019), 32, <http://hdl.handle.net/10945/62309>.

Communities self-organizing in times of crises are not a new phenomenon. In fact, history is filled with examples of spontaneous volunteers responding in the face of adversity. Clara Burton noticed that injured soldiers on the battlefield were not being treated adequately during the Civil War, and organized a group of volunteers to hand out food, water, and bandages. Her efforts laid the foundation of the American Red Cross.³ During World War II, Phillip Johnson, a civil engineer, leveraged his ability to speak Navajo to convince the U.S. Marine Corps to develop a Navajo code talker pilot program, which was credited with winning the battle of Iwo Jima.⁴ More recently, during the September 11th terrorist attacks, passengers on Flight 93 self-organized to stop hijackers from reaching their intended target in Washington, DC, and in addition to the Cajun Navy, Michael Knight, co-founder of the Acadian Ambulance service, used his 200 ambulances and helicopters to evacuate over 7,000 people during Hurricane Katrina.⁵

According to disaster researchers, appropriately leveraging the creativity and ingenuity of motivated volunteers during a disaster can be very effective.⁶ However, others note that self-organizing groups during disasters are often viewed as a hindrance to official response functions, because they are believed to be disorganized, dysfunctional, inefficient, and oppose public authorities.⁷

Spontaneous volunteers who emerge after disasters carry out many tasks that aid response and recovery operations. However, groups that organize and conduct SAR during

³ “Clara Barton: Founder of the American Red Cross,” American Red Cross, 2010, <https://www.redcross.org/about-us/who-we-are/history/clara-barton.html>; Casper, “Organizational Leadership’s Impact on Emergent Behavior,” 5.

⁴ William R. Wilson, “Codemakers: History of the Navajo Code Talkers,” HistoryNet, February 1997, <https://www.historynet.com/world-war-ii-navajo-code-talkers.htm>; Casper, “Organizational Leadership’s Impact on Emergent Behavior,” 5.

⁵ Bonabeau and Stephenson, “Expecting the Unexpected,” 3; Casper, 5.

⁶ James M. Kendra and Tricia Wachtendorf, “Elements of Resilience after the World Trade Center Disaster: Reconstituting New York City’s Emergency Operations Centre,” *Disasters* 27, no. 1 (2003): 37–53, <https://doi.org/10.1111/1467-7717.00218>; Casper, 9.

⁷ Robert A. Stallings and E. L. Quarantelli, “Emergent Citizen Groups and Emergency Management,” *Public Administration Review* 45, no. Special Issue (January 1985): 93–100, <https://doi.org/10.2307/3135003>; Jack D. Kartez and William J. Kelley, “Research-Based Disaster Planning: Conditions for Implementation,” in *Managing Disasters: Strategies and Policy Perspectives*, ed. Louis Comfort (Durham, NC: Duke University Press, 1988), 126–46.

hurricanes, such as the Cajun Navy, pose challenges for established SAR organizations. The USCG and other established SAR organizations should embrace these challenges, learn from past events, and prepare for the ever-increasing influx of spontaneous volunteers during future hurricane response operations. Additionally, a surge in spontaneous volunteerism is not exclusive to hurricanes. Emergency management officials and emergency responders should be prepared for an influx of spontaneous volunteers during any disaster, and should also seek to understand how their own organizational response affects spontaneous volunteer engagement and actions.

The purpose of this thesis is to explore the organizational response of the USCG during disasters that required maritime SAR, and to examine how the USCG's organizational response affected spontaneous volunteer engagement and actions. By examining the USCG's organizational response during disasters, and inquiring how it affects engagement with spontaneous volunteers who conduct SAR activities, this thesis seeks to determine what factors affect spontaneous volunteer engagement hopefully to incorporate spontaneous volunteer groups better into future hurricane responses.

This research project was designed with the goal of answering the overall research question: *How can the United States Coast Guard better engage organized spontaneous volunteers who conduct maritime search and rescue during hurricane response operations?*

B. RESEARCH DESIGN SUMMARY

To answer this research question, an exploratory case study methodology was used to analyze the organizational response of both the USCG and organized spontaneous volunteers (OSVs) who conducted maritime SAR operations during three separate disasters. The organizational response of both the USCG and OSVs was analyzed according to the Disaster Research Center's (DRC's) four-fold typology of organized responses to disasters, in hopes of identifying specific factors of the USCG's organizational response that affected OSV engagement. The intent of this analysis was to inquire if certain USCG organizational responses were more conducive than others were for engaging

OSVs. The cases studied were Hurricane Katrina in 2005, Hurricane Harvey in 2017, and the Lower Manhattan Boat Lift on 9/11.

The research design is described in greater detail in Chapter IV.

C. SIGNIFICANCE OF RESEARCH

Spontaneous volunteerism is not going away, and if recent history is any indication, spontaneous volunteers are not necessarily a hindrance, but should be viewed as an asset to be leveraged during disasters. Disaster response officials should plan on an influx of spontaneous volunteers during response operations, and should acknowledge that they can provide tremendous value to an already strained disaster response system.

The key to leveraging the benefits of spontaneous volunteers during disasters is understanding how the organizational response of official organizations affects spontaneous volunteer engagement and actions. The goal should be to foster an environment in which spontaneous volunteer and official response efforts are collaborative or complementary to one another, rather than in conflict with each other.

Effectively engaging spontaneous volunteers during disasters can be useful for large response organizations like the USCG, but can also be vital for smaller state, local, or tribal organizations often understaffed, underfunded, and expected to manage complex and dynamic events without outside assistance for at least the first few days following a disaster.

D. CHAPTER OVERVIEW

Chapter I highlighted that spontaneous volunteerism is not new. The occurrence of spontaneous volunteers however during recent disaster response operations is increasing, and more specifically, spontaneous volunteers who respond to conduct SAR in the aftermath of a hurricane. These spontaneous volunteers pose challenges for the established disaster response system, and established SAR organizations like the USCG need to understand how their own organizational response to disasters affects the engagement and actions of spontaneous volunteers.

Chapter II provides a foundational understanding of an organized response to disasters and spontaneous volunteerism, and is divided into two sections. The first section discusses collective group efforts, or organization, during disasters based on research conducted by the DRC, and introduces the DRC typology of organized responses to disasters. The second section defines spontaneous volunteerism, discusses potential spontaneous volunteer motivations, highlights the challenges and benefits that spontaneous volunteers pose to disaster response operations, and concludes with a brief discussion of spontaneous volunteers in a digital age.

Chapter III provides background information on the USCG's organizational response to SAR, as well as an overview of the USCG's SAR mission, which highlights the tasks and structures used to perform SAR missions in alignment with the DRC typologies noted in Chapter II. Chapter III concludes by discussing the USCG's role in maritime disaster response operations, specifically disaster responses that have a maritime SAR component.

Chapter IV contains the research design used for this thesis and details how an exploratory case study methodology was used to analyze the organizational response of both the USCG and OSVs who conducted maritime SAR operations during three separate disasters. The intent of this research and analysis was to inquire if certain USCG organizational responses were more conducive than others were for engaging OSVs.

Chapter V includes three case studies in which both the USCG and OSVs conducted maritime SAR as part of the overall disaster response. Each case study provides a brief background of the case, an analysis of the SAR response by both the USCG and OSVs, and concludes with an overall assessment of factors that contributed or hindered the response efforts of each organization.

Chapter VI provides an analysis of the organizational response of both the USCG and OSVs, according to the DRC's four-fold typology of organized responses to disasters, to identify specific factors of the USCG's organizational response that affected OSV engagement. This chapter concludes with a cross-case analysis used to note overall trends and patterns between each case study to generalize commonalities and draw conclusions.

Chapter VII revisits the research question and offers recommendations on ways that the USCG can better engage organized spontaneous volunteers who conduct maritime SAR during hurricane response operations, and identifies areas that will benefit from additional research.

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II. ORGANIZED RESPONSE TO DISASTERS AND SPONTANEOUS VOLUNTEERS

This chapter is divided into two sections that provide a foundational understanding of an organized response to disasters and spontaneous volunteerism. The first section discusses collective group efforts, or organization, during disasters based on research conducted by the DRC, and introduces the DRC typology of organized responses to disasters. The second section defines spontaneous volunteerism, discusses potential spontaneous volunteer motivations, highlights the challenges and benefits that spontaneous volunteers pose to disaster response operations, and concludes with a brief discussion of spontaneous volunteers in a digital age.

A. ORGANIZED RESPONSE TO DISASTER: A SOCIOLOGIST PERSPECTIVE FROM DISASTER RESEARCH

I do believe that the problem of responses to at least large-scale disasters do particularity lend themselves to sociological analysis.⁸

—Dr. Enrico Quarantelli

After decades of disaster research, one thing is certain. Organizational, or collective group efforts, will always be present during disasters. However, the real phenomenon is that this collective group effort is not exclusive to pre-established or official organizations.

Disaster research is a relatively new field of study. It was not until 1963 that disaster studies were institutionalized by the creation of the DRC at the Ohio State University (later moved to the University of Delaware).⁹ Tied to the sociologist department, the DRC was adequately funded and staffed to maintain field-ready research teams that would immediately respond after a disaster and begin conducting research. The goal of this research was to study organizational functioning under stress. The DRC research teams

⁸ Enrico L. Quarantelli, “Organization under Stress,” in *Symposium on Emergency Operations*, ed. Robert Britson (Santa Monica, CA: System Development Corporation, 1966), 3, <https://apps.dtic.mil/dtic/tr/fulltext/u2/640543.pdf>.

⁹ E. L. Quarantelli and Russell R. Dynes, “Response to Social Crisis and Disaster,” *Annual Review of Sociology* 3 (1977): 27, www.jstor.org/stable/2945929.

quickly discovered that organization was always present in disaster situations; however; this organization was not exclusive to pre-established organizations or formalized groups.¹⁰ Based on the DRC's in depth and longitudinal studies of both domestic and international disasters, a fourfold typology of organized responses to community-wide disasters was developed.¹¹

The DRC typology essentially states that an organized response during disasters either involves regular or non-regular tasks, and the structures used to carry out these tasks either existed before the disaster or were developed during the disaster. If these dimensions of task and structure are cross-tabulated, four types of groups (established, extending, expanding, and emergent) are identified as depicted in Table 1.

Table 1. DRC Typology of Organized Responses to Disasters.¹²

<u>Structures</u>	<u>Tasks</u>	
	Regular	Non-regular
Existing	Established	Extending
New	Expanding	Emergent

Examples of established groups would be a local fire department conducting fire suppression, or a local police department conducting traffic control after a severe thunderstorm or tornado strikes a community. These groups use their existing structures to carry out traditional or regular tasks during the disaster response, and these tasks and structures are the same for routine or daily operations. The American Red Cross setting up emergency shelters after a disaster is an example of an expanding group. The Red Cross

¹⁰ E. L. Quarantelli and Russell R. Dynes, *Different Types of Organizations in Disaster Responses and Their Operational Problems*, Preliminary Papers, No. 41 (Newark, DE: University of Delaware, Disaster Research Center, 1977), 1, <http://udspace.udel.edu/handle/19716/414>.

¹¹ Quarantelli, "Organization under Stress," 4.

¹² Adapted from Quarantelli and Dynes, *Different Types of Organizations in Disaster Responses*, 2; Havidán Rodríguez, Joseph Trainor, and Enrico L. Quarantelli, "Rising to the Challenges of a Catastrophe: The Emergent and Prosocial Behavior Following Hurricane Katrina," *The ANNALS of the American Academy of Political and Social Science* 604, no. 1 (2006): 85, <https://doi.org/10.1177/0002716205284677>.

establishes these shelters using new structures, due to a surge in volunteer staffing. However, the task of setting up shelters is a regular, albeit latent task for the group. A demolition company using its personnel and equipment to sort through and remove debris caused by an earthquake or explosion is an example of an extending group. Demolition companies clearing and removing debris from a disaster site is a non-regular task, especially if evidence needs to be preserved. However, existing group structures would carry out the performance of these tasks. Lastly, an emergent group is any ad hoc group formed to carry out a specific set of tasks in which the group defines the tasks and the structure to be used to carry them out. For example, a city engineer, meteorologist, the Army Corps of Engineers, and community volunteers may all come together to identify at risk sections of a community and construct temporary sandbag dikes in response to a flood.

B. SPONTANEOUS VOLUNTEERISM DURING DISASTERS

This section focuses on defining key terms often used synonymously throughout spontaneous volunteerism literature, such as convergence and emergence, and explores potential motivations behind spontaneous volunteer actions during disasters. Additionally, this section highlights both the challenges and benefits associated with spontaneous volunteers during disasters and concludes by discussing the increasing role technology can have in spontaneous volunteer behavior.

1. What Is a Spontaneous Volunteer?

Literature recognizes that spontaneous volunteers are an inevitable part of disasters because, “ordinary citizens are usually first on the scene in an emergency or disaster and remain long after official services have ceased.”¹³ However, disaster management, in most developed countries, relies on professional responders, and only to a small degree leverages volunteers affiliated with official organizations.¹⁴ This reliance can be explained because

¹³ Joshua Whittaker, Blythe McLennan, and John Handmer, “A Review of Informal Volunteerism in Emergencies and Disasters: Definition, Opportunities and Challenges,” *International Journal of Disaster Risk Reduction* 13 (September 2015): 359, <https://doi.org/10.1016/j.ijdr.2015.07.010>.

¹⁴ David Alexander, “The Voluntary Sector in Emergency Response and Civil Protection: Review and Recommendations,” *International Journal of Emergency Management* 7, no. 2 (2010): 151–66, <https://doi.org/10.1504/IJEM.2010.033654>, quoted in Whittaker, McLennan, and Handmer, 359.

official responders may tend to view themselves as the ones who have the knowledge, training, skills, and authority to manage and mitigate a disaster effectively. However, following this faulty logic leads to an assumption that if individuals are not part of an official organization then they are by default victims who must need rescuing. This perspective supports a long-standing myth that average citizens will panic during disasters and will not be able to help themselves or others.

However, during disasters, average citizens do not panic, but rather act in rational ways, and according to Helsloot and Ruitenberg, are considered, “the most effective kind of emergency personnel,” usually credited with saving the most lives.¹⁵ For example, in 1995, after an earthquake struck Kobe, Japan, official responders “only found about a quarter” of the trapped individuals, while average citizens performed the majority of the rescues.¹⁶ Additionally, in 2015, when an earthquake struck Kathmandu, Nepal, “local residents were the first responders” saving trapped individuals from collapsed structures, and provided food, shelter, and supplies for survivors.¹⁷ Lastly, during the 2004 Indian Ocean tsunami, the majority of life-saving and relief efforts in Sri Lanka and Thailand came from communities in the Maldives, which “sent boats to rescue people from islands that were no longer habitual,” and worked to shelter rescued individuals with host families.¹⁸

¹⁵ I. Helsloot and A. Ruitenberg, “Citizen Response to Disasters: A Survey of Literature and Some Practical Implications,” *Journal of Contingencies and Crisis Management* 12, no. 3 (September 2004): 98, <https://doi.org/10.1111/j.0966-0879.2004.00440.x>.

¹⁶ Helsloot and Ruitenberg, 103.

¹⁷ John Twigg and Irina Mosel, “Emergent Groups and Spontaneous Volunteers in Urban Disaster Response,” *Environment and Urbanization* 29, no. 2 (October 2017): 444, <https://doi.org/10.1177/0956247817721413>.

¹⁸ Twigg and Mosel, 444.

a. Convergence

Much of the early literature regarding spontaneous volunteers during disasters starts with the analysis provided by Fritz and Mathewson on convergence.¹⁹ Convergence is “the mass movement of people, messages, and supplies toward the disaster-struck area,” and encompasses two processes, “the notion of movement toward the disaster-struck area from the outside—external convergence—and movement toward specific points within a given disaster-related area or zone—internal convergence.”²⁰ Fritz and Mathewson classified converging individuals into five separate groups: “(1) the returners, (2) the anxious, (3) the helpers, (4) the curious, and (5) the exploiters” in an attempt to examine different motivations that led to convergent behavior.²¹ Kendra and Wachtendorf built upon the Fritz and Mathewson study and identified a new group within the convergence classification, “fans or supporters” who show up at disasters to encourage and support the emergency responders.²²

Additionally, Fritz and Mathewson, Lowe and Fothergill, and Tierney and Perry note that the “helpers” or volunteers who converge on the disaster area typically perform the majority of the SAR and response tasks required immediately following a disaster.²³ This neighbor-helping-neighbor construct is almost instantaneous after a disaster and begins before local authorities can arrive and set up formal organizational structures.

¹⁹ Charles E. Fritz and John H. Mathewson, *Convergence Behavior in Disasters: A Problem in Social Control* (Washington, DC: National Academy of Sciences, National Research Council, 1957), <http://archive.org/details/convergencebehav00fritrich>; Casper, “Organizational Leadership’s Impact on Emergent Behavior,” 9–10; Seana Lowe and Alice Fothergill, “A Need to Help: Emergent Volunteer Behavior after September 11th,” in *Beyond September 11th: An Account of Post-Disaster Research*, ed. Jacquelyn Monday (Boulder, CO: Institute of Behavioral Science, Natural Hazards Research and Applications Information Center, University of Colorado, 2003), 293–314, <http://hdl.handle.net/10176/co:5395>; James M. Kendra and Tricia Wachtendorf, *Rebel Food... Renegade Supplies: Convergence after the World Trade Center Attack*, Preliminary Papers, No. 316 (Newark, DE: University of Delaware, Disaster Research Center, 2001), <http://udspace.udel.edu/handle/19716/708>; Kathleen J. Tierney and Ronald W. Perry, *Facing the Unexpected: Disaster Preparedness and Response in the United States* (Washington, DC: Joseph Henry Press, 2001), ProQuest Ebook Central.

²⁰ Fritz and Mathewson, *Convergence Behavior in Disasters*, 1–3; Casper, “Organizational Leadership’s Impact on Emergent Behavior,” 9–10.

²¹ Fritz and Mathewson, 29.

²² Kendra and Wachtendorf, *Rebel Food*, 6–7.

²³ Fritz and Mathewson, *Convergence Behavior in Disasters*, 40–41; Lowe and Fothergill, “A Need to Help,” 294; Tierney and Perry, *Facing the Unexpected*, 110.

However, even when formal organizational structures are established, Fritz and Mathewson noted that disaster survivors often prefer private or informal solutions to meet their needs over formal public solutions, even if public assistance is more adequate.²⁴ This preference includes choosing to shelter with friends or family in lieu of public shelters or government provided housing, because familiarity and intimacy are tangible factors.²⁵

The convergence of “helpers” to disaster sites follows along the same familiarity and intimacy lines.²⁶ Internal convergence begins when survivors start seeking out their family and loved ones; however, once their initial concerns are satisfied, it extends to neighbors, friends, and other community-oriented issues.²⁷ External convergence is also influenced by familiarity, and the speed and volume of external convergence is directly correlated to the personal connections with those in the disaster area, and a proximity to the disaster site.²⁸ Individuals not located near a disaster site often learn of the disaster through media outlets, and rather than converge on the site itself, they tend to send money, goods, and supplies into the disaster-stricken area. However, familiarity and intimacy still play an important role as, “evidence suggests that personal identification or involvement with an individual or organization within the impacted area is more likely to result in donations,” which reinforces that familiarity and intimacy are important factors in convergent behavior.²⁹

b. Emergence

In contrast to Fritz and Mathewson’s convergence, emergence is not associated with a single individual or small group of individuals working independently, but consists of a collective of individuals who form a cohesive group in response to the same problem

²⁴ Fritz and Mathewson, *Convergence Behavior in Disasters*, 40–41.

²⁵ Fritz and Mathewson, 40–41; Casper, “Organizational Leadership’s Impact on Emergent Behavior,” 10.

²⁶ Fritz and Mathewson, 42.

²⁷ Fritz and Mathewson, 42.

²⁸ Fritz and Mathewson, 42–43.

²⁹ Fritz and Mathewson, 43–44.

or perceived need.³⁰ Stallings and Quarantelli define emergence as, “private citizens who work together in pursuit of collective goals relevant to actual or potential disasters but whose organization has not yet become institutionalized.”³¹ The emergence of a group is considered controversial during disasters, because it seems to imply that an official organization does not exist, or is not able to respond to the problem.³²

Stallings and Quarantelli observed several characteristics of emergent groups, and noted that they lack traditional structures, such as a chain of command and defined divisions of labor.³³ These groups tend to “have a flat hierarchy with little distance between the top and bottom,” which can make these groups appear unorganized and inefficient.³⁴ However, when compared to official organizations, emergent groups have far less resources devoted to administrative or management functions, and have the ability to shift their focus quickly, take on new tasks, and develop new procedures or rules. Additionally, emergent groups often have access to a greater depth of resources (donated items or volunteered time).³⁵ Stallings and Quarantelli note that while emergent groups may appear unorganized and dysfunctional, inherent flexibility is precisely what makes them so effective at coping with dynamic disasters.³⁶ Furthermore, they claim the appearance of emergent groups should not be considered a failure by established organizations, as much as it should highlight that an alternative is always available to deal with a particular problem.³⁷

It is important to note that emergent groups can develop during any stage of the disaster cycle (preparedness, response, or recovery). However, convergent groups only

³⁰ Stallings and Quarantelli, “Emergent Citizen Groups and Emergency Management,” 94.

³¹ Stallings and Quarantelli, 3; Casper, “Organizational Leadership’s Impact on Emergent Behavior,” 10.

³² Stallings and Quarantelli, 94.

³³ Stallings and Quarantelli, 98.

³⁴ Stallings and Quarantelli, 95.

³⁵ Stallings and Quarantelli, 95–98.

³⁶ Stallings and Quarantelli, 98.

³⁷ Stallings and Quarantelli, 98.

appear in the response and recovery phase of the disaster cycle, as they are in direct response to the event itself.³⁸ According to researchers Kendra and Wachtendorf, both convergence and emergence can appear during disasters and should be considered complimentary to one another:

Converging volunteers often gravitate to groups that have emerged in response to disasters, either to provide additional support or to perform tasks that complement those of emergent groups. At the same time, by providing ever-larger numbers of volunteers, convergence sets the stage for further emergence.³⁹

Lastly, emergent groups are not well understood. Therefore, they are often not considered when planning for emergencies. However, if history has demonstrated anything, it is that emergence is likely to be ever more present in future disasters.⁴⁰ Stallings and Quarantelli note that the impetus of sustained involvement by emergent groups can be directly correlated to the recognition of the group by others, as well as groups' beliefs that emergency management officials will support their efforts once attention has been drawn to their issues.⁴¹ According to their research, emergent groups hold a positive or neutral view of emergency management officials, but may become hostile if they feel that officials do not recognize the benefits they provide.⁴² However, an adversarial relationship may also form from the beginning if emergency management officials believe that emergent groups are in direct opposition to their organized structure.⁴³

³⁸ Casper, "Organizational Leadership's Impact on Emergent Behavior," 10–11.

³⁹ Kendra and Wachtendorf, *Rebel Food*, 8; Casper, "Organizational Leadership's Impact on Emergent Behavior," 11.

⁴⁰ Stallings and Quarantelli, "Emergent Citizen Groups and Emergency Management," 94.

⁴¹ Stallings and Quarantelli, 95–98; Casper, "Organizational Leadership's Impact on Emergent Behavior," 11.

⁴² Stallings and Quarantelli, 98.

⁴³ Stallings and Quarantelli, 98; Casper, "Organizational Leadership's Impact on Emergent Behavior," 11.

2. Spontaneous Volunteer Motivations

Research into human nature during disasters has shown, “groups and individuals typically become more unified, cohesive, and altruistic in such events,” and according to Kathleen Tierney, individuals tend to put their own self-interests aside and volunteer to help others during disasters.⁴⁴ However, research is limited concerning motivations behind spontaneous volunteerism. Researchers Lowe and Fothergill, and Twigg and Mosel, suggest that a compelling need to “do something” is very strong during a disaster.⁴⁵ Twigg and Mosel also suggest that this overwhelming feeling of social obligation, sense of community, and shared values may contribute to a volunteer’s motivation during disasters; stating, “people may feel personally affected by disasters that affect their neighborhoods or localities, even if they themselves, or their personal property, are not directly affected.”⁴⁶

While motivations tend to vary according to each event and its associated social, political, and cultural context, and a typical profile for disasters response volunteers does not exist, some commonalities do appear to exist. Awareness of risks and previous disaster experience tend to indicate a higher involvement in disaster volunteerism.⁴⁷ Additionally, volunteerism during disasters can be broken down into two categories, internal factors and external factors. According to Lowe and Fothergill’s research into volunteer behavior after 9/11, volunteers provide external benefits, but receive internal benefits from volunteering.⁴⁸ External benefits are provided to those they are assisting, whereas internal benefits are found in the fact that volunteers find something meaningful in the face of tragedy. They summarize their work best by stating, “we believe, the most noteworthy impact of ... volunteer work [is] how the experience positively affected the volunteers

⁴⁴ Tierney and Perry, *Facing the Unexpected*, 295; Twigg and Mosel, “Emergent Groups and Spontaneous Volunteers in Urban Disaster Response,” 444.

⁴⁵ Lowe and Fothergill, “A Need to Help,” 298; Twigg and Mosel, 449.

⁴⁶ Twigg and Mosel, 449.

⁴⁷ Twigg and Mosel, 449.

⁴⁸ Lowe and Fothergill, “A Need to Help.”

themselves.”⁴⁹ Regardless of the motivations or benefits of volunteerism, it is important to note that spontaneous volunteerism is more likely to occur when a perception that official response functions cannot address all the problems created by the disaster, or their capacity to respond adequately is insufficient.⁵⁰

3. Challenges with Spontaneous Volunteerism

While volunteer motivations can vary, one fact remains clear. Spontaneous volunteers are going to respond to disasters. This fact may create opportunities for response organizations because the use of volunteers can be a positive and useful component of the disaster response.⁵¹ However, disasters also cause an influx of people and goods into the disaster area, at the same time, and if coordination does not occur, chaos can ensue.⁵² According to some researchers, if spontaneous volunteers are going to be used during disaster response, they need to be incorporated using robust registration, credentialing, and training programs.⁵³ Moreover, concerns continue to be raised regarding the risk of using “untrained and inexperienced volunteers” during complex disaster response and recovery operations, despite the benefits they may provide.⁵⁴ Some academics and experienced responders even note that spontaneous volunteers have no role to play in disaster response.⁵⁵

Fernandez, Barbera, and Van Drop state that the mass convergence of spontaneous volunteers can create “health, safety, and security issues” during disaster responses, and

⁴⁹ Lowe and Fothergill, 303.

⁵⁰ Twigg and Mosel, “Emergent Groups and Spontaneous Volunteers in Urban Disaster Response.”

⁵¹ Helsloot and Ruitenberg, “Citizen Response to Disasters,” 103; Lauren M. Sauer et al., “The Utility of and Risks Associated with the Use of Spontaneous Volunteers in Disaster Response: A Survey,” *Disaster Medicine and Public Health Preparedness* 8, no. 1 (February 2014): 67, <https://doi.org/10.1017/dmp.2014.12>.

⁵² Helsloot and Ruitenberg, 103.

⁵³ Lauren S. Fernandez, Joseph A. Barbera, and Johan R. Van Drop, “Strategies for Managing Volunteers during Incident Response: A Systems Approach,” *Homeland Security Affairs* 2, no. 3 (October 2006): 1–15, <http://hdl.handle.net/10945/25078>; Sauer et al., “The Utility of and Risks Associated,” 67.

⁵⁴ Sauer et al., 67.

⁵⁵ Sauer et al., 67.

may actually hinder the response by distracting responders.⁵⁶ They go on to note that because response organizations have not prepared for the massive influx of spontaneous volunteers, they do not have an effective management system in place to incorporate them, which results in an ad hoc approach that pulls responders away from their primary functions to supervise volunteer actions and manage their logistics.⁵⁷ According to Fernandez, volunteer responders are an important and flexible resource during disasters, but volunteer resources can also create command and control challenges if a system to manage them is not in place.⁵⁸ Fernandez suggests that through effective planning, volunteer resources can be capitalized upon by incorporating them into existing incident command and control systems through a volunteer management system.⁵⁹

While much of the disaster planning literature notes that preparing for disasters requires a top-down “command and control” model for disaster response, it makes the faulty assumption that disasters can only be handled using a centralized decision-making process.⁶⁰ Disaster research over the past few decades has noted that a top-down command and control process is rarely used during an actual disaster and response organizations tend to use a more coordination vice control model, because decisions need to be made rapidly and by decentralized lower levels of organizations.⁶¹

In contrast to a formalized command and control system to coordinate spontaneous volunteers during disasters, Nancy Casper posits that:

As emergency management continues to become more complex, organizational leadership will be challenged to balance the need for standard operating procedures and policies against the ability to leverage

⁵⁶ Fernandez, Barbera, and Van Drop, “Strategies for Managing Volunteers during Incident Response,” 1–2.

⁵⁷ Fernandez, Barbera, and Van Drop, 2.

⁵⁸ Lauren S. Fernandez, “Volunteer Management System Design and Analysis for Disaster Response and Recovery” (PhD diss., George Washington University, 2007), <https://pqdtopen.proquest.com/doc/304875080.html?FMT=ABS>.

⁵⁹ Fernandez.

⁶⁰ Dynes, Quarantelli, and Wenger, *Individual and Organizational Response to the 1985 Earthquake in Mexico City, Mexico*, 115.

⁶¹ Dynes, Quarantelli, and Wenger, 115.

emergent behavior that allows for innovation in addressing the specific problems brought on by each unique disaster.⁶²

4. Benefits of Spontaneous Volunteerism

Spontaneous volunteers can provide a variety of benefits to the overall disaster response system, individual emergency response organizations, and the community they support during disasters. According to Whittaker, McLennan, and Handmer, spontaneous volunteers emerge immediately after a disaster, before emergency personnel are able to mobilize, and are the true “first responders” performing tasks, such as SAR, first aid, damage assessment, and assessing community needs.⁶³ Additionally, these researchers note that average citizens can play a vital role in helping official agencies during disasters, and argue that due to increasing disasters risks worldwide, urban growth and development, and climate change, spontaneous volunteers will be necessary to provide the required surge capacity needed to handle future disasters.⁶⁴

However, the ability and success of spontaneous volunteers to provide relief during disasters relies heavily on the “capacity of agencies and authorities to integrate them quickly and effectively into a coordinated strategy.”⁶⁵ As noted previously, a large influx of spontaneous volunteers can pose challenges for response organizations; however, according to McLennan, Whitaker, and Handmer, these challenges are due to the model of traditional volunteer management.⁶⁶ Traditional volunteer management is grounded on assumptions that volunteers are going to make a commitment to a particular organization

⁶² Casper, “Organizational Leadership’s Impact on Emergent Behavior,” v.

⁶³ Whittaker, McLennan, and Handmer, “A Review of Informal Volunteerism in Emergencies and Disasters,” 360.

⁶⁴ Whittaker, McLennan, and Handmer, 359.

⁶⁵ International Federation of Red Cross, *World Disasters Report. 2001*, ed. Jonathan Walter (Geneva: International Federation of Red Cross and Red Crescent Societies, 2001), 146, <https://www.ifrc.org/en/publications-and-reports/world-disasters-report/wdr2001/>; Whittaker, McLennan, and Handmer, 24.

⁶⁶ Blythe McLennan et al., “Centralised Coordination of Spontaneous Emergency Volunteers: The EV CREW Model,” *The Australian Journal of Emergency Management* 31, no. 1 (2016): 24–25, <https://ro.uow.edu.au/smhpapers1/294>.

and is based on a long-term commitment for community service.⁶⁷ Spontaneous volunteers respond to disasters in more non-traditional ways, are often less formally connected, and volunteer for shorter durations; however, they can be diverse and autonomous and embrace new technologies.⁶⁸ An example can be seen when Malaysian Airlines flight MH370 crashed into the Indian Ocean on March 8, 2014 and 2.3 million spontaneous volunteers joined in on the search for the missing airliner by scanning more than 24,000 square kilometers of satellite imagery uploaded to the website Tomnod.⁶⁹

5. Spontaneous Volunteers in the Digital Age

Bonabeau and Stephenson argue that the conventional management approach (a hierarchical structure) for natural disaster response is fundamentally mismatched to the actual tasks required.⁷⁰ Instead, they argue that flexible and highly adaptive networks are needed for disaster response. Additionally, the authors argue that rather than emphasizing the command and control aspects of disaster response, the focus should be on creating new and alternative emergency management approaches that focus on new communication technologies and tap into the science of social networks.⁷¹ Thus, the authors advocate that networked communication devices made available for the general public will foster a greater “collective intelligence” during disaster response.⁷²

Increased public support through social media platforms is accelerating the changing emergency management landscape. Hughes and Tapia stated, “Members of the public can now participate more broadly in times of crisis as they collect, create, share, and

⁶⁷ McLennan et al., 24; Lesley Hustinx and Frans Lammertyn, “Collective and Reflexive Styles of Volunteering: A Sociological Modernization Perspective,” *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations* 14, no. 2 (June 2003): 168, <https://doi.org/10.1023/A:1023948027200>.

⁶⁸ Hustinx and Lammertyn.

⁶⁹ Carmen Fishwick, “Tomnod—The Online Search Party Looking for Malaysian Airlines Flight Mh370,” *The Guardian*, March 14, 2014, <https://www.theguardian.com/world/2014/mar/14/tomnod-online-search-malaysian-airlines-flight-mh370>; Whittaker, McLennan, and Handmer, “A Review of Informal Volunteerism in Emergencies and Disasters,” 359.

⁷⁰ Bonabeau and Stephenson, “Expecting the Unexpected.”

⁷¹ Bonabeau and Stephenson.

⁷² Bonabeau and Stephenson.

seek online information through social media.”⁷³ This influx of information allows the average citizen to become more aware of disasters, as well as the needs of those affected by the disaster, which leads to an increased desire to coordinate and help.⁷⁴ Starbird and Palen have also noted that a growing informal response community of “digital volunteers” has emerged, and they are able to evolve quickly to fill emergency needs using social media tools.⁷⁵ While research still needs to be conducted on the effects of social media and volunteerism, one thing is clear. Spontaneous volunteers are using digital tools to self-organize and respond during disasters.

C. SUMMARY

This chapter provided a foundational understanding of organized responses to disasters and spontaneous volunteerism, and noted that an organized response or collective group effort is always occurring during disasters. However, this organized response is not limited to pre-established or official organizations. According to the DRC, a four-fold typology exists that can be used to identify and classify an organization based on the tasks undertaken and the organizational structures used to carry out those tasks during a disaster response. This chapter also noted that spontaneous volunteers are an inevitable part of disasters. However, they are often not leveraged by official response organizations because spontaneous volunteerism is not well understood, despite the value it may provide.

⁷³ Amanda Lee Hughes and Andrea H. Tapia, “Social Media in Crisis: When Professional Responders Meet Digital Volunteers,” *Journal of Homeland Security and Emergency Management* 12, no. 3 (2015): 679, <https://doi.org/10.1515/jhsem-2014-0080>; Leysia Palen and Sophia B. Liu, “Citizen Communications in Crisis: Anticipating a Future of ICT-Supported Public Participation,” in *Proceedings of the 2007 Conference on Human Factors in Computing Systems (CHI 2007)*, CHI ‘07 (New York: ACM, 2007), 727–36, <https://doi.org/10.1145/1240624.1240736>; Amanda L. Hughes et al., “‘Site-Seeing’ in Disaster: An Examination of On-Line Social Convergence,” in *Proceedings of the Information Systems for Crisis Response and Management Conference (ISCRAM 2008)* (Washington, DC, 2008), <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.157.3104&rep=rep1&type=pdf>; Leysia Palen et al., “Crisis in a Networked World Features of Computer-Mediated Communication in the April 16, 2007, Virginia Tech Event,” *Social Science Computer Review* 27, no. 4 (2009): 467–80, <https://doi.org/10.1177/0894439309332302>.

⁷⁴ Leysia Palen et al., “A Vision for Technology-Mediated Support for Public Participation & Assistance in Mass Emergencies & Disasters,” in *Proceedings of the 2010 ACM-BCS Visions of Computer Science Conference*, ACM-BCS ‘10 (Swinton, UK: British Computer Society, 2010), 8:1–8:12, <http://dl.acm.org/citation.cfm?id=1811182.1811194>.

⁷⁵ Kate Starbird and Leysia Palen, “‘Voluntweeters’: Self-Organizing by Digital Volunteers in Times of Crisis,” in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI ‘11 (New York: ACM, 2011), 1075, <https://doi.org/10.1145/1978942.1979102>.

While spontaneous volunteer motivations can vary, and the process by which spontaneous volunteers either converge or emerge during disasters is often difficult to recognize and prepare for (especially as spontaneous volunteers embrace social media and other digital technologies), official response organizations continue to disregard spontaneous volunteer groups, or substantial effort is expended attempting to incorporate them into existing command and control systems. Yet, recent disaster research studies have highlighted that during actual disasters, a rigid top-down command and control process is routinely being substituted for a more coordination vice control model of response. If official response organizations want to increase coordination efforts with spontaneous volunteers during future disaster response operations, then they need to have a better understanding of how their own organizational response to disasters may affect the coordination efforts and actions of spontaneous volunteers.

The next chapter discusses the USCG's maritime SAR mission and its organizational response to disasters that require a maritime SAR component.

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III. UNITED STATES COAST GUARD'S SEARCH AND RESCUE MISSION AND DISASTER RESPONSE OPERATIONS

This chapter provides background information on the USCG's organizational response to SAR during steady state and large-scale disaster operations, and is divided into two sections. The first section provides an overview of the USCG's SAR mission and highlights the tasks and structures used to perform the SAR mission. The second section discusses the USCG's role in maritime disaster response, specifically disaster responses that require maritime SAR.

A. USCG SAR MISSION

The USCG is a multi-mission service with mandates to perform 11 statutory missions. These missions include SAR, maritime drug and migrant interdiction, ports, waterways and coastal security, enforcement of laws and treaties, living marine resources protection, marine environmental protection, aids to navigation, ice operations, marine safety, and defense readiness.⁷⁶

The USCG's SAR mission "is a demand-driven mission" conducted "in support of international and domestic obligations," with the overall goal of leveraging USCG assets and resources to prevent the loss of life whenever possible.⁷⁷ "The USCG ... also assists [other] federal agencies, [and] state, local, and tribal partners with terrestrial-based SAR," and "respond [s] to mass rescue operation (MRO) events, such as Hurricane Katrina;" where the USCG SAR response was credited with saving over 35,000 people.⁷⁸

⁷⁶ Chuck Young, *Coast Guard: Observations on the Preparation, Response, and Recovery Missions Related to Hurricane Katrina*, GAO-06-903 (Washington, DC: Government Accountability Office, 2006), <https://www.gao.gov/products/GAO-06-903>; Meredith L. Austin, "Engage the Media Coast Guard's Public Affairs Posture during the Response to Hurricane Katrina" (master's thesis, Naval Postgraduate School, 2007), 15, <http://hdl.handle.net/10945/3658>.

⁷⁷ Office of Performance Management and Assessment (DCO-81), *U.S. Coast Guard Search and Rescue Mission Analysis Report* (Washington, DC: Office of Performance Management and Assessment (DCO-81), 2017), 16–21. Author's experience: I have served at multiple positions in the USCG SAR chain of command to include deploying as a search and rescue unit (SRU), planning SAR responses at the sector command center level, and being responsible for coordinating specific SAR operations as a SAR mission coordinator (SMC).

⁷⁸ Office of Performance Management and Assessment (DCO-81), 15; Young, *Coast Guard*.

1. SAR Structure and Organization

The USCG is structured in a way that aligns its SAR mission according to “internationally recognized SAR system standards,” within specific SAR regions (SRRs) that cover inland, coastal, and offshore waters.⁷⁹

An SRR is an area of defined dimensions, recognized by the International Maritime Organization (IMO) or International Civil Aviation Organization (ICAO), within which SAR services are provided.⁸⁰

Each SRR contains a USCG district office that serves as a rescue coordination center (RCC), responsible for assisting and overseeing all USCG missions within the SRR.⁸¹ USCG districts oversee operations within “established geographical areas of responsibly,” however, to reduce command and control issues “one or more Sectors ... conduct various USCG mission [s]” in support of each district or RCC.⁸² A total of 37 sectors “maintain command and control” over USCG maritime and aviation assets, and are depicted in Figure 1. All available USCG SAR units (SRUs), or assets used for SAR response, fall within the operational control of sectors, and perform both inland and costal SAR missions.⁸³

⁷⁹ Office of Performance Management and Assessment (DCO-81), 16–17.

⁸⁰ Office of Performance Management and Assessment (DCO-81), 17.

⁸¹ National Search and Rescue Committee, *National Search and Rescue Plan of the United States* (Washington, DC: United States Coast Guard, 2016), https://www.dco.uscg.mil/Portals/9/CG-5R/manuals/National_SAR_Plan_2016.pdf; Office of Performance Management and Assessment (DCO-81), 17.

⁸² Office of Performance Management and Assessment (DCO-81), 17–20.

⁸³ Office of Performance Management and Assessment (DCO-81), 20. Author’s experience: I have served at multiple positions in the USCG SAR chain of command to include deploying as an SRU, planning SAR responses at the Sector Command Center level, and being responsible for coordinating specific SAR operations as a SMC.

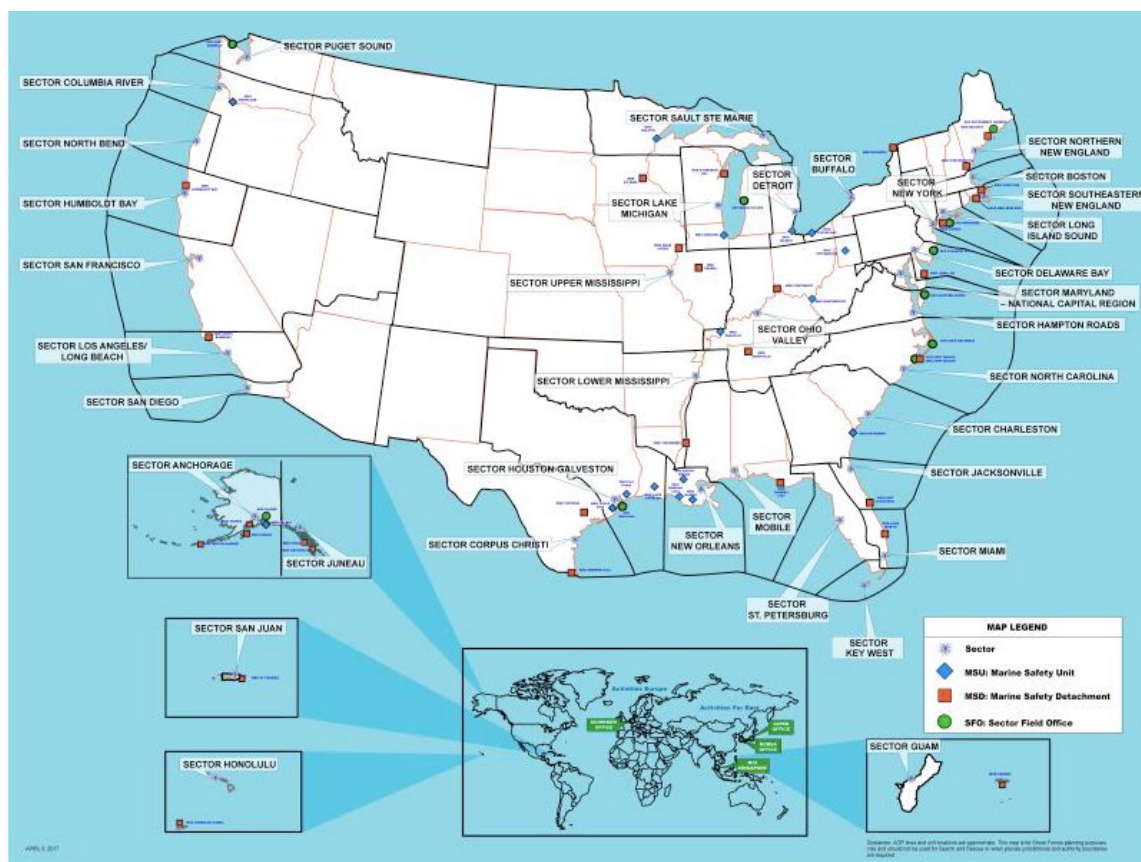


Figure 1. USCG Sectors.⁸⁴

2. SAR Tasks and Mission Execution

The USCG SAR mission can be broken down into four tasks: “distress monitoring and communications, search planning and preparation, SAR coordination, and SAR operations.”⁸⁵

a. *Distress Monitoring and Communications*

The first task in the SAR mission is notification of distress. The USCG can be alerted of a distress situation through a variety of methods that include very high frequency-

⁸⁴ Source: United States Coast Guard, “2017 United States Coast Guard Sectors Map,” Homeport, 2017, <https://homeport.uscg.mil/Pages/Sector-Map.aspx>.

⁸⁵ Office of Performance Management and Assessment (DCO-81), *U.S. Coast Guard Search and Rescue Mission Analysis Report*, 22. Author’s experience: I have served at multiple positions in the USCG SAR chain of command to include deploying as an SRU, planning SAR responses at the Sector Command Center level, and being responsible for coordinating specific SAR operations as a SMC.

frequency modulated (VHF-FM) radio calls, landline and cellular telephone calls, digital selective calling (DSC), maritime distress flares, or electronic beacons received through the COSPAS-SARSAT system.⁸⁶ After receiving a distress notification, the USCG's first action is to issue an urgent marine information broadcast (UMIB) to alert nearby vessels of the distress situation, and to request their assistance locating the individuals in distress or rendering aid.⁸⁷

b. Search Planning and Preparations

After a distress notification is received, the next SAR task is to conduct a risk assessment and planning process to determine if the USCG can safely and effectively undertake a particular SAR mission.⁸⁸ This risk assessment and planning process considers potential risks to responding assets and personnel, as well as “the likelihood of a successful rescue” despite the known risks.⁸⁹ SAR missions will be initiated if the potential for saving a life is high, and the USCG feels that its resources and personnel are able to conduct the mission. However, depending on the individual factors of each case, the USCG may decide to request assistance from other governmental agencies (OGAs), merchant vessels that participate in the Automated Mutual Assistance Vessel Rescue (AMVER) system, or Good Samaritans.⁹⁰ If the USCG accepts a mission, sector command center personnel will develop a search action plan based on the distressed individual's situation, considering

⁸⁶ Office of Performance Management and Assessment (DCO-81), 23; “SARSAT is an acronym that stands for Search and Rescue Satellite-Aided Tracking. COMSPAS is an acronym for the Russian words ‘Cosmicheskaya Sistyema Poiska Avariynich Sudov,’ which mean ‘Space System for the Search of Vessels in Distress,’” and the COSPAS-SARSAT system is an international satellite system for SAR distress alerting established by Canada, France, the United States, and the former USSR, “COSPAS-SARSAT Search and Rescue System,” National Aeronautics and Space Administration and National Oceanic and Atmospheric Administration, accessed April 27, 2021, https://www.nasa.gov/centers/goddard/pdf/105930main_cospas.pdf; Digital Selective Calling is a “VHF and MF/HF radiotelephone service [for] mariners as part of the Global Maritime Distress and Safety System. This service..., allows mariners to instantly send an automatically formatted distress alert to the Coast Guard or other rescue authority anywhere in the world,” United States Coast Guard, “Digital Selective Calling,” Navigation Center, September 2018, <https://www.navcen.uscg.gov/?pageName=AboutDSC>.

⁸⁷ Office of Performance Management and Assessment (DCO-81), 23.

⁸⁸ Office of Performance Management and Assessment (DCO-81), 23.

⁸⁹ Office of Performance Management and Assessment (DCO-81), 23.

⁹⁰ Office of Performance Management and Assessment (DCO-81), 23.

external factors, such as last known position, sea conditions, and wind speed or direction. Once a suitable plan is developed, the USCG will deploy the most appropriate SRU for the mission, i.e., aircraft, oceangoing vessel, or small boat.⁹¹ However, it is important to note that even if the USCG determines that another response asset is more appropriate due to specialized capabilities or proximity to the distress situation, the USCG will still oversee and coordinate SAR response efforts, until the distress situation has been resolved and the individuals in distress have been rescued.

c. SAR Coordination

An efficient and effective SAR response often necessitates coordination with other response entities at both the international and domestic level.⁹² Examples of domestic coordination are arraigning emergency medical services to meet USCG boats dockside to quickly transfer injured individuals to a higher level of medical care, or requesting local law enforcement or fire department assistance to access and search very shallow backwater tributaries or bays.⁹³ An example of international coordination may be airspace de-confliction and approval from foreign governments to conduct SAR operations within their countries' jurisdiction.⁹⁴ This type of coordination is especially prevalent in SRRs adjacent to foreign countries, such as the Great Lakes or Caribbean.

d. SAR Operations

The final task in the SAR mission is to deploy “one or more Search and Rescue Units (SRUs).”⁹⁵ The USCG conducts SAR operations using a “systems approach,” which employs various combinations of its own assets, OGA vessels, Good Samaritans, and

⁹¹ Office of Performance Management and Assessment (DCO-81), 23.

⁹² Office of Performance Management and Assessment (DCO-81), 23.

⁹³ Author's experience: Local fire departments or law enforcement agencies often have flat bottom shallow water boats or “fan boats” that can access backwater areas that USCG small boats cannot due to water depth constraints. The USCG mostly relies on its aviation assets to access shallow water areas in the absence of OGA coordination, with the only exception being a few disaster assistance response teams with shallow water vessels available for deployment during disaster response operations.

⁹⁴ Office of Performance Management and Assessment (DCO-81), *U.S. Coast Guard Search and Rescue Mission Analysis Report*, 23.

⁹⁵ Office of Performance Management and Assessment (DCO-81), 24.

commercial towing providers.⁹⁶ However, it is important to note that each approach has its “own advantages and disadvantages,” and that each USCG SAR response varies depending on a variety of factors, such as weather conditions, nature of distress, and the number of persons affected, as well as the geographic area where distressed individuals are located.⁹⁷ For cases far from shore, USCG aircraft are the best resource, and while “fixed wing aircraft can arrive on scene much faster than a rotary wing aircraft,” they have no hoisting capability to rescue distressed individuals from the water.⁹⁸ Fixed wing aircraft can however drop vital rescue equipment, such as lift rafts and dewatering pumps, and have much longer on scene endurance times. Additionally, while surface SRUs, such as ships and small boats can arrive on scene to “assist dewatering efforts, provide basic medical assistance, evacuate people from the vessel, and/or tow damaged vessels to shore,” they have a much slower response time.⁹⁹

Regardless of which USCG SRU will be deployed, prior to launching any SRUs, the cognizant sector command center will generate a search action plan. This plan will be used by the SRUs to search for distressed persons or craft if the location is unknown; however, once the distress location is known, a rescue plan will be developed “based on the specifics of the case.”¹⁰⁰ This rescue plan must be communicated to the individuals in distress, as well as any other responders, and must continually be re-evaluated and modified based on ongoing operations.¹⁰¹ For example, a rescue plan may be developed for a vessel taking on water in which an SRU intends to arrive on scene and begin dewatering operations. However, once on scene, the rescue plan may change to an evacuation plan, if the flooding is too great, or worse yet, the vessel sinks before the arrival of any SRUs. Additionally, if the individuals onboard abandon the vessel, a revised search plan may be needed to locate them again. Lastly, if rescue operations remove individuals from a

⁹⁶ Office of Performance Management and Assessment (DCO-81), 24.

⁹⁷ Office of Performance Management and Assessment (DCO-81), 24.

⁹⁸ Office of Performance Management and Assessment (DCO-81), 24.

⁹⁹ Office of Performance Management and Assessment (DCO-81), 24.

¹⁰⁰ Office of Performance Management and Assessment (DCO-81), 25.

¹⁰¹ Office of Performance Management and Assessment (DCO-81), 25.

distressed vessel, and the USCG is unable to tow the vessel back to shore, i.e., distressed persons were removed via a helicopter, the Coast Guard may work with commercial towing providers to tow the vessel back.¹⁰²

B. USCG'S SAR ROLE DURING MARITIME DISASTER RESPONSE

Similar to steady state operations, the USCG performs its SAR mission during disasters. The USCG uses its ships, aircraft, and small boats to respond to disasters that affect ports, inland and coastal waters, and adjacent land areas.¹⁰³ The skills and equipment used to search for people in distress, rescue them from danger, and tow disabled vessels to safety are essentially the same regardless if they are conducted during steady state operations or in conjunction with disaster response operations. The primary difference is the scale and frequency of operations, which can overwhelm the response capacity of USCG assets.

However, one new mission variant has evolved during recent disasters that the USCG does not conduct during daily operations and only performs during disaster events. The SAR of individuals from floodwaters in urban areas requires different knowledge, skills, training, and equipment. Other local, state, and federal agencies typically require specific training to perform surface water or swift water rescue operations. This training is covered under the National Fire Protection Association (NFPA) 1006 Standard for Technical Rescuer Professional Qualifications, 2008 Edition.¹⁰⁴ While the USCG does maintain a fleet of shallow water response boats for inland flooding response, personnel rely on previous experience, or improvisation to conduct these tasks vice formal training.

1. National Response System and the USCG

Like other federal, state, and local response organizations, the USCG participates in disaster responses using the roles and structures defined by ICS, as part of the National

¹⁰² Office of Performance Management and Assessment (DCO-81), 25.

¹⁰³ Deputy Commandant for Operations, *Disaster Response Mission Analysis Report* (Washington, DC: U.S. Coast Guard, 2018), 12.

¹⁰⁴ Deputy Commandant for Operations, 45.

Incident Management System (NIMS) and National Response Framework (NRF); however, the USCG has been responding to disasters long before NIMS or NRF mandates.

Throughout history, the USCG has responded to meet the nation's needs during disasters. However, the strategic landscape surrounding disasters has changed over time and altered the USCG's response from a more decentralized local operation, to a more highly synchronized event that requires coordination with numerous other federal, state, and local agencies.¹⁰⁵ The Appendix contains additional information regarding the background, evolution, and challenges of the U.S. disaster response system. Until the early 2000s, local Coast Guard commanders, using the operational assets and personnel already assigned or locally available, mostly initiated and controlled the USCG's response to disasters. This decentralized command and control model was well suited for disaster operations of limited scale and duration. Local commanders could initiate a response by deploying any and all SAR resources immediately in an effort to save lives.¹⁰⁶

During these disasters, the USCG's response would focus mainly on the maritime aspects of the disaster in which they already had statutory responsibilities and capabilities, such as SAR in the coastal area. Title 14 U.S.C. 88 provides the USCG with the authority to conduct SAR and perform any and all acts necessary to rescue or aid persons in distress upon the high seas or imperiled by flood waters.¹⁰⁷ As such, the Coast Guard's authority to conduct maritime SAR operations is continuous, rather than dependent on the implementation of the NRF or a presidential disaster declaration under the Stafford Act. This response posture mirrors that of other local first responders, but contrasts sharply with other federal government organizations, which require a Stafford Act disaster declaration, approval by the President, and a mission assignment and funding authorization by the Federal Emergency Management Agency (FEMA).¹⁰⁸

¹⁰⁵ Deputy Commandant for Operations, 14.

¹⁰⁶ Deputy Commandant for Operations, 14.

¹⁰⁷ Saving Life and Property, *U.S. Code 14* (2009) § 88 <https://www.govinfo.gov/app/details/USCODE-2009-title14/USCODE-2009-title14-partI-chap5-sec88/summary>.

¹⁰⁸ Deputy Commandant for Operations, *Disaster Response Mission Analysis Report*, 14.

The Robert T. Stafford Act was amended in 2016 to allow potentially impacted states and territories the ability to request federal assistance before a disaster, such as a hurricane or inland flooding occurred.¹⁰⁹ Prior to this amendment, the delay in processing and approving FEMA mission assignments was widely viewed as unacceptable.¹¹⁰ An example is the federal response to Hurricane Katrina in 2005.

The USCS's response to Katrina is one of the few success stories concerning the overall federal response to the disaster.¹¹¹ The USCG was able to respond quickly under its own organic authorities and saved thousands of lives before most other federal agencies even began to arrive in the area, days after the storm made landfall. In reaction to this failure, the Department of Homeland Security (DHS) responded to widespread criticism and “took a number of steps to improve preparedness and responsiveness to disasters.”¹¹² The requirement and expectations imposed by DHS (post-Katrina) resulted in major impacts to the USCG's response posture during disasters, which transformed the organization from a maritime response force to an essential component of the federal government's response to disasters. This expanded role took on operational requirements as well, including the requirement to deploy resources to support disasters that primarily impact land areas (e.g., USCG aircraft to transport disaster supplies and conduct aerial damage survey, and USCG aircraft and small boats to rescue stranded people from flooded areas).¹¹³ The current NRF identifies the USCG as one of the primary agencies for providing resources and coordinating the overall response to SAR during disasters under Emergency Support Function (ESF) #9.¹¹⁴

¹⁰⁹ Federal Emergency Management Agency, *Stafford Act, as Amended, and Related Authorities*, vol. FEMA P-592 (Washington, DC: Department of Homeland Security, 2019), https://www.fema.gov/sites/default/files/2020-03/stafford-act_2019.pdf.

¹¹⁰ Deputy Commandant for Operations, *Disaster Response Mission Analysis Report*, 14.

¹¹¹ Young, *Coast Guard*.

¹¹² Deputy Commandant for Operations, *Disaster Response Mission Analysis Report*, 15.

¹¹³ Deputy Commandant for Operations, 15.

¹¹⁴ Federal Emergency Management Agency, *Emergency Support Function #9—Search and Rescue Annex* (Washington, DC: Department of Homeland Security, 2016), https://www.fema.gov/sites/default/files/2020-07/fema_ESF_9_Search-Rescue.pdf.

2. Emergency Support Function #9

ESF #9 (Search and Rescue Annex) provides context for the deployment of federal resources that support SAR under the NRF, National Search and Rescue Plan (NSP), and U.S. National SAR Supplement (NSS). During incidents requiring a unified SAR response, the ESF Coordinator (FEMA) designates lifesaving responsibility to primary agencies that can provide specialized SAR capabilities.¹¹⁵ Primary agencies identified in ESF #9 are assigned by the operational needs and classification of the incident. According ESF #9, the three incident classifications and their associated primary agencies are the following:

- **Structural Collapse Urban Search and Rescue (US&R):** primary agency is FEMA and “includes operations for natural and manmade disasters and catastrophic incidents, as well as other structural collapse operations that primarily require Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) US&R task force operations.”¹¹⁶
- **Maritime/Coastal/Waterborne SAR:** primary agency is the USCG and “includes operations for natural and manmade disasters that primarily require air, cutter, boat, and response team [s]” for maritime response operations.¹¹⁷
- **Land SAR:** primary agency designation is shared between the Department of Interior (DoI), National Parks Service (NPS), and Department of Defense (DOD) and “includes operations that require aviation and ground forces to meet mission objectives, other than maritime/coastal/waterborne and structural collapse SAR operations.”¹¹⁸

¹¹⁵ Federal Emergency Management Agency, 1.

¹¹⁶ Federal Emergency Management Agency.

¹¹⁷ Federal Emergency Management Agency.

¹¹⁸ Federal Emergency Management Agency.

SAR services provided under ESF #9 include, but are not limited to, “distress monitoring; incident communications; locating distressed personnel; and coordinating and executing rescue operations, including extrication and/or evacuation.”¹¹⁹

3. National Search and Rescue Plan for the United States

In addition to ESF #9, the U.S. NSP, “assigns SAR responsibilities to federal agencies with the authority to conduct SAR operations.”¹²⁰ The National SAR Plan for the United States is the interagency approved policy for coordinating national SAR capabilities. This plan calls for all participants (signatories) to use “all available resources in all types of SAR operations to enable the United States to satisfy its humanitarian, national, and international commitments and obligations.”¹²¹

However, the National SAR Plan is written in a way that it does not contravene the responsibilities and legal authorities for any participant who normally assists persons in distress, and maintains that state and local authorities should normally retain SAR responsibilities during local incidents.¹²²

These various levels of policy and guidance regarding SAR operations during disasters create confusion during large-scale maritime SAR events, such as those present after hurricanes, because the USCG has the organic authority and responsibility to respond and will be designated as the primary agency for maritime SAR disasters. However, state and local authorities still have responsibilities under the National SAR Plan, which often leads to parallel SAR efforts from the state and federal officials during the same incident.

Additionally, the National SAR Plan states that participants of the plan are encouraged to support each other, as well as state and local authorities during SAR operations when applicable, and that participants are encouraged to use their SAR

¹¹⁹ Federal Emergency Management Agency, 1.

¹²⁰ National Search and Rescue Committee, *United States National Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual Version 2.0* (Washington, DC: Department of Homeland Security, 2018), 76, https://www.dco.uscg.mil/Portals/9/CG-5R/nsarc/NSS_2018_Version/National%20SAR%20Plan%202018.pdf.

¹²¹ National Search and Rescue Committee, *National Search and Rescue Plan of the United States*, 1.

¹²² National Search and Rescue Committee, 4.

capabilities to support ESF #9. However, confusion still exists whenever ESF #9 is activated. FEMA is the coordinating agency responsible for response activities under ESF #9, and the USCG is only designated the primary agency if ESF #9 is activated for maritime SAR vice US&R or land SAR. However, maritime SAR needs are often widespread in the aftermath of a hurricane, and while some areas may receive a disaster declaration, prompting ESF #9 activation with FEMA coordination, others may not. Yet, these areas may still need a maritime SAR response, regardless of a disaster declaration, and the USCG is still responsible for carrying out SAR missions in these areas under statutory mandates.

C. SUMMARY

The USCG carries out SAR activities as one of its 11 statutory missions, in support of international and domestic obligations, with the overall goal of leveraging USCG assets and resources to prevent the loss of life whenever possible. The USCG's SAR mission is primarily coordinated by sectors that align with internationally recognized SRRs. However, each sector carries out the USCG's SAR mission by focusing on the four SAR tasks of distress monitoring and communications, search planning and preparation, SAR coordination, and SAR operations.

The USCG's SAR mission is a demand driven mission conducted daily, and when necessary, as part of larger disaster response operations. Additionally, the USCG's SAR mission is essentially the same regardless if it is conducted during steady state operations or during disasters, except for the one new mission variant of SAR of individuals from floodwaters in urban areas, which requires different knowledge, skills, training, and equipment. Lastly, the Coast Guard's authority to carry out maritime SAR operations is continuous, rather than dependent on the implementation of the NRF, or a presidential disaster declaration under the Stafford Act. However, despite the various levels of policy and guidance regarding SAR operations during disasters, confusion still exists between federal, state, and local officials during disaster operations that require a maritime SAR response, which often results in a lack of coordination and a duplication of SAR response efforts.

IV. RESEARCH DESIGN

The research question for this thesis is: *How can the United States Coast Guard better engage organized spontaneous volunteers who conduct search and rescue during hurricane response operations?*

To answer this question, an exploratory case study methodology was used to analyze the organizational response of both the USCG and OSVs who conducted maritime SAR operations during three separate disasters. The organizational response of both the USCG and OSVs was analyzed according to the DRC's four-fold typology of organized responses to disasters (discussed in Chapter II), in hopes of identifying specific factors of the USCG's organizational response that affected OSV engagement. The intent of this analysis was to inquire if certain USCG organizational responses were more conducive than others were for engaging OSVs. The cases studied were Hurricane Katrina in 2005, Hurricane Harvey in 2017, and the Lower Manhattan Boat Lift on 9/11.

A. EXPLORATORY CASE STUDY METHODOLOGY

Case study research was developed in the social sciences. It is useful for capturing the complexities of a given case. An exploratory case study is a type of case study that examines phenomena that lack existing detailed primary research or a developed hypothesis that can be tested. Exploratory case study research can be used as a preliminary step towards discovering causal relationships or explanations when the data required for hypothetical formulation is not already available.¹²³ Insights can then be developed, which can later be generalized and used for generating new theories.¹²⁴ One of the most prominent authorities on case study research, Robert Yin, describes exploratory case studies as a way to scope pertinent questions and develop a new hypothesis for consecutive

¹²³ Christopher K. Streb, "Exploratory Case Study," in *Encyclopedia of Case Study Research*, ed. Albert Mills, Gabrielle Durepos, and Elden Wiebe (Thousand Oaks, CA: SAGE Publications, Inc., 2012), 372, <https://doi.org/10.4135/9781412957397.n139>.

¹²⁴ Streb, 372.

studies.¹²⁵ This research sought to use an exploratory case study methodology to inquire how the organizational response of the USCG affected organized spontaneous volunteer engagement.

B. ASSUMPTIONS

The underlying assumption was that the organizational response of the USCG during each event did have some effect on the level of OSV engagement; however, this research and analysis aimed to identify how and why. Additionally, it is certainly plausible that OSVs may have some effect on the USCG as well. However, this research only focused on how the USCG's organizational response affected OSVs, and not the other way around because the goal of this research project was to offer recommendations for how the USCG could better engage OSVs, and not how OSVs could better engage the USCG.

C. LIMITATIONS

While an exploratory case study methodology is well suited for this project, it is unable to account for every possible instance of spontaneous volunteerism during each disaster. The scope of this research project was focused only on OSVs who either formed a group or pseudo group that could be identified and classified according to the DRC typology of organized responses to disasters. Additionally, OSVs can develop in the response or recovery stage of a disaster and these volunteers can conduct a multitude of tasks including but not limited to SAR, sheltering and caring for victims, food and supply distribution, donation management, counseling services, etc. However, this research only focused on OSVs during the response phase of disaster management and specifically only on OSVs who conducted maritime SAR tasks.

Additionally, the disasters studied for this research project took place over a two-decade timespan that coincided with the evolution and rapid change of the U.S. disaster management system. It is important to note that the evolution of the disaster management system and federal mandates to adopt NIMS has influenced the organizational response

¹²⁵ Streb, 372; Robert K. Yin, *Case Study Research: Design and Methods*, 5th ed. (Los Angeles: SAGE, 2014).

and mission set of the USCG over time. The Appendix provides a more comprehensive review of the evolution of the U.S. disaster response system.

Lastly, this research is not a critique of past disasters in which OSVs conducted maritime SAR operations, nor is it a comprehensive review of the actions taken in each disaster by the USCG or OSV groups. Along that line, this research did not examine privacy, safety, or legal concerns regarding OSVs carrying out SAR related tasks during disasters. While those inquiries are worthy of future research, they are beyond the scope of this thesis.

D. DATA COLLECTION

The three cases used for analysis were the Lower Manhattan Boat Lift on 9/11, Hurricane Katrina in 2005, and Hurricane Harvey in 2017. In each case, both the USCG and OSVs carried out maritime SAR tasks, and both organizations were credited with saving lives. These cases were selected due to their varying geographical areas and varying scope and scale of maritime SAR operations. One case was caused by a terrorist attack and two involved substantial inland flooding caused by hurricanes, which made landfall 13 years apart. Case study data for this research included books, government reports, journal articles, incident after action reports, newspaper articles, and various websites. Preference was given to sources that contained first-hand accounts of events and peer-reviewed academic writings.

E. DATA ANALYSIS

To answer the overall research question of how can the USCG better engage OSVs who conduct SAR during hurricane response operations, this thesis conducted an exploratory case study to identify and analyze SAR tasks undertaken during each event, and to determine which organization (USCG/OSV) carried out each task. This exploratory case study focused on identifying the four tasks routinely carried out by the USCG during SAR missions, which include distress monitoring and communications, search planning and preparedness, SAR coordination, and SAR operations. Once SAR tasks were identified, an analysis was conducted to determine what factors contributed to or hindered the SAR response efforts of each organization. Additionally, the organizational response

of both the USCG and OSVs was analyzed according to the DRC's four-fold typology of organized responses to disasters to identify specific factors of the USCG's organizational response that affected OSV engagement.

This DRC typology analysis was conducted by examining each SAR task to determine if it was a regular or non-regular task for the organization carrying it out, and to determine if the organizational structures used to carry out each SAR task were in place prior to the disaster, or if they were created as a result of the disaster itself. Ultimately, this DRC typology analysis led to a typology identification for each organization according to the DRC typology of organized responses to disasters, and the intent of this analysis and typology identification was to inquire if certain USCG organizational responses were more conducive than others were in engaging OSVs.

F. OUTCOMES

This exploratory research and analysis hoped to identify patterns and trends in the USCG's organizational response to disasters, and highlight factors that either increased or decreased the level of OSV engagement with the USCG. The DRC typology of organized responses to disasters was chosen as a framework because analyzing the organizational response of both the USCG and OSVs based on tasks, and organizational structures used to carry out those tasks, provided a useful cross-case analysis to understand how the organizational response of the USCG affected OSV engagement.

Understanding how the organizational response of the USCG affects OSVs not only provides a better foundational understanding of cross-organizational dynamics during disaster response, but this knowledge can be leveraged to implement new strategies and response policies that can better integrate OSVs into future USCG response operations. Furthermore, state, local, or tribal organizations could also find value in understanding how their own organizational response to disasters might affect organized spontaneous volunteer engagement. Especially, since these organizations are expected to manage complex and dynamic events without outside assistance for at least the first few days following a disaster.

V. MARITIME DISASTER CASE STUDIES: OVERVIEW, BACKGROUND, AND ANALYSIS OF SAR RESPONSE

This chapter examines three case studies in which both the USCG and OSVs conducted maritime SAR as part of the overall disaster response. Each case study provides a brief background of the case, an analysis of the SAR response by both the USCG and OSVs, and concludes with an overall assessment of factors that contributed or hindered the response efforts of each organization.

A. LOWER MANHATTAN BOAT LIFT ON 9/11

The Lower Manhattan Boat Lift on 9/11 is the story of the maritime SAR operations that were part of the overall events of that day. What started out as an ordinary Tuesday morning quickly developed into:

The largest sea evacuation in history, larger than the evacuation of Dunkirk in World War II, where 339,000 British and French soldiers were rescued over the course of nine days. On 9/11 nearly 500,000 civilians were rescued from Manhattan, by boat, it took less than nine hours.¹²⁶

Notably, by all accounts, no significant accidents or injuries occurred even though people were embarking on a makeshift flotilla of vessels (some of which were not designed to carry passengers, i.e., tug boats) from embarkation points not designed for transferring personnel, and under extreme conditions of urgency and uncertainty.¹²⁷

1. Background

The Borough of Manhattan is the heart of New York City and is the epicenter for much of the global financial world; however, people may forget that it is also an island.

¹²⁶ Eddie Rosenstein, *Boatlift—An Untold Tale of 9/11 Resilience* (Brooklyn, NY: Eyepop Productions Inc., 2011), <https://www.coastguardmuseum.org/911boatlift?fbclid=IwAR1uidWyZ5Ajtf75dm4evUi51qTJeOce6cyghL0Wej6vPt9feIoXWYvNLPM#>; Carolina Salguero, “PortSide NewYork Exhibit ‘Mariners’ Response to 9/11,” PortSide NewYork, accessed June 25, 2020, <http://portsidenewyork.org/911-maritime-response>.

¹²⁷ James Kendra and Tricia Wachtendorf, *The Waterborne Evacuation of Lower Manhattan on September 11: A Case of Distributed Sensemaking*, Preliminary Paper, No. 355 (Newark, DE: Disaster Research Center, 2006), 3, <http://udspace.udel.edu/handle/19716/3194>.

Once it was clear that America was under a terrorist attack, officials in New York closed all forms of mass transit in and out of the city, which included bridges and subway tunnels. For the first time in over a century, the only way on or off the island of Manhattan was by water.¹²⁸ With all forms of mass transit shut down, people trying to evacuate the area now known as “Ground Zero” were trapped.

Individuals who headed south of Ground Zero wound up at the southernmost tip of Manhattan in an area called Battery Park, which has the Hudson River on one side and the East River on the other (Figure 2). Despite being trapped, people kept streaming in. From the relative safety of the water, many civilian boat captains saw these trapped individuals and began piloting their vessels up against the seawall to rescue them.¹²⁹ This was the beginning of the Lower Manhattan Boat Lift on 9/11.

¹²⁸ Rosenstein, *Boatlift*.

¹²⁹ Rosenstein.



Figure 2. Map of Lower Manhattan.¹³⁰

2. Analysis of SAR Response

The following analysis is broken down according to the SAR tasks of distress monitoring and communications, search planning and preparedness, SAR coordination, and SAR operations, to highlight which organization carried out each SAR task, as well as to identify the organizational structures used to carry out each task.

¹³⁰ Source: Jay Moon, “9/11 Boatlift: The Largest Marine Evacuation in History,” *INSH* (blog), August 1, 2019, <https://insh.world/history/the-great-boat-lift-of-911/>.

a. *Distress Monitoring and Communications*

The first SAR task is distress monitoring and communication, and Captain Patrick Harris was likely the first person to report to the USCG that a plane had struck the twin towers. He made his report via a maritime VHF-FM radio directly from a small marina on the western shore of Manhattan from his sailing vessel *Ventura*.¹³¹ However, either due to his unprecedented nature of the distress call, or the fact that it was not recognized as a pending maritime evacuation event, the USCG personnel who received the call responded with a vague acknowledgment that they would alert the appropriate departments.¹³² Without the realization that a maritime evacuation was developing, the USCG was at best delayed, or at worst, never issued a traditional UMIB to solicit the assistance of nearby vessels.¹³³ However, the lack of an initial UMIB did not matter because mariners near lower Manhattan were witnessing the devastation unfold firsthand and began taking action without being officially requested to do so. According to a study by Kendra and Watchendorf, this situation was a case of distributive sense-making. Distributive sense-making occurs when a group of individuals become aware of a particular event, identify the needs of those around them, and the potential actions to fulfil those needs.¹³⁴ During the 9/11 Boat Lift, mariners recognized that individuals were trapped and needed to be evacuated, without receiving a traditional request for aid from the USCG or others, and self-organized to begin evacuating lower Manhattan with their own vessels. This group emergence took place before the USCG could initiate a formal response.

¹³¹ James M. Kendra and Tricia Wachtendorf, *American Dunkirk: The Waterborne Evacuation of Manhattan on 9/11* (Philadelphia: Temple University Press, 2016), 20.

¹³² Mike Magee, ed., *All Available Boats: The Evacuation of Manhattan Island on September 11, 2001* (New York: Spencer Books, 2002), 47; David Tarnow, "All Available Boats," *Transom*, September 1, 2002, <https://transom.org/2002/all-available-boats/>; Kendra and Wachtendorf, 21.

¹³³ When the USCG receives an initial distress notification, the first step of distress monitoring and communications is to issue a UMIB, which alerts nearby vessels of the distress and requests their assistance in rendering aid or locating the individuals in distress. In the case of the 9/11 Boat Lift, it is unknown if a UMIB was ever broadcast by the USCG. While it is well documented that the USCG did issue a broadcast for all available boats to assist in the evacuation of lower Manhattan, this broadcast was not a UMIB.

¹³⁴ Kendra and Wachtendorf, *The Waterborne Evacuation of Lower Manhattan on September 11*, 2.

b. Search Planning and Preparedness and SAR Coordination

The second and third SAR tasks are search planning and preparedness and SAR coordination. These two tasks took place almost simultaneously during the Lower Manhattan Boat Lift on 9/11, and began with the efforts of USCG Lieutenant Mike Day and Sandy Hook harbor pilot Andrew McGovern.

Lieutenant Day was Chief of Waterways Oversight for the Port of New York and New Jersey in 2001, and on the morning of 9/11, was receiving a daily briefing at the Coast Guard command center on Staten Island. During the briefing, it was reported that a small plane had just struck the World Trade Center. Acting on this information, Day dispatched a USCG small boat to check out the situation, but at the time, believed it to be a “non-maritime event,” which would not require a full USCG response.¹³⁵ However, once the second plane struck, it was clear that more was going to be needed.

Lieutenant Day grabbed several planning and preparedness documents as he headed to the area to get a handle on the situation. These documents were harbor charts, a plan for Operation Sail (OpSail), and a response plan for (at the time) the worst-case scenario, a capsized Staten Island Ferry during wintertime.¹³⁶ OpSail is a citywide event in which tall ships, warships, and yachts from all around the world converge on New York Harbor, and the planning documents for the event contained information about potential staging areas and emergency medical care locations around the harbor. The capsized ferry response plan provided guidance on recovering 6,000 people from freezing waters before hypothermia set in.¹³⁷ It is important to note that neither of these plans addressed the risk assessment and planning process that typically takes place during a USCG SAR mission. At best, these plans could only be used as a starting point for the 9/11 Boat Lift, because at the time, no plan existed with detailed guidance on how to conduct a waterborne evacuation of Manhattan. The lack of advanced planning was not the only challenge that the USCG faced, as immediate planning was also lacking. “Planning” consisted of mostly an “uncontested

¹³⁵ Kendra and Wachtendorf, *American Dunkirk*, 104.

¹³⁶ Kendra and Wachtendorf, 106.

¹³⁷ Kendra and Wachtendorf, 106.

decision to do something,” and for a period of time, (at least at the onset) converges had the flexibility to define SAR operations however they deemed necessary.¹³⁸

Once Day arrived on scene, he noted that one of the most immediate problems was the coordination of maritime traffic in the harbor. Day noted that ferries, water taxis, dinner boats, and private vessels of all types had already “started to undertake their own rescue missions.”¹³⁹ In an attempt at command and control, the Coast Guard tried to assign VHF-FM radio channels for different groups; however, communications quickly broke down. Realizing this, Day and his team decided they needed, “more durable communications and a recognizable command post.”¹⁴⁰ They also realized that they needed to be more flexible than usual with the rules of the harbor. At some point during the morning, Day connected with harbor pilot Andrew McGovern, who chaired a Harbor Safety Committee on which Day served. McGovern reached out to the marine superintendent for the pilots’ headquarters and asked them to bring the 200-foot pilot boat *New York* to Manhattan. McGovern thought the pilot boat would make a good command post, because it had several radios, radars, and offered a 360-degree view from its bridge.¹⁴¹ McGovern also asked Day for some Coast Guard personnel to accompany the pilot boat and noted that people would respond better to someone in uniform.¹⁴² In a substantial departure from Coast Guard procedure, Lieutenant Day decided to use the pilot boat *New York* as a joint command post with coordination between the USCG and harbor pilots. Day also hoisted a Coast Guard flag up on the pilot boat and was quoted as saying, “I wouldn’t say we deputized it, but we took it over” clarifying “it was not fully taking it over, but the pilot boat with the Coast Guard flag symbolized the cooperation between the two entities.”¹⁴³ This moment marked the beginning of the joint SAR coordination that would follow throughout the rest of the day.

¹³⁸ Kendra and Wachtendorf, 92.

¹³⁹ Kendra and Wachtendorf, 107.

¹⁴⁰ Kendra and Wachtendorf, 107.

¹⁴¹ Kendra and Wachtendorf, 107.

¹⁴² Kendra and Wachtendorf, 107.

¹⁴³ Kendra and Wachtendorf, 107.

Lieutenant Day also “recognized the immense amount of knowledge that the Sandy Hook Pilots brought to the table,” already having a close working relationship with them due to previously spending eight months in an industry exchange program with the Port Authority of New York and New Jersey.¹⁴⁴ The goal of this industry exchange program was to foster a stronger relationship between the maritime industry and the Coast Guard, because the relationship between the two is often challenging. The maritime industry fully supports the SAR aspect of the Coast Guard, but often resents the regulatory oversight and law enforcement aspects of the Coast Guard.¹⁴⁵ This exchange program attempted to bridge this gap by creating a partnership in the port, with the emphasis on collaboration and joint problem solving.

Day anticipated the harbor pilots would offer more situational awareness than Coast Guard officers would, “because of their experience with a vast range of vessels in the harbor and because of their relationship with the maritime community.”¹⁴⁶ During the maritime evacuation, each organization had something to offer, and based on the combination of personal networks, statutory authority, credibility, and equipment, the coordination really came together and culminated in the shared space of the pilot boat *New York*.

c. SAR Operations

The final SAR task is SAR operations, and on 9/11, maritime SAR operations were carried out by over 150 vessels consisting of ferryboats, tug boats, Coast Guard boats, and even privately owned recreational boats that all converged at once. While independent SAR operations were taking place prior to Coast Guard involvement, the primary catalyst for the emergence of a coordinated effort was when Lieutenant Day and harbor pilot Andrew McGovern decided that some form of coordination needed to be established. While not a traditional UMIB, they decided to put out a radio broadcast for assistance. Day chose to make a broadcast requesting that “all available boats” able to assist with the evacuation of

¹⁴⁴ Kendra and Wachtendorf, 104.

¹⁴⁵ Kendra and Wachtendorf, 104.

¹⁴⁶ Magee, *All Available Boats*, 58; Tarnow, “All Available Boats”; Kendra and Wachtendorf, 107.

Manhattan to please report to Governors Island.¹⁴⁷ This call was transmitted to all vessels in the area equipped with a maritime radio, although evidence exists that not everyone heard the call.¹⁴⁸ Using the already established maritime VHF-FM radio system to communicate with participants of the evacuation was vital. VHF-FM channels 13 and 16 are the maritime calling and distress frequencies, respectfully, and are available to anyone with access to a maritime radio. All Coast Guard vessels, police and fire vessels, and commercial vessels have a maritime radio capable of operating on channels 13 and 16, as well as many recreational vessels that choose to invest in one. Having a common communications channel solved many of the interoperability issues of the 9/11 Boat Lift; however, at times, excess transmissions did hamper communications.¹⁴⁹

To combat the communication challenges or to decentralize command and control, vessels arriving at Governor's Island were either tasked with evacuating certain areas or were placed on specific routes. Harbor pilots were able to identify the vessels' capabilities quickly just by looking at them, and could direct the boats where they could best be used. It is important to note that some of the smaller recreational vessels that responded were re-directed or escorted out of the area by the USCG, either due to their limited capability, or out of safety concerns.¹⁵⁰ Once directed on a route, these vessels went back and forth all day long trying to evacuate as many people as they could. "You could not have planned anything that happened that quick," noted Engineer Robin Jones, onboard the tug *Mary Gellatly*.¹⁵¹ The event was described as people just having to do what they had to do; average people stepping up when they needed to. The decision to use the pilot boat *New York* as a floating command post was not the only departure from USCG procedure that happened that day.

¹⁴⁷ Rosenstein, *Boatlift*; Moon, "9/11 Boatlift"; Kendra and Wachtendorf, *The Waterborne Evacuation of Lower Manhattan on September 11*, 2; Kendra and Wachtendorf, *American Dunkirk*, 114.

¹⁴⁸ Kendra and Wachtendorf, *The Waterborne Evacuation of Lower Manhattan on September 11*, 6.

¹⁴⁹ Kendra and Wachtendorf, *American Dunkirk*, 17; Kendra and Wachtendorf, *The Waterborne Evacuation of Lower Manhattan on September 11*, 6.

¹⁵⁰ Kendra and Wachtendorf, *American Dunkirk*, 112–13.

¹⁵¹ Rosenstein, *Boatlift*.

Vincent Ardolino, the Captain of *Amberjack V*, recalled the USCG stating, “not how many people are you allowed to carry, how many people you can fit?”¹⁵² During normal operations, the USCG regulates a vessel’s max passenger capacity. However, on 9/11, the individual captains themselves were determining max passenger capacity. One captain was reported as yelling out the bridge window to cut off passengers at about 300.¹⁵³ While overloading a vessel is technically a violation of USCG regulations and federal law, captains intentionally broke the law, but did so purposefully. Despite intentionally overloading their vessels, caution was not thrown to the wind. Organization and a concern for safety were still enforced, with various accounts of crews telling passengers where to sit (for stability reasons) and providing lifejackets and safety briefings.¹⁵⁴

Certainly, the USCG could have taken over the evacuation efforts, at least in principal, because of its statutory authority and responsibility for maritime SAR. However, the USCG needed the resources and connections that the commercial maritime community brought to bear to conduct a successful operation, and in the case of 9/11, the USCG and harbor pilots carried out these SAR operations jointly. In reality, the USCG was dispersing its authority to others.¹⁵⁵ An account even surfaced of a USCG officer giving his official ball cap and lifejacket to a harbor pilot stating, “you’re in the Coast Guard if anybody asks,” even though it is a federal offense to impersonate a Coast Guard officer.¹⁵⁶ A harbor pilot at Battery Park described the coordination amongst the various vessels as a decentralized unity of effort, and noted that some mariners participating in the evacuation were not even aware that the USCG was involved. Another described Lieutenant Day’s actions as being part of the team and allowing the process to unfold, rather than trying to take charge of it.¹⁵⁷ Admiral James Loy, the Commandant of the Coast Guard at the time,

¹⁵² Rosenstein.

¹⁵³ Kendra and Wachtendorf, *American Dunkirk*, 117.

¹⁵⁴ Kendra and Wachtendorf, 117.

¹⁵⁵ Kendra and Wachtendorf, 115–17.

¹⁵⁶ Kendra and Wachtendorf, 126.

¹⁵⁷ Kendra and Wachtendorf, 115.

described the event as “the Coast Guard and the whole maritime community of the Port of New York and New Jersey, standing up and recognizing what had to be done.”¹⁵⁸

3. Summary

As previously noted, a perception exists that spontaneous volunteers will hamper the disaster response by causing a breakdown of command and control. However, very little evidence suggests that any of these problems occurred during the Lower Manhattan Boat Lift on 9/11. In fact, the evacuation could not have succeeded without the efforts of OSVs, and in many cases, these individuals brought with them special knowledge, skills, and abilities that enabled the USCG to succeed.¹⁵⁹ The willingness of the USCG to allow for a decentralized response is one of the major successes of the case, and is a contributing factor that allowed the emergence of a new group to form.

B. HURRICANE KATRINA

On August 29, 2005 Hurricane Katrina, one of the most devastating storms in U.S. history, made landfall along the Gulf Coast of Louisiana and Mississippi. The sheer magnitude of the storm itself, and the subsequent flooding of New Orleans, posed challenges for responders at the federal, state, and local levels.¹⁶⁰ The city of New Orleans, which is already six feet below sea level, was inundated with storm surge and rising floodwaters, which were exacerbated by the failure of the levee system surrounding the city.¹⁶¹ Despite the calls for evacuation, nearly 60,000 people were unable or unwilling to leave, and once the levee system broke, 80 percent of the city was submerged with up to 27 feet of water, which created the need for a massive SAR operation.¹⁶²

¹⁵⁸ Moon, “9/11 Boatlift.”

¹⁵⁹ Kendra and Wachtendorf, *American Dunkirk*, 6.

¹⁶⁰ Frances Fragos Townsend, *The Federal Response to Hurricane Katrina: Lesson Learned* (Washington, DC: The White House, 2006), 1, <https://permanent.access.gpo.gov/lps67263/katrina-lessons-learned.pdf>.

¹⁶¹ Herman Fuselier, “Cajun Navy Haunted, Inspired by Katrina Memories,” *The Advertiser*, August 28, 2015, <https://www.theadvertiser.com/story/news/local/louisiana/2015/08/31/cajun-navy-haunted-inspired-katrina-memories/71283996/>.

¹⁶² CBS News, “How Citizens Turned into Saviors after Katrina Struck”; Townsend, *The Federal Response to Hurricane Katrina*, 34.

1. Background

On August 23, 2005, Tropical Storm Katrina developed near the Bahamas, and over the next few days, strengthened into a Category 1 hurricane. Hurricane Katrina made its initial landfall in Florida. However, once the storm crossed over Florida and into the Gulf of Mexico, it quickly strengthened into a catastrophic Category 5 storm fueled by the warm waters of the Gulf. Hurricane Katrina made its second landfall over Louisiana and Mississippi and left “a trail of heartbreaking devastation and human suffering.”¹⁶³

Emergency plans at all levels of government were tested during Katrina, and in many cases, local and state recourses were overwhelmed or incapacitated due to damaged facilities, power loss, and communication outages. The disaster required an unprecedented federal level response.¹⁶⁴ However, federal response efforts were for the most part viewed as slow, highly inefficient, and ineffective; with the exception that the USCG was applauded for its forward leaning posture in initiating SAR operations immediately following the storm.¹⁶⁵ With the vast majority of government responders struggling to respond effectively to the SAR needs of the event, an OSV group emerged to fulfill these needs, perceived or real.

Hurricane Katrina was responsible for the death of over 1,600 people, a vast majority of those (almost 80%) being in the New Orleans metropolitan area.¹⁶⁶ However, this death rate would have been significantly higher if not for the efforts of an OSV group. These OSVs piloted their flat bottom boats through the flooded city streets to locate and rescue individuals trapped in their homes or on rooftops.¹⁶⁷ This spontaneous volunteer effort, in the aftermath of Hurricane Katrina, was the birth of the Cajun Navy.

¹⁶³ Townsend, 1.

¹⁶⁴ Townsend, 33; Thornburg, “Disruptive Emergent Systems in Disaster Response,” 31.

¹⁶⁵ Young, *Coast Guard*.

¹⁶⁶ Townsend, *The Federal Response to Hurricane Katrina*, 8.

¹⁶⁷ CBS News, “How Citizens Turned into Saviors after Katrina Struck”; Billy Gunn, “Greatest Story Never Told: Acadiana Boaters Braved Danger, Arrest to Rescue New Orleans-Area Residents Trapped by Hurricane Katrina Floods,” *Acadian Advocate*, September 3, 2015, https://www.theadvocate.com/acadiana/news/article_97dc876a-c30c-5e31-85ca-db001a004962.html; Fuselier, “Cajun Navy Haunted, Inspired by Katrina Memories”; Thornburg, “Disruptive Emergent Systems in Disaster Response,” 32.

2. Analysis of SAR Response

The following analysis is broken down according to the SAR tasks of distress monitoring and communications, search planning and preparedness, SAR coordination, and SAR operations, to highlight which organization carried out each SAR task, as well as to identify the organizational structures used to carry out each task.

a. Distress Monitoring and Communications

The first SAR task is distress monitoring and communication, and this task started well before Katrina made landfall. The National Weather Service monitored the storm since its formation near the Bahamas, and released a total of 61 advisories over a period of seven days, as Katrina approached the Gulf Coast.¹⁶⁸ In response to these advisories, government officials began preparing for Katrina's imminent landfall to include declaring states of emergency, activating emergency response functions, and pre-positioning response assets. Additionally, the State of Louisiana took steps to begin evacuations, and determined that an evacuation of New Orleans would be required.¹⁶⁹

Louisiana Governor Kathleen Blanco and Mississippi Governor Haley Barbour both declared a state of emergency for their respective states, and at the request of Governor Blanco, President Bush signed an emergency declaration for the State of Louisiana before the storm even made landfall, which at the time was rare.¹⁷⁰ The federal government responded to this emergency declaration by activating emergency support functions and issuing mission assignments, and FEMA began coordinating federal SAR resources from the Coast Guard, FEMA US&R Task Forces, and the DOD.¹⁷¹

Despite these preparations at the federal, state, and local levels, once Katrina hit, local responders were left with damaged infrastructure and an inoperable communications network. Neither the 911-call centers, nor the public safety radio system, were functioning

¹⁶⁸ Townsend, *The Federal Response to Hurricane Katrina*, 22.

¹⁶⁹ Townsend, 25.

¹⁷⁰ Townsend, 24–27.

¹⁷¹ Townsend, 38.

properly. Additionally, the State of Louisiana's 800 MHz interoperability radio system (a system used to coordinate response efforts across the state) was not operable for several days after the storm.¹⁷² With the 911 system down, people began calling into local radio and television stations to explain their situation and plea for help, and these calls were broadcast live over the air.¹⁷³

Seeing this devastation unfold, former Senator Nick Gautreaux was contacted by Walter Boasso (another Senator who previously served with Gautreaux) stating, "My people are dying. I need help."¹⁷⁴ In response, "Gautreaux put out his own plea" for help, and his request was sent out by local media asking for "anyone [who] wants to go help the people of New Orleans [to] please come to the Acadiana Mall" in Lafayette.¹⁷⁵ According to journalist Trent Angers, the thought was that around 25 boats might show up; however, between 350 and 400 boats actually came.¹⁷⁶ This eight-mile convoy rolled out of Lafayette towards New Orleans to initiate a citizen-led SAR response. This makeshift flotilla of OSVs would later become known as the "Cajun Navy."

With emergency call centers unable to receive requests for help, and no local command and control element present to direct rescuers (USCG or OSVs) to where they were needed upon arrival, rescue crews were forced to go from house-to-house looking for trapped individuals themselves, and trapped individuals had to find ways to communicate their distress directly to the rescuers. Jason Dorval, a USCG helicopter pilot, reported that individuals trapped on their roofs or in their attics were signaling for help by waving their arms or shining flashlights, and David Billeaud, one of the OSV rescuers, noted that graffiti was written across rooftops saying, "help us."¹⁷⁷

¹⁷² Townsend, 37.

¹⁷³ CBS News, "How Citizens Turned into Saviors after Katrina Struck."

¹⁷⁴ CBS News.

¹⁷⁵ CBS News.

¹⁷⁶ CBS News.

¹⁷⁷ David Helvarg, *Rescue Warriors: The U.S. Coast Guard, America's Forgotten Heroes* (New York: Thomas Dune Books, 2009), 9–11; Fuselier, "Cajun Navy Haunted, Inspired by Katrina Memories."

b. Search Planning and Preparedness

The second SAR task is search planning and preparedness, and as the flooding in New Orleans worsened, state and local officials continued with their evacuation efforts; however, neither the state of Louisiana, nor the City of New Orleans, had a plan for how to evacuate the city after a storm's landfall. In lieu of a plan, officials relied on FEMA, the DOD, and the USCG to conduct all post-landfall evacuations.¹⁷⁸

Each hurricane season (June 1st–November 30th), Coast Guard units across the nation prepare for hurricane response operations by revising their hurricane plans. The USCG was already in a high state of readiness prior to Katrina because 2005 was an active hurricane season.¹⁷⁹ USCG District Eight (located in New Orleans) and USCG Sector New Orleans had already updated their hurricane plans, verified contact information for area stakeholders, developed personnel deployment rosters, and held a tabletop exercise to ensure that their planning efforts were comprehensive and attainable.¹⁸⁰

Once Katrina's landfall was forecasted along the Gulf Coast, USCG units in the area began activating their respective hurricane plans. District 8 established an incident management team (IMT) on August 27th (two days before landfall), and closed the entrance to the lower Mississippi River.¹⁸¹ Once storm tracks indicated that New Orleans would be directly impacted, District Eight also decided to implement its Continuity of Operations Plan and established another IMT in St. Louis, MO.¹⁸² Additionally, in preparation for a large-scale disaster response operations, District Eight and Sector New Orleans also requested assistance from the Atlantic Area Incident Management Assist Team, which aids local commanders with incident management using NIMS and ICS.¹⁸³

¹⁷⁸ Townsend, *The Federal Response to Hurricane Katrina*, 38.

¹⁷⁹ Austin, "Engage the Media Coast Guard's Public Affairs Posture," 57.

¹⁸⁰ Austin, 56.

¹⁸¹ Austin, 58.

¹⁸² Austin, 58.

¹⁸³ Austin, 59.

In preparation of post-landfall SAR operations, USCG Disaster Assistance Response Teams and aircraft were mobilized from across the Coast Guard and staged outside the storm's impact area so that they could immediately respond as soon as it was safe to do so.¹⁸⁴ Lastly, anticipating that communication failures would be inevitable, contingency communication vehicles were pre-staged to assist with the command and control aspects of the SAR response.¹⁸⁵

The USCG's SAR planning and preparedness efforts during Hurricane Karina were much like that of any other hurricane response. Planning and preparedness consisted of pre-planning and asset staging in anticipation of SAR operations, rather than real time planning for known SAR cases, which would normally take place during steady state SAR operations. In contrast, OSVs emerged during the response phase of Katrina, and as such, no pre-planning was possible because the organization did not exist prior to the disaster itself.

c. SAR Coordination

The third SAR task is SAR coordination, and during Katrina, very little if any coordination took place. This lack of coordination was present in both internal government coordination efforts, and external coordination efforts with OSVs.

Katrina highlighted the need for greater internal government coordination between the components of the U.S. SAR system, US&R, and civil SAR.¹⁸⁶ According to the *Federal Response to Hurricane Katrina, Lesson Learned* report:

¹⁸⁴ Townsend, *The Federal Response to Hurricane Katrina*, 28. Based on the author's experience as a Disaster Assistance Response Team (DART) leader for the Ohio River Valley, DARTs are comprised of USCG personnel, equipment, and 16-foot flat bottom boats capable of deploying to disaster-stricken areas to conduct SAR operations in shallow water. The USCG only maintains a few DARTs stationed along the Mississippi and Ohio River. These DARTs are not standardized as part of a national level program, and receive no formal training on surface water or swift water rescue operations.

¹⁸⁵ Austin, "Engage the Media Coast Guard's Public Affairs Posture," 60.

¹⁸⁶ Townsend, *The Federal Response to Hurricane Katrina*, 38. Civil SAR consists of both maritime SAR and land SAR as outlined in the U.S. National SAR Plan. The USCG is recognized as the federal SAR coordinator for all aeronautical and maritime SAR, including Hawaii and all waters subject to the jurisdiction of the United States, and U.S. Northern Command (USNORTHCOM) is recognized as the federal SAR coordinator for the continental U.S. and Alaska.

US&R refers to the specialized mission of rescuing victims trapped in collapsed structures. In contrast, SAR constitutes all other missions, such as maritime, aeronautical, and land rescues. However, there is no overarching plan that incorporates both aspects of search and rescue. The absence of such a plan led to coordination problems between US&R teams and SAR teams. Some teams displayed their own initiative to fill the gap in unified command, determining their own rescue priorities, areas to be searched, and locations to drop off the people they rescued.¹⁸⁷

A clear disconnect occurred between FEMA US&R teams and the USCG during Katrina, because each organization trains for a very different mission set. For example, FEMA US&R teams were (at the time) not trained or equipped to perform water rescues. This lack of training created a challenging situation, because these US&R teams were sent in as a federal resource to conduct SAR operations that they were unable to perform.¹⁸⁸

The fragmented deployment of federal resources during Katrina was not exclusive to DHS.¹⁸⁹

There was [also] a lack of clear search and rescue guidance across [other federal] agencies because the National Response Plan and the National Search and Rescue Plan had never been fully integrated.¹⁹⁰

This lack of integrated effort, or coordination, between national level SAR organizations resulted in two separate command centers being established to oversee SAR operations in New Orleans alone, one by the Louisiana National Guard and the other by the USCG.¹⁹¹ Additionally, this lack of coordination or integration is best highlighted by the observation that Army helicopters were deployed to conduct SAR operations. They lacked, however, the capability to hoist people from rooftops, and could only conduct evacuations if they could find a safe place to land.¹⁹² Furthermore, the DOD deployed both active duty and National Guard resources; however, Title 32 (National Guard) forces were

¹⁸⁷ Townsend, 38.

¹⁸⁸ Townsend, 57.

¹⁸⁹ Both FEMA and the USCG are components of DHS.

¹⁹⁰ Young, *Coast Guard*.

¹⁹¹ Young, 22.

¹⁹² Helvarg, *Rescue Warriors*, 12.

coordinated by the state National Guard Bureau, whereas Title 10 (active duty) forces were coordinated by USNORTHCOM.¹⁹³ This conflicting language in the National Response Plan (NRP) and the National SAR Plan resulted in various governmental organizations conducting independent SAR operations, which resulted in multiple resources being sent to the same area, or not being sent to areas where they were needed.¹⁹⁴

It should be noted that the Coast Guard did attempt some minor coordination efforts with local government responders. The Louisiana State Police and Louisiana Department of Wildlife and Fisheries were reported to have provided escorts for USCG personnel, or shared local knowledge on areas that still needed to be searched or where known individuals were trapped.¹⁹⁵ However, this localized coordination occurred at the individual SAR responder level vice an organization level.

Also, a lack of external coordination efforts with OSVs forced them to also conduct independent SAR operations. An estimated 400 boaters from the area surrounding Lafayette showed up to help, but public safety officials, not knowing how to coordinate with them, and fearing that the floodwaters were too dangerous, turned many of them away. Brian Smelker, an OSV from Lafayette, recalls Louisiana Department of Wildlife and Fisheries officers telling his group, “it was too dangerous to proceed” and “we don’t need you.”¹⁹⁶ This statement resulted in many OSVs turning around and going home; however, some refused to leave and worked their way past law enforcement officials through backroads until they came to the I-10 and I-610 intersection, where the floodwaters had turned the interstate ramp into a makeshift boat launch to initiate their SAR operations.¹⁹⁷

¹⁹³ Townsend, *The Federal Response to Hurricane Katrina*, 43.

¹⁹⁴ Townsend, 57.

¹⁹⁵ Young, *Coast Guard*, 21.

¹⁹⁶ Gunn, “Greatest Story Never Told,” 4; CBS News, “How Citizens Turned into Saviors after Katrina Struck.”

¹⁹⁷ Fuselier, “Cajun Navy Haunted, Inspired by Katrina Memories.”

d. SAR Operations

The final SAR task is SAR operations and both the USCG and OSVs were instrumental in conducting SAR during Katrina, whereas local emergency response organizations struggled to perform this urgent mission. According to the *Federal Response to Hurricane Katrina: Lesson Learned* report, local responders found it impossible to establish functioning incident command structures, obtain situational awareness, manage assets, or direct operations, noting, “It was difficult for local leaders to guide the local response efforts, much less command them.”¹⁹⁸

In contrast, a Government Accountability Office (GAO) report published in July 2006 stated:

Of the estimated 60,000 people needing to be rescued from rooftops and flooded homes, over 33,500 were saved by the Coast Guard...Underpinning these efforts were the agency’s operational principles that promote leadership, accountability, and enable personnel to take responsibility and action.¹⁹⁹

Despite the USCG’s success during Katrina, and familiarity conducting daily SAR operations, the USCG was still presented with unique challenges that required innovative solutions and on-scene initiative to overcome. Most of these solutions came in the form of non-regular tasks.

The day after Katrina hit, Air Station New Orleans had no power or water, and only had access to one tanker of aviation fuel. However, realizing that the Navy had locked up their fuel depot on the other side of the airfield (prior to evacuating), USCG Electricians Mate Rodney Gordon accessed the fuel depot, and used a scavenged generator, forklift, and electrical wire to restore power to the fuel pumps.²⁰⁰ With fuel now available, Air Station New Orleans re-established its Air Operations Center, and began directing incoming aircraft to, “go out over the city and rescue people.”²⁰¹ Air Station New

¹⁹⁸ Townsend, *The Federal Response to Hurricane Katrina*, 37.

¹⁹⁹ Young, *Coast Guard*, 3.

²⁰⁰ Helvarg, *Rescue Warriors*, 15.

²⁰¹ Helvarg, 15.

Orleans's five helicopters were responsible for rescuing over 15,000 people in a week, which is equivalent to their total number of rescues for the preceding 22 years.²⁰²

Additional instances of on-scene initiative and innovation were noted when Jason Dorval, a Jayhawk helicopter pilot, concerned about the slow pace of hoist operations, decide to “[touch] his HH-60 down on the roof of a two-story hospital between two air-conditioning units,” knowing that the roof could not support the full weight of the helicopter.²⁰³ Dorval deviated from normal operations by keeping the massive rotors turning, so the helicopter never fully came to rest on the roof, which allowed him to evacuate 12 people at a time.²⁰⁴ In another part of town, USCG aircrews received a warning that they should clear out of the area because people were shooting at rescue helicopters (a fact later disproven); however, many USCG pilots choose to ignore this warning by highlighting that “the Jayhawk is a variation of the Army Black Hawk” helicopter, which is “designed to take small arms fire.”²⁰⁵ Finally, a USCG C-130 pilot tasked with conducting an environmental survey decided that her aircraft would better be used as a communication platform, so she independently established an air control link between SAR helicopters, hospitals, and improvised landing zones.²⁰⁶

USCG aircrews also had the non-regular task of hoisting people from their rooftops alongside power lines, debris, and other obstacles that would not be found in a typical maritime environment.²⁰⁷ Furthermore, USCG rescue personnel are not trained or equipped to rescue trapped individuals from their attics; however, they adapted and began

²⁰² Helvarg, 15.

²⁰³ Helvarg, 20.

²⁰⁴ Helvarg, 20.

²⁰⁵ Helvarg, 20; Rodríguez, Trainor, and Quarantelli, “Rising to the Challenges of a Catastrophe,” 83–84.

²⁰⁶ Helvarg, 15.

²⁰⁷ “Hurricane Katrina Coast Guard Rescue Swimmers Saved the Lives of Those Who Could Not Save Themselves,” Vertical, October 27, 2005, <https://verticalmag.com/press-releases/hurricane-katrina-coast-guard-rescue-swimmers-saved-the-lives-of-those-who-could-not-save-themselves-html/>; Thomas McKenzie, “Katrina Remembered,” Helicopter Association International, 2020, <https://www.rotor.org/resource?ArtMID=493&ArticleID=8475>; Townsend, *The Federal Response to Hurricane Katrina*, 21.

carrying axes “to break through rooftops.”²⁰⁸ USCG Aviation Survival Technician Joel Sayers, one of the rescuers lowered to a rooftop to rescue an elderly woman discovered that she had been able to squeeze through a small opening in the roof; however, “her husband was still trapped inside the broiling attic.”²⁰⁹ Unable to access the attic space, Sayers tied a cloth around a vent pipe on the roof and promised the man he would return. After dropping the woman off at an improvised landing zone, Sayers borrowed a fireman’s axe and returned to the roof to cut a hole large enough to rescue the man. This rescue was caught on video and made the evening rounds across national news networks.²¹⁰ Shortly afterwards, USCG responders began equipping themselves with axes and light-gas powered chainsaws. USCG responders do not routinely carry these tools; however, during Katrina, they became valuable lifesaving equipment.²¹¹

USCG boat crews also deviated from normal practices and conducted non-regular tasks. Petty Officer Jessica Guidroz, a crewmember aboard an 18-foot jet boat tasked with searching the Lakeview section of the city, by going house-to-house “knocking on roofs and attic windows looking for survivors,” recalls running over stop signs and parked cars as they navigated down the flooded streets and hoped that they did not punch a hole in the bottom of their boat.²¹² The USCG does not normally go door-to-door looking for people in distress, and most certainly, refrains from operating their vessels in areas where they could be damaged and possibly sink. Lastly, USCG personnel bridged communication challenges during SAR operations by procuring two-way radios, using text messaging, and opening commercial e-mail accounts to share information.²¹³

Despite all the innovation and non-regular tasks undertaken by the USCG to carry out SAR operations, the USCG was unable to meet all the mission demands independently. By some reports, hundreds drowned after the levees broke and flooded much of the city,

²⁰⁸ Helvarg, *Rescue Warriors*, 17.

²⁰⁹ Helvarg, 18.

²¹⁰ Vertical, “Hurricane Katrina Coast Guard Rescue Swimmers”; Helvarg, 18.

²¹¹ McKenzie, “Katrina Remembered.”

²¹² Helvarg, *Rescue Warriors*, 20.

²¹³ Young, *Coast Guard*, 30.

and many more were still trapped by rising floodwaters.²¹⁴ People needed help badly, and at the time, official responders could not deploy enough resources to locate and rescue everyone in need.²¹⁵ During this time, OSVs stepped in to assist in the massive SAR response.

Alan Durand, who directed a documentary on the efforts of the Cajun Navy during Katrina noted:

Many more people would have died in the flood waters ... if not for the hundreds of south Louisiana folks who met at Acadiana Mall in Lafayette and then hauled their boats to New Orleans, where they disregarded authorities' orders to go back home.²¹⁶

Duran also noted that overall, the Cajun Navy was responsible for rescuing over 10,000 people during Katrina, and highlighted that the organizer of the Cajun Navy, Doug Bienvenu, was responsible for rescuing hundreds of people himself, over a period of three days.²¹⁷

Notably, General Russel Honore, with the Louisiana National Guard, who commanded over 20,000 troops, 20 ships, and over 225 helicopters tasked with assisting in the SAR efforts during Katrina, “credits the Cajun Navy for doing much of the initial lifesaving,” and noted, “In reality most people are saved by neighbors and volunteers after a disaster than are saved by organized rescue people.”²¹⁸

3. Summary

Hurricane Katrina created the need for a massive SAR operation; however, the way official responders, to include federal resources, reacted to this need, was for the most part, viewed as a failure. This failure resulted in the emergence of OSV groups that responded by conducting citizen-led SAR operations. While organized spontaneous volunteerism is

²¹⁴ Gunn, “Greatest Story Never Told.”

²¹⁵ Gunn.

²¹⁶ Gunn.

²¹⁷ Gunn.

²¹⁸ CBS News, “How Citizens Turned into Saviors after Katrina Struck.”

not new, a contributing factor that led to the emergence of the OSV group during Hurricane Katrina was a lack of internal government coordination efforts. While the number of OSV groups present during Hurricane Katrina was relatively small and external or cross-organizational coordination efforts could have taken place, official responders were focused on the challenge of trying to coordinate with each other, rather than with OSVs. Additionally, a perception arose that OSVs were too novel to put actually any coordination efforts into them, and that they were more of a nuisance than a potential asset to be leveraged.

Hurricane Katrina was also the first real test of the NRP implemented post-9/11, and as such, a faulty assumption might have existed that the NRP would effectively address all coordination efforts across federal level resources. However, in reality, “there was a lack of clear search and rescue guidance across agencies because the National Response Plan and the National Search and Rescue Plan ... [were] never ... fully integrated.”²¹⁹ This lack of integration resulted in unclear roles and responsibilities for federal organizations that conduct SAR during disasters, and led to reduced capabilities in certain areas and a duplication of effort in others.

C. HURRICANE HARVEY

Hurricane Harvey hit Texas on August 25, 2017 as a Category 4 storm, and was the second most costly disaster in U.S. history, only surpassed by Hurricane Katrina in 2005.²²⁰ Harvey made landfall three separate times over a period of six days. It stalled however for over 117 hours near the Houston area, which caused torrential rainfall and extreme flooding.²²¹ In total, Harvey dumped 27 trillion gallons of water, and was one of the largest rain events ever recorded in history.²²² Over 50 inches of rain fell in some parts

²¹⁹ Young, *Coast Guard*, 22.

²²⁰ Kimberly Amando, “Hurricane Harvey Facts, Damage and Costs,” *The Balance*, September 24, 2020, <https://www.thebalance.com/hurricane-harvey-facts-damage-costs-4150087>.

²²¹ Amando.

²²² Robinson Meyer, “Hurricane Harvey Is the Rainiest Atlantic Hurricane Ever Measured,” *The Atlantic*, August 29, 2017, <https://www.theatlantic.com/science/archive/2017/08/hurricane-harvey-is-the-rainiest-atlantic-hurricane-ever-measured/538407/>.

of the area that resulted in the National Weather Service having to “[add] extra colors to capture [the] rainfall totals” accurately.²²³ Additionally, according to geophysicist Chris Milliner, the flooding was so expansive that the weight of the water actually sank the city of Houston by nearly an inch.²²⁴ Similar to Hurricane Katrina, this extensive flooding resulted in the need for a massive SAR operation.

1. Background

Harvey began as a slow-moving tropical storm that originated on August 13, 2017, off the West Coast of Africa, but once the storm arrived in the Gulf of Mexico, it began to intensify and was officially classified as a Category 1 hurricane on August 24, 2017.²²⁵ However, over the next 24 hours, Harvey continued to strengthen and grew into a major Category 4 storm before making its initial landfall.²²⁶

Hurricane Harvey made its first and second landfalls over San Jose Island, followed by Rockport, TX, which impacted the area with 130-mph winds, heavy rain, and a devastating 13-foot storm surge.²²⁷ However, almost immediately after making landfall, Hurricane Harvey began weakening and stalled causing sustained downpours and immense flooding throughout the region. Some areas received between 25–50 inches of rainfall over a period of two days, which is more than the Houston area experiences annually.²²⁸ Additionally, the excessive rainfall breached two flood-control reservoirs near Houston, which worsened the already intense flooding.²²⁹ Harvey made its third and final landfall

²²³ Meyer.

²²⁴ Mike Tolson, “Harvey Floodwater Was so Heavy It Sank Houston by Two Centimeters ... Temporarily,” *Chron*, September 6, 2017, <https://www.chron.com/news/houston-texas/houston/article/Heavy-water-Harvey-sinks-Houston-temporarily-12176813.php>.

²²⁵ Chris Huber, “2017 Hurricane Harvey: Facts, FAQs, and How to Help,” *World Vision*, September 7, 2018, <https://www.worldvision.org/disaster-relief-news-stories/2017-hurricane-harvey-facts>.

²²⁶ Huber.

²²⁷ Huber; Mark Osborn and Morgan Windsor, “Hurricane Harvey Downgraded to Category 2 Storm as Winds Weaken,” *ABC News*, August 6, 2017, <https://abcnews.go.com/US/hurricane-harvey-makes-landfall-texas-category-storm/story?id=49412285>.

²²⁸ Marina Koren, “Using Twitter to Save a Newborn from a Flood,” *The Atlantic*, August 28, 2017, <https://www.theatlantic.com/technology/archive/2017/08/harvey-rescue-twitter/538191/>; Huber.

²²⁹ Huber.

on August 30, 2017 as a tropical storm near Port Arthur, TX, while emergency responders were already trying to address existing SAR needs. By one report, over 10,000 SAR responses were underway prior to Harvey making its final landfall.²³⁰ In total, Harvey remained a tropical system that impacted the region for a week, before finally moving out of the area and dissipating.²³¹

While the unprecedented level of flooding caused by Hurricane Harvey in and around the Houston area was remarkable by itself, the application and use of digital technologies during the SAR response was quite noteworthy. Flood victims turned to social media for help at an alarming rate, which created challenges for established SAR organizations for which they were not prepared.²³² According to Rob Dudgeon, an emergency management consultant, “This is a situation where technology and accepted norms of communication are outpacing government’s ability to manage.”²³³ While established SAR organizations struggled to adapt, OSV groups readily adapted and took action.

2. Analysis of SAR Response

The following analysis is broken down according to the SAR tasks of distress monitoring and communications, search planning and preparedness, SAR coordination, and SAR operations, to highlight which organization carried out each SAR task, as well as to identify the organizational structures used to carry out each task.

a. Distress Monitoring and Communications

The first SAR task is distress monitoring and communication, and as the floodwaters began to rise in Houston, people began calling for help, as they would during any emergency situation, by dialing 911. After Harvey’s landfall, cellphone sites across

²³⁰ Huber.

²³¹ Huber.

²³² Thornburg, “Disruptive Emergent Systems in Disaster Response,” 54.

²³³ Lauren Silverman, “Facebook, Twitter Replace 911 Calls for Stranded in Houston,” NPR All Things Considered, August 28, 2017, <https://www.npr.org/sections/alltechconsidered/2017/08/28/546831780/texas-police-and-residents-turn-to-social-media-to-communicate-amid-harvey>.

Texas and Louisiana mostly remained intact; however, when people tried to call 911, they were met with varying levels of success. At least 17 emergency call centers experienced disruptions from the storm, and the ones that did not experience disruptions, still struggled due to the high call volume.²³⁴ At its peak, the Harris County 911 center, which covers the city of Houston, received approximately 80,000 calls in a 24-hour period, compared to its normal volume of around 8,000 calls a day.²³⁵ This extreme volume resulted in many people not being able to get through, or being placed on long holds. Some reports noted that it could take 45 minutes or longer to talk to a dispatcher, because the 911 call centers were so overwhelmed.²³⁶ It is important to note that the greater Harris County area has 30 emergency call centers, and this emergency communications network is the largest in Texas, and one of the largest in the nation.²³⁷ However, despite the overall size and number of emergency call centers, the emergency communications network could not adequately address the volume of calls they were receiving. Houston's Mayor, Sylvester Turner, noted that calls to emergency services had stretched the still operational call centers to capacity, and "urged residents who were not in life-threatening situations to stop calling emergency lines."²³⁸

Not being able to reach traditional emergency services, many trapped individuals turned to social media apps like Facebook, Twitter, and Nextdoor for help in hopes that someone would either relay their situation to local authorities, or could render assistance

²³⁴ Jon Brodtkin, "Tropical Storm Harvey Takes out 911 Centers, Cell Towers, and Cable Networks," arstechnica, August 28, 2017, <https://arstechnica.com/information-technology/2017/08/tropical-storm-harvey-takes-out-911-centers-cell-towers-and-cable-networks/>; Matt Sedensky, "'Hell's Breaking Loose': A 911 Center under Siege by Harvey," AP News, August 30, 2017, <https://apnews.com/article/14ef84b1750a44de943b27414a030156>.

²³⁵ Heather Kelly, "Harvey Highlights Shortcomings of Aging 911 Technology," CNN Business, September 1, 2017, <https://money.cnn.com/2017/09/01/technology/future/911-tech-harvey/index.html>.

²³⁶ Silverman, "Facebook, Twitter Replace 911 Calls for Stranded in Houston."

²³⁷ Kelly, "Harvey Highlights Shortcomings of Aging 911 Technology."

²³⁸ Laura J. Nelson, "In Houston, Pleas for Help Go Out Over Social Media: 'Please Send Help. 911 Is Not Responding,'" *Los Angeles Times*, August 27, 2017, <https://www.latimes.com/nation/la-na-houston-harvey-911-20170827-story.html>.

directly.²³⁹ One Twitter post highlighted the desperation people were experiencing stating, “The water is swallowing us up. Please send help. 911 is not responding!!!!!!”²⁴⁰ With pleas for help showing up all over social media with the hashtags #SOSHouston and #SOSHarvey, a number of spontaneous digital volunteers (many from outside the disaster area itself) started relaying emergency calls into Houston’s 911 centers.²⁴¹ However, an unexpected complication arose. Each social media post was widely shared and often resulted in multiple calls for the exact same incident.²⁴² Joe Laud, administrative manager of the Houston Emergency Center, noted they preferred calls directly, because they would get multiple requests for the same incident, noting, “It’s hard to coordinate anything, especially in the social media world.”²⁴³

In addition to relaying requests for help, many OSVs choose to initiate their own SAR responses based on the social media posts. For example, in the immediate aftermath of Harvey, the site Nextdoor, a popular social media site for neighbors to communicate with neighbors, reported an unprecedented number of users. The CEO of Nextdoor, Steve Wymer, noted, “We’re seeing people use our app if they can’t get through to 911... in very emergency, life-threatening situations.”²⁴⁴ In one particular post, someone wrote that they desperately needed a rescue and were headed to their roof. Wymer noted an immediate response that stated, “Unloading my canoe now. I’m headed your way.”²⁴⁵

Seeing that people were turning away from traditional distress notification methods, Ed Gonzales, the sheriff for Harris County, TX, attempted to communicate directly with trapped individuals, through social media; however, many other official

²³⁹ Silverman, “Facebook, Twitter Replace 911 Calls for Stranded in Houston”; Deepa Seetharaman and Georgia Wells, “Hurricane Harvey Victims Turn to Social Media for Assistance,” *Wall Street Journal*, August 29, 2017, <https://www.wsj.com/articles/hurricane-harvey-victims-turn-to-social-media-for-assistance-1503999001>.

²⁴⁰ Nelson, “In Houston, Pleas for Help Go Out Over Social Media.”

²⁴¹ Silverman, “Facebook, Twitter Replace 911 Calls for Stranded in Houston”; Koren, “Using Twitter to Save a Newborn from a Flood.”

²⁴² Kelly, “Harvey Highlights Shortcomings of Aging 911 Technology.”

²⁴³ Kelly.

²⁴⁴ Silverman, “Facebook, Twitter Replace 911 Calls for Stranded in Houston.”

²⁴⁵ Silverman.

emergency response organizations advised against using social media to request help. The Houston Police Department (HPD) directed people to call 911 for life-threatening emergencies and tweeted out, “Please do not use the HPD social media accounts for rescue requests.”²⁴⁶ Additionally, the USCG warned against using social media to report distress and posted the following message to its Twitter feed (Figure 3).



Figure 3. USCG Tweet during Hurricane Harvey.²⁴⁷

According to emergency management consultant, Rob Dudgeon, it would be impractical if not impossible for emergency management officials to use social media for distress monitoring, because:

It is literally trying to drink from a firehouse... It's very labor intensive to watch and because of the thousand different ways people can hashtag something or keyword something, trying to sort out what's relevant and what's not and what's actionable is very, very difficult.²⁴⁸

Additionally, Adrienne Russell, a professor of media, technology, and society at the University of Washington noted, “the way social media is used during emergencies

²⁴⁶ Koren, “Using Twitter to Save a Newborn from a Flood”; Seetharaman and Wells, “Hurricane Harvey Victims Turn to Social Media for Assistance.”

²⁴⁷ Adapted from Marcus Gilmer, “During Harvey, Social Media Rose to the Challenge as a Force for Good,” Mashable, August 29, 2017, <https://mashable.com/2017/08/29/social-media-harvey-rescues-force-for-good/>; Silverman, “Facebook, Twitter Replace 911 Calls for Stranded in Houston”; Koren, “Using Twitter to Save a Newborn from a Flood”; Seetharaman and Wells, “Hurricane Harvey Victims Turn to Social Media for Assistance.”

²⁴⁸ Gilmer, “During Harvey, Social Media Rose to the Challenge as a Force for Good.”

fluctuates rapidly, so crisis response agencies have a tough time planning a proper social-media strategy.”²⁴⁹

In an attempt to help with the surge of calls that emergency call centers were receiving, the USCG sent out another social media post with the hashtag #HurricaneHarvey informing individuals who needed help that they could contact the Coast Guard directly.²⁵⁰ However, as these distress calls directly to the USCG substantially increased, the local USCG sector also quickly became overwhelmed. Eventually, “all Coast Guard calls were routed to the Coast Guard’s National Command Center in Washington, DC, which set up a special triage unit to track calls and coordinate responses.”²⁵¹

b. Search Planning and Preparedness

The second SAR task of search planning and preparedness was carried out similarly to previous hurricane responses. The USCG increased its seasonal hurricane alert status, and once a pending landfall was forecasted, began pre-planning and staging assets in anticipation of pending SAR operations. The USCG pre-deployed aircraft and shallow water response vessels capable of responding in flooded urban areas, and within 24 hours, gale force winds closed all ports in the Houston, Texas City, Galveston, Freeport, and the Corpus Christi area.²⁵² Additionally, fearing a repeat of Katrina, government officials in Texas proactively began issuing evacuation orders and emergency declarations. Texas Governor Greg Abbott had already contacted the President and formally requested a federal disaster declaration prior to Harvey’s landfall, which was approved. FEMA Administrator Brock Long urged people to take evacuation orders seriously, stating, “This may be the

²⁴⁹ Seetharaman and Wells, “Hurricane Harvey Victims Turn to Social Media for Assistance.”

²⁵⁰ Nelson, “In Houston, Pleas for Help Go out over Social Media”; Catherine Shu, “Coast Guard Asks People Stranded by Harvey to Call Them Instead of Posting on Social Media for Help,” TechCrunch, August 27, 2017, <https://techcrunch.com/2017/08/27/coast-guard-asks-people-stranded-by-harvey-to-call-instead-of-posting-on-social-media/>.

²⁵¹ Office of the Director of National Intelligence, “The Water Kept Rising: How Coast Guard Intelligence Mapped Hurricane Impact,” Intel.gov, accessed March 12, 2021, <https://www.intelligence.gov/mission/intel-stories/576-the-water-kept-rising>.

²⁵² Osborn and Windsor, “Hurricane Harvey Downgraded to Category 2 Storm as Winds Weaken.”

first major landfall hurricane we've had since 2005... [and] there's going to be damage.”²⁵³

In contrast, as during Hurricane Katrina, OSVs did not emerge until the response phase of the disaster; therefore, no pre-planning or preparedness activities were undertaken. However, it is important to note that the Cajun Navy originally developed during Katrina and was active the previous year during the 2016 floods in New Orleans. Therefore, the group could have undertaken some form of planning or preparedness activities, but no evidence exists that any pre-planning occurred. This lack of pre-planning most likely resulted because the Cajun Navy has grown from the initial 350 to 400 boats that showed up at the Acadiana Mall in Lafayette, LA to more of a label for many loosely affiliated OSV groups that originate from southern Louisiana vice a single fully formalized independent organization.

c. SAR Coordination

The third SAR task is SAR coordination, and while the disastrous effects of Harvey (with its massive inland flooding) were eerily similar to Hurricane Katrina, one thing was drastically different; that of the use of technology to support SAR coordination efforts. During Harvey, a substantial amount of coordination took place. However, this coordination for the most part was confined to either official internal government coordination efforts, or internal coordination efforts amongst OSV groups. Very limited external or cross-organizational coordination efforts occurred between official responders and OSVs.

Back in Washington, DC, the special triage unit set up to support the USCG's National Command Center was having difficulty accurately identifying areas that had the greatest SAR needs, due to the sheer number of calls coming in and the unit's unfamiliarity with the local operating area. To address these challenges, the National Command Center turned to the Coast Guard's geospatial intelligence team (GEOINT), which is part of the Coast Guard's Intelligence Coordination Center. The Coast Guard's GEOINT team is

²⁵³ Osborn and Windsor.

embedded at the National Geospatial-Intelligence Agency (NGA) and conducts a myriad of geospatial analysis in support of USCG missions.²⁵⁴ Coordinating with the USCG's liaison officer at the Emergency Operations Center in Houston, the GEOINT team was able to obtain 911 call logs that were used to create heat maps showing caller locations and the type of assistance they needed.²⁵⁵ However, it is important to note that the USCG's GEOINT team is part of the intelligence community and not part of routine SAR response operations; as such, they are restricted from accessing personally identifiable information on U.S. persons. Therefore, all call logs had to be stripped of personal information before being sent to the GEOINT team, and this process took about 40 hours for each batch of data.²⁵⁶ Lastly, the call logs from the triage unit were also sanitized and provided to the GEOINT team to create a more comprehensive understanding of the total situation at hand. This heat map, comprised of data from distress calls to both local emergency call centers and directly to the USCG, was used by USCG District Eight and USCG Sector Houston/Galveston to make resource allocation decisions.²⁵⁷

Comparatively, OSVs also communicated and coordinated their collective SAR response efforts by leveraging technology. When Katrina struck in 2005, Twitter did not exist and "Facebook was still a private, school-only platform."²⁵⁸ However, during Hurricane Harvey, the Cajun Navy and a similarly named group called the Louisiana Cajun Navy took to Facebook and Twitter to relay rescue information to each other.²⁵⁹ Additionally, while Nextdoor, Facebook, Zello, and Twitter were used to conducting distress monitoring and communication, OSVs were also creating and sharing interactive crowdsourced rescue maps. Digital volunteers used hashtags to track and log rescue requests related to Harvey in a Google spreadsheet, and it is interesting to note that each

²⁵⁴ Office of the Director of National Intelligence, "The Water Kept Rising: How Coast Guard Intelligence Mapped Hurricane Impact."

²⁵⁵ Office of the Director of National Intelligence.

²⁵⁶ Office of the Director of National Intelligence.

²⁵⁷ Office of the Director of National Intelligence.

²⁵⁸ Gilmer, "During Harvey, Social Media Rose to the Challenge as a Force for Good."

²⁵⁹ Gilmer.

rescue request was logged by geographic location and assigned an incident number.²⁶⁰ The Cajun Navy and the Texas Navy (another grassroots OSV SAR organization) used this information collected in this Google spreadsheet to create a rescue map called “Hurricane Harvey Rescue.” This map displayed the names and locations of people needing to be rescued, as well as those individuals who had already been rescued.²⁶¹ Matthew Marchetti built another rescue map called “CrowdSource Rescue” after he was turned away from the rescue effort by firefighters, and was instructed to go check in at the local fire station if he wanted to help.²⁶² However, Marchetti and a couple of other volunteers decided to use Facebook to “get involved in the rescue process,” but noted that the number of posts were overwhelming and difficult to track.²⁶³ In an attempt to resolve this issue and coordinate rescue efforts, he developed a simple online mapping program for a handful of OSV responders (mostly his friends) to use; however, his “map set the internet ablaze.”²⁶⁴ In fact, Marchetti’s crowd sourcing distress map was so useful during Hurricane Harvey that professional emergency managers began working with him to figure out a way to leverage the platform during future disasters.²⁶⁵

While OSVs were using social media to receive rescue requests and create crowdsourced rescue maps, many traditional emergency management organizations were not. This is not to say that official organizations did not embrace social media; however, its use was primarily focused on information sharing vice information gathering. The Harris County Sheriff’s Office, Houston Office of Emergency Management, and the HPD all used social media to provide information and updates to residents affected by

²⁶⁰ Chelsea Bailey, “#SOSHouston: How Apps and Social Media Assist Harvey Rescue Efforts,” NBC News, August 31, 2017, <https://www.nbcnews.com/storyline/hurricane-harvey/soshouston-how-apps-social-media-assist-harvey-rescue-efforts-n797841>.

²⁶¹ Selena Larson, “Stranded Hurricane Survivors Use Zello App to Get Help,” CNN Business, August 28, 2017, <https://money.cnn.com/2017/08/28/technology/volunteers-harvey-rescue-apps/index.html>; Gilmer, “During Harvey, Social Media Rose to the Challenge as a Force for Good.”

²⁶² Jason Pohl, “An App Helped Rescue 37,000 Hurricane Victims. It’s Ready for Florence,” WKYC, September 13, 2018, <https://www.wkyc.com/article/news/nation-world/an-app-helped-rescue-37000-hurricane-victims-its-ready-for-florence/507-593678047>.

²⁶³ Pohl.

²⁶⁴ Pohl.

²⁶⁵ Pohl.

Harvey.²⁶⁶ However, these updates were only intended to be received by impacted individuals, and no mechanism was in place for two-way communications or information gathering. Despite the USCG's guidance not to report distress via social media, the organization knew that trapped individuals were doing so and needed a way to access and use this information. However, the USCG does not have a mechanism in place to receive distress notifications through social media.

Observing this challenge, Evan Twarog, a cadet at the Coast Guard Academy in New London, CT, who had previously learned of crisis mapping prior to Harvey through an independent research project, thought the technology might be useful.²⁶⁷ Twarog contacted an organization he had conducted previous research with (Digital Humanitarian Network) and was connected with the non-profit Humanity Road, which previously "aided in crisis mapping efforts before following natural disasters in Haiti and Nepal."²⁶⁸ The chief operations officer for Humanity Road, Cat Graham, was excited by the opportunity stating, "Evan was a groundbreaker in doing this, because the Coast Guard has never done this before."²⁶⁹ Responding to Twarog's request, Humanity Road solicited the help of digital volunteers from around the world. These digital volunteers "sifted through social media posts to log data on 1,000 search-and-rescue cases involving 5,200 people."²⁷⁰ However, this catalogued data was not very usable. Therefore, Twarog turned to his classmate Gabby Auzenberg who was familiar with geographic information systems (GIS) technology from her studies in marine environmental science. Auzenberg was able to take Humanity Road's data and develop SAR maps that "pinpointed the latitude and longitude of each case, and ... show [ed] the areas in the most distress."²⁷¹ These maps

²⁶⁶ Gilmer, "During Harvey, Social Media Rose to the Challenge as a Force for Good"; Silverman, "Facebook, Twitter Replace 911 Calls for Stranded in Houston."

²⁶⁷ Meg McIntyre, "Keene High Grad in Coast Guard Academy Helps Hurricane Harvey Response Efforts," Sentinel Source, September 5, 2017, https://www.sentinelsource.com/news/local/keene-high-grad-in-coast-guard-academy-helps-hurricane-harvey-response-efforts/article_b78b59d1-e6fd-55a1-908b-b1efd2a16619.html.

²⁶⁸ McIntyre.

²⁶⁹ McIntyre.

²⁷⁰ McIntyre.

²⁷¹ McIntyre.

were updated and sent to the Coast Guard District Eight Command Center and Texas Task Force One three times each day, and turned out to be quite useful; with some USCG pilots “confirm [ing] that they used the maps to find people in need of rescue.”²⁷² One of the reasons that Twarog noted this approach was successful was the support of those in his chain of command to embrace new ideas and technology.²⁷³

While internal coordination efforts were taking place within the USCG and OSV groups, minimal external or cross-organizational coordination efforts occurred between official responders and OSVs. John Gallagher, a member of the Cajun Navy noted, “[the organization] has several local chapters, and works with similar, loosely-organized groups, [however] works independently from government entities like the Federal Emergency Management Agency, the U.S. Coast Guard, or the local police and fire departments.”²⁷⁴ Additionally, Ben Husser, a native of Hammond, Louisiana and former member of the Air National Guard, who responded during Harvey as a member of the Cajun Navy, recalled an evacuation of a nursing home in Port Arthur, TX. Once he and members of the Cajun Navy arrived at the nursing home, they found 65 residents trapped in water that was feet deep and inundated with raw sewage.²⁷⁵ Husser “demanded to speak to the director of the nursing home” and was informed that the Cajun Navy could not evacuate the nursing home residents, and that “only the National Guard was authorized to do so.”²⁷⁶ Finding himself at an impasse with the nursing home director, Husser called a Louisiana congressman who was supportive of the Cajun Navy’s efforts, and after hearing the details of the situation stated, “do what you have to do to get [those] people out. We’ll deal with the consequences later.”²⁷⁷ Shortly after that call, the Port Arthur Police arrived to detain the nursing home

²⁷² McIntyre.

²⁷³ McIntyre.

²⁷⁴ Sarah McCammon, “The Cajun Navy: Heroes or Hindrances in Hurricanes?,” NPR Weekend Edition, 3, September 22, 2018, <https://www.npr.org/2018/09/22/650636356/the-cajun-navy-heroes-or-hindrances-in-hurricanes>.

²⁷⁵ Miriam Markowitz, “‘We’ll Deal with the Consequences Later’: Hurricane Harvey and Our Vigilante Future of Disaster Relief,” *GQ*, December 7, 2017, <https://www.gq.com/story/cajun-navy-and-the-future-of-vigilante-disaster-relief>.

²⁷⁶ Markowitz.

²⁷⁷ Markowitz.

director, while the Cajun Navy evacuated the nursing home residents. During an interview after this incident, Hauser noted that he has responded to dozens of storms, as both a member of the Air National Guard and as a concerned citizen with an OSV group. However, he also noted that he prefers the OSVs because he can get more accomplished by not being “bound by a set of rules” like he was in the military.²⁷⁸

Chris Fiore, an emergency medical technician noted additional examples of the lack of cross-organizational coordination. He responded as part of an OSV group during Harvey and according to his account during the first few days after landfall, law enforcement personnel were routinely turning away volunteer SAR organizations, but seemed to lack a good reason for denying their assistance.²⁷⁹ Another member of an OSV group stated that some local police and fire personnel wanted help and would allow OSVs to proceed one day only to turn them away the next.²⁸⁰ While the general theme was that official organizations were reluctant to accept OSV assistance, there were a few documented instances of local emergency responders reaching out to OSVs for help. The HPD sent out a tweet asking anyone with a boat who could help to call the department and provided a phone number, and other local emergency responders sent out requests for help on social media asking for individuals with boats or high-water vehicles to contact fire officials.²⁸¹

d. SAR Operations

The final SAR task is SAR operations, and during Hurricane Harvey, both the USCG and OSVs conducted operations by carrying out non-regular tasks with the assistance of digital technology. OSV groups themselves emerged with the help of social media, and used digital technology applications to facilitate their SAR response operations. At least three OSV groups conducted operations under the name Cajun Navy during

²⁷⁸ Markowitz.

²⁷⁹ Hollie McKay, “Harvey Victims Can’t Always Get Life-Saving Aid Easily, Volunteers Lament,” Fox News, September 6, 2017, <https://www.foxnews.com/us/harvey-victims-cant-always-get-life-saving-aid-easily-volunteers-lament>.

²⁸⁰ McKay.

²⁸¹ Koren, “Using Twitter to Save a Newborn from a Flood”; Nelson, “In Houston, Pleas for Help Go Out Over Social Media”; Seetharaman and Wells, “Hurricane Harvey Victims Turn to Social Media for Assistance.”

Hurricane Harvey. These groups were comprised of individuals from the original organization that emerged during Hurricane Katrina, and the later variants that emerged during the Louisiana floods in 2016. Additionally, numerous OSVs emerged during Harvey, inspired by the efforts of the Cajun Navy, including the Cajun Army (for people without boats), the Cajun Special Forces, the Cajun Green Cross, as well as the Texas Navy in Houston.²⁸² These OSVs leveraged digital technologies, such as social media, to connect with each other and to conduct SAR operations, and one of these digital technology applications was Zello, which was downloaded by six million people the week after Harvey hit and jumped its total registered user base to over 100 million.²⁸³

The Zello application essentially turns a cellphone into a citizens band (CB) radio, which was used by OSVs to report their positions, while other OSVs directed them to areas where they were needed, and verified that evacuations had been conducted successfully.²⁸⁴ In fact, the Zello application was so widely adopted that eventually multiple channels were created based on the area of operations across the city. OSV rescuer Charles Garfinkel noted that he used Zello to coordinate rescues, and “was amazed at the fact that [they] were able to do this and didn’t have to go through a FEMA coordinator or anything.”²⁸⁵ FEMA Administrator, Brock Long, while not recognizing OSV efforts directly noted, “[FEMA] consistently advocate [s] for a culture of preparedness and a less-bureaucratic system of disaster response and recovery.”²⁸⁶ The CEO of Zello, Bill Moore, said “the company... [was] proud to be part of the rescue efforts.”²⁸⁷ Zello is a Texas-based company out of Austin that has been around since 2012 and had been used during previous disasters. The Cajun Navy began using Zello to coordinate SAR response operations in 2016 during

²⁸² Markowitz, “We’ll Deal with the Consequences Later.”

²⁸³ Markowitz.

²⁸⁴ Bailey, “#SOSHouston: How Apps and Social Media Assist Harvey Rescue Efforts.”

²⁸⁵ Bailey.

²⁸⁶ Pohl, “An App Helped Rescue 37,000 Hurricane Victims.”

²⁸⁷ Bailey, “#SOSHouston: How Apps and Social Media Assist Harvey Rescue Efforts.”

flooding that trapped over 20,000 people in Baton Rouge, LA.²⁸⁸ Ever since, OSVs have perfected their use of Zello for SAR response operations during disasters.²⁸⁹

However, this widespread adoption of the Zello application was not without controversy. Zello was so successful during Hurricane Harvey that it was advertised on national media outlets, and links were posted on social media and Zello's website directly.²⁹⁰ Texas Search and Rescue Planning Section Chief Brandon Goering noted that some OSVs were using the TEXSAR official logo on their Zello channels, which gave the impression that the organization was coordinating with the OSVs, or was using the Zello channel themselves, which caused confusion for people trying to request help. Additionally, according to Shawn Hohnstreiter, the Board Chairman and Operations Section Chief for TEXSAR, this problem worsened when distress individuals used Zello channels to call for help, but were told that they needed to contact 911. Hohnstreiter also noted, "[TEXSAR] had received multiple complaints from people that thought these spontaneous volunteers were our legitimate organization."²⁹¹

In addition to using the Zello application to coordinate and conduct SAR operations, OSVs turned to crowdsourced rescue maps. Nick Terrel, one of the Cajun Navy rescuers who responded during Hurricane Harvey noted he spent almost a day driving around Houston, checking Facebook, and looking for areas where people needed help, but almost every location that he responded to had already been evacuated. Terrel stated, "it was very unorganized since it was just based off of social media posts. We didn't know what to do, or where to go, or who to contact to help."²⁹² However, it did not take long before Terrel learned of Marchetti's "CrowdSource Rescue" map and decided to see if it could be useful. It was so useful in fact that it became the go-to map for civilian-led SAR

²⁸⁸ Bailey.

²⁸⁹ Bailey.

²⁹⁰ McKay, "Harvey Victims Can't Always Get Life-Saving Aid Easily."

²⁹¹ McKay.

²⁹² Pohl, "An App Helped Rescue 37,000 Hurricane Victims."

operations during Harvey, which spurred more than 30,000 rescues by over 8,000 rescuers.²⁹³

The USCG also conducted SAR operations during Hurricane Harvey by carrying out non-traditional tasks aided by digital technologies. The USCG typically does not dispatch SAR resources based on a social media post; however, since so many distressed individuals were turning to social media for help during Hurricane Harvey, the organization had to adapt. Vice Admiral Sandra Stosz, the Coast Guard's Deputy Commandant for Mission Support at the time noted, "That's how [the USCG] rescued ... 11,000 people, leaning in on how the public was self-selecting to use social media, because they couldn't get through on 911 calls."²⁹⁴ Unlike in previous disasters where USCG rescuers had to respond into impacted areas and essentially go door-to-door looking for distressed individuals waving their arms or shining flashlights, the USCG took a forward leaning posture during Hurricane Harvey and conducted SAR operations by embracing new technologies. During Hurricane Harvey, distressed individuals reported their situation and location by calling 911 or the USCG directly, or by posting on social media. The USCG's GEOINT team and the USCG Academy (with the help of Humanitarian Road) took this information and aggregated it to create distress maps showing the areas where distress cases were most prevalent, or in some cases, the geo-coordinates for each individual SAR case. These distress maps were then sent to both operational commanders and individual SAR units to facilitate SAR response operations. While the USCG still lacks policy or procedures for responding to distress calls initiated through social media, the organization's efforts and willingness to embrace new technologies in the face of disasters has shown the value that digital technology can play in future disaster response operations.

²⁹³ Pohl.

²⁹⁴ Nicole Ogrysko, "Recent Hurricanes Have the Coast Guard Rethinking Social Media's Role in Rescue and Response," Federal News Network, September 21, 2017, <https://federalnewsnetwork.com/management/2017/09/recent-hurricanes-have-the-coast-guard-rethinking-social-medias-role-in-rescue-and-response/>.

3. Summary

The decision of distressed individuals to report their distress via social media vice traditional notification methods appears to be increasing during disasters. Additionally, during Hurricane Harvey, more OSV groups were identified than in the previous disaster case studies, which seem to suggest that the level of OSV involvement is also increasing. This would stand to reason as digital technologies have provided distressed individuals with an alternative way to communicate during disasters, and by the fact that OSVs are now able to leverage evolving digital technologies to self-organize, communicate, coordinate, and conduct their civilian-led SAR operations. Additionally, spontaneous volunteers' knowledge of an event's needs and their capability to get involved has increased because digital volunteers can now support the disaster response from outside the disaster area itself, which historically limited the convergence of spontaneous volunteers to individuals in the immediate proximity to the disaster stricken area.

The evolution and effectiveness of digital technologies during disaster response operations is not exclusive to OSV groups. Official organizations, such as the USCG, also realized the value that digital technologies can have during disaster related SAR operations. The willingness and adaptability of OSVs and the USCG to embrace new digital technologies is one of the successful highlights of this case. However, the lack of cross-organizational coordination continues to result in a duplication of efforts that created a reduced common operational picture for the USCG during Hurricane Harvey. Both OSVs and the USCG created distress maps during this event; however, these maps could have been more accurate, and possibly more useful, if they accounted for all data sources. The USCG created a relatively small crowdsourced distress map (with the aid of Humanity Road) that reflected only 1,000 rescues, compared to the "CrowdSourced Rescue" map created by OSVs who reflected 30,000 rescues.

VI. DISASTER RESEARCH CENTER TYPOLOGY ANALYSIS OF SAR RESPONSES TO MARITIME CASE STUDIES

This chapter conducts an analysis of the organizational response of both the USCG and OSVs, according to the DRC's four-fold typology of organized responses to disasters (based on task and structure), to identify specific factors of the USCG's organizational response that affected OSV engagement. This DRC typology analysis was conducted by examining each SAR task identified in the previous chapter to determine if it was a regular or non-regular task for the organization carrying it out, and to determine if the organizational structures used to carry out each SAR task were in place prior to the disaster, or if they were created as a result of the disaster itself. Ultimately, this DRC typology analysis led to a typology identification for each organization, according to the DRC typology of organized responses to disasters, which highlighted certain USCG organizational responses more conducive than others for engaging OSVs. This chapter concludes with a cross-case analysis to note overall trends and patterns between each case study to generalize commonalities and draw conclusions.

A. DRC TYPOLOGY ANALYSIS OF LOWER MANHATTAN BOAT LIFT ON 9/11

During the Lower Manhattan Boat Lift on 9/11, both the USCG and OSVs carried out maritime SAR tasks, and many of these tasks were non-regular tasks for both organizations. A clear and substantial blending of organizational structures also occurred between the USCG and OSVs, which was used to carry out each SAR task.

Both organizations carried out the first SAR task of distress monitoring and communication independently. The USCG acted independently when receiving the first distress call via VHF-FM radio transmission, but stopped short however of issuing a UMIB to solicit the assistance of other vessels in the area; instead, it chose to dispatch a single vessel (to assess the situation) and to work on notifying the appropriate department. The USCG did not initially recognize the event as a disaster that would require maritime SAR most likely because of the nature of the initial distress call. However, even if the USCG

recognized the event as a pending evacuation of lower Manhattan, distress monitoring for evacuations on land is not a regular task for the USCG.

OSVs near Battery Park also acted independently to learn of the distress through a process known as distributive sense-making, which was a non-regular task for most if not all the vessel operators in the area. Once these vessel operators were aware of the distress, they decided to start the evacuation efforts themselves even before the USCG could fully grasp the situation at hand.

The SAR tasks of search planning and preparedness and SAR coordination were also non-regular tasks for both organizations. Neither the USCG nor the OSVs had a plan for how to evacuate lower Manhattan, or a plan for how to coordinate an evacuation effort using the makeshift flotilla of vessels. As such, a plan needed to be developed on the spot. While the USCG did have plans, such as OpSail and a mass rescue plan for a capsized Staten Island ferry, neither of these plans addressed all aspects of the evolution unfolding. Instead, a decision was made to use the pilot boat *New York* as a joint floating command post. While a deviation from normal USCG or harbor pilot coordination efforts, it served to establish a focal point where mariners could look to identify the new developing rules of the harbor.

Due to the non-regular SAR tasks needed to conduct an evacuation of lower Manhattan, the USCG was not able to respond to the event as an established organization, and at the very least, would have needed to respond as an extending organization. However, USCG Lieutenant Mike Day and Sandy Hook harbor pilot Andrew McGovern began collaborating on what needed to be done and how to do it. This collaboration shifted the USCG from an extending group to an emergent group because now both the tasks and the structures used to carry out those tasks were new. This new organizational structure consisting of the USCG and harbor pilots decided to put out a radio broadcast for all available boats to assist in the evacuation. While this broadcast aimed to solicit help from mariners in the area like a UMIB, it was substantially different in the fact that it came from the pilot boat *New York* vice the USCG command center on Staten Island, and it provided specific instructions on where to go to assist, i.e., report to Governors Island. The overall decision to use the pilot boat *New York* as a floating command post, and the subsequent

radio broadcast for all available boats, was the initial formation of the emergent organizational structure used to conduct SAR operations throughout the remainder of the event.

The final SAR task of SAR operations was also a non-regular task for both organizations independently, as well as for the newly formed joint organization. Neither the USCG nor the harbor pilots routinely conduct evacuations on land, and conducting an evacuation of any kind is definitely a non-regular task for the OSVs involved in the event. However, maritime SAR operations were carried out by over 150 USCG and OSV vessels. This effort was similar to the systems approach of SAR operations that the USCG routinely uses, however, in lieu of USCG vessels and aircraft, SAR operations were conducted primarily by OSVs using various ferries and tug boats. Notably, the USCG was not directing which vessels should go where, but was relying on the judgment and experience of the harbor pilots at Governors Island to assess the various capabilities of the vessels and direct them where they could best be used.

The organizational structure, consisting of representatives from the USCG and OSVs, which was used to carry out maritime SAR tasks during the Lower Manhattan Boat Lift was a new structure that developed as a result of the disaster itself, and this new structure was used to carry out non-regular SAR tasks. If these dimensions of structure and task are analyzed according to the DRC typology of organized responses to disasters, it is clear that an emergent group was present as depicted in Table 2.

Table 2. USCG and OSV DRC Typology Placement during 9/11 Boat Lift

<u>Structures</u>	<u>Tasks</u>	
	Regular	Non-regular
Existing	Established	Extending
New	Expanding	Emergent

B. DRC TYPOLOGY ANALYSIS OF HURRICANE KATRINA

If we would have had to wait for the federal government to be down here to help people, you know how many people would have died?²⁹⁵

—Former Louisiana Senator Nick Gautreaux

During Hurricane Katrina, both the USCG and OSVs carried out maritime SAR tasks. Many of these tasks were non-regular for the USCG, and every task was new for the OSVs who responded. However, unlike the previous case study, during Katarina, a blending of organizational structures did not occur between the USCG and OSVs. Additionally, any substantial coordination efforts did not occur between the USCG and OSVs at the organizational level.

Both the USCG and OSVs carried out the first SAR task of distress monitoring and communication independently, and it is important to note that this task was a non-regular task for both organizations. Distress monitoring started out as a regular task for the USCG, in the form of hurricane preparations and staging of personnel and equipment just outside the area of impact. However, once it was safe to initiate operations in New Orleans, USCG responders discovered that local emergency management officials had no way to communicate, coordinate, or direct federal response assets, which resulted in USCG aircraft independently flying over flooded areas physically looking for individuals in distress. Additionally, USCG boat crews responded by going house-to-house knocking on windows and attics looking for survivors. This task was non-regular for the USCG because the organization does not normally go door-to-door looking for individuals in distress, but rather is notified of a particular distress situation and probable location prior to launching assets.

OSVs during Katrina also conducted distress monitoring and communication as a non-regular task. Former Senator Nick Gautreaux, who notified OSVs of a distress situation in which they could help, was a non-regular task by itself. Typically, elected officials do not request OSVs to implement SAR operations, and even when or if their assistance is request, it is not requested in such a general and ad hoc way. While the USCG

²⁹⁵ CBS News, “How Citizens Turned into Saviors after Katrina Struck.”

does solicit spontaneous volunteer assistance during SAR cases in the form of issuing an UMIB, this broadcast is fundamentally different because it is confined to a specific geographic area, the USCG coordinates all aspects of the SAR response, and the USCG has direct communications and information flow (via a standard maritime radio) with the volunteers who respond. Whereas, the OSVs who responded to Gautreaux's request for help, showed up without a clear plan, objective, or way to communicate or coordinate with other responders.

Rather than augment official response efforts (like a UMIB is designed to do), the non-specific media broadcasts for help resulted in a mass convergence of spontaneous volunteers to the disaster area, which ultimately led to the emergence of an organized group that became known as the Cajun Navy. Regardless of the non-regular nature of the request for spontaneous volunteers, once the Cajun Navy arrived in the city, they were met with the same challenges as USCG boat crews, and also resorted to going house-to-house looking for survivors.

For the USCG, search planning and preparedness during Katrina was a regular task conducted any time a hurricane is forecasted to make landfall in the United States. The Coast Guard conducts planning and preparedness exercises before each hurricane season, and uses its existing structure to mobilize assets and personnel from around the country to conduct a SAR response when disaster strikes. In contrast, the OSVs who responded during Katrina did not conduct any SAR planning or preparedness activities, because the organization only came into existence as a direct result of the disaster itself.

During Hurricane Katrina, SAR coordination was lacking both internally between government responders themselves and externally with OSVs. The lack of internal government coordination was noted by the establishment of two separate SAR command centers being established in New Orleans alone (DOD and USCG), and the lack of coordination efforts between the USCG and FEMA US&R task forces. This lack of coordination most likely resulted because roles and responsibilities for SAR during disasters were not clearly defined in the NRP or the National SAR Plan. Additionally, US&R task forces were activated to conduct SAR operations for which at the time they were not trained or equipped to handle.

It is clear that FEMA recognized this issue in retrospect, because the NRP was replaced by the NRF and the National SAR Plan was updated to establish the USCG as an essential component of the federal government's response to disasters; and more specifically, as the primary agency for maritime/coastal/waterborne SAR.

The lack of coordination with OSVs was also noted by reports of official responders denying OSVs access to the disaster area, and attempting to turn them around by claiming that it was too dangerous or that they were not needed. While the USCG did have a few instances of SAR coordination efforts with local officials, no evidence was found of the USCG coordinating directly with OSVs at an organizational level. Instead, the USCG attempted to coordinate with local officials because the National SAR Plan maintains that state and local authorities should normally retain SAR responsibilities during incidents, and as a federal asset under the NRP, the USCG's deployment was to support state and local officials. However, state and local officials were overwhelmed and could not support USCG coordination efforts, much less address OSV coordination. Additionally, it is important to note that neither the NRP nor the National SAR Plan fully address the fact that the USCG has a statutory authority and responsibility to conduct SAR, regardless of a disaster declaration or NRP implementation. Based on this situation, the USCG could have initiated coordination efforts directly with OSVs, but because spontaneous volunteers during disasters were not well understood, it instead chose to focus on internal SAR coordination efforts and independent USCG SAR operations.

Both the USCG and OSVs carried out the final task of SAR operations. The USCG's culture of on-scene initiative allowed it to succeed in this area during Katrina. Examples can be seen in the decision of a C-130 pilot to abandon her assigned mission of conducting an environmental overflight to establish a communications platform for SAR operations, Air Station New Orleans personnel gaining access to the Navy's fuel supply, USCG boat crews piloting their vessels through flooded streets looking for survivors, and USCG aircrews conducting non-traditional hoists from rooftops and rescuing people from inside trapped attics.

This innovation was possible because despite the communication, and command and control challenges presented during Katrina, Coast Guard personnel were not reliant

on a top-down command and control structure, and were allowed a certain amount of flexibility to act independently or with limited guidance from commanding officers. Overall, the USCG responded to Katrina using existing structures; however, numerous non-regular tasks were undertaken. If these dimensions of structure and task are analyzed according to the DRC typology of organized responses to disasters, it is clear that the USCG responded to Katrina as an extending group (Table 3) by using existing structures to carry out non-regular tasks.

Table 3. USCG DRC Typology Placement during Hurricane Katrina

<u>Structures</u>	<u>Tasks</u>	
	Regular	Non-regular
Existing	Established	Extending
New	Expanding	Emergent

In contrast, OSVs who responded during Katrina carried out SAR tasks as new or non-regular tasks for their organizations and since the group did not exist prior to the event, the organizational structures used to carry out these tasks had to be created, which made OSVs an emergent group during Hurricane Katrina (Table 4).

Table 4. OSV DRC Typology Placement during Hurricane Katrina

<u>Structures</u>	<u>Tasks</u>	
	Regular	Non-regular
Existing	Established	Extending
New	Expanding	Emergent

C. DRC TYPOLOGY ANALYSIS OF HURRICANE HARVEY

During Hurricane Harvey, both the USCG and OSVs carried out maritime SAR tasks, and similar to the previous case studies, many of these SAR tasks were non-regular tasks for both organizations. However, unlike in the previous case studies, during Hurricane Harvey, both the USCG and OSVs leveraged digital technologies to conduct SAR tasks, which often necessitated modifications to their organizational structures to carry out. However, it is important to note that these organizational structure changes were primarily limited to internal structural changes or coordination efforts and very little evidence exists that any external or cross-organizational coordination occurred.

Both the USCG and OSVs carried out the first SAR task of distress monitoring and communication independently. However, after distressed individuals turned to social media for help when they were not able to contact traditional emergency services, this SAR task quickly became a non-regular task for both organizations. The USCG responded by attempting to redirect individuals from reporting distress via social media, and sent out several messages instructing people to call 911 or to contact the USCG directly for help. Redirecting the public away from a self-selected distress notification method was a non-regular task for the USCG by itself, and the establishment of a special triage unit in Washington, DC (to handle the high volume of calls the USCG was receiving) was not only a non-regular task, but also required the establishment of new organizational structures to achieve. The USCG's National Command Center is not typically involved in SAR case prosecution, as USCG SAR missions are typically coordinated and controlled at the sector or district level in the organization in alignment with internationally recognized SRRs.

In contrast, OSV groups took a more proactive approach to embracing social media as a distress notification method. OSVs took on the role of digital volunteers by tracking and cataloging distress calls initiated through social media (based on their hashtags), and started relaying these calls in Houston's 911 centers. However, it is important to note that while digital volunteers were attempting to help, in reality, they were adding to the volume of calls that had already overwhelmed the emergency communications network because social media posts are widely shared, and often resulted in multiple 911 calls for the same

incident. Additionally, many OSVs decided to respond directly to social media posts for help by initiating their own independent SAR operations. It was a non-regular task for OSVs, because it was one of the first instances where distressed individuals could contact OSVs directly and completely circumvent traditional distress monitoring and notification pathways.

The second SAR task of search planning and preparedness was a regular task for the USCG and conducted any time a hurricane is forecasted to make landfall in the United States. The Coast Guard conducts planning and preparedness exercises before each hurricane season, and uses its existing structure to mobilize assets and SAR response personnel from around the country to conduct operations whenever disaster strikes. In contrast, the OSVs who responded during Hurricane Harvey did not conduct any SAR planning or preparedness activities, because the organization did not emerge until the response phase of the disaster itself. It is important to note that OSVs operating under the Cajun Navy name were active in 2016 (supporting flood response operations in New Orleans), and could have potentially undertaken some planning or preparedness activities prior to Hurricane Harvey. However, OSVs are continually modifying their organizational structures based on the ever-changing convergence of spontaneous volunteers present during each disaster. As such, any search planning and preparedness activities would be difficult if not impossible for OSVs, prior to the actual disaster itself.

During Hurricane Harvey, a substantial amount of SAR coordination also took place, and digital technologies helped to facilitate this coordination. However, coordination for the most part was confined to either official internal government coordination efforts, or internal coordination efforts amongst OSV groups. Very limited external or cross-organizational coordination efforts occurred between official responders and OSVs. OSV groups coordinated amongst themselves and with each other through digital media platforms by collecting distress notification data from social media and using it to create crowdsourced rescue maps. These maps were then widely shared amongst various other OSV groups conducting independent SAR operations to include the Cajun Navy and Texas Navy. Additionally, OSV groups embraced digital technologies to coordinate and communicate with each other by establishing a common communications platform. While

OSVs would typically not have a common communications platform like an official organization does, OSVs during Harvey adapted and embraced the Zello application to establish various communication channels to conduct their SAR operations.

Comparatively, the USCG's internal coordination efforts primarily focused on collecting and aggregating distress notifications, which was also a non-regular SAR task that required the establishment of new organizational structures. The USCG's National Command Center, Coast Guard GEOINT team, and USCG Academy all became components of the SAR response system, and were leveraged to aggregate distress calls directly to the USCG and sort and catalogue distress notifications initiated through social media platforms. Once these distress notifications were collected, categorized, and aggregated, they were used to make resource allocation decisions and produce distress maps for USCG SAR resources. However, an argument can be made that the OSV created distress or rescue maps were far superior to the USCG's distress or rescue maps, based on the higher number of recorded rescues identified in the OSV's version.

Both the USCG and OSVs conducted the final SAR task of SAR operations during Hurricane Harvey, and included non-regular tasks for both organizations. The emergence of OSV groups themselves was a non-regular task, because unlike in the previous case studies, OSVs used digital technologies to converge as digital volunteers. However, this convergence led to the emergence of OSVs groups that carried out additional SAR functions rather than just physically responding in shallow water vessels to conduct SAR responses (as was seen in the Hurricane Katrina case study). Hurricane Harvey was one of the first instances where OSVs did not have to be physically present in the disaster response area to get involved in the rescue efforts. Tech savvy OSVs were now able to build crowdsourced rescue maps or operate much like an official dispatcher through the Zello application to direct OSV resources to where they were needed from anywhere in the world. In comparison, the USCG also conducted SAR operations during Hurricane Harvey by carrying out non-traditional tasks aided by digital technologies. The USCG typically does not dispatch SAR resources based on a social media post; however, because so many distressed individuals were turning to social media for help, the organization had to adapt. The USCG adapted by leveraging other components of the organization typically external

to the SAR system to develop distress maps in addition to the crowdsourced rescue maps created by OSVs.

Overall, the USCG responded to Hurricane Harvey by modifying its traditional SAR response structures and conducted non-regular tasks aided by advances in digital technology. If these dimensions of structure and task are analyzed according to the DRC typology of organized responses to disasters, it is clear that the USCG responded to Harvey as an emergent group by itself, even without developing organizational structures that included OSVs (Table 5).

Table 5. USCG DRC Typology Placement during Hurricane Harvey

<u>Structures</u>	<u>Tasks</u>	
	Regular	Non-regular
Existing	Established	Extending
New	Expanding	Emergent

In comparison, OSVs responded during Harvey by developing their own organizational structures and determining how they wanted to use those structures to carry out individual SAR tasks during the disaster response. Based on the creation of new structures and the use of these structures to carry out non-regular SAR tasks, OSV groups also responded to Hurricane Harvey as an emergent group (Table 6).

Table 6. OSV DRC Typology Placement during Hurricane Harvey

<u>Structures</u>	<u>Tasks</u>	
	Regular	Non-regular
Existing	Established	Extending
New	Expanding	Emergent

D. CROSS-CASE ANALYSIS OF MARITIME CASE STUDIES

When the organizational response of both the USCG and OSVs is analyzed across all three case studies, several trends and patterns emerge. First, neither organization was able to respond to any of the disasters and perform maritime SAR functions as an established organization. This result makes sense for OSV groups that do not conduct SAR tasks daily, and where any SAR tasks undertaken are by default non-regular tasks for the group. Additionally, OSV groups emerged as a direct result of the disasters themselves, which required their organizational structures to be developed on the spot, and according to the needs of each event. However, the fact that the USCG was not able to respond as an established organization to perform SAR tasks, which the organization conducts daily, during disaster response operations, was quite interesting.

In all three case studies, the USCG had to take on non-regular tasks to carry out traditional SAR functions. It is also important to note that the USCG took on new or non-regular tasks to carry out three of the four SAR tasks routinely carried out by the USCG during SAR missions, with the exception of search planning and preparedness, which the USCG conducted as a regular task prior to Hurricanes Katrina and Harvey. Furthermore, in two of the three cases studied, the USCG had to develop new organizational structures to carry out these non-regular tasks. According to the DRC typology of organized responses to disasters, if an organization takes on non-regular tasks and develops new organizational structures to carry out those tasks, it is then considered an emergent group. This finding is consistent with those of this research that identified the USCG as an emergent group during both the Lower Manhattan Boat Lift on 9/11 and Hurricane Harvey. However, what is unique is why the USCG became an emergent group during the Lower Manhattan Boat Lift, by developing organizational structures external to the USCG and included OSVs, whereas during Hurricane Harvey, the USCG became an emergent group by developing organizational structures internal to the USCG and did not include OSVs. A probable explanation points to the rapid change and development of the U.S. disaster response system and the implementation of NIMS and the NRF.

During 9/11, the USCG did not respond as part of a national response strategy and instead responded as an independent SAR organization that had the flexibility to respond

in a more decentralized manner, with the ability to adapt to the situation at hand, and to carry out SAR tasks however necessary. Additionally, as previously noted, a decentralized command and control model is well suited for disaster operations of limited scale and duration, which explains the success of the decentralized and emergent group response (consisting of both the USCG and OSVs) during the lower Manhattan Boat Lift, as the entire operation only took nine hours. In contrast, the USCG responded to Hurricane Harvey as part of NIMS, which was implemented after 9/11, and defines the roles and structures for federal, state, and local response agencies during nationally declared disasters. As part of NIMS, the USCG responded to Hurricane Harvey not as an independent SAR organization, but as a FEMA designated primary federal agency to support state and local agencies by coordinating maritime SAR operations.

However, the USCG is still adapting to the role of primary federal agency during presidentially declared disasters, because neither the NRF nor the National SAR Plan fully address how the USCG is supposed to respond in support of state and local agencies, and yet still fulfill its statutory requirements to conduct SAR missions by performing any and all acts necessary to rescue or aid persons in distress upon the high seas or imperiled by flood waters. Evidence can be seen in the USCG's response to Hurricane Katrina, because the USCG reverted back to an independent SAR organization when the national response strategy was not working. The USCG's decision to revert back to a decentralized SAR organization also accounts for why the USCG was viewed as one of the only success stories of the federal response to Katrina. Thus, this begs the question that if the USCG responds better to disasters that require maritime SAR by performing any and all acts necessary to rescue persons in distress, then why did the USCG not explore the use of OSVs during Hurricanes Katarina and Harvey?²⁹⁶ To answer this question, a better understanding of what can be done to improve OSV engagement during future hurricane response operations is needed.

²⁹⁶ Performing any and all acts necessary to rescue persons in distress during disasters most certainly includes the use of OSVs, and is not unlike the USCG's UMIBs to solicit spontaneous volunteer assistance during steady state SAR operations.

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VII. CONCLUSIONS AND RECOMMENDATIONS

This chapter revisits the overall research question of how can the USCG better engage organized spontaneous volunteers who conduct maritime SAR during hurricane response operations. It draws conclusions based on the case study analyses, and offers recommendations for ways to increase cross-organizational engagement between official response organizations and OSVs. Finally, this chapter concludes by discussing areas that may benefit from additional research.

A. CONCLUSIONS

The analysis of the case studies found that the USCG is not able to respond effectively as an existing group to carry out SAR tasks during maritime disasters. At a minimum, the USCG either will need to conduct new or non-regular tasks or will need to create new structures to carry out new or non-regular tasks. Additionally, OSVs are an inevitable part of disaster response, and if appropriately leveraged, they can add value to an already strained disaster response system. The challenge is finding ways to integrate OSVs effectively into disaster response operations. The USCG can better engage OSVs who conduct maritime SAR during hurricane response operations by seeking out innovative and new ways to respond to disasters organizationally, with the goal of becoming an emergent group itself. As an emergent group, new organizational structures would be developed that include OSVs to carry out new or non-regular tasks as part of the emergent group transition process. While the notion of developing new organizational structures that include OSVs during hurricane response operations seems simple, in reality, several barriers must be overcome. The following section discusses some of these barriers and offers recommendations for navigating around them.

B. DISCUSSION AND RECOMMENDATIONS

The first barrier is how the USCG responds to disasters as part of a national response strategy using NIMS. This system relies on ICS to define roles and structures for responding organizations, which recent disaster research studies have indicated is not the most effective way to respond to disasters. Disasters by their very nature are unpredictable

and tend to overwhelm traditional emergency response functions, often requiring official response organizations either to take on new roles or to develop new organizational structures to respond effectively. While the rationale is that pre-defined roles and a common organizational structure provide organization amongst various responders during dynamic and chaotic events, the use of ICS is one of the major inhibitors of organized spontaneous volunteer engagement. By their very nature, OSV groups have a flat organizational structure and a decentralized command and control process. Attempting to force OSVs to yield to ICS, when they inevitably respond during disasters, sets their involvement in the event up for failure from the very beginning. Additionally, one of the primary benefits of OSVs is their innate ability to innovate, rapidly shift tasks, and develop highly adaptive networks. These qualities are the true value of OSVs during disaster response operations, and official response organizations should work to develop strategies for incorporating OSVs outside of typical ICS structures.

Another barrier that specifically limits the USCG from better incorporating OSVs during hurricane response operations is the ambiguity of the USCG's role during disasters that require maritime SAR operations in support of a national response strategy. The USCG conducts independent SAR operations on a daily basis. However, during presidentially declared disasters, it responds as a FEMA designated primary federal agency under the NRF and the National SAR Plan. Neither of these plans fully addresses the USCG's responsibility to support state and local agencies during disasters, yet still fulfill its statutory requirements to conduct SAR missions as an independent SAR organization. The USCG's ability to conduct any and all tasks necessary to prevent the loss of life during maritime SAR operations is one of the greatest values of the organization, and its ability to adapt and employ a decentralized command and control process, whenever necessary, should be leveraged to its fullest extent during maritime disasters.

Finally, the natural evolution of digital technologies, and the widespread adoption and use of social media is affecting how individuals communicate during disasters. Distressed individuals turning to social media for help is a new complexity that official response organizations need to address. Specifically, the USCG should work to develop policies and procedures for officially receiving distress notifications through social media

for both routine and disaster related operations, and should work to develop consistent mechanisms to collect and aggregate social media data effectively. The USCG could potentially leverage OSVs in this one area because they have already demonstrated the capability and capacity to add value to the overall disaster response by collecting and aggregating crowdsourced SAR data to create rescue maps.

C. AREAS FOR ADDITIONAL RESEARCH

While this research has noted that the organizational response of official organizations does affect spontaneous volunteer engagement, and has offered recommendations for how official organizations can alter their organizational structures to better incorporate OSV groups during disaster response operations, the overall topic of emergent spontaneous volunteerism is still highly complex and additional research needs to be conducted.

Future studies should be conducted on the application and use of ICS during disaster response operations that involved OSVs, since its nationwide adoption post-9/11. These studies should focus on the roles and structures for all responding organizations, according to the same DRC typology analysis of organized responses to disasters conducted in this study, to determine if ICS inhibited the development of new organizational structures or emergence during disasters when it would have been beneficial to the overall disaster response. Further research should also be conducted on OSVs who develop in the response or recovery stage of a disaster and carried out support functions, such as sheltering and caring for victims, food, and supply distribution, donation management, and counseling services, to inquire if the similar patterns and trends emerge.

To understand the USCG's role better during disasters that require maritime SAR, a comprehensive review of national response strategies should be conducted with a focus on ESF #9 of the NRF and the National SAR Plan. Specifically, this review should look at the USCG's roles and responsibilities during nationally declared disasters, and how these national response strategies impact the organization's statutory mandates to conduct SAR operations. The goal of this comprehensive policy review should be focused on identifying

gaps, and creating new policy and doctrine that offers more precise and comprehensive role clarity for the USCG during nationally declared disasters.

Future research also needs to be conducted on spontaneous volunteer motivations, and ways in which social media may impact a spontaneous volunteer's decision to get involved in disaster response operations or not. While research regarding spontaneous volunteer motivations is limited, a better understanding of the motivations behind spontaneous volunteerism, and how digital communication technologies are affecting the way individuals become aware of particular disaster needs, and decide to become involved or not, may offer a measured understanding of the inflection point in which spontaneous volunteers are likely to emerge during disasters. This knowledge could help official organizations prepare to alter their organizational structures to include OSVs as quickly and efficiently as possible.

Lastly, research should be conducted on the privacy, safety, and legal concerns surrounding the use of OSVs during maritime SAR operations, which were beyond the scope of this research project.

D. SUMMARY

The USCG is not able to respond effectively as an existing group to carry out SAR tasks during maritime disasters, and needs to either conduct new or non-regular tasks or create new structures to carry out new or non-regular tasks. If the USCG desires to engage OSVs who conduct maritime SAR more effectively, during future hurricane response operations, then innovative and new ways to incorporate OSVs into new organizational structures need to be developed. However, several barriers need to be overcome:

- First, the USCG responds to disasters as part of a national response strategy using NIMS. This system relies on ICS to define roles and structures for responding organizations. The use of ICS is one of the major inhibitors of organized spontaneous volunteer engagement, and future studies should be conducted on the application and use of ICS during disaster response operations to develop strategies for incorporating OSVs outside of typical ICS structures.

- Another barrier is the ambiguity of the USCG's role during disasters that require maritime SAR operations in support of a national response strategy. To understand the USCG's role better during disasters that require maritime SAR, a comprehensive review of national response strategies should be conducted. This review should focus on addressing the USCG's role to support state and local agencies during disasters, yet still fulfill its statutory requirements to conduct SAR missions as an independent SAR organization.
- Finally, the natural evolution of digital technologies, and the widespread adoption and use of social media is affecting how individuals communicate during disasters. The USCG should work to develop policies and procedures for officially receiving distress notifications through social media, for both routine and disaster related operations, and should work to develop consistent mechanisms to collect and aggregate social media data effectively to create crowdsourced rescue maps during disasters.

Responding to major hurricanes can challenge official response organizations. However, properly engaging and leveraging OSVs can provide a beneficial surge capacity if done properly. As the lead federal maritime SAR agency, the USCG can and should work to effectively integrate OSVs who conduct maritime SAR into future hurricane response operations.

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APPENDIX. U.S. DISASTER RESPONSE SYSTEM BACKGROUND, EVOLUTION, AND CHALLENGES

“Throughout history, frustration with current policies has often led to changes in disaster management.”²⁹⁷ In fact, FEMA was created to address the fragmentation across various disaster response agencies.²⁹⁸

It is important to understand how the established disaster response system in the United States developed, functions today, and addresses volunteerism overall. This appendix is broken down into several sections that define disasters, identify key events in U.S. disaster management history (highlighting subsequent policy shifts), and discuss how the current disaster management system in the United States addresses volunteerism. Lastly, this appendix concludes by discussing how ICS may not be the best system for community-wide disasters where spontaneous volunteers are part of the disaster response.

A. WHAT IS A DISASTER?

Disaster researchers can use a common functionalist or systems prospective to conceptualize disasters. Disasters are extreme events that impact communities in ways that exceed their capacity to prevent adverse effects. Simply put, disasters happen when community response needs outpace capabilities.²⁹⁹

The response needs to a small-scale, slow-moving disaster may be just below the threshold where local communities can respond without the need for outside assistance. However, large-scale, rapid-onset disasters require assistance from larger outside entities, such as governmental organizations, as well as public and private assistance to “minimize damage and disruption and restore the community to routine functioning.”³⁰⁰ Additionally,

²⁹⁷ James Kendra and Tricia Wachtendorf, “‘Cajun Navy’ Rescuers in Hurricane Harvey Show Vital Role of Volunteer Boats,” *The Conversation*, August 31, 2017, <http://theconversation.com/cajun-navy-rescuers-in-hurricane-harvey-show-vital-role-of-volunteer-boats-83200>.

²⁹⁸ Scott Gabriel Knowles, *The Disaster Experts Mastering Risk in Modern America* (Philadelphia: University of Pennsylvania Press, 2011).

²⁹⁹ Tierney and Perry, *Facing the Unexpected*, 8–9.

³⁰⁰ Tierney and Perry, 9.

it is important to note that responding to disasters often requires organizations to adapt to be effective.³⁰¹

B. ORIGINS OF “COMMAND AND CONTROL”

“Disaster response in America traditionally has been handled by State and local governments, with the Federal government playing a supporting role,” however, over time, that role has evolved.³⁰² One of the first instances of disaster intervention by the federal government occurred in 1803, when a fire destroyed the city of Portsmouth, New Hampshire.³⁰³ From that point until 1950, the federal government provided sporadic aid, “in an ad hoc manner without an established Federal role or coordinated response plan.”³⁰⁴ Not until the Civil Defense Act of 1950 did the United States receive some form of federal disaster relief legislation to codify the federal government’s role in disaster response.³⁰⁵

The Federal Civil Defense Administration (FCDA) was also created under the Civil Defense Act and followed a military organization structure. This original structuring has had long-lasting effects for the disaster response system ever since.³⁰⁶ The underlying assumption was that disasters were viewed as the enemy to be defeated, and disaster response was organized around the military doctrine of command and control. The concept behind this viewpoint was, “disasters cause ‘chaos’ and that ‘command’ and ‘control’ are the means to reduce the situation to regular proportions.”³⁰⁷

Official responders in the disaster response system are typically paramilitary emergency response personnel, such as police, fire, and emergency medical services. These organizations are considered paramilitary because they function according to a military style of command structure, with a top-down hierarchy. Since these paramilitary groups

³⁰¹ Tierney and Perry, 9.

³⁰² Townsend, *The Federal Response to Hurricane Katrina*, 11.

³⁰³ Townsend, 11.

³⁰⁴ Townsend, 11.

³⁰⁵ Townsend, 12.

³⁰⁶ Helsloot and Ruitenberg, “Citizen Response to Disasters,” 104.

³⁰⁷ Helsloot and Ruitenberg, 104.

are structured this way, it makes sense that they would find the command and control model as the most suitable model for disaster response operations. It also stands to reason that because spontaneous volunteer groups do not follow a top-down command and control structure, and often have a flat hierarchy, that government responders would assume they are unable to cope with disaster situations adequately.³⁰⁸

C. SEPTEMBER 11, 2001 AND THE NATIONAL INCIDENT MANAGEMENT SYSTEM

In response to the terrorist attacks on 9/11, the federal government took steps to alter how it responded to national emergencies and created a comprehensive NIMS. This system was designed to:

Provide a consistent nationwide approach for Federal, State, and local governments to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity.³⁰⁹

NIMS is essentially a national command and control system that defines roles and responsibilities for responders at all levels of government. It was designed to be “flexible and scalable,” with the concept being that the same disaster management system can be used by emergency responders whether they are responding to a single motor vehicle accident or a large-scale natural disaster.³¹⁰ NIMS is mandated for use by all federal agencies, and while not specifically mandated for state and local agencies, it is connected to federal preparedness grants and other disaster response funding.³¹¹ To take advantage of federal funding, and federal training opportunities, many state and local agencies have adopted NIMS. FEMA oversees the NIMS program, and “manages periodic updates to the

³⁰⁸ Helsloot and Ruitenberg, 104.

³⁰⁹ George W. Bush, *Management of Domestic Incidents*, Homeland Security Presidential Directive 5 (Washington, DC: The White House, 2003), <https://www.dhs.gov/publication/homeland-security-presidential-directive-5>.

³¹⁰ Federal Emergency Management Agency, *National Incident Management System*, 3rd ed. (Washington, DC: Department of Homeland Security, 2017), 1–3, https://www.fema.gov/sites/default/files/2020-07/fema_nims_doctrine-2017.pdf.

³¹¹ Thornburg, “Disruptive Emergent Systems in Disaster Response,” 9.

doctrine, coordinates with partner agencies on implementation, and manages training courses for federal, state, and local responders.”³¹²

NIMS also mandated ICS as, “a standardized approach to the command, control, and coordination of on-scene incident management that provides a common hierarchy within which personnel from multiple organizations can be effective.”³¹³ ICS is designed to be used by all levels of government, as well as the private sector and non-governmental organizations (NGOs), and “specifies an organizational structure for incident management.”³¹⁴ This system is designed to be expandable and flexible to adjust to any incident, up to, and including major disasters. This structure can grow by implementing various aspects of the incident command, command staff, and general staff to meet the evolving need of the incident. Figure 4 illustrates the basic ICS structure.

³¹² Thornburg, 10.

³¹³ Federal Emergency Management Agency, *National Incident Management System*, 24.

³¹⁴ Federal Emergency Management Agency, 24.

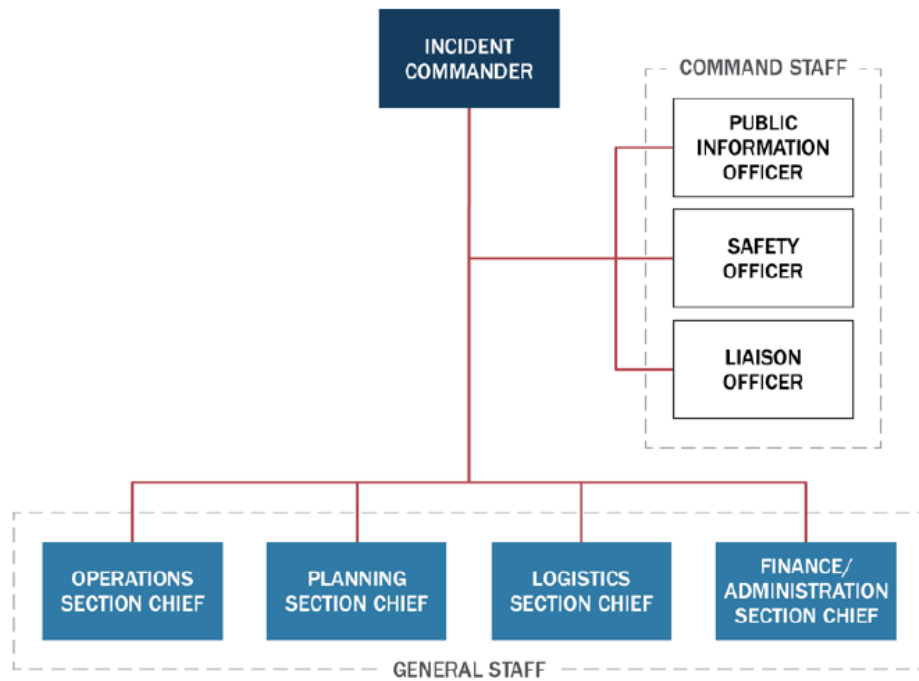


Figure 4. Standard ICS Structure.³¹⁵

D. HURRICANE KATRINA AND THE NATIONAL RESPONSE FRAMEWORK

NIMS and ICS got their first real test during Hurricane Katrina. However, the after action analysis of the federal government's response to Katrina highlighted management failures at all levels of government.³¹⁶ DHS, and in particular FEMA, was reported to be inflexible, slow to react to changing conditions, and lacked redundancy.³¹⁷ Furthermore, when traditional command and control channels were interrupted, individual components were not able to adapt and self-deploy.³¹⁸ It is important to note that a single component of DHS was exempt from criticism due to its forward leaning posture. The USCG did not

³¹⁵ Source: Federal Emergency Management Agency, 25.

³¹⁶ Townsend, *The Federal Response to Hurricane Katrina*.

³¹⁷ Townsend; Bonabeau and Stephenson, "Expecting the Unexpected," 1.

³¹⁸ Bonabeau and Stephenson, 1.

wait for authorization to begin SAR operations and according to the GAO, it was based on the Coast Guard's principles to "enable personnel to take responsibility and action."³¹⁹

In response to Katrina, the federal government passed the Post Katrina Emergency Management Reform Act and subsequent NRF. However, the NRF still promoted a structured ICS as the preferred model for disaster response, and subsequently codified the ICS into an emergency response culture.

The NRF defines the whole of community strategy and doctrine for building, sustaining, and delivering response core capabilities.³²⁰ According to the NRF:

Once an incident occurs, efforts focus on saving lives, protecting property and the environment, and preserving the social, economic, cultural, and political structure of the jurisdiction. Depending on the size, scope, and magnitude of an incident, local, state, tribal, territorial, and insular area governments, and, in some cases, the Federal Government, may be called to action.³²¹

E. VOLUNTEERS AND THE DISASTER RESPONSE SYSTEM

Despite the value that spontaneous volunteers bring to disaster response, government responders tend to view them as somewhat external to the disaster response system.³²² While professional responders and affiliated volunteers tend to be viewed as part of the disaster response system, volunteers not affiliated with official organizations tend to be viewed as illegitimate, ineffective, and a nuisance to be managed.³²³ This sentiment is more prevalent among law enforcement that tends to view spontaneous volunteer response as "a crowd control problem."³²⁴ Along this line of thinking, average

³¹⁹ Young, *Coast Guard*.

³²⁰ Federal Emergency Management Agency, *National Response Framework*, 3rd ed. (Washington, DC: Disaster Research Center, 2016), 1, https://www.ready.gov/sites/default/files/2019-06/national_response_framework.pdf.

³²¹ Federal Emergency Management Agency, 20.

³²² Whittaker, McLennan, and Handmer, "A Review of Informal Volunteerism in Emergencies and Disasters," 360; Helsloot and Ruitenberg, "Citizen Response to Disasters."

³²³ Whittaker, McLennan, and Handmer, 360.

³²⁴ Casper, "Organizational Leadership's Impact on Emergent Behavior," 14; Kartez and Kelley, "Research-Based Disaster Planning."

citizens can only gain legitimacy in the disaster response system by affiliating with a response organization prior to the disaster.

In an attempt to incorporate volunteers into formal command and control processes, the federal government created organizations, such as the Citizen Corps and developed Citizen Emergency Response Teams (CERTs).³²⁵ The Citizen Corps is the DHS's mechanism for citizens to volunteer; however, this volunteerism must be done through a sponsoring agency that defines the roles and responsibilities of the volunteers.³²⁶ However, the role and function of the Citizen Corps is "ambiguous and fragmented," and its training does not align with the professional emergency response disciplines, often causing questions about liability and capabilities during disasters.³²⁷ While these efforts do show that the disaster response system acknowledges the value that volunteers can provide, it remains focused on a formalized command and control system and expects volunteers to yield to ICS if they want to contribute to the response efforts.

F. "BREAKING THE ICS MOLD"

ICS was developed as a resource and task organization tool for managing wildfires, and in this context, is highly practical and very effective. Therefore, its adoption was implemented nationwide due to, "frustrations with incompatible systems across organizations."³²⁸ However, more recent disaster management research has begun to question the application of ICS across the broad spectrum of disasters. Researchers Kendra and Wachtendorf argue that:

The Incident Command System does not deliver a completely uniform compatible system in more decentralized, complex disasters ... because improvised and emergent activity can't be fully structured ahead of time. Instead, the Incident Command System works quite well in emergencies

³²⁵ Casper, 2.

³²⁶ Pamela Biladeau, "Strengthening and Expanding the Citizen Corps" (master's thesis, Naval Postgraduate School, 2006), <http://hdl.handle.net/10945/2856>.

³²⁷ Biladeau, 1–2.

³²⁸ Kendra and Wachtendorf, "'Cajun Navy' Rescuers in Hurricane Harvey Show Vital Role of Volunteer Boats."

where established responders are working with other established and expected responders.³²⁹

Kendra and Wachtendorf go on to note, “the incident command system is basically, a tool for agencies to manage themselves.”³³⁰

Furthermore, scholars Buck, Trainor, and Aguirre define the characteristics of an incident that is ideal for ICS as one that is small in nature, easily understood, resolved by established procedures, and lacks any emergent activity.³³¹ Responding to a disaster involves the whole of community and is different from an emergency, in which government responders can handle the incident themselves, and find ICS useful to manage their interactions with each other.³³² Disasters are complex and dynamic events and yet the disaster management system still chooses to respond to them using a rigid and inflexible command and control system.

³²⁹ Kendra and Wachtendorf.

³³⁰ Kendra and Wachtendorf.

³³¹ Kendra and Wachtendorf.

³³² Kendra and Wachtendorf.

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