

WASHINGTON STATE
Academy of Sciences
Science in the Service of Washington State

May 12, 2020

Julie Watson
Killer Whale Policy Lead
Washington Department of Fish & Wildlife
PO Box 43200
Olympia, WA 98504-3200

Dear Julie,

The Washington State Academy of Sciences (WSAS), in order to fulfill the Statement of Work for the Underwater Acoustics and Orca Project with the Washington Department of Fish and Wildlife (WDFW Contract 19-14506), hosted a workshop to engage additional members of the scientific community to identify relevant research, findings, data, and researchers to inform the Academy's process of identifying the best available science.

The workshop was held on April 27, 2020. 12:30-4:30pm PT virtually, via videoconference, and resulted in additional research findings and data for the WSAS committee to consider.

To accompany this memo, I have attached the following workshop materials that were provided to participants:

- Workshop invitation
- List of invitees
- List of participants
- Workshop objective statement
- Workshop agenda
- List of WSAS committee members
- WSAS code of conduct
- WSAS: Who are we
- Summary of literature

Please let me know if you have any questions.

Sincerely,



Donna Gerardi Riordan
Executive Director

C: Yasmeeen Hussain, Associate Program Officer

From: Yasmeen Hussain <yasmeen.hussain@washacad.org>
Sent: Friday, April 3, 2020
Cc: donna.riordan@washacad.org; Devon Thorsell <Devon.Thorsell@washacad.org>
Subject: Invitation to WSAS Workshop on Underwater Acoustics and Disturbance

Dear Dr. [],

We are writing to invite you to a workshop on vessel-related underwater acoustics and disturbance of Southern Resident Killer Whales, hosted by the Washington State Academy of Sciences (WSAS) study committee on underwater acoustics and disturbance. This workshop will be held on **Monday, April 27, 2020, 12:30pm-4:30pm PT**. This workshop will be held fully **virtually**, by videoconference.

The Washington Department of Fish and Wildlife (WDFW) has asked WSAS to conduct a scientific and technical review of the best available science on disturbance and noise impacts to Southern Resident Killer Whales (SRKW) from small vessels and commercial whale watching, as requested by the Washington State Legislature (SSSB 5577). This Underwater Acoustics and Disturbance Project will inform the development of new WDFW regulations for a commercial whale watching licensing program in Washington State.

As part of the WSAS process, the study committee is hosting this workshop to engage additional members of the scientific community with expertise relating to vessel impacts on SRKW to identify relevant research, findings, data, and researchers to include in a summary of the best available science on underwater acoustics and vessel disturbance.

As this is an invitation-only scientific workshop, the invitation is not transferable. If you feel that other scientists should be considered for invitation, please feel free to share their contact information with us. Please indicate your interest in attending this workshop by responding to yasmeen.hussain@washacad.org by April 10, 2020.

Meeting materials will be forwarded to confirmed attendees approximately one week in advance of the meeting including:

- Project scope of work and timeline
- List of WSAS committee members
- Workshop objective statement
- WSAS: Who are we
- WSAS Code of Conduct
- A calendar invitation with call-in information

Please RSVP for the meeting by emailing yasmeen.hussain@washacad.org by COB April 10, 2020.

Sincerely,

Donna Gerardi Riordan
Executive Director

Cc: Yasmeen Hussain, Associate Program Officer; Devon Thorsell, Program Operations Manager

From: Yasmeen Hussain <yasmeen.hussain@washacad.org>
Sent: Friday, April 24, 2020
Cc: donna.riordan@washacad.org; Devon Thorsell <Devon.Thorsell@washacad.org>
Subject: Invitation to WSAS Workshop on Underwater Acoustics and Disturbance

We are looking forward to the Underwater Acoustics and Disturbance workshop on Monday April 27, 2020, 12:30pm-4:30pm PT. In addition to the workshop materials provided previously, attached you will find the **workshop agenda** and a **summary of the literature** identified by the committee.

We will be using Zoom **videoconferencing** for this workshop. As this workshop is invitation only, please do not share the meeting call-in information or meeting materials. Please use the below information to access the meeting:

Video call from PC, Mac, Linux, iOS, or Android:

<https://wsu.zoom.us/j/91723068554?pwd=NFhTSEFrcDVjMW82VjgyaENuYnp1dz09>

OR US Mobile One Tap Phone Call +16699009128,,91723068554#

OR +1 669 900 9128; International phone number: <https://wsu.zoom.us/j/91723068554>

Meeting ID: 917 2306 8554

Password: 030507

Due to increased security concerns, our Zoom administrator has instituted the following requirements:

1. All participants must have a Zoom account to access the meeting by video. You may use a work account or a personal account to join. The invitation to this workshop was due to your own expertise, and you will not be expected to represent your organization/institution at the meeting. If you run into issues with the internet bandwidth required for Zoom or are concerned about technical difficulties, we encourage you to use the dial-in telephone option ([more info about meeting controls by phone](#)).
2. All Zoom meetings will be password protected and have additional meeting controls to prevent unauthorized access.

We will go over logistics for the meeting before getting started on Monday, but in the meantime, please reach out to our Program Manager at devon.thorsell@washacad.org if you have any questions or concerns about the platform. If you are unfamiliar with Zoom, please plan to log in 10 minutes early to ensure that the program is working for you.

Regards,
Yasmeen

From: Devon Thorsell <Devon.Thorsell@washacad.org>
Sent: Tuesday, April 28, 2020
To: Yasmeen Hussain <Yasmeen.Hussain@washacad.org>; Donna Riordan <donna.riordan@washacad.org>
Subject: Provide Feedback on 4/27 Underwater Acoustics and Disturbance Workshop

Dear Workshop Participants,

Thank you for your engaged participation in the **WSAS Underwater Acoustics and Disturbance Scientist Workshop** on April 27. Attached you will find the list of participants and attendees at the workshop.

Please take a few minutes to **provide WSAS feedback on the virtual workshop experience by Friday, May 1**: https://wsu.co1.qualtrics.com/jfe/form/SV_9QChyiQRpYVuOdn. The survey will take about 5 minutes. Your feedback will help us structure future virtual workshops.

Please feel welcome to contact yasmeen.hussain@washacad.org with any additional thoughts about relevant studies or data that may be helpful to the committee. Thank you again!

Best,

Devon Emily Thorsell
Program Operations Manager

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INVITEES – SCIENTIST WORKSHOP
 UNDERWATER ACOUSTICS AND DISTURBANCE STUDY
 APRIL 27, 2020, 12:30PM-4:30PM PT

First Name	Last Name	Affiliation
Erin	Ashe	Oceans Initiative
Helen	Bailey	University of Maryland Center for Environmental Science
David	Bain	University of Washington; Orca Conservancy
Ken	Balcomb	Center for Whale Research
Lynne	Barre	NOAA Northwest Fisheries Science Center
Lance	Barrett-Lennard	Oceanwise
Christopher	Bassett	University of Washington Applied Physics Lab
Lars	Bejder	Hawai'I institute of Marine Biology
Clément	Chion	University of Quebec
Fredrik	Christiansen	Murdoch University
Chris	Clark	Cornell University
Thomas	Doniol-Valcroze	Fisheries and Oceans Canada
John	Durban	NOAA Southwest Fisheries Science Center
Graeme	Ellis	Fisheries and Oceans Canada (retired)
Christine	Erbe	Curtin University
Holly	Fearnbach	SR3 Sealife
JohnKB	Ford	Fisheries and Oceans Canada (retired)
Joe	Gaydos	SeaDoc Society
Deborah	Giles	WildOrca
Brad	Hanson	NOAA Northwest Fisheries Science Center
Todd	Hass	Puget Sound Partnership
Kathy	Heise	Oceanwise
James	Higham	University of Otago
John	Hildebrand	University of California San Diego
John	Horne	University of Washington
Darlene	Ketten	Woods Hole Oceanographic Institution
Camille	Kowalski	University of Quebec
Takahiro	Kubo	University of Kent
Sue	Moore	University of Washington Center for Ecosystem Sentinels
Rick	Osborne	Whale Museum
Lael	Parrott	University of British Columbia
Tim	Ragen	US Marine Mammal Commission (retired)
Frances	Robertson	San Juan County
Mei	Sato	University of British Columbia
Brandon	Southall	Southall Environmental Associates
Kate	Stafford	University of Washington Applied Physics Lab
Sheila	Thornton	Fisheries and Oceans Canada
Andrew	Trites	University of British Columbia
Peter	Tyack	University of St. Andrews
Svein	Vagle	Fisheries and Oceans Canada
Scott	Veirs	Orcasound; Beam Reach
Val	Veirs	Orcasound; Beam Reach

Doug	Wartzok	Florida International University
Michael	Weiss	Center for Whale Research; Orca Behavior Institute
Rob	Williams	Oceans Initiative
Jason	Wood	SMRU Consulting
Andrew	Wright	Fisheries and Oceans Canada
Harald	Yurk	Fisheries and Oceans Canada

Invited Observers

First Name	Last Name	Affiliation
Shane	Aggergaard	CWWLP Advisory Cmte
Rein	Attemann	CWWLP Advisory Cmte
Kelley	Balcomb-Bartok	Observer
Grace	Ferrara	CWWLP Intergovernmental Cmte
Jeff	Friedman	CWWLP Advisory Cmte
Cindy	Hansen	CWWLP Advisory Cmte
Michael	Jasny	CWWLP Advisory Cmte
Tom	Murphy	CWWLP Advisory Cmte
Nora	Nickum	CWWLP Advisory Cmte
Lovel	Pratt	CWWLP Advisory Cmte
Ivan	Reiff	CWWLP Advisory Cmte
Joe	Scordino	CWWLP Advisory Cmte
Taylor	Shedd	CWWLP Advisory Cmte

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PARTICIPANTS – SCIENTIST WORKSHOP
 UNDERWATER ACOUSTICS AND DISTURBANCE STUDY
 APRIL 27, 2020, 12:30PM-4:30PM PT

First Name	Last Name	Affiliation	Role
Erin	Ashe	Oceans Initiative	Participant
Helen	Bailey	University of Maryland Center for Environmental Science	Participant
David	Bain	University of Washington; Orca Conservancy	Participant
Ken	Balcomb	Center for Whale Research	Participant
Lynne	Barre	NOAA Northwest Fisheries Science Center	Participant
Joe	Gaydos	SeaDoc Society	Participant
Deborah	Giles	WildOrca	Participant
Brad	Hanson	National Oceanic and Atmospheric Administration	Participant
Todd	Hass	Puget Sound Partnership	Participant
John	Hildebrand	University of California, San Diego	Participant
John	Horne	University of Washington	Participant
Darlene	Ketten	Woods Hole Oceanographic Institution	Participant
Camille	Kowalski	University of Quebec	Participant
Sue	Moore	University of Washington Center for Ecosystem Sentinels	Participant
Tim	Ragen	US Marine Mammal Commission (retired)	Participant
Frances	Robertson	San Juan County	Participant
Mei	Sato	University of British Columbia	Participant
Brandon	Southall	Southall Environmental Associates	Participant
Sheila	Thornton	Fisheries and Oceans Canada	Participant
Andrew	Trites	University of British Columbia	Participant
Scott	Veirs	Orcasound, Beam Reach	Participant
Val	Veirs	Orcasound, Beam Reach	Participant
Doug	Wartzok	Florida International University	Participant
Jason	Wood	SMRU Consulting	Participant
Andrew	Wright	Fisheries and Oceans Canada	Participant
Harald	Yurk	Fisheries and Oceans Canada	Participant
Peter	Dahl	WSAS Committee	Committee
Marla	Holt	WSAS Committee	Committee
David	Lusseau	WSAS Committee	Committee
Dawn	Noren	WSAS Committee	Committee
Susan	Parks	WSAS Committee	Committee
Dom	Tollit	WSAS Committee	Committee
Ron	Thom	WSAS Committee	Committee

Julie	Watson	Washington Department of Fish and Wildlife	Observer
Jessica	Stocking	Washington Department of Fish and Wildlife	Observer
Shane	Aggergaard	CWWLP Advisory Committee	Observer
Rein	Attemann	CWWLP Advisory Committee	Observer
Grace	Ferrara	CWWLP Intergovernmental Committee	Observer
Jeff	Friedman	CWWLP Advisory Committee	Observer
Cindy	Hansen	CWWLP Advisory Committee	Observer
Nora	Nickum	CWWLP Advisory Committee	Observer
Lovel	Pratt	CWWLP Advisory Committee	Observer
Ivan	Reiff	CWWLP Advisory Committee	Observer
Joe	Scordino	CWWLP Advisory Committee	Observer
Taylor	Shedd	CWWLP Advisory Committee	Observer
Kelley	Balcomb- Bartok	Pacific Whale Watch Association	Observer
Donna	Gerardi Riordan	WSAS Staff	WSAS Staff
Yasmeen	Hussain	WSAS Staff	WSAS Staff
Devon	Thorsell	WSAS Staff	WSAS Staff

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WSAS Underwater Acoustics and Disturbance – Scientist Workshop

The Washington State Academy of Sciences (WSAS) Underwater Acoustics and Disturbance study committee is hosting a virtual workshop on Monday, April 27, 2020 to engage additional members of the scientific community with expertise relating to vessel impacts on Southern Resident Killer Whales (SRKW).

The objective of this workshop is for expert scientists to share their understanding of the relevant research, findings, and data for the committee to consider in assembling a summary of the best available science on vessel impacts on SRKW. This may include underwater acoustics, disturbance from vessel presence or density, disturbance from whale watching activities, and may also include findings about underwater acoustics, cetaceans, and whale watch impacts more generally. In addition, the committee would be interested in input on the relative scientific and technical merit of particular interventions to mitigate vessel impacts, existing literature, and current data gaps. A summary of literature identified so far will be distributed to workshop attendees approximately one week prior to the workshop.

The information gathered at the workshop will inform the study committee's summary of the best available science on underwater acoustics and disturbance, which will be used by WDFW to draft new regulations for a commercial whale watching licensing program.

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WSAS COMMITTEE FOR
UNDERWATER ACOUSTICS AND DISTURBANCE

Peter Dahl – Senior Principal Engineer, Acoustics Department, Applied Physics Laboratory; Professor, Mechanical Engineering, University of Washington – dahl@apl.washington.edu

Dr. Peter H. Dahl is a Senior Principal Engineer with the University of Washington Applied Physics Laboratory, and a Professor of Mechanical Engineering at the University of Washington. His research focuses on underwater sound. He has published extensively on the physics of acoustic propagation as influenced by the sea surface and seabed, vector acoustic properties of underwater and airborne sound, and studies on underwater noise from explosives and marine pile driving. Dr. Dahl has conducted several ocean-going experiments in underwater acoustics, sponsored by the U.S. Office of Naval Research involving international collaborative teams, and is currently a Principal Investigator for two projects under the purview of the Navy's Living Marine Resource program concerning the effects of sound on marine life. Dr. Dahl received his Ph.D. from the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution Joint Program in Ocean Engineering. He is a Fellow of the Acoustical Society of America (ASA), has served as the chair of the ASA technical committee on Underwater Acoustics (2002-2005), on its Executive Council (2008-2011), and was the ASA Vice President (2013-2014). ([link](#))

Marla Holt – Research Wildlife Biologist, NOAA Fisheries – marla.holt@noaa.gov

Dr. Marla Holt is a Research Wildlife Biologist for the Marine Mammal Ecology Team; she joined the Northwest Fisheries Science Center as a National Research Council (NRC) Postdoctoral Associate for the Marine Mammal Program. Dr. Holt's postdoctoral research was an investigation on the effects of vessel noise on the acoustic signals of Southern Resident killer whales. She also wrote a review paper which focused on sound exposure in Southern Resident killer whales. Dr. Holt received her Ph.D. from the University of California, Santa Cruz in Ocean Sciences. Her dissertation focused on pinniped spatial acoustics including sound localization and auditory masking in captive seals and sea lions and call directionality in free-ranging northern elephant seals. Dr. Holt also has an M.S. in Marine Sciences and a B.A. in Marine Biology from the University of California, Santa Cruz. Her current research focuses on marine mammal acoustics including the effects of noise on the acoustic signals and behavior of Southern Resident killer whales, their use of sound during different activity states, and the cost of sound production in odontocetes. Dr. Holt's research interests include marine mammal sound production and acoustic communication, sensory ecology (including hearing capabilities and auditory scene analysis), sound exposure and acoustic risk factors, and passive acoustic monitoring. ([link](#))

David Lusseau – Professor, School of Biological Sciences, University of Aberdeen – d.lusseau@abdn.ac.uk

Dr. David Lusseau works at the intersection of life, formal, and social sciences to understand how individuals make decisions when uncertain and what the consequences of those decisions are for their health, social life, and demographic contributions. He has been at the University of Aberdeen since 2007. He obtained his BSc in marine biology at the Florida Institute of Technology and his PhD in

Zoology at the University of Otago (New Zealand). He then received a Killam fellowship for postdoctoral work at Dalhousie University. He was elected member of the Young Academy of Scotland in 2007, Fellow of the Royal Statistical Society in 2009, and Fellow of the Royal Society of Biology in 2016. Dr. Lusseau has worked on sustainable wildlife management since his PhD at Otago, particularly focussing on developing quantitative methods to detect and avoid wicked problems when managing these socioecological systems. He is a member of IUCN's Cetacean Specialist Group and Sustainable Use and Livelihoods Specialist Group and recently convened the marine mammal assessment chapter of the 2nd UN World Ocean Assessment. ([link](#))

Dawn Noren – Research Fish Biologist, Conservation Biology Division, National Oceanic and Atmospheric Administration – dawn.noren@noaa.gov

Dr. Dawn Noren is a research fishery biologist, with expertise in physiological ecology, at the NOAA Fisheries Northwest Fisheries Science Center in Seattle, WA. She is currently a member of the International Whaling Commission Scientific Committee and primarily works with the environmental concerns and whale watching sub-committees. Her research includes energetics and metabolism, assessment of body condition, diving physiology, and anthropogenic impacts. Her recent work focuses on killer whale prey requirements, the effects of vessels and sound on cetacean behavior and energetics, factors influencing killer whale body condition indices, the transfer of contaminants from female dolphins and killer whales to their calves, and Southern Resident killer whale habitat use patterns. Her earlier research focused on Steller sea lion, northern elephant seal, and bottlenose dolphin physiology. Previously, Dr. Noren was a National Research Council (NRC) Postdoctoral Research Associate at the National Marine Mammal Laboratory at the NOAA NMFS Alaska Fisheries Science Center in Seattle, WA. Dr. Noren earned a M.S. in Marine Sciences and a Ph.D. in Ecology and Evolutionary Biology, both from the University of California, Santa Cruz. She earned a B.S. in Biological Sciences with an emphasis in Marine Sciences from the University of Maryland, College Park. ([link](#))

Susan Parks – Associate Professor, Biology, Syracuse University – sparks@syr.edu

Dr. Susan Parks' research focuses on the ecology and evolution of acoustic signaling. Diverse research topics in the lab span the fields of behavioral ecology, bioacoustics, biological oceanography, and conservation biology. Current projects in the lab involve studies of marine and terrestrial animals ranging from observational studies characterizing the acoustic behavior of species to experimental studies investigating behavioral functions of sounds and the impacts of noise on communication. Dr. Parks holds a PhD from Massachusetts Institute of Technology/ Woods Hole Oceanographic Institution and a BA from Cornell University ([link](#))

Ron Thom – Staff Scientist Emeritus, Coastal Sciences Division, Pacific Northwest National Laboratory – ron.thom@pnnl.gov

Dr. Ron Thom has conducted applied research in coastal and estuarine ecosystems since 1971. His research includes coastal ecosystem restoration; adaptive management of restored systems; benthic primary production; ecosystem monitoring; climate change and adaptation; carbon storage in restored coastal systems, and ecology of fisheries resources. Dr. Thom has directed approximately 200 multidisciplinary ecological studies and worked on systems in California, Washington, Oregon, Alaska, Massachusetts, New York, Nebraska, and Alabama. He chaired the original Technical Advisory Committee of the EPA's Puget Sound Estuary Program, was appointed by the Governor of Washington to the 2015 Northwest Straits Commission, and served as a member of US EPA Science Advisory Board panel reviewing the Great Lakes Restoration Program in 2011. Dr. Thom served on the National Academy panel that developed recommendations for monitoring the effectiveness

recovery actions in the Gulf of Mexico coastal ecosystem following the 2010 oil spill. He co-chaired the 2015 conference of the Coastal and Estuarine Research Federation (CERF), and co-chaired the 2016 Salish Sea Ecosystem Conference. In 2010, he was elected to the Washington State Academy of Sciences, and in 2016 was elected president-elect of the Academy to serve in 2018-2020. Dr. Thom managed the Coastal Ecosystem technical group at PNNL until 2013. He currently serves as the Senior Science Advisor to the Puget Sound Partnership, which is the EPA National Estuary Program in Puget Sound. ([link](#))

Dom Tollit – Senior Research Scientist, SMRU Consulting – djt@smruconsulting.com

Dr. Dom Tollit is a Principal Scientist with SMRU Consulting. He has over 28 years of experience studying the behavioural ecology, foraging, and population dynamics of marine predators. His primary research interests are to understand the ecological role of pinnipeds in coastal habitats and to define key parameters within multi-species environmental risk assessment frameworks. Following a PhD at the University of Aberdeen in Scotland, Dr. Tollit worked for SMRU in St. Andrews University, the University of Tasmania and the National Trust for Fiji, before leading a Steller sea lion foraging ecology research program at the University of British Columbia. Since 2009, Dr. Tollit has undertaken a variety of North American based consultancy projects, including noise impact assessment, environmental and acoustic-based monitoring programs and pinniped ecological research. His collaborative research has led to more than 35 journal publications in the field of marine mammal science. Recent project experience includes working with industry, NGOs, federal and local regulators (DFO, NOAA, CSLC) and a variety of academic institutions in Canada and the USA. He is currently the technical advisor to Vancouver Fraser Port Authority's ECHO program and actively involved in improving Population Consequences of Disturbance (PCOD) assessments. ([link](#))

WASHINGTON STATE
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Science in the Service of Washington State

Code of Conduct

Values Statement

- The Washington State Academy of Sciences (WSAS) is committed to increasing both the scientific and technical knowledge concerning challenges facing Washington State and the use of such knowledge to improve the condition of the citizens, government, and businesses of Washington State.
- WSAS respects civil and human rights and the central importance of freedom of inquiry and expression in research, teaching, and publication. We strive to help public policymakers in developing informed regulations and policies concerning Washington State.
- WSAS values the diversity of our membership and endeavors to be inclusive and welcoming to our members, partners and staff

WSAS was created by Governor Christine Gregoire as an independent, non-profit, self-perpetuating honorary society of the state's leading scientists to provide unbiased advice to the state on any matter for which evidence can inform sound public policy. The credibility of the advice from WSAS rests on its reputation, which depends on the reputation of its members. Membership in WSAS is a privilege predicated on its members adhering to certain standards of conduct. WSAS members, by accepting membership in the Academy, agree to abide by the following Code of Conduct. The Code of Conduct also applies to WSAS staff, consultants and subcontractors, study committee members, and WSAS meeting participants.*

Principles

This Code of Conduct provides a common set of principles and standards upon which WSAS and our members build their professional and scientific work on behalf of the state.

- We are committed to providing a respectful, safe and welcoming environment for all, free from discrimination and harassment based on race, sex/gender, sexual orientation, gender identity/expression, age, color, religion, creed, national or ethnic origin, physical, mental, or sensory disability, including the use of a trained service animal, marital status, genetic information, status as an honorably discharged veteran or member of the military, or socioeconomic status.
- Scientific integrity—including the independence of the scientific process and the rigorous application of science-based knowledge—should be upheld throughout all levels of WSAS. Study committee members are expected to provide comprehensive, transparent, unbiased, and understandable technical analyses.

*This Code applies to WSAS activities across a variety of contexts, such as in person, postal, telephone, internet, and other electronic transmissions. This Code of Conduct applies to behavior and actions occurring outside the scope of WSAS activities when such behavior has the potential to adversely affect the safety and well-being of members or WSAS as an organization. Members are furthermore expected to conform to the codes of ethics that govern their employing institution (if any). Lack of awareness or misunderstanding of an Ethical Standard is not itself a defense to a charge of unethical conduct. If you have questions about to Code of Conduct and would like clarification, please contact the WSAS Office or a member of the Board of Directors.

Expectations and Standards

Members in an academic community have the right to equal treatment and opportunity regardless of race, sex/gender, sexual orientation, gender identity/expression, age, color, religion, creed, national or ethnic origin, physical, mental, or sensory disability, including the use of a trained service animal, marital status, genetic information, status as an honorably discharged veteran or member of the military, or socioeconomic status. This includes a community free of intimidation, coercion, exploitation, discrimination, and all forms of harassment. Membership in WSAS should be based on professional and service capabilities alone, in addition to adherence to the standards set forth in this Code of Conduct.

Members, study committee volunteers, and staff have a professional responsibility to serve the public interest and welfare and to further the public understanding of science and engineering. Attention should be focused on the highest standards of scientific integrity as well as the personal responsibility of the individual members or staff. In conformance with these principals, the following examples of expected and unacceptable behavior are provided; however, the list is not intended to be exhaustive.

Expected Behavior

- Scientific integrity is expected of all members.
- Exercise consideration and respect in speech and actions.
- Attempt collaboration before conflict.
- Maintain confidentiality with respect to discussions of candidates for WSAS election and the deliberations of WSAS committees and working groups.
- Be mindful of your surroundings and of your fellow Academy members. Alert staff, Board members, and/or other members if you notice a dangerous situation, someone in distress, or violations of this Code of Conduct, even if they seem inconsequential.
- Remember that event venues may be shared with members of the public; please be respectful to all patrons of these locations.

Unacceptable Behavior

- Plagiarism, falsification of data, misuse of grant funds and other breaches of scientific integrity.
- Violence, threats of violence or violent language directed against another person.
- Sexist, racist, homophobic, transphobic, ableist or otherwise discriminatory or harassing behavior.
- Posting or threatening to post other people's personal information ("doxing").
- Bullying behavior, including but not limited to personal insults, yelling, undermining, or belittling others.
- Inappropriate photography or recording, for example, recording a private conversation without the consent of all parties
- Sexually harassing behavior, including but not limited to unwelcome sexual attention, sexualized comments or jokes; inappropriate touching, groping, and unwelcome sexual advances.
- Intimidation, stalking or following (online or in person).
- Advocating for, or encouraging, any of the above behavior.

- Sustained disruption of Academy events, including talks and presentations.

Board Members, Committees, and Staff

Board Members, study committee members, and staff should act in good faith and with honesty, accuracy, personal and professional integrity, and reasonable competence. Reasonable competence may require gaining a comprehensive knowledge of WSAS, its aspirations, missions, programs, and financial conditions and general non-profit issues to ensure compliance with WSAS's governing documents and applicable state and federal laws.

Board Members, study committee members, and staff should act in a manner that promotes board and committee unity and confidence. This means engaging in candid, open, and honest discussion, while keeping disagreements impersonal and accepting decisions made on a majority or consensus basis. However, Board Members and Committee Members (when acting with delegated authority) have the right to dissent or abstain from voting and have their dissent or abstention recorded.

Board Members, study committee members, and staff must comply with federal, state, and local laws and should adhere to the policies, goals, and principles of WSAS.

Sanctions

The WSAS Board of Directors may impose sanctions on WSAS members and study committee members, including Officers and Board Members, for violations of the standards of the Code of Conduct, up to and including removal from office, exclusion from WSAS activities, and/or suspension or termination of WSAS membership. The Board of Directors may notify other bodies and individuals of its actions consistent with state and federal law.

Sanctions may be imposed only by the affirmative vote of a majority of Board Members, after reasonable notice and an opportunity to respond has been provided to the individual accused of violating this Code of Conduct (see also WSAS Bylaws, Section 3.12, Term-Removal of Officers).

Staff members may be disciplined or terminated for violations of this Code of Conduct consistent with the terms and conditions of their employment.

This Code of Conduct may be amended by a majority vote of the Board of Directors, in accordance with the WSAS Bylaws.

WASHINGTON STATE

Academy of Sciences

Science in the Service of Washington State

We live in a time of extraordinary opportunities and challenges – many of which involve science or technology with impacts to jobs, health, the environment and other aspects of the quality of life in the state of Washington. The Washington State Academy of Sciences (WSAS) is a unique state resource for the government, organizations and citizens as they confront these challenges and seize opportunities to improve their lives.

WSAS serves and leads by

- Identifying and recruiting as Members the state’s most distinguished scientific and technical experts
- Conducting relevant time-sensitive unbiased studies that inform state and local planners and decision makers
- Organizing in-depth discussions about important issues confronting Washington State
- Identifying emerging trends and needs that will have significant impact on our citizens’ future.

About WSAS

The Washington State Legislature authorized WSAS in 2005 as a private, nonprofit 501 (c)(3) organization whose work is nonpartisan, independent and funded from both private and public sources.

WSAS Members are nominated and recognized by their peers as outstanding leaders in their respective scientific and technical fields and are committed to serving the citizens of Washington. Its nearly 260 members’ expertise cuts across the physical sciences and mathematics, engineering and technology, biological sciences, health sciences, and behavioral and social sciences. Most are also members of the National Academies of Sciences, Engineering or Medicine, and a significant proportion of them have served extensively on National Academies’ study committees.

WSAS engages Members’ expertise in specific scientific and technical reviews and analyses using a committee structure modeled after the one used by the National Academies. Great care is taken to appoint committees and working groups of specialists to conduct high-quality studies; subject draft reports to rigorous, independent science and technical peer review; and secure WSAS Board of Directors approval before the release of reports to ensure that they are free from bias and conflict of interest.

WSAS addresses a range of challenging public issues – environmental quality; sustainability and climate change; jobs, infrastructure and economic development; and quality of life, health, education and workforce development. Its reports do not contain policy recommendations; rather, they contain the best available scientific and technical analyses to inform public discussion and decision making.

How WSAS Serves Washington State

WSAS provides authoritative, independent scientific and technical advice to inform policy development and decision making in Washington State. It responds to requests from the Governor, the State Legislature, and other state entities or private organizations. It also is a source of independent scientific information for the public.

WSAS conducts its work for the State primarily by convening study committees and issuing objective reports that are funded by the government and non-governmental organizations.

In addition, WSAS develops and sustains a culture of scientific and technical excellence in Washington State through annual scientific symposia, public and K-12 education programs, and support for students in science and engineering.

Topical Working Groups

In 2016 the WSAS established three Topical Working Groups (TWGs) aligned with the state's key scientific and technological policy interests. TWGs are designed to engage members in critical policy issues facing the state, organize and conduct projects addressing these issues, and help coordinate efforts to connect with other state and local organizations. The initial TWGs are:

- Environmental Quality, Sustainability and Climate Change
- Jobs, Infrastructure and Economic Environment
- Quality of Life, Health, Education and Workforce Preparedness

Selected Examples of WSAS impact on Washington state

Washington State continually faces vexing issues that are controversial, fraught with uncertainty, and politically contentious. Those entrusted to develop policies and make decisions to address these issues benefit greatly from the rigorous and objective scientific and technical analyses that WSAS provides in the public interest. Examples include:

COMMISSIONED REPORTS, REVIEWS AND REQUESTED ADVICE

Evaluation with Recommendations by the Washington State Academy of Sciences of Interim Report: 2015 Drought and Agriculture. December 2016.

This evaluation responded to a request from the Washington State Department of Agriculture to review the science supporting the methodologies and interpretation of the results of its study of the 2015 drought on Washington agriculture.

*Opportunities for Addressing Laminated Root Rot Caused by *Phellinus Sulphurascens* in Washington's Forests.* December 2013.

This report responded to a request from the Washington State Department of Natural Resources to identify approaches and opportunities ripe for research on understanding and managing of root diseases of Douglas fir.

White paper on Washington State Initiative 522 (I-522): Labeling of Foods Containing Genetically Modified Ingredients. November 2013.

Six legislators requested WSAS to provide an independent white paper addressing the science underlying the use of products from genetically modified plants and/or animals in food and the impacts of required labeling of foods containing ingredients from genetically modified plants and/or animals.

Sound Indicators: A Review for the Puget Sound Partnership. August 2012.

The State Legislature asked WSAS to assess the progress of the Puget Sound Partnership's (PSP) 2020 Action Agenda to protect and restore Puget Sound.

WSAS ANNUAL SYMPOSIA PROCEEDINGS

Proceedings of the Ninth Annual Symposium, Columbia River Treaty, Issues for the 21st Century, 2016.

Proceedings of the Eighth Annual Symposium, Accelerating Science's Impact: Translating Discoveries into Solutions, 2015.

Proceedings of the Seventh Annual Symposium, Health Disparities in Washington State: Narrowing the Gap, 2014.

Proceedings of the Sixth Annual Symposium, Energy: Environmentally Acceptable Choices for Washington State, 2013.

Proceedings of the Fifth Annual Symposium, Water, Washington and the World, Ensuring Economically and Environmentally Sustainable Water Resources, 2012.

Proceedings of the Fourth Annual Symposium, Rising Above the Gathering Storm: STEM Education in Washington State, 2011.

Objective

The purpose of this document is to track literature that the WSAS Underwater Acoustics and Disturbance Committee may consider in reviewing the best available science on underwater acoustics and disturbance of Southern Resident Killer Whales (SRKW) by small vessels. The committee is reviewing literature from species beyond *Orinus orca* due to the dearth of information on SRKW directly. The committee has excluded multiple studies on responses to specific sound types such as pile-driving and naval sonar that are not relevant to the scope of this review. This list of literature does not reflect suggestions made by scientists participating in the April 27, 2020 workshop.

Topics

- Comparative connection of taxa
 - Patterns of behavior and abandonment in other cetaceans
 - Stress physiology
- Effects of
 - Physical disturbance of vessels
 - Underwater noise
 - Echo sounders
 - Acute vs Chronic exposure
 - Numbers of vessels and amount of time spent
 - Interacting stressors – relative effects
- Boat density and distribution – Small vessels, Whale watch vessels
 - Especially around San Juans
- Vessel noise generation – cavitation, technology
- Ocean ambient noise; masking
- Sound propagation
- Marine mammal hearing
- Types of effects
 - Physiology
 - Behavior
- Whale watch customers
 - What customers want (outreach, closeness to whales, # of whales)
 - Demographics
- Whale watching
 - Effects on conservation
 - Best practices for conservation
 - Effects of public perception
 - Sentinel effect
- Adaptive management of regulations

Tags:

[Orca] = Killer Whales

[Comparative] = evidence for comparable effects between species

[Vessel] = Focus on vessel effects

[Disturbance] = Disturbance

[Cumulative] = compounding effects of multiple stressors

[Boats] = Focus on the boat sounds, density, distribution

[Acoustics] = Sound propagation; focus on the acoustic stimuli or hearing

[Physiology] = Physiology and/or energetics effects

[Behavior] = Behavioral effects

[Communication] = Changes in echolocation/acoustic behavior

[Customers] = Info about whale watch customer demographics, desires

[WhaleWatch] = sentinel or conservation effect of whale watching; effects of public perception

[Management] = pertaining to management/regulations

[NPR] = not peer reviewed

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