

COLLEEN REICHMUTH

Associate Research Scientist

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RESEARCH FOCUS

Psychological mechanisms related to the sensory, cognitive, and behavioral ecology of amphibious marine mammals. Current research focuses on auditory perception, detection and tracking of hydrodynamic disturbances, brain and behavioral effects of neurotoxin exposure, sound production mechanisms, and communication.

PROFESSIONAL PREPARATION

University of California Santa Cruz	Biology	B.Sc. , 1993
University of California Santa Cruz	Marine Sciences	M.Sc. , 1997
University of California Santa Cruz	Ocean Sciences	Ph.D. , 2002
University of California Santa Cruz	Comparative Cognition	Post-doc., 2002-2004

ACADEMIC/PROFESSIONAL APPOINTMENTS

University of California Santa Cruz, Institute of Marine Sciences		
Associate Research Scientist		10/2009 to present
Assistant Research Scientist		7/2007 to 9/2009
Associate Research Specialist		7/2006 to 7/2007
Research Specialist		6/2003 to 7/2006
Laboratory Manager and Research Marine Mammal Trainer		6/1997 to 9/1998
University of California Santa Cruz, Department of Ocean Sciences		
Lecturer		9/2008 to present
University of Southern Denmark		
Invited Instructor	summer 2008, 2010, 2012	
Université Jean Monnet, Sainte-Etienne, Sensory Ecology and Neuro-Ethology Laboratory		
Visiting Research Professor		6/2012 to 7/2012

SELECTED PUBLICATIONS

- Sills, J.M., Southall, B.L., and **Reichmuth, C.** (in press). Amphibious hearing in ringed seals (*Pusa hispida*): underwater audiograms, aerial audiograms and critical ratio measurements. *Journal of Experimental Biology*.
- 2015 Beltran, R.S., Connolly Sadou, M., Condit, R., Peterson, S., **Reichmuth, C.**, Costa, D. Use of fine-scale whisker growth dynamics to infer temporal foraging from stable-isotope signatures. *Marine Ecology Progress Series*. 523:243-253.
- 2014 Cunningham, K., Southall, B.L., and **Reichmuth, C.** Auditory sensitivity of seals and sea lions in complex listening scenarios. *Journal of the Acoustical Society of America*, 136(6):3410-3421.

- 2014 Ghoul, A. and **Reichmuth, C.** Hearing in the sea otter (*Enhydra lutris*): Auditory profiles for an amphibious marine carnivore. *Journal of Comparative Physiology A*. Online First: 24 September.
- 2014 Ghoul, A. and **Reichmuth, C.** Hearing in sea otters (*Enhydra lutris*): audible frequencies determined from a controlled exposure approach. *Aquatic Mammals*, 40(3):Online First.
- 2014 Connolly Sadou, M., Beltran, R.S. and **Reichmuth, C.** A calibration procedure for measuring pinniped vibrissae using photogrammetry. *Aquatic Mammals*, 40(2):213-218.
- 2014 **Reichmuth, C.** and Casey, C. Vocal learning in seals, sea lions, and walruses. *Current Opinion in Neurobiology*, 28:1-6.
- 2014 Cunningham, K., Hayes, S.A., Rub, A.M.W., and **Reichmuth, C.** Auditory detection of ultrasonic coded transmitters by seals and sea lions. *The Journal of the Acoustical Society of America*, 135(4):1978-1985.
- 2014 Sills, J.M., Southall, B.L., and **Reichmuth, C.** Amphibious hearing in spotted seals (*Phoca largha*): underwater audiograms, aerial audiograms, and critical ratio measurements. *Journal of Experimental Biology*, 217:726-734.
- 2014 Ghoul, A. and **Reichmuth, C.** Hearing in the sea otter (*Enhydra lutris*): Auditory profiles for an amphibious marine carnivore. *Journal of Comparative Physiology A*. Online First: 24 September.
- 2014 Ghoul, A. and **Reichmuth, C.** Hearing in sea otters (*Enhydra lutris*): audible frequencies determined from a controlled exposure approach. *Aquatic Mammals*, 40(3):Online First.
- 2014 Connolly Sadou, M., Beltran, R.S. and **Reichmuth, C.** A calibration procedure for measuring pinniped vibrissae using photogrammetry. *Aquatic Mammals*, 40(2):213-218.
- 2014 **Reichmuth, C.** and Casey, C. Vocal learning in seals, sea lions, and walruses. *Current Opinion in Neurobiology*, 28:1-6.
- 2014 Cunningham, K., Hayes, S.A., Rub, A.M.W., and **Reichmuth, C.** Auditory detection of ultrasonic coded transmitters by seals and sea lions. *The Journal of the Acoustical Society of America*, 135(4):1978-1985.
- 2014 Sills, J.M., Southall, B.L., and **Reichmuth, C.** Amphibious hearing in spotted seals (*Phoca largha*): underwater audiograms, aerial audiograms, and critical ratio measurements. *Journal of Experimental Biology*, 217:726-734.
- 2013 **Reichmuth, C.**, Holt, M.M., Mulsow, J., Sills, J.M., and Southall, B.L. Comparative assessment of amphibious hearing in pinnipeds. *Journal of Comparative Physiology A*, 199(6):491-507.
- 2013 Cook, P., Rouse, A., Wilson, M. and **Reichmuth C.** California sea lions (*Zalophus californianus*) can keep the beat: motor entrainment to rhythmic auditory stimuli in a non vocal mimic. *Journal of Comparative Psychology*, Advance online publication DOI:10.1037/A0032345.
- 2013 Mulsow, J. and **Reichmuth, C.** The binaural click-evoked auditory brainstem response of the California sea lion (*Zalophus californianus*). *Journal of the Acoustical Society of America*, 133(1):579-586.

- 2012 **Reichmuth, C.**, Ghoul, A. and Southall, B.L. Temporal processing of sounds by seals. *Journal of the Acoustical Society of America*. 132(4):2147-2150.
- 2012 **Reichmuth, C.** Psychophysical studies of auditory masking in marine mammals: key concepts and new directions. In: *The Effects of Noise on Aquatic Life*, A.N. Popper and A. Hawkins (Eds). Springer Science, Pp. 23-27.
- 2012 Mulsow, J. **Reichmuth, C.**, Houser, D. and Finneran, J.J. Auditory evoked potential measurement of hearing sensitivity in pinnipeds. In: *The Effects of Noise on Aquatic Life*, A.N. Popper and A. Hawkins (Eds). Springer Science, Pp. 73-76.
- 2012 Ghoul, A. and **Reichmuth, C.** Sound production and reception in southern sea otters (*Enhydra lutris nereis*). In: *The Effects of Noise on Aquatic Life*, A.N. Popper and A. Hawkins (Eds). Springer Science, Pp. 157-159.
- 2011 **Reichmuth, C.** and Southall, B.L. Underwater hearing in California sea lions (*Zalophus californianus*): expansion and interpretation of existing data. *Marine Mammal Science*, online publication, 6pp.
- 2011 Cook, P., **Reichmuth, C.**, Gulland, F. Rapid behavioral diagnosis of domoic acid toxicosis in California sea lions. *Biology Letters*, 10.
- 2011 Mulsow, J., **Reichmuth, C.**, Gulland F., Rosen, D., and Finneran, J. Aerial audiograms of several California sea lions (*Zalophus californianus*) and Steller sea lions (*Eumetopias jubatus*) measured using single and multiple simultaneous auditory steady-state response methods. *Journal of Experimental Biology*, 214:1138-1147.
- 2010 Nachtigall, P.E., Moore, P.W.B., Gisiner, R.C., and **Reichmuth, C.** Memories: Ronald J. Schusterman, honorary member of the Marine Mammal Society. *Marine Mammal Science*, 26(4):997-1001.
- 2010 Lynn, B.L., **Reichmuth, C.**, and Schusterman, R.J. Filial imprinting in a Steller sea lion (*Eumetopias jubatus*). *Aquatic Mammals*, 36(1), 79-83.
- 2010 Mulsow, J. and **Reichmuth, C.** Psychophysical and electrophysiological aerial audiograms of a Steller sea lion (*Eumetopias jubatus*). *Journal of the Acoustical Society of America*, 127(4):2692-2701
- 2008 Nachtigall, P.E., **Reichmuth, C.**, and Schusterman, R.J. Healthy stranded animals and laboratory research. *Marine Mammal Science*, 24(3):746.
- 2008 Gulland, F.M.D., Nutter, F., Dixon, K., Calambokidis, J. Schorr, G., Barlow, J., Rowles, T., Wilkin, S. Spradlin, T., Gage, L. Mulsow, J., **Reichmuth, C.**, Moore, M., Smith, J., Folkens, P., Hanser, S.F., Jang, S., and Baker, C.S. Health assessment, antibiotic treatment, and behavioral responses to herding efforts of a cow-calf pair of humpback whales (*Megaptera novaeangliae*) in the Sacramento River Delta, California. *Aquatic Mammals*, 34(2):182-192.
- 2007 Schusterman, R.J. and **Reichmuth C.** Novel sound production via contingency learning in the Pacific walrus (*Odobenus rosmarus divergens*). *Animal Cognition*, 11:319-327.
- 2007 Kastak, D., **Reichmuth, C.**, Holt, M. Mulsow, J., and Southall, B.L. Onset, growth, and recovery of in-air temporary threshold shift in a California sea lion (*Zalophus californianus*). *Journal of the Acoustical Society of America*, 122(5):2916-2924.

- 2007 **Reichmuth, C.**, Mulsow, J., Finneran, J., Houser, D.S., and Supin, A. Ya. Measurement and response characteristics of auditory brainstem responses in pinnipeds. *Aquatic Mammals*, 33:132-150.
- 2007 Mulsow, J. and **Reichmuth, C.** Electrophysiological assessment of temporal resolution in pinnipeds. *Aquatic Mammals*, 33:122-131.
- 2007 Houser, D.S., Crocker, D.E., **Reichmuth, C.**, Mulsow, J., and Finneran, J.J. Auditory evoked potentials in northern elephant seals (*Mirounga angustirostris*). *Aquatic Mammals*, 33:110-121.
- 2006 Lindemann, K.L., **Reichmuth Kastak, C.** and Schusterman, R.J. The role of learning in the production and comprehension of auditory signals by pinnipeds. *Aquatic Mammals*, 32:483-490.
- 2005 Kastak, D., Schusterman, R.J., Southall, B.L., **Reichmuth Kastak, C.** Underwater temporary threshold shifts in three pinniped species: effects of noise level and duration. *Journal of the Acoustical Society of America*, 118:3154-3162.
- 2005 Southall, B., Schusterman, R.J., Kastak, D., and **Reichmuth Kastak, C.** Reliability of underwater hearing thresholds in pinnipeds. *Acoustic Research Letters Online*, 6:243-249.
- 2004 **Reichmuth Kastak, C.** Insight. In: *The Encyclopedia of Animal Behavior*, M. Bekoff (Ed). Greenwood Publishers, Pp. 706-707.
- 2004 Schusterman, R.J. and **Reichmuth Kastak, C.** Equivalence relations. In: *The Encyclopedia of Animal Behavior*, M. Bekoff (Ed). Greenwood Publishers, Pp. 285-290.
- 2003 Schusterman, R.J., Kastak, D., Levenson, D.H., **Reichmuth Kastak, C.** and Southall, B.L. Pinniped sensory systems and the echolocation issue. In: *Echolocation in Bats and Dolphins*, J.A. Thomas, C. Moss, M. Vater (Eds). University of Chicago Press, Pp.531-535.
- 2003 Schusterman, R.J., **Reichmuth Kastak, C.**, and Kastak, D. Equivalence classification as an approach to social knowledge: from sea lions to simians. In: *Animal Social Complexity: Intelligence, Culture, and Individualized Societies*, F. B. M DeWaal and P.L. Tyack (Eds), Harvard University Press, Pp. 179-206.
- 2002 **Reichmuth Kastak, C.** and Schusterman, R.J. Sea lions and equivalence: extending classes by exclusion. *Journal of the Experimental Analysis of Behavior*, 78:449-465.
- 2002 **Reichmuth Kastak, C.** and Schusterman, R.J. Long-term memory for concepts in a California sea lion (*Zalophus californianus*). *Animal Cognition*, 5:225-232.
- 2002 Schusterman, R.J., **Reichmuth Kastak, C.**, and Kastak, D. The cognitive sea lion: meaning and memory in the lab and in nature. In: *The Cognitive Animal: Empirical and Theoretical Perspectives on Animal Cognition*, M. Bekoff, C. Allen, and G. Burghardt (Eds). MIT Press. Pp. 217-228.
- 2002 **Reichmuth, C.** *Concept learning and memory in California sea lions*. Ph.D. Thesis, University of California at Santa Cruz. 123 Pp.
- 2001 **Reichmuth Kastak, C.**, Schusterman, R.J, and Kastak, D. Equivalence classification in California sea lions using class-specific reinforcers. *Journal of the Experimental Analysis of Behavior*, 76:131-158.

- 2001 Schusterman, R.J., Southall, B.L., Kastak, D. and **Reichmuth Kastak, C.** Pinniped vocal communication: Form and function. *Proceedings of the 17th International Congress on Acoustics, Volume IV*, September 2-7, Rome, Italy.
- 2000 Schusterman, R.J., **Reichmuth, C.** and Kastak, D. How animals classify friends and foes. *Current Directions in Psychological Science*, 9(1):1-6.
- 1999 Schusterman, R.J., Kastak, D., Levenson, D.H., Southall, B.L., and **Reichmuth, C.** Why pinnipeds don't echolocate: the role of selection in pinniped biosonar. *Journal of the Acoustical Society of America*, 107:2256-2264.
- 1999 Kastak, D., Schusterman, R.J., Southall, B.L. and **Reichmuth, C.** Underwater temporary threshold shift induced by octave-band noise in three species of pinniped. *Journal of the Acoustical Society of America*, 106(2):1142-1148.
- 1997 Schusterman, R.J., Kastak, D. and **Reichmuth, C.** 1997. What's in a name? Equivalence by any other name would smell as sweet. *Journal of the Experimental Analysis of Behavior*, 68(2):252-258.
- 1997 **Reichmuth, C.** *Functional classes and equivalence relations in California sea lions*. M.Sc. Thesis, University of California at Santa Cruz. 106 Pp.
- 1995 Schusterman, R.J., Kastak, D. and **Reichmuth, C.** 1995. Equivalence class formation and cross modal transfer: Testing marine mammals. *In: Sensory Systems of Aquatic Mammals*, R.A. Kastelein, J.A. Thomas, and P.E. Nachtigall (Eds), De Spil Publishers, Woerden, The Netherlands.