

**An International Symposium:  
Potential Application of Vessel-Quieting Technology on  
Large Commercial Vessels**

1-2 May, 2007  
NOAA Main Campus, Science Center  
1305 East-West Highway  
Silver Spring, MD 20910



**ABSTRACTS**

**Session I: Introduction: meeting objectives, vessel acoustics, ambient noise, and biology**

0830 **Dr. Brandon Southall, NOAA Ocean Acoustics Program**

**General introduction: Recap of 2004 symposium and overview of agenda, objectives, and products of current vessel-quieting symposium**

Three years ago, NOAA's Ocean Acoustics Program initiated a collaborative dialogue among the shipping industry, academic and government scientists, regulators, and environmental advocates regarding environmental aspects of large vessel sound emission. This introductory presentation will briefly describe outcomes of the initial symposium "Shipping Noise and Marine Mammals: A Forum for Science, Management, and Technology." Additionally, the reasoning and objectives for the current symposium on vessel-quieting technologies, intended to advance the proactive spirit of progress on this conservation issue, will be discussed.

0845 **Ms. Kathy Metcalf, Chamber of Shipping of America**

**Perspectives on marine acoustics from a shipping industry representative**

This presentation will provide a brief overview of the shipping industry's participation in previous initiatives relating to commercial shipping generated sound and its potential impact on living marine resources. It will also provide a look ahead at the industry's perspective and provide a way forward to assess the impacts of sound generated by commercial shipping, and based on results of this assessment, as necessary, identify appropriate legal and technological strategies by which commercial shipping sound could be mitigated.

0900 **Dr. John Hildebrand, Scripps Institute of Oceanography**

**Large vessels as point sound sources I: Characteristics of radiated sound and marine ambient noise in nearshore/continental shelf environments**

Noise generation by large vessels will be described, as well as the contribution of vessel noise to ocean ambient noise. Ambient noise in the deep-water North Pacific basin has been increasing at a rate of about 3 dB per decade for the past four decades. Repeat ambient noise measurements suggest that basin-wide increases in the number of commercial ships, as well as increased noise from individual ships, have contributed to deep-water ambient noise. Repeated measurements at a shallow-water (110 m) site near San Clemente Island reveal increased noise associated with local shipping. Local ships were observed in 31 percent of recordings collected in 1963 and in 89 percent of



recordings in 2005-2006. However, when noise from local ships is excluded from the 2005-2006 recordings, median sound levels were the same as those observed in the absence of ships during 1963, suggesting that deep-water ship noise does not propagate to this shallow water site.

0920 **Mr. Blair Kipple, Naval Surface Warfare Center, Bremerton Detachment**

**Measured radiated sound from large commercial vessels: Controlling sources of radiated noise from large modern cruise ships and dependence on propulsion type and vessel speed**

The radiated underwater sound from eight large cruise ships was measured and characterized at the U.S. Navy's Southeast Alaska Acoustic Measurement Facility (SEAFAC). Cruise ship sound level, character, and controlling acoustic sources were significantly vessel dependent. Propulsion system type and vessel speed were typically important factors. One-third octave band levels of up to 125 dB re 1  $\mu$ Pa at 500 yards were measured. The principle sources of acoustic energy were typically related to the power generation and propulsion systems, and from the ship's propellers. Sound from some vessels exhibited significant speed dependence, particularly with regard to propeller related energy. Sound from other vessels showed little speed dependence over the range of speeds that were tested.

0940 **Mr. Michael Bahtiarian, Noise Control Engineering**

**ASA standards committee (WG47) on measurements of vessel radiated noise**

The development of an entirely new commercial standard for "Underwater Noise Measurement of Ships" started in early 2007. Currently, no voluntary consensus standard exists for performing underwater noise measurements of ships. For many years, the field of underwater noise from ships has been the exclusive specialty of the Navy. However, non-navy vessels are looking to be just as quiet so that they can perform better science. The goal of the project is to develop an American National Standard for the measurement of underwater noise levels of ships using commercial technology. This presentation will be an update of the committee work to date. A mission statement of the committee and discussion of measurement grades is to be presented. The presentation shall also serve as outreach to the acoustical community. As such, the author hopes to provide time for questions and feedback.

1020 **Dr. Roy Gaul, Blue Sea Corporation**

**Effects of distant shipping on ambient noise in the open ocean**

Passage of a ship overhead or within a range of a few miles can raise the ambient noise intensity several orders of magnitude above the typical background. This near-field influence can stretch across a frequency band from 10 Hz to more than 1000 Hz. As the ship opens range beyond a few tens of miles, the noise at higher frequencies tends to drop below the usual background leaving a hump in the spectrum with a peak at 50-60 Hz. At ranges greater than about 100 miles, this hump tends to fade into the background, even for large commercial ships. The aggregation of noise generated by ships at long range creates the background noise at frequencies less than 100 Hz that is prevalent over broad expanses of the world ocean. The onset of local storms typically overrides the distant shipping contribution. Examples will be shown of the relationship between wind and distant shipping that are the dominant influences on low frequency ambient noise in the open ocean.





1040 **Dr. Douglas Nowacek, Florida State University, Tallahassee, FL**

**Biological functions of acoustic communication and effects of noise on animals**

Use of sound by marine animals is in many ways typical of animal communication, but it is atypical in others. Generally, marine animals use sound for intra and inter-specific communication, territory defense, food finding and navigation. I will discuss the basic premises of these functions as well as several specific examples of how marine animals use sound. With this background, I will then explore the potential ways in which these functions may be affected by noise. These effects fall into four general categories: i) masking; ii) signal degradation; iii) reduction of acoustically useful ranges; and iv) physiological effects. Again, these concepts will be presented in a general context, followed by specific examples and how these exemplars of sound use may be affected by noise. My presentation is intended to provide a sound basis for addressing the goals of the symposium, specifically, the potential effectiveness of different quieting technologies *vis a vis* the uses of sound by marine animals.

1100 **Mr. Willem Verboom, SEAMARCO/TNO, The Netherlands**

**Some philosophies about shipping noise and porpoises**

The population of harbour porpoises in the seas around The Netherlands is increasing exponentially. The reason is unclear: are conditions in the North Sea improving or are conditions in Northern-Europe deteriorating so much that porpoises are moving south? Regardless of the cause, there are now resident porpoises in Dutch coastal waters. Consequently, the number of porpoise strandings is increasing dramatically (101 dead porpoises on the beach in the first 3½ months of 2007). Live-stranded porpoises are rehabilitated in stranding facilities prior to release during which time they are available for research, including studies of their hearing and behaviour. As a result of these studies, the presentation will comment on the influence of shipping noise on the behaviour of porpoises, such as the direct influence of shipping noise (Zone of Discomfort), the audibility (Zone of Audibility) and some words on the potential consequences of the increase in sea noise levels due to (distant) shipping.

**Session II: Feasibility and estimated cost/benefits of applying existing and future quieting technologies to large commercial vessels**

1330 **Mr. Ray Fisher, Noise Control Engineering**

**Existing/future technology to address radiated sound from internal machinery (fisheries research vessels) – applications to large commercial vessels**

The primary path for machinery induced underwater noise is 'structureborne' – that is vibrations transmitted from the machinery feet directly to the wetted hull plate. A secondary path is airborne excitation – where noise radiated from the machinery casing is transmitted through the hull into the water. This presentation will discuss the relative strength of various typical machinery items and how their acoustic energy gets into the ocean. The levels and frequencies for diesel versus gas turbine machinery will be compared and contrasted. Machinery noise control approaches, such as isolation mounts, damping, acoustic insulation, enclosures, construction changes, air bubble layer, etc., will be presented. Their effectiveness and non-acoustic impacts on weight, space, weight and cost – both of materials and installation, will be covered. For illustrative purposes, the noise control effort for the NOAA fisheries research vessels and for the University of Delaware will be presented along with their impact on the vessel's signature.





1410 **Dr. Neal Brown, NAB Associates**

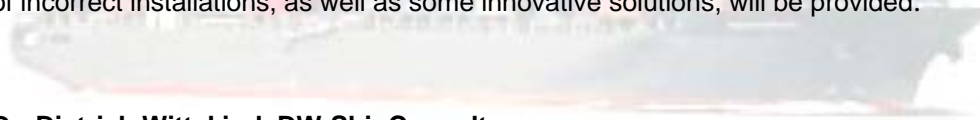
**Existing/future technology to address radiated sound by modifying vessel-operating parameters (e.g., speed) and propeller type/motion – applications to large commercial vessels**

Propulsor cavitation is the principal threat. Noise radiation may be reduced by both design and operation. We will discuss the inherent cavitation noise performance of several propulsor types and variations in the context of the types of vessels they may be applied to – economically. Various applicable propulsor types will be compared qualitatively where applicable. Cavitation noise reduction technologies will be discussed and applicability delineated. A Marine Mammal protection scheme will be suggested where established marine traffic channels are near shore or pass through ocean areas of concern. It will further be suggested that ship speed reductions in these channels will provide a significant reduction in MM exposure to U/W noise. Quantitative estimates of the noise reductions attainable by specific speed reductions will be presented along with a discussion of their cost consequences.

1510 **Mr. Kurt Yankaskas, NAVSEA 03**

**Shipboard noise control**

This presentation will review techniques used to control noise aboard ships. Although the Navy is unique with respect to commercial maritime operations, the techniques are appropriate for other shipboard applications. As in any ship construction process, sometimes the installation compromises the intent of the noise control feature. Examples of incorrect installations, as well as some innovative solutions, will be provided.



1550 **Dr. Dietrich Wittekind, DW-ShipConsult**

**Industry perspective on potential costs/economic benefits of vessel-quieting technologies (e.g., effects on fuel usage, efficiency) for large vessels**

In the past, commercial ships have not been the focus for their contribution to radiated noise in the ocean. The main purposes of dealing with ship acoustics are safety, health and comfort aspects of crew and passengers. This paper addresses the main sources for shipping noise: cavitating propellers and propulsion machinery. They may dominate the noise level at short distances in all frequency ranges and the low frequency spectrum at any distance. The causes of today's acoustic condition of ships and global measures to reduce the acoustic input into the oceans are discussed. Acoustic countermeasures are well tried on warships and research vessels. Some of these can be applied to commercial ships, however, in the majority of cases low noise levels are not connected directly to high economy. This is demonstrated by the typical noise reduction measures on propellers. Some technology, however, is available which could be applied at comparatively low cost, such as active noise control or air injection into certain areas of the propeller. These will require further research for correct installation, safe prediction of their effect and efficient employment.





**Session III: Non-regulatory incentives to reduce sound emissions from large commercial vessels**

0830 **Mr. Kurt Yankaskas, NAVSEA 03**

**Workplace compliance/crew safety issues**

This presentation will review some of the challenges faced in hearing protection and operational safety. Military operations occur frequently in an extreme noise environment when compared to other industrial operations. This has resulted in hearing and tinnitus disability compensation paid by Veterans Administration to exceed \$1.4 billion annually. Therefore some R&D projects have focused on advanced hearing protection devices. A review of current efforts will be provided.

0850 **Mr. Dodge Kenyon, Manager, Maritime Affairs, Holland-America Cruise Line**

**Managing Environmental Aspects of Large Passenger Vessels**

Mr. Kenyon will discuss Holland America Line's ISO 14001 Environmental Management System as it relates to the noise aspects of the line's operation. He will explain the risk based approach used to evaluate environmental aspects that determined which environmental aspects were considered significant. He will discuss concerns about noise on passenger ships and the undesired impact it can have. He will briefly cover the current objects, targets and the progress being made toward reaching Holland America Line's environmental management goals.

0910 **Ms. Constance Bruce, Director, Marketing & Communications, Special Media Projects, Cornell Laboratory of Ornithology**

**Sound Carries: A Lesson for publicizing that you are part of the Green Solution**

More corporations throughout Europe and the United States are pro-actively embracing conservation measures. CEOs across all types of industries are collaborating with lawmakers and government agencies to engage in green initiatives that can have a positive environmental impact and save their companies money, while improving future markets and productivity. Increasingly, consumers are using their purchasing power to select products that support sustainability. People are influencing companies to "go green," and Green Means Good Business. In fact, "going green" is now getting competitive. So what does this mean for the shipping industry? Are there opportunities for advancing this industry's goals and genuinely participating in marine conservation? Real opportunities exist for creating dynamic and effective partnerships with the experts, scientists and conservation groups. The products from these partnerships will enhance the chances of achieving environmental solutions and give the public something to shout about!

0930 **Mr. Steve Sellers, Director of Diving and Water Safety, East Carolina University and President, American Academy of Underwater Sciences**

**Benefits to recreational divers of vessel-quieting applications**

Modern free swimming open circuit scuba traces its origins to World War II when Cousteau and Gagnan developed the Aqua-Lung. Since that time open circuit diving has spawned a world wide recreational and tourism industry, as well as scientific and commercial diving operations. Today's "sport divers" are tomorrow's activists looking to protect the environmental resources they have come to view as threatened. Increasing ambient noise is not currently on the radar screen for the general diving public, but the



advent of computer controlled closed circuit rebreathers is demonstrating to an increasing diving population just how much there is to hear in the underwater environment.

0950 **Ms. Rosa Shim, Clean Ports, USA; U.S. Environmental Protection Agency**

**Precedents for proactive industry effort: EPA's National Clean Diesel Campaign**

EPA's National Clean Diesel Campaign (NCDC) is an example of a successful program that uses innovative strategies to address diesel exhaust in the absence of regulation. Three key components have been pivotal in NCDC's innovative measures, including public outreach from public health advocacy groups, viable technologies that solve the diesel exhaust problem, and quantifiable impacts of clean diesel practices which serve as leverage for program implementation. NCDC's approaches have set precedents for proactive industry effort.





## **SPEAKER AND SESSION CHAIR BIOGRAPHIES**

### ■ **Mr. Michael Bahtiarian, Noise Control Engineering**

Mr. Bahtiarian is currently the vice president of Noise Control Engineering in Billerica, MA, which specializes in shipboard noise and vibration control. He holds a B.S. in Mechanical Engineering from Penn State University and a M.S. in Mechanical Engineering from RPI. He has completed on numerous shipboard noise control programs including: the AGOR-24 Class Oceanographic Research Vessels, Kennicott Alaska Marine Highway System (AMHS) Ferry, the San Francisco Bar Pilots Station Boat and most recently, the NOAA FRV-40, Army's Logistical Support Vessel (LSV). He served as the Project Manger for the University of Delaware, R/V SHARP project and ship, successfully meeting the ICES noise requirement. He is a Board Certified acoustical engineer by the Institute of Noise Control Engineering (INCE).

### ■ **Dr. Neal Brown, NAB Associates**

Dr. Brown has a Ph.D. in Naval Architecture from M.I.T. and is formerly a professor at M.I.T.'s Department of Naval Architecture and Marine Engineering, principal engineer at Bolt Beranek and Newman, Inc., founder of Atlantic Applied Research Corporation, and visiting professor at University of New Orleans, School of Naval Architecture and Marine Engineering. Dr. Brown has developed the technology of underwater noise control for marine vehicle propulsors. This has included both cavitating and non-cavitating noise sources with both discrete and continuous spectrum components. The hydrodynamic design principles he developed have recently been applied to silence a large, high-power water-jet propulsor pump. Several applications for research ships and mobile offshore drilling units have similarly benefited by reducing the cavitation noise of their propulsion and/or positioning thrusters. Dr. Brown also served as project manager-acoustics for the Arctic Pilot Project, a consortium headed by Petro-Canada, for the transportation of LNG from the High Arctic by ice-breaker tankers, through politically-acoustically sensitive sea areas; and testified before the bewigged Canadian Energy Board, Ottawa.

### ■ **Ms. Constance Bruce, Director, Marketing & Communications, Special Media Projects, Cornell Laboratory of Ornithology**

Constance Bruce, with over 25 years in television news and factual programming production, acquisition and promotion with National Geographic, ABC News, CBS News, and independent production companies, is the Director, Special Media Projects, Communications & Marketing at the Cornell Lab of Ornithology. Bruce was the first Program Acquisition director for the National Geographic Channels and acquired all the programming for the launch of National Geographic international channels. Later as an independent producer, Bruce conceptualized and built the integrated commercial websites of the Barth companies, world leaders in hops sales and distribution. Along with advising independent factual program producers on media markets and promotion, she directed the distribution and promotion of *Witness to Hope*, the award-winning documentary on Pope John Paul II with broadcast and DVD sales worldwide. Since moving to Ithaca in 2004, Bruce joined the Cornell Lab of Ornithology (the Lab) to direct the communications and media for the Ivory-billed Woodpecker Research Project and create and implement the strategy for multi-media production to enhance the outreach initiatives of the Lab's science, research and conservation projects.

### ■ **Mr. Ray Fisher, Noise Control Engineering**

Mr. Fischer is the president of Noise Control Engineering in Billerica, MA, which specializes in shipboard noise and vibration control. He holds a B.S. in Physics and an M.S. in Ocean Engineering from the University of Massachusetts. With over 33 years of experience in marine acoustics he has been involved with the design and testing of over 200 ships and off-shore structures. He is a co-author of the SNAME Design Guide for Shipboard Airborne Noise Control. Recently, as part of a Navy SBIR, he





developed software to accurately predict shipboard noise. His company has successfully designed several quiet research vessels and is investigating new methods and materials to reduce both habitability and underwater radiated noise from both naval and commercial vessels and off-shore structures.

■ **Dr. Roy Gaul, Blue Sea Corporation**

Dr. Gaul graduated from Texas A&M University in 1955 with a B.S. in civil engineering, and in 1956 and 1966 with M.S. and Ph.D. degrees in physical oceanography. Positions during his first 15 years of professional experience included ocean engineer, oceanographer, research scientist, and laboratory manager for commercial, academic, and U.S. Navy organizations. From 1971-79, Dr. Gaul directed the Long Range Acoustic Propagation Project in the Office of Naval Research that provided acoustical and oceanographic information to support development and operation of submarine surveillance systems. After three years with an offshore engineering firm, Dr. Gaul founded Blue Sea Corporation in 1982. The company has provided technical services and research related to ocean acoustics, marine systems, undersea sensor technology, twin-hull ship development, and concepts for very large floating structures.

■ **Dr. Roger Gentry, ProScience Solutions**

Roger L. Gentry completed a Master's degree in 1966 in marine mammal acoustics, a Ph.D. in animal behavior at the University of California, Santa Cruz in 1970, and a postdoctoral fellowship in behavior at the University of Adelaide, South Australia before working as a fur seal biologist at the NOAA National Marine Mammal Laboratory in Seattle from 1974 to 1998. There he conducted field research on whales, penguins and many species of seals, helped pioneer Time-Depth recorders, and published books on fur seals and numerous journal articles. From 1995 through 2005 he worked on acoustic issues in the NOAA Office of Protected Resources where he advised regulators on such projects as ATOC, LFA, seismic airguns, and mid-frequency sonar. He also started two expert panels to write noise exposure criteria for marine mammals and for fish and turtles, and with Brandon Southall convened the first symposium on shipping noise. In 2006 he became the Program Manager for OGP, a London-based oil industry partnership that sponsors original research on sound produced by the offshore industry, and its effects on marine life.

■ **Dr. Edmund Gerstein, Florida Atlantic University**

Edmund R. Gerstein is director of marine mammal research and behavior in the Charles E. Schmidt College of Science at Florida Atlantic University. Dr. Gerstein received his Ph.D. in psychobiology and neuroscience. His research interests lie in bioacoustics, sensory biology, cognition, and the behavioral ecology of marine mammals. He is president of Leviathan Legacy Inc., an underwater acoustics company currently investigating near surface ship noise radiation and the acoustics that can contribute to vessel collisions with whales and other marine animals. Leviathan Legacy Inc. holds technical and method patents and licenses for underwater acoustic technologies.

■ **Dr. Leila Hatch, Stellwagen Bank National Marine Sanctuary**

Dr. Leila Hatch is an Ocean Noise Specialist at the Gerry E. Studds Stellwagen Bank National Marine Sanctuary (SBNMS), which is administered through NOAA's National Ocean Service. Dr. Hatch's work at SBNMS focuses on characterizing the underwater noise budget of the sanctuary, including estimating variation in the relative inputs to that budget from various sound source types. She is also active in designing mitigation and monitoring designs for activities impacting the sanctuary's acoustic environment, and developing SBNMS as a case study for spatial management of underwater noise. Dr. Hatch came to SBNMS in February 2006 after working on marine mammal and fisheries legislation for the Democrats on the House of Representatives' Resources Committee as a John A. Knauss Fellow (National Sea Grant, NOAA). She did her doctoral degree in the Department of Evolutionary Biology at Cornell University, where she focused on







estimation of population subdivision among fin whales in the Northern Hemisphere through the integration of acoustic and genetic metrics. Prior to her graduate work, Leila participated in field research and data analysis for studies that examined the impacts of low-frequency sound sources on baleen whale species. Dr. Hatch is currently funded by the National Marine Sanctuary Foundation through grants from the International Fund for Animal Welfare, the National Science Foundation, and the NOAA's National Marine Sanctuary Program.

■ **Dr. John Hildebrand, Scripps Institute of Oceanography**

Dr. John A. Hildebrand is a Professor at the Scripps Institution of Oceanography at the University of California at San Diego and a member of the Committee of Scientific Advisors of the Marine Mammal Commission. He obtained a B.S. degree in Physics and Electrical Engineering at the University of California San Diego, and a Ph.D. degree in Applied Physics from Stanford University. He has been on the research staff of the Scripps Institution of Oceanography since 1983. During this time he has chaired ten graduate Ph.D. thesis committees, and regularly teaches classes on bioacoustics, and experimental laboratory acoustics. He has contributed to more than 100 referred publications, on topics ranging from acoustic wave propagation, to sound production by marine mammals. His recent research has focused on ambient noise, acoustic techniques for marine mammal population census, and the effects of high intensity sound on marine mammals.

■ **Mr. Dodge Kenyon, Manager, Maritime Affairs, Holland-America Cruise Line**

Mr. Dodge Kenyon is Manager, Maritime Affairs in the Fleet Operations Department at Holland America Line. His primary duties include managing the fleet internal investigation program, as well as conducting audits and inspections onboard their ships. Prior to Holland America Line, Mr. Kenyon worked for 12 years as a Vessel Inspector with the Washington State Department of Ecology and Office of Marine Safety on oil spill prevention and marine safety issues involving large commercial vessels. Mr. Kenyon has also been employed as a Marine Surveyor with the American Bureau of Shipping and has worked shipboard as a licensed Marine Engineer on a variety of ocean going cargo vessels.

■ **Mr. Blair Kipple, Naval Surface Warfare Center, Bremerton Detachment**

Mr. Kipple has worked in the field of underwater acoustics with the U.S. Navy for 25 years and holds a Master's degree in acoustics. His primary experience is with measurement, characterization, and quieting of ship signatures.

■ **Ms. Kathy Metcalf, Chamber of Shipping of America**

Kathy J. Metcalf graduated with highest honors from the US Merchant Marine Academy in June 1978 with a B.S. degree conferred in Marine Transportation and Nautical Sciences. From 1983 to 1997, Ms. Metcalf served in various positions for Sun Company's Marine Operations Department and during this period, Ms. Metcalf attended the evening division of the Delaware Law School of Widener University leading to the conferring of a Juris Doctorate degree with high honors in 1988. In 1997, Ms. Metcalf resigned from Sun Company to become the Director of Maritime Affairs for the Chamber of Shipping of America, a maritime trade association representing US based commercial shipping interests in international, federal and state forums. Her responsibilities in this position include monitoring and development of positions with regards to legislative and regulatory initiatives and advocacy on issues of impact for the members of the Chamber of Shipping, before various organizations including the International Maritime Organization, the US Congress, and federal and state regulatory agencies. In this capacity, she has testified before Congressional committees, federal and state regulatory agencies and has attended numerous sessions of the International Maritime Organization as the American shipowner representative on the US delegation to the Marine Environment Protection Committee and the Maritime Safety Committee.





■ **Dr. Douglas Nowacek, Florida State University**

After receiving his B.A. in Zoology from Ohio Wesleyan University in 1991, Doug worked for ~2 years in a pathology laboratory at the Case Western Reserve University School of Medicine. Doug entered the MIT/WHOI Joint Program in Biological Oceanography in 1993. In 1997, Doug married Stephanie Smathers, who completed her masters in marine science at UC Santa Cruz in 1999. Doug completed his Ph.D. in 1999 with a project focused on the sound use and behavior of foraging bottlenose dolphins. From 2000-2002 Doug was a National Research Council Postdoctoral Research Associate working on right whale bioacoustics and behavior specifically focused on the circumstances surrounding collisions between ships and right whales. After completing his NRC postdoc, Doug joined the scientific staff at Mote Marine Laboratory in Sarasota, FL. Then, in 2003, Doug joined the faculty in the Oceanography Department at Florida State University. Doug continues his right whale research and is also studying aspects of bioacoustics and behavioral ecology, primarily in right whales, manatees and dolphins.

■ **Mr. Steve Sellers, Director of Diving and Water Safety, East Carolina University and President, American Academy of Underwater Sciences**

Steve Sellers is the Director of Diving and Water Safety for East Carolina University in Greenville, NC, the current President of the American Academy of Underwater Sciences (AAUS), and a Course Director with the National Association of Underwater Instructors (NAUI). He has an extensive diving background in Scientific, Recreational, and Public Safety Diving, logging thousands of dives and hours underwater in varied aquatic environments over the past 25 years; his diving experience range from emergency response diving, to recreational scuba instruction using air and nitrox, to supervision of and participation in scientific diving operations utilizing cutting edge diving technologies and techniques such as mixed gas and the use of fully closed circuit rebreathers.

■ **Ms. Rosa Shim, Clean Ports USA; U.S. Environmental Protection Agency**

Rosa Shim is a Mechanical/Environmental Engineer at the U.S. Environmental Protection Agency in the Office of Transportation and Air Quality. She has been with EPA's Clean Ports USA Program since its inception in 2004 and currently oversees the In-use Testing Program of diesel retrofit technology verification.

■ **Dr. Brandon Southall, NOAA Ocean Acoustics Program**

Brandon Southall heads NOAA's Ocean Acoustics Program within the National Marine Fisheries Service, Office of Science and Technology. He also maintains a research affiliation and continues bioacoustics research on northern elephant seals through the University of California, Santa Cruz (Long Marine Laboratory). Brandon began his career in marine biology at the New England Aquarium in 1992 working on sea lion vocalizations with Kathy Streeter and Dr. Eric Greene. He obtained B.A. degrees in Environmental Biology and English from the University of Montana in 1994 and then conducted research on sea lion vocalizations and hearing at the Dolphin Research Center in Florida. After joining Dr. Ronald Schusterman's pinniped bioacoustics laboratory at the University of California, Santa Cruz, Brandon conducted laboratory studies on hearing and the effects of noise seals and sea lions, as well as field research on northern elephant seal acoustic communication. He obtained an M.S. in Marine Science in 1998 and a Ph.D. in Ocean Sciences in 2002 from the University of California, Santa Cruz. Dr. Southall joined NOAA's Ocean Acoustics Program Fisheries Acoustics program in 2003. His work with the program has included developing acoustic exposure criteria for marine mammals, fish, and sea turtles; organizing/chairing international symposia on shipping noise; chairing an inter-agency task force on sound and the marine environment; leading the development of a NOAA passive-acoustic network; directing NOAA's science and technology research funding on marine acoustics; and organizing an ongoing series of educational lectures across the nation on marine noise issues.





■ **Mr. Willem Verboom, SEAMARCO/TNO, The Netherlands**

After a B.Sc. in Electrical Engineering (1965) joined the Royal Netherlands Naval Electronics Establishments (Sonar Department) and was involved in calibration and maintenance of sonar systems aboard naval ships, in particular in investigating and eliminating 'sonar self-noise'. Studied at several underwater noise laboratories in the Netherlands and abroad. After joining the Dutch research organization TNO (Industrial Noise Control Department) in 1977, various industrial plant noise abatement projects under contract with the Dutch Ministry for the Environment. From 1981 marine engineering and underwater ship noise control with the TNO Ship Acoustics Department. Involved in bioacoustic research since 1990, resulting in 40+ papers. Project manager for ship acoustics, bioacoustic research (marine mammals and fish), radiated ship noise and ambient sea noise measurements. Joined TNO Underwater Technology Group in 2004, especially for the development of noise criteria for marine mammals with respect to the use of military sonars and other major man-made noise sources. Although retired from TNO services in November 2005, still consultant for TNO and the Dutch ecological institute Seamarco (dir. Ron Kastelein).

■ **Dr. Dietrich Wittekind, DW-ShipConsult**

Dr. Wittekind has a degree in Naval Architecture from Universities of Hanover, Hamburg and University of Michigan and completed his doctoral thesis at the University of Armed Forces, Hamburg. Dr. Wittekind has formerly worked for Nordseewerke Emden (NSWE) Naval Ship Design as the head of submarine design, at HDW Submarine Design as the division manager for mechanical and electrical engineering, and was managing director of Hamburg Ship Model Basin (HSVA). He is currently a consultant running projects with shipyards, submarine suppliers, and model basins. He is also serves as the Chairman of MoD Advisory Committee for noise reduction of German Navy ships and is a Lecturer for Ship Acoustics at Technical University Hamburg, Harburg.

■ **Mr. Kurt Yankaskas, NAVSEA 03**

Kurt Yankaskas is presently the branch head for Enterprise HSI in the Human Systems Integration Directorate, Naval Sea Systems Command, Washington, DC. His duties include developing the HSI design standards for future Navy ships. He has 29 years of practical application in design and development of US Navy ships. His projects have included acoustic signature control features, design integration, and threat assessment against U.S. Naval Surface Ships. Mr. Yankaskas has provided the technical direction for all acoustic matters pertaining to surface ship design and fleet support projects utilizing state-of-the-art acoustic control for ship silencing. In this capacity, he has authored or co-authored numerous technical reports and journal articles. He was a Special Assistant in the Secretary of the Navy's Office of Safety and Survivability. He was previously a test engineer at NSWCCD where he developed acoustic testing and test procedures and conducted numerous acoustic tests aboard surface ships and submarines. Mr. Yankaskas earned his BS in Ocean Engineering from Florida Atlantic University and his BS in Biology from Rensselaer Polytechnic Institute. He received a Meritorious Civilian Service Award for his work on SWATH acoustics and integrated testing. Mr. Yankaskas was the recipient of the 1995 ASNE Jimmy Hamilton Award and the 1998 RADM James Lisanby Award for Professionalism. Both honors were based on his innovative work in surface ship acoustics.

■ **Ms. Sharon Young, Humane Society of the United States**

Sharon Young is the Marine Issues Field Director for The Humane Society of the United States and is adjunct Faculty at the Tufts Center for Animals and Public Policy. She has served on a number of task forces dealing with risk to marine mammals from entanglement in fishing gear, collisions with vessels and advising on ocean noise. She is also appointed to the Atlantic Scientific Review Group, a Congressionally mandated independent scientific body reviewing research and conservation needs for marine mammals on the U.S. East Coast.

