

5-2016

# Improving Multijurisdictional Disaster Response Capabilities

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Professor Name [Last, First] *	Cuthbert, Randall		
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Running Head: IMPROVING MULTIJURISDICTIONAL DISASTER RESPONSE  
CAPABILITIES

IMPROVING MULTIJURISDICTIONAL DISASTER RESPONSE CAPABILITIES

A Master's Thesis  
Submitted to the Faculty  
of  
American Public University

by  
Dominica R. Ramirez

In Partial Fulfillment of the  
Requirements for the Degree  
of  
Master of Arts in Emergency and Disaster Management  
May 2016

American Public University  
Charles Town, WV

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Dedication

I would like to dedicate this paper to my parents who have always stood by me no matter what and to my husband who believed in me even when I could not believe in myself.

### Acknowledgment

I would like to express my deepest gratitude to Dr. Randall Cuthbert for the knowledge, encouragement, and dedication he so graciously shared in guiding me through the completion of my final master's requirement. Additionally, my completion of this project would not have been possible without the suggestions and motivation of my fellow classmates.

## ABSTRACT OF THE THESIS

## IMPROVING MULTIJURISDICTIONAL DISASTER RESPONSE CAPABILITIES

by

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American Public University System, January 17, 2016

Charles Town, West Virginia

Professor Randall Cuthbert, Thesis Professor

This research examines multijurisdictional response efforts for five different disasters that affected the state of Texas. A qualitative approach was used to identify common themes in these disaster responses where multijurisdictional training would have provided benefit. Examination of each response uncovered that despite the National Incident Management System, jurisdictions across Texas would benefit from a robust multijurisdictional training initiative to facilitate more effective response operations. Problems such as communication, command and control, mutual aid deficiencies, and self-deployments were apparent in almost every studied disaster. The areas for improvement identified in each disaster confirmed the hypothesis that mitigation of these response faults would best be served through multijurisdictional training efforts.

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## Introduction

Texas is the second largest state in the United States in regards to both area and population. The US Census Bureau estimates the population to be around 27 million people and continues to grow (United States Census Bureau, 2016). Despite the expansive land area, the population centers around four major metropolitan areas: Austin, Dallas-Fort Worth, Houston, and San Antonio. These key regions are closely integrated with their suburban counterparts and in some areas it is difficult to distinguish one city from the next.

Since 1953 there has been at least one major disaster declared every calendar year in the state of Texas. In 1993, Branch Davidian cult extremists instigated a 51 day standoff that left eighty people dead near the town of Waco, Texas. In 1997, an F5 tornado decimated the town of Jerrell, Texas leaving 27 dead. In 2000, an F3 tornado wiped out downtown Fort Worth causing millions of dollars in damages. In 2005, Hurricane Rita severely affected the Gulf Coast shortly after Hurricane Katrina catastrophe. In 2013, a fertilizer plant explosion devastated the city of West, Texas (FEMA, n.d.). Days after Christmas in 2015, destructive storms swept through North Texas killing eight and causing an estimated \$1.2 billion in damages (Osborne, 2015). These are just a handful of the types of disasters the state of Texas is affected by.

The close proximity of cities in major Texas metropolitan areas ensures that a catastrophic event in one city is certain to have far reaching impacts to the many other cities nearby. Emergency managers must be cognizant of the intricacies of response efforts when multiple jurisdictions are affected. If the different jurisdictions are not training together to prepare for emergency events, their response efforts will falter. Emergency managers need to work together to create joint training plans that allow all jurisdictions to practice for these emergency situations prior to their occurrence. The purpose of this research is to highlight the

need for joint training practices across Texas so that when the time comes, all first responders regardless of jurisdiction, know exactly what is expected of them.

The Federal Emergency Management Agency (FEMA) designed courseware for senior executives in the emergency management field to address multijurisdictional issues like command and control, communication, and allocation of resources. The program advertises that it “hones strategic leadership and critical thinking for senior executives involved with multi-jurisdictional, national, and international homeland security and emergency management policy development and decision making responsibilities” (FEMA, 2016). While this program is a great asset for senior leaders, a similar program is lacking for lower level management and first responders; those that would benefit the most from joint training ventures as they are the ones that put their lives on the line responding to incidents. This paper will seek to underline the need for multi-city, joint training throughout the major metropolitan areas in Texas. It is expected that first responders will benefit from joint training with improved productivity, performance, and morale thus improving response efforts.

This study will focus on major Texas disasters requiring joint responses. Texas emergency management personnel and first responder agencies are the main target for this research, but the concept of joint training is far reaching and much needed outside of the confines of the state of Texas. Therefore this training will also be applicable to other first responders and emergency managers interested in furthering the joint training ventures of their own regions. It is hopeful that this research will encourage senior leaders to authorize joint training ventures within their area of responsibility. Upper level management understanding the importance of joint training projects is essential for the movement to gain momentum. Initially, financial support will be necessary conduct these potentially lifesaving training workshops, but

without proper support from strategic leaders, any training endeavors are doomed to fail regardless of the finances. The information herein is also intended for emergency managers organizing or wishing to organize joint training activities. Finally, this research is for those police, fire, emergency medical, and nongovernmental organization managers who wish to increase their capabilities by providing a unified relief effort during disaster responses.

The study is designed to identify training deficiencies throughout the different jurisdictions as evidenced by their disjointed response efforts in hopes that from their mistakes, other emergency management organizations can glean information needed to ensure proper response efforts in the future for similar scenarios. Incomplete, improper, or the complete lack of training leaves these cities vulnerable to catastrophic mistakes, which in the field of emergency management can cost people their lives. Research furthering joint training efforts will not only enable better responses, but will also ease the burden of strategic policy makers as smoother response efforts will emerge with consistent, proper joint training.

The goal of this research is to identify joint training needs throughout the state of Texas. In fulfillment of this goal, the research aims to uncover where training deficiencies exist and what benefits joint training can provide to eliminate these deficiencies. In order to ensure we are able to integrate and utilize all assets the different towns have to offer, the various agencies and jurisdictions must learn effective means of working together, which begins with training together. Future joint training endeavors will allow municipalities to work seamlessly together to mitigate the effects of major disasters and bring about relief more swiftly. Eventually emergency managers will be able to expand joint training ideals beyond response efforts and proactively enact joint mitigation measures as well.

### Literature Review

Multijurisdictional responses are often required in large scale disasters. However, in smaller towns, something that would be considered a small disaster in larger cities could be enough to decimate the small town and overwhelm their minimal resources. Because of this, these smaller towns would also benefit from multiple jurisdiction involvement in response efforts, as their resources are not as abundant as that of larger regions. Literature on five different disasters in Texas, both large and smaller scale disasters, were investigated to identify if multiple jurisdiction disaster responses occurred and if so, how those multiple jurisdictions affected the response operations to see if joint training measures would have improved those responses. Each piece of disaster literature was then reviewed for successes and failures of the multijurisdictional response efforts and how those districts interacted to accomplish the mission. While each of these response operations were overall successful, the various pieces of literature identified areas that could be improved with proper multijurisdictional and organization planning and training prior to the next catastrophe to ensure future operational successes and smoother, more coordinated response efforts which could prove essential to saving lives.

#### **Fort Worth Tornado**

In Fort Worth Texas, on 28 March 2000, severe weather threatened the region. By early evening, cloud rotations were reported at one of the local airports. At a quarter past six in the evening, a funnel touched down in the small town of River Oaks, neighboring Fort Worth. The tornado then traveled approximately five miles in ten minutes with a 4-mile wide path destroying neighborhoods and leaving a trail of destruction through the middle of downtown Fort Worth. The tornado left five dead and many more wounded, some quite seriously. While moderate in size, the tornado was rated a modest F3 on the Fujita-Pearson scale, it created over \$450 million

in damages (McEntire, 2002). Due to the scope of the damage, federal disaster declarations were announced on April 7, 2000 authorizing federal aid in the wake of the disaster.

An article by D. McEntire on the response to the 28 March tornado spoke to the successes and challenges of multiple jurisdiction and organization coordination. While the tornado covered a relatively small area, it affected many different communities. Both the city and the county jointly handled initiating the Emergency Operations Center (EOC), then collaboratively decided to activate the tornado warning and siren systems before the tornado touched down which set the tone for a multijurisdictional response effort from the onset (McEntire, 2002). McEntire then breaks his article into sections covering different aspects of the response and successes and failures of each.

To better manage the disaster, the city of Fort Worth was divided into eight sectors for first responders' assignments. However, by the time the sectors were designated, most emergency responders were already task saturated. This led to firefighters being called in from off duty and assigned to strike teams with twelve hour shifts to facilitate all field response efforts. The search and rescue aspect of the response initially seemed daunting for the strike teams, so the city made the decision to call up the state controlled Texas Task Force Urban Search and Rescue team. However, due to the lengthy activation process, response activities were delayed and realizing the potential impact, the decision was made to utilize assistance from all over the Dallas-Fort Worth (DFW) Metroplex. Soon offers of aid from other fire departments were pouring in from places as far away as Oklahoma, Miami, Phoenix, and Memphis. Previous mutual aid agreements were also enacted to ensure all response stations were properly staffed (McEntire, 2002).

Once initial emergency calls were under control, the next step was damage assessment. The day following the tornado, the Red Cross and the city Development Department and Risk Assessment partnered with the Texas Division of Emergency Management to conduct damage assessments alongside FEMA. The Red Cross handled all residential areas while the city Development and Risk Management group covered affected commercial areas. The success of the damage assessments were attributed to recent EOC exercises on assessments, which distributed the workload among the city, state, and local officials for residential and commercial evaluations (McEntire, 2002).

Public safety and perimeter control quickly became an issue during response efforts. Dangerous conditions halted nonessential operations as police set up a perimeter to control traffic flow into and out of the damaged areas. City police and county sheriffs were called into monitor controlled area access, however none were on the same page as far as who was allowed to enter. In some instances, all city workers were allowed in, in others no one was allowed into the damaged areas. This prompted police officers to quickly work together to create a permit system to identify necessary personnel who would be allowed access to the restricted areas. A credentialing office was set up in the EOC to assist with mitigating self deployers. While the police department, under the guidance of the fire department, took charge of this task initially, eventually different businesses Directors of Security were trained and allowed to issue permits as well. With the permit system in place, police were able to partner with other organizations, like the public library, utility companies, and others, to facilitate debris removal and other high interest tasks (T. Hatch, personal communication, Mar 21, 2016).

Sheltering those affected was another topic requiring multiple organizations' coordination. Community churches and the Red Cross were able to assist those neighborhoods

that were majorly affected by the tornado and shelters were mostly designed to house all of the Search and Rescue operators deployed to help in the disaster response. The Dallas Salvation Army provided beds and the Red Cross and other volunteers provided an abundance of food. The police and fire training centers were able to house most of the rescue workers and serve as a base for operations. Other donations and disaster assistance was handled through the Fort Worth Water Department which fielded all donation calls. Recent Red Cross training was accomplished that taught employees of the water department about donations management which facilitated smoother operations and maximized the utilization of resources (McEntire, 2002).

Recovery efforts for the tornado were overall successful, but naturally some problems were still encountered in joint response. There was a lack of coordinated response between the field and the EOC as effective communications were never established. Southwestern Bell attempted to mitigate these issues by donating cell phones for emergency responders, but there was still a limited flow of information as cell networks were quickly overwhelmed. Other communication issues arose with equipment. At one point, the police radio channels lost all connectivity and therefore the ability to communicate with one another. Communication between the different organizations was also stunted due to unfamiliarity as well as equipment issues. Communication also faltered between city officials and business leaders as to when they would be allowed to enter the damaged facilities and when they could resume business operations (Cramer, 2003). Then there were problems communicating with the public as language barriers in some neighborhoods prevented the residents from receiving necessary information. Finally, McEntire noted some of the discussed command and control issues that were problematic in response operations when multiple responding agencies were unclear as to

whose direction they should follow, the incident commander or their own leadership (McEntire, 2002).

### **Hurricane Rita**

As Hurricane Rita came right on the heels of Hurricane Katrina, a mere four weeks later, tensions and emotions were high as emergency response officials scrambled to ameliorate the mistakes of the not so distant past. Many Hurricane Katrina victims had very recently relocated to Texas in precisely the areas Hurricane Rita was expected to hit. Because of this, Hurricane Rita spurred the largest single emergency movement in American population history and much of the literature present on Hurricane Rita covers that evacuation (Carpender, Campbell, Quiram, Frances and Artzberger, 2006).

Authors Miller and Douglas published an article on the 2009 American Psychological Association Annual Conference Proceedings that identified lessons learned from Hurricane Rita, Katrina, and Ike. Their article detailed the need to think collectively when planning for disasters instead of the individualistic approach of merely planning within your local community. One segment of the article specifically addressed this need in response to the actions taken by emergency response personnel leading up to and following Hurricane Rita. It was noted that evacuation orders were issued independently, without the various counties communicating with one another to ensure a smooth evacuation process. Prior to the completion of coastal evacuations, the Houston Mayor stressed the importance of city residents swift evacuation stating that “Now is not a time for warnings; it is a time for evacuation” (as cited in Harden and Moreno, 2005). This only contributed to the already gridlocked highways as people scrambled to leave the potentially hurricane stricken areas. Evacuees spent hours on the road, often traveling only a few miles. Trips that normally take three or four hours were taking up to twenty four hours to make. Many people soon ran out of gas in the gridlock and were underprepared

with no food or water in the sweltering heat of the Texas summer. The Texas National Guard was tasked to assist stranded motorists, but it was quickly discovered that they lacked the proper tools to do so (Miller and Douglas, 2009).

Texas evacuation plans failed to account for the large number of evacuees. Due to the prediction of the storm's path, many more people than were necessary initially evacuated. Additionally, with many evacuees from Hurricane Katrina now residing in the area, the "Katrina effect" had emotions high and many residents were wary to take a chance of sheltering in place again (Berger, 2006). This led to record numbers of evacuees and instead of the anticipated 1.2 million evacuees, that number swelled to 2.5 million people fleeing eight different counties. Even without the additional evacuees, there was still a lack of adequate traffic control mechanisms in place for the rural routes which led to massive traffic control problems (Carpender, et. al, 2006). In some areas, the highway was reduced to one lane, with no discernable reasons why, despite the ongoing evacuation. Critics of the Hurricane Rita evacuation plan often stated that plans for contraflow lanes should have been developed sooner (Berger 2006). Contraflow lanes allow evacuating traffic to travel on the inbound lanes and while they were eventually opened, it was much too late to be of any real aid in mitigating the evacuation congestion.

During the evacuation process, Miller and Douglas cited that there were upwards of 130 mostly preventable deaths during the various ordered evacuations (2010). However, emergency rooms and hospitals along the route were unprepared for the surge of patients and quickly became overwhelmed. Furthermore, it was found that minimally prepared evacuation efforts failed to account for the special needs population and their necessary medical equipment which lead to severe injury, illness, and sometimes death. Most notably, a bus carrying nursing home

residents evacuating from Houston to Dallas caught fire and then exploded when oxygen tanks on board quickly ignited and intensified the fire. 23 elderly victims lost their lives (NTSB, 2007).

Resource issues also emerged in the response to Hurricane Rita. Federal aid was available, but the process of receiving that aid was ensnarled in paperwork. This left many resources, which could have been of profound benefit, unused. Jefferson County placed numerous requests for federal support to airlift 1,300 special needs residents from their respective hospitals and nursing homes but was repeatedly turned down. Generators that could have aided disaster stricken communities instead sat unused on trailers waiting for approval to be used (Strick and Milbank, 2005). Furthermore, the evacuation highlighted that many nursing homes failed to have evacuation plans despite state requirements. Nursing homes that had evacuation plans in place often used the same bus company which left a shortage of buses when all were required to evacuate at the same time (Miller and Douglas, 2009).

Professor Maddox of Baylor University penned an article suggesting that the issues with emergency response to Hurricane Rita stem from the top down management approach to policies (2005). Had municipalities worked with local responders to build a plan from those in the field, the evacuation and response efforts had the potential to flow much more smoothly. Maddox suggests “the ability to mobilize resources depends on a pre-existing local collaborative network[s]” and that “the local response to any disaster is more a function of management of people, ideas, supplies and strategies, and less a matter of practiced drills” (2005). Therefore strengthening those local collaborative networks will ultimately lead to better response efforts.

### **Bastrop County Wildfires**

In September 2011, severe draught created optimal conditions for Texas wildfires. Strong winds attributed to Tropical Storm Lee merged several smaller fires in Bastrop County into a giant blaze that eventually killed two people, destroyed over 1,600 homes, and burned over 32,000 acres in the most destructive forest fire in Texas history (McDonald, 2012). Much of the literature dedicated to this incident speaks to the effectiveness of the joint response effort between various fire departments.

When the severity of the fires was first realized, emergency response was initiated from Bastrop, Round Rock, and Austin with municipalities like Travis, Westlake, Pedernales, Spicewood, and various other communities quickly following suit to aid in the disaster stricken areas. Throughout Texas, smaller communities rely on volunteer firefighters and Texas Forest Service representatives stressed the importance of inter and intra state professional aid to ensure the safety of all responders (CBS News, 2011). In 2007, the Texas legislature created a statewide mutual aid system, the Texas Intrastate Fire Mutual Aid System, which allowed other jurisdictions to offer equipment and firefighters to the local affected governments without expressly written mutual aid agreements. During the Bastrop fire emergencies, this agreement allowed fire fighters from as far away as North Texas to provide aid to Bastrop and the other affected counties (Victoria Advocate, 2011).

Of particular importance to this research, the Travis County After Action Report (AAR) was examined to see what insights field responders garnered regarding these Texas wildfires. Overall, responders commented on the successes of the response efforts in the face of such a large scale disaster. The criticality and benefits of Travis and Austin counties collocated Emergency Operations Center (EOC) was noted. From this location, emergency vehicles and

mobile command posts were dispatched and up-to-date information was posted to let all fire affected evacuees know the current status of their homes. Responders working in the EOC posted a list of addresses with corresponding maps to the front of the mobile EOC to let residents know whether their homes survived or succumbed to the fires (Upbring, 2011). This allowed residents to obtain peace of mind, or begin alternate preparations, while keeping out of the danger areas thus easing a burden off emergency responders and keeping out of their way.

The AAR then discussed areas the responders thought could use improvement. Overall, responders noted the need for better communication all around. It was hugely problematic that there was no communication prior to the establishment of the EOC. Luckily, the EOC was established fairly early in the disaster, but this established an environment of reactivity versus proactivity. Once the EOC was established, protocols on how to communicate with the EOC were lacking. This was apparent to those working in areas such as the Incident Command Posts (ICP) and satellite EOCs where they were all operating on different software that did not integrate with one another. Because of the limits of the EOCs' and ICPs' information systems, various bits of information flowed from multiple directions. Compounding these communication issues were the multiple phone problems with no radio backups in place. The communication problems were apparent in failed attempts to secure resources due to logistics (Travis County Office of Emergency Management, 2011).

Communication was also an issue between the Public Health and Health and Human Services Departments; which were important in providing air quality reports and facilitating information for affected residents. However, they were often left out of the chain of communication with the EOCs and information between the two health departments was also minimal (Travis County Office of Emergency Management, 2011). This lead to misinformation

and confusion for the residents about evacuation, what those residents should be doing, and when they should do it. Many noted that successful integration of social media could have alleviated some of the communication issues with the public, but that failed to occur in this disaster.

In addition to communication problems, there were also substantial issues in disaster planning and resources. The failure of advanced planning left many available resources unused. Nearby Blanco and Burnett Counties had a multitude of available supplies, but no plan on how to how to integrate them. Many resources sat in staging areas, unassigned while needed in the field because they were not properly checked into the list of available resources. Due to the communication problems, well intentioned first responders self-deployed, further complicating the allocation of resources and making it impossible to track these personnel and their vehicles. As a result, situational awareness suffered or became nonexistent (Travis County Office of Emergency Management, 2011).

### **West Fertilizer Company Explosion**

Literature surrounding the West fertilizer explosion had one common theme: poor planning which led to the unnecessary death of fifteen firefighters; becoming one of the largest loss of firefighters' lives since 9/11. On April 13, 2013 a major fertilizer plant in West, Texas caught fire. Less than twenty minutes after the initial fire was reported, an explosion that registered 2.1 on the Richter scale occurred at the fertilizer plant as the tons of stockpiled ammonium nitrate and ammonia supplies reacted to the building fire. The explosion caused a crater ten feet deep and 93 feet across at the site of the impact. The initial damage assessment estimated over \$100 million in damages. Over 500 structures in a thirty seven block radius were damaged by the explosion, including 193 of the town's reported 700 homes (State Fire Marshal's Office, 2013).

The State Fire Marshal's investigation into the incident led to a number of significant findings. First, there was no standard operating procedure for emergency events, especially one this large scale. On top of that, neither the fire department nor the fertilizer company had any incident response plans for the facility. Next, command and control was never established because an incident management system was not put into place (State Fire Marshal's Office, 2013). In this rural community, the firefighters were all volunteers; therefore they treated this plant fire like they would a typical residential fire, failing to take into account the hazardous materials housed throughout the plant. The state of Texas had not adopted any standardized training for volunteer fire departments which ultimately put the West volunteer fire fighters at a disadvantage. Furthermore, lack of an incident safety officer and no accountability plan left firefighters' well-being vulnerable to the catastrophe erupting around them. Previous to this event, the fire department had no governing authority over the plant which led to a lack of fire prevention codes or hazardous duty programs at the plant or plans within the fire department (State Marshal's Office, 2013).

In large part, the deaths of the firefighters, all from three different jurisdictions, were contributed to a failure by all parties to adhere to nationally recognized safety practices. The lack of an Incident Command System permitted senior officials stand by without taking charge, ultimately leading to an uncoordinated response with no overall direction or supervision. Furthermore, it was found that the West Volunteer Fire Department had never trained for an operation of this magnitude; made apparent as one responding firefighter attempted to search for appropriate responses for hazardous materials' fire emergencies on his cell phone as he rushed to perform response operations. These training deficiencies, combined with a lack of resources,

ultimately lead to the loss of numerous lives and millions of dollars of destruction (State Marshal's Office, 2013).

FEMA also conducted a lessons learned review following the fertilizer plant explosion. One of the greatest lessons was the need to control well-intentioned, self-dispatching response agencies. For the West disaster, over 120 different agencies showed up to provide aid in response operations. Problems occurred when these agencies attempted to take control without a firm grasp of big picture goals of the response actions. It was difficult to establish order when multiple jurisdictions responded with multiple leaders attempting to give orders. Many times, these orders conflicted leaving the responding individuals confused as to their next steps in the response efforts and who exactly they should be taking orders from. Eventually, emergency managers called in state troopers to establish security and stability so that proper orders could be dispensed (FEMA, 2015).

The final piece of literature examined was the U.S. Chemical Safety and Hazard Investigation Board's report findings. This report extensively detailed the damages resulting from the fire and subsequent explosion, but the lessons learned were in line with all previous reports. Loss of life and damage was attributed to not having an Incident Command System and Incident Management System in place, the Volunteer Fire Department's lack of knowledge on the hazards surrounding the fertilizer plant, the lack of situational awareness and risk assessment, the lack of pre-incident planning, and the limited and conflicting guidance on how to respond to the disaster. The report also discussed in detail other Fertilizer Grade Ammonium Nitrate (FGAN) incidents and how the city of the West and McLennan County failed to research and learn from those incidents despite having a similar facility in their town.

### **Dallas Superstorm 2015**

The day after Christmas of 2015, a deadly storm pattern emerged over North Texas. The storm produced an EF4 tornado that devastated the small towns of Garland and Rowlett, Texas and killed nine people. Literature regarding the Garland response efforts identified sixty firefighters who deployed for the initial response efforts under the direction of two fire chiefs. The firefighters were divided into North and South teams, in accordance with previous plans to tackle flooding issues, which had worked effectively for the town. Team 1 fielded all emergency calls, while team 2 remained in the field to begin response operations. Once the initial danger from the tornado passed and the damage was assessed, team 1 divided the city into five operational commands to organize response efforts in the most damaged areas. As the magnitude of the disaster quickly overwhelmed the small town's resources, mutual aid was requested. However, the proximity of the two towns affected by the tornado meant many of the mutual aid partners were already in route to help nearby Rowlett respond to their emergency calls. Dallas Police Department and Arlington Fire Department personnel aided by offering personnel and heavy equipment for the response operations. Very quickly, communications were overwhelmed as emergency calls were collected on ten different operational channels. The numerous first responders in the field from multiple response agencies made it difficult for the command staff to properly control and allocate the resources. Eventually, Garland assigned some of its firefighters to ride with their mutual aid partners for communication purposes (Matthews, 2016).

Rowlett, Texas is an even smaller town than Garland. In each of the four fire stations, there is only one engine and one ambulance. The tornado damaged 30 businesses, 1,100 homes, and injured over 20 people so the magnitude of this tornado immediately overwhelmed the city.

In the weeks prior to the tornado, Rowlett had conducted table top exercises simulating a disaster much like this one and walked through the actions they would take which proved useful in their response to the aftermath of the tornado. Prior practice, even just a simple table top exercise, enabled Rowlett's emergency response personnel to have general ideas on what to do in this strikingly similar disaster and gave them the opportunity to put into action the very things they had trained for. One of the biggest issues was requesting mutual aid to supplement the smaller fire department. Mutual aid was dispatched from over twenty-five different fire departments throughout the Metroplex highlighting the need for a staging area to ensure all assets were deployed appropriately. These relationships were the basis of response efforts to the tornado. Rowlett requested the assistance of Texas Task Force 1 and 2 Urban Search and Rescue teams who were able to make it to the town in a relatively short amount of time since Arlington's search and rescue operations had already committed to assist Garland, Texas (Matthews, 2016).

The city of Rockwall, Rowlett's neighbor, was one of the many cities to provide mutual aid. Rockwall prepared an after action report which was then studied to see how these multiple jurisdictions interacted to respond to the tornado. Rockwall responded with necessary equipment and personnel to aid Rowlett's firefighters in responding to emergency calls. Problems arose with communication when cell phones were unable to connect following the storm. Attempts at communication between the cities was further complicated when calls to the 8TAC talk groups went unanswered (Rockwall City Council, 2016). Rockwall's Fire Chief's inability to locate and communicate with Rowlett's emergency response leaders caused him to make executive decisions on road closures and setting up his own command section to facilitate communications and operations with responders from Rockwall under his span of control. As a result, other fire departments providing aid contacted Rockwall's chief for dispatch and reporting instructions.

The two responding Rockwall fire chiefs communicated by cell phone intermittently as some cell towers were damaged and the remaining were overloaded with calls. Another neighboring community, Wylie, Texas, was in communication with Rowlett so it was therefore requested they join with Rockwall's fire chief so the three could work in concert. It was then decided Rockwall, Royse City, and Fate would work through Wylie for better communication on what needed to be accomplished. The Rockwall chief took it upon himself to drive around to find the Rowlett staging area. Upon finding it, they were advised to move the four responding fire department representatives to Rowlett's staging area in an attempt to condense staging areas and eliminate any more confusion in an already chaotic situation (Rockwall City Council, 2016).

Along with Rockwall firefighters, emergency personnel from other disciplines were also requested to aid in the tornado response. Rockwall police, public works, and emergency managers all deployed to provide aid, remove debris, and work in the EOCs. The Rockwall Community Emergency Response Team (CERT) also deployed to assist the Rowlett CERT upon request. The CERT groups worked together to search for trapped persons, provide emergency medical care, and clear debris among other tasks. Recognizing the need to organize the outpouring of volunteers, the Rockwall CERT also set up a temporary Volunteer Reception Center to manage and assign the volunteers (Rockwall City Council, 2016).

### **Summary of Findings**

In each of these disasters, outside aid was always offered and available. In many cases, the outpouring of support was almost overwhelming. However, despite having mutual aid agreements, often times that outside aid was poorly managed and underutilized. While none of the disaster responses should be considered failures, there were definite areas where improved coordination would have vastly improved the response efforts. As with most disaster situations,

communication issues were a central problem in response operations. Command and control issues also affected many of the five studied disasters. Finally, self deployers proved to be a hurdle in each disaster situation, but one that could be harnessed for the greater good if proper training and protocols were in place. These issues in multijurisdictional response operations all underscore the need for a training program to not only mitigate the problem areas, but also foster relationships among responders.

Critics argue that increasing multijurisdictional coordination would deplete some of the power at local levels in managing their disasters (Miller and Douglas, 2009). Asking for other jurisdictions to provide aid, especially ones larger than the requesting agency, often means giving up control of your operation. However, during a disaster, borders are invisible as the ultimate goal becomes to mitigate the loss of life and sustained damages.

### **Shortfalls in Literature**

One of the major literature shortfalls is the lack of research in multijurisdictional interactions and response capabilities. When multiple jurisdictions were tasked to respond together, the coordinating literature focused mainly on the outcome of those response efforts rather than on how those responses were carried out. Many pieces of literature would discuss problems like communication, command and control, and incident management, or lack thereof, but failed to address the specifics which caused the problems. This left many questions, specifically why these areas consistently proved problematic and how exactly those problems occurred. Were they a result of poor planning, improper training, working with unfamiliar organizations in unfamiliar times, or a combination of each? With more data, these many of these questions could have been answered satisfactorily.

Despite the fact that many of these disasters made national headlines, few academic articles can be found analyzing the disaster responses. This left much of the data gathering to news, magazine, and online articles. Because there were not many academic sources, numerous articles were necessary only to collect small amounts of data of useable data. After action reports were very hard to obtain. Many cities were reluctant to release their information. Requests for copies or excerpts were either ignored or denied. Some incidents also occurred too recently, so the after action reports were not yet completed. Notes regarding the response efforts were also unavailable.

### Methodology

Educational psychologist John Creswell identified three major types of research design in his 2009 research design book: quantitative, qualitative, and mixed methods research. He defines quantitative research as “a means for testing objective theories by examining the relationship among variables” (Creswell, 2009, p. 4). Instruments of collecting data are typically numerically based and can be appropriately measured resulting in statistical data findings. Quantitative research is characteristically associated with scientific based research projects. Qualitative research, on the other hand, is more often associated with social issues. Data collection involves such methods as observations, interviews, case studies, and focus groups with non-statistical analyses. Finally, mixed methods research is a combination of both quantitative and qualitative research methods (Creswell, 2009).

This project will be best accomplished using qualitative research for its exploratory nature and unlimited finding options. Reviewing the past disaster events that have affected Texas residents and how effective those responses were, will provide the basis for this project. Understanding how the different municipalities have come together during previous disaster

events and the difficulties they encountered will be instrumental in identifying joint training needs. Detecting those issues faced in previous joint responses will be the priority during literature reviews. The qualitative research approach will provide the foundation for discovering what changes are required, and training necessary, to properly integrate multiple Texas jurisdictions in disaster response efforts. It is anticipated that responses requiring multiple jurisdictions to jointly respond will present trending issues in unified response, communication, and point to a lack of pre-incident joint training. Previous studies have indicated that despite repeated lessons, unified responses nationwide are still faltering. In a 2006 study of previous disasters, Hurricane Andrew, the Oklahoma City Bombing, the September 11 attack, and Hurricane Katrina were all analyzed. Repeatedly, it was noted that these disasters lacked unified command which in turn impeded highly effective joint response efforts (Donahue and Tuohy, 2006).

It is important in qualitative research that studies are conducted in the natural settings, therefore major disasters in Texas since the early 2000s will be examined (Creswell, 2009). Initially, the effectiveness of response efforts will be examined and then those response efforts will be scrutinized to establish what role different jurisdictions played in those efforts. Finally, communication systems will be scrutinized to see how successful they were at both communicating and accomplishing the mission. The first incident to be examined will be tornado of 2000 that wrecked downtown Fort Worth and the surrounding area. While the tornado was relatively small, it still affected many communities. The second incident to be examined will be Hurricane Rita. While the hurricane mostly impacted the Gulf Coast, response efforts canvassed the state providing a critical research perspective. The 2011 Bastrop County wildfires, which burned for over a month and became the most destructive wildfires in Texas

History, will then be examined (Peckham, 2011). Next, the 2013 fertilizer plant explosion will be examined because it covered a small area, but their lack of resources necessitated a joint response. Finally, the most recent tornado and severe storms that swept the Dallas area after Christmas of 2015 will be examined.

Each event will be analyzed for successes and failures in joint responses to see if joint training would provide benefit for future disaster events by improving the quality of response efforts. Previous research, case studies, after action reports, lessons learned, and other relevant documents will be explored and utilized throughout this research. Training plans and exercises will be evaluated to see what lessons can be garnered from each and how to improve future response capabilities based on these lessons learned. Agencies like FEMA and the Red Cross will also be researched for information on joint agency and multijurisdictional training currently active in Texas or applicable to the state. Official reports, journal and newspaper articles will be the primary research focus, but insightful private documents may also be used. Audio and visual materials from reputable sources will also be reviewed for usefulness. These data collection methods are most appropriate to study multiple jurisdiction training needs as they will provide common themes across a broad spectrum of incidents.

Once the data is collected, it will then be organized and analyzed. Trends and patterns will be identified to discover what training has previously occurred and what type of training needs to occur to facilitate better response capabilities in joint environments. Data will also be analyzed for trends in training lapses. Areas for improvement will then be identified to see if joint training involving multiple agencies and jurisdictions would benefit the Texas emergency management community.

In any type of research, the potential for bias is present. For research to be successful, it is important to identify the bias elements the research is subject to. The first instance of bias to potentially exist in this research is the cities researched. Due to the vast amounts of information present, every major incident in Texas could not be examined. Therefore, only the larger incidents were examined which limits the cities' trainings and responses examined. Neglecting to include a wider variety of incidents in the research may lead to overlooking information that could improve the effectiveness of joint training programs. Researcher's own experience with disaster event responses and trainings as well as personal connections to some disaster sites may also create an incident of bias (Creswell, 2009). Remaining conscious of the potential for bias due to personal connections is the best way to mitigate that bias. Despite concentrated efforts, the potential for bias in the research still exists, but the ability to identify and admit to that bias should mitigate the intensity of its effects.

It is not anticipated that any ethical issues will arise from this research. Confidentiality should not be an issue as only organizations will be examined and no personal data will be utilized. It will be important to highlight how the response efforts affected communities, but it is unnecessary to collect individual information and any personal identifiable information will be stripped for the purposes of this research. It should also be noted that individually identifiable information of the first responders is also unnecessary and will be removed so that this research strictly deals with organizations and their response efforts as a whole.

### Discussion

After reviewing numerous references for each of the five major disasters presented, it is clear that multijurisdictional response efforts are on a rising trend. For the past several years, governments have emphasized the need for fiscal responsibility and shared resources are an

effective way to continue to meet needs while saving money. In a sprawling state like Texas, small towns are quickly overwhelmed when disasters strike and multijurisdictional response efforts ensure adequate resources and expertise are applied to mitigate further destruction in an already catastrophic situation. Literature confirms that while these combined response efforts can overall be considered successful, there should be improvements made for the future to facilitate timelier, more coordinated, and more effective disaster aid in multijurisdictional response efforts through extensive multijurisdictional training ventures.

### **Lessons from the Fort Worth Tornado of 2011**

Fort Worth is the fifth largest city in Texas, covering nearly 350 square miles in over four counties (McCann, 2008). Because of its size, Fort Worth has multiple resources available that many other smaller cities would not have. However, this also means that it has a much larger population of people affected when disaster strikes. In the case of the March 28, 2000 tornado that struck Fort Worth, very few other jurisdictions responded to assist following the destruction not only because of the city's self-sufficiency, but also because the large scale tornado crossed jurisdictional boundaries and impacted many of the cities around Fort Worth.

Even when additional aid was requested from the state, the city could not wait for the assets to arrive and therefore began conducting their own operations, like search and rescue, rather immediately following the tornado. However, the city did call upon some of their mutual aid agreements to provide personnel to run some of the search and rescue stations while Fort Worth firefighters were conducting twenty four hour operations in two twelve hour shifts, responding to the various emergency calls in the affected areas (McEntire, 2002).

Despite the areas of improvement following the Fort Worth tornado, the response was an overall, well-coordinated success. Luckily, the city had already adopted an agreeable stance on

the necessity of the emergency management field, despite this being a relatively new discipline. Emergency preparedness meetings that occurred prior to the tornado facilitated a more coordinated response to this tornadic event. The previous distribution of damage assessment responsibilities meant that the task could occur quickly and unimpeded. State, local, and private organizations worked together instead of scrambling to decide what to do in the immediacy of the tornado. While in the same jurisdiction, city officials also made sure to include public works in their planning, which had not previously occurred. This meant the Water Department was trained to be a vital part of response operations following the tornado which in turn facilitated much needed donations management actions for the city allowing emergency management personnel to focus on distribution and coordination of those resources (McEntire, 2002). The Fort Worth Fire Department and Police Department also had a closely developed relationship which facilitated smoother response efforts in the aftermath of the tornado. Both of the academies and training centers are collocated and the departments train together throughout the responders' careers. Still, this tornado response highlighted the need for city police officers to know and understand the Incident Command System, and following the tornado classes were initiated to train the Fort Worth police officers (T. Hatch, personal communication, Mar 21, 2016).

While the city of Fort Worth was very self-sufficient, their previously established mutual aid agreements listed resources available to them if necessary. Fort Worth had established twenty seven mutual aid contracts prior to this tornado, many of which they invited to joint training opportunities prior to the disaster (T. Hatch, personal communication, Mar 21, 2016). Furthermore, creating these mutual aid agreements provided grounds for establishing a relationship with the different jurisdictions surrounding the city of Fort Worth, facilitating

networking and cooperation among the various entities. This meant key players were already familiar with one another and more aware of the different resources and abilities available. Vital personnel noted that familiarity with one another eliminated the display of egos which facilitated smoother response operations as competition was replaced by a shared common goal (Cramer, 2003).

Technology was also key to disaster response in Fort Worth following the tornado. A Disaster Services Human Resources computer program mobilized volunteers from as far away as Georgia and South Carolina with specific abilities to aid in the response operations. Communication was encouraged throughout the different sectors of operations so that all responders could get a big picture idea of what was happening in the city collectively. Cell phones and radios were used to their fullest capacity despite some of the service problems.

The smooth operating EOC was also vital to the success of the response. First, the EOC was used to operating jointly with both city and county officials. It was therefore large enough to accommodate all involved in the response efforts space wise and had the necessary communications resources available for all who required it. The EOC also halted operations every two hours so that each entity involved in the response knew what was happening in each division, who needed what resources, and where more assistance was needed. Planning meetings were also held each afternoon to review the reports for the day, assess any unmet needs, and assign new tasks to meet those needs. This allowed everyone involved to obtain the necessary bigger picture perspective for a well-equipped, well managed response.

### **Lessons from Hurricane Rita**

Much like Fort Worth, the Gulf Coast region has a plethora of resources available to access in the wake of disasters. With Houston holding the record as the most populous city in

the state of Texas, emergency managers have a larger budget with which to protect their people and to gather resources. The smaller cities in the vicinity of Houston often look to their sister city for guidance and resource sharing. However, during Hurricane Rita preparations, these relationships failed to operate successfully, specifically when it came time to call for evacuations.

The 2005 hurricane season was a season of record. When Hurricane Rita threatened to hit the Gulf Coast, it was the fifth major hurricane of the season with wind speeds measuring up to 120 miles per hour. Not even a month before Hurricane Rita made land fall, Hurricane Katrina hit the coast of Louisiana leaving thousands dead when they failed to evacuate. This further complicated Hurricane Rita plans and preparations because many Hurricane Katrina victims had just recently relocated to the Texas Gulf Coast and tensions were high as another high powered storm threatened their livelihoods yet again. Keeping in mind the extra populace and heightened fears, regional emergency planners should have taken caution to create robust evacuation and shelter plans.

In the wake of Hurricane Rita, potentially affected cities like Houston, Galveston, Beaumont, Port Arthur, Orange, and other cities, independently decided to encourage the large scale evacuations without prior coordination with one another on how exactly that evacuation would occur. Despite the idea that different regions would be cleared to evacuate at certain times, little police presence meant that any one area was free to leave as they saw fit. The extreme traffic problems that emerged due to the lack of coordination with all cities and jurisdictions led to frustrations by evacuees and created more dangerous situations for emergency managers and first responders to attend to, with no plans in place as to how to alleviate the traffic backlog. Following the hurricane, both critics of these extreme traffic conditions and emergency

managers alike noted that evacuation planning should involve all major affected territories to assure the effectiveness of the evacuation. Furthermore, they noted that this planning should be followed by training and exercises more maximum efficiency (Carpender, et. al, 2006). These trainings and exercises should also involve all jurisdictions but feasibility is often an issue for both funding and availability of the various jurisdictions. In order to encourage maximum participation, alternatives to traditional exercises must be presented, like table top drills or video teleconferencing. These trainings should also be sure to involve not only emergency managers, but first responders at all levels as well. Strategic plans are important, but tactical level insight is also essential to effective operations. Furthermore, involving all entities provides a higher level of connectivity and buy in enables operations to run more smoothly.

With the traffic issues, came issues with personnel stranded on the highway. Hours of waiting in standstill traffic caused many unprepared evacuees to run out of gas, food, water, and other essentials. The National Guard was called in to aid stranded motorists, with one of their largest tasks to resolve the fuel issues. The Guard deployed with fuel tanks full of fuel, however, because there was no prior coordination, no one thought about how those cars needing gas would be fueled. The National Guard fuel tanks were designed to fuel jets, not cars, so the attachment to actually fill the depleted gas tanks of stranded motorists was ineffective (Miller and Douglas, 2009). Lessons learned stated that in the future, it would be more beneficial to partner with private fuel companies and state troopers to facilitate the fuel needs for stranded motorists (Berger, 2006).

Evacuees also criticized the governments' failure to utilize all lanes of traffic for outbound travelers. One citizen noted that high occupancy lanes went unused, by evacuees or emergency personnel, and in their hours of driving it was rare to see any police officers assisting

in controlling traffic flow (Litman, 2006). While contraflow lanes were suggested to combat the extreme traffic, the lack of prior planning as to how those lanes could be enacted and would operate created a ‘too little, too late’ situation that did nothing to alleviate the traffic congestion affecting thousands. Had the numerous emergency managers and responders met, discussed, or trained on how to create effective contraflow plans prior to an event like Hurricane Rita, a smoother evacuation could have presented. However, officials in the state of Florida, which has some of the most efficient evacuation measures, argue against the use of contraflow lanes for outbound traffic. Instead, they use those lanes as emergency operations outposts. They stage necessary materials such as ice, food, water, and emergency supplies to assist the passing motorists. They also use these lanes to transport post-storm recovery and repair materials necessary in the aftermath of disaster, like generators, debris removal trucks, and repair tools (Carey, 2005).

Resource issues were another hot spot in the Hurricane Rita response. The over obligation of limited resources hindered evacuation and response efforts. The example of nursing homes using the same bus company for evacuations proved what little interagency and multijurisdictional coordination existed. Prior exercises or run downs of emergency plans would have identified the multiple jurisdictions with the same response plans and alerted officials to this crucial misstep in care for elderly residents. However, since there was no prior coordination, last minute scrambling to secure transportation left many residents at risk.

Due to the issues the Houston area experienced in preparing for and responding to Hurricane Rita, regional councils were created to coordinate things like transportation, resources, and emergency decisions affecting multiple areas. This allowed for needs to be met with more immediacy and facilitated interagency coordination. These councils also alleviated the strong

need to rely solely on state resources, which could take days to arrive, and created a more succinct path to regional resources (Miller and Douglas, 2009). The difference between these councils and a typical mutual aid agreement is the actual planning that takes place prior to emergencies to facilitate better response actions. The Houston area not only took note of the flaws surrounding the failed Rita evacuation, they took action. These councils have Board of Director meetings monthly to discuss and create robust emergency management programs for the region.

Multiple jurisdiction planning prior to an evacuation would also have been useful from a public health perspective. Despite the fact that Hurricane Rita was not as deadly a storm as predicted, there were still many unnecessary casualties. The surge of traffic that left emergency rooms and hospitals overwhelmed and underprepared, while maybe not preventable, could have been better managed. Public health officials in conjunction with emergency managers could have noted traffic considerations and increased their staff as well as their supplies in preparation for the personnel surge. However, with all counties individually operating, it was not thought of to look outside their own scope and needs. This created extreme delays in emergency care as resources were quickly tied up with the surge of patients.

### **Lessons from the Bastrop County Fires**

The Bastrop county fires lent many lessons learned about the failure to effectively utilize multijurisdictional response capabilities. While firefighters from throughout the region joined in fighting the wildfire, state resources and resources from each of these jurisdictions were not well managed. Responding firefighters had to choose between actually fighting the fires and filling out the mountains of paperwork necessary to request assistance from higher entities (Ward, 2011). Future response efforts would benefit from jurisdictions being assigned different tasks;

like one out firefighting while the other tackles the paperwork. This would eliminate duplication of effort and mitigate the delay in aid since one jurisdiction would always be monitoring the paperwork instead of spreading themselves across multiple tasks. This would also be an effective way to utilize jurisdictional resources that are farther away. Rather than waste travel time sending firefighters to the fire, they can easily coordinate necessary paperwork since they would already be familiar with the process. In an effort to enact these types of plans, prior training with all jurisdictions would be necessary to promote the effectiveness of such plans.

Paperwork issues caused severe delays in federal aid that could have mitigated some of the effects of the fire. While firefighters struggled to control the blaze, a plane that could have been used to fight the fire sat unused. Prior preparation and planning with all jurisdictions involved would have led to the discovery of the contract lapse for the aerial firefighting resource (Ward, 2011). Another aerial asset flew in to fight the fire also remained inoperable due to preventable issues. The Federal Aviation Administration governs the time pilots must rest between flights. So while a useable plane became available to fight the Bastrop fires, a pilot trained in aerial firefighting was not available leaving that asset also sidelined (Victoria Advocate, 2011). In situations like the Bastrop County Fires, aerial resources could have reduced the intensity of the wildfires and allowed firefighters to gain control much more quickly than the twenty six days it took without that resource.

Communication was also an issue during response operations. Prior to the activation of the EOC, the different responding jurisdictions were not in communication with each other. Therefore, no one entity knew where the other was deploying, when they would arrive, and what resources they would be bringing with them. Once the EOC was activated, there were no instructions as to how each of the jurisdictions should communicate with the EOC. The common

communication tool among EOCs in Texas, WebEOC, was operational, but unmonitored.

Therefore, many requests sent up using the WebEOC system went unanswered. Cell phone communications were intermittent as cell towers in the disaster affected area were unreliable. Some towers were damaged during the scope of the fire and others were simply overloaded with not only emergency responder communications, but also with the many residents affected by the fires traveling out of the area. Communication problems like these, had they been previously identified in training situations, could easily have been corrected prior to any type of disaster occurring.

Long term planning for response operations to the twenty six day ordeal were never communicated out of the county. This created problems when the multiple counties responding did not have the strategic vision necessary to carry out the type of response required to achieve those strategic goals. Multijurisdictional training which presents strategic plans prior to any events would allow all territories involved in to understand the ultimate goals of their response efforts.

The breadth of the Bastrop County fires created a frenzy of well-intentioned responders desperate to help control the blaze. However, many of these responders failed to follow proper protocol because there was no clear lines delineating how to best to volunteer to provide aid to the area. This created a lack of control from command posts and EOCs alike as they struggled to identify all available manpower and resources. Prior training involving multiple jurisdictions could have outlined ways for those well intentioned self deployers to best serve the needs of the affected counties.

Resource staging was another area identified as problematic when multiple jurisdictions responded to the Bastrop fires. Without a properly identified staging area, some resources sat

unused while others were task saturated. This wasteful practice contributed to widespread confusion and slower response times that could have been mitigated with proper training. Prior training would have also allowed all jurisdictions involved in response operations to know exactly what resources were available which would then allow those resources to be tasked appropriately. Multijurisdictional training would have allowed advanced resource planning so that all resources were properly utilized. In Bastrop, EOCs were negligent in effectively utilizing resources because of ignorance of those resources available.

The Travis County after action report identified that training in the basic incident command system and command posts would have benefited all jurisdictions involved. The command posts and EOC needed better liaison support to coordinate all the activities each jurisdiction was tasked with accomplishing. Prior training would have identified these lapses in knowledge and benefited responders as they tackled this large scale fire. The training would also have allowed the jurisdictions to learn to work in concert so while one was accomplish a task, the next could be gearing up to take over or complete a complimentary task to allow the fire to come under control much more quickly.

Like the previous emergencies, the Bastrop fires were subject to the same communication, command and control, and resource issues of the past. However, in this instance, the fires were so widespread, responders really needed to work in concert to get them under control. Prior training would have benefit the Bastrop response in numerous ways. Identifying jurisdictions further away to tackle necessary requirements, like accomplishing paper work to request federal aid, would have made valuable use of both time and manpower. Meanwhile, the closer jurisdictions, the ones who are capable of training together, could have defined plans to facilitate a smoother response. While it is hopeful that the state, let alone this

county, never experiences a fire of this scale again, hopefully these lessons will encourage those areas prone to wildfires to facilitate some sort of multijurisdictional training to facilitate future response efforts a little more effectively.

### **Lessons from the West Fertilizer Plant Fire and Explosion**

One of the biggest arguments for multijurisdictional training can be made from studying the events that unfolded in the wake of the West Fertilizer Plant fire and explosion. The fifteen lives lost might have been saved had multijurisdictional training been implemented previous to any disaster. As the state of Texas did not mandate regulations as to what types of training volunteer fire fighters should complete, skill levels vary from the most basic to the more advanced. In the case of West, Texas, these volunteer firefighters lacked the technical training and expertise that more robust fire departments are accustomed to.

Training with multiple jurisdictions, ones that have more vigorous training standards and experience with hazardous chemicals, could have provided a standardized response plan to hazardous materials incidents, which the city lacked but needed. These plans would have given the volunteer firefighters a basic knowledge on how to respond to hazardous chemicals which they previously lacked. Instead of choosing to fight the fire like they would a typical residential fire, prior training with other jurisdictions would have awarded the volunteer firefighters options they were previously unaware of which could have saved lives and mitigated some of the destruction experienced in the town.

In addition to lacking the knowledge to fight a chemically dangerous fire, the West Volunteer Fire Department also lacked the high tech equipment that would have been useful in a disaster of this scale. These volunteer fire departments often rely on donations and charitable contributions which means little money for operations. Their standard equipment is much

different than that of a city staffed with paid employees and government funding for supplies.

While the volunteer firefighters did the best they could given the circumstances, the Chemical Health and Safety board noted that “the failure was in the community, county and state leadership to provide emergency planning and implementation guidance” (Pell and Rogers, 2013).

As with previous incidents, self-deployments became an issue. Well-meaning volunteers arrived to assist in responding to the explosion. However, each volunteer took it upon themselves to decide what was important and what needed to be done. At the height of response operations, community, county, state, and federal incident managers were each on scene giving different orders to the various response personnel. Eventually, state troopers were called in to control the flow of personnel and thus the flow of orders for each responding agency to eliminate the confusion and allow for more effective operations to take place. Prior training not only with the multiple jurisdictions involved, but also with state and federal partners could have eliminated the confusion and multiple leadership agencies and orders. However, at the start of the whole ordeal, the West Volunteer Fire Department chief failed to establish incident command which contributed to the confusion of leadership once the response was underway.

Initial volunteers from other jurisdictions even put themselves in harm’s way, which ultimately cost them their lives, as they attempted to guide the West Volunteer Fire Department’s response to the plant fire without taking away of the local responding agency’s control. Had the West Volunteer Fire Department been afforded the opportunity to train with these more seasoned and experienced fire fighters prior to this situation, those other firefighters’ suggestions may have carried more weight as they would have an established relationship and foundation of trust.

The Chemical Safety Board's report on the West disaster identified the need to incorporate lessons learned from other similar incidents as a means to prevent disasters like this in the future. A goal of multijurisdictional training would be to highlight these previous disasters other jurisdictions have experienced and apply those lessons learned without having to experience them personally. The ability to connect to a story personally is a much more effective teaching tool than simply reading about something in a training manual. In the West disaster, jurisdictions from across Texas came together to help. Had they come together prior to the disaster and shared stories, they may have been able to prevent this disaster from being so catastrophic.

### **Lessons from the Garland/Rowlett Superstorm**

The Garland and Rowlett response to the tornado shed light on interesting multijurisdictional issues. These two cities shared mutual aid agreements with many of the same partners, which prior to this disaster was never an issue. However, the tornado, which affected both towns in equally devastating manners, identified problems in the shared mutual aid agreements of these communities. Response times increased as jurisdictions from farther away responded to help. Had the cities practiced and drilled together prior to this emergency, they may have uncovered the potential flaws in their shared mutual aid agreements. Understandably, Garland was unable to assist Rowlett in their response needs, and vice versa, as they were both task saturated. However, what neither anticipated was their mutual aid partners also becoming overwhelmed at the enormity of the disaster. When Garland requested aid from its partners, they were already otherwise engaged assisting Rowlett's Fire Department. Multijurisdictional training would have identified this complication and a plan could have been worked out for how each would get the necessary help much more quickly without affecting one another.

Communication issues between the jurisdictions was one of the most prevalent barriers to smooth response operations. Multiple radio frequencies were used, with no standard protocol on which should be used for what. When new jurisdictions joined the response efforts, no one was on the same frequency. Previous training would have allowed all the jurisdictions to dictate which channels to use for what and when. To mitigate some of the communication problems, Garland used some of its manpower resources as communication points of contact thus wasting a valuable field asset for response. Firefighters were identified to ride in trucks with other jurisdictions just to facilitate communication with the EOC (Matthews, 2016). Had previous communication issues been identified, these firefighters could have deployed in support of response operations instead of filling a passive role as a call center. Again in this incident, cell phones were unreliable communication as many cell towers were damaged by the storm and the others were overloaded with both victims trying to get help and responders trying to enable the aid for those victims.

In Rowlett, resource staging was an issue as none of their jurisdictional partners were aware of where the resource staging area was located. The multiple responding jurisdictions made their own resource staging areas and created their own command posts since communication was virtually nonexistent in the early aftermath of the tornado. These multiple staging areas caused confusion for responding partners because they were unable to identify needs in advance of their deployments. Prior training would have identified this lack of knowledge and identified the most common resource staging areas and alternate locations so that other responding jurisdictions could have narrowed down the area in which to report for detailed instructions.

### **Summary of lessons**

Recurring themes in each of these disasters seem to be issues in communication, command and control, resource management, and self-deployments. Multijurisdictional training has the ability to mitigate many of these common problems. With all jurisdictions involved in trainings, each would be able to understand the others' strategic objectives and the values of that incident commander. This would allow self deployers to understand the need for a unified response. Instead of amassing crowd, an orchestrated response with a united team would deploy. It would give self deployers the plan for where to report to get an assignment, versus just showing up and going to work. This would eliminate the extra workload for EOCs and incident commanders in overlapping assignments and allow more areas to be covered. Self deployers would still feel useful and as if they were part of the solution instead of being part of the problem as they can be without prior training.

Multijurisdictional training would also assist in keeping first responders, victims, and property safe and mitigating the damages of a disaster. The simple act of information sharing would make all responders better equipped to handle disasters while serving both the individual and collective interests of all involved. This would prove especially important for smaller departments and those staffed with volunteers. Because they lack the need for extensive training, they are often unprepared for large scale disasters. Multijurisdictional training would allow smaller jurisdictions to interact with highly trained sister jurisdictions would give them exposure to potential disaster situations not otherwise available. This could translate into more knowledge which thus translates into improving safety and saving lives.

Next, joint training would enable each jurisdiction to identify the others' strengths and weaknesses. It will also identify who has what equipment and capabilities, how each could

benefit, and innovative ways to use said equipment to better the responses and operations of each jurisdiction. Therefore, deficiencies can be identified and purchases can be made to mitigate these deficiencies before another disaster occurs. Multijurisdictional training would not only have enabled, but encouraged larger cities, like Waco, Texas, to train with smaller volunteer fire departments, like that of West, Texas to prevent the chaos and mistakes made during the West fertilizer explosion. Those trainings and exercises would provide a multitude of benefits. The different jurisdictions would be afforded the opportunity to gain valuable equipment familiarization and knowledge on which type of disaster would benefit from each of the different pieces of equipment. Training together would also provide familiarity with a multitude of incidents that smaller cities and volunteer fire departments may never otherwise receive. Multijurisdictional training would fulfill the need for more robust trainings and exercises while also fostering a climate of cooperative response planning.

Another area where multijurisdictional training would benefit joint responses is in mutual aid agreements. It is often not thought of prior to a disaster that mutual aid is shared among more than a few jurisdictions. Therefore at the time disaster strikes, if the disaster affects more than one area, mutual aid is often spread too thin. For large scale disasters, prior training with multiple jurisdictions would identify these conflicts. Overlapping mutual aid plans could be de-conflicted sooner, which would save in the chaos surrounding a disaster event. Mutual aid also has the added benefit of cost sharing for large, necessary, but rarely used equipment. Shared costs mean more economical benefits to a greater number of personnel in various locations throughout the region.

Most importantly, prior training would foster relationships and create a foundation on which to improve response operations. Fort Worth Fire Battalion Chief Tim Johns echoed the

how valuable it is to be able to place a face with a name and capabilities, “and you don’t want to do that for the first time on an emergency” (Van Horne, 2015). Prior existing relationships were cited as extremely beneficial to response operations in most of the disaster response operations studied. These relationships enabled otherwise difficult tasks to be accomplished much more rapidly, as evidenced by the Fort Worth tornado response. Furthermore, studies found that responders would often take command from supervisors in their own jurisdiction with which they were familiar while neglecting the overall commands of the incident manager simply because of the existing relationships (Bureau of Justice Assistance, 2005).

Building and strengthening relationships among the jurisdictions throughout the response region would strengthen and improve response capabilities by providing a foundation of trust among responders. Those relationships become the foundation of successful response operations as previously noted. Following the fertilizer plant explosion in West, Texas, McLennan County emergency manager Mr. Frank Patterson stated: “people do not rise to the level of their training, but sink to their level of comfort” (FEMA, 2015). Unfortunately for emergency response efforts requiring multiple jurisdictions to respond, each district has a very different level of comfort, and without previous interactions their comfort level with each other is minimal, which can further complicate response efforts. Not only are responders working to combat the effects of the disaster, but often they find themselves attempting to build and maintain relationships in order to build the essential element of trust during response operations. At the same time, they must also facilitate proper response actions in the chaotic aftermath of an incident. The goal then, would be to provide multijurisdictional training that would allow responders to forge a level of comfort with one another and understanding of each other’s methods. This would allow the different jurisdictions to find comfort that despite one jurisdiction’s lack of resources and technical

knowledge, another of their jurisdictional possess competence in those areas. Response operations could begin with more immediacy as they would have prior knowledge as to who they can look with particular response needs that they previously may not have known. Aside from familiarity and comfort with one another, multijurisdictional training would also nurture a team mentality which would prove beneficial in improving response capabilities.

A theme of improving communication was noted throughout each of the previously studied incidents. Improving multijurisdictional responses means improving the way the various jurisdictions communicate with one another. The various communication tools currently utilized all have their place, but ensuring responding jurisdictions have a centralized method of communication will allow a faster, more efficient responses. The five studied disasters emphasized communication issues from faulty equipment, to different operating systems, to equipment failures all because there were no previous plans on how these jurisdictions would communicate with one another in the event of a disaster situation. Improving the way different agencies communicate will begin with training. A focus of multijurisdictional training would need to be on communication so that jurisdictions operate via the same methods when they are responding collectively.

### Conclusions and Recommendations

The National Incident Management System states that “incident management organizations and personnel also must participate in realistic exercises-including multidisciplinary and multijurisdictional events...to improve integration and interoperability” and that these trainings “ensure that personnel at all jurisdictional levels....can function effectively together during an incident” (U.S. Department of Homeland Security, 2004). This research discovered that despite the directives in the National Incident Management and Incident

Command Systems, greater training initiatives for multijurisdictional response operations are necessary to improve response proficiency in those operations. Furthermore, regardless of these federal requirements, many agencies simply are not as well versed in those requirements as would be beneficial for the highest of public safety standards. Organizations are used to operating in a vacuum, with their jurisdiction naturally at the forefront of what matters. During times of multijurisdictional response efforts, this vacuum mentality prohibits unit cohesion, complicates response efforts, and delays emergency operations as the jurisdictions must take the time to learn to work together. Despite terminology and hierarchies containing the same basic principles, the way each jurisdiction carries out these principles still has the potential to be vastly different from one another. A benefit of multijurisdictional training would be to allow each jurisdiction to see how the other operates, thus facilitating flexibility in the aftermath of a disaster when aiding another jurisdiction. Many times, because the Incident Command System is in place, it is falsely believed that any emergency management and first responder groups should be able to work together to successfully complete response operations despite the potential differences in each department. While ICS certainly helps operations run more smoothly, it is only as effective as the training those responders have previously received. The five incidents studied for this research achieved the ultimate success of recovery, however, there were definite areas for improvement that would have benefited from prior multijurisdictional trainings and exercises because the time for learning new tactics, techniques, and procedures should never be during an incident.

In a series of emergency response exercises in the Dallas-Fort Worth area in 2011, it was noted that while most jurisdictions had plans to respond to major disasters, many of those plans were severely uncoordinated (Geospatially Enabling Community Collaboration Workshop,

2011). Allowing and encouraging jurisdictions to conduct joint trainings and exercises would ease the coordination of response efforts when disaster strikes. Lessons learned from previous disasters enabled the state of Texas to create the Texas Statewide Mutual Aid System, which allows mutual aid response from all local entities even without a written mutual aid agreement (State of Texas Emergency Management Plan, 2013). While this is a great tool to have in place, it still does little to facilitate smooth responses if these jurisdictions are unfamiliar with how the other operates. In some instances the vast differences in response preferences may even impede response operations when jurisdictions must take time to discuss what to do versus the ability to take immediate action. With the goal of emergency management to mitigate damages and save lives, coordination among responding agencies should be at the forefront of all emergency managers' goals.

In Dennis Mileti's 1999 text titled *Disasters by Design: A Reassessment of Natural Hazards in the United States*, he highlighted the need for collaborative problem solving. Instead of taking an individual approach to responding to large scale disasters, Mileti suggested municipalities join forces to create a greater atmosphere of disaster resiliency. Response plans that are integrated and comprehensive, with mutual goals, have a higher success rate than those created individually, when more than one jurisdiction is involved in response operations. These comprehensive plans would not only integrate key players in multijurisdictional response efforts, they would also identify potential hazards and individual jurisdiction's capacities and capabilities.

Identification of multijurisdictional response issues would allow policy makers, emergency managers, and key leaders to understand the challenges and limitations faced by first responders in joint environments. All leaders would then be able to address those issues to

improve response efforts. This would enable a voice for joint responders' and provide a potential avenue for proper training and equipment; tools necessary to enable more effective disaster response operations. Identifying multijurisdictional issues would also foster open dialogue among these important leaders, encouraging a culture of multijurisdictional response efforts. These dialogues would then potentially benefit all communities involved by opening up not only joint response plans, but joint mitigation measures as well. The initiation of unified thinking will allow strategic plans of disaster mitigation to have more far reaching effects than an individual localized approach, which could lead to wide scale diminishment of disaster vulnerabilities for the future (Mileti, 1999).

Instead of the top down approach usually taken in the emergency management field, research like this would enable first responders on the ground to shape the future of emergency response operations and create safer communities not only for themselves, but for their neighbors as well. It would also encourage buy in as the lower level emergency management professionals would be appealing to their leadership for initiative support, especially financial, to begin their multijurisdictional training efforts that would not only save the lives of first responders placed in extreme situations, but also the lives of those individuals directly affected by the disaster. As state leadership is won over, eventually national leadership would be compelled to pay attention to the movement towards multijurisdictional joint training, understand its importance, and provide more funding for future initiatives enabling better training opportunities. While the Department of Homeland Security Office of Domestic Preparedness already developed grant programs to give preference to proposals with regional initiatives, these programs should be expanded to encourage joint training initiatives (Bureau of Justice Assistance, 2005).

A consistent approach to multijurisdictional disaster response training would promote integrated training efforts to facilitate smoother disaster response operations and mitigate delays in bringing emergency situations under control as the first twelve hours are often the most critical (Van Horne, 2013). Mileti also suggested that the best way to create a consistent, integrated approach would be through a series of conferences allowing federal, state, county, and city officials to examine practices currently in place that need more preparation efforts to sustain better response capabilities within each jurisdiction (1999).

Federal policy on multijurisdictional training would be most effective because it would allow a standardization across the United States, creating an atmosphere of inter and intra state cooperation. A reinvention of the National Incident Management system is unnecessary, however, a revision of our present systems to include fostering multijurisdictional response training efforts would provide the basis for more integrated emergency response operations. Once governmental organizations have a thorough understanding of multijurisdictional response trainings, they should be expanded to include nongovernmental organizations as well as the private sector. As these issues are already covered through NIMS, buy in from leaders at all levels will be the most important part of fostering the environment for multijurisdictional response efforts to ensure proper management and mitigation of further devastation is cultivated prior to a disaster, in the planning and preparation phases of disaster management.

International partners would also be a good source of information to build up multijurisdictional response efforts. Since the United States is one of the most advanced countries in the world, it is hard to imagine lesser developed countries are capable of teaching us better response techniques. However, precisely because they do subsist on less than we do, their ability to respond across jurisdictions, and the techniques they employ to do so, could provide a

platform for creating multijurisdictional trainings throughout the United States. Conversely, it would be prudent that the United States share lessons learned and identify problem areas and solutions for those countries lacking the knowledge and resources we have.

The state of Texas has been making great strides in fostering a climate of multijurisdictional training. In 2013, the North Texas region began inaugural Exercise Urban Shield trainings. These weekend long regional trainings simulated possible disaster scenarios at over eighteen different locations across the metroplex. This ground breaking training is the first of its kind for all of the North Texas response entities. A police chief from one jurisdiction stated “if we can’t interact from communications all the way down to tactics and be able to integrate ourselves with another team when they call for mutual aid or support...there’s a high probability of failure” (Van Horne, 2013). A key point from the Chief was the need to and importance of integration. Operations like Exercise Urban Shield foster an environment for integration while ensuring all responders hold a minimum common level of capabilities for the tasks they are required to accomplish in times of disaster.

Future research should be conducted on the weaknesses of multijurisdictional response efforts of the past to provide more examples of how simply relying on the Incident Command System is ineffectual. As this research only studied incidents in the state of Texas, future researchers should broaden their scope to see if multijurisdictional response operations across the United States face similar issues. Next, if similar issues are identified, researchers should focus on current multijurisdictional response training programs throughout the United States to identify best practices. Information from the various research can then be used to broaden those training programs and encourage other municipalities to adopt similar programs. Trainings like Exercise Urban Shield can then be expanded not only throughout the state of Texas, but also the United

States. Furthermore, researchers should identify training programs already in place allowing multiple jurisdictions to train together. Finally, existing multijurisdictional training programs should be compared and contrasted to identify best practices for disbursement throughout the emergency management field. This initiative should be at the forefront of all agencies' agendas with an eventual goal of expanding thoughts beyond response into proactive joint mitigation measures to secure the safety and wellbeing not just of the victims, but the first responders as well.

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