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Climate Change is the most imminent threat to US National Security and the longevity of the Department of Defense. Climate change stokes global insecurity and multiplies the nation's most prominent national security threats. Aggravated by the detriments of extreme climates and disasters, the world's hotspots present an amplified challenge to the US as the leader in global security. The humanitarian crises and fiscal fallout of natural disasters, occurring more frequently and with greater magnitude, captivate the attention and resources of a military force that faces rapidly enhancing military threats from near-peer adversaries. Military readiness and global lines of effort suffer as a result of the additional burden. Climate poses a direct threat to the American way of life as climate change proliferates disastrous events such as hurricanes, wildfire, flooding, and spread of infectious disease on US soil. The DoD is not currently postured to meet the demands of climate issues while ensuring military supremacy to provide security for itself and valued allies. The DoD requires reallocation of personnel, resources, and funding to support the crisis response and humanitarian requirements of climate extremes/events in order to meet its national security demands. The military must be resourced to counter the transnational climate threat while reforming its force as prescribed by the 2018 National Defense Strategy to account for great power competition and enhanced adversary capabilities.

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Executive Summary

Title: Enemy at the Floodgates: The DoD's Climate Conundrum

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Thesis: Climate Change is the most imminent threat to US National Security and the longevity of the Department of Defense.

Discussion: Climate change stokes global insecurity and multiplies the nation's most prominent national security threats. Aggravated by the detriments of extreme climates and disasters, the world's hotspots present an amplified challenge to the US as the leader in global security. The humanitarian crises and fiscal fallout of natural disasters, occurring more frequently and with greater magnitude, exhaust the resources and personnel of a military force charged with deterring and protecting against dynamic military threats of near-peer adversaries. Military readiness and global security lines of effort suffer as a result of the additional burden. Climate poses a direct threat to the American way of life as climate change proliferates disastrous events such as hurricanes, wildfire, flooding, and spread of infectious disease on US soil. Beyond destroying facilities, such conditions divert military resourcing away from its global posture, security requirements, and intended overseas operational challenges. The DoD is not currently postured to meet the demands of climate complications while ensuring military supremacy to provide security for itself and valued allies.

Conclusion: Relocating DoD bases to less vulnerable regions in tandem with reinforcing facility requirements for those that cannot is a major line of effort to combat climate shifts in a fiscally responsible manner. Furthermore, the DoD requires reallocation of personnel, resources, and funding to support the crisis response and humanitarian requirements for foreign disaster relief spawned by climate extremes/events in order to meet its future national security demands. The military must be resourced to counter the transnational climate threat while reforming its force as prescribed by the 2018 National Defense Strategy to account for great power competition and enhanced adversary capabilities.

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Introduction

The Department of Defense (DoD) is locked in a grapple with a rapidly changing global climate. The effects of climate change negatively impact each military branch of service and all operations within the purview of the DoD. This paper accepts as fact what the DoD has previously recognized: That climate change a) is a scientific fact that will continue or worsen and b) presents a national and global security threat. This piece will not focus on the natural or man-made causes of a heating planet nor will it attempt to predict future trends with forecasting. This is not climate science analysis. It will also not suggest what human actions are required to reverse or slow atmospheric warming. Rather, this piece will focus on encapsulating the multitude of security, readiness, and fiscal predicaments stemming from weather event destruction and the global instability climate change induces. It frames the climate problem in its entirety for the DoD, aiming to prompt urgency. The case studies examined are selected from a relatively short one-year period. This was not done to narrowly focus on a timeframe anomaly or “cherry-pick” events to confirm a bias. Instead, the period is a recent year chosen to enhance the piece’s relevance to today’s force posture and global environment and, specifically, display the frequency with which climate events impact the DoD. Similar analysis of previous years independently would show equally prolific and costly destruction, negating any concern the time period was an aberration. Lastly, this piece reveals the degree of detrimental impact seen within every branch of the military, level and/or unit of employment, thus proving climate change a preeminent concern in each geographic region and future theatre of operation. Mitigating actions are necessary to ensure US national security and to maintain global stability. Confrontation with climate change is inescapable, yet it can be effectively countered through urgent and proactive measures.

Part I: The DoD's Climate Conundrum

The US military is grappling with an opponent it cannot defeat. The most formidable long-term threat to national security is not a near-peer adversary, extremist group, weapon of mass destruction, or cyberspace attack. Climate change and the destruction of frequent disasters have promoted Mother Nature to the military's most threatening adversary. Contact with climate change is imminent and the fallout is costly. Crippled readiness and weakened posture plague the DoD from repeated events as it remains underprepared to counter future crises. The climate challenge presents an infinite struggle, where the opposition is impervious to conventional military might, yet requires the extensive resourcing of a traditional clash with lethal foe. No victory will be declared in the mercurial endeavor with this oddity. However, the transnational climate threat must be assuaged in order to support the three lines of effort of the National Defense Strategy (NDS): to build a more lethal force, strengthen alliances & partnerships, and reform the department for better business practices.¹ There is no specified task in the NDS to counter the effects of climate change, yet every goal and priority of the document can be derailed by its detrimental impacts.

The DoD remains consistently, and understandably, focused on the near-term horizon, given the perpetuity of a litany of global security threats. However, a shift in priority is required to ease the constant depletion climate affixes to the armed forces, rendering them less capable to confront the evil-doers of the world. As the physical character of the DoD's operating environment that now encompasses space and cyberspace is rapidly reshaped, so must the US's planning vision as climate will thwart progress for the foreseeable future. The extent of future damage inflicted is debatable, therefore quantifying magnitude and extent of future damage is an inexact science, a paradox that encumbers planning and preparation. Once investigated and

evaluated, measures to bolster the resilience of the armed forces can be identified and implemented to ensure the nation maintains military supremacy and on course to attain its strategic defense goals.

Dropping its reactionary approach to climate devastation is the first in a continuum of mitigating actions required by the DoD. Post factum fixes and retroaction serves to only hamper the reformation of the armed forces as prescribed by the Secretary of Defense's (SECDEF) 2018 NDS.² Climate woes hamstringing the redesign of the force to buttress its lethality to deter great power competitors, another key component and line of effort of the SECDEF's national defense vision.³ Additional aspirations and demands of the document may be unattainable if the DoD cannot develop and field a force capable of fulfilling the Secretary of Defense's demands. Countering the fiscal, structural, and equipment & personnel readiness costs endured from climate change and destructive weather events is therefore not only an implied task of the NDS, it is essential. Environmental injects into the system driving force design are required to account for unavoidable setbacks. Adequate corrective measures in the near-term offsetting climate impacts will enable the proper reform of the force for the future operating environment, yielding versatility as an added benefit of the process.

Mitigating the natural enemy is paramount to keeping the warfighter capable of confronting the world's myriad of *human* adversaries. This requires reassessment of the operational environment, a routinely prescribed practice within the Joint Planning Process (JPP). Recalibration of priorities based on reassessment must be widespread and predictive through climate trends, evidence, and models. The data required to plan for the environment is available and must be injected into the psyche of the long-term military advisor. The JPP prescribes planning for an enemy's most dangerous course of action while countering its most prolific

threat or “center of gravity” (COG). The climate change adversary should be handled no differently. Assuming a natural correction/reversal of the global climate state is failing to plan for the most likely and/or dangerous course of action. Wishful thinking is not an attribute of any sound planning or employment concept, yet has been commonplace in approaching climate risk to this point. Calculated adjustment for continued global instability, destructive weather events, and the myriad of additional consequences of climate trends is not an outlandish or overly progressive planning ethos. It is due diligence and dismissing climate’s eminence or relevance is deliberate defiance of military planning doctrine. Respecting the gravity of the threat, as one would any adversary capability, is not overcautious paranoia based off brittle evidence. It is calculated adjustment based on factual change in the operating environment, a best practice to remain prolific in future conflict. While a mentality shift *is* required, no major reform or stark deviation of policy or doctrine is required to offset climate’s complications. Application of existing planning principles will ease the burden of climate challenges, once the problem is granted its due attention. Adversarial action inducing such damage to the force would never be dismissed to the extent climate is overlooked and left unmitigated.

Climate change sparks global insecurity, repeatedly stoking the world’s hotspots and centers of turmoil. This equates to higher operational demands on the force accompanied with billowing defense costs to reestablish and maintain regional stability in US areas of interest. The Earth’s atmosphere resembles a pressure cooker, constantly straining a resource-stretched littoral population, aggravating the instable regions of the world when weather events strike. The global community turns to the US to distinguish such hotbeds and assist when catastrophe ensues and the US is masterful at easing the pain with military and interagency efforts. Yet frequent turmoil equates to jaw-dropping defense expenditures and enormous bills for the American taxpayer.

While easing the pain, US power projection capabilities are engrossed with global disaster relief. Climate does not spare the North American region either. On the home front, continental US (CONUS) disasters have crippled multi-billion-dollar facilities. Resources and personnel apportioned for overseas operations are often absorbed within US borders as the military is utilized regularly to provide Defense Support of Civil Authority (DSCA) missions, compounding the exhaustion of each branch. The nation's forces in readiness are anything but a power projection capability when monopolized with global Humanitarian Aid/Disaster Relief (HADR). The detriments to readiness of such events are irrecoverable and Global Force Management (GFM) requirements/obligations do not cease when CONUS disaster strikes, further handicapping forces reeling from two-plus decades of war. This trend, unencumbered puts the vitality of each branch at risk while diminishing the progress of the DoD. The longevity of the individual service member and in turn the entirety of the force is at risk due to task bombardment and operational fatigue, amplified by climate challenges.

Patchwork policies and reactionary fiscal fixes have enabled the force to limp along to current date. The United States can ill afford to combat the effects of climate change with quick infrastructure repair or lowest bidder rebuilds of damaged and often antiquated base infrastructure. This is literally reinforcing failure. Climate will amplify the DoD's struggle to maintain its global posture and security aptitude while perpetually repairing its damaged facilities and or devoting its forces in readiness to disaster relief year-round. An already inflated and cumbersome defense budget must now account for destruction, repair, reinforcement of bases, cutting valuable overseas appropriations. The DoD must urgently act to mitigate the threat multiplier of climate change or soon be left combating nothing but nature, leaving a façade of national security and a potentially obsolete defense posture. Perpetual global agitation will be a

reality of climate change and as the leader in global security the US will be shouldered with the burden and obligation of ushering the global community through continued destruction.

Part II: Background: Acknowledging and Examining the Problem through the DoD's

Report on Changing Climate Effects

A comprehensive review of climate related events titled *Report of Effects of a Changing Climate to the Department of Defense* was conducted and published by the DoD in 2019. Its primary focus was CONUS DoD infrastructure damage from recurrent flooding, drought, wildfire, thawing permafrost, and desertification. The study compiled previous and predicted (next 20 years) damage on 79 DoD facilities, revealing extensive effects of climate-related events. Flooding, fire, and drought were the primary culprits in damage to base infrastructure.⁴ The report was prompted by the 2018 NDS which prioritized “long-term, strategic competition with great power competitors” and stated that the effects of a changing climate were present to national security interests in that “near-peer” arena.⁵ It introduced a concern that climate change will impact the DoD’s mission, operational posture, and infrastructure.⁶ The report provides due attention to addressing an emerging issue that military leadership has alluded to but not ordered action: that climate change threatens national security and its events are a recurring multiplier of global instability. Predicting possible effects on facilities out twenty years from now is the singular visionary demand of the study. While a commendable inclusion of climate in visionary planning, it may fall short of encapsulating the magnitude of the issue, given two decades is hardly long-term thinking. This is arguably a century-plus, not decades long dilemma.

The DoD’s report acknowledges the litany of climate issues the department has in its crosshairs. However, the focus is solely on infrastructure and mostly ensuring building codes adapt to bolster the survivability of base structures and port facilities. This risks downplaying the

extent of weather events and dismisses the notion that climate change is anything more than a planning factor vice a serious threat. Furthermore, the study is focused narrowly on workspaces and buildings only, while disregarding damage to electricity, water, sewer, roadway, and “life support” base infrastructure that is especially vulnerable to weathering and requires constant, costly maintenance/repair. The report shows slight urgency in the department’s climate planning ethos and a promising shift toward acknowledging the large-scale fiscal and readiness challenges that will compound in coming decades.

Of the sampling of Navy, Air Force, Army, Defense Logistics Agency (DLA) Defense Financing and Accounting Service (DFAS) and Washington Headquarters Service (WHS), 76 % of the installations have or will experience damage by recurrent flooding.⁷ This includes seasonal flooding, regular tidal flooding, and extreme weather events. Sixty-one percent will endure the detrimental effects of worsening drought in CONUS regions, many not typically known as drought regions such as Washington D.C. Finally, 54 % of the 79 installations have or will experience the costly and dangerous damage of wildfires, an often-overlooked phenomenon resulting from the same regional droughts prompted by climate change.⁸

Navy and Marine Corps installations mostly reside in the littoral regions of the nation for obvious maritime purposes while Air Force bases built along coasts to lend themselves to ocean training airspace. Thus, they remain vulnerable to extreme coastal weather events. Installations not hugging America’s coastline generally lay in inland, wildfire and flood prone rural regions in the Rocky Mountains and planes of Midwest America. The DoD trains, stores, builds, and postures in the most climate-event-plagued regions of the US. As “100-year” phenomena and the “storms of the century” become the “storms of the decade” or simply seasonal weather norms, a constant state of destruction, disrepair, and repair is commonplace for department facilities. In

several cases, which will be examined, damage is irreparable. In most cases, patchwork repairs to keep bases barely operating or simple rebuilding structures that will again fall victim to events has become the prevalent response. The “we will rebuild” rally cry of the DoD is an admirable response appealing local officials and citizens in the wake of disaster but is a practice destined to repeatedly drain the resources of the DoD as billions are annually sunk into CONUS installation repairs that are often cheaply constructed, overbudget, and behind schedule. They too are often rebuilt hastily and inefficiently to quickly restore operations following weather events. Defense budgeting with little preparatory or up-front funding allocated to counter and minimize the effects of weather events is haphazard fiscal approach as disaster events become consistent occurrences. Later case studies will reveal that military branches already operate with billions in maintenance backlogs, *before* major weather strikes on key bases. Climate compounds existing financial predicaments.

The 2019 review of CONUS-based facilities was an introductory step in acknowledging and identifying climate change’s detrimental effects on DoD infrastructure. Furthermore, it was the first of its kind to acknowledge the worsening of climate trends and prompted survey respondents to predict future effects on infrastructure, a vital step in respecting climate change. Areas not previously prone to flooding, fires, even permafrost have recently seen such occurrences become commonplace. Facilities lack the standards to endure extreme conditions for they were not conceivable at the time of design and construction. This study provides a glimpse into the damage already inflicted by climate change and what impacts DoD facilities will incur over the next 20 years. It also prompts climate reviews every five vice ten years, a small adjustment that does, however, display a glimmer of urgency from those vested in the issue.⁹ Most profoundly, the study presents and validates the DoD’s assumption that climate change will

worsen and it is concession that construction, renovation, and repair standards must adapt accordingly. This key adaptation in mentality provides a basis to prompt a larger, departmentwide shift to properly plan for, fund, and mitigate climate change.

Part III: The Unaccounted Adversary

The case studies examined are a sampling from a one-year time window and includes several additional Humanitarian Aid/Disaster relief efforts the DoD was involved with during a between mid 2018-2019 with one historical reference. Climate events are anything but rare, making their occurrence relatively predictable for military planners yet the DoD is often caught on its heels when mother nature displays its sinister side. Weather disasters now surface as regularly as seasonal storm patterns or melt-off: like clockwork. Climate change induces weather events, both in frequency and magnitude. Therefore, the DoD has a vested interest in limiting the fiscal damage through foresight. That anticipation has yet to permeate the planning philosophy of the DoD or the Planning, Programming, Budgeting, and Execution (PPB&E) process of resourcing. Military planners, historically cynical by nature, oddly display a great tendency to error on the side of optimism with climate considerations. An error that spawns repetitive sunken costs for a department never fiscally satiated.

Examining the profound damage and fallout of past weather events aim to prompt the required shift in planning urgency required to fortify the resiliency and survivability of the US military. These testimonials display the prevalence and breadth of the climate impact, as all events occurred in rapid succession and inflicted damage to every branch of the military, challenging all levels/units of employment.

II MEF Crippled: Hurricane Florence 2018.

In September of 2018, II Marine Expeditionary Force (II MEF) Headquarters Camp Lejeune, North Carolina (CLNC), situated on North Carolina's Atlantic coast, endured a direct hit by Hurricane Florence. The category II storm crawled along the coast, offering three days of devastating winds and, most notably, dumped 30+ inches of rain on the Jacksonville area causing devastating flooding to both Camp Lejeune and nearby II Marine Air Wing (2d MAW) at Marine Corps Air Station (MCAS) Cherry Point, NC.¹⁰ Over 250 Marine Corps Installations Command East (MCIEAST) structures were devastated by winds/and or flooding and over \$3.6 billion of damage to DoD base infrastructure was assessed when the waters subsided.¹¹

The fiscal figures alone to repair/replace the vital infrastructure housing two major subordinate commands (2nd Marine Air Wing and Division), three Marine Expeditionary Unit (MEU) headquarters and all the II MEF General staff were staggering. Buildings, training areas, and base infrastructure sit in disrepair to this day as II MEF scrambles to retain use of facilities simply to ensure commands remain operational. The Corps cannot quantify the training value lost during the event or the detriments to individual Marine and Sailor readiness in the aftermath. "The conditions we are working in are just like that of Iraq and Afghanistan", remarked Colonel Brian Wolford, Chief of Staff, II MEF.¹² Months after disaster, working conditions for Marines and Civilian Marines rival that of a war zone. The base today remains highly vulnerable to minor weather events as funds to repair facilities have trickled from the federal government.

Florence jolted II MEF to a standstill in the fall of 2018. With the Carolina MAGTF housing roughly a third of the combat power of the Marine Corps, readiness sustained irrecoverable setbacks as the Corps largest force-providing MEF emerged from Hurricane Florence badly tattered. Off-base personnel were under mandatory evacuation for at least one week while only essential personnel remained on post, manning the destructive weather posture

to keep minimal operations running. The storm prompted the need for alternate headquarters in inland protected areas, a core location concept that will be later addressed.¹³

Hurricane Florence exposed a blatant vulnerability in II MEF's readiness and ability to conduct its national level Operational Plans (OPLAN) as advertised by the Marine Corps' "fight tonight" motto. Florence's untimely arrival fell in the deployment window of a roughly 8,000 personnel deployment in support of a NATO exercise conducted mostly in the Kingdom of Norway where II MEF would ironically test its deploy-ability and sustainability to its full extent. It encompassed movement of gear and personnel using amphibious shipping, commercial, or "Black Bottom" shipping, and extensive gear draws from the Marine Corps Prepositioning Posture-Norway (MCPN).¹⁴ The service's adaptability and survivability was on display as II MEF exercised in mixed company of over 20 NATO and partner nations providing support of a notional adversarial threat action in the Scandinavian region. Such an exercise was the largest II MEF movement since Operations Enduring and Iraqi Freedom and the largest NATO exercise since the early 1980's, a keystone moment in the reemphasis on NATO defense posture in the European Theatre.¹⁵

Hurricane Florence struck the coast as II MEF's Advanced Party and main body forces were set to deploy across the Atlantic Ocean. Much of the force remain either locked down aboard MCIEAST facilities or mandatorily evacuated to the outer fringes of Carolina, away from Florence's path. What little staff remained behind scrambled to revamp the Time Phased Force Deployment Data (TPFDD) for the nearly 8,000 personnel departing immediately once operations resumed. Many returned to flooded homes, destroyed offices, and unserviceable equipment that was staged to travel, yet inoperable. The II MEF staff deployed only a portion of

the originally slated force into theatre within their given force flow constraints and within its mission essential task timeline to echelon forces and capabilities in theatre.¹⁶

The exercise was a success in terms of human capacity, yet it was a stark reminder of how unprepared the force was in overcoming large magnitude weather events, now CONUS regularities. Maintaining operations while on a short tether to respond to global demands is an essential task for II MEF, it yet was crippled by a single weather event that is likely to occur again and could do so in more violent scale and magnitude. Despite the successes of EXERCISE TRIDENT JUNCTURE 2018, it exposed a vulnerability to be exploited by an adversary. The force arguably did not arrive prepared to fight and win or defend its Scandinavian partner's sovereignty to the extent expected from an ally. It limped into a friendly territory through international sea and air ports under passive conditions with degraded combat power and little capacity to build. Had this force been required to conduct forcible entry operations in a live scenario in hostile territory given the resources at hand, the Marine Corps could have greatly faltered in its promises to its NATO allies and fallen short of its advertised essential tasks within the NATO/EUCOM defense plan. Climate events put the force at risk of advertising national level OPLAN capabilities it cannot fulfill, an extreme unmitigated risk for SECDEF, left with limited options abroad when the nation is battling climate adversity domestically.

Hurricane Michael 2018:

Mother Nature took pause only one month following her destruction of II MEF and the Carolinas before unleashing chaos on the Gulf Coast of Florida. Hurricane Michael made landfall on the shores of Panama City on 10 October, 2018 as a category five storm and left the coast in ruins. In the eye of the behemoth was Tyndall Air Force base, home of the 325th Fighter Squadron and the one of the Air Force's largest aircraft stores, most notably the F-22 at roughly

\$300 million each. Tyndall was nearly a total loss. Every one of its 484 standing structures endured damage and the base was evacuated, closed, and remained so for several weeks and operationally below capacity long thereafter.¹⁷ Like II MEF, the Air Force sustained countless lost man hours, flight hours, and diminished readiness it has yet to recover. Roughly half of Tyndall's structures will or have been torn down in the year since Michael, the other half all require extensive repairs.¹⁸ Initial costs to simply reopen the base and achieve an operational capable status totaled roughly \$700 million and rebuild/repair of the facilities will take another 5-7 years.¹⁹ The base endured extensive damage to its water, gas, and electrical infrastructure that remains degraded. 100% of Tyndall's base housing was destroyed and will remain closed for the foreseeable future. As of October 2019, 40% of its barracks have reopened.²⁰

Tyndall's rebuild will consist of hardened structures coded to withstand another category Five force hurricane. Such structures are accompanied with immense costs. They will survive such a storm, but much of the remainder of the base, its personnel's housing, and aircraft will not. Tyndall will be hit again. Rebuilding a costly base that houses the most expensive stealth fighters in the US arsenal in the direct path of another Michael is ill-advised. The federal government is celebrated and applauded by state governors and officials when declaring rebuilds, committing to reviving the surrounding cities relying heavily base employment and military commerce. However, the fiscally logical option may be to relocate high value bases to less vulnerable CONUS locations. The rebuild in the wake of destruction is a steadfast and admirable approach, yet an inherently flawed reinforcement of failure that could cause repeated financial peril. Tyndall is in its second of up to ten years to rebuild, at an estimate topping off just under \$5 billion.²¹ As the federal government currently scours for funding to repair Tyndall, the Air Force alone sits with \$33 billion backlog in unrelated facilities and maintenance costs.²²

Part IV: HA/DR Drain

Unrestored Hope: Somalia 2018

In the early 1990's, the US conducted a costly expeditionary operation aimed at easing the human suffering spawned by a sub-Saharan drought that plagued an East African cluster of nations. Somalia, the most detrimentally impacted and unstable state experienced prolonged famine as a result. Most recall OPERATION RESTORE HOPE as a fumbled humanitarian aid mission stricken with miscalculations and planning flaws. The downward spiral of events included the downing of American helicopters and loss of American life at the hands of citizens turned combatants in Somalia's largest population center and capital city Mogadishu. The forgotten aspect of this string of events is the profound manner in which climate conditions can spawn irreversible regional conflict and instability due to a lack of resources and sovereign order. A regional drought had doomed the area for a matter of years, straining all resource stores and leaving the nation starved and malnourished. Such crippling droughts in an already austere environments are more commonplace due to climate change and most prevalent in the highly populated littoral and equatorial regions. East Africa has been reliving the perils of drought for the last seven years and conditions in Somalia closely mirror the 1990's.²³ Having never quite recovered from recent famine, the nation still lacks the resources, infrastructure, and ability to feed its overpopulated city centers while operating in the margins, teetering on the edge of becoming a failed state.

Continued efforts following OPERATION RESTORE HOPE by partnerships such as the African Mission in Somalia (AMISOM), a coalition of neighboring states collectively keeping Somalia afloat have eased the issue slightly. The US provides military guidance and aid to AMISON coalition, established in 2007, with several other lines of effort aimed at easing human

suffering in Somalia through its Combined Joint Task Force, Horn of Africa (CJTF-HOA).²⁴ This costly military hub, located in Djibouti, provides efforts to bolster regional security in addition to anti-piracy and partnership building at an annual toll of roughly \$310 million.²⁵ One of its main lines of effort is combating the Al Shabab threat in the region, an extremist organization that uses terrorist tactics and violently seizes control of local populations when resources fall short.²⁶ Instability flourishes during resource-scant periods and the US becomes heavily involved in regional security efforts to quell civil turmoil. Climate change worsens the resources problem, particularly in semi-arid or desert regions along the equatorial coastlines that typically prove to be hotbeds of extremist activity, migration instability, and food insecurity. The US military finds its regional Quick Reaction Forces (QRF), MEU's and other military contingency bodies monopolized by regional instability caused by extreme climates, similar to the East African dilemma. Forces in readiness such as the MEU or the East African Response Force (EARF) are commodities too precious to be perpetually tasked with regional stability operations with little improvement in sight. Billions of dollars are poured into these commands that provide little overall value to US national security as they constantly quell different tinder box regions teetering on the edge of collapse.²⁷

The DoD is shouldering the burden of global crises aggravated by climate extremes in which its not prepared to spearhead for the next lifetime. Climate change is straining a global population and the US DoD to include the US Agency of International Development (USAID) constantly scrambles to ease human suffering. The US cannot maintain its readiness and global posturing for large scale near-peer conflict as the NDS insists when its assets are allocated in perpetuity by competing areas. Next, the following section encircles similar hampering of Naval

readiness by security and competing maritime demands that climate change places on its aging fleets of amphibious shipping.

No Relief from Relief: Expeditionary Forces

Disaster relief issues transcend the borders of the US. The preponderance of MEU deployments since the invasions of Iraq and Afghanistan have involved in Humanitarian Aid/Disaster Relief (HA/DR) operations. One of its ancillary tasks, HA/DR is a valuable capability of the MEU and an outstanding use of the US military as a diplomatic arm of foreign assistance in times of humanitarian need. However, HA/DR missions drain resources and hurt readiness of the warfighting aspect of the MEU. Disasters monopolize the MEU and compromise its value as a force in readiness when it is in the wrong hemisphere, consuming its sustainment, and breaking its equipment. Strategic uses of the “fight tonight” force are off the table when its engulfed by humanitarian support. Additionally, disaster areas are prone to rapid spread of infectious disease. Response to these unfortunate events is likely to leave the force depleted due to sickness, equipment in disrepair, and diminishment of its 15 days of sustainment organic to the unit. The US bolstered its MEU presence in the Mediterranean and Middle East regions to 1.0 (ever-present) and deployed Special Purpose Marine Air/Ground Task Forces (SPMAGTF) in Africa and Kuwait when it found its alert-postured forces were not available during crisis events such as Benghazi in 2012. Gaps were identified and filled using a permanent posture of MEU’s and land based SPMAGTFs within the threat circles of the region’s hotbeds. This creates an availability issue of response capability. If an east coast MEU is in, for instance, the Caribbean saving lives providing aid, it is not in the Mediterranean waiting for the Sudanese embassy to fall. A Western Pacific (WESTPAC) MEU in southeast Asia providing food and water to a village destroyed by a typhoon is not available to conduct a long-range raid in Middle

East/Africa to capture a high value target (HVT). Henceforth, with the frequency of disasters in the 7th Fleet India Pacific Command (INDOPACOM) region, and one single MEU to boot, the Marine Corps' 31st MEU is often incapacitated a great amount of the time and rarely postured to respond to Chinese aggression in disputed waters of the South China Sea.

Climate events often favor the adversary and provide them an advantage as crisis perpetually weakens the US response capabilities and strategic deterrence efforts when its high-value war machines are monopolized by competing aid missions. These events provide the space for an adversary to capitalize and execute an offensive action with a delayed US response. While the SECDEF may weigh the threats and only commits the force to HA/DR when the operating area is "cold" and permissive, this can quickly change, specifically when adversarial forces are well aware that expeditionary force's readiness is quickly spent in a disaster scenario. Regional nodes and US allies are left vulnerable and as a result, the first blow in an enemy incursion could likely be provided by the shaping fires of mother nature. Therefore, the US must dedicate its humanitarian assistance on a limited basis and not detract from its deterrence actions and global quick-reaction posture by shifting all available resources when disaster strikes. The DoD must reassess its disaster relief mission and bolster its alternative aid entities to spare the military. Perhaps a separate military force dedicated to foreign aid and humanitarian assistance is required, given USAID and other agencies strongly desire the lift and security of the military, but do not require its full war-fighting capacity to Foreign Disaster Relief (FDR).

Part V: Flood, Fire, Frost and Facilities

Flood: "When the Levee Breaks" Offutt Air Force Base, 2018.

In early 2019, the DoD's newest functional component command- Space Command was stood up on Offutt AFB in Omaha, NE. This was not the only unprecedented event at Offutt that

same year, as the base and surrounding urban center was obliterated by unparalleled flooding resulting from rapid regional melt-off and above average Spring temperatures. The floods destroyed the local area caused extensive damage to the highly trafficked airbase, bringing operations to a standstill. This closely mirrored the loss of training, readiness, and operational gain seen at Camp Lejeune the year prior. The \$420 million damage estimates paint only a monetary figure. The loss of personnel capability, man hours, and productivity due to such weather events is immeasurable.²⁸ Expensive repairs will continue to revamp the functional command's future home as it sits poised to launch Space Force. However, the threat to the base and surrounding city where most personnel living off-base reside will remain unmitigated for years to come. Midwest America, outside the threats of wildfire and coastal storms, also remains in the crosshairs of extreme weather events. The DoD must rethink the future home of its newest, and potentially most expensive force as its efficacy will likely be stunted by the vulnerabilities of Offutt. Consolidation and relocation of commands will be a necessity as Space Command grows its expensive and vast footprint within CONUS borders and climate considerations must be at the forefront of its infrastructure vision. The growth of a new force provides opportunity to model future base construction to withstand climate in a location less prone to disaster.

Fire: California, 2018

America endured the deadliest wildfires in its history with the Humboldt County Camp Fire and hundreds of others that engulfed the West in 2018. California itself has dealt with 14 of its 20 largest Wildfires in the last 15 years.²⁹ According the US National Oceanic Atmospheric Administration (NOAA), the region has experienced ten of its warmest years on record during that same 15-year span.³⁰ The US wildfire issue is inextricably linked to global climate change. DoD readiness is jeopardized as a result. Fifty four percent of the 79 DoD facilities reported

reside in areas of high wildfire risk and that percentage stands to grow.³¹ Several Major Subordinate Commands (MSC) headquarters are situated in wildfire prone areas to include high value bases such as 3d MAW and I MEF in southern CA. Additionally, Fort Carson's 4th Infantry Division and the US Air Force Academy, both saddled in the foothills of the Rocky Mountains in Colorado Springs, CO, remain in one of America's most fire prone regions. While the DoD has not witnessed a complete destruction of an entire base similar to Tyndall with a wildfire, the potential for a such a key base to be lost or severely damage by inferno exists. Wildfires, like hurricanes have increased not only in frequency, but also in magnitude and are among the most destructive forces in the US over the last two decades.³²

Additionally, The DoD commits a vast amount of manpower and fiscal resources to fighting fires and providing disaster relief in tandem with aid organizations and the Federal Emergency Management Agency (FEMA). The US military works hand in hand with California Fire Control (CALFIRE) on an annual basis to combat the fire threat and I MEF provides extensive resources to combat the Southern California issue.³³ The humanitarian aid and resources the DoD pours into CONUS DSCA disaster relief rivals the aid it provides overseas during Tsunami, hurricane, earthquake, typhoon, and famine relief. This too equates to readiness lost for the military's most capable and valuable units, doctrinally allocated for overseas utilization. With DSCA a prevalent addition to the range of military operations and a frequent call to duty, additional training and readiness demands are placed on commanders of low density/high demand units. Ultimately, training, manning, and resourcing for DSCA and domestic support draws from the expeditionary readiness of the force.

Frost: Arctic Circle of Insecurity

A heating atmosphere opens new sea lanes. New sea lanes must be defended. Several arctic sea lanes north of Scandinavia have a passage opening of roughly a month a year. In 2018, the minimum sea ice extent in the Arctic was 25% below the 30-year average from 1980-2010.³⁴ With the recession of the Arctic ice caps, new sea lanes have opened that are highly trafficked and like the South China Sea, are highly contested waters. The Arctic will become a land grab in the next half century as it has recently been revealed that as much as 16% of the world's oil and 38% natural of gas reserves are locked in its ice caps, waiting to be extracted by those who claim the new frontier.³⁵ Its newest sea lanes must be secured, patrolled, and resourced for search and rescue operations. Traffic in the area will spike exponentially, presenting a maritime security issue for NATO's northern flank and a new US maritime demand.

The US has apportioned a great deal of its newly stood up 2d fleet out of Norfolk, VA to augment 6th Fleet's area of operations in the European theatre. Thus, leaving it a presence in the Baltic, Arctic, and Scandinavian waters while the 6th Fleet remains focused on the Mediterranean Sea with its southern European and African areas of interest. However, manning and equipping 2d Fleet to the level it will be able to provide a maritime presence that is capable of deterrence, sea control, or even forcible entry may be decades away. This is largely the result of dwindling resources and high demand on the Navy's Amphibious shipping. Two decades of two separate regime change wars has plunged the readiness of amphibious shipping to the point where the 22nd MEU recently deployed as a land-based force without an amphibious Ready Group (ARG) ships to accompany it-hardly expeditionary. Land forces to source the amphibious units of east coast ARG's derive from II MEF, highly tasked by a deluge of GFM demands and previously examined readiness issues of its own, amplified by climate challenges. The Navy/Marine Corps teams cannot build, maintain, and modernize its shipping quickly enough to

meet the demands of the DoD's current maritime posturing, let alone equip another land force to accompany and police growing sea lanes in the Arctic. The opening of the Arctic frontier will be a reality of climate change and compound demands on military resourcing as the US strives to maintain its global maritime domain advantage.

Facilities: Fleets Under Siege

Any service member enjoying stints with the US Navy's 2d or 6th Fleets aboard Naval Station Norfolk over the last two decades has witnessed the result of climate change. Global rising sea levels create headaches for the US's global naval facilities, many of which flood regularly during high tides or routine weather fronts, not just extreme weather events. This issue threatens the world's littoral metropolises. For the US Navy, both Hampton Roads, VA and Naval Base Coronado, CA experienced regular flooding and a sea level rise as much as three feet in recent decades, which caused repeated damage and regular maintenance fixes.³⁶ A series of locks and seawalls for most, if not all, of the DoD's global seaport infrastructure is required in the next century to ensure the Navy's ships maintain pier access at these locations. Initiatives to build and reinforce Naval facilities for beyond a century, not simply the 20 years the DoD looks into, is dire to cost-saving measure for the US Navy. Like hurricane repair, port reinforcement comes at a ghastly cost. Funding remains unallocated and must be siphoned from competing costs, such as amphibious shipping repair. Fix-as-you-go repairs will incur more cost in the long run and should be avoided. Therefore, reinforcement for centuries not decades of climate impact must be an urgent imperative for those crafting the defense spending priorities.

Part VI: A Vision for the Next Century: "I-CAR"

Climate change is an infinite game. Those who will combat the worst of this crisis are likely not in cabinet, office, or even uniform yet. Most initiatives, policies and funding outlooks

have shelf life similar to the remaining tenures of the individuals implementing them. This unfortunate reality equates to a limited vision throughout the federal government, DoD, and service branch leadership regarding long term plans to counter the detrimental costs of climate change. Much like national security should not be viewed as a short-term dilemma, climate change cannot be countered with short term solutions and patchwork fixes that do not outlast an administration or an annual budget.

A two-pronged inclusive approach must be applied by the DoD under its authorities to counter climate change. The vision of must first include relocating and consolidating CONUS-based DoD assets to low risk regions in facilities built to withstand climate extremes within the next century. The best minds, technology and resources must be thrown at this problem with an urgency rivaling that of the past world wars containing existential threats. This will be conceptualized with the “I-CAR” plan introduced below. Second, the DoD must alter the US military’s role in FDR and DSCA through creation a branch of the armed service dedicated to HA/DR.

I-CAR: Investigate, Consolidate, Alternate, Relocate

Investigating the scope of climate change in its entirety is a necessity for the DoD. Analysis is the dire first step of the planning process and must encapsulate the magnitude of the climate issue while informing the masses of the urgency of the climate issue. This provides the leveling to synchronize commanders and planners to find best fit solutions to challenges within their given areas of expertise. The implied task has been provided by the NDS, therefore commanders are charged to direct the initial guidance to address the issue. The problem must then be framed in such a way to identify proper courses of action that can become the methodology to ensure national security can coexist with climate instability. The DoD must use

its resources to provide better predictive models and scale the size of the issue in order to delineate what each level of command owes the collective effort to better the force through counteracting climate change. The DoD must quantify the issue.

From a fiscal lens, the DoD must also appoint authority to a qualified body to investigate and quantify what combating climate realistically costs. Previous damage metrics and costs are the basis of deriving a predictive model that can be applied to determine necessary budgetary adjustments. Climate change must be elevated to the top of the resourcing priorities of the DoD PPB&E process. This model provides the injects required for the new force design system to account for climate considerations as it molds the NDS's future force. Absorbing the impact of climate change without vectoring or halting progress in spite climate setbacks must an emerging concept of the NDS implementation design. Fund the initiatives and direct commanders to operate within those restraints to achieve future force readiness with climate resilience equally weighted with the lethality SECDEF demands.

Consolidation and collocation of service components to mega bases is sound measure to counter climate change and save costs. Training areas can be shared and large bases can exist to house the major subordinate commands as whole. Given the nature of today's conflicts, joint military operations are commonplace and collocating services could yield additional training value. Consolidating Major Subordinate Commands (MSCs) will cut logistical costs as well and create major training and basing hubs. National security does not rely on the location of CONUS borders due to the luxury of two oceans and friendly alliances on two US borders. Forces do not need to be postured along ocean borders to counter next century's threats, only able to respond to those areas. There is no need with modern armament & technology to remain tied to the shores. Naval bases need remain coastal but can be consolidated and built to withstand rising sea levels

as prescribed. These domestic infrastructure improvements are economic stimulators and valued initiatives as regional employment occurs in tandem with housing growth surrounding bases. The revamping of a large part of American infrastructure would be economically beneficial for jobs and growth while preventing further loss of dollars poured into rebuilding in disaster areas.

Alternate sites provide a transitional solution to ease the burden on damaged and vulnerable coastal bases. II MEF took away a myriad of lessons for executing its Destructive Weather Plan while attempting to deploy II MEF forward, enduring the brunt of Hurricane Florence's destruction. II MEF identified the need to revamp its Continuity of Operations Plan or its "COOP".³⁷ While it maintained a skeleton crew of essential personnel to maintain accountability and provide relief assistance in the local area, it shut down the MEF headquarters and halted all non-essential operations for the duration of the storm. The COOP prescribes the establishment of the II MEF Fwd Command Operations Center in an alternative location that enables the MEF to maintain its daily battle rhythm, current operations, and even training during disaster. This could be emplaced a region favoring longevity if Camp Lejeune were to be a total loss and II MEF had to maintain operations, remaining postured for worldwide deployment. II MEF conducted a full rehearsal of the COOP in the summer of 2019 and rehearsed the capability to relocate the MEF and maintain operations successfully.³⁸ As a force in readiness, the MEF should theoretically be able to quickly relocate to an alternative location and maintain a fully operational capable (FOC) status. Henceforth, it is valuable training value to do so in a CONUS scenario to simulate II MEF conducting one of its OPLANS and echeloning the entire MEF forward in a case of large-scale conflict.

Establishing alternate sites would be a training continuum event for the MEF and set the stage for permanent relocation to a "warm site" for II MEF out of the hurricane prone littoral

Carolina region. Only elements, equipment, and personnel who are required reside on the coast for amphibious training purposes would remain along the eastern seaboard. A large preponderance of the MEF and supporting staff can be permanently relocated to alternative bases outside the extreme weather danger areas. This will create travel and logistical concerns for II MEF's fusion of capabilities but it will prove less costly than perpetually operating in a nearly destroyed base. Alternate sites through NC, Georgia, or further inland are suitable and do not hamper II MEF training by introducing too much distance between commands. The headquarters must get out of the imminent path of Mother Nature. This is a valuable way to keep a MEF expeditionary in nature and relocate high value commands that need not be hugging the disaster-prone coasts.

This concept can also be achieved for other Navy, Air Force and Army units. The push inland and establishment of "warm" sites that are pre-equipped and prepared to house a fully operating major subordinate command is a sound investment for the DoD to maintain a ready force while cutting rebuild and repair costs as weather events increase. The Army can move about CONUS easily. The Navy can move all non- "wet" assets away from the littorals. While the USAF prefers ocean ranges and airspace for training, the greater 48 states provide more than enough airspace to house the Air Force needs and get them out of the danger areas of extreme events as well. Alternate sites or bases can be assumed for all MSCs in less vulnerable regions to house personnel, establish command & control, and remain primed to answer the nation's call.

Relocation of high value commands to less threatened areas is imperative to the survivability of the force. If mega bases are not the preferred avenue of the service chiefs, migrating MSCs to less vulnerable regions is necessary to preserve and enhance the force. The vast landscape of the US affords for relocation of its military's highest value commands to places

in far less risk to major weather destruction or interference. The preponderance of military facilities of the US were constructed in the last century and antiquated facilities constructed to accommodate a different force need replacement or mass renovation. Rebuilding in disaster prone locations when erecting energy efficient, climate-resistant buildings adapted to accommodate a more technologically advanced force in a safer region can be a cost-saving measure. Maintenance will account for the preponderance of cost once constructed. Furthermore, units now occupying aging hangars, spaces, or barracks poorly equipped to enable efficient storage and training of today's advanced force can be upgraded to state-of-the-art facilities with lower operating and maintenance costs than the crumbling infrastructure in which many currently dwell. Many technologies introduced to the force require new buildings or costly retrofitting of old structures to enable their upkeep. Such is true with the fleet of the USMC's MV-22, which required costly hangar upgrades or replacement upon its introduction to the force. The largest of these "mega hangars" now sits exposed in the coastal banks of Marine Corps Air Station New River, Hurricane Florence's recent target.³⁹ America's bases remain in constant repair and expansion. Expanding in locations that will not require repeated repair is better stewardship of the government tax dollars and a sound readiness investment even if saved man-hours and energy efficiency are the chief benefits. As with collocating, such projects also provide regional employment benefits and stimulus for local economies.

A Case for an Aid Force

Given the resourcing demands, the DoD may require a separate branch of the armed forces dedicated to HA/DR and DSCA missions. An Aid Force can be task organized specifically to provide expedient and cost-efficient FDR and DSCA response. It will remain an armed force, due to the inherent risks associated with disaster and crisis response. It would also

continue to fulfill the security and lift missions required but not organic to Interagency Organizations such as the State Department, USAID, and non-governmental organizations (NGOs). Aid Force would consist of the brightest logistics, communications, and medical planners of the DoD and be grown out of Northern Command which currently oversees CONUS security endeavors. The branch would primarily focus on CONUS DSCA missions supporting America in its weather, pandemic, and internal stability operations at the call of the President but remain world-wide deployable. Given the frequency of natural disasters, Aid Force would be highly utilized yet the US can maintain its defense posture to respond to large scale threats while continuing the global humanitarian assistance invaluable to US diplomatic efforts. The additional of the force also ensures aid to partners if the regional military force is already decisively engaged in wartime operations when disaster strikes. Given the moral and ethical obligation to assist its allies, the American public would likely support the fiscal expenditure for a humanitarian organization that is defense-based, rather than additional dollars to a warfighting organization that happens to conduct humanitarian operations. The addition of the aid force is a course of action to guarantee the US continues to provide the security and deterrence measures in addition to humanitarian assistance promises to its regional partners. This measure closes the security gap an adversary could exploit when climate creates vulnerability.

Part VII: Conclusion

Climate change is the most dangerous transnational threat to the DoD and continually diminishes the readiness of every branch of the armed forces. Climate change demands mitigation in order to ensure the demands of the 2018 NDS are met and the US national defense vision is achieved. Left unmitigated, Mother Nature will continue to destroy CONUS facilities,

drain national security resources, stoke global instability, and provide shaping fires for great power adversaries.

DoD must remain prepared and capable of fighting and winning its nation's large-scale wars at short notice, regardless of domestic or global climate adversity. A force monopolized by humanitarian assistance and disaster relief cannot fulfill the deterrence, reaction, counteraction, partner engagement efforts assigned as mission-essential tasks to each service. An evacuated MSC, dueling with a weather crisis, does not have OPLAN Readiness. A MEU disbursing humanitarian aid is not, at that time, a power projecting maritime security or deterrence force. Near-peer competitors are not deterred or contained by a crippled military in financial strains from domestic fiscal turmoil, floating about in disrepair. Strapped for funds, with diverted personnel and resources, the American military runs the risk of making national defense promises it cannot fulfill if climate risk is not directly tempered. Failing to answer the nation's call spells doom for any service, regardless of domestic priority.

Global security, like climate change, is an infinite battle and the brightest minds, time, and resources must be committed to derive a vision addressing both while attaining NDS demands. As the US achieved its position as a global power, it assumed a security role for its interests and allies in an environment lacking great power competition. That competition, as identified by the NDS, is now ever present and sinister. However, the US has a moral obligation to continue aiding the world's suffering through FDR while simultaneously fulfilling its global security promises to allies and interests. It must reinforce and resource both invaluable lines of effort while implementing solutions to the additional challenges presented by climate. As the NDS demands near-peer adjustment, it implies climate change must be countered to achieve its strategic defense vision. That is legal direction from the highest authority that provides

justification and empowers leadership to apply resourcing to cultivate a climate-resilient force that is both lethal and capable. Simply, it is an order from the highest office of the DoD to combat climate change.

The US adjusts to counter myriad threats of all magnitude in enemy technology, tactics, and capability yet has been questionably is slow in acting to counter a threat already destroying and draining resources. The “hope nature cooperates” sentiment and course of action must be stricken from the planning psyche. A long-term vision to counter the detriments of climate through robust fiscal reform to build infrastructure resilience is dire and must emerge as a premier PPB&E agenda item. More so than emerging weapons technology, countering the high cost of climate change is an investment the DoD can ill afford to fumble or attempt to retroactively plan for after bases are ripped apart, overnight or over decades. All actions to reform and to compete with other great powers or develop next generation warfighting capability through state-of-the-art technology are irrelevant if a crippled military cannot man, train, and equip a deployable force. Amnesty for destroying US military facilities and readiness would never be granted to an aggressor. Mother Nature gets no pass and must be countered as if it were lethal, state-sponsored adversary. Optimism is no longer a tolerable tenant of the DoD’s climate planning philosophy.

Adjustments today will cushion the blow of tomorrow’s crises and steer the nation towards another century of the US flourishing under the blanket of security the DoD provides. Movement and consolidation of facilities and personnel will lessen the costly damage and readiness losses climate imparts upon the force while dampening the human perils of disaster. Furthermore, the establishment of an Aid Force or total reform of US crisis response resourcing ensures the US will maintain the diplomatic and moral benefits of humanitarian assistance

without diminishing its warfighting readiness in hostile areas overseas where it owes its people and allies a capable response force to quell acts of evil. The measures are long term, but not exclusive actions to untangle the DoD's climate conundrum. A climate-resilient, lethal force will be the aggregate result of a collective shift in DoD priority centered around commitment to countering the devastating adversary of Mother Nature.

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