



## CURRICULUM VITAE

ANN E. BOWLES

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### POSITION

*SENIOR RESEARCH SCIENTIST* - Lead, Animal Behavior & Senses Program  
Hubbs-SeaWorld Research Institute (HSWRI), 2595 Ingraham Street, San Diego, CA 92109. PH: 619/226-3870. FAX: 619/226-3944. E-mail: [abowles@hswri.org](mailto:abowles@hswri.org).

### EDUCATION

*GRADUATE:* Ph.D., Marine Biology, Scripps Institution of Oceanography, Sept 1994.

*UNDERGRADUATE:* B.A., Linguistics, University of California at San Diego, June 1978.  
*Magna Cum Laude.* Departmental Awardee 1978. Special Projects Minor, Animal Behavior.

### AREAS OF EXPERTISE

ANIMAL COMMUNICATION; SENSORY ECOLOGY; EFFECTS OF ANTHROPOGENIC DISTURBANCE

### PROFESSIONAL EXPERIENCE

*OCTOBER 1994-PRESENT.* Senior Research Scientist, HSWRI

*SEPTEMBER 2012-PRESENT.* Research Associate, Department of Environmental and Ocean Sciences, University of San Diego (USD); graduate program affiliate since 1994.

*JULY 2008 – 2016.* Adjunct Professor, San Diego State University; Research Associate 1991-2008.

*OCTOBER 1995-2000, NOVEMBER 2006 - 2025.* Visiting Scholar, University of California at San Diego

### SELECTED PROJECTS

1. Vocal production studies – Mentoring *Biphonation production mechanisms of the pilot whale (*Globicephala macrorhynchus*)*, conducted by HSWRI Post-Doctoral Research Associate Audra Amea; *Vocal matching and changes in beluga vocalizations*, conducted by USD Environmental and Ocean Sciences graduate student Alexa Manley; Funding from SeaWorld-Busch Gardens Conservation Fund
2. *Update of "Marine Mammals and Noise", 20th Anniversary (2014 - 2025)* - Multi-agency funding; update of the classic Richardson et al. 1995 text "*Marine Mammals and Noise*"; with National Marine Mammal Foundation, HLS Research and Curtin University.
3. *Monitoring Interactions and Reducing Entanglement of Protected Species in Marine Aquaculture Lines and Netting (2018 – 2022)* – Funded by NOAA Saltonstall-Kennedy Grant Program. Feasibility research to pro-actively design and monitor aquaculture gear to prevent adverse interactions.
4. *Detectability of Ultrasonic Acoustic Transmitters by Pinnipeds (2006 – 2008)* – Co-PI, with Mike Shane, HSWRI Aquaculture Program; funded by National Oceanographic and Atmospheric Administration and the San Diego County Fish and Wildlife Commission

5. *Auditory Sensitivity of the Polar Bear (2006 – 2008)* – Co-PI with Megan Owen; funded by HSWRI, San Diego Zoo Institute for Conservation Research and Polar Bears International
6. *Design of a Manatee Finder: Sonar Techniques for Reducing Manatee-boat Interactions (2002 – 2006)* – Co-PI, with Jules Jaffe, Scripps Institution of Oceanography; Florida Marine Research Institute Manatee Avoidance Technology Program
7. *Effects of Off-Highway Vehicle Noise on Wildlife in the Sierra Nevada Range: Noise Exposure Assessment (2003 - 2008)* – Subcontractor; U.S. Forest Service for California Off-Highway Vehicle Commission
8. *Bioacoustic Tools for Long-Term, Non-Invasive Monitoring of Threatened and Endangered Birds (2004-2006)* – Subcontractor; Veterinary Medical Teaching and Research Center, University of California at Davis for Strategic Environmental Research and Development Program
9. *Killer Whale Development of Stereotyped Pulsed Calls and Usage in Social Contexts (2001– 2014)* – PI; HSWRI with in-kind support from SeaWorld, Inc.
10. *Manatee Behaviors in the Presence of Fishing Gear: Response to Novelty and the Potential for Reducing Gear Interactions (1999-2001)* – PI; U.S. Fish and Wildlife Service and HSWRI
11. *Responses of Cetaceans and Pinnipeds to Novel Objects and Simulated Fishing Gear (1994-1997)* – Co-PI, with P.K. Yochem; National Marine Mammal Laboratory (NMML) and SeaWorld, Inc

#### **PROFESSIONAL SOCIETIES AND AFFILIATIONS**

Fellow, Acoustical Society of America (ASA); Representative to ASA Committee on Standards, Animal Bioacoustics Technical Committee (1999-2011); Co-chair, ASA Animal Bioacoustics Technical Committee (1995-1997); Member, Noise Technical Committee; American Association for the Advancement of Science; Animal Behavior Society; Society for Marine Mammalogy; Phi Beta Kappa, Sigma of California; Sigma Xi; Wildlife Society

#### **INVITED PARTICIPATION – ADVISORY PANELS, WORKING GROUPS, AND REVIEWS**

*Acoustic Criteria Panel.* 1998 to 2022. Originally convened by the NOAA Acoustics Program, National Marine Fisheries Service, Office of Protected Resources, Silver Spring, MD; later under independent contract (panel member; 3 publications)

*Institute for Environmental Monitoring and Research.* 1999, 2000, 2012. Expert advice on effects of human-made noise on wildlife for military flight operations areas in Labrador.

*National Academy of Sciences, Ocean Studies Board.* 2012. Reviewer for “*Evaluation of the Drakes Bay Oyster Company Special Use Permit DEIS and Peer Review*”.

*Zoological Society of San Diego Animal Health Sustainability Council.* 2009-2011. Provided expert advice on practices for maintaining animal collections in zoological environments.

*National Park Service Natural Sounds Program.* 2008-2010. Scientific advisor on *Grand Canyon Overflights Wildlife Expert Panel* (15 September 2008), *Wildlife Response to Aviation Noise in Protected Natural Areas* (21-23 September 2010, Cambridge, MA)

*Western Gray Whale Advisory Panel Task Force (2007) and Interim Independent Scientists Group (2006).* International Union for the Conservation of Nature, monitoring and mitigation measures to protect Western Gray Whales from seismic survey activities and construction off Sakhalin Island (served as associate scientist, assisted in report preparation)

*National Marine Mammal Laboratory.* 2003. *Interactions of Vessels with Southern Resident Killer Whales: A Research Workshop.* Convened by NMML, 7 to 9 May 2003, Seattle, WA. (served as scientific advisor).

*Office of Naval Research.* 1998. *Workshop on the effects of Anthropogenic Noise on the marine environment*, Sponsored by ONR, Bethesda, MD, 10-12 February, 1998 (served as scientific advisor)

*Marine Mammal Commission*. 1996. *Acoustic Deterrents Workshop*. Convened by the Marine Mammal Commission, 20-22 March, 1996, Battelle Conference Center, Seattle, Washington (expert participant in Working Group 4, Use of Acoustic Harassment Devices).

## SELECTED PUBLICATIONS

### 2025:

Erbe C, Houser D, **Bowles A**, & Porter MB 2025 In Press. *Marine Mammal Acoustics in a Noisy Ocean*. Springer Nature, New York, NY. 829 pp. ISBN: 9783031770210

Erbe C, Murray A, Aulich M, **Bowles A**, Browne C, Elsdon B, Evans EK, Frankel A, Gavrilov A, Gosby C, Hawkins L, Jolliffe C, Hong Duc PN, & Wei C. 2025 In Press. Mysticete sounds. Ch 3 in Erbe, C., Houser, D., Bowles, A., & Porter, M.B. (Eds) *Marine Mammal Acoustics in a Noisy Ocean*. Springer Nature, New York, NY. 829 pp.

Sousa-Lima RS, Azofeifa-Solano JC, da Silva VMF, Dantas GA, Carletti IM, **Bowles A**, Rountree R, & Erbe C. 2025 In Press. Sirenian sounds. Ch 7 in Erbe C, Houser D, Bowles A, & Porter MB. (Eds) *Marine Mammal Acoustics in a Noisy Ocean*. Springer Nature, New York, NY. 829 pp.

Erbe C, **Bowles A**, Houser D, Jolliffe C, Madhusudhana S, Marley SA, Salas AR, Salgado-Kent C, Schoeman R, Senigaglia V, Tollefsen C, Trigg L, & Wellard R. 2025 In Press. Behavioral responses to underwater noise. Ch 10 in Erbe C, Houser D, Bowles A, & Porter MB. (Eds) *Marine Mammal Acoustics in a Noisy Ocean*. Springer Nature, New York, NY. 829 pp.

### 2023:

Selbmann A, Deecke VB, Filatova OA, Fedutin ID, Miller PJO, Simon M, **Bowles AE**, Lyrholm T, Sigurjónsson J, Lacey L, Magnúsdóttir EE, Maunder W, Wensveen PJ, Svavarsson J, & Samarra FIP. 2023. Call type repertoire of killer whales (*Orcinus orca*) in Iceland and its variation across different regions. *Marine Mammal Science* 2023: 1-25.

### 2021:

Southall BL, Nowacek DP, **Bowles AE**, Senigaglia V, Bejder L & Tyack PL. 2021. Marine mammal noise exposure criteria: Assessing the severity of marine mammal behavioral responses to human-made noise. *Aquatic Mammals* 47(5): 421-464.

### 2020:

Owen M, Pagano A, Wisdom S, Kirschoffer BJ, **Bowles A**, O'Neill C. 2020. Estimating the audibility of industrial noise to denning polar bears. *Journal of Wildlife Management*.85(2): 384 – 396.

### 2019:

Southall BL, Finneran JJ, Reichmuth C, Nachtigall PE, Ketten DR, **Bowles AE**, Ellison WT, Nowacek DP, & Tyack PL. 2019. Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects. *Aquatic Mammals* 45(2): 125-232.

### 2016:

♦**Bowles AE**, Musser WB, Clark KF, Denes SL, and Grebner DM. 2016. Perspectives on the function of behaviors synchronized with calling in female killer whales, *Orcinus orca*: patterns of bubbling and nodding in bouts. *International Journal of Comparative Psychology* 29: 1 - 16, Stan Kuczaj memorial volume.

### 2015:

♦**Bowles AE**, Grebner DM, Musser WB, Nash JS, & Crance JL. 2015. Disproportionate emission of bubble streams with killer whale biphonic calls: perspectives on production and function. *JASA Express Letters* 137(2): EL165-170.

## 2014:

♦Musser WB, **Bowles AE**, Grebner, DM, & Crance JL. 2014. Differences in acoustic features of vocalizations produced by killer whales cross-socialized with bottlenose dolphins. *Journal of the Acoustical Society of America*, 137(4): 1990-2002.

Kershenbaum A, **Bowles AE**, Freeberg TM, Jin DZ, Lameira AR, & Bohn K. 2014. Animal vocal sequences: not the Markov chains we thought they were. *Proceedings of the Royal Society B*: 20141370.

♦Crance JL, **Bowles AE**, & Garver A. 2014. Evidence for vocal learning in juvenile male killer whales, *Orcinus orca*, from an adventitious cross-socializing experiment. *Journal of Experimental Biology* 217: 1229-1237.

## 2012:

♦**Bowles AE**, & Anderson RC. 2012. Behavioral responses and habituation of small cetaceans and pinnipeds to novel objects and simulated fishing gear with and without a pinger. *Aquatic Mammals* 38(2): 161-188.

## 2011:

Hayward LS, **Bowles A**, Ha JC, & Wasser SK. 2011. Impacts of acute and long-term vehicle exposure on physiology and reproductive success of the northern spotted owl. *Ecosphere* 2(6), Article 65: 1 - 20 [online journal of the Ecological Society of America].

Owen MA, & **Bowles AE**. 2011 Auditory Psychophysics and the Management of a Threatened Large Carnivore, the Polar Bear (*Ursus maritimus*). *International Journal of Comparative Psychology* 24: 244-254.

Schlundt CE, Dear RL, Houser DS, **Bowles AE**, Reidarson T, & Finneran JJ. Auditory evoked potentials in two short-finned pilot whales (*Globicephala macrorhynchus*). *Journal of the Acoustical Society of America* 129(2): 1111-1116.

## 2010:

**Bowles AE**, Denes SL, & Shane M. 2010. Acoustic characteristics of ultrasonic coded transmitters for fishery applications: could marine mammals hear them? *Journal of the Acoustical Society of America* 128(5): 3223-3231.

## 2008:

Zielinski WJ, Slauson KM, & **Bowles AE**. 2008. Effects of off-highway vehicle use on the American marten. *Journal of Wildlife Management* 72(7): 1558-1571

**Bowles AE**, & Schulte-Fortkamp, B. 2008. Noise as an indicator of quality of life: Advances in measurement of noise and noise effects on humans and animals in the environment. *Acoustics Today* 4(2): 35-39.

## 2007:

Southall B, **Bowles AE**, Ellison WT, Finneran JJ, Gentry RL, Greene CR Jr, Kastak D, Ketten DR, Miller JH, Nachtigall PE, Richardson WJ, Thomas JA, & Tyack PL. 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. *Aquatic Mammals* 33(4): 411-521.

Jaffe J, Simonet F, Roberts PL, & Bowles AE. 2007. Measurement of the acoustic reflectivity of Sirenia (Florida manatees) at 171 kHz. *Journal of the Acoustical Society of America*. 121(1):158-165.

## 2003:

♦Wolski L, Anderson R, Bowles AE, & Yochem PK. 2003. Measuring hearing in the harbor seal (*Phoca vitulina*): comparison of behavioral and auditory brainstem response techniques. *Journal of the Acoustical Society of America* 113(1):629-637.

**2001:**

Wisdom S, Bowles AE, & Anderson K. 2001. Call development and behavior of 'JJ', a rehabilitated gray whale calf, *Eschrichtius robustus*. *Aquatic Mammals* 27(3):239-255.

Ting C, Garrelick J, & Bowles A. 2001. An analysis of the response of sooty tern eggs to sonic boom overpressures. *Journal of the Acoustical Society of America* 111(1, pt. 2):562-568.

**1995:**

Bowles AE. 1995. Responses of wildlife to noise. Ch 8, pp. 154-213 in Knight RL, & Gutzwiller KJ (eds) *Wildlife and Recreationists: Coexistence through Management and Research*. Island press, Washington, D.C.

**1994:**

Bowles AE, Smultea M, Würsig B, DeMaster DP, & Palka D. 1994. Relative abundance and behavior of marine mammals exposed to transmissions from the Heard Island Feasibility Test. *Journal of the Acoustical Society of America* 96(4):2469-2484.

**1990:**

Jayko K, Reed M, & Bowles AE. 1990. Simulation of interactions between migrating whales and potential oil spills. *Environmental Pollution* 63:97-127.

**1988:**

Bowles AE, Young WG, Asper ED. 1988. Ontogeny of stereotyped calling of a killer whale calf, *Orcinus orca*, during her first year. *Rit Fiskideldar (Journal of Marine Sciences, Reykjavik, special volume)* 11:251-275.

Moore SE, Francine JK, Bowles AE, & Ford JKB. 1988. A preliminary analysis of the calls of killer whales, *Orcinus orca*, from Iceland and Norway. *Rit Fiskideldar (Journal of Marine Sciences, Reykjavik, special volume)* 11:225-250.

**STUDENTS SUPERVISED**

Rindy Anderson, USD*	Juliette Nash, USD*
Romy Boiskin, Dept. Biology, University of California, San Diego (UCSD)*	Nichole Nichols, UW (Ph.D)
Jessica Crance, USD*	Megan Slack, USD
Whitney Hansen, USD*	Eri Suzuki, Dept. Biology, UCSD
Melania Guerra, Scripps Institution of Oceanography (Ph.D)	Tina Yack, San Diego State University - UC Davis Joint Ph.D
Jennifer Keating, California State University, San Marcos	Ryan Yont, USD*
Mark Kinsey, USD*	Sheyna Wisdom, USD*
Sally Lane, USD	Larry Wolski, USD
Alexa Manley, USD*	

**Notes:** \* Thesis advisor; Master's student unless otherwise specified.

**Selected Educational Outreach Activities**

**2009-2013:** Presenter, *American Association for University Women Tech Trek* – annual career event for high school women to encourage interest in STEM topics (>345 students)

**2009-2012, 2015, 2020, 2025:** Presenter *Better Education for Women in Science and Engineering* ("BE WiSE") program – annual overnight career event for 7-8<sup>th</sup> grade women (≈280 students)

**2008:** Presenter, *Southwestern Marine Educator's Association* (SWMEA) Spring Educator Workshop

**2006-2019:** Presenter for *SeaWorld Career Camp* – weekly summer science demonstrations for 7-8<sup>th</sup> grade students (>1700 students)

**2005, 2008:** San Diego County Office of Education *SDCOE ITV* segment and demonstrations:, "Math in the Real World", on polar bear hearing measurements; "Technology in Wildlife Biology" for *Plugging into Science*.

**2004:** Presentation for *Alliance of Marine Mammal Parks and Aquariums Education Committee* – "Sound and Marine Mammals"

**2002-2007:** Presenter, *Expanding Your Horizons* (sponsored by Women's Bureau, U.S. Department of Labor, and others) – day-long career outreach demonstrations (>180 students)

**2000-2001:** Presentations for *Manatee Entanglement Working Group* (Maitland, Tallahassee, Hawks Cay) – outreach regarding behaviors that lead to entanglement in manatees

**2000-2010:** Organizer & Presenter, *Hubbs Science Series* - monthly public science lectures

**1997:** Presenter, *NSF Women in Science and Engineering* ("WISE") program, University of Massachusetts, Lowell (>200 students)