WHAT IMAGERY COLLECTION CAPABILITIES DOES THE NATIONAL GUARD NEED TO FULFILL ITS DOMESTIC EMERGENCY RESPONSE MISSIONS?

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The National Guard is granted unique legal charter to operate domestically under the command of a Governor or be federalized and operate under the command of the President. Today each of the 50 states, the three territories and the District of Columbia, has a National Guard. Due to their dual domestic and federal requirements, the National Guard must maintain flexibility in the training and equipment they pursue. The best missions to be nested with the National Guard are those which easily lend themselves to both Federal and domestic application. For the Air National Guard this means concentrations in missions such as Airlift, Communications, Civil Engineering, Cyber and Intelligence Surveillance and Reconnaissance (ISR). Despite the value the National Guard is to the Air Force, due to budgetary constraints, the Air National Guard is projecting the loss of its RC-26B aircraft. In order to conduct a needs-based recapitalization, it is necessary to study the domestic response needs of the National Guard.

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

WHAT IMAGERY COLLECTION CAPABILITIES DOES THE NATIONAL GUARD NEED TO FULFILL ITS DOMESTIC EMERGENCY RESPONSE MISSIONS? by Maj Andrew T. Hill, 101 pages.

The National Guard is granted unique legal charter to operate domestically under the command of a Governor or be federalized and operate under the command of the President. Today each of the 50 states, the three territories and the District of Columbia, has a National Guard. Due to their dual domestic and federal requirements, the National Guard must maintain flexibility in the training and equipment they pursue. The best missions to be nested with the National Guard are those which easily lend themselves to both Federal and domestic application. For the Air National Guard this means concentrations in missions such as Airlift, Communications, Civil Engineering, Cyber and Intelligence Surveillance and Reconnaissance (ISR). Despite the value the National Guard is to the Air Force, due to budgetary constraints, the Air National Guard is projecting the loss of its RC-26B aircraft. In order to conduct a needs-based recapitalization, it is necessary to study the domestic response needs of the National Guard.

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This thesis consumed hundreds of hours of the year my family and I spent at Fort Leavenworth. It challenged the entire family tremendously. Were it not for the support of my wife Starla, I would surely have failed in this endeavor. In February, I wanted to quit, believing the project couldn't be completed because I could not get the data I wanted. She reminded me that it was not only me I would be giving up on, but that I would be dishonoring the sacrifices she and the kids had already endured to get that far. Thank you for that reality check. I would also like to thank my daughter, Aili and my son, Cian. At the time of this project they were 8 and 3 years old, respectively. They needed their Dad but had to understand I was not available very much. Thank you for your sacrifice, patience and understanding. I love you all.

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ACRONYMS

CI/KR	Critical Infrastructure and Key Resources
COA	Certificate or Waiver of Authority
DoD	Department of Defense
EO	Electro Optical
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FMV	Full Motion Video
IAA	Incident Awareness and Assessment
IR	Infrared
ISR	Intelligence Surveillance and Reconnaissance
LIDAR	Light Detection and Ranging
LOC	Lines of Communication
MSI	Multi-Spectral Imagery
NAO	National Applications Office
NGB	National Guard Bureau
PAD	Processing Assessment and Dissemination
PCA	Posse Comitatus Act
PIR	Priority Information Requirements
SAR	Synthetic Aperture Radar
UAS	Unmanned Aircraft System
U.S.	United States

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CHAPTER 1

INTRODUCTION

The purpose of this thesis is to analyze the imagery collection needs of the National Guard for domestic emergency response. Because Remotely Piloted Aircraft are one of the fastest growing categories of collection assets this thesis will address the additional requirements to use unmanned platforms for domestic use. However, the focus of this effort is not to address the value of manned vs. unmanned collection assets. Both have their appropriate place in domestic operations. The focus of this effort is on the sensor capabilities most beneficial to the National Guard's domestic missions while bearing in mind the Guard is a dual role force and any assets missioned for domestic purposes must also have federal applicability. The research question is: What imagery collection capabilities does the National Guard need to fulfill its domestic emergency response missions? This effort will also examine the realities of operating unmanned aircraft in the National Airspace System in support of domestic emergencies. The National Airspace System consists of, not only the airspace above the United States (U.S.), but also air traffic control facilities, navigational aids and technology overseen and administered by the Federal Aviation Administration (FAA). The National Airspace System exists to ensure safety of flight and for those people, structures and resources on the ground.

To begin with, chapter 1 briefly describes the history of the organized militias in order to understand the longstanding relationships the National Guard has with both governors and presidents. To understand the needs of the National Guard one first needs to understand why it exists and the legal charter by which it functions. Therefore,

chapter 1 covers some of the relevant legal framework to include the Posse Comitatus Act of 1878, National Defense Acts, Militia Acts and others along with their impacts. In addition to the legal foundation, chapter 1 examines past and present roles of the National Guard in order to answer why it performs the missions it does. With those laws come, not only legal authority, but legal protection for Guardsmen in the conduct of their responsibilities. To that end, chapter 1 provides an overview of Incident Awareness and Assessment (IAA) and how the National Guard establishes a Joint IAA Team to conduct domestic imagery collection while respecting U.S. Persons' privacy. Lastly, this chapter includes FAA limitations and requirements specific to operating Unmanned Aircraft Systems (UAS) inside the National Airspace System.

History and Legal Background

The National Guard is in the unique position to operate domestically under the command of a Governor or to be federalized and operate under the command of the President. The Governors of each state and of the commonwealths of Puerto Rico, Guam, and the Virgin Islands have a National Guard Force and retain the authority to fix the locations of units and headquarters. No changes to the branch, organization or allotment of a National Guard unit may be made without the approval of the respective Governor.[1] The Constitution of the United States, addresses Congress' legal authorities for what is, today, the National Guard of the United States, then referred to as the militias. "Congress shall have power. . . . To provide for calling forth the militia to execute the Laws of the

[1] 32 U.S. Code, sec 104 191, 6, Units: Location; Organization; Command.

Union, suppress Insurrections and repel Invasions."[2] "To provide for organizing, arming, and disciplining, the militia, and for governing such Part of them as may be employed in the Service of the United States, reserving to the States respectively, the Appointment of the Officers, and the Authority of training the Militia according to the discipline prescribed by Congress."[3] The militias it addressed predate the Constitution by 140 years. The birthdate of the National Guard is December 13th 1636. On that day the Massachusetts General Court directed the first militia regiments to be established to guard against the ever increasing threats from native peoples against colonial settlements.[4] The National Defense Act of 1916 standardized the term "National Guard" to identify all organized militia forces in the nation.[5] It also brought increased continuity and standards between the Regular Army and the National Guard to ease its members' transition to active Federal service.[6] With few exceptions, the Posse Comitatus Act (PCA) of 1878 restricted the active and reserve components of the military from performing civil law enforcement operations. Therefore, The National Guard is uniquely legally positioned as both a domestic force provider and a strategic reserve for the U.S. Army and Air Force when federalized.

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[2] U.S. Constitution, Art. 1, sec. 8.

[3] Ibid.

[4] Michael D. Doubler, *I am the Guard: A History of the Army National Guard, 1636-2000* (Washington, DC: Government Printing Office, 2001).

[5] Ibid.

[6] Ibid.

At the founding of the United States two views predominated the thinking with respect to a standing professional Army. In the first case, there was general distrust in what a strong Federal Government might become and concern that a strong national Army could threaten the sovereignty of the states. In the second case, there was concern for the country's ability to adequately defend itself using only citizen soldier militias with limited training. This conflict is reflected in the compromise of the Constitution which granted Congress authority to raise and support a national Army and also organize the militia. The 2nd Amendment reaffirms this need stating, "A well-regulated Militia, being necessary to the security of a Free State, the right of the people to keep and bear Arms, shall not be infringed."[7] The Militia Act of 1903 created the modern National Guard from the organized militias. Amended in 1933, the Militia Act of 1903, created two distinct but overlapping organizations: The National Guard of the United States and the National Guard of the various states. Since 1933, the "Dual Enlistment" provisions of the act clarified that members of the National Guard will continue to fulfill their historical function as a state militia, but will engage in federal service at times.[8] Guardsmen's chain of command ends with their Governor as the commander in chief unless they are federalized (called into active federal service under the authority of 10 USC Section 12301). Even when serving in emergency response efforts in states other than their own, Guardsmen remain subordinate to the Governor of the state to which they are assigned.

[7] *Constitution of the United States,* Amendment II.

[8] Doubler.

However, when federalized, a Guardsman's commander in chief is the President, the same as a member of the regular Army or Air Force.

Because of its dual roles, the best missions to be nested with the National Guard are those which easily lend themselves to both Federal and domestic application. For the Air National Guard this has meant concentrating on missions such as Air Mobility, Communications, Civil Engineering, Cyber Operations and Intelligence Surveillance and Reconnaissance (ISR)/IAA. ISR is a federal mission conducted to enable military missions overseas. IAA is a domestic mission conducted in response to a disaster. Both involve airborne imagery collection, but they differ tremendously in scope, purpose, process, and permissible collection systems and methods.

The Incident Awareness and Assessment Process

Conducting IAA is a delicate task. Guardsmen seeking to leverage traditional Department of Defense (DoD) ISR assets to conduct domestic imagery collection must strictly adhere to all applicable legal frameworks for the protection of U.S. Persons' Information. This section briefly highlights excerpts from Executive Order 12333 and other Intelligence Oversight Program guidance. It is germane to the topic of a responding force's information requirements to cover highlights which drive what the National Guard will do and what they must avoid doing. This information will help inform later sections on the sensors and platforms appropriate to be nested with the National Guard as a dual purpose force.

The state IAA officer is often also the director of joint military intelligence at the state joint force headquarters. This individual will develop relationships within the remote sensing community of the respective state. This community may include private

entities as well as local, state and federal agencies. This pre-disaster coordination helps with deconfliction, ensures unity of effort and economy of force. When a disaster strikes or is impending, the state Director of Joint Military Intelligence determines what collection requirements exist and which can be satisfied using assets already within and available to the state. Any collection requirements that cannot be satisfied with local assets are coordinated for coverage between the state Joint Force Headquarters director of intelligence and the National Guard Bureau (NGB) directorate of intelligence in a formalized process called the "NG-J2 Coord Call."

At the outset of a response operation, the state Joint Staff coordinates to identify intelligence gaps. From these, they build a Component Prioritized Collection List. Based on the Commander's Priority Information Requirements (PIR), the collection list identifies specific points of interest, areas of interest, Critical Infrastructure and Key Resources (CI/KR) to be collected on. Examples of requirements include chemical facilities, bridges, dams, levees, flood plains, main roads, densely populated areas, power plants, shelters and hospitals, fuel and supply distribution points, etc. Each collection list nomination will include the following points of information:

1. justification for the requirement;
2. desired product forma;
3. name of the area, point, or line of interest;
4. latitude and longitude of the collection target area;
5. specific information to be collected at each location;
6. reporting instructions; and
7. special instructions.

This step is essential to focusing the collection as narrowly as possible onto only the information needed to help direct the response activities. U.S. person's information which is incidentally collected in the process must be handled, stored, disseminated, and destroyed in accordance with the stipulations of an approved Proper Use Memorandum.

The Proper Use Memorandum is a critical document which must be approved prior to conducting domestic imagery collection in order to ensure compliance with Intelligence Oversight requirements. The roots of the Intelligence Oversight program are nested in Article 4 of the Bill of Rights which states: "The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized."[9] The Intelligence Oversight program was established as the result of abuses by DoD intelligence units conducting domestic intelligence collection on citizens during the Civil Rights movement and anti-Vietnam demonstrations of the 1960s and 1970s. In 1981 President Reagan signed Executive Order 12333 to protect the rights of protestors, or any citizens exercising their rights, and put a halt to future privacy invasions by the DoD. It provided clear guidelines on how to perform intelligence activities consistent with the legal rights guaranteed by the Constitution. From the Executive Order 12333 framework, each successive level of command produced more specific guidance. At the state level, Guardsmen in a Title 32 Status are subject to the

[9] *Constitution of the United States,* Amendment IV.

restrictions of, and more importantly, protected by the provisions within all the following Manuals, Instructions, Directives, and Regulations:

Executive Order 12333
Department of Defense Directive 5200.27
Department of Defense Directive 5240.1-R
Department of Defense Manual 5240.1
Air Force Instruction 14-104
Army Regulation 381-10
Army Regulation 380-13
Chief of National Guard Bureau Instruction 2400.00A
Chief of National Guard Bureau Instruction 0700.01
Chief of National Guard Bureau Manual 2000.01

Guardsmen operating in a State Active Duty status are not federal employees. They work directly for the state to which they are assigned. As such, they do not fall under the provisions of the 10 documents above. They are guided, restricted by and protected by the state laws in which they are responding (not necessarily the state to which they are assigned). For example, if a Tennessee Guardsman is responding to an emergency in Kentucky he or she is still accountable to the Governor of Tennessee as the Commander in Chief of the Tennessee National Guard. However, the Tennessee Guardsman must abide by Kentucky state laws regarding proper collection, handling, storage, dissemination and destruction of U.S. Persons' Information. Furthermore in accordance with CNGBI 2400.00A, "National Guard intelligence personnel operating in a state active duty status are . . . prohibited from engaging in a Department of Defense intelligence or counterintelligence mission or using intelligence or counterintelligence systems, resources, or equipment."[10]

[10] National Guard Bureau, CNGBI 2400.00A, *Acquisition and Storage of Information Concerning Persons and Organizations not Affilliated with the Department of Defense* (Arlington, VA: National Guard Bureau, 2013).

An approved Proper Use Memorandum must be on file before conducting any collection activities. It will specifically describe what information is planned to be collected, which systems and sensors will be used, where, how and how long the information will be retained as well as where, how and to whom it will be disseminated. Prior to submitting a Proper Use Memorandum for approval, it must be reviewed by both the state Staff Judge Advocate and Inspector General and signed by the State Director of Joint Military Intelligence. If the Director of Joint Military Intelligence is not at least a major, the first major or above (or civilian equivalent) in his or her chain of command will sign the memo. For a request to use only National Guard assets National Guard Bureau Director of Military Intelligence is the approval authority. If the request includes active duty or cross agency assets National Guard Bureau Intelligence Directorate Staff will forward it to the appropriate office for review and approval. If the request includes Unmanned Aerial Systems (UAS), approval authority is with the Secretary of Defense.

Some domestic emergencies begin so suddenly that, in the interest of preserving life and property, responders do not have sufficient time to submit a Proper Use Memorandum, for approval prior to initiating response activities. In such cases the Adjutant General may execute his or her immediate approval authority and, "may authorize airborne domestic imagery collection to include the lawful acquisition of U.S. Persons information when that support is consistent with the Constitution and other laws, regulations, and instructions."[11] A Proper Use Memorandum must still be filed with NGB as soon as possible and a report made to the Chief of National Guard Bureau detailing the

[11] National Guard Bureau, CNGBM 2000.01, *National Guard Intelligence Activities* (Arlington, VA: National Guard Bureau, 2012).

circumstances and actions taken. However, Remotely Piloted Aircraft are not included in the Adjutant General's immediate approval authority.

With the National Guard's Information Requirements identified, the elements of information needing to be collected developed, and with the areas of interest determined, the Joint IAA Team can develop a collection plan. Building a collection plan is a complex process. The nature of the Essential Elements of Information will often determine which sensors are appropriate to be tasked for a particular requirement. For example, if the Information Requirement is, "What is the location, number and disposition of personnel in distress or in need of rescue," the IAA team would have very particular requirements of the imagery that gets returned. They must be able to distinguish between individuals to count them. They must be able to retrieve specific coordinates for the imagery or otherwise direct responders to their location. Other valuable elements of information may include the presence and number of children or possible injuries to people needing rescue. One of the most effective sensors for this task is Electro Optical/Infrared (EO/IR) and full-motion video with Rover downlink so ground responders can receive the information in near-real-time. Other sensors might be capable, but the IAA Officer will need to make that determination given the specifics of the sensor and the detail required on the resulting imagery.

The IAA Officer is responsible for the collection operation. State leadership relies on him or her to provide information that is accurate and timely, but also relevant and useable. Each of the platforms used in the IAA operation must be integrated into the Processing Assessment and Dissemination (PAD) Architecture. This architecture is the system of communications equipment, analysts, storage locations, computers and the plan

to receive imagery from a sensor—platform. It takes the sensor feed or images, analyzes it to make assessments or determine answers to the PIR, and disseminates finished intelligence products to decision makers and responders. The PAD Architecture must be custom-built for nearly each disaster to incorporate the various sensors and platforms assigned to the mission, account for damaged infrastructure and overcome the specific terrain limitations where the response efforts are taking place. PAD Architecture is similar to what the active duty component would refer to as Processing Exploitation and Dissemination Architecture. The concepts and purposes behind the two are very similar. However, PAD Architecture will typically be much more temporary and exist for the express purpose of responding to a disaster.

With the collection list constructed, the sensors—platforms in place, a plan to receive any needed out-of-state sensors—platforms, the Proper Use Memorandum approved and the PAD Architecture built, executing the collection plan becomes a streamlined process. The collection list can be broken out into sub-lists by sensor collection capability and these sub-lists used as specific collection decks for individual platforms.

Domestic Unmanned Aircraft System use Requirements

As was previously stated, the Secretary of Defense retains approval authority for using UAS in any domestic operations, regardless of the component or status of the operators. According to CNGBM 2000.01 National Guard UAS assets will not be employed for domestic use without specific Secretary of Defense approval.[12] As a matter of

[12] National Guard Bureau, CNGBM 2000.01.

practice, using UAS for IAA operations is an exception, not the standard. There may be times when a UAS platform is the most appropriate for the task. If the nature of the disaster requires extended endurance, or a UAS sensor has a superior collection capability for the need, a UAS request may be approved.

Unlike manned platforms, which only require the approval of the owning authority, unmanned platforms also require approval from the FAA. Air traffic controllers are not required to provide air traffic separation services to all UAS operators.[13] Before the DoD may operate UAS within U.S. Airspace the operators must file for a Certificate or Waiver of Authority (COA) from the FAA. To use UAS for emergency response activities, a National Guard unit may file for a Special Governmental Interest Addendum. The Special Governmental Interest Addendum is an expedited process formerly called an Emergency COA. All four of the following conditions must be met to receive a Special Governmental Interest Addendum:

1. The proponent must be operating under the authority of an active COA;
2. The UAS operations must be conducted within a timeframe incompatible with the processing time required for a regular COA;
3. The requested operations must be flown by a governmental entity or sponsored (supported) by a governmental entity;

[13] Federal Aviation Administration (FAA), JO 7200.23A, *Air Traffic Organization Policy on Unmanned Aircraft Systems (UAS)* (Washington, DC: Federal Aviation Administration, 2017).

4. The operations must directly support an active homeland security, law enforcement, or emergency operations effort, or some other response, relief, or recovery activity benefiting a critical public good.[14]

Although not specifically required, the IAA Officer should have the FAA approval available to reference before submitting the Proper Use Memorandum for Secretary of Defense signature. The Special Governmental Interest request for a Certificate of Authority must include the UAS type, the Operators' Name, Organization or Agency address, phone number as well as the pilots' certificate number and pilots' and observers' names and phone numbers. The requests must also include all the specifics about the planned flights such as: dates, times, locations, altitudes, airspace class, and direction and distance from the nearest airport for all planned flights.

Conclusion

This chapter provided background information to better understand the origins and roles of the National Guard in order to appreciate its domestic imagery needs and collection requirements. It was presented in three sections. First, it covered a brief history of how the National Guard came from the militias of the late 1600s. The purpose of examining the history of the National Guard was to understand why it enjoys such a unique relationship with its state or territory leadership compared to the active components or reserves. The Guard's unique dual roles as both a domestic emergency response force and a strategic reserve are a tremendous value to the nation. This dual role

[14] FAA, JO 7200.23A.

is important to the research question because it informs the kinds of missions most appropriate to be nested with the National Guard.

Second, this chapter included a brief overview of the IAA process and intelligence oversight considerations. This topic is necessary to emphasize the attention Guardsmen give to protecting the privacy of U.S. Persons while conducting domestic imagery collection.

Lastly, this chapter covered the additional requirements to include UAS in an IAA collection plan. This is an important part of the study because it is not well understood even within National Guard Intelligence communities and because it informs mission selection within the context of the National Guard's dual purpose.

The next chapter is a review of relevant literature focused on three topics germane this study: the history of the National Guard, legal considerations and ISR/IAA.

CHAPTER 2

LITERATURE REVIEW

This research effort identifies the informational requirements the National Guard has when responding to domestic emergencies. This is necessary in order to begin the conversation over which missions and systems are most appropriate to be nested with the National Guard given the Guard's requirement to perform both federal and domestic duty. This chapter covers relevant literature and, like chapter 1, has three topic areas. The first is the role of the National Guard. It has been written about by Michael D. Doubler in *I am the Guard: A History of the Army National Guard 1636-2000,* Gregory O. Bodge in *The Role of the National Guard in Homeland Security,* Scott Foster and Bert Tussing in *Reexamining the Role of the Guard and Reserves in Support to Civilian Authorities,* and John Nagl in *An Indispensable Force, Investing in America's National Guard and Reserves*. All of these literary pieces adequately cover their topics, but none directly address the National Guard's collection needs based on historical disaster records.

The second topic addresses cultural considerations, standard practices, legal documents, legal opinions, along with requirements and constraints with respect to conducting IAA. Particular emphasis has been placed on the Posse Comitatus Act of 1878. Relevant works include Carla Crandall's "Why Aren't We Using That Intel Stuff? Using Reconnaissance Satellite Imagery in Domestic Disaster Prevention and Response," Stephen Dycus' "The Role of Military Intelligence in Homeland Security, The Constitution of the United States," and Matt Matthews' "The Posse Comitatus Act and the United States Army: A Historical Perspective." This thesis uses the background provided in these documents to provide empirical, pragmatic, reasoned evidence for the

kinds of capabilities the National Guard needs to fulfill its domestic mission requirements.

The final section is specific to IAA. Relevant works include Garry S. Floyd's *Airborne Intelligence, Surveillance, and Reconnaissance: Mission Command and Centralized Control*, Stephen J. Guerra's *Air National Guard Remotely Piloted Aircraft and Domestic Missions Opportunities and Challenges*, Mark L. Coble's *National Guard Intelligence Support to Domestic Operations*, Jason B. Mitchell's *Persistent Intelligence, Surveillance, and Reconnaissance (P-ISR): Debunking the Myth, Establishing the Concept, and Achieving the Possible*, Jennifer Sovada's *Intelligence, Surveillance and Reconnaissance Support to Humanitarian Relief Operations Within the United States: Where Everyone is in Charge*. Each of the literary pieces listed advocates changes to current practices with respect to collection activities, but none directly addresses the wide variance of missions and collection needs of the National Guard. The purpose of this thesis is not to advocate for a particular aircraft on behalf of the National Guard, but identify the most valuable kinds of sensors which can easily be applied to domestic and federal missions.

Role of the National Guard

The role of the National Guard has been written about from many perspectives. For this document, the evolution of historical roles was contrasted with current missions in order to inform future needs the National Guard may be called upon to fill. Most of the history and legislation about the Guard was specific to the Army National Guard. The Air National Guard shares many of the same roots as the Army National Guard and enjoys

the same dual roles. However, the capabilities and missions of the Air Guard are significantly different from those of the Army Guard.

The Militia Act of 1792, among other things, "required all free, able-bodied men ages 18-45 to serve in the enrolled militia and to provide their own weapons and equipment."[15] *De facto* this required nearly every household in the nation to be armed, although no provisions for failing to appear for militia duty were included. The Militia Act of 1792 created the Adjutants General in each State with authority to enact the orders of the Governor, affirming the militias' role as serving the needs of the Governors. Also in 1792, Congress passed the Calling Fourth Act which granted the President some of Congress' authority to call the militias into federal service. This created the legal precedent and establishing the militias as a dual-role force. During the Whiskey Rebellion, the militias were called upon by the federal government to suppress the insurrection and enforce federal law. In the early 1800s only the largest cities could support police departments. State police forces did not yet exist. "Militiamen frequently served under the direction of sheriffs and marshals to enforce laws, act as posses, guard prisoners, and quell agitated mobs."[16] The U.S. continued to rely heavily on militias to provide ready, able forces for many years both at the behest of Governors and Presidents. The Mexican War was the first war the U.S. fought on foreign soil. At the Battle of Buena Vista the regular Army made up just 10 percent of the U.S. Force. The other 90 percent were militias and volunteers who were instrumental in the conflict's success.

[15] Doubler.

[16] Ibid.

During the Civil War several states began adopting the term National Guard to refer to their militia units. "In 1861, Connecticut became the first State to adopt the title National Guard for its militia units, and the following year, the Empire State officially changed the designation of its militia forces to 'The National Guard of the State of New York.'[17] Pennsylvania and Ohio raised State regiments for limited, local service that bore the title 'National Guard' in their designations."[18] In the post-Civil War 1870s, militias undertook an anti-terrorism role in helping defeat the Ku Klux Klan in Arkansas, Tennessee, and North Carolina.

Prior to the late 1870s both the militias and Regular Army were called upon to enforce the laws of the nation and support civil authorities. The Posse Comitatus Act of 1878 was a monumental shift in U.S. domestic policy. It firmly established the National Guard in the role as the sole dual-status force in the nation. Regular Army may still be called upon to aid civil authorities, but only at the behest of the President or other civil authority in certain extreme circumstances. The Posse Comitatus Act, "prohibited the established practice of Regulars acting under the jurisdiction of U.S. marshals and judges . . . [and] insured that the Governors would continue to rely upon National Guard units for law enforcement."[19]

The Militia Act of 1903 officially converted the volunteer militia into the National Guard. "Guard units received increased funding and equipment, and in return, they were

[17] Doubler.

[18] Ibid.

[19] Ibid.

to conform to federal standards for training and organization."[20] However, the Dick Act, as it was called, did more than increase funding and standardize training for the National Guard. It significantly eased the transition for Guardsmen being called up for federal service. The profound effect was not just to reaffirm the National Guard in its role as a low-cost strategic reserve for the Regular Army; it provided the means to do so. At the same time, Governors benefited from the increased discipline, readiness and capability.

The Dick Act did leave one thing wanting, however. Under the Militia Act of 1903, the National Guard could only be federalized for nine months at a time and was restricted to operations within U.S. borders. In order for National Guard units to better meet the nation's needs when federalized, "the Militia Act of 1908 removed limits on the Guard's length of service and geographic employment. In return, Congress directed that the National Guard would be called to active duty before the raising of any volunteer units."[21] However the Militia Act of 1908 lacked legal sufficiency for using National Guard troops in overseas conflicts. "On February 12, 1912, U.S. Attorney General George W. Wickersham rendered an opinion that . . . followed a strict interpretation of the Constitution and ruled that the federal government was forbidden from employing the National Guard for purposes beyond those enumerated in the Constitution's militia clauses."[22] To remedy this, Congress passed the National Defense Act of 1916 which

[20] Doubler.

[21] Ibid.

[22] Ibid.

stated, “during a national emergency Guardsmen would be drafted into the Army as individuals and then serve in their State units as part of the Regular Army.”[23]

While the National Defense Act of 1916 solved the question of Guardsmen serving overseas for extended periods, no mechanism existed to return Guardsmen to their states after such a call up. At the conclusion of World War I former Guardsmen, “returned home with individual discharge papers in hand free of any federal or State obligations.”[24] In addition to reestablishing the National Guard as the primary reserve force, The National Defense Act of 1920, “specified that in the future Guardsmen released from active service would revert to their status as State soldiers.”[25]

Most legislation which followed did little to redefine the roles the National Guard would fill. Throughout these decades the constant remained that National Guard forces were routinely relied upon for civil law enforcement and disaster response within their states. In the 1990s Guardsmen responded to unprecedented numbers of domestic disaster missions, some of enormous scope. From the Los Angeles riots of 1992, to Hurricane Andrew, to the vehicle-borne improvised explosive device terrorist attacks on the World Trade Center and Oklahoma City, the National Guard continued to prove its enduring domestic flexibility and value to the communities they served.

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[23] Doubler.

[24] Ibid.

[25] Gregory O. Bodge, “The Role of the National Guard in Homeland Security” (Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2007).

Gregory O. Bodge wrote about the National Guard responding to terrorism in "The Role of the National Guard in Homeland Security." He advocates, not only an increased role for the National Guard in defense of the homeland, but better integration of National Guard capabilities into the Department of Homeland Security. The piece is relevant because it succinctly outlines what roles the National Guard must fulfill to meet the objectives assigned it under the National Security Strategy. After the fall of the Soviet Union and the attacks on the U.S. on September 11, 2001, "the National Guard became part of the operational reserve, and defending the homeland moved from a secondary strategy of defense against ballistic missiles to a primary mission of the United States government."[26] However, questions remained regarding specific roles for the National Guard in homeland defense and how best to meet the simultaneous demands of the federal government and the states. With its establishment, the Department of Homeland Security assumed responsibility for responding to attacks within the U.S. DoD retained responsibility for projecting forces outside the U.S.[27] This created two questions with respect to the role of the National Guard: first, since Department of Homeland Security was only given authority of the Coast Guard during normal operations, where and how was Department of Homeland Security to draw the necessary manpower to adequately defend the homeland? Second, what would be the relationship between federal responders and Guardsmen serving domestically?

[26] Bodge.

[27] Ibid.

The answer to both questions is that Guardsmen should not, in general, be placed in federal status when responding domestically. Unless the President exercises the powers granted him under the Insurrection Act, placing Guardsmen in Title 10 of the United States Code status severely limits the law enforcement actions Guardsmen may perform due to the restrictions of the Posse Comitatus Act. National Guard responders should remain under the control of their governor. How well National Guard forces integrate with federal responders should depend entirely on the level and quality of pre-event coordination, not on a formalized chain of command or reporting structure. As stated in chapter 1, the requirements of CNGBI 2400.00A prohibit National Guard intelligence personnel from using intelligence equipment or performing certain kinds of intelligence missions when in State Active Duty. Therefore, for the purposes of domestic imagery collection, Title-32 status is the most desirous of the three to maximize flexibility. It provides the most guidance and protection for National Guard Intelligence professionals performing domestic response activities.

In addition to clearly establishing the missions and status the National Guard will assume during domestic emergencies, the DoD must delineate between the lines of effort for all its elements with a domestic response mission. These elements include NGB, the States' National Guard, United States Northern Command, the Joint Staff, and the Office of the Secretary of Defense. "While first responders are busy providing for the needs of their communities following disasters, they do not need to be overburdened with superfluous information requirements. Competing concerns for updates and evolving requirements are certainly predictable at all levels of government; but constantly interrupting crisis response efforts for the sake of feeding 'the information beast' is well

beyond frustrating for the men and women serving at the site of an incident."[28] The Joint Staff, United States Northern Command, NGB and the Office of the Secretary of Defense are powerful enablers. They will supply the States' National Guard with funding, equipment and other resources necessary to the response activity. However, in order for them to effectively supply responders, they rely on timely information reporting prior to and during an emergency. The Joint Information Exchange Environment is the mechanism for States to provide the necessary information to higher-level DoD entities. Maintaining and operating a 24/7 Joint Operations Center in each state and territory has strained resources in many cases, but these layers of command and reporting apparatuses help to resource responders during emergencies. Reporting via the Joint Information Exchange Environment falls into one of two categories, Routine Reports or Contingency Reports.[29] These reporting tools and methods serve to better equip the National Guard in its domestic response roles while enhancing other DoD elements' abilities to perform theirs.

Since the terrorist attacks on September 11, 2001, the DoD has relied heavily on the National Guard to meet its foreign force projection requirements in Iraq and Afghanistan. The 2006 to 2008 Congressional Commission on the National Guard and Reserves concluded that, "the U.S. government had no reasonable alternative but to rely increasingly on the Guard and Reserves as an operational force that could participate

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[28] Scott Forster and Bert Tussing, *Reexamining the role of the Guard and Reserves in Support to Civilian Authorities: Assessing the Evolving Relationship of the National Guard Bureau With Other Department of Defense Organizations in Responding to Crisis* (Carlisle, PA: Center for Strategic Leadership, July 2008).

[29] Ibid.

routinely in ongoing military missions at home and abroad."[30] The number of National Guard deployments over these two operations, have resulted in a level of corporate knowledge and combat experience rarely, if ever, seen in National Guard history. Furthermore, "Reserve component service members' civilian backgrounds and careers provide them with expertise, particularly in specialized and high-tech fields, that is generally difficult to locate, train and retain in the active component."[31] The civilian expertise within the National Guard has the greatest potential to redefine the current roles and missions the National Guard performs while federalized. The RAND Corporation conducted a study of the Air Force and concluded, "Guardsmen and Reservists employed in high-tech fields such as information technology can be tapped to provide the most current knowledge, tools, and techniques for network warfare operations . . . DoD could pay for an active duty infantry soldier to learn the latest police training and tactics so that he or she could advise host nation police forces, [however] it often makes more sense for an Army Guardsman or Reservist with 20 years of experience as a law-enforcement officer to do the job."[32] Historically the DoD has relied on contracted support for such specialized capabilities. Placing Guardsmen in these and other roles removes a cumbersome burden from the commander of strict adherence to a contract's specifications. Future federal roles of the National Guard should include an avenue to

[30] John Nagl and Travis Sharp, *An Indispensable Force Investing in America's National Guard and Reserves* (Washington, DC: Center for a New American Security, 2010).

[31] Ibid.

[32] Ibid.

capitalize on the civilian specializations and expertise unique to the reserve component-especially for highly marketable, difficult to train and retain skills like cyber operations.

Cultural and Legal Considerations of IAA

The Latin term *Posse Comitatus*, means "power of the county." The practice of *Posse Comitatus* dates back to 15th century England. Historically, it referred to the obligation of all able bodied males of age, as citizens of the land, to assist a law enforcement officer in the performance of his duties.[33] "While the framers of the Constitution didn't legislate against it, they believed the creation and use of a standing army to control the people was the greatest danger to be avoided."[34] Prior to the Posse Comitatus Act of 1878, there were few restrictions on a sheriff calling on Army Regulars to conduct law enforcement activities when needed.

The practice of slavery divided the U.S. as perhaps no other issue has, before or since. The Fugitive Slave Act and the subsequent post-civil war reconstruction years placed the U.S. Army in the position to enforce laws when the militias could not be depended upon to do so. In 1850 when a marshal "called upon citizens to help guard an escaped slave in Pennsylvania, the crowd not only refused to take part in his posse but also freed his captive."[35] President Fillmore made his willingness to use federal troops to enforce the Fugitive Slave Act very clear. "In 1851, President Fillmore informed the

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[33] Matt Matthews, *The Posse Comitatus Act and the United States Army: A Historical Perspective,* Global War on Terrorism Occasional Paper (Fort Leavenworth, KS: Combat Studies Institute Press, 2006).

[34] Ibid.

[35] Ibid.

United States Senate that it was his right to use the Army and the Navy to uphold the law."[36] However after the Union victory in the Civil War, passing of the 14th Amendment to the U.S. Constitution and the First Reconstruction Act, the U.S. Army was used to enforce compliance with these new laws and help stop the systematic oppression of black people in the South. Despite successes the Regular Army had in ensuring black citizens' legal rights in the 1860s and 1870s, some view the Posse Comitatus Act's restrictions on the Regular Army from serving as a law enforcement entity as a capitulation to Southern Democrats in the post-Civil War years.[37]

While the non-Federalized National Guard remained unaffected by the Posse Comitatus Act, there was widespread confusion surrounding it. This led many active component commanders and politicians to abstain from all law enforcement activities conducted by federal military forces. However, in response to the growing drug problem, Congress approved the Department of Defense Authorization Act of 1982 which created Sections 371 through 378 of Title 10 of the U.S. Code.[38] These seven sections added much needed clarity on how and for what purposes active component forces could be used domestically.

The Department of Defense Authorization Act of 1982 came on the heels of Executive Order 12333 in 1981. As was briefly mentioned in chapter 1, Executive Order

[36] Matthews.

[37] Ibid.

[38] Ibid.

12333 was the result of DoD intelligence components committing gross invasions of privacy.

> The Defense Department now describes what happened in the 1960s and 70s as a classic example of what we would today call 'mission creep.' What had begun as a simple requirement to provide basic intelligence to commanders charged with assisting in the maintenance and restoration of order, had become a monumentally intrusive effort. This resulted in the monitoring of activities of innocent persons involved in the constitutionally protected expression of their views on civil rights or anti-war activities. The information collected on the persons targeted by Defense intelligence personnel was entered into a national data bank and made available to civilian law enforcement authorities. This produced a chilling effect on political expression by those who were legally working for political change in domestic and foreign policies.[39]

In general, members of the active component of the DoD, the Reserves, and Guardsmen when federalized may perform supporting roles to civilian responders and law enforcement agencies. This commonly includes such activities as loaning specialized equipment, providing training and assisting in disaster consequence management.[40] The National Guard is far less restricted from providing direct support to civil authorities when not federalized.

When operating in Title-32 status, the National Guard is uniquely postured to provide a bridge between the collection capabilities of many ISR platforms, and the information requirements of responders. For example, many of the ISR sensors in use by the DoD have capabilities which remain highly classified. In most cases this does not necessarily preclude using the sensor in a response effort; only that the resultant imagery itself is not releasable. The questions which drove the collection may still be answered

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[39] Stephen Dycus, "The Role of Military Intelligence in Homeland Security" *Louisiana Law Review* 64, no. 4 (Summer 2004): 779-807.

[40] Ibid.

without releasing the imagery. For instance, if the PIR is "Are primary lines of communication into and out of the incident area suitable for use by responders?" Analysts could search classified imagery for blockages such as landslides, floodwaters, traffic congestion, or down trees and powerlines. There is no need to release classified DoD satellite imagery of the area of interest to answer the questions. It would be wholly sufficient to simply identify the location(s) and extent of blockages, or lack thereof.

Conducting domestic imagery collection can be a daunting task. Improper collection, storage, dissemination and destruction practices can have serious consequences for those responsible. The many different legal guiding regulations, executive orders, directives and instructions have been found to discourage rather than encourage use of the capabilities for domestic users.[41] Foundational documents as have been discussed in this chapter and chapter 1, notably the PCA and the 4th Amendment to the U.S. Constitution, have had the effect of causing National Guard commanders to error on the side of not conducting domestic collection in the face of procedural uncertainty. In 2005 members of the House of Representatives Committee for Homeland Security convened a hearing on the proposal to open the National Applications Office (NAO). "The vision of the NAO was that it would promote wider distribution of domestic imagery from reconnaissance satellite assets for civil, national security, and law enforcement purposes."[42] U.S. Representative Thompson, believed the NAO's proposed

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[41] Carla Crandall, "Why Aren't We Using That Intel Stuff? Using Reconnaissance Satellite Imagery in Domestic Disaster Prevention and Response," *BYU Law Review*, no. 5 (2010), accessed September 5, 2017, https://digitalcommons.law.byu.edu/cgi/viewcontent.cgi?article=2559&context=lawreview.

[42] Ibid.

procedures lacked sufficient protections for the privacy of U.S. Persons. He delivered an opinion stating, "The legal framework for all domestic imagery collection, whether for disaster planning or law enforcement, should be completed as a seamless package so privacy and civil liberties are approached holistically and not haphazardly."[43]

In light of past abuses by the DoD intelligence community, this cautionary default may seem warranted. But, it comes at the cost of being able to respond to a crisis with the speed and precision that could save lives. "More to the point, there does not appear to be a PCA violation for domestic imagery confined strictly to disaster preparation and response. . . . By its terms, the PCA only limits military participation in law enforcement activities."[44] Incidental U.S. Persons' Information collection is anticipated when conducting IAA in an emergency response. The Joint IAA Training course Guardsmen must complete prior to conducting IAA collection specifically addresses how to properly handle, store, disseminate, and destroy domestic imagery containing U.S. Persons' Information. Were a U.S. Person to allege unreasonable search and seizure under the 4th Amendment, an adjudicating court would have to weigh the value of the imagery collected against the U.S. Persons' privacy interest. As long as the collection authority can demonstrate requesting the collection in response to an emergency declaration, following proper safeguards to protect the U.S. Persons' Information and that no U.S.

[43] Crandall.

[44] Ibid.

Persons were targeted in the collection, it is unlikely that a court would rule that that collection violated the 4th Amendment.[45]

IAA Practical Application and Considerations

Collection is only as valuable as the interpretation possible with the resultant imagery. Some collection methods require a much more robust PAD Architecture than others. For example, with a Synthetic Aperture Radar (SAR) image, it is possible for an untrained observer to misinterpret shades and shapes. SAR is very beneficial in a flood response because of its ability to penetrate inclement weather. If an observer mistakes a shadow for a body of water in a flood response, resources may be misdirected, or not committed when and where needed. Conversely, EO/IR images with a high National Imagery Interpretability Rating Scale rating do not usually require specialized training to make accurate interpretations. In any collection activity the staff has a responsibility to only disseminate information to a commander that will facilitate utilization.[46] Doing otherwise, may generate more questions than answers, slowing decisions and response activities. This principle is at the heart of the difference between imagery and intelligence. Imagery is simply what comes from the sensor. Intelligence is, in this context, imagery that has been interpreted, addresses specific questions pertaining to the response and answers the commander's PIR.

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[45] Crandall.

[46] Jason B. Mitchell, "Persistent Intelligence, Surveillance, and Reconnaisance (P-ISR): Debunking the Myth, Establishing the Concept, and Achieving the Possible" (Master's Thesis, U.S. Marine Corps Command and Staff College, Quantico, VA, 2011).

Approaching IAA from the perspective of answering questions is essential. Too often analysts have found themselves in a conundrum, unable to disseminate imagery due to lack of system interoperability,[47] imagery classification,[48] ownership issues, or any number of other impediments. Returning to the example of SAR imagery in a flood response, if the SAR sensor is on a satellite with classified capabilities (as is most often the case), responders may still be told whether a given route into or out of the incident area is useable without viewing or disseminating the image. The choice between showing a commander an image and not answering the PIR is a false dichotomy.

In the practical application of IAA, another common false dichotomy is between commanders owning the collection platform and having their priorities addressed.

A *Joint Forces Quarterly* article co-written by then Lieutenant General Raymond Odierno described how early in the Iraq War the 72-hour Air Tasking Order cycle posed a problem:

> Ground commanders could not plan operations around ISR availability; instead, they submitted requirements and then waited to find out if they would get echelons above division (EAD) coverage. At best, they would know 72 hours out if they had been allocated a Full Motion Video (FMV) asset; at worst, they would find their asset pulled at the last minute to support a higher priority corps requirement.
>
> General Odierno and his coauthors go on to assert that 'the counter-insurgency environment's decentralized nature makes it imperative that ISR asset control, from tactical through theater level, be pushed to the lowest possible echelon' as doing so enables commanders to seize the initiative and 'take advantage of fleeting opportunities.'

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[47] Jennifer P. Sovada, "Intelligence, Surveillance, and Reconnaissance Support to Humanitarian Relief Operations within the United States: Where Everyone is in Charge" (Paper, Joint Military Operations, Naval War College, Newport, RI, 2008).

[48] Mitchell.

> That said, with enough coordination and joint planning, centralized theater control and decentralized execution can approach the level of support afforded by organic control.[49]

Applying the same logic to domestic operations, there may be many instances when National Guard responders could have their collection requirements satisfied by active duty platforms, U.S. Coast Guard platforms or any number of cross agency assets. Ownership is not essential to utilizing regional assets, however, pre-event coordination and exercises are imperative to ensure effective communication, integration, economy of force, deconfliction and cross queuing. These efforts are a fantastically demanding undertaking. Any of the 54 National Guard commands seeking to leverage these assets will need individuals within the full-time staff dedicated to liaison, planning and coordination. Although, full-time manning resources and workloads of the National Guard are outside the scope of this research, therein lies the biggest impediment.

In domestic response operations, often it is not possible for the needed asset to be owned by the National Guard. For example, in the event of a chemical spill over a widespread area where ground maneuverability prohibits National Guard Civil Support Teams from sampling and identifying the agent(s), aerial surveys are the best way to identify and measure the contaminants. As of this writing, the most capable asset for the task is the Airborne Spectral Photometric Environmental Collection Technology operated by the Environmental Protection Agency. It has the ability to passively survey, reliably identify, and measure the IR signatures of a wide variety of Chemical, Biological,

[49] Garry S. Floyd, "Airborne Intelligence, Surveillance, and Reconnaissance: Mission Command and Centralized Control" (Monograph, School for Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2013).

Radiological, and Nuclear agents from a safe distance. This one-of-a-kind aircraft is not well suited to federal military missions. Even if such a system were available for acquisition by the National Guard, its highly specialized nature is not appropriate for the dual roles and diverse range of missions the National Guard is called upon to perform.

Conducting cross agency coordination for specialized requirements such as Light Detection and Ranging (LIDAR), Hyper-Spectral Imagery and others is the logical approach, but only for highly specialized requirements. General (Retired) Odierno's concerns as stated in Floyd's research above are echoed and amplified in domestic operations. As a matter of practicality, "to be of operational use, intelligence must be timely, accurate, usable, complete, relevant, objective, available, and disseminated to those decision-makers and interagency operators who need it for successful [Homeland Defense] and [Civil Support] operations."[50] Issues such as asset availability, collection priorities, necessary sensor capabilities, and applicability to both the Guard's domestic and federal missions present a strong case for organic collection platforms. These platforms must be rapidly deployable and flexible enough to address the diverse mission sets the National Guard performs.

One such mission, which requires substantial flexibility, is the Counter Drug Task Force. "In 1989, Congress created the National Guard Counterdrug Support Program in the National Defense Authorization Act and directed the National Guard to provide

[50] Mark L. Coble, "National Guard Intelligence Support to Domestic Operations" (Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2009).

counterdrug support to local, state, and federal law enforcement agencies."[51] The mission was to provide support to law enforcement, not conduct law enforcement. When the National Guard conducts aerial reconnaissance in support of Law Enforcement Officers performing counterdrug missions, the Law Enforcement Officer must be either present or in direct communication with the aircraft. Law Enforcement Officers are authorized to fly onboard the aircraft if the mission and aircraft allow.[52] Also, in this sensitive collection effort where U.S. Persons are often the target, the supported Law Enforcement entity conducts the Processing Assessment and Dissemination. The imagery will pass through the National Guard's possession, but may not be retained by Guardsmen or stored on National Guard systems.

Whether in support to law enforcement or in response to disasters, there is a growing demand for the capabilities UAS can provide. Many of the most common sensors in use by manned platforms are also available on a UAS. Not only can UAS perform the same detection, but can do so with increased loiter time while keeping pilots at a safe distance (as may be beneficial in a Chemical, Biological, Radiological, and Nuclear environment). However, there are some practical operational constraints to using them in response to domestic operations beyond the requirements listed in chapter 1 such as Secretary of Defense approval for their use and for the Proper Use Memorandum. In addition to the added coordination with the FAA, there are strong public sensitivities

[51] Coble.

[52] National Guard Bureau, NGR 500-2, *National Guard Counterdrug Support* (Arlington, VA: National Guard Bureau, 2008).

specifically directed against UAS being used domestically.[53] For safety of flight the FAA may require a chase plane to maintain visual contact with the UAS and be in communication with the UAS pilot to mitigate the risk of mid-air collisions. None of this is insurmountable, but should be considered when developing the IAA collection plan.

Summary

This chapter reviewed relevant literature on the topic of National Guard IAA collection divided into three topic sections. The first was the role of the National Guard. It described the Guard's evolution from the regional militias to what it has become, why, and how. Understanding these roles helps inform the present missions of the National Guard and, thereby, understand the imagery collection capabilities needed.

The second topic was cultural and legal considerations of IAA. It described the origins of the Posse Comitatus Act. In the interest of protecting Americans' right to personal privacy, many legal restrictions and strict collection procedures have been implemented when incidental collection of U.S. Persons' information is possible. Current literature on the topic adequately describes the historical problems and present laws, but falls short of informing a National Guard commander on what he or she may do, what these laws mean for the roles of the Guard, or informing the collection capabilities needed.

The IAA practical application and real-world considerations were the third topic. This section described the considerations and requirements when certain kinds of

[53] Stephen J. Guerra and Michael J. McNerney, *Air National Guard Remotely Piloted Aircraft and Domestic Missions Opportunities and Challenges* (Santa Monica: RAND Corporation, 2015).

collection are used in response to domestic emergencies. It briefly covered the occasional necessity of coordinating for cross agency support and active or reserve support for specialized collection capabilities. It also discussed some of the downfalls of relying entirely on outside coordination to satisfy the informational requirements of a responding force. Lastly, it covered some practical considerations when conducting law enforcement support and using UAS. The next chapter describes the method used to analyze a data set of disasters which the National Guard could be requested to support.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

This Thesis describes the National Guard's information collection needs in response to domestic emergencies. This chapter's first section describes the data which were analyzed, why these data were selected and how they have been interpreted for this research. The second section describes the Scenario Analysis research method, why the author selected this particular method and how the method was adapted to address the research question using the sampled data. The final section of this chapter includes challenges to validity. This section covers the several alternate methods considered, why they were not implemented and the drawbacks to using Scenario Analysis for this purpose.

The Sample Data

This research uses a sample of the Federal Emergency Management Agency (FEMA) record of emergency declarations (see Appendix A). The sample size was a five-year period with a date range of January 01, 2013 to December 31, 2017. A contiguous date range instead of samples was necessary to avoid skewing results by arbitrarily including or excluding major domestic events. The sample range is of the five calendar years directly preceding this research's publication, not because this is somehow representative of future disaster trends but because recent history is the most logical starting place for a discussion of present needs.

While records of past domestic emergencies are not necessarily indicative of the kinds and locations in the future, they are a valid starting place. Reasonable assessments can be drawn from the records. For example, it is reasonable to assess that because disasters such as fires, floods, and winter weather events frequent particular regions of the country that they will continue to do so in the future. Conversely, rare major disasters must be planned for to the extent possible, despite the fact that such events may not appear in these FEMA records. Examples of such disasters include a terrorist attack involving Chemical, Biological, Radiological, and Nuclear devices, a catastrophic earthquake in the Cascadia Subduction Zone in Oregon and Washington, or a major volcanic eruption such as Mount St. Helens.

These FEMA data are only a small sample of the kinds of missions for which the National Guard may be called upon to respond. They exclude natural disasters which did not receive federal declaration. For example earthquakes occur multiple times per week in some parts of the country, but rarely result in damage or overwhelm local response capabilities. The same is true of tornadoes. Less than 1 percent of the tornadoes which occur each year in the U.S. result in a federal disaster declaration. Contrariwise, the National Guard was certainly activated many times during the sample period for disaster responses which did not receive federal declaration. Such data would, obviously, not be included in this sample set but would still inform the needs of the National Guard. These FEMA data exclude National Guard support to law enforcement missions and Title 10 of the United States Code federal missions. These data are not intended to infer the National Guard was activated to respond to each of these disasters. The purpose of selecting these data was to describe the frequency with which various incident types occur and discuss

the kinds of collection needed to satisfy a commander's information requirements if the National Guard did respond.

The statistics listed in Appendix A are a direct data input of a text file pulled from the FEMA website. Appendix A lists the beginning and end dates of the disaster, the duration, the state in which the disaster was declared, a positive or negative data point for each incident type the declaration resulted in (indicated by a 1 for positive and empty cell for negative), and finally the declaration type. If a disaster was declared for a tribal government the state in which the tribe is located was substituted. The reason for doing so was, when a tribal government needs National Guard support, they request it through the state in which they are located.

In a sizeable minority of cases a single declaration resulted in multiple data points because one event may have met FEMA's criteria for several incident types. For example, from February 15 to 23, 2015 Kentucky experienced a single event which caused flooding, landslides, mudslides, severe winter storms and snowstorms. The net result is that over the five year sample period, FEMA recorded 388 disaster declarations which resulted in 760 data points for the incidents types.

The Federal Emergency Management Agency differentiates disasters into an extensive variety of incident types. There are 18 categories of incident types listed in the disaster declarations over the past five years. They were; (1) Severe Storms, (2) Flooding, (3) Landslides, (4) Mudslides, (5) Earthquakes, (6) Straight-Line Winds, (7) Hurricanes, (8) Typhoons, (9) Tornados, (10) Tropical Storms, (11) Volcanos, (12) Lava Flows, (13) Fires, (14) Wildfires, (15) Chemical Spills, (16) Chemical Explosions, (17) Severe Winter Storms, and (18) Snowstorms. FEMA draws fine distinctions between the types of

incidents presumably because the precise nature of the definitions aligns with their internal tracking and helps with accounting. For example, the differences between a landslide and a mudslide are immaterial from a collection and disaster response perspective, as are many of the differences between hurricanes, typhoons and tropical storms. The difference between a hurricane and a typhoon is geographically where it occurs. The difference between the two of them and a tropical storm is the intensity. For response purposes, the National Guard does not need such accurate delineation.

Moreover, retaining these finely delineated data points would skew the results of this research. For example, returning to the differences between landslides and mudslides, of the 32 landslide and 40 mudslide data points recorded, 16 were listed as only one or the other. Regardless if the incident was a landslide, a mudslide or both, from the perspective of collection management, the PIR and resulting data needed from the imagery will remain the same. Therefore, Appendix A will retain all of FEMA's data and be part of the permanent record of this research. However, for the purposes of analyzing the National Guard's informational needs in a response effort, immaterial duplications of data points have been eliminated prior to developing an assessment from the Scenario Analysis process. Appendix B is the resulting data which was analyzed. In Appendix B several Incident Types which are similar in nature have been combined into a single data point. For those disasters which FEMA recorded as more than one of the similar incident types, only one data point was retained. The incident types which were combined in Appendix B were; (1) Landslides and Mudslides, (2) Hurricanes, Typhoons, and Tropical Storms, (3) Fires and Wildfires, and (4) Severe Winter Storms and Snowstorms.

Even with consolidating similar events, some events are rare. Earthquakes, and Volcanoes each only received federal declaration one time during the sample period. Only four Chemical Spills received federal declaration. Regions which regularly experience a particular kind of disaster build up the infrastructure in such a way to withstand their effects, or are not built up at all. The danger for the states is when the rare catastrophic events occur. For example, areas of Hawaii which experience routine volcanic eruptions are not overwhelmed when they occur, but when Mt. St. Helens exploded in southern Washington it was the biggest disaster to ever hit the state. Local state planners and responders need to plan for rare catastrophic events but including them in this study does little to inform the National Guard's regular collection needs. Therefore, those three categories will be omitted from this Scenario Analysis process.

The Federal Emergency Management Agency's records are not complete in every case. In a small minority, the end date is missing from the disaster record. Without the duration figure, later calculations to determine the answer to the research question would not be possible. Because the disaster received federal declaration, the duration must have been at least one day. For the sake of having a workable dataset, when the end date was missing from a record the minimum possible value of one day has been substituted. Appendix B reflects this change along with further calculations to the data. In the cases when the duration was artificially made to reflect one day for the purposes of this research, the end date and duration cells were shaded grey in Appendix B.

In the bottom row, Appendix B also indicates the total disaster days broken out by incident type for the entire sample period and below that the annual average is calculated. To determine this number the duration of the declaration in column C was multiplied by

the value in columns E through O and tallied below. In this way, the annual average number of incident days, nationally, can be compared to the kind of sensors needed for each incident type as determined by the scenario analysis trees discussed next.

Research Method

Hsia et.al. described the scenario analysis research method in a March 1994 article titled "Formal Approach to Scenario Analysis." Their research was developed around requirements analysis for software development based on the needs of a user. As an example of the method, they demonstrated how they could map all possible conditions of a system based on user inputs. For this research, the same process has been applied to identify National Guard collection requirements based on the information needed in a variety of incident types. "Scenario analysis is the process of understanding, analyzing, and describing system behavior in terms of particular ways the system will be used. . . . The end product of scenario analysis is a document that consists of sets of correct, complete, consistent, and validated scenarios."[54]

In the research presented by Hsia et.al. they presented a telephone call being placed to a four-digit number. The caller could hang up at any point in the dialing process including after dialing a fourth digit. If the caller did not hang up during or after dialing, the three remaining options were to receive an error message, a busy signal, or a ring tone. If the caller received a ringtone and the callee picked up or the phone went to voice mail the call would be connected. The scenario tree continued thusly through all possible

[54] Pei Hsia, Jayarajan Samuel, Jerry Gao, David Kung, Yasufumi Toyoshima, and Chris Chen, "Formal Approach to Scenario Analysis," *IEEE Software* (March 1994): 33-40.

scenario outcomes until eventually the only available result was the phone being replaced on the hook. Within their scenario tree, each node represents a state of the system, while the events or decisions which lead to those states were represented by a connecting arm, which they referred to as an edge.[55]

For this research, a separate scenario tree was developed for eight of the incident types in Appendix B. The phone on the hook in the example, is akin to National Guard steady state operations. The first node was the disaster represented by the incident type. Successive nodes represent conditions within a state leading to IAA collection. The edges (connecting lines between nodes) represent decisions by state leadership leading to the next condition. With the first event being true (the disaster strikes) in order to enter the scenario, the second level is a binary choice. In the first choice the local first responders were overwhelmed. In the second, they were not. In every incident listed in Appendix B local first responders were overwhelmed. That is a precondition to receiving federal declaration. The scenario tree develops through successive possible choice patterns to create sets of correct, complete, consistent and validated scenarios.[56] Each of the scenario trees follows a similar pattern: The incident occurs, the Guard responds, as part of the response the Guard conducts IAA based on probable PIR for the incident type. The nodes following the list of probable PIR represent necessary sensors to provide the information the National Guard requires during that incident type. It would have been possible to continue the scenario tree to its conclusion as did Hsia et.al. If done, the scenario trees

[55] Hsia et al.

[56] Ibid.

would have concluded when all collection was complete and the Guard returned to steady state operations. Those additional steps were omitted from these scenarios because they do not inform the topic of this research. The scenarios did not include platforms (manned or unmanned aircraft) which carry the particular sensors. This study was intentionally platform agnostic because making a case for specific mission bed down in the National Guard is outside the scope of this research.

With a scenario tree developed for the eight common incident types listed in Appendix B, it was possible to deduce the approximate number of needed sorties of each sensor type averaged over a single year. For example, FEMA listed 143 severe storms over the sample period. If the National Guard responded to each, conducted IAA for each, every disaster lasted only one day, and all the information the National Guard needed to support the response could be collected in a single sortie flying a single sensor, the minimum need is approximately 29 sorties per year (143/5=28.6). If each aircraft can fly once per day, the value in columns E through O of Appendix B can be used to infer the number of sorties needed for each sensor category in response to a specified type of disaster response.

The vast majority of sensors which produce EO still imagery are also able to produce IR still imagery and Full-Motion Video (FMV) feeds in either EO or IR settings. There are a few exceptions (notably the U-2 using its Optical Bar Camera). However, for the purpose of this research, EO/IR/FMV capable sensors have been consolidated into a single category in the scenario trees. That category is simply called “Optical” collection.

Two alternate research methods were considered for this effort. They were Process Tracing and conducting a Comparative Case Study. In the Process Tracing

design, the intent was to determine the corporate process of assigning flying missions to the National Guard in order to assess whether any system improvements could be identified and recommended by this needs-based effort. This method of determining the needs of the National Guard proved untenable. As far as could be determined, no such formal process exists to determine a needs-based approach to assigning flying missions to a particular state. The competitive process for states seeking assignment of a particular mission is based on the needs of the active duty Air Force and is heavily influenced by political and national strategic needs. The intent behind the Comparative Case Study was to sample several states which face similar kinds of natural disasters, law enforcement situations and other circumstances. By sampling the needs of these states, the scientific process could compare the assets missioned in these states and assess the effectiveness and appropriateness of these assets for the particular mission set.

Challenges to Validity

Conducting this scenario analysis effort instead of the two methods above broadens the scope from a small sample of states' needs to those of the whole country. At the same time, it develops the necessary preparatory work for a needs-based assessment of the National Guard's corporate process for missioning.

There were, however, some drawbacks to this method. Neither the NGB nor any of the states polled for this effort could supply records of the frequency with which the National Guard was called upon to respond to domestic disasters such as those listed in Appendix A. Therefore, this effort has been completed without the aid of historical Guard response records. Because the FEMA data being used does not specify a corresponding Guard response rate, empirical estimates must be substituted. If a disaster exceeded the

response capabilities of the county, the state, and the capacity of state to state support, thus requiring a federal disaster declaration and federal response, it is far more likely that National Guard support was requested than not. For the sake of analysis and as a place to begin the conversation on the National Guard's collection needs, an assessed Guard response rate of .8 has been applied. Absent the historical response records of the National Guard for comparative purposes, this is a reasonable assessment. The actual response rate may be as high as .9 or as low as .7 but the trend results would not change by adjusting the rate. That is, if the results of this Scenario Analysis point most prominently to one sensor over another, changes in the response rate will only increase or decrease how much that particular sensor is needed to fulfill the Guard's domestic response requirements. This study relies on experiential data to draw conclusions from the historical records. If quantitative data are applied to this method later, the outcomes may be different. However, it is unlikely the conclusions would.

Summary

Chapter 3 described the steps taken to gather FEMA statistics on declared disasters and how those data were tallied and interpreted to best answer the research questions. This chapter also described the feasibility of, and reasons for selecting, the scenario analysis research method. Lastly, it described how the end products of the scenario analysis method were compared to the frequency and duration of natural disasters to conclude the approximate number of sorties divided by sensor type needed for the National Guard's domestic missions. Chapter 4 will apply this method to the FEMA data and answer the research questions.

CHAPTER 4

ANALYSIS

Introduction

The purpose of this research is to determine the imagery collection capabilities the National Guard needs to conduct its domestic emergency response missions. This chapter describes the separate scenario analysis trees for each type of disaster listed in Appendix B. The results of the scenario analysis process identify those sensors most beneficial to responding in each specific category of disaster. These results were compared against the duration of each incident type to describe the potential annual usage rate of each kind of sensor. As was mentioned in chapter 3, sensors capable of producing electro optical, infrared, and full-motion video imagery are referred to simply as Optical.

Severe Storm

Severe Storms were the second most common incident type FEMA recorded as having received federal declaration over the sample period. At 143 declarations the average was more than two per month. The U.S. spent 317 days per year on average responding to severe storms. As with all the scenario trees the severe storm tree has six levels (see figure 1). The root node, steady state operations, is not pictured. This is when the National Guard is available for tasking, but not activated. Level 1 depicts when the event occurs, in this case a storm was so severe and destructive it overwhelmed county, state and available inter-state support, thus receiving federal disaster declaration. From the system condition where a severe storm has received federal declaration, two possible conditions follow. An edge (connecting line) indicates the decision point which

progresses the system to the next possible set of conditions. In Level 1 an edge descends from the state of a severe storm to one of two possible nodes in Level 2. In the first case, civilian responders are not overwhelmed and the National Guard remains at Level 0. In the second case, civilian responders were overwhelmed requiring outside support.

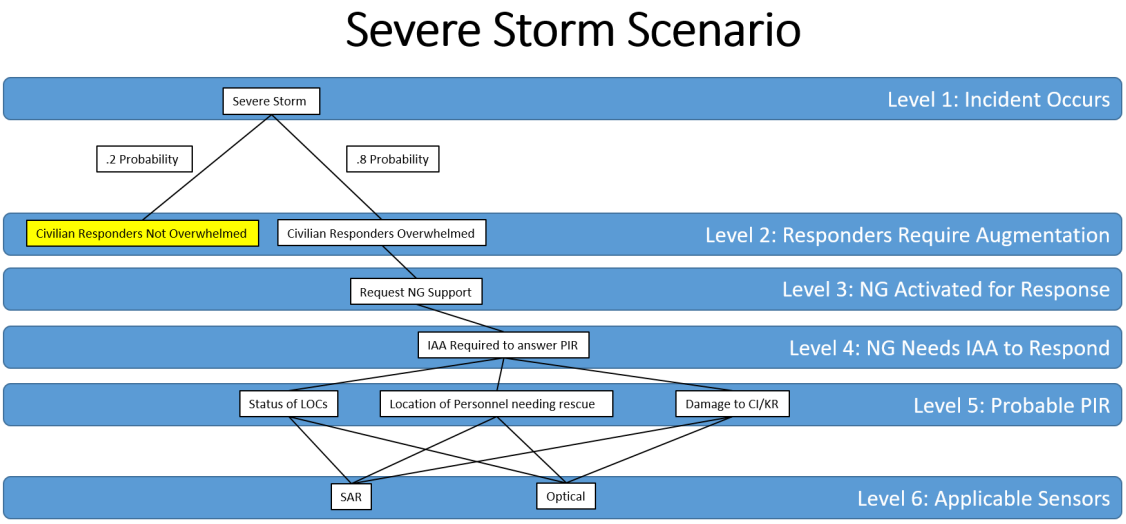

Figure 1. Severe Storm Scenario

Source: Created by author.

In the Scenario Analysis example produced by Hsia et.al., their intent was to communicate all possible conditions of a software system. In this application, the intent is to show the probability of entering a chain of events which leads to the National Guard needing to conduct IAA collection and what sensors are most needed for the task. Whether the collection occurs or not is immaterial to identifying what needs to be known and how to determine it. If civilian responders are overwhelmed and the National Guard is activated to respond, the Probable PIR listed in the Scenario Tree are a reasonable

starting place upon which the state director of intelligence can expand as the situation dictates. In the case of a severe storm the three probable PIR were: the status of lines of communication (i.e. routes of ingress—egress), locations of personnel needing rescue and damage to CI/KR. In this scenario, all three PIR could be collected against using either an optical sensor or synthetic aperture radar. Therefore, the PIR listed in Level 5 each have one edge between them and the sensors in Level 6. The six edges represent decision points which may change from one day to the next during a response, or potentially more than one sensor could be tasked on the same PIR in a different area. This outcome gives the commander the most flexibility in applying available IAA geographically to maximize coverage within the areas of interest.

The three PIR for this scenario are standard practice within domestic IAA operations. Status of lines of communication are a necessary piece of information during a response operation because, should they be blocked it impedes responders' ability to enter the affected area to bring rescuers, medical supplies, food, heavy equipment, etc. They would also no longer be able to resupply themselves or remove victims and debris from the affected area. Optical sensors have proven to be effective at determining whether Lines of Communication (LOC) are clear and useable. However, in a severe storm, inclement weather may preclude those sensors from effectively collecting on the LOC in question. SAR is able to penetrate inclement weather, but without a high image clarity rating, the results may not be useful in determining answers to the PIR.

Because of the infrared signature given off by humans, IR still imagery and IR FMV are tremendously effective at locating personnel needing rescue. Electro Optical and SAR are useful as well, but people may not be as readily discerned in the imagery.

CI/KR include structures such as bridges, water treatment facilities, hospitals, power plants etc. If the affected area is communications degraded, or if ground responders cannot make a damage determination, aerial imagery may be the most effective way to determine if a particular CI/KR site is damaged.

When all PIR are answered, the IAA collection may cease. This may take weeks or even months, depending on the severity and extent of the storm damage. The commander may update PIR and adjust sensors as the response continues until all PIR have been answered or response operations conclude. At which point the National Guard returns to steady state operations.

The other scenario trees followed similar logic paths and were arrayed in the same six levels. The differences lay in the PIR a commander would need answered for the incident type and the sensors that would be needed for collecting that information.

Flooding

Flooding was the most commonly recorded incident in the five year sample set. At 172 instances, the average was nearly three floods per month of sufficient severity to receive federal disaster declaration. The U.S. averaged 454 days of federally declared flood response operations per year during the sample period. The three PIR from the previous scenario tree were still applicable to a flooding scenario (see figure 2). LOC status, location of personnel needing rescue, and damage to CI/KR could still be collected against using Optical sensors and SAR.

Furthermore, in a flooding scenario the commander would need to know the location and extent of flooding and whether the floodwaters were advancing or receding. To collect on this, Optical sensors and SAR would be useful, but the best tool is LIDAR.

In addition to location and extent of a flood, it has the ability to measure the depth of flood water. Therefore LIDAR is also beneficial in helping determine if LOC are still fordable. Floodwaters crossing a roadway with a depth of only a few inches do not usually render the LOC unusable. However if flooding has exceeded the fording ability of responding military vehicles, the commander would need to know.

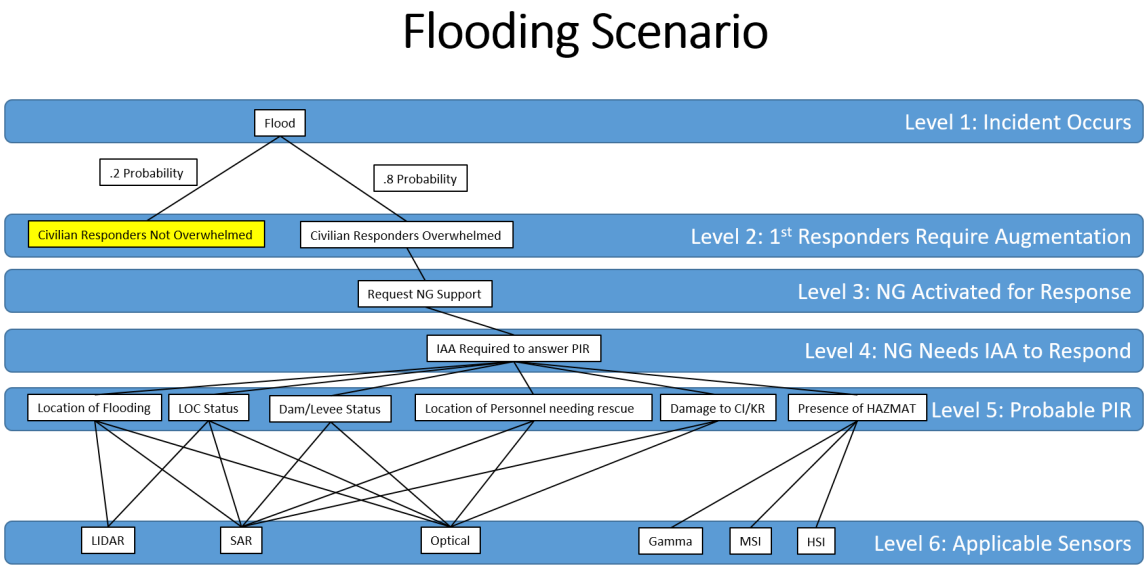

Figure 2. Flooding Scenario

Source: Created by author.

Floods can overload a dam or levee's maximum capacity causing them to lose structural integrity. Also, debris traveling with floodwater can strike a dam or levee and reduce its integrity. If a dam or levee fails, the results may be catastrophic. Timely damage detection is critical to saving lives and limiting property damage.

Flooding may generate a biohazard zone. Either by the presence of decomposing organic tissues in the water, naturally occurring bacteria in the area which become

exacerbated by the presence of floodwater, or if other contaminants such as waste water combine with floodwater. Hazardous chemicals may also accidentally be released into floodwaters. To detect the presence of Hazardous Material in floodwaters gamma detection, Multi-Spectral Imagery or Hyper-Spectral Imagery may be employed.

Landslides and Mudslides

There were 44 federal disaster declarations for landslides or mudslides during the sample period. The average number of days spent responding to these events was 117 per year. In the event of a landslide or mudslide all the same sensors are likely to be useful as with a flooding scenario except SAR. Initially optical sensors and possibly LIDAR will be useful in measuring the extent and depth of the slide (see figure 3).

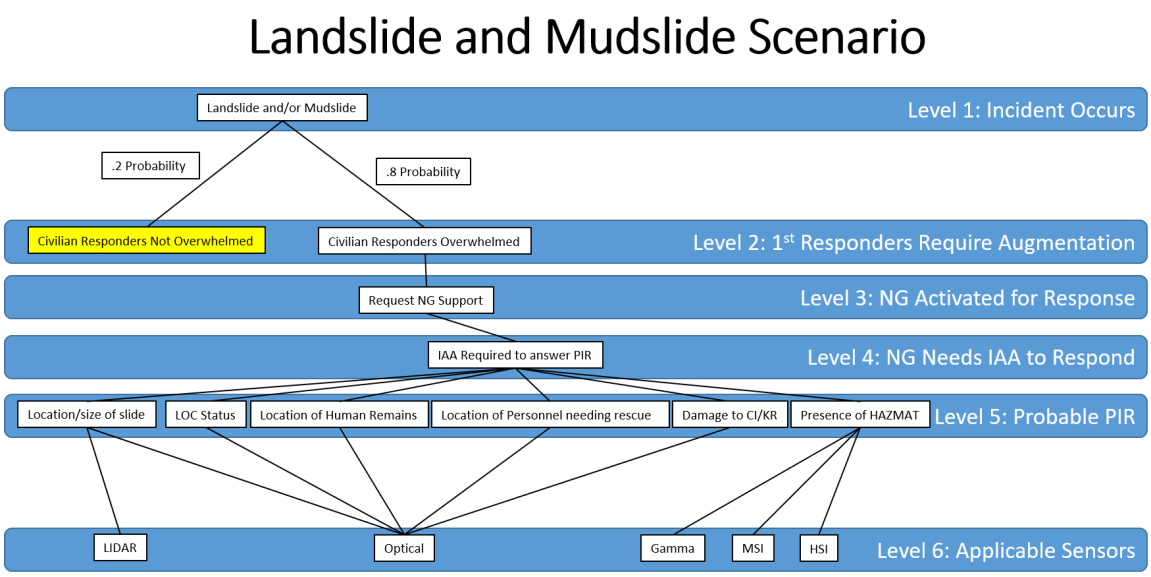

Figure 3. Landslide and Mudslide Scenario

Source: Created by author.

If any people perished in the slide the human remains will need to be located and recovered. This is a very difficult task. First the IAA cell will need to overlay the pre-slide location of the structures which were destroyed, roadways which were active at the time, public gathering places or other sites where it was likely people were located during the slide. Using the initial EO/IR/FMV and LIDAR imagery, contour Geographic Information System data, etc. the IAA cell must assess the new locations where the human remains will most likely be recovered. The PIR for the presence of Hazardous Material and any damage to CI/KR are the same as with the previous scenario.

Within the first 72 hours it is possible to recover victims of a slide who were trapped but did not perish. After 72 hours, the likelihood of a trapped victim surviving without a source of water decreases substantially. IR imagery is the most capable for this task because of its ability to detect a human IR signature. Once detected, Electro Optical imagery and FMV can provide responders finer details than would otherwise be apparent in the IR returns.

Straight-Line Winds

At 61 recorded events over the five-year sample period an average of one straight-line wind event received federal declaration per month (see Appendix B). Given the length of time to respond, the U.S. averaged 155 days per year conducting emergency recovery operations from this kind of event. This category of storm can cause tornado-like destruction but span a very wide area. The PIR which would be applicable to this incident type have been discussed in previous incident types: LOC status, dam or levee status, location of personnel needing rescue, damage to CI/KR, and presence of hazmat (see figure 4). Useful sensors for these PIR include optical, Multi-Spectral Imagery, and

Hyper-Spectral Imagery. However, the methods used to collect would differ in that a wider area of search than previous incident types would correlate to either faster moving and-or higher flying assets, including possibly, a greater reliance on space-based collection capabilities.

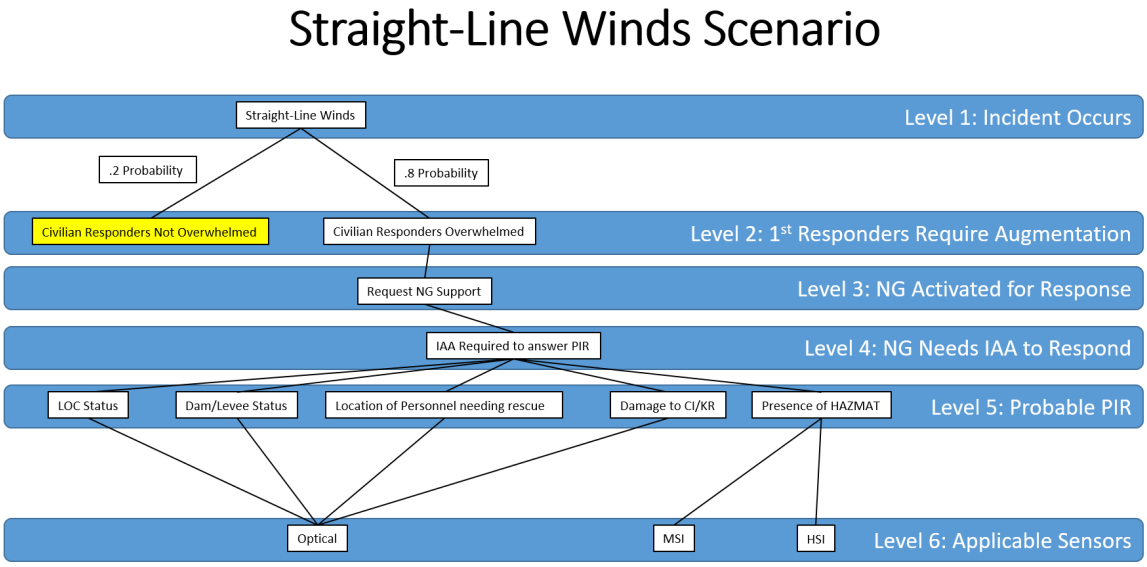

Figure 4. Straight-Line Winds Scenario

Source: Created by author.

Tropical Storm—Hurricane—Typhoon

Tropical Storms, Hurricanes, and Typhoons averaged two federal declarations every three months over the sample period. This correlated to an average of 117 days per year conducting emergency recovery operations from these kinds of disasters. When severe enough to receive federal declaration, these events almost always caused flooding in the affected area. The probable PIR within this scenario tree, along with the applicable sensors to collect on them, have been described in previous scenario trees (see figure 5).

Similar to straight-line winds, when these storms are so severe they receive federal declaration, they will also span a very wide area. High-altitude platforms and wide aperture sensors will be very useful in the recovery efforts.

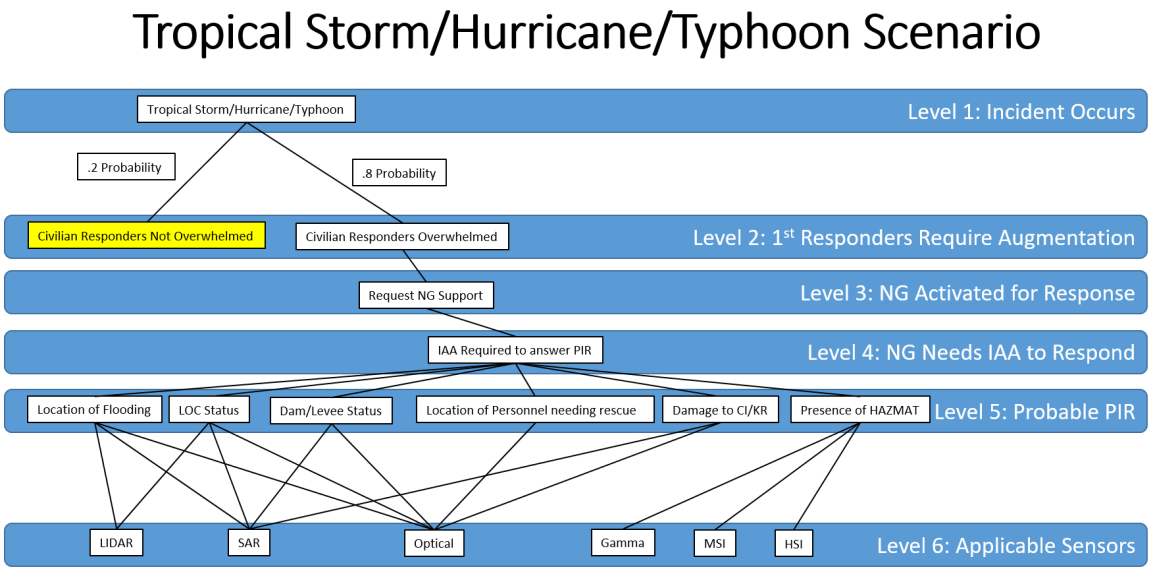

Figure 5. Tropical Storm/Hurricane/Typhoon Scenario

Source: Created by author.

Tornados

The U.S. experiences the highest number of tornados of any country in the world with an annual average of 1,253.[57] It is rare, however, that a tornado results in such extensive damage to property and infrastructure that it would receive federal disaster declaration. Areas of the country which experience regular tornadoes are prepared to

[57] National Oceanic and Atmospheric Administration, "U.S. Tornado Climatology," accessed March 25, 2018, https://www.ncdc.noaa.gov/climate-information/extreme-events/us-tornado-climatology.

respond. The average number of tornados which received federal declaration was approximately one per month (see Appendix B). Therefore, less than 1percent of tornados in the U.S. results in federal disaster declaration. However, this 1 percent results in an average of 161 days per year under federally declared emergency recovery efforts.

Because the path of a tornado is typically very small, collection targets common to other incident types may or may not be applicable. Probable PIR for this scenario tree includes LOC status, the extent and location of the damage, location of personnel needing rescue, damage to CI/KR, and presence of hazmat (see figure 6).

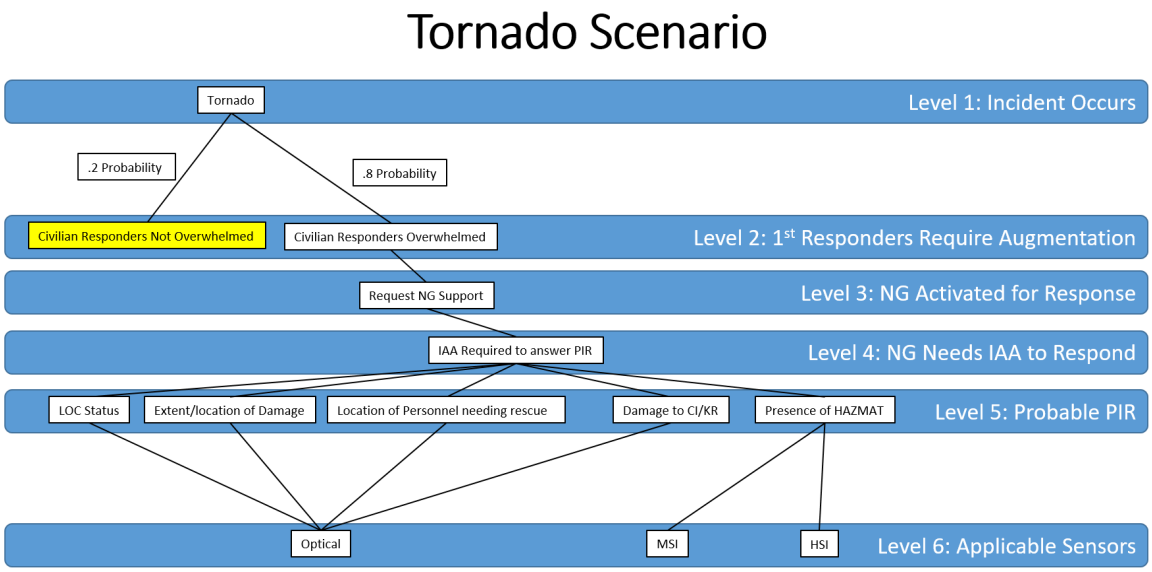

Figure 6. Tornado Scenario

Source: Created by author.

Fires and Wildfires

One of the most common incident types to receive federal declaration over the sample period was fires and-or wildfires. At 110 recorded declarations over the five

years, the average was just under two per month (see Appendix B). That rate of incident declarations translates to an average of 239 days per year of responding under emergency conditions.

If the National Guard conducts IAA in response to being called up for a fire response, in addition to many of the PIR which have been discussed previously, the location of fire lines and-or hot spots outside the containment zone would need to be determined (see figure 7). IR still imagery will be one of the most beneficial sensors for detecting that information. Taken at regular time intervals and layered or combined into a single graphic, the IAA cell can determine the direction and rate of advance for any uncontained fires. If the IAA cell has the technical knowledge to do so, translating the IR still imagery into a geo-referenced shape file can communicate all the necessary information to fire crews and cut down tremendously on the amount of bandwidth needed to share the imagery. Adding time stamps and sequencing the imagery to show the direction and rate at which the fires are traveling not only tells a commander what communities or infrastructure will be threatened by advancing fires, but also estimate the time available and best route for evacuation.

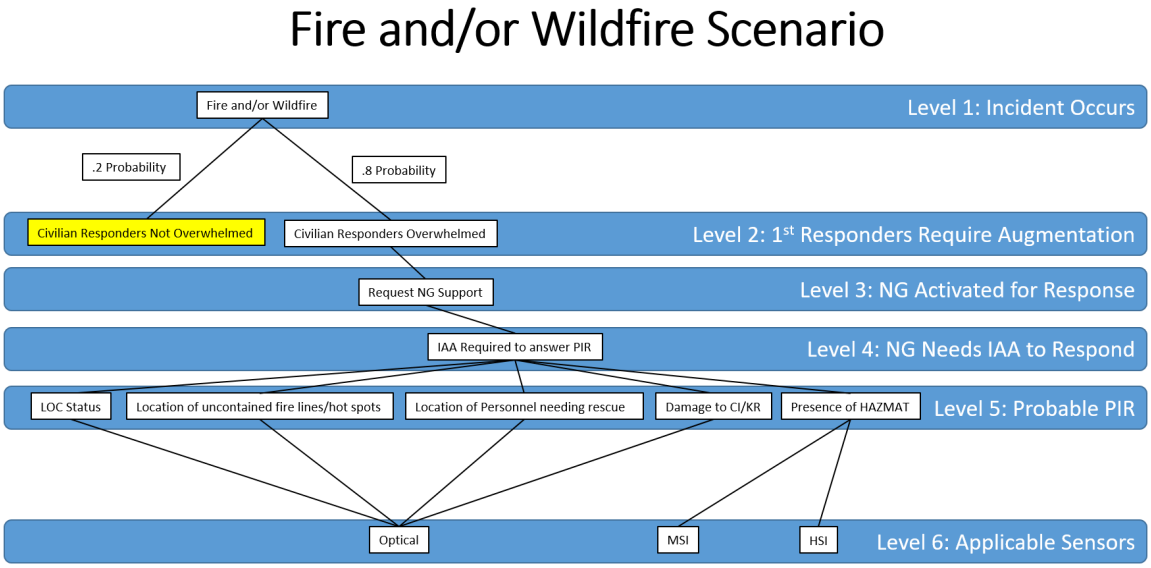

Figure 7. Fire and Wildfire Scenario

Source: Created by author.

Severe Winter Storms and Snowstorms

The final incident type which has been included in this analysis is Severe Winter Storms and Snowstorms. Blizzards are included in this tally. There were a total of 41 data points in this category equating to a rate of approximately two declarations every three months (see Appendix B). On average the U.S. spent 91 days per year responding to winter weather events that were so severe they received federal emergency declaration. Airborne IAA collection may be extremely difficult during these events. Due to the high risk of icing on aircraft wings, IAA sorties may be delayed or cancelled for safety of flight. However, ground transportation is, perhaps, most impeded during these disasters than during any other category examined for this research, making aerial collection all the more important.

The three probable PIR for winter weather events are status of LOC, the location of personnel needing rescue and damage to CI/KR (see figure 8). Because inclement weather was the cause of the emergency declaration, optical sensors may not be effective in cloud cover or dense precipitation. While SAR is able to penetrate inclement weather, it may be difficult to detect the needed information from SAR imagery.

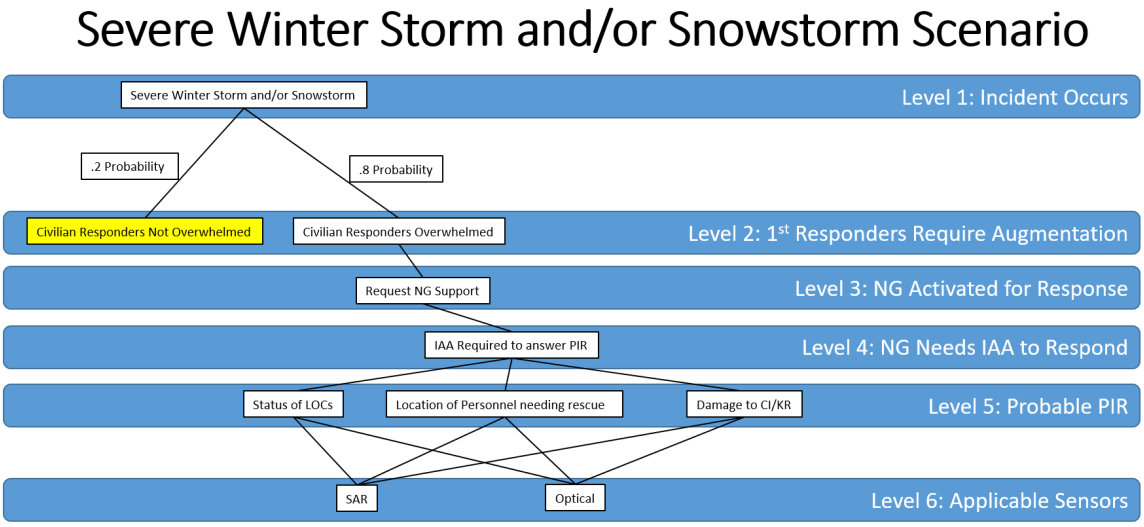

Figure 8. Severe Winter Storm and-or Snowstorm Scenario

Source: Created by author.

Primary Research Question

The purpose of this thesis was to analyze the imagery collection needs of the National Guard. The primary research question is, what imagery collection capabilities does the National Guard need to fulfill its domestic emergency response missions? This research is not intended to advocate in favor of, or against, any particular platform, mission or aircraft, but rather to be an assessment of needed capabilities and how they

would be applied in domestic emergencies. As described in chapter 3, the scope has been limited to events which received federal disaster declaration. In the case of each, the researcher made reasonable assessments of probable PIR and useful sensors for detecting the needed information that could enable the response.

Table 1 compares the categories of sensors on the X axis and kinds of disasters on the Y axis. The total duration, in days, for each kind of disaster listed in Appendix B are recorded as a data point under each type of sensor needed to respond to that particular disaster as determined in the Scenario Analysis process. The third from the bottom row tallies all sensors needed by totaling the number of days each sensor capability is needed. Below that row the annual average is calculated by dividing by five years. Finally, the last row displays the assessed annual need based on a National Guard response rate of .8 to one day of federally declared disaster. If each sensor can fly only once per day, this total number of days reflects the approximate number of sensors needed to respond to the disasters recorded in Appendix B.

At the conclusion of the scenario analysis process, the first observation is that in all incident types which received federal declaration, optical sensors were most frequently needed. Depending on the incident type there may have been more sensors which would be of benefit, but EO/IR/FMV sensors were most common by a wide margin. Mathematically, if the National Guard were requested at a rate of .8 responses to one federally declared disaster day, the total number of needed optical sensor sorties comes to 1320 per average year. The next highest data points were Hyper-Spectral Imagery and Multi-Spectral Imagery sensors (typically only one or the other is necessary to detect contaminants in a disaster area). At the same .8 response rate, the total number

of contaminant detection sorties needed per year comes to 994. SAR sensors were the third most needed category to meet the requirements of the National Guard's domestic missions. The average number of needed SAR sorties came to 783 per year at the same .8 National Guard response rate. Finally, LIDAR and Gamma detection both came in at 550 sorties per year using the same Guard response rate (see table 1).

Table 1. Duration of Disasters Compared to Sensors needed to Respond

Duration of Disasters vs. Sensors Needed to Respond						
	Optical	SAR	HSI	MSI	Gamma	LIDAR
Severe Storm	1585	1585				
Flooding	2268	2268	2268	2268	2268	2268
Landslide Mudslide	585		585	585	585	585
Straight-line Wind	773		773	773		
Tropical Storm / Hurricane / Typhoon	585	585	585	585	585	585
Tornado	806		806	806		
Fire / Wildfire	1193		1193	1193		
Severe Winter Storm / Snowstorm	454	454				
Total of Sample FEMA Data	**8249**	**4892**	**6210**	**6210**	**3438**	**3438**
Annual Average	**1650**	**978**	**1242**	**1242**	**688**	**688**
Annual Need Given National Guard Response Rate of .8	**1320**	**783**	**994**	**994**	**550**	**550**

Source: Created by author, using calculation from FEMA data.

There is a strong case to be made that, at least the preponderance of collection platforms in the National Guard should be manned. This is not apparent from the scenario analysis process since the same EO/IR/FMV sensors can be mounted to unmanned and manned platforms alike. Since many of the same sensor capabilities are available to both platform categories, it is important to consider the advantages and disadvantages of the platforms themselves. How could UAS benefit the National Guard in performance of its dual missions? What of the disadvantages of operating UAS? The challenges of operating

UAS in response to domestic emergencies are not insurmountable, but have a high potential to slow the process down.

In most cases DoD UAS enjoy longer loiter times over the mission area. Loitering over a collection target is useful for developing patterns of life in federal counterterrorism operations overseas. It is also applicable in support to law enforcement operations domestically such as the counterdrug mission. The disadvantages, as was covered in chapters 1 and 2, include the fact that UAS may need to have a manned chase plane accompany it to-from the mission area. UAS's require Secretary of Defense approval for their domestic use and for the Proper Use Memorandum. A principle reason for both of these precautions is safety of flight. Not only because a UAS pilot has a very limited field of view, but because if the aircraft loses datalink it will follow a pre-determined course of action to attempt to reacquire communications with the ground station. If it is unable to do so, it will attempt to land at a predetermined airport. In the worst case, the aircraft will crash further burdening responders with recovering the aircraft and meeting the needs of the resulting safety investigation board and accident investigation board (while still responding to the domestic emergency). In the best case, it will be successful in returning to base. While doing so, the pilot will not be able to input flight commands to the aircraft. Having a large autonomously flying aircraft traveling through the national airspace, likely having lost its chase plane, is a tremendous safety of flight issue

The National Guard has dual federal and domestic response missions. The most appropriate sensor capabilities to nest with the National Guard, therefore, are ones which seamlessly lend themselves to both federal and domestic needs. From this research, it is apparent that EO/IR/FMV sensors are tremendously beneficial to domestic response

efforts. They are also in high demand federally. It follows, then, when discussing the imagery collection needs of the National Guard, to consider the advantages and challenges associated with different categories of aircraft able to meet the need.

From the FEMA disaster declaration data it is apparent that there is tremendous need for domestic collection capabilities. Table 1 compares the number of incidents which received federal declaration multiplied by the duration of each and produces a tally broken out by the kinds of sensors which help satisfy the typical PIR for the incident type. Because the sample data only represent natural disasters which received some form of federal declaration, they omit state or territory emergencies which did not receive a declaration but for which the response efforts could benefit from these sensors. It also does not account for support to law enforcement, exercises, training events, support to federal missions and many other reasons the National Guard may conduct collection activities. However, the data in table 1 are beneficial in comparing the relative value of certain sensor types to each other in order to create prioritizations and evaluate the National Guard's domestic collection needs.

Conclusion

In chapter 4 the records of federal disaster declarations for the five years prior to this study have been consolidated to eight statistically significant categories. A scenario tree was constructed for each of them and relationships between nodes and edges were explained along with supporting information specific to the incident type being described. Within each scenario tree the probable PIR were arrayed along with the IAA sensors which would be beneficial for collecting in support of the PIR. In order to address the research question, the number of incidents (frequency) was multiplied by the duration of

each incident over the sample period. This tally is included at the bottom of Appendix B. This product was, in turn multiplied by the probability the National Guard would be called upon to respond to the disaster in order to assess the kinds of sensors needed. The product of that calculation was then multiplied by the days per year each category of disaster declaration lasted. Algebraically, the process was ((frequency) x (duration))÷(5 years) x (sensors the Guard would need) x (assessed Guard response rate)=(annual National Guard collection capability needed).

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this thesis was to determine the imagery collection capabilities needed by the National Guard in order to fulfill its domestic emergency response missions. This chapter summarizes the conclusions and recommends future research.

Summary of Results and Implications

Chapter 1 described relevant background information significant to this research topic. It listed significant legal documents and their effects in assigning roles, responsibilities and missions to the National Guard. It described the IAA process and how the National Guard conducts domestic imagery collection in response to disasters along with some of the protections in place to safeguard U.S. Persons' Information while doing so. Lastly, because UAS are such a rapidly expanding segment of imagery collection, chapter 1 described the requirements of using UAS in support of civil authorities.

Chapter 2 reviewed the relevant literature on three topics closely related to the thesis. It described the roles of the National Guard. It addresses the cultural sensitivities, standard practices and legal considerations surrounding IAA collection. Finally, chapter 2 reviewed several works which described shortcomings, needs and issues facing the ISR/IAA community.

Chapter 3 outlined the research method. It described the sample data, why it was selected and how it would be used for this thesis. It described the Scenario Analysis

research method and how it was adapted to determine the sensors most needed to respond to a variety of disasters. Finally, chapter 3 described drawbacks to using the research method and alternate methodologies considered.

Chapter 4 described how the standard PIR for eight different disaster types help the National Guard meet its requirements to respond when called in an emergency. It correlated the relationship between the needed information and how to determine that information using IAA collection. Chapter 4 tallied the number of total days for each disaster declaration to illustrate how often, using a categorical sample set, sensors are needed for recovery efforts.

This method of assessing the National Guard's needs is not able to address the question of how many of a particular kind of sensor ought to be part of the National Guard inventory. For instance, as was stated in chapter 4, the average number of days spent under a federal disaster declaration for fire response was 239 per year. However, for most states, the fire season begins in May and ends in September. It is not uncommon for multiple fire complexes to receive federal fire management assistance declarations in the same state, let alone the entire country. A single aircraft is not able to collect on such geographically separated simultaneous events. Conversely, in several cases a single PIR could be addressed by multiple categories of sensors. For example, in a flood, the commander needs information on the size and scope of the flooding, Optical, SAR and LIDAR sensors can all help inform that, but all three are not necessarily needed in tandem to address the PIR. This method is, however, able to assess and prioritize categories of sensors in order from most to least needed. Table 1 compares the applicable sensors to each other in order to compare their relative needed frequency in any given

year as well as over the entire sample set. The implication is that optical sensors are the most needed followed by Hyper-Spectral Imagery, Multi-Spectral Imagery, then SAR, then Gamma and LIDAR.

Future Research

Three topics would greatly enhance the scholarship and corporate knowledge on this needs-based assessment of the National Guard's IAA collection requirements. First, as was briefly described in chapter 3, using historical records that account of actual National Guard response efforts would be of great benefit. With this information to compare against the FEMA data, one could describe very precisely the rate at which the Guard responds to a variety of federally declared disasters, the duration of their response efforts, and how often they respond absent a federal disaster declaration. New data should include missions the National Guard performs beyond recovering from natural disasters, most notably, support to law enforcement for border security and counterdrug efforts.

The second direction a future researcher could take is to delineate the data by state and-or region. This research took data for the entire nation and interpreted it to describe the IAA capabilities needed on an annual basis across all 54 states and territories. This effort was limited to only natural disaster response efforts. However, not all states (and territories) or regions experience the same kinds, durations and frequencies of natural disasters. A systematic approach to addressing the National Guard's needs would, logically, be rooted in the regional frequency of various kinds of disasters and the sensors which are most appropriate to responding in those circumstances.

The third recommended addition is to complete the process tracing method described briefly in chapter 3. The National Guard's corporate process for determining

where and which capabilities and platforms will be nested in the U.S. is an important building block to further the scholarship on the topic. With that information the researcher could analyze it to determine where a needs-based assessment, such as this, may benefit the missioning process to better meet the states' needs.

Recommended Application

At the state National Guard level, it is necessary to determine if the assets available are sufficient to meet their information requirements as driven by the frequency, type and duration of disasters to which they must respond. The information and processes in this document help develop understanding on what kinds of information must be determined in a natural disaster and how to collect it. It is a valuable component for legislators, governors or senators seeking to improve the capabilities of the National Guard in their state. By following this outline, state leadership can rapidly and clearly communicate how and why a capability to meet the emergency recovery needs they face is lacking.

Conclusion

The ongoing effort to improve the knowledge base within the National Guard to better enable bringing IAA capabilities to bear in domestic operations must continue. The pensiveness many states have to conducting IAA collection is rooted in a lack of understanding of the processes and requirements. This is exacerbated by how rarely it is exercised and-or applied in real-world responses. Assessing the Guard's IAA collection needs either on a national or regional scope is of little to no consequence if the state leadership is unwilling to commit it to practice. There is a cultural shift needed in many

states' National Guard leadership. Should U.S. Persons' Information be inappropriately collected or mishandled there are legitimate concerns over opening the state up to a questionable intelligence activity investigation and the strain on public relations that may cause. However, the risk is easily mitigated and the reward is a vastly improved ability to respond to a variety of disasters, saving lives and mitigating property damage in the process.

GLOSSARY

Civil Emergency. Any occasion or instance for which, in the determination of the President, federal assistance is needed to supplement state and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.[58]

Collection. Information is collected when it is received by a Defense Intelligence Component, whether or not it is retained by the Component for intelligence or other purposes. Collected information includes information obtained or acquired by any means, including information that is volunteered to the Component. Collected information does not include:

Information that only momentarily passes through a computer system of the Component;

Information on the Internet or in an electronic forum or repository outside the Component that is simply viewed or accessed by a Component employee but is not copied, saved, supplemented, or used in some manner;

Information disseminated by other Components or elements of the Intelligence Community; or

Information that is maintained on behalf of another U.S. Government agency and to which the Component does not have access for intelligence purposes.[59]

Imagery. A likeness or presentation of any natural or manmade feature or related object or activity and the positional data acquired at the same time the likeness or representation was acquired, including products produced by space-based national intelligence reconnaissance systems and likenesses or presentations produced by satellites, airborne platforms, unmanned aerial vehicles, or other similar means. Imagery does not include handheld or clandestine photography taken by or on behalf of human intelligence collection organizations. This definition is consistent with Section 467 of Title 10, U.S.C. [60]

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[58] Joint Chiefs of Staff, Joint Publication (JP) 3-28, *Defense Support of Civil Authorities* (Washington, DC: Government Printing Office, 2013).

[59] Office of the Deputy Chief Management Officer of the Department of Defense, Department of Defense (DoD) Manual 5240.01, *Procedures Governing the Conduct of DoD Intelligence Activities* (Washington, DC: Department of Defense, August 2016).

[60] Ibid.

Immediate Response. Any form of immediate action taken in the United States and territories to save lives, prevent human suffering, or mitigate great property damage in response to a request for assistance from a civil authority, under imminently serious conditions when time does not permit approval from a higher authority.[61]

Incident. An occurrence, caused by either human action or natural phenomena, that requires action to prevent or minimize loss of life, or damage, loss of, or other risks to property, information, and-or natural resources.[62]

Incident Awareness and Assessment. The Secretary of Defense approved use of Department of Defense intelligence, surveillance, reconnaissance, and other intelligence capabilities for domestic non-intelligence support for defense support of civil authorities. Also called IAA.[63]

Incidental Collection of USPI. Collection of USPI that is not deliberately sought by a Defense Intelligence Component, but that is nonetheless collected. Collection of USPI that is not deliberately sought is considered incidental regardless of whether it is expected or reasonably anticipated to occur.[64]

U.S. person. Includes:

A U.S. citizen.

An alien known by the Defense Intelligence Component concerned to be a permanent resident alien.

An unincorporated association substantially composed of U.S. citizens or permanent resident aliens.

A corporation incorporated in the United States, except for a corporation directed and controlled by a foreign government or governments. A corporation or corporate subsidiary incorporated abroad, even if partially or wholly owned by a corporation incorporated in the United States, is not a U.S. person.

A person or organization in the United States is presumed to be a U.S. person, unless specific information to the contrary is obtained. Conversely, a person or

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[61] Joint Chiefs of Staff, JP 3-28.

[62] Ibid.

[63] Ibid.

[64] Office of the Deputy Chief Management Officer of the Department of Defense, DoD Manual 5240.01.

organization outside the United States, or whose location is not known to be in the United States, is presumed to be a non-U.S. person, unless specific information to the contrary is obtained.[65]

USPI. Information that is reasonably likely to identify one or more specific U.S. Persons. USPI may be either a single item of information or information that, when combined with other information, is reasonably likely to identify one or more specific U.S. Persons. Determining whether information is reasonably likely to identify one or more specific U.S. Persons in a particular context may require a case-by-case assessment by a trained intelligence professional. USPI is not limited to any single category of information or technology. Depending on the context, examples of USPI may include: names or unique titles; government-associated personal or corporate identification numbers; unique biometric records; financial information; and street address, telephone number, and Internet Protocol address information. USPI does not include:

A reference to a product by brand or manufacturer's name or the use of a name in a descriptive sense, as, for example, Ford Mustang or Boeing 737;

Imagery from overhead reconnaissance or information about conveyances (e.g., vehicles, aircraft, or vessels) without linkage to additional identifying information that ties the information to a specific U.S. person.[66]

Questionable Intelligence Activity. any conduct that constitutes, or is related to, an intelligence activity that may violate the law, any Executive order or Presidential directive, or applicable DoD, service or NGB policy. A QIA may be considered highly sensitive or significant in nature if the development or circumstance involving the intelligence activity or personnel could impugn the reputation or integrity of the DoD Intelligence Community or otherwise call into question the propriety of an intelligence activity. Such matters might be manifested in or by an activity:

(a) Involving congressional inquiries or investigations.

(b) That may result in adverse media coverage.

[65] Office of the Deputy Chief Management Officer of the Department of Defense, DoD Manual 5240.01.

[66] Ibid.

(c) That may impact on foreign relations or foreign partners.(d) Related to the unauthorized disclosure of classified or protected information such as information identifying a sensitive source and method.[67]

[67] Office of the Deputy Chief Management Officer of the Department of Defense, DoD Manual 5240.01.

APPENDIX A

FEMA DISASTER RECORDS 31 DECEMBER 2017 - 1 JANUARY 2013

				Incident Type															
Beginning Date	End Date	Duration	State	Severe Storm	Flooding	Landslides	Mudslides	Earthquake	Straight-Line Wind	Hurricane	Typhoon	Tornado	Tropical Storm	Volcano & Lava Flow	Fire	Wildfire	Chemical Spill / Explosion	Severe Winter Storm	Snowstorm	Declaration Type
October 29, 2017	October 30, 2017	1	Vermont	1	1															Major Disaster
October 29, 2017	November 1, 2017	3	New Hampshire	1	1															Major Disaster
October 29, 2017	November 1, 2017	3	Maine	1	1															Major Disaster
August 1, 2015	August 4, 2015	3	Mariana Islands									1								Major Disaster
October 4, 2017	October 6, 2017	2	New Mexico	1	1															Major Disaster
November 28, 2017	November 30, 2017	2	Alaska	1																Major Disaster
October 6, 2017	October 10, 2017	4	Mississippi							1										Major Disaster
October 6, 2017	October 10, 2017	4	Alabama							1										Major Disaster
May 2, 2017	August 6, 2017	96	New York		1															Major Disaster
July 22, 2017	July 27, 2017	5	Kansas		1				1											Major Disaster
September 6, 2017	September 13, 2017	7	South Carolina	1						1										Major Disaster
August 28, 2017	September 10, 2017	13	Louisiana										1							Major Disaster
October 8, 2017	October 31, 2017	23	California													1				Major Disaster
October 7, 2017	October 11, 2017	4	Florida							1										Emergency Declaration
October 6, 2017	October 10, 2017	4	Alabama							1										Emergency Declaration
October 6, 2017	October 10, 2017	4	Mississippi							1										Emergency Declaration
April 29, 2017	June 15, 2017	47	Idaho		1															Major Disaster
July 19, 2017	July 23, 2017	4	Wisconsin		1	1			1											Major Disaster
October 5, 2017	October 8, 2017	3	Louisiana											1						Emergency Declaration
September 4, 2017	October 4, 2017	30	Florida							1										Major Disaster
September 17, 2017	November 15, 2017	59	Puerto Rico							1										Major Disaster
September 16, 2017	September 22, 2017	6	Virgin Islands							1										Major Disaster
September 17, 2017	November 15, 2017	59	Puerto Rico							1										Emergency Declaration
September 16, 2017	September 22, 2017	6	Virgin Islands							1										Emergency Declaration
September 7, 2017	September 20, 2017	13	Georgia							1										Major Disaster
September 8, 2017	September 14, 2017	6	Alabama							1										Emergency Declaration
September 4, 2017	October 18, 2017	44	Florida							1										Major Disaster
September 5, 2017	September 7, 2017	2	Puerto Rico							1										Major Disaster
September 4, 2017	October 4, 2017	30	Florida							1										Emergency Declaration
September 7, 2017	September 20, 2017	13	Georgia							1										Emergency Declaration
September 6, 2017	September 13, 2017	7	South Carolina							1										Emergency Declaration
September 5, 2017	September 7, 2017	2	Virgin Islands							1										Major Disaster
September 5, 2017	September 8, 2017	3	Utah												1					Fire Management Assistance
September 4, 2017	October 18, 2017	44	Florida							1										Emergency Declaration
September 5, 2017	September 7, 2017	2	Puerto Rico							1										Emergency Declaration
September 5, 2017	September 7, 2017	2	Virgin Islands							1										Emergency Declaration
August 27, 2017	September 10, 2017	14	Louisiana											1						Emergency Declaration
July 19, 2017	July 23, 2017	4	Iowa	1	1	1			1											Major Disaster
May 6, 2017	June 16, 2017	41	Idaho		1	1	1													Major Disaster
August 23, 2017	September 15, 2017	23	Texas							1										Major Disaster
July 28, 2017	July 29, 2017	1	West Virginia	1	1	1	1													Major Disaster
June 29, 2017	July 1, 2017	2	Vermont	1	1															Major Disaster
July 1, 2017	July 2, 2017	1	New Hampshire	1	1															Major Disaster
January 7, 2017	January 10, 2017	3	Oregon	1	1	1	1													Major Disaster
June 7, 2017	June 22, 2017	15	Wyoming		1															Major Disaster
June 22, 2017	June 27, 2017	5	Michigan	1	1															Major Disaster
June 12, 2017	June 17, 2017	5	Nebraska	1					1			1								Major Disaster
May 16, 2017	May 20, 2017	4	Oklahoma	1	1				1			1								Major Disaster
July 14, 2017	July 15, 2017	1	Nevada												1					Fire Management Assistance
March 23, 2017	April 29, 2017	37	North Dakota		1															Major Disaster
March 14, 2017	March 15, 2017	1	New York															1		Major Disaster
April 29, 2017	May 3, 2017	4	Nebraska						1									1	1	Major Disaster
May 27, 2017	May 28, 2017	1	Tennessee	1	1				1											Major Disaster
April 28, 2017	May 3, 2017	5	Kansas		1				1									1	1	Major Disaster
April 26, 2017	May 19, 2017	23	Arkansas	1	1				1				1							Major Disaster
April 28, 2017	May 11, 2017	13	Missouri	1	1				1				1							Major Disaster
March 14, 2017	March 15, 2017	1	New Hampshire		1													1		Major Disaster
April 28, 2017	May 2, 2017	4	Oklahoma	1	1							1								Major Disaster

April 30, 2017	unk	#VALUE!	Mississippi	1	1				1			1								Major Disaster
March 6, 2017	March 28, 2017	22	Idaho	1	1	1	1													Major Disaster
February 8, 2017	February 11, 2017	3	California		1															Major Disaster
February 5, 2017	February 27, 2017	22	Idaho		1													1		Major Disaster
February 7, 2017	February 27, 2017	20	Utah		1													1		Major Disaster
January 30, 2017	February 22, 2017	23	Washington		1	1	1											1		Major Disaster
February 1, 2017	February 23, 2017	22	California		1		1											1		Major Disaster
February 5, 2017	February 22, 2017	17	Nevada		1		1											1		Major Disaster
February 6, 2017	February 7, 2017	1	Wyoming						1									1		Major Disaster
January 18, 2017	January 23, 2017	5	California		1		1											1		Major Disaster
April 4, 2017	April 5, 2017	1	Kansas												1					Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas												1					Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas												1					Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas												1					Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas												1					Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas												1					Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas												1					Fire Management Assistance
January 13, 2017	January 16, 2017	3	Kansas															1		Major Disaster
January 5, 2017	January 14, 2017	9	Nevada		1		1											1		Major Disaster
January 3, 2017	January 5, 2017	2	California															1		Major Disaster
January 3, 2017	January 12, 2017	9	California		1		1											1		Major Disaster
February 7, 2017	unk	#VALUE!	Louisiana	1					1			1								Major Disaster
January 13, 2017	January 16, 2017	3	Oklahoma															1		Major Disaster
December 24, 2016	December 26, 2016	2	South Dakota															1		Major Disaster
January 21, 2017	January 22, 2017	1	Georgia	1					1			1								Major Disaster
January 20, 2017	January 21, 2017	1	Mississippi	1	1				1			1								Major Disaster
January 2, 2017	unk	#VALUE!	Georgia	1					1			1								Major Disaster
December 14, 2016	December 17, 2016	3	Oregon		1													1		Major Disaster
November 28, 2016	December 9, 2016	11	Tennessee													1				Major Disaster
October 20, 2016	October 21, 2016	1	Pennsylvania	1	1															Major Disaster
November 28, 2016	December 28, 2016	30	Tennessee												1					Fire Management Assistance
October 7, 2016	October 15, 2016	8	Virginia							1										Major Disaster
September 21, 2016	September 24, 2016	3	Minnesota	1	1															Major Disaster
September 21, 2016	October 3, 2016	12	Iowa	1	1															Major Disaster
September 21, 2016	September 22, 2016	1	Wisconsin	1	1		1													Major Disaster
September 2, 2016	September 12, 2016	10	Kansas	1	1															Major Disaster
October 17, 2016	October 26, 2016	9	Colorado												1					Fire Management Assistance
October 14, 2016	October 31, 2016	17	Nevada												1					Fire Management Assistance
October 4, 2016	October 30, 2016	26	South Carolina							1										Major Disaster
October 4, 2016	October 25, 2016	21	North Carolina							1										Major Disaster
October 4, 2016	October 15, 2016	11	Georgia							1										Major Disaster
October 3, 2016	October 19, 2016	16	Florida							1										Major Disaster
October 4, 2016	October 24, 2016	20	North Carolina							1										Emergency Declaration
October 4, 2016	October 15, 2016	11	Georgia							1										Emergency Declaration
October 4, 2016	October 30, 2016	26	South Carolina							1										Emergency Declaration
September 11, 2016	September 14, 2016	3	Hawaii	1	1	1	1													Major Disaster
October 4, 2016	October 19, 2016	15	Florida							1										Emergency Declaration
October 4, 2016	October 7, 2016	3	Colorado												1					Fire Management Assistance
October 2, 2016	October 4, 2016	2	Nevada												1					Fire Management Assistance
August 21, 2016	August 31, 2016	10	Idaho												1					Fire Management Assistance
August 23, 2016	August 27, 2016	4	Iowa	1	1				1											Major Disaster
August 31, 2016	September 11, 2016	11	Florida							1										Major Disaster
July 30, 2016	July 31, 2016	1	Maryland	1	1															Major Disaster
August 30, 2016	September 1, 2016	2	Oregon												1					Fire Management Assistance
August 27, 2016	August 30, 2016	3	Washington												1					Fire Management Assistance
July 2, 2016	July 9, 2016	7	Kentucky	1	1	1	1					1								Major Disaster
August 16, 2016	September 8, 2016	23	California												1					Fire Management Assistance
August 21, 2016	August 29, 2016	8	Washington												1					Fire Management Assistance
August 21, 2016	August 24, 2016	3	Washington												1					Fire Management Assistance
August 16, 2016	August 22, 2016	6	California												1					Fire Management Assistance
August 13, 2016	September 6, 2016	24	California												1					Fire Management Assistance
August 13, 2016	August 22, 2016	9	California												1					Fire Management Assistance
August 11, 2016	October 2, 2016	52	Louisiana	1	1															Major Disaster

August 7, 2016	August 16, 2016	9	California											1					Fire Management Assistance
July 11, 2016	July 12, 2016	1	Wisconsin	1	1														Major Disaster
June 11, 2016	unk	#VALUE!	Montana									1							Major Disaster
July 31, 2016	August 3, 2016	3	Washington											1					Fire Management Assistance
July 29, 2016	August 7, 2016	9	Nevada											1					Fire Management Assistance
July 30, 2016	August 8, 2016	9	California											1					Fire Management Assistance
July 28, 2016	August 4, 2016	7	Wyoming											1					Fire Management Assistance
July 29, 2016	July 31, 2016	2	Nevada											1					Fire Management Assistance
July 22, 2016	August 1, 2016	10	California											1					Fire Management Assistance
July 13, 2016	August 18, 2016	36	New Mexico											1					Fire Management Assistance
June 11, 2016	June 13, 2016	2	Oklahoma	1	1														Major Disaster
July 9, 2016	July 14, 2016	5	Colorado											1					Fire Management Assistance
July 9, 2016	July 14, 2016	5	California											1					Fire Management Assistance
June 22, 2016	June 29, 2016	7	West Virginia	1	1	1	1												Major Disaster
June 23, 2016	July 6, 2016	13	California											1					Fire Management Assistance
June 21, 2016	July 12, 2016	21	Utah											1					Fire Management Assistance
June 20, 2016	June 30, 2016	10	California											1					Fire Management Assistance
June 19, 2016	June 29, 2016	10	California											1					Fire Management Assistance
June 7, 2016	June 11, 2016	4	Oregon											1					Fire Management Assistance
June 8, 2016	June 15, 2016	7	Arizona											1					Fire Management Assistance
May 22, 2016	June 24, 2016	33	Texas	1	1														Major Disaster
June 4, 2016	June 10, 2016	6	California											1					Fire Management Assistance
April 15, 2016	April 16, 2016	1	Montana						1								1		Major Disaster
March 8, 2016	March 13, 2016	5	Arkansas	1	1				1			1							Major Disaster
April 17, 2016	April 30, 2016	13	Texas	1	1														Major Disaster
April 21, 2016	April 22, 2016	1	New Hampshire											1					Fire Management Assistance
April 5, 2016	unk	#VALUE!	Oklahoma											1					Fire Management Assistance
April 5, 2016	April 6, 2016	1	Kansas											1					Fire Management Assistance
March 23, 2016	April 7, 2016	15	Kansas											1					Fire Management Assistance
March 9, 2016	March 29, 2016	20	Mississippi	1	1														Major Disaster
January 22, 2016	January 23, 2016	1	Pennsylvania														1	1	Major Disaster
March 7, 2016	March 29, 2016	22	Texas	1	1							1							Major Disaster
January 22, 2016	January 23, 2016	1	Delaware		1												1		Major Disaster
January 22, 2016	January 24, 2016	2	New Jersey														1	1	Major Disaster
March 8, 2016	April 8, 2016	31	Louisiana	1	1														Major Disaster
January 22, 2016	January 23, 2016	1	Virginia														1	1	Major Disaster
January 22, 2016	January 23, 2016	1	Maryland														1	1	Major Disaster
January 22, 2016	January 23, 2016	1	District of Columbia															1	Major Disaster
December 22, 2015	January 13, 2016	22	Georgia	1	1														Major Disaster
December 6, 2015	December 23, 2015	17	Oregon		1	1	1		1								1		Major Disaster
December 12, 2015	December 15, 2015	3	Alaska	1															Major Disaster
December 26, 2015	January 5, 2016	10	Oklahoma		1												1		Major Disaster
December 26, 2015	January 22, 2016	27	Texas		1				1			1					1		Major Disaster
December 26, 2015	January 22, 2016	27	Arkansas	1	1				1			1							Major Disaster
December 28, 2015	February 1, 2016	35	Louisiana	1	1														Major Disaster
December 1, 2015	December 14, 2015	13	Washington		1	1	1		1			1					1		Major Disaster
December 16, 2015	December 27, 2015	11	Idaho														1		Major Disaster
December 23, 2015	December 31, 2015	8	Alabama	1	1				1			1							Major Disaster
December 23, 2015	January 9, 2016	17	Missouri	1	1				1			1							Major Disaster
November 12, 2015	November 21, 2015	9	Washington	1	1	1	1		1										Major Disaster
December 23, 2015	December 28, 2015	5	Mississippi	1	1				1			1							Major Disaster
December 22, 2015	January 9, 2016	18	Missouri	1	1				1			1							Major Disaster
November 27, 2015	November 29, 2015	2	Oklahoma		1												1		Major Disaster
November 17, 2015	unk	#VALUE!	Idaho	1					1										Major Disaster
October 22, 2015	October 31, 2015	9	Texas	1	1				1			1							Major Disaster
August 27, 2015	unk	#VALUE!	Alaska	1															Major Disaster
August 9, 2015	September 10, 2015	32	Washington				1								1				Major Disaster
August 29, 2015	unk	#VALUE!	Washington	1															Major Disaster
October 1, 2015	October 23, 2015	22	South Carolina	1	1														Major Disaster
October 1, 2015	October 23, 2015	22	South Carolina	1	1														Emergency Declaration
September 9, 2015	October 30, 2015	51	California											1					Major Disaster
September 13, 2015	September 16, 2015	3	Oregon											1					Fire Management Assistance
September 9, 2015	October 2, 2015	23	California											1					Fire Management Assistance

August 13, 2015	September 10, 2015	28	Washington												1				Emergency Declaration
August 14, 2015	September 6, 2015	23	Oregon											1					Fire Management Assistance
August 11, 2015	August 25, 2015	14	Oregon											1					Fire Management Assistance
July 11, 2015	July 20, 2015	9	Kentucky	1	1	1	1		1			1							Major Disaster
August 8, 2015	August 11, 2015	3	Oregon											1					Fire Management Assistance
August 8, 2015	August 12, 2015	4	Arizona											1					Fire Management Assistance
May 15, 2015	July 27, 2015	73	Missouri	1	1				1			1							Major Disaster
May 8, 2015	May 29, 2015	21	South Dakota	1	1				1										Major Disaster
July 10, 2015	July 14, 2015	4	West Virginia	1	1	1	1		1										Major Disaster
July 30, 2015	August 29, 2015	30	Oregon											1					Fire Management Assistance
August 1, 2015	August 4, 2015	3	Mariana Islands								1								Major Disaster
June 20, 2015	June 25, 2015	5	Iowa	1	1				1			1							Major Disaster
June 17, 2015	June 24, 2015	7	South Dakota	1	1				1			1							Major Disaster
June 9, 2015	unk	#VALUE!	Vermont	1	1														Major Disaster
June 23, 2015	unk	#VALUE!	New Jersey	1															Major Disaster
May 4, 2015	June 21, 2015	48	Kansas	1	1				1			1							Major Disaster
May 4, 2015	June 15, 2015	42	Colorado	1	1	1	1					1							Major Disaster
May 18, 2015	June 20, 2015	33	Louisiana	1	1														Major Disaster
May 24, 2015	June 6, 2015	13	Wyoming	1	1														Major Disaster
May 7, 2015	June 15, 2015	39	Arkansas	1	1				1			1							Major Disaster
May 6, 2015	June 17, 2015	42	Nebraska	1	1				1			1							Major Disaster
June 17, 2015	June 27, 2015	10	Arizona											1					Fire Management Assistance
May 13, 2015	May 16, 2015	3	Guam								1								Major Disaster
May 4, 2015	June 23, 2015	50	Texas	1	1				1			1							Major Disaster
May 5, 2015	June 22, 2015	48	Oklahoma	1	1				1			1							Major Disaster
April 13, 2015	April 15, 2015	2	West Virginia	1	1	1	1												Major Disaster
April 8, 2015	April 11, 2015	3	West Virginia	1	1	1	1												Major Disaster
April 3, 2015	April 5, 2015	2	West Virginia	1	1	1	1												Major Disaster
March 3, 2015	March 9, 2015	6	Kentucky		1	1	1										1	1	Major Disaster
April 2, 2015	April 17, 2015	15	Kentucky	1	1	1	1					1							Major Disaster
February 15, 2015	February 23, 2015	8	Kentucky		1	1	1										1	1	Major Disaster
February 15, 2015	February 18, 2015	3	Georgia														1		Major Disaster
January 26, 2015	January 29, 2015	3	Massachusetts		1												1	1	Major Disaster
January 26, 2015	January 29, 2015	3	Connecticut														1	1	Major Disaster
January 26, 2015	January 29, 2015	3	Rhode Island														1	1	Major Disaster
February 15, 2015	February 23, 2015	8	Tennessee		1												1		Major Disaster
March 3, 2015	March 15, 2015	12	West Virginia		1	1	1										1		Major Disaster
January 26, 2015	January 29, 2015	3	New Hampshire														1	1	Major Disaster
January 26, 2015	January 29, 2015	3	Maine		1												1	1	Major Disaster
December 9, 2014	December 13, 2014	4	Vermont														1		Major Disaster
December 4, 2014	December 7, 2014	3	California	1	1		1												Major Disaster
December 23, 2014	December 24, 2014	1	Mississippi	1								1							Major Disaster
November 17, 2014	November 27, 2014	10	New York		1												1	1	Major Disaster
May 20, 2014	June 4, 2014	15	Arizona											1					Fire Management Assistance
September 7, 2014	September 9, 2014	2	Arizona	1	1														Major Disaster
September 7, 2014	September 10, 2014	3	Nevada	1	1														Major Disaster
September 4, 2014	March 26, 2015	203	Hawaii										1						Major Disaster
September 9, 2014	September 11, 2014	2	Missouri	1	1				1			1							Major Disaster
September 15, 2014	September 26, 2014	11	New Mexico	1	1														Major Disaster
October 8, 2014	October 13, 2014	5	California											1					Fire Management Assistance
August 21, 2014	August 26, 2014	5	Montana	1	1				1										Major Disaster
July 27, 2014	August 5, 2014	9	New Mexico	1	1														Major Disaster
August 18, 2014	August 24, 2014	6	Kentucky	1	1	1	1												Major Disaster
August 11, 2014	August 13, 2014	2	Michigan	1	1														Major Disaster
September 13, 2014	October 3, 2014	20	California											1					Fire Management Assistance
September 15, 2014	September 26, 2014	11	Oregon											1					Fire Management Assistance
September 15, 2014	September 27, 2014	12	California											1					Fire Management Assistance
September 14, 2014	September 20, 2014	6	California											1					Fire Management Assistance
August 24, 2014	September 8, 2014	15	California					1											Major Disaster
August 7, 2014	August 10, 2014	3	Hawaii										1						Major Disaster
July 29, 2014	August 3, 2014	5	American Samoa	1	1	1													Major Disaster
July 28, 2014	July 31, 2014	3	Guam										1						Major Disaster
September 5, 2015	September 10, 2015	5	California											1					Fire Management Assistance

August 24, 2014	August 28, 2014	4	California												1				Fire Management Assistance
August 18, 2014	August 23, 2014	5	California												1				Fire Management Assistance
August 18, 2014	August 22, 2014	4	California												1				Fire Management Assistance
June 25, 2014	July 2, 2014	7	North Dakota	1	1														Major Disaster
August 5, 2014	August 11, 2014	6	Oregon												1				Fire Management Assistance
June 5, 2014	June 10, 2014	5	Tennessee	1	1				1			1							Major Disaster
July 9, 2014	August 6, 2014	28	Washington												1				Major Disaster
August 1, 2014	August 9, 2014	8	California												1				Fire Management Assistance
August 2, 2014	August 9, 2014	7	California												1				Fire Management Assistance
August 2, 2014	August 9, 2014	7	California												1				Fire Management Assistance
August 1, 2014	August 16, 2014	15	California												1				Fire Management Assistance
June 26, 2014	July 8, 2014	12	Iowa	1	1				1			1							Major Disaster
June 1, 2014	June 4, 2014	3	Nebraska	1	1				1			1							Major Disaster
June 13, 2014	June 20, 2014	7	South Dakota	1	1							1							Major Disaster
July 21, 2014	July 22, 2014	1	Utah												1				Fire Management Assistance
June 14, 2014	June 21, 2014	7	Nebraska	1	1				1			1							Major Disaster
June 14, 2014	June 24, 2014	10	Iowa	1	1				1			1							Major Disaster
July 9, 2014	August 5, 2014	27	Washington												1				Emergency Declaration
July 19, 2014	July 22, 2014	3	Washington												1				Fire Management Assistance
July 19, 2014	July 20, 2014	1	Washington												1				Fire Management Assistance
June 11, 2014	July 12, 2014	31	Minnesota	1	1	1	1		1										Major Disaster
June 3, 2014	June 5, 2014	2	Iowa	1	1				1			1							Major Disaster
July 9, 2014	July 14, 2014	5	Washington												1				Fire Management Assistance
May 13, 2014	May 22, 2014	9	New York	1	1														Major Disaster
July 1, 2014	July 6, 2014	5	California												1				Fire Management Assistance
May 11, 2014	May 13, 2014	2	Nebraska	1	1				1			1							Major Disaster
April 15, 2014	April 18, 2014	3	Vermont	1	1														Major Disaster
May 14, 2014	May 22, 2014	8	California												1				Fire Management Assistance
May 14, 2014	May 17, 2014	3	California												1				Fire Management Assistance
April 28, 2014	May 6, 2014	8	Florida	1	1				1			1							Major Disaster
April 28, 2014	May 5, 2014	7	Alabama	1	1				1			1							Major Disaster
April 28, 2014	May 3, 2014	5	Mississippi	1	1							1							Major Disaster
April 27, 2014	April 28, 2014	1	Arkansas	1	1							1							Major Disaster
January 5, 2014	January 9, 2014	4	Indiana														1	1	Major Disaster
March 1, 2014	March 17, 2014	16	Montana		1														Major Disaster
March 2, 2014	March 4, 2014	2	Tennessee														1		Major Disaster
February 12, 2014	February 13, 2014	1	Maryland															1	Major Disaster
February 6, 2014	February 11, 2014	5	Oregon														1		Major Disaster
March 22, 2014	April 29, 2014	38	Washington		1		1												Major Disaster
March 6, 2014	March 7, 2014	1	North Carolina														1		Major Disaster
March 22, 2014	April 29, 2014	38	Washington		1		1												Emergency Declaration
February 10, 2014	February 15, 2014	5	South Carolina														1		Major Disaster
February 10, 2014	February 15, 2014	5	Georgia														1		Major Disaster
February 10, 2014	February 19, 2014	9	South Carolina														1		Emergency Declaration
February 10, 2014	February 14, 2014	4	Georgia														1		Emergency Declaration
February 4, 2014	February 20, 2014	16	Pennsylvania														1		Emergency Declaration
December 5, 2013	December 6, 2013	1	Oklahoma														1		Major Disaster
December 20, 2013	December 27, 2013	7	Vermont														1		Major Disaster
November 5, 2013	November 14, 2013	9	Alaska	1	1				1										Major Disaster
October 27, 2013	October 29, 2013	2	Alaska		1														Major Disaster
January 9, 2014	January 20, 2014	11	West Virginia													1			Emergency Declaration
December 5, 2013	December 7, 2013	2	Arkansas														1		Major Disaster
October 30, 2013	October 31, 2013	1	Texas	1	1														Major Disaster
August 17, 2013	October 25, 2013	69	California												1				Major Disaster
November 17, 2013	November 18, 2013	1	Illinois	1					1			1							Major Disaster
October 2, 2013	October 7, 2013	5	Nebraska	1	1							1					1		Major Disaster
October 3, 2013	October 17, 2013	14	South Dakota		1												1	1	Major Disaster
October 4, 2013	October 5, 2013	1	North Dakota														1		Major Disaster
July 27, 2013	July 28, 2013	1	North Carolina	1	1	1	1												Major Disaster
September 9, 2013	September 22, 2013	13	New Mexico	1	1		1												Major Disaster
September 13, 2013	September 16, 2013	3	New Mexico	1	1														Major Disaster
July 22, 2013	August 16, 2013	25	Kansas	1	1				1			1							Major Disaster
June 26, 2013	July 12, 2013	16	Pennsylvania	1	1							1							Major Disaster

July 23, 2013	July 29, 2013	6	New Mexico	1	1															Major Disaster
July 19, 2013	July 21, 2013	2	New Mexico	1	1															Major Disaster
July 3, 2013	July 14, 2013	11	North Carolina	1	1	1	1													Major Disaster
September 9, 2013	September 14, 2013	5	California												1					Fire Management Assistance
September 11, 2013	September 30, 2013	19	Colorado	1	1	1	1													Major Disaster
September 11, 2013	October 31, 2013	50	Colorado	1	1	1	1													Emergency Declaration
August 2, 2013	August 14, 2013	12	Missouri	1	1				1											Major Disaster
August 8, 2013	August 14, 2013	6	Arkansas	1	1															Major Disaster
July 29, 2013	August 1, 2013	3	California													1				Major Disaster
August 20, 2013	September 8, 2013	19	California												1					Fire Management Assistance
August 20, 2013	August 28, 2013	8	Washington												1					Fire Management Assistance
August 18, 2013	August 24, 2013	6	Montana												1					Fire Management Assistance
August 17, 2013	August 26, 2013	9	Oregon												1					Fire Management Assistance
August 15, 2013	August 30, 2013	15	Idaho												1					Fire Management Assistance
August 13, 2013	August 19, 2013	6	Utah												1					Fire Management Assistance
August 12, 2013	August 29, 2013	17	Idaho												1					Fire Management Assistance
August 10, 2013	August 14, 2013	4	Washington												1					Fire Management Assistance
June 20, 2013	June 28, 2013	8	Wisconsin	1	1		1													Major Disaster
August 7, 2013	August 13, 2013	6	California												1					Fire Management Assistance
August 5, 2013	August 10, 2013	5	California												1					Fire Management Assistance
July 28, 2013	August 4, 2013	7	Oregon												1					Fire Management Assistance
June 25, 2013	July 11, 2013	16	Vermont	1	1															Major Disaster
June 26, 2013	July 3, 2013	7	New Hampshire	1	1	1														Major Disaster
April 17, 2013	April 20, 2013	3	Texas															1		Major Disaster
June 19, 2013	June 30, 2013	11	South Dakota	1	1							1								Major Disaster
July 2, 2013	July 7, 2013	5	Florida	1	1															Major Disaster
June 21, 2013	June 28, 2013	7	Iowa	1	1							1								Major Disaster
July 27, 2013	August 14, 2013	18	Washington												1					Fire Management Assistance
July 27, 2013	August 19, 2013	23	Oregon												1					Fire Management Assistance
June 11, 2013	June 21, 2013	10	Colorado													1				Major Disaster
June 13, 2013	unk	#VALUE!	West Virginia	1	1															Major Disaster
June 11, 2013	June 17, 2013	6	Colorado													1				Major Disaster
June 20, 2013	June 26, 2013	6	Minnesota	1	1				1											Major Disaster
July 19, 2013	July 21, 2013	2	Oregon												1					Fire Management Assistance
May 29, 2013	June 11, 2013	13	Missouri	1	1				1			1								Major Disaster
May 17, 2013	June 17, 2013	31	North Dakota	1	1															Major Disaster
June 26, 2013	July 11, 2013	15	New York	1	1															Major Disaster
May 19, 2013	June 3, 2013	15	Montana		1															Major Disaster
July 4, 2013	July 17, 2013	13	Nevada												1					Fire Management Assistance
July 1, 2013	July 8, 2013	7	Arizona												1					Fire Management Assistance
June 30, 2013	July 7, 2013	7	Arizona												1					Fire Management Assistance
May 19, 2013	June 15, 2013	27	Iowa	1	1							1								Major Disaster
June 19, 2013	June 30, 2013	11	Colorado												1					Fire Management Assistance
May 24, 2013	May 31, 2013	7	South Dakota	1	1							1								Major Disaster
May 25, 2013	June 1, 2013	7	South Dakota	1	1															Major Disaster
May 30, 2013	June 3, 2013	4	Arkansas	1	1							1								Major Disaster
May 17, 2013	June 12, 2013	26	Alaska		1															Major Disaster
June 18, 2013	June 30, 2013	12	Arizona												1					Fire Management Assistance
April 16, 2013	May 15, 2013	29	Michigan		1															Major Disaster
June 11, 2013	June 15, 2013	4	Colorado												1					Fire Management Assistance
June 11, 2013	June 21, 2013	10	Colorado												1					Fire Management Assistance
May 22, 2013	May 26, 2013	4	Vermont	1	1															Major Disaster
May 31, 2013	June 8, 2013	8	California												1					Fire Management Assistance
April 17, 2013	April 30, 2013	13	Iowa	1	1				1											Major Disaster
April 22, 2013	May 16, 2013	24	North Dakota		1															Major Disaster
May 18, 2013	June 2, 2013	15	Oklahoma	1								1								Major Disaster
April 8, 2013	April 10, 2013	2	South Dakota															1	1	Major Disaster
April 16, 2013	May 5, 2013	19	Illinois	1	1				1											Major Disaster
May 2, 2013	May 11, 2013	9	California												1					Fire Management Assistance
May 1, 2013	May 5, 2013	4	California												1					Fire Management Assistance
April 9, 2013	April 11, 2013	2	Iowa															1		Major Disaster
April 9, 2013	April 11, 2013	2	Minnesota															1		Major Disaster
February 20, 2013	February 23, 2013	3	Kansas																1	Major Disaster

April 22, 2013	May 7, 2013	15	North Dakota		1															Emergency Declaration
February 8, 2013	February 9, 2013	1	New York															1	1	Major Disaster
April 17, 2013	April 20, 2013	3	Texas														1			Emergency Declaration
February 8, 2013	February 10, 2013	2	Massachusetts		1													1	1	Major Disaster
April 15, 2013	April 22, 2013	7	Massachusetts														1			Emergency Declaration
February 24, 2013	February 26, 2013	2	Oklahoma															1	1	Major Disaster
February 8, 2013	February 10, 2013	2	Maine		1													1	1	Major Disaster
February 8, 2013	February 10, 2013	2	Rhode Island															1	1	Major Disaster
February 8, 2013	February 12, 2013	4	Connecticut															1	1	Major Disaster
February 8, 2013	February 11, 2013	3	New Hampshire															1	1	Major Disaster
December 15, 2012	January 21, 2013	37	Arizona															1		Major Disaster
January 14, 2013	January 17, 2013	3	North Carolina	1	1	1	1													Major Disaster
January 8, 2013	January 17, 2013	9	Louisiana	1	1															Major Disaster
February 10, 2013	February 22, 2013	12	Mississippi	1	1							1								Major Disaster
February 8, 2013	February 12, 2013	4	Connecticut															1		Emergency Declaration
Total:				**143**	**172**	**32**	**40**	**1**	**61**	**33**	**3**	**59**	**5**	**1**	**103**	**7**	**4**	**69**	**27**	**760**

Source: Federal Emergency Management Agency, The Department of Homeland Security, accessed February 5, 2018, FEMA.gov.

APPENDIX B

CONSOLIDATED FEMA DISASTER RECORDS MULTIPLIED BY DURATION

31 DECEMBER 2017 - 1 JANUARY 2013

				Incident Type											
Beginning Date	End Date	Duration	State	Severe Storm	Flooding	Landslide / mudslide	Earthquake	Straight-Line Wind	Tropical Storm / Hurricane / Typhoon	Tornado	Volcano & Lava Flow	Fire / Wildfire	Chemical Spill / Explosion	Severe Winter Storm / Snowstorm	Declaration Type
October 29, 2017	October 30, 2017	1	Vermont	1	1	0	0	0	0	0	0	0	0	0	Major Disaster
October 29, 2017	November 1, 2017	3	New Hampshire	3	3	0	0	0	0	0	0	0	0	0	Major Disaster
October 29, 2017	November 1, 2017	3	Maine	3	3	0	0	0	0	0	0	0	0	0	Major Disaster
August 1, 2015	August 4, 2015	3	Mariana Islands	0	0	0	0	0	3	0	0	0	0	0	Major Disaster
October 4, 2017	October 6, 2017	2	New Mexico	2	2	0	0	0	0	0	0	0	0	0	Major Disaster
November 28, 2017	November 30, 2017	2	Alaska	2	0	0	0	0	0	0	0	0	0	0	Major Disaster
October 6, 2017	October 10, 2017	4	Mississippi	0	0	0	0	0	4	0	0	0	0	0	Major Disaster
October 6, 2017	October 10, 2017	4	Alabama	0	0	0	0	0	4	0	0	0	0	0	Major Disaster
May 2, 2017	August 6, 2017	96	New York	0	96	0	0	0	0	0	0	0	0	0	Major Disaster
July 22, 2017	July 27, 2017	5	Kansas	0	5	0	0	5	0	0	0	0	0	0	Major Disaster
September 6, 2017	September 13, 2017	7	South Carolina	7	0	0	0	0	7	0	0	0	0	0	Major Disaster
August 28, 2017	September 10, 2017	13	Louisiana	0	0	0	0	0	13	0	0	0	0	0	Major Disaster
October 8, 2017	October 31, 2017	23	California	0	0	0	0	0	0	0	0	23	0	0	Major Disaster
October 7, 2017	October 11, 2017	4	Florida	0	0	0	0	0	4	0	0	0	0	0	Emergency Declaration
October 6, 2017	October 10, 2017	4	Alabama	0	0	0	0	0	4	0	0	0	0	0	Emergency Declaration
October 6, 2017	October 10, 2017	4	Mississippi	0	0	0	0	0	4	0	0	0	0	0	Emergency Declaration
April 29, 2017	June 15, 2017	47	Idaho	0	47	0	0	0	0	0	0	0	0	0	Major Disaster
July 19, 2017	July 23, 2017	4	Wisconsin	0	4	4	0	4	0	0	0	0	0	0	Major Disaster
October 5, 2017	October 8, 2017	3	Louisiana	0	0	0	0	0	3	0	0	0	0	0	Emergency Declaration
September 4, 2017	October 4, 2017	30	Florida	0	0	0	0	0	30	0	0	0	0	0	Major Disaster
September 17, 2017	November 15, 2017	59	Puerto Rico	0	0	0	0	0	59	0	0	0	0	0	Major Disaster
September 16, 2017	September 22, 2017	6	Virgin Islands	0	0	0	0	0	6	0	0	0	0	0	Major Disaster
September 17, 2017	November 15, 2017	59	Puerto Rico	0	0	0	0	0	59	0	0	0	0	0	Emergency Declaration
September 16, 2017	September 22, 2017	6	Virgin Islands	0	0	0	0	0	6	0	0	0	0	0	Emergency Declaration
September 7, 2017	September 20, 2017	13	Georgia	0	0	0	0	0	13	0	0	0	0	0	Major Disaster
September 8, 2017	September 14, 2017	6	Alabama	0	0	0	0	0	6	0	0	0	0	0	Emergency Declaration
September 4, 2017	October 18, 2017	44	Florida	0	0	0	0	0	44	0	0	0	0	0	Major Disaster
September 5, 2017	September 7, 2017	2	Puerto Rico	0	0	0	0	0	2	0	0	0	0	0	Major Disaster
September 4, 2017	October 4, 2017	30	Florida	0	0	0	0	0	30	0	0	0	0	0	Emergency Declaration
September 7, 2017	September 20, 2017	13	Georgia	0	0	0	0	0	13	0	0	0	0	0	Emergency Declaration
September 6, 2017	September 13, 2017	7	South Carolina	0	0	0	0	0	7	0	0	0	0	0	Emergency Declaration
September 5, 2017	September 7, 2017	2	Virgin Islands	0	0	0	0	0	2	0	0	0	0	0	Major Disaster
September 5, 2017	September 8, 2017	3	Utah	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance
September 4, 2017	October 18, 2017	44	Florida	0	0	0	0	0	44	0	0	0	0	0	Emergency Declaration
September 5, 2017	September 7, 2017	2	Puerto Rico	0	0	0	0	0	2	0	0	0	0	0	Emergency Declaration
September 5, 2017	September 7, 2017	2	Virgin Islands	0	0	0	0	0	2	0	0	0	0	0	Emergency Declaration
August 27, 2017	September 10, 2017	14	Louisiana	0	0	0	0	0	14	0	0	0	0	0	Emergency Declaration
July 19, 2017	July 23, 2017	4	Iowa	4	4	4	0	4	0	0	0	0	0	0	Major Disaster
May 6, 2017	June 16, 2017	41	Idaho	0	41	41	0	0	0	0	0	0	0	0	Major Disaster
August 23, 2017	September 15, 2017	23	Texas	0	0	0	0	0	23	0	0	0	0	0	Major Disaster
July 28, 2017	July 29, 2017	1	West Virginia	1	1	1	0	0	0	0	0	0	0	0	Major Disaster
June 29, 2017	July 1, 2017	2	Vermont	2	2	0	0	0	0	0	0	0	0	0	Major Disaster
July 1, 2017	July 2, 2017	1	New Hampshire	1	1	0	0	0	0	0	0	0	0	0	Major Disaster
January 7, 2017	January 10, 2017	3	Oregon	3	3	3	0	0	0	0	0	0	0	0	Major Disaster
June 7, 2017	June 22, 2017	15	Wyoming	0	15	0	0	0	0	0	0	0	0	0	Major Disaster
June 22, 2017	June 27, 2017	5	Michigan	5	5	0	0	0	0	0	0	0	0	0	Major Disaster
June 12, 2017	June 17, 2017	5	Nebraska	5	0	0	0	5	0	0	5	0	0	0	Major Disaster
May 16, 2017	May 20, 2017	4	Oklahoma	4	4	0	0	4	0	0	4	0	0	0	Major Disaster
July 14, 2017	July 15, 2017	1	Nevada	0	0	0	0	0	0	0	0	0	1	0	Fire Management Assistance
March 23, 2017	April 29, 2017	37	North Dakota	0	37	0	0	0	0	0	0	0	0	0	Major Disaster
March 14, 2017	March 15, 2017	1	New York	0	0	0	0	0	0	0	0	0	0	1	Major Disaster

April 29, 2017	May 3, 2017	4	Nebraska	0	0	0	0	4	0	0	0	0	0	4	Major Disaster
May 27, 2017	May 28, 2017	1	Tennessee	1	1	0	0	1	0	0	0	0	0	0	Major Disaster
April 28, 2017	May 3, 2017	5	Kansas	0	5	0	0	5	0	0	0	0	0	5	Major Disaster
April 26, 2017	May 19, 2017	23	Arkansas	23	23	0	0	23	0	23	0	0	0	0	Major Disaster
April 28, 2017	May 11, 2017	13	Missouri	13	13	0	0	13	0	13	0	0	0	0	Major Disaster
March 14, 2017	March 15, 2017	1	New Hampshire	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
April 28, 2017	May 2, 2017	4	Oklahoma	4	4	0	0	0	0	4	0	0	0	0	Major Disaster
April 30, 2017	May 1, 2017	1	Mississippi	1	1	0	0	1	0	1	0	0	0	0	Major Disaster
March 6, 2017	March 28, 2017	22	Idaho	22	22	22	0	0	0	0	0	0	0	0	Major Disaster
February 8, 2017	February 11, 2017	3	California	0	3	0	0	0	0	0	0	0	0	0	Major Disaster
February 5, 2017	February 27, 2017	22	Idaho	0	22	0	0	0	0	0	0	0	0	22	Major Disaster
February 7, 2017	February 27, 2017	20	Utah	0	20	0	0	0	0	0	0	0	0	20	Major Disaster
January 30, 2017	February 22, 2017	23	Washington	0	23	23	0	0	0	0	0	0	0	23	Major Disaster
February 1, 2017	February 23, 2017	22	California	0	22	22	0	0	0	0	0	0	0	22	Major Disaster
February 5, 2017	February 22, 2017	17	Nevada	0	17	17	0	0	0	0	0	0	0	17	Major Disaster
February 6, 2017	February 7, 2017	1	Wyoming	0	0	0	0	1	0	0	0	0	0	1	Major Disaster
January 18, 2017	January 23, 2017	5	California	0	5	5	0	0	0	0	0	0	0	5	Major Disaster
April 4, 2017	April 5, 2017	1	Kansas	0	0	0	0	0	0	0	0	1	0	0	Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas	0	0	0	0	0	0	0	0	11	0	0	Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas	0	0	0	0	0	0	0	0	11	0	0	Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas	0	0	0	0	0	0	0	0	11	0	0	Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas	0	0	0	0	0	0	0	0	11	0	0	Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas	0	0	0	0	0	0	0	0	11	0	0	Fire Management Assistance
April 4, 2017	April 15, 2017	11	Kansas	0	0	0	0	0	0	0	0	11	0	0	Fire Management Assistance
January 13, 2017	January 16, 2017	3	Kansas	0	0	0	0	0	0	0	0	0	0	3	Major Disaster
January 5, 2017	January 14, 2017	9	Nevada	0	9	9	0	0	0	0	0	0	0	9	Major Disaster
January 3, 2017	January 5, 2017	2	California	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
January 3, 2017	January 12, 2017	9	California	0	9	9	0	0	0	0	0	0	0	9	Major Disaster
February 7, 2017	February 8, 2017	1	Louisiana	1	0	0	0	1	0	1	0	0	0	0	Major Disaster
January 13, 2017	January 16, 2017	3	Oklahoma	0	0	0	0	0	0	0	0	0	0	3	Major Disaster
December 24, 2016	December 26, 2016	2	South Dakota	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
January 21, 2017	January 22, 2017	1	Georgia	1	0	0	0	1	0	1	0	0	0	0	Major Disaster
January 20, 2017	January 21, 2017	1	Mississippi	1	1	0	0	1	0	1	0	0	0	0	Major Disaster
January 2, 2017	January 3, 2017	1	Georgia	1	0	0	0	1	0	1	0	0	0	0	Major Disaster
December 14, 2016	December 17, 2016	3	Oregon	0	3	0	0	0	0	0	0	0	0	3	Major Disaster
November 28, 2016	December 9, 2016	11	Tennessee	0	0	0	0	0	0	0	0	11	0	0	Major Disaster
October 20, 2016	October 21, 2016	1	Pennsylvania	1	1	0	0	0	0	0	0	0	0	0	Major Disaster
November 28, 2016	December 28, 2016	30	Tennessee	0	0	0	0	0	0	0	0	30	0	0	Fire Management Assistance
October 7, 2016	October 15, 2016	8	Virginia	0	0	0	0	0	8	0	0	0	0	0	Major Disaster
September 21, 2016	September 24, 2016	3	Minnesota	3	3	0	0	0	0	0	0	0	0	0	Major Disaster
September 21, 2016	October 3, 2016	12	Iowa	12	12	0	0	0	0	0	0	0	0	0	Major Disaster
September 21, 2016	September 22, 2016	1	Wisconsin	1	1	1	0	0	0	0	0	0	0	0	Major Disaster
September 2, 2016	September 12, 2016	10	Kansas	10	10	0	0	0	0	0	0	0	0	0	Major Disaster
October 17, 2016	October 26, 2016	9	Colorado	0	0	0	0	0	0	0	0	9	0	0	Fire Management Assistance
October 14, 2016	October 31, 2016	17	Nevada	0	0	0	0	0	0	0	0	17	0	0	Fire Management Assistance
October 4, 2016	October 30, 2016	26	South Carolina	0	0	0	0	0	26	0	0	0	0	0	Major Disaster
October 4, 2016	October 25, 2016	21	North Carolina	0	0	0	0	0	21	0	0	0	0	0	Major Disaster
October 4, 2016	October 15, 2016	11	Georgia	0	0	0	0	0	11	0	0	0	0	0	Major Disaster
October 3, 2016	October 19, 2016	16	Florida	0	0	0	0	0	16	0	0	0	0	0	Major Disaster
October 4, 2016	October 24, 2016	20	North Carolina	0	0	0	0	0	20	0	0	0	0	0	Emergency Declaration
October 4, 2016	October 15, 2016	11	Georgia	0	0	0	0	0	11	0	0	0	0	0	Emergency Declaration
October 4, 2016	October 30, 2016	26	South Carolina	0	0	0	0	0	26	0	0	0	0	0	Emergency Declaration
September 11, 2016	September 14, 2016	3	Hawaii	3	3	3	0	0	0	0	0	0	0	0	Major Disaster
October 4, 2016	October 19, 2016	15	Florida	0	0	0	0	0	15	0	0	0	0	0	Emergency Declaration
October 4, 2016	October 7, 2016	3	Colorado	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance

October 2, 2016	October 4, 2016	2	Nevada	0	0	0	0	0	0	0	0	2	0	0	Fire Management Assistance
August 21, 2016	August 31, 2016	10	Idaho	0	0	0	0	0	0	0	0	10	0	0	Fire Management Assistance
August 23, 2016	August 27, 2016	4	Iowa	4	4	0	0	4	0	0	0	0	0	0	Major Disaster
August 31, 2016	September 11, 2016	11	Florida	0	0	0	0	0	11	0	0	0	0	0	Major Disaster
July 30, 2016	July 31, 2016	1	Maryland	1	1	0	0	0	0	0	0	0	0	0	Major Disaster
August 30, 2016	September 1, 2016	2	Oregon	0	0	0	0	0	0	0	0	2	0	0	Fire Management Assistance
August 27, 2016	August 30, 2016	3	Washington	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance
July 2, 2016	July 9, 2016	7	Kentucky	7	7	7	0	0	0	7	0	0	0	0	Major Disaster
August 16, 2016	September 8, 2016	23	California	0	0	0	0	0	0	0	0	23	0	0	Fire Management Assistance
August 21, 2016	August 29, 2016	8	Washington	0	0	0	0	0	0	0	0	8	0	0	Fire Management Assistance
August 21, 2016	August 24, 2016	3	Washington	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance
August 16, 2016	August 22, 2016	6	California	0	0	0	0	0	0	0	0	6	0	0	Fire Management Assistance
August 13, 2016	September 6, 2016	24	California	0	0	0	0	0	0	0	0	24	0	0	Fire Management Assistance
August 13, 2016	August 22, 2016	9	California	0	0	0	0	0	0	0	0	9	0	0	Fire Management Assistance
August 11, 2016	October 2, 2016	52	Louisiana	52	52	0	0	0	0	0	0	0	0	0	Major Disaster
August 7, 2016	August 16, 2016	9	California	0	0	0	0	0	0	0	0	9	0	0	Fire Management Assistance
July 11, 2016	July 12, 2016	1	Wisconsin	1	1	0	0	0	0	0	0	0	0	0	Major Disaster
June 11, 2016	June 12, 2016	1	Montana	0	0	0	0	0	0	1	0	0	0	0	Major Disaster
July 31, 2016	August 3, 2016	3	Washington	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance
July 29, 2016	August 7, 2016	9	Nevada	0	0	0	0	0	0	0	0	9	0	0	Fire Management Assistance
July 30, 2016	August 8, 2016	9	California	0	0	0	0	0	0	0	0	9	0	0	Fire Management Assistance
July 28, 2016	August 4, 2016	7	Wyoming	0	0	0	0	0	0	0	0	7	0	0	Fire Management Assistance
July 29, 2016	July 31, 2016	2	Nevada	0	0	0	0	0	0	0	0	2	0	0	Fire Management Assistance
July 22, 2016	August 1, 2016	10	California	0	0	0	0	0	0	0	0	10	0	0	Fire Management Assistance
July 13, 2016	August 18, 2016	36	New Mexico	0	0	0	0	0	0	0	0	36	0	0	Fire Management Assistance
June 11, 2016	June 13, 2016	2	Oklahoma	2	2	0	0	0	0	0	0	0	0	0	Major Disaster
July 9, 2016	July 14, 2016	5	Colorado	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
July 9, 2016	July 14, 2016	5	California	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
June 22, 2016	June 29, 2016	7	West Virginia	7	7	7	0	0	0	0	0	0	0	0	Major Disaster
June 23, 2016	July 6, 2016	13	California	0	0	0	0	0	0	0	0	13	0	0	Fire Management Assistance
June 21, 2016	July 12, 2016	21	Utah	0	0	0	0	0	0	0	0	21	0	0	Fire Management Assistance
June 20, 2016	June 30, 2016	10	California	0	0	0	0	0	0	0	0	10	0	0	Fire Management Assistance
June 19, 2016	June 29, 2016	10	California	0	0	0	0	0	0	0	0	10	0	0	Fire Management Assistance
June 7, 2016	June 11, 2016	4	Oregon	0	0	0	0	0	0	0	0	4	0	0	Fire Management Assistance
June 8, 2016	June 15, 2016	7	Arizona	0	0	0	0	0	0	0	0	7	0	0	Fire Management Assistance
May 22, 2016	June 24, 2016	33	Texas	33	33	0	0	0	0	0	0	0	0	0	Major Disaster
June 4, 2016	June 10, 2016	6	California	0	0	0	0	0	0	0	0	6	0	0	Fire Management Assistance
April 15, 2016	April 16, 2016	1	Montana	0	0	0	0	1	0	0	0	0	0	1	Major Disaster
March 8, 2016	March 13, 2016	5	Arkansas	5	5	0	0	5	0	5	0	0	0	0	Major Disaster
April 17, 2016	April 30, 2016	13	Texas	13	13	0	0	0	0	0	0	0	0	0	Major Disaster
April 21, 2016	April 22, 2016	1	New Hampshire	0	0	0	0	0	0	0	0	1	0	0	Fire Management Assistance
April 5, 2016	April 6, 2016	1	Oklahoma	0	0	0	0	0	0	0	0	1	0	0	Fire Management Assistance
April 5, 2016	April 6, 2016	1	Kansas	0	0	0	0	0	0	0	0	1	0	0	Fire Management Assistance
March 23, 2016	April 7, 2016	15	Kansas	0	0	0	0	0	0	0	0	15	0	0	Fire Management Assistance
March 9, 2016	March 29, 2016	20	Mississippi	20	20	0	0	0	0	0	0	0	0	0	Major Disaster
January 22, 2016	January 23, 2016	1	Pennsylvania	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
March 7, 2016	March 29, 2016	22	Texas	22	22	0	0	0	0	22	0	0	0	0	Major Disaster
January 22, 2016	January 23, 2016	1	Delaware	0	1	0	0	0	0	0	0	0	0	1	Major Disaster
January 22, 2016	January 24, 2016	2	New Jersey	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
March 8, 2016	April 8, 2016	31	Louisiana	31	31	0	0	0	0	0	0	0	0	0	Major Disaster
January 22, 2016	January 23, 2016	1	Virginia	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
January 22, 2016	January 23, 2016	1	Maryland	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
January 22, 2016	January 23, 2016	1	District of Columbia	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
December 22, 2015	January 13, 2016	22	Georgia	22	22	0	0	0	0	0	0	0	0	0	Major Disaster
December 6, 2015	December 23, 2015	17	Oregon	0	17	17	0	17	0	0	0	0	0	17	Major Disaster

December 12, 2015	December 15, 2015	3	Alaska	3	0	0	0	0	0	0	0	0	0	0	Major Disaster
December 26, 2015	January 5, 2016	10	Oklahoma	0	10	0	0	0	0	0	0	0	0	10	Major Disaster
December 26, 2015	January 22, 2016	27	Texas	0	27	0	0	27	0	27	0	0	0	27	Major Disaster
December 26, 2015	January 22, 2016	27	Arkansas	27	27	0	0	27	0	27	0	0	0	0	Major Disaster
December 28, 2015	February 1, 2016	35	Louisiana	35	35	0	0	0	0	0	0	0	0	0	Major Disaster
December 1, 2015	December 14, 2015	13	Washington	0	13	13	0	13	0	13	0	0	0	13	Major Disaster
December 16, 2015	December 27, 2015	11	Idaho	0	0	0	0	0	0	0	0	0	0	11	Major Disaster
December 23, 2015	December 31, 2015	8	Alabama	8	8	0	0	8	0	8	0	0	0	0	Major Disaster
December 23, 2015	January 9, 2016	17	Missouri	17	17	0	0	17	0	17	0	0	0	0	Major Disaster
November 12, 2015	November 21, 2015	9	Washington	9	9	9	0	9	0	0	0	0	0	0	Major Disaster
December 23, 2015	December 28, 2015	5	Mississippi	5	5	0	0	5	0	5	0	0	0	0	Major Disaster
December 22, 2015	January 9, 2016	18	Missouri	18	18	0	0	18	0	18	0	0	0	0	Major Disaster
November 27, 2015	November 29, 2015	2	Oklahoma	0	2	0	0	0	0	0	0	0	0	2	Major Disaster
November 17, 2015	November 18, 2015	1	Idaho	1	0	0	0	1	0	0	0	0	0	0	Major Disaster
October 22, 2015	October 31, 2015	9	Texas	9	9	0	0	9	0	9	0	0	0	0	Major Disaster
August 27, 2015	August 28, 2015	1	Alaska	1	0	0	0	0	0	0	0	0	0	0	Major Disaster
August 9, 2015	September 10, 2015	32	Washington	0	0	32	0	0	0	0	0	32	0	0	Major Disaster
August 29, 2015	August 30, 2015	1	Washington	1	0	0	0	0	0	0	0	0	0	0	Major Disaster
October 1, 2015	October 23, 2015	22	South Carolina	22	22	0	0	0	0	0	0	0	0	0	Major Disaster
October 1, 2015	October 23, 2015	22	South Carolina	22	22	0	0	0	0	0	0	0	0	0	Emergency Declaration
September 9, 2015	October 30, 2015	51	California	0	0	0	0	0	0	0	0	51	0	0	Major Disaster
September 13, 2015	September 16, 2015	3	Oregon	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance
September 9, 2015	October 2, 2015	23	California	0	0	0	0	0	0	0	0	23	0	0	Fire Management Assistance
August 13, 2015	September 10, 2015	28	Washington	0	0	0	0	0	0	0	0	28	0	0	Emergency Declaration
August 14, 2015	September 6, 2015	23	Oregon	0	0	0	0	0	0	0	0	23	0	0	Fire Management Assistance
August 11, 2015	August 25, 2015	14	Oregon	0	0	0	0	0	0	0	0	14	0	0	Fire Management Assistance
July 11, 2015	July 20, 2015	9	Kentucky	9	9	9	0	9	0	9	0	0	0	0	Major Disaster
August 8, 2015	August 11, 2015	3	Oregon	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance
August 8, 2015	August 12, 2015	4	Arizona	0	0	0	0	0	0	0	0	4	0	0	Fire Management Assistance
May 15, 2015	July 27, 2015	73	Missouri	73	73	0	0	73	0	73	0	0	0	0	Major Disaster
May 8, 2015	May 29, 2015	21	South Dakota	21	21	0	0	21	0	0	0	0	0	0	Major Disaster
July 10, 2015	July 14, 2015	4	West Virginia	4	4	4	0	4	0	0	0	0	0	0	Major Disaster
July 30, 2015	August 29, 2015	30	Oregon	0	0	0	0	0	0	0	0	30	0	0	Fire Management Assistance
August 1, 2015	August 4, 2015	3	Mariana Islands	0	0	0	0	0	3	0	0	0	0	0	Major Disaster
June 20, 2015	June 25, 2015	5	Iowa	5	5	0	0	5	0	5	0	0	0	0	Major Disaster
June 17, 2015	June 24, 2015	7	South Dakota	7	7	0	0	7	0	7	0	0	0	0	Major Disaster
June 9, 2015	June 10, 2015	1	Vermont	1	1	0	0	0	0	0	0	0	0	0	Major Disaster
June 23, 2015	June 24, 2015	1	New Jersey	1	0	0	0	0	0	0	0	0	0	0	Major Disaster
May 4, 2015	June 21, 2015	48	Kansas	48	48	0	0	48	0	48	0	0	0	0	Major Disaster
May 4, 2015	June 15, 2015	42	Colorado	42	42	42	0	0	0	42	0	0	0	0	Major Disaster
May 18, 2015	June 20, 2015	33	Louisiana	33	33	0	0	0	0	0	0	0	0	0	Major Disaster
May 24, 2015	June 6, 2015	13	Wyoming	13	13	0	0	0	0	0	0	0	0	0	Major Disaster
May 7, 2015	June 15, 2015	39	Arkansas	39	39	0	0	39	0	39	0	0	0	0	Major Disaster
May 6, 2015	June 17, 2015	42	Nebraska	42	42	0	0	42	0	42	0	0	0	0	Major Disaster
June 17, 2015	June 27, 2015	10	Arizona	0	0	0	0	0	0	0	0	10	0	0	Fire Management Assistance
May 13, 2015	May 16, 2015	3	Guam	0	0	0	0	0	3	0	0	0	0	0	Major Disaster
May 4, 2015	June 23, 2015	50	Texas	50	50	0	0	50	0	50	0	0	0	0	Major Disaster
May 5, 2015	June 22, 2015	48	Oklahoma	48	48	0	0	48	0	48	0	0	0	0	Major Disaster
April 13, 2015	April 15, 2015	2	West Virginia	2	2	2	0	0	0	0	0	0	0	0	Major Disaster
April 8, 2015	April 11, 2015	3	West Virginia	3	3	3	0	0	0	0	0	0	0	0	Major Disaster
April 3, 2015	April 5, 2015	2	West Virginia	2	2	2	0	0	0	0	0	0	0	0	Major Disaster
March 3, 2015	March 9, 2015	6	Kentucky	0	6	6	0	0	0	0	0	0	0	6	Major Disaster
April 2, 2015	April 17, 2015	15	Kentucky	15	15	15	0	0	0	15	0	0	0	0	Major Disaster
February 15, 2015	February 23, 2015	8	Kentucky	0	8	8	0	0	0	0	0	0	0	8	Major Disaster
February 15, 2015	February 18, 2015	3	Georgia	0	0	0	0	0	0	0	0	0	0	3	Major Disaster

January 26, 2015	January 29, 2015	3	Massachusetts	0	3	0	0	0	0	0	0	0	0	3	Major Disaster
January 26, 2015	January 29, 2015	3	Connecticut	0	0	0	0	0	0	0	0	0	0	3	Major Disaster
January 26, 2015	January 29, 2015	3	Rhode Island	0	0	0	0	0	0	0	0	0	0	3	Major Disaster
February 15, 2015	February 23, 2015	8	Tennessee	0	8	0	0	0	0	0	0	0	0	8	Major Disaster
March 3, 2015	March 15, 2015	12	West Virginia	0	12	12	0	0	0	0	0	0	0	12	Major Disaster
January 26, 2015	January 29, 2015	3	New Hampshire	0	0	0	0	0	0	0	0	0	0	3	Major Disaster
January 26, 2015	January 29, 2015	3	Maine	0	3	0	0	0	0	0	0	0	0	3	Major Disaster
December 9, 2014	December 13, 2014	4	Vermont	0	0	0	0	0	0	0	0	0	0	4	Major Disaster
December 4, 2014	December 7, 2014	3	California	3	3	3	0	0	0	0	0	0	0	0	Major Disaster
December 23, 2014	December 24, 2014	1	Mississippi	1	0	0	0	0	0	1	0	0	0	0	Major Disaster
November 17, 2014	November 27, 2014	10	New York	0	10	0	0	0	0	0	0	0	0	10	Major Disaster
May 20, 2014	June 4, 2014	15	Arizona	0	0	0	0	0	0	0	0	15	0	0	Fire Management Assistance
September 7, 2014	September 9, 2014	2	Arizona	2	2	0	0	0	0	0	0	0	0	0	Major Disaster
September 7, 2014	September 10, 2014	3	Nevada	3	3	0	0	0	0	0	0	0	0	0	Major Disaster
September 4, 2014	March 26, 2015	203	Hawaii	0	0	0	0	0	0	0	203	0	0	0	Major Disaster
September 9, 2014	September 11, 2014	2	Missouri	2	2	0	0	2	0	2	0	0	0	0	Major Disaster
September 15, 2014	September 26, 2014	11	New Mexico	11	11	0	0	0	0	0	0	0	0	0	Major Disaster
October 8, 2014	October 13, 2014	5	California	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
August 21, 2014	August 26, 2014	5	Montana	5	5	0	0	5	0	0	0	0	0	0	Major Disaster
July 27, 2014	August 5, 2014	9	New Mexico	9	9	0	0	0	0	0	0	0	0	0	Major Disaster
August 18, 2014	August 24, 2014	6	Kentucky	6	6	6	0	0	0	0	0	0	0	0	Major Disaster
August 11, 2014	August 13, 2014	2	Michigan	2	2	0	0	0	0	0	0	0	0	0	Major Disaster
September 13, 2014	October 3, 2014	20	California	0	0	0	0	0	0	0	0	20	0	0	Fire Management Assistance
September 15, 2014	September 26, 2014	11	Oregon	0	0	0	0	0	0	0	0	11	0	0	Fire Management Assistance
September 15, 2014	September 27, 2014	12	California	0	0	0	0	0	0	0	0	12	0	0	Fire Management Assistance
September 14, 2014	September 20, 2014	6	California	0	0	0	0	0	0	0	0	6	0	0	Fire Management Assistance
August 24, 2014	September 8, 2014	15	California	0	0	0	15	0	0	0	0	0	0	0	Major Disaster
August 7, 2014	August 10, 2014	3	Hawaii	0	0	0	0	0	3	0	0	0	0	0	Major Disaster
July 29, 2014	August 3, 2014	5	American Samoa	5	5	5	0	0	0	0	0	0	0	0	Major Disaster
July 28, 2014	July 31, 2014	3	Guam	0	0	0	0	0	3	0	0	0	0	0	Major Disaster
September 5, 2015	September 10, 2015	5	California	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
August 24, 2014	August 28, 2014	4	California	0	0	0	0	0	0	0	0	4	0	0	Fire Management Assistance
August 18, 2014	August 23, 2014	5	California	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
August 18, 2014	August 22, 2014	4	California	0	0	0	0	0	0	0	0	4	0	0	Fire Management Assistance
June 25, 2014	July 2, 2014	7	North Dakota	7	7	0	0	0	0	0	0	0	0	0	Major Disaster
August 5, 2014	August 11, 2014	6	Oregon	0	0	0	0	0	0	0	0	6	0	0	Fire Management Assistance
June 5, 2014	June 10, 2014	5	Tennessee	5	5	0	0	5	0	5	0	0	0	0	Major Disaster
July 9, 2014	August 6, 2014	28	Washington	0	0	0	0	0	0	0	0	28	0	0	Major Disaster
August 1, 2014	August 9, 2014	8	California	0	0	0	0	0	0	0	0	8	0	0	Fire Management Assistance
August 2, 2014	August 9, 2014	7	California	0	0	0	0	0	0	0	0	7	0	0	Fire Management Assistance
August 2, 2014	August 9, 2014	7	California	0	0	0	0	0	0	0	0	7	0	0	Fire Management Assistance
August 1, 2014	August 16, 2014	15	California	0	0	0	0	0	0	0	0	15	0	0	Fire Management Assistance
June 26, 2014	July 8, 2014	12	Iowa	12	12	0	0	12	0	12	0	0	0	0	Major Disaster
June 1, 2014	June 4, 2014	3	Nebraska	3	3	0	0	3	0	3	0	0	0	0	Major Disaster
June 13, 2014	June 20, 2014	7	South Dakota	7	7	0	0	0	0	7	0	0	0	0	Major Disaster
July 21, 2014	July 22, 2014	1	Utah	0	0	0	0	0	0	0	0	1	0	0	Fire Management Assistance
June 14, 2014	June 21, 2014	7	Nebraska	7	7	0	0	7	0	7	0	0	0	0	Major Disaster
June 14, 2014	June 24, 2014	10	Iowa	10	10	0	0	10	0	10	0	0	0	0	Major Disaster
July 9, 2014	August 5, 2014	27	Washington	0	0	0	0	0	0	0	0	27	0	0	Emergency Declaration
July 19, 2014	July 22, 2014	3	Washington	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance
July 19, 2014	July 20, 2014	1	Washington	0	0	0	0	0	0	0	0	1	0	0	Fire Management Assistance
June 11, 2014	July 12, 2014	31	Minnesota	31	31	31	0	31	0	0	0	0	0	0	Major Disaster
June 3, 2014	June 5, 2014	2	Iowa	2	2	0	0	2	0	2	0	0	0	0	Major Disaster
July 9, 2014	July 14, 2014	5	Washington	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
May 13, 2014	May 22, 2014	9	New York	9	9	0	0	0	0	0	0	0	0	0	Major Disaster

July 1, 2014	July 6, 2014	5	California	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
May 11, 2014	May 13, 2014	2	Nebraska	2	2	0	0	2	0	2	0	0	0	0	Major Disaster
April 15, 2014	April 18, 2014	3	Vermont	3	3	0	0	0	0	0	0	0	0	0	Major Disaster
May 14, 2014	May 22, 2014	8	California	0	0	0	0	0	0	0	0	8	0	0	Fire Management Assistance
May 14, 2014	May 17, 2014	3	California	0	0	0	0	0	0	0	0	3	0	0	Fire Management Assistance
April 28, 2014	May 6, 2014	8	Florida	8	8	0	0	8	0	8	0	0	0	0	Major Disaster
April 28, 2014	May 5, 2014	7	Alabama	7	7	0	0	7	0	7	0	0	0	0	Major Disaster
April 28, 2014	May 3, 2014	5	Mississippi	5	5	0	0	0	0	5	0	0	0	0	Major Disaster
April 27, 2014	April 28, 2014	1	Arkansas	1	1	0	0	0	0	1	0	0	0	0	Major Disaster
January 5, 2014	January 9, 2014	4	Indiana	0	0	0	0	0	0	0	0	0	0	4	Major Disaster
March 1, 2014	March 17, 2014	16	Montana	0	16	0	0	0	0	0	0	0	0	0	Major Disaster
March 2, 2014	March 4, 2014	2	Tennessee	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
February 12, 2014	February 13, 2014	1	Maryland	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
February 6, 2014	February 11, 2014	5	Oregon	0	0	0	0	0	0	0	0	0	0	5	Major Disaster
March 22, 2014	April 29, 2014	38	Washington	0	38	38	0	0	0	0	0	0	0	0	Major Disaster
March 6, 2014	March 7, 2014	1	North Carolina	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
March 22, 2014	April 29, 2014	38	Washington	0	38	38	0	0	0	0	0	0	0	0	Emergency Declaration
February 10, 2014	February 15, 2014	5	South Carolina	0	0	0	0	0	0	0	0	0	0	5	Major Disaster
February 10, 2014	February 15, 2014	5	Georgia	0	0	0	0	0	0	0	0	0	0	5	Major Disaster
February 10, 2014	February 19, 2014	9	South Carolina	0	0	0	0	0	0	0	0	0	0	9	Emergency Declaration
February 10, 2014	February 14, 2014	4	Georgia	0	0	0	0	0	0	0	0	0	0	4	Emergency Declaration
February 4, 2014	February 20, 2014	16	Pennsylvania	0	0	0	0	0	0	0	0	0	0	16	Emergency Declaration
December 5, 2013	December 6, 2013	1	Oklahoma	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
December 20, 2013	December 27, 2013	7	Vermont	0	0	0	0	0	0	0	0	0	0	7	Major Disaster
November 5, 2013	November 14, 2013	9	Alaska	9	9	0	0	9	0	0	0	0	0	0	Major Disaster
October 27, 2013	October 29, 2013	2	Alaska	0	2	0	0	0	0	0	0	0	0	0	Major Disaster
January 9, 2014	January 20, 2014	11	West Virginia	0	0	0	0	0	0	0	0	0	11	0	Emergency Declaration
December 5, 2013	December 7, 2013	2	Arkansas	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
October 30, 2013	October 31, 2013	1	Texas	1	1	0	0	0	0	0	0	0	0	0	Major Disaster
August 17, 2013	October 25, 2013	69	California	0	0	0	0	0	0	0	0	69	0	0	Major Disaster
November 17, 2013	November 18, 2013	1	Illinois	1	0	0	0	1	0	1	0	0	0	0	Major Disaster
October 2, 2013	October 7, 2013	5	Nebraska	5	5	0	0	0	0	5	0	0	0	5	Major Disaster
October 3, 2013	October 17, 2013	14	South Dakota	0	14	0	0	0	0	0	0	0	0	14	Major Disaster
October 4, 2013	October 5, 2013	1	North Dakota	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
July 27, 2013	July 28, 2013	1	North Carolina	1	1	1	0	0	0	0	0	0	0	0	Major Disaster
September 9, 2013	September 22, 2013	13	New Mexico	13	13	13	0	0	0	0	0	0	0	0	Major Disaster
September 13, 2013	September 16, 2013	3	New Mexico	3	3	0	0	0	0	0	0	0	0	0	Major Disaster
July 22, 2013	August 16, 2013	25	Kansas	25	25	0	0	25	0	25	0	0	0	0	Major Disaster
June 26, 2013	July 12, 2013	16	Pennsylvania	16	16	0	0	0	0	16	0	0	0	0	Major Disaster
July 23, 2013	July 29, 2013	6	New Mexico	6	6	0	0	0	0	0	0	0	0	0	Major Disaster
July 19, 2013	July 21, 2013	2	New Mexico	2	2	0	0	0	0	0	0	0	0	0	Major Disaster
July 3, 2013	July 14, 2013	11	North Carolina	11	11	11	0	0	0	0	0	0	0	0	Major Disaster
September 9, 2013	September 14, 2013	5	California	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
September 11, 2013	September 30, 2013	19	Colorado	19	19	19	0	0	0	0	0	0	0	0	Major Disaster
September 11, 2013	October 31, 2013	50	Colorado	50	50	50	0	0	0	0	0	0	0	0	Emergency Declaration
August 2, 2013	August 14, 2013	12	Missouri	12	12	0	0	12	0	0	0	0	0	0	Major Disaster
August 8, 2013	August 14, 2013	6	Arkansas	6	6	0	0	0	0	0	0	0	0	0	Major Disaster
July 29, 2013	August 1, 2013	3	California	0	0	0	0	0	0	0	0	3	0	0	Major Disaster
August 20, 2013	September 8, 2013	19	California	0	0	0	0	0	0	0	0	19	0	0	Fire Management Assistance
August 20, 2013	August 28, 2013	8	Washington	0	0	0	0	0	0	0	0	8	0	0	Fire Management Assistance
August 18, 2013	August 24, 2013	6	Montana	0	0	0	0	0	0	0	0	6	0	0	Fire Management Assistance
August 17, 2013	August 26, 2013	9	Oregon	0	0	0	0	0	0	0	0	9	0	0	Fire Management Assistance
August 15, 2013	August 30, 2013	15	Idaho	0	0	0	0	0	0	0	0	15	0	0	Fire Management Assistance
August 13, 2013	August 19, 2013	6	Utah	0	0	0	0	0	0	0	0	6	0	0	Fire Management Assistance
August 12, 2013	August 29, 2013	17	Idaho	0	0	0	0	0	0	0	0	17	0	0	Fire Management Assistance

August 10, 2013	August 14, 2013	4	Washington	0	0	0	0	0	0	0	0	4	0	0	Fire Management Assistance
June 20, 2013	June 28, 2013	8	Wisconsin	8	8	8	0	0	0	0	0	0	0	0	Major Disaster
August 7, 2013	August 13, 2013	6	California	0	0	0	0	0	0	0	0	6	0	0	Fire Management Assistance
August 5, 2013	August 10, 2013	5	California	0	0	0	0	0	0	0	0	5	0	0	Fire Management Assistance
July 28, 2013	August 4, 2013	7	Oregon	0	0	0	0	0	0	0	0	7	0	0	Fire Management Assistance
June 25, 2013	July 11, 2013	16	Vermont	16	16	0	0	0	0	0	0	0	0	0	Major Disaster
June 26, 2013	July 3, 2013	7	New Hampshire	7	7	7	0	0	0	0	0	0	0	0	Major Disaster
April 17, 2013	April 20, 2013	3	Texas	0	0	0	0	0	0	0	0	0	3	0	Major Disaster
June 19, 2013	June 30, 2013	11	South Dakota	11	11	0	0	0	0	11	0	0	0	0	Major Disaster
July 2, 2013	July 7, 2013	5	Florida	5	5	0	0	0	0	0	0	0	0	0	Major Disaster
June 21, 2013	June 28, 2013	7	Iowa	7	7	0	0	0	0	7	0	0	0	0	Major Disaster
July 27, 2013	August 14, 2013	18	Washington	0	0	0	0	0	0	0	0	18	0	0	Fire Management Assistance
July 27, 2013	August 19, 2013	23	Oregon	0	0	0	0	0	0	0	0	23	0	0	Fire Management Assistance
June 11, 2013	June 21, 2013	10	Colorado	0	0	0	0	0	0	0	0	10	0	0	Major Disaster
June 13, 2013	June 14, 2013	1	West Virginia	1	1	0	0	0	0	0	0	0	0	0	Major Disaster
June 11, 2013	June 17, 2013	6	Colorado	0	0	0	0	0	0	0	0	6	0	0	Major Disaster
June 20, 2013	June 26, 2013	6	Minnesota	6	6	0	0	6	0	0	0	0	0	0	Major Disaster
July 19, 2013	July 21, 2013	2	Oregon	0	0	0	0	0	0	0	0	2	0	0	Fire Management Assistance
May 29, 2013	June 11, 2013	13	Missouri	13	13	0	0	13	0	13	0	0	0	0	Major Disaster
May 17, 2013	June 17, 2013	31	North Dakota	31	31	0	0	0	0	0	0	0	0	0	Major Disaster
June 26, 2013	July 11, 2013	15	New York	15	15	0	0	0	0	0	0	0	0	0	Major Disaster
May 19, 2013	June 3, 2013	15	Montana	0	15	0	0	0	0	0	0	0	0	0	Major Disaster
July 4, 2013	July 17, 2013	13	Nevada	0	0	0	0	0	0	0	0	13	0	0	Fire Management Assistance
July 1, 2013	July 8, 2013	7	Arizona	0	0	0	0	0	0	0	0	7	0	0	Fire Management Assistance
June 30, 2013	July 7, 2013	7	Arizona	0	0	0	0	0	0	0	0	7	0	0	Fire Management Assistance
May 19, 2013	June 15, 2013	27	Iowa	27	27	0	0	0	0	27	0	0	0	0	Major Disaster
June 19, 2013	June 30, 2013	11	Colorado	0	0	0	0	0	0	0	0	11	0	0	Fire Management Assistance
May 24, 2013	May 31, 2013	7	South Dakota	7	7	0	0	0	0	7	0	0	0	0	Major Disaster
May 25, 2013	June 1, 2013	7	South Dakota	7	7	0	0	0	0	0	0	0	0	0	Major Disaster
May 30, 2013	June 3, 2013	4	Arkansas	4	4	0	0	0	0	4	0	0	0	0	Major Disaster
May 17, 2013	June 12, 2013	26	Alaska	0	26	0	0	0	0	0	0	0	0	0	Major Disaster
June 18, 2013	June 30, 2013	12	Arizona	0	0	0	0	0	0	0	0	12	0	0	Fire Management Assistance
April 16, 2013	May 15, 2013	29	Michigan	0	29	0	0	0	0	0	0	0	0	0	Major Disaster
June 11, 2013	June 15, 2013	4	Colorado	0	0	0	0	0	0	0	0	4	0	0	Fire Management Assistance
June 11, 2013	June 21, 2013	10	Colorado	0	0	0	0	0	0	0	0	10	0	0	Fire Management Assistance
May 22, 2013	May 26, 2013	4	Vermont	4	4	0	0	0	0	0	0	0	0	0	Major Disaster
May 31, 2013	June 8, 2013	8	California	0	0	0	0	0	0	0	0	8	0	0	Fire Management Assistance
April 17, 2013	April 30, 2013	13	Iowa	13	13	0	0	13	0	0	0	0	0	0	Major Disaster
April 22, 2013	May 16, 2013	24	North Dakota	0	24	0	0	0	0	0	0	0	0	0	Major Disaster
May 18, 2013	June 2, 2013	15	Oklahoma	15	0	0	0	0	0	15	0	0	0	0	Major Disaster
April 8, 2013	April 10, 2013	2	South Dakota	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
April 16, 2013	May 5, 2013	19	Illinois	19	19	0	0	19	0	0	0	0	0	0	Major Disaster
May 2, 2013	May 11, 2013	9	California	0	0	0	0	0	0	0	0	9	0	0	Fire Management Assistance
May 1, 2013	May 5, 2013	4	California	0	0	0	0	0	0	0	0	4	0	0	Fire Management Assistance
April 9, 2013	April 11, 2013	2	Iowa	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
April 9, 2013	April 11, 2013	2	Minnesota	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
February 20, 2013	February 23, 2013	3	Kansas	0	0	0	0	0	0	0	0	0	0	3	Major Disaster
April 22, 2013	May 7, 2013	15	North Dakota	0	15	0	0	0	0	0	0	0	0	0	Emergency Declaration
February 8, 2013	February 9, 2013	1	New York	0	0	0	0	0	0	0	0	0	0	1	Major Disaster
April 17, 2013	April 20, 2013	3	Texas	0	0	0	0	0	0	0	0	0	3	0	Emergency Declaration
February 8, 2013	February 10, 2013	2	Massachusetts	0	2	0	0	0	0	0	0	0	0	2	Major Disaster
April 15, 2013	April 22, 2013	7	Massachusetts	0	0	0	0	0	0	0	0	0	7	0	Emergency Declaration
February 24, 2013	February 26, 2013	2	Oklahoma	0	0	0	0	0	0	0	0	0	0	2	Major Disaster
February 8, 2013	February 10, 2013	2	Maine	0	2	0	0	0	0	0	0	0	0	2	Major Disaster
February 8, 2013	February 10, 2013	2	Rhode Island	0	0	0	0	0	0	0	0	0	0	2	Major Disaster

February 8, 2013	February 12, 2013	4	Connecticut	0	0	0	0	0	0	0	0	0	0	4	Major Disaster
February 8, 2013	February 11, 2013	3	New Hampshire	0	0	0	0	0	0	0	0	0	0	3	Major Disaster
December 15, 2012	January 21, 2013	37	Arizona	0	0	0	0	0	0	0	0	0	0	37	Major Disaster
January 14, 2013	January 17, 2013	3	North Carolina	3	3	0	0	0	0	0	0	0	0	0	Major Disaster
January 8, 2013	January 17, 2013	9	Louisiana	9	0	0	0	0	0	0	0	0	0	0	Major Disaster
February 10, 2013	February 22, 2013	12	Mississippi	12	0	0	0	0	0	12	0	0	0	0	Major Disaster
February 8, 2013	February 12, 2013	4	Connecticut	0	0	0	0	0	0	0	0	0	0	4	Emergency Declaration
Total Duration of Disaster Declarations				**1585**	**2268**	**585**	**15**	**773**	**585**	**806**	**203**	**1193**	**24**	**454**	**8491**
Yearly National Average Fed Dec Duration				**317**	**454**	**117**	**3**	**155**	**117**	**161**	**41**	**239**	**5**	**91**	**1698**
Total Number of Disaster Declarations				**143**	**172**	**44**	**1**	**61**	**41**	**59**	**1**	**110**	**4**	**72**	**708**

Source: Federal Emergency Management Agency, The Department of Homeland Security, accessed February 5, 2018, FEMA.gov.

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