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COMMITTEE ON FOREIGN AFFAIRS

**STATEMENT OF**  
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**BEFORE THE**  
**HOUSE COMMITTEE ON FOREIGN AFFAIRS**  
**SUBCOMMITTEE ON ASIA, THE PACIFIC, AND THE GLOBAL ENVIRONMENT**  
**ON**  
**CLIMATE CHANGE FINANCE:**  
**PROVIDING ASSISTANCE FOR VULNERABLE COUNTRIES**  
**IMPACT OF CLIMATE CHANGE ON THE MILITARY**  
**AND NEED FOR ADAPTATION FUNDING**

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Mr. Chairman, members of the subcommittee and distinguished colleagues, I want to thank you for the opportunity to address you today regarding climate change with regards to the military. My name is Rear Admiral David Titley and I am the Oceanographer of the Navy and the Director of Navy's Task Force Climate Change. The Chief of Naval Operations, Admiral Gary Roughead, established Task Force Climate Change in May of 2009 to address implications of climate change for national security and naval operations. Today I am speaking about the impacts of climate change on the Navy.

The 2010 Quadrennial Defense Review (QDR) identifies climate change as an issue that will play a significant role in shaping the future security environment, and names climate change as one of four specific issues requiring reform. Climate change is also addressed in the 2010 National Security Strategy, which states that the issue is a key challenge requiring broad global cooperation.

The QDR discusses how climate change will affect the Department of Defense (DoD) in two broad ways: first, by shaping the operating environment, roles, and missions that we undertake due to physical changes such as rising temperature and sea level, retreating glaciers, earlier snowmelt, and changing precipitation patterns; and second, the QDR describes the need for DoD to adjust to the impacts of climate change on our facilities and military capabilities by constructing a strategic approach that considers the influence of climate change on shaping operating environment, roles, and missions. In addition to the QDR, the 2008 National Defense

Authorization Act requires the DoD to consider the impact of climate change on its “facilities, capabilities, and missions.” Taking into account this guidance, the Navy recognizes the need to adapt to climate change and is closely examining the impacts that climate change will have on military missions and infrastructure.

In terms of climate change impact on missions, the Navy is watching with interest the changing Arctic environment. September 2007 saw a record low in sea ice extent and 2008 and 2009 were the second and third lowest extents, respectively. Observations from the University of Washington’s Applied Physics Lab show that September ice volume was the lowest in 2009 at 67 percent below its 1979 maximum. Reduction in ice volume means that thicker, multi-year sea ice is being replaced by first-year ice that is thin and more susceptible to melting or wave and wind influence. Regardless of changes to sea ice, the Arctic will remain ice covered in the winter through this century and remains a very difficult operating environment due to sea ice, freezing temperatures, and extreme weather. The changing Arctic has national security implications for the Navy. The QDR identifies the Arctic as the region where the influence of climate change is most evident in shaping the operating environment and directs DoD to work with the Coast Guard and Department of Homeland Security to address gaps in Arctic communications, domain awareness, search and rescue, and environmental observation and forecasting capabilities. The Navy’s Maritime Strategy identifies that new shipping routes have the potential to reshape the global transportation system, generating potential sources of competition for access and natural resources. For example, the Bering Strait has the potential to increase in strategic significance over the next few decades, while China is actively exploring

ways to increase its presence in the Arctic and has applied for observer status to the Arctic Council.

While the Arctic is a bellwether for global climate change, there are other impacts of climate change on missions that the Navy must consider, including water resources, fisheries, and implication for humanitarian assistance and disaster relief. Availability of freshwater will change with the redistribution of precipitation patterns and saltwater intrusion resulting from sea level rise. Furthermore, alterations in freshwater systems will present challenges for flood management, drought preparedness, and water supply. On the other hand, some areas of the world, such as Russia, will likely see longer growing seasons and an increase in water availability, providing opportunities for economic growth. In addition to water supply, large scale redistribution of fisheries catch potential is a concern in areas of the world that depend heavily upon this industry as a primary food source. Leading fishery scientists estimate decreases of up to 40% in overall catch potential for most major fisheries near the tropics over the next four decades due to warming and changes in ocean chemistry, while the Arctic region may see a 30-70% increase in overall catch potential. As countries around the world experience challenges and opportunities related to global climate change, these scenarios have the potential to both accelerate instability, potentially leading to increased demands for Humanitarian Assistance and Disaster Relief (HA/DR), and reinforce the need for global cooperation. The Navy must understand where, when, and how climate change will affect regions around the world and work to build resilience and partnerships with foreign militaries.

In addition to impacts to Navy missions, we must also be aware of impacts to military infrastructure, both within and outside of the Continental United States. The recent National Research Council Report, “Advancing the Science of Climate,” notes that many United States military bases are located in areas likely to be affected by sea level rise and tropical storms, and that future military operations may take place in areas subject to drought or extreme high temperatures. The Navy’s operational readiness hinges on continued access to land, air, and sea training and test spaces. Coastal infrastructure is particularly vulnerable because it will be affected by changes in global and regional sea level coupled with storm surge and/or severe storm events. Overseas bases may also be impacted by sea level rise, changing storm patterns, and water resource challenges. Bases such as Guam and Diego Garcia provide a strategic advantage to the Navy in terms of location and logistics support.

The potential impacts of climate change on Navy missions and infrastructure require adaptation efforts that are informed by the best possible science, and initiated at the right time and cost. The Navy is currently undertaking assessments for areas of potential major funding. For example, the Strategic Environmental Research and Development Program (the DoD’s environmental science and technology program) is leading a QDR-directed, comprehensive assessment of military installations to assess the potential impacts of climate change on DoD’s missions. The project will result in impact and vulnerability assessment tools designed for military installations, regionally applicable climate change information, and adaptation strategies appropriate for DoD requirements. The Defense Science Board’s Task Force on Trends and Implications of Climate Change for National and International Security is conducting a study on the impacts of climate

change on state stability in Africa, and will make recommendations on the role DoD should take in conjunction with other U.S. government agencies in limiting the adverse consequences of climate change in Africa. Lastly, the Navy has sponsored the National Research Council's Naval Studies Board to study the national security implications of climate change on U.S. Naval forces, and is currently conducting a Capabilities Based Assessment for the Arctic to identify capabilities required for future operations in the region and possible capability gaps, shortfalls, and redundancies. Assessments such as these will inform Navy strategy, policy, and plans to guide future investments.

The Department of Defense is already conducting adaptation efforts through a variety of activities. The Navy is conducting climate change wargames that include climate change impacts on future tactical, operational, and strategic Naval capabilities. Additionally, the Navy has, within the last year, promulgated two roadmaps concentrated on the Arctic and global climate change. The roadmaps guide strategy, future investment, action, and public discussion on the Arctic and global climate change. Also, the U.S. Army Corps of Engineers has official guidance to look at the effects of sea level rise on its installations in the Continental U.S., and is working with foreign countries on water availability and conflict resolution scenarios as well as water resource operations and infrastructure development in arid and semi-arid regions such as Afghanistan. This summer, the Navy will participate in Canada's largest annual Arctic exercise, Operation NANOOK.

Furthermore, the Navy is actively leveraging interagency, international, and academic partnerships to ensure it has access to the best science and information and to avoid duplication of efforts. We are participating in many of the interagency efforts being conducted on climate change, including the Interagency Climate Change Adaptation Task Force, co-chaired by the Council on Environmental Quality, the Office of Science and Technology Policy, and the National Oceanic and Atmospheric Association, and the U.S. Global Change Research Program's National Climate Assessment, which are coordinating agency climate science needs and adaptation efforts across the federal government.

In conclusion, I will borrow a quote from Dr. John Holdren, the President's Science Advisor who says, "We must avoid the unmanageable, and manage the unavoidable." The Navy understands the challenges and opportunities that climate change presents to its missions and installations. We are beginning to conduct the assessments necessary to inform future investments and are initiating adaptation activities in areas where we have enough certainty with which to proceed.

Thank you Mr. Chairman and I look forward to answering any questions the Subcommittee may have.