National Security Implications of Climate Change for U.S. Naval Forces

Committee

Frank L. Bowman

Co-Chair

Admiral Bowman is President of Strategic Decisions, LLC, a private consulting firm that provides governments and organizations with management training and strategic planning expertise. He retired from the U.S. Navy in 2005 as a 4-star Admiral. From 1996-2005, Admiral Bowman served as Director, Naval Nuclear Propulsion, Naval Sea Systems Command, and concurrently as Deputy Administrator for Naval Reactors in the Naval Nuclear Security Administration, Department of Energy. His prior naval assignments include Chief of Naval Personnel, Director for Political-Military Affairs, and Deputy Director of Naval Operations on the Joint Staff. Upon his retirement from active military service, Admiral Bowman served as President and CEO of the Nuclear Energy Institute, the policy organization for the commercial nuclear power industry. In 2006, Admiral Bowman was made an Honorary Knight Commander of the Most Excellent Order of the British Empire in recognition of his commitment in support of the Royal Navy submarines program. He also has served on numerous advisory panels, including the visiting committee at the Massachusetts Institute of Technology (Nuclear Engineering) and the Penn State Nuclear Advisory Board. His NRC service includes as a member of the NAE's Forum on Diversity in the Engineering Workforce (1999-2004). Most recently, he served as a member of the military advisory board for the 2008 Center for Naval Analyses Corporation report entitled National Security and the Threat of Climate Change. Admiral Bowman is a member of the National Academy of Engineering,

Antonio J. Busalacchi, Jr.

Co-Chair

Dr. Busalacchi is Director of the Earth System Science Interdisciplinary Center and Professor in the Department of Atmospheric and Oceanic Science at the University of Maryland, College Park. His research interests include tropical ocean circulation and its role in the coupled climate system, and climate variability and predictability. Dr. Busalacchi has been involved in the activities of the World Climate Research Program (WCRP) for many years and currently is chair of the Joint Scientific Committee that oversees the WCRP. He previously was co-chair of the scientific steering group for its subprogram on Climate Variability and Predictability. Dr. Busalacchi has served extensively on NRC activities, including as chair of the Climate Research Committee and Committee on a Strategy to Mitigate the Impact of Sensor Descopes and Demanifests on the National Polar-orbiting Operational Environmental Satellite System and Geostationalry Operational Environmental Satellite Spacecraft, and member of the Committee on Earth Studies, the Panel on the Tropical Ocean Global Atmosphere Program, and the Panel on Ocean Atmosphere Observations Supporting Short-Term Climate Predictions. Dr. Busalacchi currently serves as a member of the NRC Committee on America's Climate Choices: Panel on Advancing the Science of Climate Change, and as Chair of the Board on Atmospheric Sciences and Climate.

Arthur B. Baggeroer

Member

Dr. Baggeroer is Ford Professor of Engineering and the Secretary of the Navy/Chief of Naval Operations Chair for Ocean Science in the Departments of Ocean and Electrical Engineering at the Massachusetts Institute of Technology (MIT). His areas of expertise include advanced signal processing methods applied to sonar, ocean acoustics, and geophysics. Dr. Baggeroer has served as Director of the MIT-Woods Hole Joint Program in Oceanography and Oceanographic Engineering. During sabbatical leaves he has also served as a consultant to the Chief of Naval Research at the NATO Supreme Allied Commander Atlantic Center in La Spezia, Italy, and as a Green Scholar at the Scripps Institution of Oceanography. He is a fellow of the Institute of the Electrical and Electronic Engineering and the Acoustical Society of America. Dr. Baggeroer recently served as co-chair of the NRC Committee on Distributed Remote Sensing for Naval Undersea Warfare. He is a member of the National Academy of Engineering and a former member of the NRC's Naval Studies Board and Ocean Studies Board

Cecilia Bitz

Member

Dr. Bitz is an associate professor in the Atmospheric Sciences Department at the University of Washington. Her research interests include climate dynamics, climate change, paleoclimate, the role of sea ice in the climate system, Arctic/North Atlantic interactions, and sea ice model development. The primary tools for her research are a variety of models, from simple reduced models to sophisticated climate system models. Dr. Bitz is a member of the advisory board for the Community Climate System Model sponsored by the National Science Foundation and Department of Energy and the steering committee for the NOAA Climate and Global Change postdoctoral program. She currently serves on the NRC Climate Research Committee and was a member of the U.S. International Polar Year Planning Committee.

Ronald Filadelfo

Member

Dr. Filadelfo is Research Team Leader for the Environment and Energy Research Team at the Center for Naval Analyses (CNA), the Navy’s Federally Funded Research and Development Center. His early work at CNA was in the field of antisubmarine warfare, and since the mid-1990s he has worked on Navy environmental issues. His current research focus is on the effects of military sonars on marine mammals. For the last two years he has examined the issue of climate change and its relationships to national security. Most recently, Dr. Filadelfo served on the CNA study team for the 2008 report entitled National Security and the Threat of Climate Change.

Jeffrey M. Garrett

Member

Admiral Garrett retired from the U.S. Coast Guard with the rank of Rear Admiral after 31 years of service and is currently an independent consultant. While on active duty, Admiral Garrett served in a variety of command, operational, and staff assignments. His shipboard assignments included polar icebreaking deployments throughout the eastern and western Arctic and in the Antarctic in the polar icebreakers Burton Island (WAGB 283) and Polar Star (WAGB 10), and as commanding officer (CO) of Polar Sea (WAGB 11). As the commissioning CO of Healy (WAGB 20), he brought the nation's newest polar icebreaker through delivery, shakedown operations, and ice trials in the eastern Arctic and through the Northwest Passage to homeport in Seattle. Other Coast Guard service included duties at the Vessel Traffic Service in Valdez, Alaska; command of a Great Lakes icebreaker; and multiple programming and budgeting staff assignments at Coast Guard Headquarters. As a flag officer, he served as the Coast Guard's Director of Resources, responsible for the service's budget, long-range planning, and policy development and as Commander of the 13th District in the Pacific Northwest. His military awards include the Distinguished Service Medal, Legion of Merit, Antarctic Service Medal (4 awards), and Arctic Service Medal (5 awards). Since retirement, Admiral Garrett served as a member of the NRC Committee on Assessment of U.S. Coast Guard Polar Icebreaker Roles and Future Needs (2006), Chairman of the Coast Guard's Polar Operations and Policy study (2008), and as a consultant for a variety of maritime and polar-related projects.

Harry W. Jenkins, Jr.

Member

General Jenkins retired from the U.S. Marine Corps with the rank of Major General and is President of Soaring Eagle Consulting, LLC, specializing in defense-related programs and technologies. General Jenkins' background includes naval operations, mine countermeasures, and Marine Corps intelligence operations, in particular, its mission use of C4ISR [command, control, communications, computers, intelligence, surveillance, and reconnaissance] systems. He formerly served as Director of Business Development and Congressional Liaison at ITT Industries-Defense, where he was responsible for activities in support of tactical communications systems and airborne electronic warfare between the Navy, Marine Corps, Coast Guard, and National Guard. During Operation Desert Storm, General Jenkins served as the Commanding General of the Fourth Marine Expeditionary Brigade. He most recently served on the NRC Committee on The "1,000-ship Navy"—A Distributed and Global Maritime Network.

Catherine M. Kelleher

Member

Dr. Kelleher is Professor for Public Policy at the University of Maryland and Senior Faculty Associate at Brown University's Watson Institute where her research interests include cooperative European defense and security policies, NATO relations, and international security and arms control. Dr. Kelleher served in the Clinton Administration as Personal Representative of the Secretary of Defense in Europe and as Deputy Assistant Secretary of Defense for Russia, Ukraine, and Eurasia. She has served on numerous scientific boards and advisory committees, including as vice chair, co-vice chair, and member of the NRC Committee on International Security and Arms Control and as a member of the NRC Committee on the "1,000-ship Navy"—A Distributed Global and Maritime Network. She is a member of the NRC's Naval Studies Board.

Mahlon C. Kennicutt, II

Member

Dr. Kennicutt received his PhD in Oceanography from Texas A&M University in 1980. After 1 1/2 years of Post-Doctoral work in Geosciences at the University of Tulsa, Dr. Kennicutt returned to Texas A&M University in 1981 and was a founding member of the Geochemical and Environmental Research Group (GERG). At GERG he served in various positions and rose to be Director for 6 1/2 years ending in 2004. He was promoted to full professor with tenure in the Department of Oceanography in 2002. At Texas A&M University he has served as a Principal Investigator, Deputy Program Manager, and/or Program Manager on several large interdisciplinary programs. He has participated in/or lead over $22 million worth of research, contracts, and grants during his time at Texas A&M University. He has served as PI on National Science Foundation grants from Marine Chemistry and the Office of Polar Programs. He has spent over 575 days at sea, deployed to Antarctica 6 times, participated in 6 submersible dives in various vessel including the Navy NR-1, and maintains a current project at McMurdo Station, Antarctica of r the US Army and NSF. Dr. Kennicutt served as leader of an interdisciplinary research program entitled the Sustainable Coastal Margins Program (SCMP) a coalition of six Colleges, 9 academic departments, five centers, and two institutes at Texas A&M as well as five partners external to Texas A&M. He was Director of Sustainable Development in the Office of the Vice President for Research from 2004 to 2008. Dr. Kennicutt is the US Delegate to Scientific Committee on Antarctic Research (SCAR). Dr. Kennicutt was elected to a 4-year term as President of SCAR in 2008. Within SCAR he has served on committees and held various offices including the Vice President for Finance and Scientific Affairs, member of the Standing Committee to the Antarctic Treaty System, Chair of the Delegates Committee on Scientific Affairs and Secretary of the SCAR Scientific Research Program Subglacial Antarctic Lake Environments. He has also served as ex officio member of the Polar Research Board since 1998 and has been a science advisor to the US Department of State Antarctic Treaty Delegations since 2002. Dr. Kennicutt has served as a member of several National Academies Committees and acted as a report monitor and external reviewer of several NAS reports. He is also served on a Committee of Visitors reviewing NSF Office of Polar Programs logistical and science support efforts.

Ronald R. Luman

Member

Dr. Luman is Head of the National Security Analysis Department at the Johns Hopkins University Applied Physics Laboratory (JHU/APL). He has led a variety of systems engineering efforts in the areas of missile guidance systems, unmanned undersea vehicles, countermine warfare, ballistic missile defense, intelligence systems, and domestic infrastructure resiliency. Dr. Luman has served on studies for the National Research Council (as a member of the NRC Committee on the Role of Naval Forces in the Global War on Terror) and National Infrastructure Advisory Council, and chairs the annual JHU Unrestricted Warfare Symposium as a means to foster stronger collaboration between the national security policy, andlysis, and technology communities. He is also the Acting Director of Strategic Planning at JHU/APL and the Systems Engineering Program Chair at the JHU Whiting School of Engineering.

W. B. Lyons

Member

Dr. Lyons is a Distinguished Professor of Mathematical and Physical Sciences at the Ohio State University School of Earth Sciences and Director of the Byrd Polar Research Center from 1999 to 2009. Previously he was a faculty member at the University of New Hampshire, the University of Nevada, Reno (where he served as the Director of the Hydrologic Sciences Graduate Program), and the University of Alabama, Tuscaloosa (where he was the Loper Chair of Environmental Geology). Dr. Lyons research interests include environmental geochemistry of trace metals, such as mercury, the causes and rates of chemical weathering and landscape change, the dynamics of carbon in the terrestrial environment, the role of agriculture and urbanization on water resources, and the impact of climate change on polar ecosystems. Dr. Lyons is a fellow of the Geological Society of America, the American Association for the Advancement of Science, and the American Geophysical Union. He is a past member of the NRC’s Polar Research Board, and past chair of the NRC Committee on Designing an Arctic Observing Network.

James J. McCarthy

Member

Dr. McCarthy is the Alexander Agassiz Professor of Biological Oceanography. He holds faculty appointments in the Department of Organismic and Evolutionary Biology and the Department of Earth and Planetary Sciences. His research interests focus on the regulation of plankton productivity in the sea, and the upper ocean nitrogen cycle, especially in mixing processes, monsoonal cycles, and the El Nino Southern Oscillation system. He participated in the early planning phases of the International Geosphere-Biosphere Programme and served as its chair for the first six years of the program. He was involved in the first Intergovernmental Panel on Climate Change (IPCC) assessment, co-authoring the concluding chapter of Working Group I. In the third IPCC assessment he co-chaired Working Group II, whose task it was to assess impacts of and vulnerabilities to global climate change, with an intensified focus on adaptation. He is past president and Chair of the Board of the American Association for the Advancedment of Science. Dr. McCarthy has served on numerous scientific advisory boards and committees, including the NRC Ecosystems Panel, Committee on Global Change Research, and Committee to Review the Global Ocean Observing System.

Michael J. McPhaden

Member

Dr. McPhaden is a senior scientist at the National Oceanic and Atmospheric Administration’s Pacific Marine Environmental Laboratory in Seattle, Washington. He is an affiliate professor in the School of Oceanography at the University of Washington, Director of the TAO [Tropical Atmosphere Ocean] Project Office, and a senior fellow with the Joint Institute for Marine and Atmospheric Research at the University of Hawaii. Dr. McPhaden’s primary research and expertise is in the ocean’s role in climate and ocean-atmospheric interactions. He has served on the NRC Panel on Near-Term Development of Operational Ocean Observations. Dr. McPhaden is currently President-Elect of the American Geophysical Union.

John H. Moxley, III

Member

Dr. Moxley is retired Managing Director of North American Health Care Division, Korn/Ferry International. His areas of expertise include government policy and federal government administration; military training, costs, and manpower issues; military medical issues; and chemical, biological, radiological, and nuclear detection. He has held a number of senior positions in academia, government, and commercial industry, including Dean of both the University of Maryland and the University of California (San Diego) Medical Schools, Assistant Secretary of Defense for Health Affairs, and Senior Vice President at American Medical International. He has served on numerous scientific boards and advisory committees, including the American Hospital Association Board of Trustees, the California Medical Association, the American Medical Association, the National Fund for Medical Education, and the Henry M. Jackson Foundation for the Advancement of Military Medicine. He recently served as co-chair of the NRC Committee on Manpower and Personnel Needs for a Transformed Naval Force and is a former member of the NRC's Board on Army Science and Technology as well as the NRC's Naval Studies Board. Dr. Moxley is a member of the Institute of Medicine.

David J. Nash

Member

Admiral Nash is a retired Rear Admiral in the U.S. Navy and president of Dave Nash and Associates, LLC, a project development firm serving businesses and governments around the world. Admiral Nash has over four decades of experience in building, design, and program management for both the U.S. Navy and the private sector. His experience includes the management of multi-billion dollar physical asset programs, including the Navy's shore installations worldwide and the reconstruction of Iraq's infrastructure. Most recently, Admiral Nash served as director of the Iraq Program Management Office (PMO) under the Coalition Provisional Authority and later, as director of the Iraq Reconstruction Management Office (IRMO) under the U.S. State Department. Under his direction, these organizations managed the $18.4 billion Iraq infrastructure reconstruction program. Admiral Nash is the recipient of numerous awards, including the Society of American Military Engineers Golden Eagle Award, the Beavers Award for Heavy Engineering Construction, the ASCE John I. Parcel-Leif J. Sverdrup Award for Civil Engineering Management, and the CERF/IIEC Henry L. Michel Award for Industry Advancement of Research. He was elected to the National Academy of Engineering "for leadership in the reconstruction of devastated areas after conflicts and natural disasters." He currently serves on the NRC Board on Infrastructure and the Constructed Environment and recently served on the NRC's Committee on Toward Sustainable Critical Infrastructure Systems: Framing the Challenges Workshop.

Heidi C. Perry

Member

Ms. Perry is Director, Internal Research and Development, at the Charles Stark Draper Laboratory. Her expertise includes guidance, navigation and control; global position system anti-jam and ground control; precisions weapons delivery command and control; guided munitions and missile technologies. Previously, Ms. Perry served as Division Leader of Mission Systems, Software Engineering Division Leader, and Principle Member of Technical Staff at Draper. She served as a member of the NRC Committee on the “1,000-ship Navy”—A Distributed Global and Maritime Network and is a member of the NRC’s Naval Studies Board.

J. M. Shepherd

Member

Dr. Shepherd is an associate professor conducting research, advising, and teaching in atmospheric sciences, climatology, water-cycle processes, and urban climate systems. He joined the Department of Geography’s Atmospheric Sciences Program at the University of Georgia (UGA) in January 2006. Prior to joining the UGA faculty, Dr. Shepherd spent 12 years as a research meteorologist in the Earth-Sun Division at NASA-Goddard Space Flight Center. Dr. Shepherd also served as a member of the United Nations World Meterological Organization steering team on aeroslos and precitipation, and was contributing author on the 2007 Inter-governmental Panel on Climate Change (IPCC) Fourth Assessment Report. Dr. Shepherd is currently a member of NASA Precipitation Measurement Missions Science team and the NOAA Climate Working Group. He is editor for the Journal of Applied Meteorology and Climatology.

Charles F. Wald

Member

General Wald is Director and Senior Advisor to Aerospace and Defense Industry for Deloitte LLP. In this role, he is responsible for providing senior leadership in strategy and relationships with defense contractors and Department of Defense program executives. He is a subject matter specialist in weapons procurement and deployment, counter terrorism, national, energy and international security policy. General Wald has over 35 years of service and was a command pilot with more than 3,600 flying hours and 430 combat hours. As the Supported Commander, he led the coalition air campaign in Operation Enduring Freedom, leading to the extraction of Taliban forces in Afghanistan. Additionally, General Wald has received major military awards and decorations, including the Defense Distinguished Service Medal, the Defense Superior Service Medal and the Distinguished Flying Cross. General Wald is a graduate of North Dakota State University and received a Masters Degree in International Relations from Troy University. He also completed coursework at Harvard University and the National War College and has been awarded an Honorary Doctor of Law degree from North Dakota State University. General Wald served as a member of the military advisory board for the 2008 Center for Naval Analyses Corporation report entitled National Security and the Threat of Climate Change.

David A. Whelan

Member

Dr. Whelan is Vice President, Deputy General Manager, Phantom Works and Chief Scientist, Integrated Defense Systems, at the Boeing Company. His areas of expertise include defense research, development, and enabling technologies, such as autonomous vehicles and space-based moving target indicator radar systems. Prior to joining Boeing, he served as Director of the Tactical Technology Office at DARPA. His high-technology development experience includes roles as a research physicist for Lawrence Livermore National Laboratory, and as a lead engineer at Northrop Grumman. Dr. Whelan has served on numerous scientific boards and advisory committees, including the Defense Science Board, the Air Force Scientific Advisory Board, and the NRC Committee on Research, Development and Acquisition Options for U.S. Special Operations Command (SOCOM). Dr Whelan is a member of the National Academy of Engineering and is vice chair of the NRC’s Naval Studies Board. He also serves as a member of the NRC Americas Climate Choices: Panel on Advancing the Science of Climate Change.

Carl Wunsch

Member

Dr. Wunsch is the Cecil and Ida Green Professor of Physical Oceanography at the Massachusetts Institute of Technology. His research interests include ocean observing technologies and the general circulation of the ocean and its implications for climate change. He has served on numerous scientific boards and advisory committees, including the NRC's Ocean Studies Board and the International Steering Group for the World Ocean Circulation Experiment. He is a foreign member of the Royal Society, a recipient of the American Geophysical Union's Macelwane Award and Maurice Ewing Medal, and the American Meteorological Society's Henry Stommel Medal. Dr. Wunsch is a member of the National Academy of Sciences.