

## National Guard Response Considerations to U.S. Climate Change

by

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### Abstract

The President and the Secretary of Defense recognize global climate change as a national security risk in the 2015 National Security Strategy and a Department of Defense report to Congress. Two significant implications for the United States are sea-level rise affecting coastal areas (particularly during severe storms) and drought-induced wild land fires in the western part of the country. The National Guard provides significant defense support to civil authorities during emergency response to events in these categories. This paper measures the Guard's "Essential 10" mission capabilities against the emergency support functions used by the Federal Emergency Management Agency as a framework to evaluate adequacy of the distribution of National Guard units to respond to coastal flooding and wild land fires. It proposes a number of force structure changes across the Army National Guard to better align "Essential 10" capabilities against these two climate-related threats. Finally, the author offers an assessment of the risk these changes might pose to future global National Guard combat missions.

## **National Guard Response Considerations to U.S. Climate Change**

Scientists acknowledge that climate change manifests in various ways that negatively affect human society. Coastal flooding from sea-level rise and wild land fires resulting from forecasted higher levels of drought are two threats that seem increasingly more frequent. Two cases provide recent examples of their impacts.

In October 2012, Hurricane Sandy came ashore in New Jersey and New York.<sup>1</sup> In its wake, according to CNN, “the storm left over one hundred and thirty dead, devastated tens of thousands of homes, left over 8-million people with no power, and paralyzed America’s largest metropolitan region.”<sup>2</sup> Strong winds, pervasive flooding, and “breakout fires caused upwards of \$50 billion in damage.”<sup>3</sup> The storm’s coastal and inland flooding were harbingers of the potentiality of future storms. During 2015, California suffered some of the most severe wild land fires in decades. In July 2015, the *Rough Fire Complex* in Fresno County consumed over 150,000 acres of the Sierra National Forest, destroying homes, farm structures and life.<sup>4</sup> At its end, this fire was the 20<sup>th</sup> largest in California history. In 2015 in California alone, almost 9000 wild land fires destroyed nearly 894,000 acres.<sup>5</sup> If the National Guard had not been involved in the response efforts for these two climate related disasters, their effects would have been more lasting.

The National Guard is the first response force for “defense support to civil authorities” (DSCA) to augment local disaster responses in every state. A 2015 report by the U.S. Department of Defense (DoD) recognizes two climate-related risks that may require increased DSCA capability: “more frequent and/or more severe extreme weather events, and sea level rise and temperature changes.”<sup>6</sup> This study proposes that the increased potential and magnitude for two of these risks—coastal flooding and wild

land fires—is great enough to justify reallocation of National Guard capabilities across the nation to accomplish this expanding mission.

### Climate Change as a Defense Risk

The 2015 *National Security Strategy* postulates, “climate change is an urgent and growing threat to our national security, contributing to increased natural disasters, refugee flows, and conflicts over basic resources such as food and water.”<sup>7</sup> It recognizes the effects of sea-level rise and coastal storms<sup>8</sup> as significant threats to the United States homeland.<sup>9</sup> While the National Security Strategy fails to identify wild land fires as a specific threat, the literature review in this work posits it as a legitimate factor. This paper accepts the DoD position that global climate changes are already occurring to varying degrees. The DoD defines climate change as:

Variations in average weather conditions that persist over multiple decades or longer that encompass increases and decreases in temperature, shifts in precipitation, and changing risk of certain types of severe weather events.<sup>10</sup>

In making the case for adjusting National Guard force structure adjustments, this work first explores the expected effects within each U.S. geographical region. These climate affects shall demonstrate significant trends that leaders must tackle. Next, it will explain how DSCA augments civilian disaster response efforts and examines such capabilities in the National Guard. The paper also catalogues a number of National Guard domestic response missions, which demonstrate significant weather related operations, many demanding necessary force realignment. The paper will then propose specific geographic redistribution of certain National Guard units to meet these climate-related risks and will propose conversion of other National Guard units as force

structure “bill payers” to offset the changes. Finally, it will assess risk to other National Guard missions for each move or conversion. Finally, this paper will argue that these climate-related threats pose greater risk to national security than the loss of combat capability from the recommended bill payers.

Climate change could affect the U.S. homeland through a wide array of problems such as severe heat waves, changes in aquatic biology, decreased crop yields, electricity outages, and flooding due to snowmelt. This work provides little voice to these risks beyond its scope. The two most pervasive threats of climate change will be from coastal flooding due to sea level rise<sup>11</sup> (particularly during storms) and a higher likelihood of wild land fires due to climate-induced drought. This work now examines a regional survey of these threats to provide some scope of the risk.

#### Flooding Threats - Coastal Regions

In the climate scenarios, the most significant event in the Northeast will be sea-level rise, particularly in highly populated New York City and the New Jersey shores.

Gornitz et al. aver:

Rising oceans will eat away at the nearly 2400 km of shoreline encircling the greater New York City metropolitan region — presently home to 19.6 million people. Sea level has already climbed around 27 cm in New York City and 38.5 cm along the New Jersey coast during the 20th century.....present rates of sea level rise could accelerate severalfold [sic], as mountain and polar glaciers melt and upper ocean layers heat up and expand, due to global warming.<sup>12</sup>

Scholars at Cambridge put it more bluntly, “The densely populated coasts of the Northeast will endure substantial increases in the extent and frequency of storm surges,<sup>13</sup> coastal flooding, erosion, property damage, and loss of wetlands.”<sup>14</sup>

The southeastern United States will also face this potential threat, along with Atlantic and Gulf hurricane activity. Warmer ocean-surface temperatures since the

1970s have been attributed to greater Atlantic hurricane strengths.<sup>15</sup> Hoyos et al. note that there are no observed correlations between higher ocean temperatures and higher frequencies of storms.<sup>16</sup> Despite this, the hurricane seasons of 2004 and 2005 were significant for the Southeast. Many hurricanes made landfall in Florida in 2005 while Hurricanes Katrina and Rita were especially devastating to Louisiana, Mississippi, Alabama and east Texas; 1800 people died and over 200 square miles of coastal Louisiana were submerged.<sup>17</sup>

Climate change will increase these hazards in other coastal zones. Sea-level rise will “increase erosion of beaches and significant coastal land areas in the Northwest.”<sup>18</sup> The densely populated South Puget Sound in Washington (centered on Olympia, Tacoma, and Seattle) is at special risk.<sup>19</sup> A study by the University of Washington warns, “A mid-range estimate of relative sea-level rise for the Puget Sound basin is about 13 inches by the year 2100, but could be as high as 50 inches at the higher estimated warming rates.”<sup>20</sup>

The State of Alaska has more coastline than the other 49 states together, stretching over almost 35,000 miles.<sup>21</sup> Frequent storms in the Gulf of Alaska, in the Bering, Chukchi, and Beaufort Seas, already slam into this coastline for months at a time each year.<sup>22</sup> Scientists predict northward shifts in Pacific storms because of a reduction of ice cover and an increase in temperatures.<sup>23</sup> Climate models show that the Bering Sea may experience noticeable drops in atmospheric pressure, causing more storms to occur in the region.<sup>24</sup>

The Pacific and Caribbean Island states and territories of the United States show risks in climate related change due to their dense populations and their lower elevations

above sea level. Scientists predict rising air and ocean surface temperatures in both the Pacific and Caribbean during the twenty-first century. The islands will flood more frequently because higher storm tides will wear away at the protective beaches and expose coastal lands to permanent submersion.<sup>25</sup> Storms, with their large surge and rainfall, significantly affect life on islands in the Pacific Ocean and the Caribbean Sea, including “loss of life, damage to infrastructure and property, and contamination of freshwater supplies.”<sup>26</sup>

#### Threat of Drought-Induced Wild Land Fires

Rising temperatures will affect both the Northwest and Southwest regions. In the latter, scientists recognize that past climatological changes in Colorado River flows indicate that drought is frequent. This region bears the longest “mega-droughts” on Earth.<sup>27</sup> Rapid southwest warming reduces spring snowpack in the Rocky Mountains and reduced Colorado River flows; this is a foreboding trend.<sup>28</sup>

The most significant issue driven by climate change in the Southwest will be record wild land fires. These fires will be whipped up by hotter-than-usual temperatures, coupled with reduced spring snowpack and lower soil moisture levels.<sup>29</sup> These wild land fires will vary in frequency and intensity, depending on local changes in heat and rainfall, and underbrush (fuel). For example, scientists expect increased fires in wetter, forested areas, while there will be a lesser occurrence in areas with limited underbrush (fuels).<sup>30</sup>

The Northwest faces similar issues and depends on its snow pack as a source of water for growing industrial and municipal demands. The higher temperatures create problems in meeting this demand; hotter winters cause more precipitation to fall as rain instead of snow, prompting earlier snowmelt because reduced snowpacks have less

resistance to the summer sun.<sup>31</sup> By mid-century, scientists forecast possible decreases in April snowpack of up to 40 percent in the Cascade Mountains, for example.<sup>32</sup> This results in a reduction of water available during warmer seasons and could lead to cumulative drought.<sup>33</sup>

Engineers planned the region's domestic water infrastructure assuming that most of the summer water demand would be met naturally by snowpack. Thus, a reduction in snowpack presents challenges not envisaged by the engineers. Faster snow runoff will extend the length of summer dry seasons. This will have important effects on reservoirs and the nearby bio-systems—both are key components of preventing or mitigating wild fires.<sup>34</sup> Climbing summer temperatures and earlier snowmelt will aggravate the risks of wild fires in a Northwest suffering extended lack of soil moisture.<sup>35</sup> Scientists have already observed these phenomena in the recent past. Trees stressed by drought and hotter weather will become more vulnerable to insect attacks from pests like the spruce beetle and mountain pine beetle; this new source of food will tend to increase the insect populations and consequently intensify the next season of attacks.<sup>36</sup> The result is more dead trees that increase the fire hazard.<sup>37</sup> Thus far, this work has explored the regional implications of climate change on the United States. It now examines the disaster management response.

#### Anatomy of Defense Support to Civil Authorities (DSCA)

All disasters are “local” and municipal first responders routinely handle them. When such events exceed their capacity, local emergency managers solicit a regional response effort across several towns or counties. The governor may provide state assistance when a disaster exceeds regional capacity. The National Guard is one of the governor's first response forces for these domestic contingency missions.<sup>38</sup> The state

Adjutant General (TAG) is the governor's principal agent to provide state military operational support organized under Title 32 U.S. Code, section 902.<sup>39</sup> The National Guard units must be equipped with the right mix of capabilities and capacity to meet these disaster responses.

Larger disasters that exceed state capacity may necessitate a presidential *Stafford Act* declaration.<sup>40</sup> Such authorizes the application of federal resources and activates a Federal Emergency Management Agency (FEMA) disaster office. Sometimes, the President may mobilize National Guard formations in an active duty status under Title 10, U.S. Code. Regardless of duty status, the National Guard (like all military forces) supports the civilian FEMA efforts—never as the lead agency. The 2016 *National Guard Posture Statement* highlights the expansive contribution of National Guard service members in this mission:

Living and working in nearly 3,000 communities, the National Guard is often the face of the military across the nation. It connects the U.S. military to America. Army and Air National Guardsmen were called-up (in state active duty and Title 32 status) by their governors 200 times and logged 281,263 man-days responding to homeland incidents in FY14. Part of those responses included 63 natural disasters; including 17 fires, 14 winter storms, 12 tornadoes, 12 floods and 3 hurricanes.<sup>41</sup>

#### A Survey of National Guard Climate Related Disaster Responses

Table 1 (at the end of this paper) summarizes climate related natural disasters severe enough to require mobilization of the National Guard between 2009 and 2014. Each U.S. region depicts the number of man-days per fiscal year for each event classification. An examination of these trends demonstrates significant mobilizations for flooding, wild land fires, hurricanes or severe weather events, like a tornado. Fiscal Year 2009 shows a large amount of flooding and winter storm events, whereas 2013 recorded the Hurricane Sandy event. The table does not report the significant Western

region wild land fire events of 2015, since the data was unavailable at the time of this writing.

While Table 1 does not make the case for significant climate shifts, the events do demonstrate a significant need to look at response-oriented equipment and force structure to mitigate future climate change. The events demand an examination of engineering capability and capacity, whether they require debris clean up in response to a flood, for hurricane or flood preparation (such as sand bag barrier construction), or for post-storm debris removal. The Western region states also show a heavy demand for firefighting capability due to a likelihood of drought conditions causing more wild land fires. Given these trends and their concomitant responses, this work will survey a helpful framework to examine requirements.

#### FEMA Emergency Support Functions

A meaningful dialogue on force structure changes benefits from an established framework. The Federal Emergency Management Agency operates fifteen Emergency Support Functions (ESF) as functional management areas to provide crisis response operations.<sup>42</sup>

The Federal ESFs bring together the capabilities of Federal departments and agencies and other national-level assets. ESFs are not based on the capabilities of a single department or agency, and the functions for which they are responsible cannot be accomplished by any single department or agency. Instead, Federal ESFs are groups of organizations that work together to deliver core capabilities and support an effective response.<sup>43</sup>

The National Guard, directed by the governor and operating under its own command and control, can support the first thirteen ESFs through its own support framework of ten essential capabilities. These capabilities form the rubric of support that provide the manpower and equipment capabilities in a response effort.

These “Essential 10” are command and control; logistics; aviation; security (can also perform general labor and firefighting); engineering; maintenance; communications; chemical, biological, radiological and nuclear (CBRN); medical; and transportation.<sup>44</sup>

The Chief of the National Guard Bureau, GEN Frank Grass, describes how National Guard soldiers simultaneously exercise aspects of the Essential 10 while training for their unit missions:

Putting their military skills to use in underserved American communities, more than 1,300 Guard members performed engineering, medical and construction missions as part of Innovative Readiness Training [IRT] in Fiscal Year 2014. IRT provides Guard members real-world training opportunities and prepares units for their wartime missions.<sup>45</sup>

As an illustration, this study will survey the adequacy of Essential 10 assets in two regions—the Northeast and the Southwest—to augment the federal coordinator responsible for each of FEMA’s Emergency Support Functions to deal with coastal flooding and wild land fires. This analysis will be followed by recommended adjustments to National Guard force structure and distribution to cover shortfalls.

<b>ESSENTIAL 10</b>	<b>CT</b>	<b>MA</b>	<b>ME</b>	<b>NY</b>	<b>NH</b>	<b>NJ</b>	<b>VT</b>
<b>Mission Command</b>	84	192	84	727		67	
<b>Aviation</b>	641	397	182	535	73	377	111
<b>Chemical</b>							
<b>Communication</b>		37		529	33		
<b>Engineer</b>	488	502	698	796	88	475	83
<b>Logistics</b>	688	616	197	194			610
<b>Maintenance</b>		45		152		1455	
<b>Medical</b>		79		78			
<b>Security</b>	951	2408	370	3656	836	2711	1347
<b>Transportation</b>		215	174	272		167	

**PERSONNEL RECAP**

<b>CRITICAL EQUIP</b>	<b>CT</b>	<b>MA</b>	<b>ME</b>	<b>NY</b>	<b>NH</b>	<b>NJ</b>	<b>VT</b>
<b>UH 60 Helicopters</b>	15	10	5	15	5	15	10
<b>CH 47 Helicopters</b>							
<b>Light Haul Trucks</b>		25					
<b>Medium Haul Trucks</b>	60	60	60	60		50	

**EQUIPMENT RECAP**

Figure 1: Northeast Region National Guard “Essential 10” Capabilities<sup>46</sup>

<b>ESSENTIAL 10</b>	<b>AZ</b>	<b>CA</b>	<b>CO</b>	<b>NM</b>	<b>NV</b>	<b>UT</b>
<b>Mission Command</b>	<b>259</b>	<b>787</b>	<b>193</b>			<b>195</b>
<b>Aviation</b>	<b>789</b>	<b>1541</b>		<b>101</b>	<b>198</b>	<b>701</b>
<b>Chemical</b>		<b>146</b>				
<b>Communication</b>	<b>185</b>	<b>38</b>	<b>38</b>	<b>3</b>	<b>344</b>	<b>38</b>
<b>Engineer</b>	<b>476</b>	<b>1365</b>	<b>256</b>	<b>204</b>	<b>305</b>	<b>580</b>
<b>Logistics</b>	<b>503</b>	<b>1639</b>	<b>127</b>	<b>339</b>	<b>588</b>	<b>418</b>
<b>Maintenance</b>	<b>186</b>	<b>199</b>	<b>42</b>		<b>185</b>	<b>142</b>
<b>Medical</b>	<b>100</b>	<b>192</b>	<b>59</b>	<b>77</b>		<b>99</b>
<b>Security</b>	<b>1639</b>	<b>5453</b>	<b>2550</b>	<b>1471</b>	<b>769</b>	<b>2522</b>
<b>Transportation</b>	<b>1030</b>	<b>1344</b>		<b>552</b>	<b>333</b>	
<b>PERSONNEL RECAP</b>						
<b>CRITICAL EQUIPMENT</b>	<b>AZ</b>	<b>CA</b>	<b>CO</b>	<b>NM</b>	<b>NV</b>	<b>UT</b>
<b>UH 60 Helicopters</b>	<b>30</b>	<b>60</b>		<b>15</b>	<b>15</b>	<b>30</b>
<b>CH 47 Helicopters</b>						<b>4</b>
<b>LIGHT Haul Trucks</b>		<b>20</b>				
<b>Medium Haul Trucks</b>	<b>300</b>	<b>264</b>	<b>10</b>	<b>180</b>	<b>120</b>	
<b>Heavy Equip Transport</b>		<b>96</b>				
<b>EQUIPMENT RECAP</b>						

Figure 2. Southwest Region National Guard “Essential 10” Capabilities<sup>47</sup>

ESF #1—Transportation (Department of Transportation):<sup>48</sup> “Supports management of transportation systems and infrastructure.”<sup>49</sup> In both regions, the National Guard may assist by clearing transportation infrastructure such as highways, waterways or railways of debris; current engineer force structure is adequate to perform such tasks. However, due to the large extent of oceanfront and major cities present in both regions, engineers will become overwhelmed quickly with other tasks. National Guard transportation assets seem adequate as well to service this ESF.

ESF #2—Communications (Department of Homeland Security, DHS):<sup>50</sup> “Coordinates the reestablishment of the critical communications infrastructure, facilitates the stabilization of systems and applications from cyber attacks.”<sup>51</sup> The National Guard has some distributed capacity to assist with a cyber defense mission in coordination with other U.S. government cyber assets: their Computer Network Defense Teams

“control and operate the defensive cyber system that is embedded in every state, territory and District of Columbia National Guard headquarters.”<sup>52</sup>

The National Guard has some communications units within both regions; however, the likely requirement to restore communications lines and other infrastructure will require additional military engineering forces. Nevertheless, the National Guard’s Joint CONUS Communications Support Environment can augment existing Federal and state agency communications capabilities with additional connectivity from a domestic response incident site anywhere in the nation. The 2015 *National Guard Posture Statement* elaborates on an important component of this capability:

The JISCC is a mobile communications package that allows first responders, state and federal agencies to talk to each other during a crisis. Mobile, the JISCC can be deployed to an incident to allow responders to share voice, video and data via satellite and high-frequency radio.<sup>53</sup>

ESF #3—Public Works and Engineering (U.S. Army Corps of Engineers):<sup>54</sup>

“Provides infrastructure systems, environmental response/health and safety, mass search and rescue operations, infrastructure repair and protection, and construction management.”<sup>55</sup> The demand in both the Northeast and Southwest will likely be high for sand bagging operations pre-storm and debris clean up and removal post-storm. This will overwhelm the current National Guard engineering forces in either region. A wild land fire scenario may not require the same amount of National Guard resources to support the coordinator.

ESF #4—Firefighting (Department of Agriculture/U.S. Forest Service and DHS/FEMA/U.S. Fire Administration):<sup>56</sup> “Coordinates the support for the detection and suppression of urban fires.”<sup>57</sup> The National Guard will likely have enough forces to fight fires in both regions using soldiers from infantry and military police units normally

available under the security/general labor capability. The number of National Guard UH-60 Blackhawk helicopters stationed in the Northeast region and UH-60 and CH-47 Chinook heavy-lift helicopters located in the Southwest seem sufficient to move soldiers to and from firefighting tasks while maintaining other missions such as rescue, transport of emergency crews, observation and delivery of vital supplies. Note: This opinion assumes that all AH-64 Apache attack helicopters are traded for the UH-60 Blackhawk cargo models under the Army's Aviation Restructuring Initiative.

In addition, the California Air National Guard employs two C-130 fixed-wing aircraft that mount the Modular Airborne Fire Fighting System (MAFFS) for fire retardant application.<sup>58</sup> Last year, according to the National Guard Bureau, Air Guard crews from three different MAFFS-trained squadrons "flew a total of 88 sorties and dropped more than 246,000 gallons of fire retardant on wildfires."<sup>59</sup> Finally, the Air Guard supports interagency wild land firefighting efforts through real-time surveillance of fires from its Predator unmanned aircraft systems.<sup>60</sup>

ESF #5—Information and Planning (DHS/FEMA):<sup>61</sup> "Supports and facilitates multiagency planning and coordination for operations involving incidents requiring Federal coordination."<sup>62</sup> Sufficient National Guard command and control headquarters exist to assist to augment this ESF in both regions.

ESF #6—Mass Care, Emergency Assistance, Temporary Housing, and Human Services (DHS/FEMA):<sup>63</sup> "Services include sheltering and feeding; coordination of voluntary organizations and donations; all manner of housing; and disaster assistance loans, grants and other assistance programs."<sup>64</sup> The Northeast and Southwest regions

have sufficient National Guard armories and military facilities to provide shelter, as well as some medical support.

ESF #7—Logistics (General Services Administration and DHS/FEMA):<sup>65</sup>

“Integrates whole community logistics incident planning and support for timely and efficient delivery of supplies, equipment, services, and facilities.”<sup>66</sup> National Guard logistics and security forces throughout both regions—plus 300 medium and light haul trucks in the Northeast and their 884 counterparts in the Southwest—can operate local distribution points for regional distribution centers to service communities in need.

ESF #8—Public Health and Medical Services (Department of Health and Human Services):<sup>67</sup> “Provides public health medical surge support including patient movement, behavioral health services, food and water safety, and mass fatality management.”<sup>68</sup>

The National Guard has some medical units in both regions to provide this service. In addition, the Air National Guard has Evacuation and Medical Support Squadrons (EMEDS), which can perform mass care, triage and emergency medical treatment. This seems adequate for mass care for an event in either scenario. For larger trauma situations, a state TAG would coordinate to import mass casualty assistance and care capabilities from his or her counterparts in neighboring states under mutual support agreements.

ESF #9—Search and Rescue (SAR) (DHS/FEMA):<sup>69</sup> “Provide lifesaving assistance in structural collapse urban SAR, maritime/coastal/waterborne SAR, and land SAR.”<sup>70</sup> The National Guard may perform search and rescue with its security forces, and employ aviation units for aerial surveillance. Search and extraction teams

respond to structural collapses. These teams exist in the engineer units within every state and appear to be adequate for the anticipated need for both regions.

ESF #10—Oil and Hazardous Materials Response (Environmental Protection Agency).<sup>71</sup> The National Guard can provide forces to help perform cleanup of a spill in both the Northeast and Southwest regions.

ESF #11—Agriculture and Natural Resources (Department of Agriculture):<sup>72</sup> “Protects the nation’s food supply, respond to plant and animal pest and disease outbreaks, and protect natural and cultural resources.”<sup>73</sup> While the National Guard does not have force structure in either region that directly affects this ESF, it could provide soldiers whose civilian careers may give them technical expertise to assist agricultural coordinators as required. This capability has already been demonstrated by the success of the Agriculture (or Agribusiness) Development Teams (ADT) deployed to Afghanistan. According to the Center for Army Lessons Learned,

ADTs consisted of farmers and agribusiness subject matter experts who are partnered with their home states’ land grant universities, agriculture extension agents, and Afghan colleges and universities as a reach-back resource for the latest in farming technology and practices to assist the Afghan farmers. ADTs are involved in the following areas: Animal husbandry, Horticulture, Irrigation, Storage and distribution, and Agribusiness education.<sup>74</sup>

ESF #12—Energy (Department of Energy):<sup>75</sup> “Facilitates the reestablishment of damaged energy systems and components and provides technical expertise during an incident involving radiological/nuclear materials.”<sup>76</sup> Again, the National Guard does not have technical expertise, but it may provide energy responders with assistance with transportation, cordon and security and general support. There are no National Guard chemical units in either region; however, the eight Civil Support Teams assigned to states in the Northeast and another seven stationed in the Southwest region (with

related forces) have detection and decontamination capability.<sup>77</sup> The 2015 *National Guard Posture Statement* drives home this point:

In the event of a chemical, biological, radiological, nuclear (CBRN) attack in the United States, the first “on the ground” military response will be one or more of our 57 Civil Support Teams, 10 National Guard Homeland Response Forces (HRFs), or 17 CBRN Enhanced Response Force Packages (CERFPs). Ninety-seven percent of Americans live within a five-hour response window of a National Guard HRF or CERFP.<sup>78</sup>

ESF #13—Public Safety and Security (Department of Justice/Bureau of Alcohol, Tobacco, Firearms, and Explosives):<sup>79</sup> “Coordinates the integration of public safety and security capabilities and resources to support the full range of incident management activities.”<sup>80</sup> Under the *Posse Comitatus Act*, any of the 12,000 National Guard soldiers within either region may perform general emergency support, security and law enforcement roles.<sup>81</sup>

This survey has shown that the Northeast and Southwest regions have adequate National Guard forces to accomplish coastal flood preparation or recovery and wild land firefighting. However, each region requires an additional three Engineer battalions to accomplish the full panoply of Essential 10 missions: transportation facility clearance, coastal protection, and debris clean up, communications restoration, etc.

#### Summary of Force Structure Requirements and Bill Payers

This effort has examined the potential National Guard missions under scenarios involving coastal flooding and wild land fires. It will now apply the same force structure assumptions across the entire United States based on these scenarios. The next section of the paper provides a detailed breakdown of force structure changes to meet the response conditions discussed in this work; if a reader is interested, the author can provide comprehensive tables extracted from the Army Stationing and Installation Plan.

In summary, the “bill payers” for these force structure changes across the nation will be primarily infantry and artillery units within the considered region. The Adjutants General of the United States, as well as the Army National Guard Force Management Division, would collaborate with Department of the Army force managers to integrate such changes. Note: These changes reflect the opinion of the author, neither do they represent the official position of the Department of the Army or the National Guard Bureau.

#### Northeast Region

Add one Engineer Battalion in Maine, New Jersey and New York. Bill payers:

1. 1-181<sup>st</sup> Infantry Battalion, MA ARNG
2. B Company, 3-172<sup>nd</sup> Infantry Battalion, ME ARNG
3. 1-112<sup>th</sup> Field Artillery Battalion, NJ ARNG
4. 1-69<sup>th</sup> Infantry Battalion, NY ARNG

#### Mid Atlantic Region

Add one Engineer Battalion in Maryland and one in North Carolina. Billpayers:

1. 1-158<sup>th</sup> Cavalry Squadron, MD ARNG
2. 231<sup>st</sup> Chemical Company, MD ARNG
3. One Company from the 1-175<sup>th</sup> Infantry Battalion, MD ARNG
4. 1-113<sup>th</sup> Field Artillery Battalion, NC ARNG

#### Southeast Region

Add one Engineer Battalion in Florida, South Carolina and Texas. Billpayers:

1. Two Companies from the 2-124<sup>th</sup> Infantry Battalion, FL ARNG
2. 1-114<sup>th</sup> Field Artillery Battalion, MS ARNG
3. One Battalion from the 118<sup>th</sup> Infantry Regiment, SC ARNG

4. 1-143<sup>rd</sup> Infantry Battalion (Airborne), TX ARNG
5. One company from the 3-144<sup>th</sup> Infantry Battalion, TX ARNG

#### Southwest Region

Add two Engineer Battalions in California and convert one Aviation Battalion from the AH-64 Apache to the UH-60 Blackhawk. Billpayers:

1. Convert the 1-285<sup>th</sup> Aviation Battalion (Attack) to (Assault), AZ ARNG
2. 1-144<sup>th</sup> Field Artillery Battalion, CA ARNG
3. 1-160<sup>th</sup> Infantry Battalion, CA ARNG

#### Northwest Region

Add Engineer Battalions in Alaska, Oregon and Washington. Billpayers:

1. 1-148<sup>th</sup> Field Artillery Battalion, ID ARNG
2. 2-162<sup>nd</sup> Infantry Battalion, OR ARNG
3. 2-218<sup>th</sup> Field Artillery Battalion, OR ARNG
4. 2-146<sup>th</sup> Field Artillery Battalion, WA ARNG
5. One Company from the 1-161<sup>st</sup> Infantry Battalion, WA ARNG

#### Mid West Region

Add two Engineer Battalions in Michigan and Wisconsin. Billpayers:

1. 1-125<sup>th</sup> Infantry Battalion, MI ARNG
2. 1-120<sup>th</sup> Field Artillery Battalion, WI ARNG

#### U.S. Islands

Add one Engineer Battalion in Hawaii. Billpayers:

1. 1-279<sup>th</sup> Infantry Battalion, OK ARNG
2. 145<sup>th</sup> Adjutant General Company, OK ARNG

#### Great Plains Region

While not discussed in this work, the Great Plains region faces significant drought due to aquifer depletion.<sup>82</sup> Additional water purification capabilities would be helpful to meet this shortfall. The Army should realign the 125th Quartermaster Company (Water Purification) from the Delaware Army National Guard to the Nebraska Army National Guard to provide more regional water purification capability. This unit would also be prepared to support water purification efforts in the U.S. islands as required.

### Risk Analysis

This work has postulated a requirement to add 17 National Guard engineer battalions to prepare for anticipated climate-related risks. As billpayers, the equivalent number of forces from infantry, cavalry or field artillery battalions would be removed from the Army National Guard inventory. This means an equivalent loss of combat forces available to the Combatant Commanders for mission assignments.

The risk to these anticipated missions requirements can be assessed by first examining the defense strategic guidance documents. The 2010 Quadrennial Defense Review proposed several risk categories under the Defense Risk Management Framework. Among these was operational risk associated with the strategic goals of deterrence and assurance by building partner capacity.<sup>83</sup> Assessing risk is very complex in an ambiguous strategic environment. Narrowing the anticipated problem helps with understanding the risk in the trades among different elements of the force structure.

Figure 3 identifies the complex strategic environment shaping the U.S. security landscape. It posits that the risks of a large state-to-state conflict are low while assessing the risk from other conflicts or smaller contingencies as high.

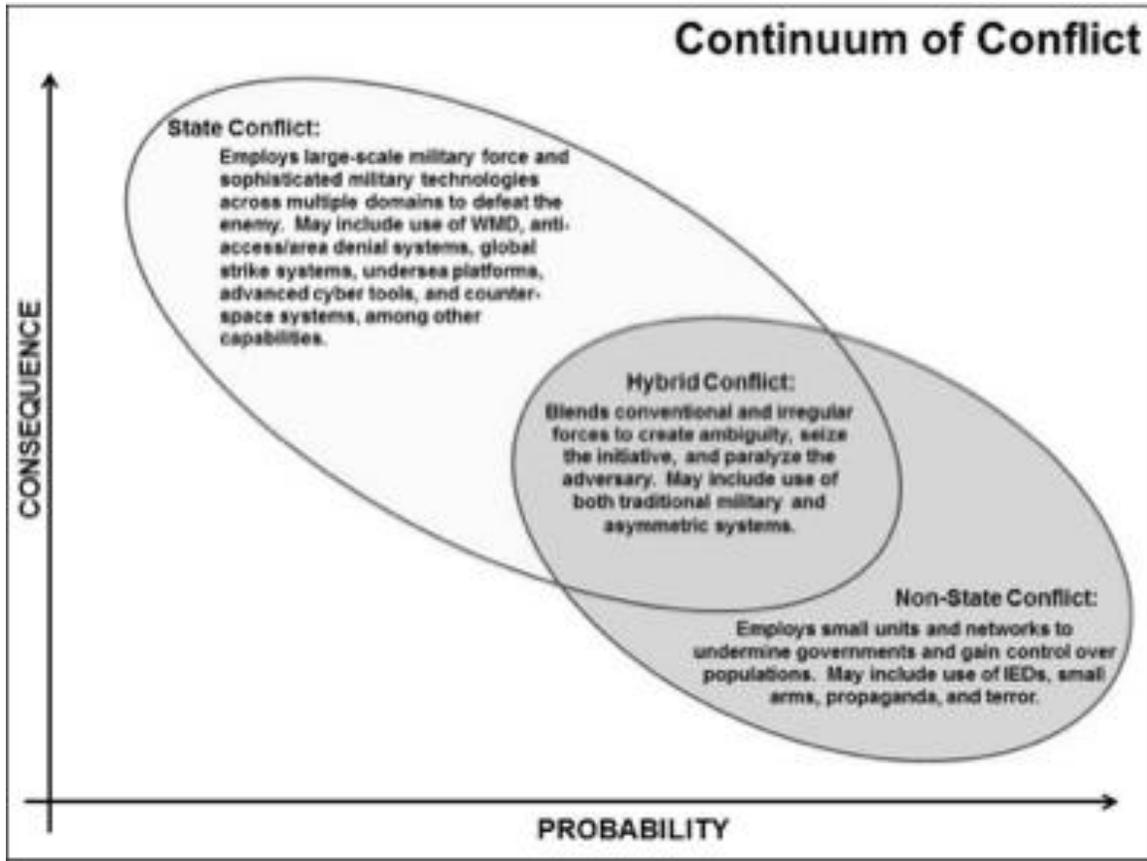


Figure 3: Continuum of Conflict (National Military Strategy, 2015)<sup>84</sup>

The 2015 National Military Strategy declares as a key goal: deter adversaries and to assure allies by maintaining a forward presence of land forces. This will become a principal mission for National Guard forces in the coming decade as the Army senior leaders considers its optimal component mix for land force requirements. Army National Guard brigade combat teams (BCT) will be a key contributor to the Active Component Army's forward presence missions. The most logical assumption is for the Army National Guard to provide one BCT per year in a mixture of deployment cycles to meet the global missions across all of the Geographical Combatant Commands.

Under such a scenario, the Army National Guard would have to provide one infantry, armor or cavalry battalion and one artillery battalion each year from

uncommitted BCTs to round out the brigade slated to deploy. While not optimal, the risk to stressing personnel in National Guard formations is low given the number of BCTs currently in the Army National Guard, even with the minimal force structure changes proposed as a result of sequestration imposed by the Budget Control Act of 2011.<sup>85</sup> Should this “forward presence” scenario articulated in the National Military Strategy require a smaller National Guard force, the effects would be further minimized. In summary, these proposed force structure changes to enhance readiness for two DSCA missions present low to moderate operational risks, given the potential strategic environment anticipated in the coming decade. This paper avers that the proposed force structures changes are both reasonable and prudent.

### Conclusion

This study has highlighted two future anticipated climate change events: potential coastal flooding due to increased storm activity and magnified by sea level rise, and drought-induced wild land fires particularly in the western United States. It has examined National Guard mobilizations supporting these particular threats and has examined the rubric of support through the lens of the Federal Emergency Management Agency’s National Response Framework. The work has recommended force structure changes in response to the threat in light of the framework. Further, the work has considered operational risks in light of the future strategic environment. From an anticipation of the panoply of missions envisaged supporting the combatant commander. The work concludes that the future risks as minimal.

Further, this work recommends more research to examine force structure changes within other Reserve Components that may assist federal, state and local officials with climate change mitigation activities related to ecological, biological and

agricultural aspects of America’s natural resources. Further, this work did not discuss potential drought-induced refugee migration into America, an issue that warrants additional study. Finally, any force structure change will require a continuous risk assessment as senior civilian and military leaders determine the exact missions to assign to the Total Army. America’s Army National Guard must be reconfigured to meet the increasing threats associated with climate change to the homeland. This work offers a dialogue to begin this effort.

Table 1. Domestic Operational Missions of the National Guard by Fiscal Year<sup>86</sup>

FY 2010		
EVENT	REGION	MAN DAYS
FLOODS	MIDWEST	4227
	NORTHWEST	5429
	MID ATLANTIC	3623
	SOUTHWEST	1035
	SOUTHEAST	8818
	NORTHEAST	6755
SEVERE WEATHER/TORNADO	SOUTHEAST	193
	MID ATLANTIC	41
	MIDWEST	361
	NORTHWEST	34
	SOUTHWEST	9
DROUGHT RESPONSE	SOUTHEAST	405
	SOUTHWEST	239
FIRES	SOUTHWEST	1240

FY 2011		
EVENT	REGION	MAN DAYS
FLOODS	MIDWEST	92
	SOUTHEAST	129
WINTER STORMS	NORTHEAST	1010
	MID ATLANTIC	1270
	MIDWEST	5909
	NORTHWEST	76
	SOUTHEAST	1556
DROUGHT RESPONSE	SOUTHWEST	2372
	SOUTHEAST	408
	NORTHWEST	2
FIRES	SOUTHWEST	9
	SOUTHEAST	40
	SOUTHWEST	272

FY 2012		
EVENT	REGION	MAN DAYS
FLOODS	MIDWEST	627
	SOUTHWEST	285
	NORTHWEST	53
	MID ATLANTIC	2042
	SOUTHEAST	17
SEVERE WEATHER	NORTHEAST	5675
WINTER STORMS	MID ATLANTIC	10638
TORNADOS	MIDWEST	10392
	NORTHWEST	778
	SOUTHEAST	1101
	SOUTHWEST	71
	SOUTHEAST	88371
TROPICAL STORM HURRICANES	NORTHEAST	621
	NORTHWEST	139
DROUGHT RESPONSE	SOUTHEAST	1013
	SOUTHWEST	72
FIRES	SOUTHEAST	132
	SOUTHWEST	12762
	NORTHWEST	7819
	NORTHEAST	32
	MID WEST	1663

FY 2013		
EVENT	REGION	MAN DAYS
FLOODS	MIDWEST	1418
	SOUTHWEST	6011
	NORTHWEST	629
	MID ATLANTIC	218
	SOUTHEAST	8
SEVERE WEATHER	NORTHEAST	74562
HURRICANES	MID ATLANTIC	
TORNADOS	MIDWEST	2592
	NORTHWEST	
	SOUTHEAST	1233
	SOUTHWEST	
DROUGHT RESPONSE	MIDWEST	4
	SOUTHWEST	125
WINTER STORMS	NORTHEAST	10874
	SOUTHEAST	280
	SOUTHWEST	21
	MIDWEST	1009
FIRES	SOUTHEAST	48
	SOUTHWEST	14480
	NORTHWEST	211
	NORTHEAST	
	MID WEST	195

FY 2014		
EVENT	REGION	MAN DAYS
FLOODS	MIDWEST	835
	NORTHWEST	2077
	MID ATLANTIC	218
	SOUTHEAST	242
FLOODS	NORTHEAST	
	MID ATLANTIC	
	MIDWEST	835
	NORTHWEST	
	SOUTHEAST	242
	NORTHWEST	2077
TORNADO	SOUTHEAST	3410
HURRICANES	SOUTHEAST	2560
DROUGHT RESPONSE	MIDWEST	82
	SOUTHWEST	901
WINTER STORMS	NORTHEAST	1726
	NORTHWEST	716
	SOUTHEAST	8693
	SOUTHWEST	21
	MIDATLANTIC	6043
	MIDWEST	1887
FIRES	SOUTHEAST	
	SOUTHWEST	5602
	NORTHWEST	7754
	NORTHEAST	
	MID WEST	255

FY 2015		
EVENT	REGION	MAN DAYS
FLOODS	MIDWEST	36
	NORTHWEST	78
	MID ATLANTIC	
	SOUTHEAST	1267
	SOUTHWEST	834
TORNADO	SOUTHEAST	
HURRICANES-TROP STRM	SOUTHWEST	7702
	NORTHWEST	56
DROUGHT RESPONSE	MIDWEST	634
LAVA RESPONSE HI	SOUTHWEST	5940
WINTER STORMS	NORTHEAST	14991
	NORTHWEST	
	SOUTHEAST	1430
	SOUTHWEST	
	MIDATLANTIC	1627
	MIDWEST	
FIRES	SOUTHEAST	
	SOUTHWEST	177
	NORTHWEST	505
	NORTHEAST	16
	MID WEST	159

## Endnotes

<sup>1</sup> Stephen E. Flynn, "America Isn't Ready for Superstorms," *CNN*, January 6, 2013, <http://www.cnn.com/2013/01/06/opinion/flynn-storms-preparation/index.html> (accessed May 25, 2016); Tim Lister, "Experts Warn of Superstorm Era to Come," *CNN*, October 31, 2012, <http://www.cnn.com/2012/10/31/us/sandy-climate-change/> (accessed May 25, 2016).

<sup>2</sup> *Ibid.*

<sup>3</sup> Jessica Lucia Frattaroli, "A State's Duty to Prepare, Warn, and Mitigate Natural Disaster Damages," *Boston College International & Comparative Law Review* 37 (2014): 173-174.

<sup>4</sup> California Department of Forestry and Fires (CALFIRES), "Summary of the Twenty Largest Fires," [http://www.fire.ca.gov/communications/downloads/fact\\_sheets/Top20\\_Acres.pdf](http://www.fire.ca.gov/communications/downloads/fact_sheets/Top20_Acres.pdf) (accessed November 14, 2015).

<sup>5</sup> National Interagency Fire Center, "Fire Statistics for 2015," [http://www.predictiveservices.nifc.gov/intelligence/2015\\_Statsumm/fires\\_acres15.pdf](http://www.predictiveservices.nifc.gov/intelligence/2015_Statsumm/fires_acres15.pdf) (accessed November 14, 2015).

<sup>6</sup> U.S. Department of Defense, *Response to Congressional Inquiry on National Security Implications of Climate-Related Risks and a Changing Climate* (Washington, DC: U.S. Department of Defense, July 23, 2015), 4-5.

<sup>7</sup> Barack H. Obama, *The National Security Strategy* (Washington, DC: The White House, February 2015), 12.

<sup>8</sup> *Ibid.*

<sup>9</sup> *Ibid.*

<sup>10</sup> Deputy Secretary of Defense, *Climate Change Adaptation and Resilience*, DoD Directive 4715.21 (Washington, DC: Under Secretary of Defense for Acquisition, Technology, and Logistics, January 14, 2016), 11.

<sup>11</sup> Obama, *The National Security Strategy*, 12.

<sup>12</sup> V.M. Gornitz, S. Couch, and E.K. Hartig, "Impacts of Sea Level Rise in the New York City Metropolitan Area," *Global and Planetary Change* 32, no. 1 (2001): 61-88.

<sup>13</sup> Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, eds., *Global Climate Change Impacts in the United States: U.S. Global Change Research Program* (Cambridge, UK: Cambridge University Press, 2009), 108.

<sup>14</sup> Ibid.

<sup>15</sup> Peter J. Webster et al., "Changes in Tropical Cyclone Number, Duration and Intensity in a Warming Environment," *Science* 309 (2005): 1844-1846.

<sup>16</sup> C.D. Hoyos et al., "Deconvolution of the Factors Contributing to the Increase in Global Hurricane Intensity," *Science* 312, no. 577 (2009): 94-97.

<sup>17</sup> Ibid.

<sup>18</sup> P.W. Mote et al., *Sea Level Rise Scenarios for Washington State* (Seattle: Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, 2008), 11.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Alaska Public Lands Information Centers, "Interesting Facts about Alaska," <http://www.alaskacenters.gov/unique.cfm> (accessed March 25, 2016).

<sup>22</sup> Ibid.

<sup>23</sup> J. H. Yin, "A Consistent Poleward Shift of the Storm Tracks in Simulations of 21st Century Climate," *Geophysical Research Letters* 32 (2005): L18701.

<sup>24</sup> G.A. Meehl et al., "Global Climate Projections," in *Climate Change 2007: The Physical Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, S. Solomon et al., eds. (Cambridge, UK: Cambridge University Press, 2007), 747-845.

<sup>25</sup> Thomas R. Karl, Jerry M. Melillo and Thomas C. Peterson, eds., *Global Climate Change Impacts in the United States: U.S. Global Change Research Program* (Cambridge, UK: Cambridge University Press, 2009), 110.

<sup>26</sup> D. M. Scott et al., *Pacific Dialogue on Water and Climate, Synthesis Report* (South Pacific Applied Geoscience Commission, Fiji Islands, 2003), 28.

<sup>27</sup> Karl et al., *Global Climate Change Impacts in the United States*, 126.

<sup>28</sup> T.P. Barnett et al., "Human-Induced Changes in the Hydrology of the Western United States," *Science* 319, no. 5866 (2008): 1080-1083.

<sup>29</sup> A.L. Westerling et al., "Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity," *Science* 313, no. 5789 (2008): 940-943.

<sup>30</sup> A.L. Westerling and B.P. Bryant, "Climate Change and Wildfire in California," *Climatic Change* 87, Supplement 1 (2008): S231-S249.

<sup>31</sup> Karl et al., *Global Climate Change Impacts in the United States*, 135.

<sup>32</sup> J.T. Payne et al., "Mitigating the Effects of Climate Change on the Water Resources of the Columbia River Basin" *Climatic Change* 62, no. 1 (2003): 233-256.

<sup>33</sup> W. J. Gutowski et al., "Causes of Observed Changes in Extremes and Projections of Future Changes" in *Weather and Climate Extremes in a Changing Climate: Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands*, T.R. Karl et al. eds., Synthesis and Assessment Product 3.3. (Washington, DC: U.S. Climate Change Science Program, 2008), 81-116.

<sup>34</sup> I.T. Stewart, D.R. Cayan and M.D. Dettinger, "Changes in Snowmelt Runoff Timing in Western North America under a 'Business as Usual' Climate Change Scenario," *Climatic Change* 62, no. 1 (2008): 17-232.

<sup>35</sup> Ibid.

<sup>36</sup> <sup>36</sup> M.G. Ryan et al., "Land Resources" in *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States* and "Water Resources," in *The Effects of Climate Change on Agriculture, Land Resources*, Peter Backlund, A. Janetos, and D. Schimel, eds., Synthesis and Assessment Product 4.3 (Washington, DC: U.S. Department of Agriculture, 2008), 75-120; Karl et al., *Global Climate Change Impacts in the United States*, 141

<sup>37</sup> Ibid.

<sup>38</sup> Timothy J. Lowenburg, *The Role of the National Guard in National Defense and Homeland Security* (Washington DC: National Guard Association of the United States, 2010), <http://www.ngaus.org/sites/default/files/pdf/primer%20fin.pdf> (accessed January 10, 2016).

<sup>39</sup> Ibid.

<sup>40</sup> "Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. This Act constitutes the statutory authority for most Federal disaster response activities especially as they pertain to Federal Emergency Management Agency (FEMA) and FEMA programs." FEMA website, <https://www.fema.gov/media-library/assets/documents/15271> (accessed May 25, 2016).

<sup>41</sup> National Guard Bureau, *National Guard Bureau Posture Statement 2016* (Washington, DC: Office of the Chief, National Guard Bureau, 2016), 10.

<sup>42</sup> Federal Emergency Management Agency (FEMA), *National Response Framework Second Edition* (Washington, DC: U.S. Department of Homeland Security, May 2013), 1-3.

<sup>43</sup> *Ibid.*, 37.

<sup>44</sup> National Guard Bureau, *National Guard Bureau Posture Statement 2015* (Washington, DC: Office of the Chief, National Guard Bureau, 2015), 44-45.

<sup>45</sup> National Guard Bureau, *NGB Posture Statement 2016*, Office of the Chief NGB, 11.

<sup>46</sup> Office of the Assistant Chief of Staff for Installation Management, *Army Stationing and Installation Plan* (Washington, DC: U.S. Department of the Army).

<sup>47</sup> *Ibid.*

<sup>48</sup> FEMA, *National Response Framework*, Table 4.

<sup>49</sup> *Ibid.*

<sup>50</sup> *Ibid.*

<sup>51</sup> *Ibid.*

<sup>52</sup> National Guard Bureau, *NGB Posture Statement 2015*, Office of the Chief NGB, 38.

<sup>53</sup> *Ibid.*, 43.

<sup>54</sup> FEMA, *National Response Framework*, Table 4.

<sup>55</sup> *Ibid.*

<sup>56</sup> *Ibid.*

<sup>57</sup> *Ibid.*

<sup>58</sup> California Air National Guard 146th Airlift Wing, news release 010312, March 5, 2012, <http://www.146aw.ang.af.mil/news/story.asp?id=123292620>; Wyoming Air National Guard, "Wyoming and North Carolina MAFFS Crews Join Aerial Firefighting Efforts in California," *National Guard News*, August 14, 2015, <http://www.nationalguard.mil/News/ArticleView/tabid/5563/Article/613602/wyoming-and-north-carolina-maffs-crews-join-aerial-firefighting-efforts-in-cali.aspx> (both accessed March 30, 2016).

<sup>59</sup> National Guard Bureau, *NGB Posture Statement 2016*, Office of the Chief NGB, 11.

<sup>60</sup> National Guard Bureau, *NGB Posture Statement 2015*, Office of the Chief NGB, 38.

<sup>61</sup> FEMA, *National Response Framework*, Table 4.

<sup>62</sup> *Ibid.*

<sup>63</sup> Ibid.

<sup>64</sup> Ibid.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid.

<sup>68</sup> Ibid.

<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

<sup>72</sup> Ibid.

<sup>73</sup> Ibid.

<sup>74</sup> Center for Army Lessons Learned, *Handbook 10-10 Agribusiness Development Teams in Afghanistan* (Fort Leavenworth, KS: U.S. Army Combined Arms Center, November 2009), 10.

<sup>75</sup> FEMA, *National Response Framework*, Table 4.

<sup>76</sup> Ibid.

<sup>77</sup> Ibid.

<sup>78</sup> National Guard Bureau, *NGB Posture Statement 2015*, 34.

<sup>79</sup> FEMA, *National Response Framework*, Table 4.

<sup>80</sup> Ibid.

<sup>81</sup> “The *Posse Comitatus Act* is a federal law (18 U.S.C. § 1385, original at 20 Stat. 152) [that], in concert with the Insurrection Act of 1807, ... limit[s] the powers of the federal government in using federal military personnel to enforce domestic policies within the United States.” Wikipedia, “Posse Comitatus Act,” [https://en.wikipedia.org/wiki/Posse\\_Comitatus\\_Act](https://en.wikipedia.org/wiki/Posse_Comitatus_Act) (accessed January 14, 2016).

<sup>82</sup> See Iowa State University, “The Ogallala Aquifer Depletion,” <http://www.meteor.iastate.edu/gccourse/issues/society/ogallala/ogallala.html>. This summary is based on a study by Donald A. Wilhite, Center for Agricultural Meteorology and Climatology, University of Nebraska (accessed March 28, 2016).

<sup>83</sup> U.S. Department of Defense, *Quadrennial Defense Review Report of 2010* (Washington, DC: U.S. Department of Defense, January 2010), 96.

<sup>84</sup> U.S. Department of Defense, *The National Military Strategy of the United States of America* (Washington, DC: U.S. Department of Defense, June, 2015), 4.

<sup>85</sup> Michelle Tan, "Army Lays Out Plan to Cut 40,000 Soldiers," *Army Times*, July 10, 2015, <http://www.armytimes.com/story/military/pentagon/2015/07/09/army-outlines-40000-cuts/29923339/> (accessed March 28, 2016).

<sup>86</sup> Table 1 data comes from queries run by the author in November-December 2015 in the database maintained by the National Guard Coordination Center, National Guard Bureau, Arlington, VA.