

DAVID E. CADE – CURRICULUM VITAE

UC Santa Cruz, Institute of Marine Studies
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EDUCATION

Ph.D. Biology, **Stanford University** (2019)
M.Sc. Earth, Ocean and Atmospheric Sciences, **Oregon State University** (2014)
M.A. Education, **Stanford University** (2005)
B.A. Mathematics, **Brown University** (2002) C.V. Starr fellow for public service

RESEARCH & ACADEMIC HISTORY

University of California, Santa Cruz, Post-Doc, Institute of Marine Science, 2019-present.
Sympatric overlap of Antarctic predators in a rapidly warming ecosystem.
(PI: Ari Friedlaender)

Stanford University, Hopkins Marine Station. Ph.D. program, Dept. of Biology, 2014-2019
Multi-scale drivers of efficiency in rorqual whale engulfment filtration feeding.
(Advisor: Jeremy Goldbogen)

Oregon State University, M.Sc. program, College of Earth, Ocean, and Atmospheric Sciences,
2011-2014. Detection, classification and ecology of acoustic scattering layers.
(Advisor: Kelly Benoit-Bird)

Stanford University, M.A. program. California Teaching Credential in Mathematics, 2004-2005
Using metaphors to explore the properties of exponents with 9th graders.
(Supervisor: Beth Injasoulian)

TEACHING EXPERIENCE *(listed by relevancy)*

University of San Francisco, San Francisco, CA. Adjunct Professor, Marine Biology, 2014

Summit Preparatory Charter High School, Redwood City, CA. Mathematics Teacher, All levels, 2006-2010

Cross-Cultural Environmental Leadership School (XCEL), San Francisco, CA. Mathematics Teacher, Algebra and Geometry, 2005-2006

Mission High School, San Francisco, CA. Student teacher, Freshmen integrated math, 2004-2005

Stanford University, Palo Alto, CA. TA for Biologging, 2016, Plant Biology, 2015

Oregon State University, Corvallis, OR. Teaching Assistant, Introductory Biology, 2014

Various, Experiential and environmental education instructor in New Hampshire, New Mexico, Washington and Utah wilderness areas, 1999-2004

PUBLICATIONS ([google scholar profile](#)) ([pdf links](#))

- Cade, D.E.**, Levenson, J.J., Cooper, B., de la Parra, R., Webb, D.H. & Dove, A. (2020) Whale sharks increase swimming effort while filter feeding, but appear to maintain high foraging efficiencies. *Journal of Experimental Biology*, 223, jeb224402.
- Hein, A.M., Altshuler, D.L., **Cade, D.E.**, Liao, J.C., Martin, B.T. & Taylor, G.K. (2020) An algorithmic approach to natural behavior. *Current Biology*, 30, R663-675.
- Potvin, J., **Cade, D.E.**, Werth, A.J., Shadwick, R.E. & Goldbogen, J.A. (In press). A Perfectly Inelastic Collision: Bulk Prey Engulfment by Baleen Whales and Dynamical Implications for the World's Largest Cetaceans. *American Journal of Physics*.
- Segre, P.S., Potvin, J., **Cade, D.E.**, Calambokidis, J., Di Clemente, J., Fish, F.E., Friedlaender, A.S., Gough, W.T., Johnson, M., Kahane-Rapport, S.R., Oliveira, C., Parks, S.E., Penry, G.S., Simon, M., Stimpert, A.K., Wiley, D.N., Madsen, P.T., Goldbogen J.A. (2020) Energetic and physical limitations on the breaching performance of large whales. *eLife*. 9, e51760.
- Cade, D.E.**, Carey, N., Domenici, P., Potvin, J. & Goldbogen, J.A. (2020) Predator-informed looming stimulus experiments reveal how large filter feeding whales capture highly maneuverable forage fish. *Proceedings of the National Academy of Sciences*, 117, 472-478.
- Tackaberry, J.E., **Cade, D.E.**, Goldbogen, J., Wiley, D., Friedlaender, A.S., Stimpert, A. (2020) From a calf's perspective: Humpback whale nursing behavior on two US feeding grounds. *PeerJ*, 8:e8538.
- Goldbogen, J.A., **Cade, D.E.**, Wisniewska, D.M., Potvin, J., Segre, P.S., Savoca, M.S., Hazen, E.L., Czapanskiy, M.F., Kahane-Rapport, S.R., DeRuiter, S.L., Gero, S., Tønnesen, P., Gough, W.T., Hanson, M.B., Holt, M., Jensen, F.H., Simon, M., Stimpert, A.K., Arranz, P., Johnston, D.W., Nowacek, D.P., Parks, S.E., Visser, F., Friedlaender, A.S., Tyack, P.L., Madsen, P.T. & Pyenson, N.D. (2019a) Why whales are big but not bigger: Physiological drivers and ecological limits in the age of ocean giants. *Science*, 366, 1367-1372.
- Goldbogen, J.A., **Cade, D.E.**, Calambokidis, J., Czapanskiy, M.F., Fahlbusch, J., Friedlaender, A.S., Gough, W.T., Kahane-Rapport, S.R., Savoca, M.S. & Ponganis, K.V. (2019b) Extreme bradycardia and tachycardia in the world's largest animal. *Proceedings of the National Academy of Sciences*, 116, 25329-25332.
- Calambokidis, J., Fahlbusch, J.A., Szescioraka, A.R., Southall, B.L., **Cade, D.E.**, Friedlaender, A.S. & Goldbogen, J.A. (2019) Differential Vulnerability to Ship Strikes between Day and Night for Blue, Fin, and Humpback Whales Based on Dive and Movement Data from Medium Duration Archival Tags. *Frontiers in Marine Science*, 6.
- Southall, B.L., DeRuiter, S.L., Friedlaender, A., Stimpert, A.K., Goldbogen, J.A., Hazen, E., Casey, C., Fregosi, S., **Cade, D.E.** & Allen, A.N. (2019) Behavioral responses of individual blue whales (*Balaenoptera musculus*) to mid-frequency military sonar. *Journal of Experimental Biology*, 222, jeb190637.
- Friedlaender, A.S., Bowers, M.T., **Cade, D.E.**, Hazen, E.L., Stimpert, A.K., Allen, A.N., Calambokidis, J., Fahlbusch, J., Segre, P. & Visser, F. (2019) The advantages of diving deep: Fin whales quadruple their energy intake when targeting deep krill patches. *Functional Ecology*.

- Gough, W.T., Segre, P.S., Bierlich, K., **Cade, D.E.**, Potvin, J., Fish, F.E., Dale, J., di Clemente, J., Friedlaender, A.S., Johnston, D.W., Kahane-Rapport, S.R., Kennedy, J., Long, J., Oudejans, M., Penry, G.S., Savoca, M.S., Simon, M., Videsen, S., Visser, F., Wiley, D. & Goldbogen, J.A. (2019) Scaling of swimming performance in baleen whales. *Journal of Experimental Biology*, 222, jeb. 204172..
- Segre, P.S., **Cade, D.E.**, Calambokidis, J., Fish, F.E., Friedlaender, A.S., Potvin, J. & Goldbogen, J.A. (2019) Body flexibility enhances maneuverability in the world's largest predator. *Integrative and comparative biology*, 59, 48-60.
- Cade, D.E.**, Barr, K.R., Calambokidis, J., Friedlaender, A.S. & Goldbogen, J.A. (2018) Determining forward speed from accelerometer jiggle in aquatic environments. *Journal of Experimental Biology*, 221, jeb. 170449.
- Werth, A.J., Potvin, J., Shadwick, R.E., Jensen, M.M., **Cade, D.E.** & Goldbogen, J.A. (2018) Filtration area scaling and evolution in mysticetes: trophic niche partitioning and the curious cases of sei and pygmy right whales. *Biological Journal of the Linnean Society*, 125, 264-279.
- Goldbogen, J.A., **Cade, D.E.**, Calambokidis, J., Friedlaender, A.S., Potvin, J., Segre, P.S. & Werth, A.J. (2017a) How Baleen Whales Feed: The Biomechanics of Engulfment and Filtration. *Annual review of marine science*, 9, 1-20.
- Goldbogen, J.A., **Cade, D.E.**, Boersma, A.T., Calambokidis, J., Kahane-Rapport, S.R., Segre, P.S., Stimpert, A.K. & Friedlaender, A.S. (2017b) Using Digital Tags With Integrated Video and Inertial Sensors to Study Moving Morphology and Associated Function in Large Aquatic Vertebrates. *The Anatomical Record*, 300, 1935-1941.
- Findlay, K.P., Seakamela, S.M., Meyer, M.A., Kirkman, S.P., Barendse, J., **Cade, D.E.**, Hurwitz, D., Kennedy, A., Kotze, P.G.H., McCue, S.A., Thornton, M., Vargas-Fonseca, O.A. & Wilke, C.G. (2017) Humpback whale "super-groups" – A novel low-latitude feeding behaviour of Southern Hemisphere humpback whales (*Megaptera novaeangliae*) in the Benguela Upwelling System. *PloS one*, 12, e0172002.
- Friedlaender, A.S., Herbert-Read, J.E., Hazen, E.L., **Cade, D.E.**, Calambokidis, J., Southall, B.L., Stimpert, A.K. & Goldbogen, J.A. (2017) Context-dependent lateralized feeding strategies in blue whales. *Current Biology*, 27, R1206-R1208.
- Cade, D.E.**, Friedlaender, A.S., Calambokidis, J. & Goldbogen, J.A. (2016) Kinematic Diversity in Rorqual Whale Feeding Mechanisms. *Current Biology*, 26, 2617-2624.
- Segre, P.S., **Cade, D.E.**, Fish, F.E., Potvin, J., Allen, A.N., Calambokidis, J., Friedlaender, A.S. & Goldbogen, J.A. (2016) Hydrodynamic properties of fin whale flippers predict maximum rolling performance. *Journal of Experimental Biology*, 219, 3315-3320.
- Cade, D.E.** & Benoit-Bird, K.J. (2015) Depths, migration rates and environmental associations of acoustic scattering layers in the Gulf of California. *Deep Sea Research Part I: Oceanographic Research Papers*, 102, 78-89.
- Cade, D.E.** & Benoit-Bird, K.J. (2014) An automatic and quantitative approach to the detection and tracking of acoustic scattering layers. *Limnology and Oceanography: Methods*, 12, 742-756.

DAVID E. CADE

PUBLICATIONS (submitted)

- Cade, D.E.**, Seakamela, S. M., Findlay, K. P., Fahlbusch, J., S., Fukunaga, J., Kahane-Rapport, S.R., Oestreich, W., Ryan, J., Warren, J., Calambokidis, J., Hazen, E., Friedlaender, A. S., Kotze, D., Meyer, M., McCue, S., Wilke, C., Goldbogen, J. A. (In review) Extensive, ephemeral, hierarchically-structured prey patches drive collective exploitation by super groups of lunge-feeding whales. *eLife*
- Bamford, C.C.G., Kelly, N., Dalla Rosa, L., **Cade, D.E.**, Fretwell, P., Trathan, P.N., Cubaynes, H., Mesquita, A., Gerrish, L., Friedlaender, A.S. & Jackson, J.A. (In review) Space vs Sea: a novel method for estimating baleen whale density. *Scientific reports*.
- Kahane-Rapport, S.R., Savoca, M.S., **Cade, D.E.**, Segre, P.S., Bierlich, K.C., Calambokidis, J., Dale, J., Friedlaender, A.S., Johnston, D., Werth, A.J. & Goldbogen, J.A. (In review) Lunge filter feeding biomechanics constrain rorqual foraging ecology across scale. *Journal of Experimental Biology*.
- Flammang, B.E., Marras, S., Lehmkuhl, O., Anderson, E.J., Mukherjee, A., **Cade, D.E.**, Beckert, M., Nadler, J.H., Houzeaux, G., Vazquez, M., Amplo, H.E., Calambokidis, J., Friedlaender, A.S. & Goldbogen, J.A. (In review) Remoras pick where they stick and surf on blue whales. *Journal of Experimental Biology*
- Czapanskiy, M.F., Savoca, M.S., Gough, W.T., Segre, P.S., Wisniewska, D.M., **Cade, D.E.** & Goldbogen, J.A. (In review) Large baleen and small toothed whales face greatest energetic consequences from sonar disturbance. *Journal of Applied Ecology*
- Oestreich, W.K., Fahlbusch, J.A., **Cade, D.E.**, Calambokidis, J., Margolina, T., Joseph, J., Friedlaender, A.S., McKenna, M.F., Stimpert, A.K., Southall, B.L., Goldbogen, J.A. & Ryan, J.P. (In review) Animal-borne measures of behavior enable acoustic detection of migration in dispersed populations. *Current Biology*
- Matika, A.F., Jourdain, E., **Cade, D.E.**, Karoliussen, R. & Hammond, P.S. (In review) Diving characteristics, energetics and prey profitability in herring-feeding killer whales (*Orcinus orca*) in northern Norway. *Marine Mammal Science*.

MANUSCRIPTS in final preparation

- Pirotta, E., Booth, C., **Cade, D.E.**, Calambokidis, J., Costa, D.P., Fahlbusch, J.A., Friedlaender, A.S., Goldbogen, J.A., Harwood, J., Hazen, E.L., New, L. & Southall, B.L. (In prep) Context-dependent variability in the predicted daily energetic costs of disturbance in blue whales.

AWARDS

- Outstanding achievement award, Hopkins Marine Station, 2014
Anne T. and Robert M. Bass Fellowship, Stanford University, 2014-2017

RESEARCH GRANTS

- San Francisco and Monterey American Cetacean Society Research Grants, 2017, 2016, 2015

DAVID E. CADE

Defense University Research Instrumentation Program, project collaborator, 2016
Meyers Ocean Trust Student Research Award, 2016

ACADEMIC MENTORING

Salinas High School/Hopkins Marine Station Mentoring Program Founder & Coordinator, 2015-2019

Julie Fukunaga, Stanford Undergraduate, 2017. See Cade, Seakamela et al.

Kaela Montano, Ashley Guido, Salinas High School students, 2016-2017

Julianne Eitoku, Sandra Bautista, Salinas High School students, 2015-2016

Marisa Roth, Stanford Undergraduate, 2015

PEER REVIEW

40+ peer reviews. See [publons profile](#). Journals:

Journal of Experimental Biology

Functional Ecology

Plos One

Marine Ecology Progress Series

PeerJ

Royal Society Open Science

ICES Journal of Marine Science

Oceanography

Proceedings B: Biological Sciences

Progress in Oceanography

Marine Mammal Science

Endangered Species Research

INVITED LECTURES & SYMPOSIA

Pacific Grove Museum of Natural History – Invited Seminar	2017/2020
California Ocean Alliance – Marine Mammal Scientist Training Program (x5)	2018/2019
UC Santa Cruz – Biology of Marine Mammals Guest Lecture	2018
Moss Landing Marine Labs – Invited Seminar	2017
Aarhus University – Inertial Sensing Workshop Guest Lecture	2017
Weber State University Arts Integration Conference – Co-keynote speaker	2017
Lincoln High School (San Francisco) Marine Biology – Guest Lecture	2017
Point Reyes National Seashore Docent Training – Invited Seminar	2016
Biennial International American Cetacean Society Conference – Invited Talk	2016
Cal State University-Monterey Bay – Invited Seminar	2016
American Cetacean Society SF Bay – Invited Seminar	2016
American Cetacean Society Monterey Bay – Invited Seminar	2016
Cal State University-Monterey Bay – Marine Conservation Guest Lecture	2015
Moss Landing Marine Labs – Marine Acoustics Guest Lecture	2014

DAVID E. CADE

CONFERENCE PROCEEDINGS (SELECTED)

First author presentations

Ocean Sciences meeting, San Diego, CA	2020
Society for Integrative and Comparative Biology, Austin, TX	2020
World Marine Mammal Conference, Barcelona, SP	2019
Society for Integrative and Comparative Biology, San Francisco, CA	2018
Biennial Conference of the Biology of Marine Mammals, Halifax, NS	2017
CA Student Chapter of the Society for Marine Mammalogy, Moss Landing, CA	2017
Biennial Conference of the Biology of Marine Mammals, San Francisco, CA	2015
NW Student Chapter of the Society for Marine Mammalogy, Corvallis, OR	2015
Acoustics Society of America, Indianapolis, IN	2014

First author posters

The 6 th International Bio-logging Science Symposium, Konstanz, Germany	2017
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Co-authored presentations

(4) Ocean Sciences meeting, San Diego, CA	2020
Society for Integrative and Comparative Biology, Austin, TX	2020
(13) World Marine Mammal Conference, Barcelona, SP	2019
(2) Society for Integrative and Comparative Biology, San Francisco, CA	2018
(6) Biennial Conference of the Biology of Marine Mammals, Halifax, NS	2017
Acoustics Society of America, Honolulu, HI	2016

RELEVANT FIELD EXPERTISE

Current CI on US NMFS marine mammal permits 23095, 20430, and 21678

- Authorized to conduct cetacean field research in US and Antarctic waters
- 6+ years experience with suction cup and dart-attached tagging, biopsy sampling, UAV work, behavioral observation and small boat operation
- Placed, processed and/or supervised over 400 video/accelerometer tag deployments
- Level II disentanglement response training

Chief scientist/PI for cetacean field studies

Antarctic, March 2020

Monterey Bay, 2016-2018

Nine years of field studies in diverse environments collaborating with 15+ institutions including:

Antarctic (3 seasons) 2018-2020

Monterey Bay, CA (6 seasons) 2014-2019

Washington (3 seasons) 2015-2018

Azores, Portugal (3 seasons) 2015-2018

Cape Cod, MA (3 seasons) 2015-2017

So. California (5 seasons) 2013-2017

Svalbard, Norway (1 season) 2016

Andenes, Norway (1 season) 2016

Western South Africa (1 season) 2015

Newfoundland Coast (1 season) 2015

Oregon Coast (1 season) 2012

Gulf of California (1 season) 2011

Current Wilderness First Responder (WFR) and CPR certification (WMI/Stanford), exp June 2021

DAVID E. CADE

SCUBA certification (assistant instructor, NAUI)
4 seasons research diving with REEF check (2008-2010, 2015)

SELECTED MEDIA COVERAGE

Media for PNAS anchovy manuscript: ([NPR](#)) ([phys.org](#)) ([others](#))
Media for PNAS heart rate manuscript: ([quirks and quarks](#)) ([San Jose Mercury news](#)) ([>200 other](#))
Media for Cade et al 2016: ([video abstract](#)) ([Stanford](#)) ([Daily Planet Canada](#)) ([Gizmodo](#))
Others: ([Science Magazine for SMM 2017](#)) ([Monga Bay](#)) ([Outreach blog](#))
Passive acoustics work with MBNMS: ([local news link](#)) ([outreach video](#))

REFERENCES

Jeremy Goldbogen, Assistant Professor of Biology, Stanford University
Email: jergold@stanford.edu

Elliott Hazen, Research Ecologist, NOAA Southwest fisheries, Adjunct Professor, UCSC
Email: elliott.hazen@noaa.gov

Jean Potvin, Professor of Physics, St. Louis University
Email: jean.potvin@slu.edu

John Calambokidis, Director, Cascadia Research Collective
Email: calambokidis@cascadiaresearch.org

Fleur Visser, Chief Scientist, Kelp Marine Research
Email: fleurvisser@gmail.com