

## **Invitation for Comment on the List Candidates for the Ecological Processes and Effects Committee Augmented for the Ballast Water Advisory**

April 8, 2010

The EPA Science Advisory Board (SAB Staff Office) announced in a *Federal Register* notice (Volume 75, Number 37, pages 8700-8701) that it was augmenting the expertise on the SAB Ecological Processes and Effects Committee (EPEC) to provide advice on technologies and systems to minimize the impacts of invasive species in vessel ballast water discharge. To augment the expertise on the EPEC, the SAB Staff Office sought nominations of recognized experts in the fields of aquatic biology, aquatic toxicology, microbiology, wastewater engineering, statistics, and naval engineering or architecture. The SAB Staff Office particularly sought nominations of scientists with specialized knowledge and expertise in treatment technologies to eliminate or reduce the presence of living organisms in drinking water, wastewater discharges, and other water use circumstances. Background information on the project and details on the nomination process appeared in the cited notice. The notice is available on the SAB Website at:

<http://yosemite.epa.gov/sab/sabproduct.nsf/25f814f6a5c6aa4185256ebb007b557f/81d197093a5c4db0852576d2007cda83!OpenDocument>.

Based on qualifications and interest of the nominees, the SAB Staff Office identified candidates to augment the EPEC for this advisory activity. The biosketches of these candidates are provided below. Biosketches of the members of EPEC are available at: <http://yosemite.epa.gov/sab/sabpeople.nsf/WebCommitteesSubcommittees/Ecological%20Processes%20and%20Effects%20Committee>. We hereby invite comments from members of the public to provide relevant information or other documentation that the SAB Staff Office should consider in determining who should serve on the Ecological Processes and Effects Committee Augmented for the Ballast Water Advisory.

The SAB Staff Office will review all information provided by candidates, any information that the public may provide in response to the posting of information about the candidates on the SAB website, and information gathered by the SAB Staff independently on the background of the candidates. The SAB Staff Office Director makes the final decision about who will serve on the Committee based on all relevant information. For the EPA SAB Staff Office, a balanced committee or panel is characterized by inclusion of candidates who possess the necessary domains of knowledge, the relevant scientific perspectives (which, among other factors, can be influenced by work history and affiliation), and the collective breadth of experience to adequately address the general charge. Specific criteria to be used in evaluating a candidate include: a) scientific and/or technical expertise, knowledge, and experience; b) availability and willingness to serve; c) absence of financial conflicts of interest; d) absence of appearance of a lack of impartiality; e) skills working in committees, subcommittees, and advisory panels; and, for the panel as a whole, f) diversity of scientific expertise, viewpoints, etc. Please provide any comments you may have with respect to the candidates, no later than April 29, 2010. Please make your comments to the attention of Dr. Thomas Armitage, Designated Federal Officer. Emailing comments ([armitage.thomas@epa.gov](mailto:armitage.thomas@epa.gov)) is the preferred mode of receipt.

## Candidates to Augment the Ecological Processes and Effects Committee for the Ballast Water Advisory

### Burkholder, JoAnn

#### North Carolina State University

Dr. JoAnn Burkholder is a William Neal Reynolds Distinguished Professor, a Fellow of the American Association for the Advancement of Science (AAAS), and Director of the Center for Applied Aquatic Ecology at North Carolina State University. Her research over the past 35 years has emphasized human alterations of aquatic ecosystems, including issues such as harmful algal blooms, ballast water transport of exotic species, and watershed influences on nutrient loading and other pollutants. Dr. Burkholder has authored or co-authored nearly 150 peer-reviewed publications, and she is a member of professional societies such as the American Society of Limnology and Oceanography, the AAAS, and Sigma Xi. She has been invited to testify before the U.S. House and Senate as an expert on water quality and impacts from harmful algal blooms. She has held Governor-appointed policy positions on the North Carolina Coastal Futures Committee, and on the North Carolina Marine Fisheries Commission where she served as Chair of the Habitat and Water Quality Committee. She also served as science advisor on a Governor appointed environmental commission in Maryland, and received an Admiral of the Chesapeake Award for her assistance. Dr. Burkholder has received numerous other awards such as the Distinguished Service in Environmental Education Award from the Environmental Educators of North Carolina, the Borlaug Award for Service to the Environment and Society, the J. Compton Lifetime Achievement Award for leadership in river conservation, and the Scientific Freedom and Responsibility Award from the American Association for the Advancement of Science.

### Cohen, Andrew

#### San Francisco Estuary Institute

Dr. Andrew Cohen received his M.S. and Ph.D. in Energy and Resources from the University of California at Berkeley. He is the Director of the Center for Research on Aquatic Bioinvasions (CRAB), and adjunct director of the San Francisco Estuary Institute's Biological Invasions research program, which he founded in 1997. His research interests include aspects of biological invasions in marine and fresh waters (including the extent and impacts of bioinvasions, environmental controls on potential distributions, vector dynamics and management including ballast water treatment and regulation, factors affecting invasion success, eradication approaches, and parasites and invasions) and other topics in ecology and ecosystem management (ecological history of marine waters, estuarine restoration, sediment dynamics in estuaries). In 1998 Dr. Cohen was awarded a Pew Fellowship in Marine Conservation, and in 1999 he received the San Francisco Bay Keeper's Environmental Achievement Award for his research's influence on policy development. He has served on the Executive Committee of the Western Regional Panel on Aquatic Nuisance Species, as the Chair of the State of California's Science Advisory Panel on the response to the western Dreissenid mussel invasions, and as an alternate representative to the national Aquatic Nuisance Species Task Force. In the 1990s he served as Vice President and Board member of one of California's largest water and wastewater treatment agencies. He helped write California's first ballast water law in 1999, and as a member of California's Ballast Water Performance Standards Committee was instrumental in drafting the ballast water discharge standards that were enacted in 2006. He has also authored several general-interest publications on the environment, including a guide to the natural history of San Francisco Bay.

## **Dobbs, Fred**

### **Old Dominion University**

Dr. Fred C. Dobbs is a marine microbial ecologist who received his A.B. (Biology, Departmental Honors) from Franklin and Marshall College, his M.S. in Zoology from The University of Connecticut, and his Ph.D. in Oceanography from The Florida State University. Subsequently, he held institutional post-doctoral positions at the State University of New York at Stony Brook and at the University of Hawaii. In 1993, Dr. Dobbs joined the faculty at Old Dominion University and now is Professor and Graduate Program Director in the Department of Ocean, Earth and Atmospheric Sciences. His recent and ongoing research, funded by the National Science Foundation, the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the Office of Naval Research, and the U.S. Coast Guard, addresses several areas in aquatic microbial ecology, with particular focus on a community-level approach to studies of infectious diseases and the microbial ecology of ships' ballast tanks. Since 2001, he has been a member of the U.S. EPA EPA/ETV Ballast Water Technology Panel, administered by NSF International (under the Environmental Technology Verification program), the Environmental Protection Agency, and the U.S. Coast Guard. He serves on the Advisory Panel of the Marine Invasive Species Program, California State Lands Commission, and is an Advisory Board Member, Maritime Environmental Resource Center, University of Maryland.

## **Drake, Lisa**

### **Science Applications International Corporation**

Dr. Lisa Drake is a Senior Scientist located at the U.S. Naval Research Laboratory in Key West, Florida with the company SAIC. Dr. Drake holds an M.S. in Oceanography (1991) from Old Dominion University, Norfolk, Virginia and a Ph.D. in Oceanography (1997) from Old Dominion University. As a Post-Doctoral Researcher and then a Research Assistant Professor, for seven years Dr. Drake conducted research on organisms in ship ballast water and in biofouling of submerged surfaces of ships. After teaching at the U.S. Coast Guard Academy in New London, Connecticut from 2005-2008, she joined SAIC in 2008. Currently, she is the lead biologist in a team of biological and physical scientists, engineers, and a statistician developing procedures and methods used in testing ballast water treatment systems. Specifically, the biology group is developing robust, automated analyses of protist and zooplankton viability. Dr. Drake has been active in national and international policy by: participating in EPA Environmental Technology Verification technical panel meetings to develop the Generic Protocol for the Verification of Ballast Water Treatment Technologies, serving as a private sector advisor to the U.S. Delegation to the United Nation's International Maritime Organization Subcommittee on Bulk Liquids and Gases, and participating in the International Council for the Exploration of the Seas/Intergovernmental Oceanographic Commission/International Maritime Organization Working Group on Ballast and Other Ship Vectors (ICES/IOC/IMO WGBOSV). She served on the steering committee for the Sixth International Conference on Marine Bioinvasions: August, 2009, Portland, Oregon; the Northeast Aquatic Nuisance Species (NEANS) Panel; and is a member of the steering committee for the Seventh International Conference on Marine Bioinvasions to be held in August 2011 in Spain.

## Haas, Charles

### Drexel University

Dr. Charles Haas is the L.D. Betz Professor of Environmental Engineering and Head of the Department of Civil, Architectural & Environmental Engineering at Drexel University. He holds a B.S. (Biology, 1973) from the Illinois Institute of Technology; an M.S. (Environmental Engineering, 1974) from the Illinois Institute of Technology; and a Ph.D. (Environmental Engineering, 1978) from the University of Illinois at Urbana-Champaign. Dr. Haas' research interests center around the assessment of risk from and control of risks (by treatment interventions) from human exposure to infectious agents. He has extensive experience in water and wastewater treatment processes, especially disinfection, and in risk assessment. He also has prior experience with hazardous waste treatment, particularly heavy metals. Dr. Haas has served on a number of National Research Council and World Health Organization committees. He is past chairman of American Water Works Association and Water Environment Federation Disinfection Committees. He is on the National Academies Water Science & Technology Board, and the U.S. EPA Board of Scientific Counselors Executive Committee. He is a fellow of the American Academy of Microbiology, the Society for Risk Analysis, and the American Association for Advancement of Sciences, and is a Board Certified Environmental Engineering Member of the American Academy of Environmental Engineers.

## Howes, Brian

### University of Massachusetts, Dartmouth

Dr. Brian Howes is an estuarine ecologist/biogeochemist and is currently a Professor in the Department of Estuarine and Ocean Science, School for Marine Science and Technology, University of Massachusetts Dartmouth and also the Manager of the Coastal Systems Program and Technical Director of the Massachusetts Estuaries Project, which is determining nitrogen thresholds for 89 estuaries comprising most of the coast of Massachusetts. Dr. Howes holds an M.A. (1980) and Ph.D. (1984) in marine biology from the Boston University Marine Program at the Marine Biological Laboratory in Woods Hole. Dr. Howes joined the faculty of the Woods Hole Oceanographic Institution (WHOI) in 1987 following a post-doc at WHOI and a year as a research assistant professor at the Center for Coastal and Environmental Studies Rutgers University. In 1997, Dr. Howes moved his research team to the newly established School for Marine Science and Technology within University of Massachusetts to establish the Coastal Systems Program focusing on science based management of aquatic systems. Dr. Howes' current research focuses on estuarine and salt marsh response to changing land-use and nutrient enrichment, alteration of hydrodynamics and specific response of eelgrass and benthic communities to nitrogen enrichment. He has investigated aquatic systems from the Antarctic Dry Valley Lakes, to the Danube River, to the Caribbean and sub-tropics, although the bulk of the work has been along the temperate mid-Atlantic coast of the U.S. Other work has included benthic system recovery from oil contamination, cycling of organic contaminants through benthic animals and more recently natural attenuation of land-based contaminants by surface water ecosystems and assessing the impacts of marine renewable energy technologies, primarily those based upon tidal currents. Dr. Howes has held a variety of adjunct and research positions at Boston University, Rutgers Ecology Program, USGS, and University of Massachusetts -Amherst. He has served as a reviewer to numerous agencies and scientific journals, including as an associate editor of *Estuaries*. He was a member of the National Academy of Sciences Danube Delta Science Group and chaired the regional committee to oversee the groundwater clean-up of Massachusetts Military Reservation. He has directed numerous ecological restoration projects on lakes, wetlands and embayments and continues to serve on a number of technical advisory committees and boards. From 1997 to present, Dr. Howes has worked as a technical advisor to the U.S. Coast Guard on issues of ballast water treatment to prevent entry of invasive species through shipping discharges. He was a member of a small team developing the protocols related to the present Shipboard Testing and Evaluation Program (STEP) and is presently assisting in revisions to that program. In addition, Dr. Howes has participated since 2001, as a technical advisor to the U.S. EPA/U.S. Coast Guard ETV program on shore-based testing of ballast water treatment systems. He is the author or co-author of ~70 refereed journal articles and more than 100 published general articles and reports.

## Lemieux, Edward

### U.S. Naval Research Laboratory

Mr. Edward Lemieux is currently the Director of the Center for Corrosion Science & Engineering of the U.S. Navy's Naval Research Laboratory in Washington, D.C. Mr. Lemieux currently leads a diverse research portfolio of approximately \$20M annually in marine corrosion and coatings, cathodic protection, environmental effects on materials, fouling control, condition based maintenance and material science in general. Mr. Lemieux is the principal investigator for two current Office of Naval Research Future Naval Capabilities efforts including EPE-08-09 Maintenance Reduction Technologies and EPE-10-03 Corrosion and Corrosion Related Signature Technologies. Mr. Lemieux is also an Engineering Agent and Manager for Corrosion Control and Cathodic Protection for the Naval Sea Systems Command, respectively. He currently supports NAVSEA 05P2 as the technical lead for corrosion control research and development for the OHIO REPLACEMENT Program. With respect to ballast water science and technology, Mr. Lemieux is the principal investigator for ongoing science and technology work sponsored by the U.S. Coast Guard to develop test facilities and methods for standardized testing of ballast water treatment systems. Mr. Lemieux currently supports the U.S. delegation to the International Maritime Organization's Marine Environmental Protection Committee and is a member of the Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP) Ballast Water Working Group for the review of Active Substances.

## Lodge, David

### University of Notre Dame

Dr. David M. Lodge is a Professor in the Department of Biological Sciences, Director of the Center for Aquatic Conservation, and Director of the new Environmental Change Initiative at the University of Notre Dame. Dr. Lodge completed his D.Phil. at Oxford University as a Rhodes Scholar, and is an Aldo Leopold Leadership Fellow. Dr. Lodge's research, published in over 150 scientific papers, has been featured in many videos, radio shows, magazine articles, and newspapers including *The New York Times*. Lodge is a freshwater ecologist whose research focuses on ecosystem services and ecological forecasting to better inform environmental risk analysis, bioeconomics, policy, and management. Study sites are usually freshwater ecosystems, including the Laurentian Great Lakes, and inland lakes and streams in North America and Africa. A special emphasis in research is nonindigenous species, including pathogens, parasites, and other invasive species in terrestrial, marine, and freshwater ecosystems. Dr. Lodge and collaborators are developing lab-on-a-chip genetic tools to detect harmful species in the ballast water of ships and in other aqueous environments. Dr. Lodge served as the first Chair of the U.S. national Invasive Species Advisory Committee, led global analyses of future losses of freshwater biodiversity in response to climate change and human consumption of water, headed the committee that wrote a policy paper on invasive species for the Ecological Society of America, and has testified several times before U.S. congressional committees on scientific research and invasive species policy including ballast water policy. The mission of the Center for Aquatic Conservation is to foster translational research — novel intellectual contributions shaped by partners in agencies, non governmental organizations, and the private sector that contribute to improved natural resource management and policy. In the spirit of 'science serving society,' many Notre Dame scientists, engineers and other faculty contribute to research on invasive species; climate change adaptation; water and global health; and land use, water quality and aquatic habitats. The Center for Aquatic Conservation has a formal partnership with The Nature Conservancy.

## MacIsaac, Hugh

### University of Windsor, Ontario Canada

Dr. Hugh MacIsaac is a professor and invasive species research chair at University of Windsor, and directs the Canadian Aquatic Invasive Species Program. His lab works on vectors and pathways of aquatic invasive species transmission, and secondary spread to inland lakes. Most of his work occurs on the Great Lakes and its watershed, although he also does work on marine coastal invasions in eastern and western Canada and has begun work in the Arctic. Most of his work on ships pertains to ballast water and sediments, but he is also looking at the importance of hull fouling. He has been a faculty member for 18 years. Dr. MacIsaac holds a B.Sc in biology from the University of Windsor, a M.Sc in botany from the University of Toronto, and a Ph.D. in biology from Dartmouth College.

## **Mackey, Thomas**

### **Hyde Marine, Inc.**

Mr. Thomas P. Mackey is an internationally recognized expert and leader in the development, manufacturing and application of ballast water treatment systems. He is a Senior Consultant with Hyde Marine, Inc. (a Calgon Carbon Corporation company), having served as CEO for 37 years prior to its acquisition by Calgon Carbon Corporation in 2010. He received BSE and MSE degrees in Naval Architecture and Marine Engineering from the University of Michigan. Mr. Mackey is a Life Fellow, Honorary member, and Honorary Vice President of the Society of Naval Architects and Marine Engineers (SNAME) and the 2005 SNAME Land medalist. Mr. Mackey is also a Fellow of the Institute of Marine Engineering Science & Technology (IMarEST) and a Fellow of the Royal Institution of Naval Architects (RINA). He was the Chairman of the First World Maritime Technology Conference, WMTC 2003, in San Francisco, and the first Chairman of the World Maritime Technology Congress. He has presented many technical papers on Ballast Water Management and shipboard security at various symposia during the past several years. Hyde Marine has been actively involved with shipboard security systems since early this decade and with ballast water management procedures and equipment since 1996. He has also presented several technical papers on other subjects to various professional societies.

## **Reid, David**

### **Retired Federal Research Scientist**

Dr. David Reid retired in March 2010 after more than 40 years of service as a U.S. federal civil service research scientist. He received a B.S. (Geology) from State University of New York - Stony Brook and a Ph.D. (Oceanography) from Texas A&M University. Dr. Reid was employed for 15 years by the U.S. Navy as a civilian oceanographer conducting research using natural radiochemical tracers to map mixing and transport of water masses in the ocean. In 1985 he became Assistant to the Director of the National Oceanic and Atmospheric Administration's (NOAA) Great Lakes Environmental Research Laboratory. In this position he helped establish and participated in research to compile and interpret detailed bathymetry of the Great Lakes and supervised the lab's Biogeochemical Sciences Division during the formation of its invasive species research program. In 1999 Dr. Reid returned to full-time research and initiated a ballast water research program on invasive species vector risk to the Great Lakes from residual ballast water and sediment. He was awarded both a Department of Commerce Bronze Medal (2002) and the Department of Commerce Gold Medal (2008) for leadership of that research. Most recently he served as co-principal investigator for research on the efficacy of salt brine as a biocide in ballast tanks, as well as a shipboard study of mixing in ballast tanks on operating cargo vessels. Recent research was funded by NOAA. Past research support was provided by NOAA, U.S. EPA, U.S. Coast Guard, Great Lakes Protection Fund, U.S. Army, and State of Michigan. Dr. Reid has served on the Technical Program Committee of the International Conference on Aquatic Invasive Species (ICAIS) since 2002 and was co-chair of the 16th ICAIS in 2009. He served on the Research Committee of the national Aquatic Nuisance Species Task Force (ANSTF) from 2005 through 2009 and was chair of the ANSTF Research Committee from 2008 through 2009. He was NOAA representative to the Great Lakes Panel on Aquatic Nuisance Species from 2000-2009 and was a member of the Research Committee of that Panel.

## Reynolds, Kevin

### The Glosten Associates

Mr. Kevin Reynolds is a Senior Associate at The Glosten Associates, Inc. He holds a B.S. in Marine Engineering Systems from the U.S. Merchant Marine Academy. He has 17 years of marine engineering and design experience and holds an Unlimited Chief Engineer merchant mariner license for operating ships. He has hands-on shipyard experience as a new construction project engineer, and is professionally licensed as a naval architect/marine engineer in the State of Washington. Mr. Reynolds leads Glosten's marine environmental engineering efforts with a focus on a holistic approach that considers water effluent, air emissions, and energy efficiency. These efforts have led to the development of a hydrocarbon vapor recovery system, application of advanced wastewater treatment systems, and the integration of control technology for reduction of the overall energy use and air emissions of marine vessel propulsion and auxiliary plants. Since 2001, Mr. Reynolds has performed significant work in the pursuit of solutions for offloading ballast water in accordance with sound environmental practice. This work has resulted in broad experience that ranges from advising science teams and regulatory agencies to performing design and engineering for treatment system suppliers and ship owners. He has performed due-diligence reviews of treatment systems during acquisition processes, led the design of a treatment system prototype installation, and led the design of the Maritime Environmental Resource Center and T.S. Golden Bear ballast test facilities. He led the development of an automated compliance, monitoring, and advisory ballast management program for shipboard use under U.S. Coast Guard and National Oceanic and Atmospheric Administration (NOAA) guidance. Mr. Reynolds serves the broader maritime community by participating in various work groups, projects, and panels studying ballast water issues. These groups include: Washington State Governor's Ballast Water Work Group; California State Lands Commission Ballast Technology Assessment Panel; International Maritime Organization – International workshop on Compliance Monitoring and Enforcement for Ballast Water Management; Naval Research Laboratory – Testing and Evaluating Ballast Water Treatment Technologies; National Science Foundation - Engineering Controls for Ballast Water Discharge.

## Sanders, James

### Skidaway Institute of Oceanography

Dr. James Sanders is Director of the Skidaway Institute of Oceanography, a campus of the University System of Georgia. He received his B.S. from Duke University in Zoology and his Ph.D. from the University of North Carolina in Marine Sciences, then was a postdoctoral investigator at Woods Hole Oceanographic Institution. Prior to his arrival in Savannah in 2001, Dr. Sanders was on the faculty and served as Director of the Academy of Natural Sciences' Estuarine Research Center in Maryland, then was Chairman of the Department of Ocean, Earth and Atmospheric Sciences at Old Dominion University in Virginia. Dr. Sanders is known for his interests within the area of nutrient and trace element biogeochemistry: how trace elements are transported through coastal zones, transformed by chemical and biological reactions during transport, and how they influence growth and species composition of autotrophic organisms and in particular, the regulation of algal bloom formation. He serves as a consultant to federal and state science agencies and industrial groups in the U.S. and Europe. Dr. Sanders is currently a member of the chartered U.S. EPA Science Advisory Board. He is a member of numerous scientific societies, is Past President of the National Association of Marine Laboratories and a Trustee of the Consortium for Ocean Leadership. He is the author of over 75 scientific publications.

## **Tamburri, Mario**

### **University of Maryland Center for Environmental Science**

Dr. Mario N. Tamburri received a Bachelors degree from University of California Santa Barbara, a Masters degree from University of Alabama, and a Ph.D. from the University of South Carolina in biology and marine science. After spending six years at the Monterey Bay Aquarium Research Institute, Dr. Tamburri joined the faculty at the Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science in 2002 and is now a Research Associate Professor and the Executive Director of the Alliance for Coastal Technologies. Dr. Tamburri has worked on the issue of ballast water and invasive species for 12 years and serves on several advisory boards including: the U.S. EPA Environmental Technology Verification (ETV) program's technical panel on ballast water treatment testing for the U.S. Coast Guard; the California State Lands Commission Ballast Water Technical Advisory Panel; International Council for the Exploration of the Sea (ICES) Working Group on Ballast and Other Ship Vectors; and as a consultant for the American Bureau of Shipping. His work in this area has also led to a partnership with the Maryland Port Administration (MARAD) and National Oceanic and Atmospheric Administration (NOAA) to establish the Maritime Environmental Resource Center (MERC), which provides test facilities, information, and decision tools to address key environmental issues facing the international maritime industry. Dr. Tamburri has led the testing and evaluation of several diverse ballast water treatment systems, at multiple scales (e.g., laboratory, land-based, shipboard); participated comprehensive reviews of available and developing ballast water treatment systems (including mechanical/biological efficacy and economic assessments); published peer-reviewed papers on ballast water treatment testing and efficacy, and ballast water regulation compliance and enforcement; participated in dozens of national and international meetings, conferences, and symposia on ballast water invasive species; and has several active national and international collaborations addressing this issue.

## **Welschmeyer, Nicholas**

### **San Jose State University**

Dr. Nicholas Welschmeyer is Professor of Oceanography at the Moss Landing Marine Laboratories and San Jose State University. Dr. Welschmeyer earned his B.A. from the University of California, Berkeley and his M.S. and Ph.D. in Oceanography from the University of Washington. He served as Assistant through Associate Processor in biological oceanography at Harvard University from 1982-1989. Dr. Welschmeyer's research interests focus on the interactions of phytoplankton and zooplankton in the pelagic environment. In his research he utilizes radioisotope/spectroscopic techniques and organic analyses to understand environmental problems including physiological stress, invasive species and long-term environmental change biological oceanographic contexts. Current projects include a long term analysis of diatom and dinoflagellate abundance in Monterey Bay and a physiologically-based analysis of current methods to quantify viability in ballast water treatment testing. Dr. Welschmeyer has conducted multiple analyses of ballast water treatment system efficacy and performance. He is currently the principal investigator for the Golden Bear Ballast Test Facility (California Maritime Academy, Vallejo, CA). Dr. Welschmeyer is involved on multiple advisory committees involving ballast treatment issues including the Technical Advisory Panel for the California State Lands Commission Marine Invasive Species Program.

## **Wright, David**

### **University of Maryland**

Professor David Wright is a graduate of the University of Newcastle-upon-Tyne where he received an honors degree in zoology, a Ph.D. in comparative physiology (1973) and a D.Sc. (2001). Dr. Wright is currently Professor Emeritus of Environmental Toxicology at the University of Maryland, Center for Environmental Science following his retirement in 2009. He is the author of over 100 peer-reviewed papers and books. He has conducted research into problems associated with non-indigenous species for the past 20 years and has made over 50 presentations world-wide on this subject. He directed the Baltimore Harbor Ballast Water Treatment Demonstration project from 1999-2005 and is a member of the Advisory Board of its successor, the Maritime Environmental Resource Center. He continues to conduct several ballast water treatment trials, both dockside and shipboard under the auspices of the U.S. Coast Guard and the International Maritime Organization and is a regular contributor to workshops and conferences on the development of biological endpoints for ballast water testing.