



2016 Industry Forum

Proceedings Document





Dear Forum Participants,

Thank you, again, to everyone who participated in the Consortium for Ocean Leadership's (COL) Industry Forum: Sound in the Sea. The Forum was very well attended and included professionals and experts representing multiple sectors that are stakeholders in ocean acoustics. The day's excellent discussion resulted in the cross-sector agreements laid out in this proceedings document. COL will continue its effort to bring together multiple stakeholders for ongoing discussion, partnership building, and cross-sector efforts to advance the science that underpins our understanding of sound in the sea. From that enhanced understanding, decision makers in all sectors will be better equipped to make wise decisions that help ensure our ocean remains healthy and productive for all. This is the goal of our work and we, at COL, look forward to working with our partner stakeholders on next steps.

The Industry Forum has benefited from the generous sponsorship gifts of several of our Member Institutions, federal agencies with responsibilities in this area, industry partners, and other non-government organizations that see the collective benefit of bringing together diverse stakeholders to discuss Sound in the Sea and how we can work together to advance the science that guides decision-making in all sectors. Please also join the Consortium for Ocean Leadership in thanking them, again, for their generous support, which allowed us to bring this group together.

Sincerely,

A handwritten signature in blue ink that reads "Jonathan W. White". The signature is fluid and cursive, with a prominent initial "J".

Jonathan W. White, RADM, USN (ret.)

*President and CEO
Consortium for Ocean Leadership*

2016 Industry Forum: *Sound in the Sea*

Proceedings Document

Executive Summary

Current data and trends indicate that anthropogenic sound in the ocean may continue to rise with increasing commercial, recreational, and scientific endeavors conducted in, near, and on ocean waters. At the same time, a recent report¹ from the National Academy of Sciences examining the impact of sound, in conjunction with other stressors, on marine mammals found more data are needed to determine the effect of the combined interactions. On October 26, the Consortium for Ocean Leadership's (COL) Industry Forum explored these issues, identified scientific gaps, and developed recommendations that seek to advance the discussion on sound in the sea. While ocean sound issues have been discussed previously by many study groups and workshops, this Forum was unique in that the attendees were from the complete cross section of stakeholders on the issue of ocean noise. In fact, over 100 stakeholders attended, representing academia, ocean industry and technology companies, environmental and scientific nonprofits, and federal agencies – all of which rely on the best available science and inputs from both traditional and cutting-edge technologies for decision-making.

The opening panels focused on defining and measuring the ocean acoustic environment, advances in both current and future technologies, and the roles of research and monitoring programs in filling knowledge gaps. During the final panel, attendees identified possible ways forward and recommendations for working towards building cross-sector agreements, including resolving conflicts on where existing science gaps could be closed to ensure our ocean remains healthy while allowing for the responsible introduction of anthropogenic sound from a variety of activities that include scientific research, shipping and commerce, recreation, and resource exploration and extraction. In addition, none of these industries can function without a scientifically-savvy ocean workforce. The lunchtime dialogue centered on what industry, government, and universities can do to produce interdisciplinary graduates who are better prepared to enter tomorrow's ocean industries. The outcomes of this panel will be combined with other ongoing analyses and included in a separate report on education and workforce trends.

The results of the Forum, consisting of statements and recommendations that were generally agreed upon by individual participants, are provided in the following pages. In summary, there was broad agreement that a sustained vehicle is needed to unify cross-sector stakeholders around common priorities and to cohere efforts to advance the science that guides our understanding of sound in the sea and decision-making in all stakeholder sectors.

1

<http://oceanleadership.org/assessing-effects-human-caused-activities-marine-mammals/>

I. Agreement Statements

The goal of the Forum was to determine collaborative means to address science, research, and technology gaps and needs related to monitoring and investigating sound in the sea, with the ultimate goal of enabling decision-makers in all sectors to make science-based decisions about activities in the ocean. After a day of robust discussion, participants came to general agreement on the following statements:

1. Congregating stakeholders for productive dialogue has been a challenge, so a sustained vehicle to regularly convene and facilitate ongoing, cross-sector dialogue would help build trust and a collaborative environment in which stakeholders can work toward common priorities and goals. This vehicle would also help stakeholder communities, often at odds, articulate known knowledge gaps and work together to develop plans and achieve common interests.
 2. Standardization of ocean acoustic measurements and related data would benefit all stakeholders, allowing for easier collaboration, archiving, and decision making and potentially leading to advances in the field of marine acoustics.
 3. All stakeholders would be benefited by cross-sector action to fill existing science and technology gaps in the following areas: noise sources; the responses to sound by marine life and environments; and understanding the temporal, spectral, and spatial overlap between species. It is important to note that there are many existing federal, military, industry, and research program efforts working on pieces of the broader effort to fill these gaps. Any initiative coming out of the COL Industry Forum must engage current efforts to leverage the work of others and not recreate the wheel.
-

II. Recommendations and Action Items

From these statements, COL developed recommendations in the areas of Joint Collaboration and Advocacy, as well as proposed action items. These will help advance understanding of sound in the sea, enable productive dialogue and collaborations needed to consider the development and implementation of new technologies and monitoring efforts to mitigate potential threats to ocean biota, and enhance the effectiveness of policy development and cross-sector management.

Joint Collaboration

1. Stakeholder representatives should create cohesive cross-sector position statements emphasizing:
 - The need for continued research and financial support for the study of ocean acoustics.
 - The role of science in underpinning wise decision-making and policy.
 - The importance of standardizing ocean acoustic measurements and related data.

2. To help garner public and private resources for the needed science and technology development, stakeholders across sectors must agree on and broadly convey the messages related to ocean noise that they hold in common, such as the importance of science and innovation to communities' interests and decision-making.
3. The stakeholder community needs to identify a champion individual or organization to serve as a catalyst in the effort to develop a set of uniform standards for data collaboration across sector partnerships.
4. Collection of broad-scale, baseline data would help determine the biologically significant impacts sound has on marine animal behavior and environments.
5. Current scientific investigation is generally focused on very narrow and limited questions. A group of cross-sector representatives needs to articulate the necessity of a transition from this narrow view to a broader scientific scope that entails long-term, regional-scale observation and monitoring.

Advocacy

1. As noted in NOAA's [Ocean Noise Strategy Roadmap](#)², communication gaps among sectors need to be bridged for building consensus and uniformity.
2. Federal mission agencies need to support the development and use of a collective engine that incorporates marine acoustic and other observational data into a multi-dimensional ocean soundscape. This will lead to an improved understanding of the biological impacts of sound on marine animal behavior and environments.
3. Our growing economy introduces many anthropogenic acoustic sources, both purposefully and as a byproduct, including shipping, seismic exploration, oil and gas production, oceanographic research and mapping, navigation fathometers, renewable energy production, military sonars, and ocean infrastructure construction. The federal government and other funders of scientific research need to incentivize development of new and innovative technologies that increase our understanding of ocean noise.

Action Items

COL will move forward to ensure that progress made at this Forum is continued through the following actions:

1. Explore approaches to successful cross-sector dialogue that includes agreed-to conditions for positive engagement prior to the establishment of a multi-stakeholder, cross-sector panel to identify, further develop, and work toward key recommendations in 2017.
2. Facilitate ongoing discussions between U.S. and international academic institutions, federal agencies, industry, and environmental organizations to advance collaboration. It will be important to draw from previous examples of successful cross-sector efforts so that the feasibility and need for a more formal, coordinated scientific and technical program on ocean sound can be determined and meet the needs of federal agencies and other stakeholders while also contributing to larger international efforts.

² http://cetsound.noaa.gov/Assets/cetsound/documents/Roadmap/ONS_Roadmap_Final_Complete.pdf

III. Panel Summaries

Defining the Ocean Acoustic Environment

Dr. David L. Bradley, Pennsylvania State University, Moderator

Dr. James Miller, University of Rhode Island

Dr. Jason Gedamke, NOAA National Marine Fisheries Service

Dr. Robert Gisiner, International Association of Geophysical Contractors

Overarching discussion focused on how to more effectively define and measure biologically significant impacts of sound with current and future long-term data sets. It was noted that significant gaps in the current ocean noise strategy include the lack of effective outreach and collaboration across multiple sectors, as well as the need to increase partnerships to secure broad-based investments and other resources. Current research tends to be tightly focused on limited questions and issues. A broad-based and sustained funding source supporting larger-scale research efforts would allow for an expansion in research topics and, ultimately, in basic knowledge. The panel emphasized that the inclusion of time and space into current models examining the propagation of ocean noise would greatly enhance our ability to monitor and assess biologically significant impacts on marine life and environments. This was classified as an interdisciplinary problem, and increasing subject diversity could be a potential solution. Additionally, the responses to sound by marine life and environments; understanding of the temporal, spectral, and spatial overlap between species and noise sources; and broad-scale monitoring need to be elevated as research priorities. Panelists also discussed the need for funding of long-term research on animal response and adaptation to sound in the ocean. Finally, significant discussion focused on how to integrate, coordinate, and archive the massive amounts of data being collected, in ways that are both accessible and meaningful for scientific purposes.

Measuring the Ocean Acoustic Environment

Dr. Brandon Southall, SEA, Inc., Moderator

Ms. Debra Hernandez, Southeast Coastal Ocean Observing Regional Association

Dr. Kyle Becker, Office of Naval Research

Ms. Cynthia Pyć, JASCO Applied Sciences

The central topic of the panel was the need for collaboration across multiple sectors to secure partnerships and funding to address broad and challenging regional-scale questions and to sustain systems that are not driven by acute questions. Current and near-term technologies are available to gather the data needed by collaborators. Technology is not the barrier to scientific progress. Rather, establishing partnerships and sustained funding to further research needs would ensure decision-makers are able to base their decisions on current, peer-reviewed science. This association could lead to solutions for stakeholders in supporting long-term monitoring and the formation of an ocean noise data archive system. The panel noted that sound data and recording parameters need to be communicated and publicized to a wider range of stakeholders. Engaging citizen scientists, as long as there is an established and specific scientific standard to follow, is one possible way for academic research institutions and federal agencies to alleviate costs, break down communication barriers between sectors, and educate the broader public on data importance. Identified gaps in science include the need to both increase spatial and temporal frequency and to set data standards for acoustic research for future collaborations.

Resolving Conflict and Building Consensus

Dr. Jennifer Miksis-Olds, University of New Hampshire, Moderator

Dr. Jill Lewandowski, Bureau of Ocean Energy Management

Mr. John Calambokidis, Cascadia Research

Ms. Sarah Tsoflias, E&P Sound & Marine Life Joint Industry Program

Ms. Margaret Cooney, International Fund for Animal Welfare (formerly)

The panel presented a four-step process to achieve the goals of conflict resolution, collaboration, and forming a common direction for future ocean acoustic research. These include discovery, understanding, building consensus, and working toward action. In order to build cross-sector agreements, collaborations based on mutual trust are required. International cooperation could move forward larger-scale collaborative solutions. A major obstacle to cross-sector partnerships is the desire to maintain data confidentiality, which can be overcome through cooperative agreements and sector communities expanding beyond their own societies. A sustained vehicle to consistently organize stakeholders could provide ongoing cross-sector communication that would build trust and help stakeholders work toward overlapping interests and goals in a changing world. Cutting-edge technology, scientific advances, and stakeholder consensus on common priorities are even more important as we deal with our changing economy and ocean, and these also can be best achieved through cross-sector partnerships. The panelists discussed the need to establish stakeholder consensus on the most efficient way to share, collect, and archive data, as well as the need to communicate the importance of ocean sound measurements and observations to different scientific communities. The need for educating the U.S. public about scientific activities on sound in the ocean was another major takeaway.

Participants

(As of print date)

Carolyn Wilson, Luncheon Discussion Panelist

American Geosciences Institute

Andy Radford

American Petroleum Institute

Andrew Ziegwied

ASV Global, LLC

Jill Lewandowski, Resolving Conflict and Building Consensus Panelist

BOEM

Desray Reeb

BOEM

John Calambokidis, Resolving Conflict and Building Consensus Panelist

Cascadia Research

Kim Olsen

CSA Ocean Sciences, Inc.

John Young

CSA Ocean Sciences, Inc.

Marlon Lewis

Dalhousie University

Blaine Collins

DNV GL

Geoff Cooper

Duke University Nicholas School of the Environment

Sarah Tsoflias, Resolving Conflict and Building Consensus Panelist

E&P Sound & Marine Life Joint Industry Program

David Saulsbury

Eastman Chemical Company

Megan Davis

FAU Harbor Branch Oceanographic Institute

Meg Thompson

Federal Science Partners

Joel Widder

Federal Science Partners

Phil Kramer

Florida Institute of Oceanography

Marvourneen Dolor

Great Lakes Observing System

Michael Porter

Heat, Light, and Sound Research, Inc.

Charna Meth

Independent Contractor

Robert Gisiner, Defining the Ocean Acoustic Environment Panelist

International Association of Geophysical Contractors

Nikki Martin

International Association of Geophysical Contractors

Dustin Van Liew

International Association of Geophysical Contractors

Beth Allgood

International Fund for Animal Welfare

Margaret Cooney, Resolving Conflict and Building Consensus Panelist

International Fund for Animal Welfare

Josie Quintrell

IOOS Association

Scott Carr

JASCO Applied Sciences

David Hannay

JASCO Applied Sciences

Cynthia Pyć, Measuring the Ocean Acoustic Environment Panelist

JASCO Applied Sciences

Roberto Racca

JASCO Applied Sciences

Jeff Condiotty

Kongsberg Maritime

Jake Sobin

Kongsberg Maritime

Peter Yinger

L-3

Justin Manley

Liquid Robotics, Inc.

Forsyth Kineon-Simpson

Lynker Technologies, LLC

Tiffini Brookens

Marine Mammal Commission

Kevin Traver

Marine Technology Society

Arthur Baggeroer

Massachusetts Institute of Technology

Kelly Benoit-Bird

MBARI

Chris Scholin

MBARI

Stacey Karras

NAS, Ocean Studies Board

Eric Lindstrom

NASA

Kris Hoellen

National Aquarium

Barbara Bischof

National Oceanographic Partnership Program

Joanna Peth

National Oceanographic Partnership Program

Rick Murray

National Science Foundation

Holly Smith

National Science Foundation

Ru Morrison
NERACOOS

Jason Gedamke, Defining the Ocean Acoustic Environment
Panelist

NOAA Fisheries

Jolie Harrison
NOAA Fisheries

Allison Hernandez
NOAA Fisheries

Amy Scholik-Schlomer
NOAA Fisheries

Kathy Broughton
NOAA National Marine Sanctuaries

Shep Smith
NOAA National Ocean Service

Todd Christenson
NOAA Office of Education

Matt Womble
NOAA Office of the Chief Scientist

Jeff Vorberger
NOIA

Mark Wood
Ocean Sonics, Ltd.

Scott Van Buskirk
Oceaneering International

Kyle Becker, Measuring the Ocean Acoustic Environment
Panelist

Office of Naval Research

Steven Hipfel
Office of Naval Research

Raymond Soukup
Office of Naval Research

Roberta Marinelli
Oregon State University

David Bradley, Defining the Ocean Acoustic Environment
Moderator

Pennsylvania State University

Allison Miller
Schmidt Ocean Institute

Leonard Pace
Schmidt Ocean Institute

Brandon Southall, Measuring the Ocean Acoustic Environment
Moderator

SEA, Inc.

Debra Hernandez, Measuring the Ocean Acoustic Environment
Panelist

SECOORA

Hank Lobe
Severn Marine Technologies, LLC

Kris Lynch
Shell Exploration & Production Company

Ruth Perry
Shell Exploration & Production Company

Clark Alexander
Skidaway Institute of Oceanography of UGA

Ralph Rayner
Sonardyne International, Ltd.

Rob Dunbar
Stanford University

Paul Cooper
Teledyne CARIS, Inc.

Peter Furze
Teledyne Marine

Debbie Thomas
Texas A&M University

Sue Cook, Luncheon Discussion Panelist
The Oceanography Society

Tara Elliott
U.S. Navy

Timothy Gallaudet, Invited Speaker
U.S. Navy

Dick West
U.S. Navy (ret.)

Tony Busalacchi
UCAR

Ari Gerstman
UCAR

S. Bradley Moran, Luncheon Discussion Moderator
University of Alaska Fairbanks

Jim Edson
University of Connecticut

Brian Taylor
University of Hawaii at Manoa

Don Boesch
University of Maryland Center for Environmental Science

Jennifer Miksis-Olds, Resolving Conflict and Building Consensus Moderator
University of New Hampshire

Jim Miller, Defining the Ocean Acoustic Environment Panelist
University of Rhode Island

Robert Thunell
University of South Carolina

Jackie Dixon
University of South Florida

Monty Graham
University of Southern Mississippi

Terry Quinn
University of Texas at Austin

Peter Hill
Woods Hole Oceanographic Institution

Meeting Agenda

8:00 a.m. Continental breakfast available

8:30 a.m. *Welcome and opening remarks: Jon White, Consortium for Ocean Leadership*

8:45 a.m. *Advancing our understanding of sound in the sea to improve broad decision-making*

RDML Timothy Gallaudet

9:00 a.m. *Defining the Ocean Acoustic Environment*

What are the sources and characteristics of sound in the sea and its impacts, as we currently understand them? Where do we currently have scientific gaps to fully understand sound in the sea and its impacts? What ongoing programs, tools and/or initiatives are underway to better define and characterize sound in the sea? How should these programs, tools and initiatives be expanded or refined to meet national interests?

Moderator: David Bradley, Pennsylvania State University
James Miller, University of Rhode Island
Jason Gedamke, NOAA National Marine Fisheries Service
Robert Gisiner, International Association of Geophysical Contractors

10:15 a.m. Break

10:30 a.m. *Measuring the Ocean Acoustic Environment*

What are the technologies we use to measure sound in the sea and its impacts? What (and where) are we not measuring what we need to? What are the new, emerging or wished-for technologies that would enhance our current knowledge base? How do we apply evolving technologies to ocean sound policy and decision-making? How can information regarding measurement and impacts be more effectively communicated? Where do pathways for collaboration exist between the private and public sectors (i.e. technology and sound research industries, energy industries, government research initiatives)?

Moderator: Brandon Southall, SEA, Inc.
Debra Hernandez, Southeast Coastal Ocean Observing Regional Association
Kyle Becker, Office of Naval Research
Cynthia Pyc, JASCO Applied Sciences

11:45 a.m. Break for lunch

12:15 p.m. *The Future Ocean Workforce – Data and Perceptions: What are we missing?*

Moderator: S. Bradley Moran, University of Alaska Fairbanks
Carolyn Wilson, American Geosciences Institute
Susan Cook, The Oceanography Society

1:45 p.m. Break

2:00 p.m. *Resolving Conflict and Building Consensus*

What can we agree upon in terms of science gaps, impacts, key principles and recommendations to decision makers and/or the broader ocean community? What are the specific science- and technology-based differences that we have across the community? What actions are we willing to take together to achieve improvements? What specific capabilities or initiatives might help resolve our differences?

Moderator: Jennifer Miksis-Olds, University of New Hampshire
Jill Lewandowski, Bureau of Ocean Energy Management
John Calambokidis, Cascadia Research
Sarah Tsofilias, E&P Sound & Marine Life Joint Industry Program
Margaret Cooney, International Fund for Animal Welfare (formerly)

4:15 p.m. Recommendations

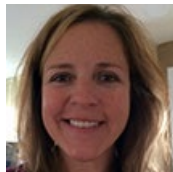
6:00 p.m. Reception at Acadiana | 901 New York Avenue, NW | 202.408.8848

IV. Acknowledgements

COL would like to acknowledge and thank all of the participants for their exceptional contributions that fostered a strong discussion that will hopefully lead to future collaborations and consensus. The Forum was a necessary and important first step in a productive path ahead that could lead to the advancement of the science that guides decision-making in all stakeholder sectors.

Our very generous Forum sponsors helped make this event possible. We would especially like to thank them, as well as our advisory group, panelists, and COL staff who made this event a success. See you next year!

Advisory Group



Dr. Jill Lewandowski
Bureau of Ocean Energy Management



Mr. Hank Lobe
Severn Marine Technologies, LLC/Sonardyne International and COL Board Member



Dr. Jennifer Miksis-Olds
University of New Hampshire and COL Board Member



Dr. Ruth Perry
Shell Exploration & Production Company



Dr. Chris Scholin
Monterey Bay Aquarium Research Institute and COL Board Member

Sponsors





www.OceanLeadership.org

This proceedings document reflects the themes, discussion points, and general agreements developed by the stakeholder participants at the COL Industry Forum: Sound in the Sea, held on October 26, 2016, in Washington, D.C. This document and the COL-developed recommendations were reviewed by and have the support of the individuals participating in the Forum prior to its publication.

*Author: Nicholas Hunt
Editor: Amy L. Castner*