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COMMITTEE ON SCIENCE & TECHNOLOGY

**STATEMENT OF**  
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**BEFORE THE**  
**HOUSE COMMITTEE ON SCIENCE & TECHNOLOGY**  
**SUBCOMMITTEE ON ENERGY & ENVIRONMENT**  
**ON**  
**THE NAVY'S CLIMATE CHANGE INTERESTS**

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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 the Navy's climate change interests. 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 why the Navy cares about climate change and how we are responding to the challenges and opportunities it presents.

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 directs the Department of Defense to take specific action to reduce the risks associated with climate change, while also identifying climate change and energy security as "inextricably linked." In addition, climate change is 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 geopolitical impacts resulting from these changes; 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.

In addition, DoD participates in the Interagency Climate Change Adaptation Task Force. In October, the Task Force submitted a progress report to the President with recommendations for how Federal policies and programs can better prepare the Nation to respond to the impacts of climate change. The Task Force recommended that Agencies and Departments, including DoD, make adaptation a standard part of planning to minimize climate risks and damages and to ensure that resources are invested wisely and that services and operations remain effective in a changing climate.

Taking into account the DoD guidance and Interagency Climate Change Adaptation Task Force recommendations, the Navy recognizes the need to adapt to climate change and is closely examining the impacts that climate change will have on its military missions and infrastructure.

In terms of climate change impact on missions, the Navy is watching with great interest the changing Arctic environment. September 2007 saw a record low in sea ice extent and the declining trend has continued -- September 2010 was third lowest extent on record and the overall trend has shown an 11.2 percent decline per decade in seasonal ice coverage since satellites were first used to measure the Arctic ice in 1979. Perhaps more significantly, estimates from the University of Washington's Applied Physics Lab show that the amount of sea ice continues to decrease dramatically. September ice volume was the lowest recorded in 2010 at 78 percent below its 1979 maximum and 70 percent below the mean for the 1979-2009 period. 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. 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. For example, the Bering Strait has the potential to increase in strategic significance over the next few decades as the ice melts and the shipping season lengthens, and companies begin to ship goods over the pole rather than through the Panama Canal.

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, agriculture, 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, potentially 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 an increase in overall catch potential. Further impacts to marine ecosystems will be caused by ocean acidification, often referred to as "global warming's silent

partner.” Shifting precipitation patterns and frequency of floods and droughts may generate humanitarian assistance and disaster response requirements and the Navy, with its expeditionary capabilities, may be tasked to support these requests in accordance with the 2010 National Security Strategy, which states that “a changing climate portends a future in which the United States must be better prepared and resourced to exercise robust leadership to help meet critical humanitarian needs.” The Navy must understand where, when, and how climate change will affect regions around the world and work with federal partners to develop the capabilities needed to ensure readiness in the 21<sup>st</sup> century.

In addition to impacts to Navy missions, we must 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. 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 a potential increase in storm surge and/or severe storm events. Overseas bases may 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. For example, the Strategic Environmental Research and Development Program (the DoD’s

environmental science and technology program) is currently funding four research projects, situated in different geophysical settings along the US coastline, that collectively are developing the physical process models and assessment methodologies needed to assess the impacts of sea level rise and associated storm surge on DoD coastal installations. In addition, via its recently submitted Strategic Sustainability Performance Plan mandated by Executive Order 13514, DoD has articulated its strategy for a QDR-directed, comprehensive assessment of military installations to assess the potential impacts of climate change on DoD's missions. The associated research and development aspects of this effort 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 making recommendations on the role DoD should play in dealing with other U.S. government agencies to mitigate potential consequences of environmental change in areas important to U.S. national security. 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 Navy is already executing adaptation efforts through a variety of activities. The Navy is conducting wargames that include climate change impacts on future tactical, operational, and strategic Naval capabilities. Within the last year the Navy 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. The Navy Arctic Strategic Objectives, released in May 2010, specify the objectives required to ensure the Arctic remains a safe, stable, and secure region where U.S. national and maritime interests are safeguarded and the homeland is protected. This past summer, the Navy participated in Canada's largest annual Arctic exercise, Operation NANOOK, which provided our sailors valuable operating experiencing in the region. The Navy established Task Force Energy to meet the growing energy challenges that we face as a service and a nation, and subsequently, the five energy goals as outlined by the Secretary of the Navy. Task Force Climate Change and Task Force Energy work closely to ensure that overlapping issues of climate change and energy security are addressed.

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 coordination with appropriate DoD offices, in many of the interagency efforts being conducted on climate change, including the National Science and Technology Council's Roundtable on Climate Information and Services, co-chaired by the Office of Science and Technology Policy, the National Oceanic and Atmospheric Administration, and the U.S. Geological Survey and the U.S. Global Change Research Program's National Climate Assessment, which in part are coordinating agency climate science needs and adaptation efforts across the federal government. Finally, the Navy is joining an effort with the Air Force and the National Oceanic and Atmospheric Administration to advance U.S. environmental prediction capability to mitigate the impact of the severe weather and answer

operational requirements facing our nation. This capability will combine the forecasting skills of the Navy's and the National Weather Service's global numerical weather, ocean, and ice models to provide a better Earth Systems Prediction Capability.

I would like to close with a quote from Vice Admiral Richard Truly, former NASA Administrator, and Director of Department of Energy's National Renewable Energy Lab. "The stresses that climate change will put on our national security will be different than any we've dealt with in the past...this is why we need to study this issue now, so that we'll be prepared and not overwhelmed by the required scope of our response when the time comes." 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.