

Curriculum Vitae



Personal Information:

Bell, Tom William
111 Bigelow, Woods Hole Oceanographic Institution, Woods Hole, MA 02543
(619) 857-1233
tbell@whoi.edu
www.tomwbell.net

Education:

- Ph.D. Interdisciplinary Program in Marine Science, University of California, Santa Barbara, September 2016 *advisor* – Dr. David Siegel
- M.Sc. Biology (Ecology), San Diego State University, December 2011 *advisor* – Dr. Walter Oechel
- B.A. Integrative Biology, B.A. Legal Studies, University of California, Berkeley, December 2006

Professional Appointments:

- Assistant Scientist, Woods Hole Oceanographic Institution, Woods Hole, 2021 – *present*
- Assistant Research Scientist, University of California, Santa Barbara, 2020 – 2022
- Assistant Project Scientist, University of California, Santa Barbara, 2017 – 2020
- Postdoctoral Scholar, University of California, Los Angeles, 2016 – 2018
- Postdoctoral Scholar, University of Alaska Southeast, 2016 – 2018

Research Grants or Fellowships:

Active:

- The Nature Conservancy – (2022 – 2025) “Development of KelpWatch: Increasing stakeholder access.” PI: T. Bell. (\$79,672)
- Advanced Research Projects Agency – Energy: OPEN, (2022 – 2025) “Quantifying the potential and risks of large-scale macroalgae cultivation and purposeful sequestration as a viable CO₂ reduction strategy.” PI: D. Siegel. Co-PI: T. Bell, R. Miller, D. Valentine, C. Carlson, H. Kite-Powell, J. McWilliams, D. Bianchi (\$3,050,196)
- National Aeronautics and Space Administration – (2022 – 2025) “Assessing spatial biodiversity dynamics in kelp forest ecosystems using spaceborne remote sensing.” PI: T. Bell. Co-PI: R. Miller (\$651,253)
- National Aeronautics and Space Administration – (2021 – 2024) “Vulnerability of giant kelp populations to climate change.” PI: T. Bell. Co-PIs: K. Cavanaugh, J. Byrnes (\$756,918)
- National Oceanic and Atmospheric Administration – (2021 – 2026) “Sustaining and Expanding the Southern California Ocean Observing System (SCCOOS).” PI: T. Bell. (\$49,999)
- National Oceanic and Atmospheric Administration – (2021 – 2026) “The Central and Northern California Ocean Observing System: Information solutions to power healthy and prosperous oceanic, coastal and estuarine communities.” PI: T. Bell. (\$49,873)
- National Science Foundation – (2020 – 2023) “Collaborative Research: Patterns, causes, and consequences of synchrony in giant kelp populations.” PI: M. Castorani. Co-PIs: T. Bell, D. Reuman, K. Cavanaugh (\$965,329; \$166,274 to WHOI).
- California Sea Grant – (2020 – 2023) “Where, when, and how? A guide to kelp restoration in California using spatio-temporal models of kelp dynamics.” PI: J. Caselle. Co-PIs: T. Bell, M. Carr (\$538,766)
- Advanced Research Projects Agency – Energy: Macroalgae Research Inspiring Novel Energy Resources, (2018 – 2023) “Scalable Aquaculture Monitoring System (SAMS).” PI: D. Siegel. Co-PIs: T. Bell, K. Cavanaugh, R. Miller, N. Nelson, N. Nidzieko, D. Reed (\$2,004,000)

Completed:

- California Sea Grant – (2019 – 2022) “Benefits Beyond Biomass: Biophysical feedbacks within Marine Protected Areas may promote ecosystem resilience in the face of global climate change.” PI: A. Stier. Co-PIs: T. Bell, K. Nickols, N. Nidzieko (\$250,000)

- The Nature Conservancy – (2019 – 2021) “Kelp Canopy Monitoring with Google Earth Engine.” PI: J. Caselle. Co-PIs: T. Bell (\$101,000)
- Point Reyes National Seashore - U.S. National Parks Service Grant, (2016 - 2019) “Rapid, large-scale eelgrass monitoring using high-resolution (sUAS – drone) remote sensing.” PIs: T. Bell, M. Castorani (\$22,000)
- UC Affiliates Graduate Dissertation Fellowship, (2015) “Giant kelp biomass and net primary productivity dynamics are associated with regional patterns of physiological condition.” PI: T. Bell. (\$3,000)
- Brython Davis Endowment Graduate Fellowship, (2015) “Scale dependence of bottom-up vs. demographic control on the dynamics of giant kelp forests” PI: T. Bell. (\$13,500)
- NASA Earth and Space Science Fellowship, (2012 - 2015) “Hyperspectral remote sensing of giant kelp in the Santa Barbara Channel.” PI: T. Bell. (\$90,000)
- Edna Bailey Sussman Internship, (2009) “Variation of Carbon Exchange over Multiple Temporal Scales in an Arid Shrub Ecosystem near La Paz, Baja California Sur, Mexico.” PI: T. Bell. (\$8,000)

Publications: (PDF copies available at tomwbell.net)

* equal author contribution, ^ authored by mentored student/technician

2022

- (49) Saccomanno, V.R., **Bell, T.W.**, Pawlak, C., Stanley, C.K., Cavanaugh, K.C., Hohman, R., Klausmeyer, K.R., Cavanaugh, K.C., Nickels, A., Hewardine, W., Garza, C., Fleener, G., Gleason, M. (*in press*), Using Unoccupied Aerial Vehicles (UAVs) to map and monitor changes in emergent kelp canopy after an ecological regime shift, *Remote Sensing in Ecology and Conservation*.
- (48) Monismith, S.G., Alhajjar, M.W., Woodson, C.B., Boch, C.A., Hernandez, A., Vazquez-Vera, L., **Bell, T.W.**, Micheli, F. (2022), Influence of kelp forest biomass on nearshore currents, *Journal of Geophysical Research - Oceans*, 127, e2021JC018333.
- (47) Monismith, S.G., Alhajjar, M.W., Daly, M., Valle-Levinson, A., Juarez, B., Fagundes, M., **Bell, T.W.**, Woodson, C.B. (2022), Kelp forest drag coefficients derived from tidal flow data, *Estuaries and Coasts*.
- (46) Castorani, M.C.N., **Bell, T.W.**, Walter, J.A., Reuman, D.C., Cavanaugh, K.C., Sheppard, L.W. (2022), Disturbance and nutrients synchronize kelp forests across scales through interacting Moran effects, *Ecology Letters*, 25, 1854-1868.
- (45) Walter, J.A., Castorani, M.C.N., **Bell, T.W.**, Sheppard, L.W., Cavanaugh, K.C., Reuman, D.C. (2022), Tail-dependent spatial synchrony arises from nonlinear driver-response relationships, *Ecology Letters*, 25, 1189-1201.
- (44) Houskeeper, H.F., Rosenthal, I.S., Cavanaugh, K.C., Pawlak, C., Trouille, L., Byrnes, J.E.K., **Bell, T.W.**, Cavanaugh, K.C. (2022), Automated satellite remote sensing of giant kelp at the Falkland Islands (Islas Malvinas), *PLOS One*, 17, e0257933.
- (43) **Bell, T.W.**, Siegel, D.A. (2022), Nutrient availability and senescence spatially structure the dynamics of a foundation species, *Proceedings of the National Academy of Sciences*, 119, 1, e2105135118.

2021

- (42) Cavanaugh, M.T., **Bell, T.W.**, Catlett, D., Cimino, M.A., Doney, S.C., Klajbor, W., Messié, M., Montes, E., Muller-Karger, F.E., Otis, D., Santora, J.A., Schroeder, I.D., Triñanes, J., Siegel, D.A. (2021), Satellite Remote Sensing and the Marine Biodiversity Observation Network, *Current Science and Future Steps*, *Oceanography*, 34, 2.
- (41) Cavanaugh, K.C., **Bell, T.W.**, Costa, M., Eddy, N.E., Gendall, L., Gleason, M.G., Hessing-Lewis, M., Martone, R., McPherson, M., Pontier, O., Reshitnyk, L., Beas-Luna, R., Carr, M., Caselle, J.E., Cavanaugh, K.C., Flores Miller, R., Hamilton, S., Heady, W.N., Hirsh, H., Hohman, R., Lee, L., Lorda, J., Ray, J., Reed, D.C., Saccomanno, V., Schroeder, S.B. (2021), A Review of the Opportunities and Challenges for Using Remote Sensing for Management of Surface-Canopy Forming Kelps, *Frontiers in Marine Science*, 8:7533531.
- (40) Siegel, D.A., DeVries, T., Doney, S.C., **Bell, T.W.** (2021), Assessing the sequestration time scales of ocean-based carbon dioxide reduction strategies. *Environmental Research Letters*, 16, 104003.

- (39) Tomascik, T., Mohammed, S.N.C., **Bell, T.W.** (2021), Comment on Gazi et al. (2020): Detecting coral reef degradation on St. Martin's Island, Bangladesh?, *Ocean Science Journal*, 56, 326-329.
- (38) Zhang, Z., Bortolotti, L.E., Li, Z., Armstrong, L.M., **Bell, T.W.**, Li, Y. (2021), Heterogeneous changes to wetlands in the Canadian prairies under future climate, *Water Resources Research*, 57, e2020WR028727.
- (37) Arafah-Dalmau, N., Cavanaugh, K.C., Possingham, H.P., Munguia-Vega, A., Montaña-Moctezuma, G., **Bell, T.W.**, Cavanaugh, K., Micheli, F. (2021), Southward decrease in the protection of persistent giant kelp forests in the northeast Pacific. *Communications Earth & Environment*, 2:119, 1-7.
- (36) McPherson, M.L., Finger, D.J.I., Houskeeper, H.F., **Bell, T.W.**, Carr, M.H., Rogers-Bennett, L., Kudela, R.M. (2021), Large-scale shift in the structure of a kelp forest ecosystem co-occurs with an epizootic and marine heatwave. *Communications Biology*, 4, 298.
- (35) Cavanaugh, K.C., Cavanaugh, K.C., **Bell, T.W.**, Hochridge, E.G. (2021), An automated method for mapping giant kelp canopy dynamics from UAV. *Frontiers in Environmental Science*, 8:587354.
- (34) Detmer, A.R., Miller, R.J., Reed, D.C., **Bell, T.W.**, Stier, A.C., Moeller, H.V. (2021), Variation in disturbance to a foundation species structures the dynamics of a benthic reef community. *Ecology*.
- (33) Tinker, M.T., Yee, J., Laidre, K.L., Hatfield, B., Harris, M., Tomoleoni, J., **Bell, T.W.**, Saarman, E., Carswell, L., Miles, K. (2021), Habitat features predict carrying capacity of a recovering marine carnivore. *Journal of Wildlife Management*, 85, 303-323.

2020

- (32) **Bell, T.W.**, Nidzieko, N., Siegel, D.A., Miller, R., Cavanaugh, K., Nelson, N., Reed, D., Federov, D., Cavanaugh, K., Moran, C., ^Snyder, J., ^Griffith, M. (2020), The utility of satellites and autonomous remote sensing platforms for monitoring offshore aquaculture farms: A case study for canopy forming kelps. *Frontiers in Marine Science*, 7:520223.
- (31) Harrison, L.R., Legleiter, C.J., Overstreet, B.T., **Bell, T.W.**, Hannon, J. (2020), Assessing the potential for spectrally based remote sensing of salmon spawning locations. *River Research and Applications*, 1-15.
- (30) ^Hamilton, S., **Bell, T.W.**, Watson, J., Grorud-Colvert, K., Menge, B. (2020), Remote Sensing: Generation of Long-Term Kelp Forest Datasets for Evaluation of Impacts of Climatic Variation. *Ecology*. e03031.
- (29) Friedlander, A.M., Ballesteros, E., **Bell, T.W.**, Caselle, J.E., Campagna, C., Hüne, M., Muñoz, A., Salinas-de-León, P., Sala, E., Dayton, P. (2020), Kelp forests at the uttermost part of the earth: 45 years later. *PLOS One*. 15, e0229259.
- (28) ^Snyder, J.N., **Bell, T.W.**, Siegel, D.A., Nidzieko, N.J., Cavanaugh, K.C. (accepted), Sea surface temperature imagery elucidates spatiotemporal nutrient patterns and serves as a tool for offshore kelp aquaculture siting in the Southern California Bight. *Frontiers in Marine Science*.
- (27) **Bell, T.W.**, Okin, G., Cavanaugh, K.C., Hochberg, E.J. (2020), Impact of water characteristics on the discrimination of benthic cover in and around coral reefs from imaging spectrometer data. *Remote Sensing of Environment*. 239, 111631.

2019

- (26) Wyngaard, J., Barbieri, L., Thomer, A., Adams, J., Sullivan, D., Parr, C., Shrestha, S.R., Crosby, C., Klump, J., **Bell, T.W.** (2019), Emergent challenges for science sUAS data management: Fairness through community engagement and best practices development. *Remote Sensing*. 11, 1797.
- (25) Cavanaugh, K.C., Reed, D.C., **Bell, T.W.**, Castorani, M.C.N., Beas-Luna, R. (2019), Spatial variability in the resistance and resilience of giant kelp in southern and Baja California to a multiyear heatwave. *Frontiers in Marine Science*. 6:413.
- (24) ^Sainz, J., Di Lorenzo, E., **Bell, T.W.**, Gaines, S., Miller, R., Lenihan, H. (2019), Spatial planning of Marine Aquaculture under Climate Decadal Variability: A case study for Mussel Farms in California. *Frontiers in Marine Science*. 6:253.
- (23) **Bell, T.W.**, Allen, J.A., Cavanaugh, K.C., Siegel, D. A. (2019), Three decades of variability in California's giant kelp forests from the Landsat satellites. *Remote Sensing of Environment*.

2018

- (22) Lester, S.E., Stevens, J.M., Gentry, R.R., Kappel, C.V., **Bell, T.W.**, Costello, C.J., Gaines, S.D., Kiefer, D.A., Maue, C.C., Rensel, J.E., Simons, R.D., Washburn, L., White, C. (2018), Marine spatial planning makes room for offshore aquaculture in a crowded coastal zone. *Nature Communications*, 9:945, 1-13.
- (21) Friedlander, A.M., Ballesteros, E., **Bell, T.W.**, Giddens, J., Henning, B., Hüne, M., Muñoz, A., Salinas-de-León, P., Sala, E. (2018), Marine biodiversity at the end of the world: Cape Horn and Diego Ramírez islands. *PLOS ONE*, 13, e0189930.
- (20) **Bell, T.W.**, Reed, D.C., Siegel, D. A. (2018), Regional patterns of physiological condition determine giant kelp primary production dynamics. *Limnology and Oceanography*, 63, 472-483.
- (19) Lamy, T., Reed, D.C., Rassweiler, A.R., Siegel, D.A., Kui, L., **Bell, T.W.**, Simons, R., Miller, R.J. (2018) Scale-specific driver of kelp forest communities. *Oecologia*, 186, 217-233.

2017

- (18) Biederman, J.A., Scott, R.L., **Bell, T.W.**, Bowling, D., Dore, S., Garatuza-Payan, J., Kolb, T.E., Krishnan, P., Krofcheck, D., Litvak, M.E., Maurer, G.E., Meyers, T., Oechel, W.C., Papuga, S., Ponce-Campos, G.E., Rodriguez, J., Vargas, R., Watts, C., Yepez, E.A., Goulden, M.L. (2017) CO₂ exchange and evapotranspiration across dryland ecosystems of southwestern North America. *Global Change Biology*, 23, 4204-4221.
- (17) Kelly, P., **Bell, T. W.**, Reisinger, A., Spanbauer, T., Bortolotti, L., Bentrup, J., Briseño-Avena, C., Dong, X., Flanagan, A., Follett, E., Grosse, J., Guy-Haim, T., Holgerson, M., Hovel, R., Luo, J., Millette, N., Mine, A., Muscarella, M., Oliver, S., Smith, H. (2017) Ecological Dissertations in the Aquatic Sciences (Eco-DAS): An excellent networking and professional development opportunity for early career aquatic scientists. *Limnology and Oceanography Bulletin*, 26, 25-30.
- (16) Teck, S., Lorda, J., Shears, N.T., **Bell, T.W.**, Cornejo-Donoso, J., Caselle, J.E., Hamilton, S.L., Gaines, S.D. (2017) Disentangling the effects of fishing and environmental forcing on demographic variation in an exploited species. *Biological Conservation*, 209, 488-498.
- (15) Guy-Haim, T., Alexander, H., **Bell, T.W.**, Bier, R., Bortolotti, L., Briseño-Avena, C., Dong, X., Flanagan, A., Grosse, J., Grossmann, L., Hasnain, S., Hovel, R., Johnston, C., Miller, D., Muscarella, M., Noto, A., Reisinger, A.J., Smith, H., Spanbauer, T., Stamieszkin, K. (2017) How do experimental characteristics of aquatic mesocosms change the direction and magnitude of effect sizes in climate change research? A systematic review protocol. *Environmental Evidence*, 6, 1-6.
- (14) Wheeler, S.G., Anderson, T.W., **Bell, T.W.**, Morgan, S.G., Hobbs, J.A. (2017) Regional productivity predicts individual growth and recruitment of rockfishes in a northern California upwelling system. *Limnology and Oceanography*, 62, 754-767.
- (13) Cabral, R.B., Gaines, S.D., Johnson, B., **Bell, T.W.**, White, C. (2017), Redistribution of fishing and non-fishing effort after the implementation of marine protected areas: Identifying drivers for informing expectations in marine spatial planning. *Ecological Applications*, 27, 416-428.
- (12) Castorani, M.C.N., Reed, D.C., Raimondi, P.T., Alberto, F., **Bell, T.W.**, Cavanaugh, K.C., Siegel, D.A., Simons, R. (2017) Fluctuations in population fecundity drive variation in demographic connectivity and metapopulation dynamics. *Proceedings of the Royal Society B*, 284, 2016208.
- (11) Gentry, R.R., Lester, S.E., Kappel, C.V., Stevens, J., White, C., **Bell, T.W.**, Gaines, S.D. (2017) Offshore Aquaculture: Spatial Planning Principles for Sustainable Development. *Ecology and Evolution*, 7, 733-743.
- (10) Koweek, D., Nickols, K.J., Leary, P., Litvin, S.Y., **Bell, T.W.**, Luthin, T., Mucciarone, D.A., Dunbar, R.B., Lummis, S. (2017) A year in the life of a central California kelp forest: physical and biological insights into carbon cycling. *Biogeosciences*, 14, 31-44.

2016

- (9) Reed, D.C., Washburn, L., Rassweiler, A., Miller, R., **Bell, T.W.**, Harrer, S. (2016) Extreme warming challenges sentinel status of kelp forests as indicators of climate change. *Nature Communications*, 7, 13757.
- (8) Biederman, J.A., Scott, R.L., Goulden, M.L., Vargas, R., Litvak, M.E., Kolb, T.E., Yepez, E.A., Oechel, W.C., Blanken, P.D., **Bell, T.W.**, Garatuza-Payan, J., Maurer, G.E., Dore, S., Burns, S.P. (2016) Contrasting effects of fast interannual and slow climatic precipitation variability on ecosystem carbon balance. *Global Change Biology*, 22, 1867-1879.

- (7) Young, M.A., Cavanaugh, K.C., **Bell, T.W.**, Raimondi, P.T., Edwards, C., Drake, P., Erikson, L., Storlazzi, C. (2016) Explaining and predicting spatial patterns of persistence of giant kelp, *Macrocystis pyrifera*, forests in central California. *Ecological Monographs*, 86(1), 45-60.
- (6) Morton, D.N., **Bell, T.W.**, Anderson, T.W. (2016) Spatial synchrony of amphipods in giant kelp forests. *Marine Biology*, 163(2), 1-11.

2015

- (5) Castorani, M.C.N., Reed, D.C., Alberto, F., **Bell, T.W.**, Simons, R. Cavanaugh, K.C., Siegel, D.A., Raimondi, P.T. (2015) Connectivity predicts local extinction and colonization in a marine metapopulation. *Ecology*, 96, 3142-3152.
- (4) **Bell, T.W.**, Cavanaugh, K.C., Reed, D.C., Siegel, D.A. (2015) Geographical variability in the controls of giant kelp biomass dynamics. *Journal of Biogeography*, 42, 2010-2021.
- (3) Johansson, M.L., Alberto, F., Reed, D.C., Raimondi, P.T., Coelho, N.C., Young, M.A., Drake, P.T., Edwards, C.A., Cavanaugh, K.C., Assis, J., Ladah, L.B., **Bell, T.W.**, Coyer, J.A., Siegel, D.A., Serrão, E.A. (2015) Seascape drivers of *Macrocystis pyrifera* population genetic structure in the eastern North Pacific. *Molecular Ecology*, 24, 4866-4885.
- (2) ***Bell, T.W.**, *Cavanaugh, K.C., Siegel, D.A. (2015) Remote monitoring of giant kelp biomass and photosynthetic condition: An evaluation of the potential for the Hyperspectral Infrared Imager (HyspIRI) mission. *Remote Sensing of Environment*, 167, 218-228.

2012

- (1) **Bell, T.W.**, Menzer, O., Troyo-Diéquez, T., Oechel, W. (2012) Variation of Carbon Exchange over Multiple Temporal Scales in an Arid Shrub Ecosystem near La Paz, Baja California Sur, Mexico. *Global Change Biology*, 18, 2570-2582.

Technical Publications:

- Lafferty, K.D., Rassweiler, A., Gotschalk, C.C., Morton, D.N., **Bell, T.W.**, Henderikx, F., Kushner, D.J., Sprague, J., Johnson, C., and Washburn, L. (2019) The response of kelp forest organisms to spatial and temporal variation in wave energy in the California Channel Islands. Camarillo (CA): US Department of the Interior. OCS Study BOEM 2019-064. 38 p.
- Hohman, R., Hutto, S., Catton, C. and F. Koe. 2019. Sonoma-Mendocino Bull Kelp Recovery Plan. Plan for the Greater Farallones National Marine Sanctuary and the California Department of Fish and Wildlife. San Francisco, CA. 166 pp. **Role:** *Working group member*
- Turpie, K.R., Abelev, A., Babin, M., Bachmann, C., **Bell, T.W.**, Brando, V., Byrd, K., Dekker, A., Devred, E., Forget, M-H., Goodman, J., Guild, L., Hochberg, E., Hu, C., Young-Heon, J., Kelly, M., Klemas, V., Lee, Z., Moisan, T., Moses, W., Muller-Karger, F., Palacios, S., Philpot, B., Toro-Farmer, G., Yu, Q. (2015) Coastal and inland aquatic data products for the Hyperspectral Infrared Imager (HyspIRI), NASA.
- Turpie, K.R., Ackelson, S., **Bell, T.W.**, Dierssen, H., Goodman, J., Green, R., Guild, L., Hochberg, E., Klemas, V.V., Lavender, S., Lee, C., Minnet, P., Muller-Karger, F., Ortiz, J., Palacios, S., Thompson, D.R., Zimmerman, R. (2015) Global observations of coastal and inland aquatic habitats, NASA.
- Turpie, K.R., Allen, D.W., Ackelson, S., **Bell, T.W.**, Cavanaugh, K., Dierssen, H., Fisher, J.B., Goodman, J., Guild, L., Hochberg, E., Klemas, V.V., Lavender, S., Lee, C., Muller-Karger, F., Ortiz, J., Palacios, S., Thompson, D.R., Zimmerman, R. (2015) New need to understand changing coastal and inland aquatic ecosystem services, Decadal survey for earth science and applications from space, NASA.

Datasets:

- **Bell, T.W.**, Cavanaugh, K.C., D.A. Siegel. (2022) Time series of quarterly NetCDF files of kelp biomass in the canopy from Landsat 5, 7 and 8, 1984 - 2022 (ongoing). Santa Barbara Coastal LTER.
- **Bell, T.W.**, D.A. Siegel. (2021) Kelp canopy chlorophyll to carbon ration derived from aerial hyperspectral imagery ver 1. Santa Barbara Coastal LTER.

- Castorani, M.C.N., Reed, D.C., Raimondi, P.T., Alberto, F., **Bell, T.W.**, Cavanaugh, K.C., Siegel, D.A. Kelp metapopulations: Semi-annual time series of giant kelp patch area, biomass, and fecundity in southern California, 1996-2006. Santa Barbara Coastal LTER.

Mentoring: Active Advising Activities

Postdoctoral Researchers

- Dr. Sara Gonzalez (WHOI) – Genetics, Physiology, and Production of Natural and Farmed *Sacharrina* (co-advised with Lindell, Tepolt, and Alexander)
- Dr. Henry Houskeeper (UCLA) – Development of image automation processing pipelines for the development of a global map of kelp canopy dynamics (co-advised with Cavanaugh)

Graduate Students

- Nathalie Eegholm – Spatiotemporal Patterns of Giant Kelp NPP, *Committee Member*; UCSB
- Karen Aerni – Mosquito Ditching in Saltmarshes, *Committee Member*; Northeastern University
- Katherine Cavanaugh – Hyperspectral Remote Sensing of Giant Kelp, *Committee Member*; UCLA

Teaching Experience:

- Instructor – Geodynamics Seminar Series (12.572), WHOI-MIT Joint Program, January – June 2022
- Teaching Associate (***Instructor of Record***) – Biogeography: The Study of Plant and Animal Distributions (Geography 167), UCSB, Santa Barbara, CA, June – July 2016
- Teaching Associate (***Instructor of Record***) – Marine Resources of the CA Current (Geography 158), UCSB, Santa Barbara, CA, September – December 2015
- Teaching Associate (***Instructor of Record***) – Intermediate Remote Sensing Techniques (Geography 115C), UCSB, Santa Barbara, CA, April – June 2015
- Teaching Assistant – Marine Resources of the CA Current (Geography 158), UCSB, Santa Barbara, CA January - March 2012
- Laboratory Instructor – Human Anatomy, SDSU, San Diego, CA August 2008 – May 2011
- Invited Guest Lectures (*many at UCSB – details upon request*)

Honors, Awards and Societies:

- Western Society of Naturalists 2009 – 2022
- American Geophysical Union 2014 – 2022
- Association for the Sciences of Limnology and Oceanography 2014 – 2022
- Ecological Society of America 2017 - 2022

Professional Service:

- Faculty Search Committee, Marine Policy Center, WHOI, Spring 2022
- Reviewer Editor – Frontiers in Marine Conservation and Sustainability
- Using Drones for High Spatial and Temporal Resolution Long Term Observations Workshop – Role: *Workshop Lead*, Long Term Ecological Research All Scientists Meeting, Asilomar, CA, October 2018
- R Workshop, Role: *Instructor*, Software Carpentry R Language Workshop, UCSB, Spring 2015
- Faculty Search Committee, *Graduate Student Rep*, Physical Oceanography, UCSB, Spring 2015
- Faculty Search Committee, *Graduate Student Rep*, Marine Carbon Cycle Modeling, UCSB, Spring 2014
- HyspIRI/Surface Biology & Geology Coastal and Inland Executive Committee, 2014 - *present*
- HyspIRI Mission Aquatic Studies Group, 2012 - 2018
- WSN Student Committee, 2014 – 2015
- EEMB Graduate Student Advisory Committee, 2012 – 2015
- W.E.B. Du Bois Event Graduate Representative, 2012 – 2014
- *Reviewer for:* AAAS Grant Proposals, US NSF Grant Proposals – Biological Oceanography, US NOAA Grant Proposals – Species Recovery Grants to Tribes, Netherlands Space Office Grant Proposals, PLOS ONE, Remote Sensing of Environment, Soil Science of America, Marine Ecology Progress Series, Frontiers in Marine Science, Optics Express, Agricultural and Forest Meteorology, Applied Optics, Applied Sciences, Psychological Research, Sustainability, Remote Sensing, Aquatic

Conservation: Marine and Freshwater Systems, Algal Research, J. Experimental Marine Biology and Ecology, J. Marine Science and Engineering, Applied Geography, Frontiers in Marine Conservation and Sustainability, Scientific Reports, Marine Biology, Coral Reefs, Frontiers in Ecology and the Environment, Limnology and Oceanography, Geoscience and Remote Sensing Letters, Frontiers in Environmental Science, Annals of GIS, Remote Sensing in Ecology and Conservation

Workshop Attendance:

- UC DroneCamp (*virtual*), June 2022
- TNC Kelp Mappers Meeting, May 2019 - 2022
- Regional Ecosystem Services Observation Network (RESON), November 2021, February 2022
- TNC Kelp Mappers Meeting (*virtual*), May 2021
- TNC Kelp Mappers Meeting (*virtual*), May 2020
- Regional UAV Workshop, Moss Landing, CA, December 2019
- Entering Mentoring Workshop, LTER All Scientists Meeting, Asilomar, CA, October 2018
- Ecological Dissertations in the Aquatic Sciences XII, University of Hawaii, Manoa, October 2016
- Pacific Anomalies Workshop II, University of Washington, Seattle, WA, January 2016
- Pacific Anomalies Workshop I, Scripps Institute of Oceanography, La Jolla, CA, May 2015
- Data Management Workshop, LTER Main Office, U. New Mexico, Albuquerque, NM, August 2012
- CICESE/SDSU Science Meeting, CICESE, Ensenada, Baja California, Mexico, March 2008, 2009

Professional Presentations as lead author (= invited; ^^ = session chair):**

- August 2022: Ecological Society of America**
Multidecadal kelp forest dynamics following the reintroduction of an apex predator
- July 2021: WHOI Summer Lecture Series**
Understanding ecosystems from the edge of space
- February 2022: Ocean Sciences Meeting, (*virtual*)
Utilizing a Multiyear Dataset of Unoccupied Aircraft System Imagery to Validate Landsat Derived Giant Kelp Canopy
- November 2021: Western Society of Naturalists, (*virtual*)
Utilizing a Multiyear Dataset of Unoccupied Aircraft System Imagery to Validate Landsat Derived Giant Kelp Canopy
- July 2021: WHOI Summer Lecture Series (*virtual*)**
Remote Sensing of Coastal Ecosystems using Satellites and Drones
- May 2021: Arizona State University Global Discovery and Conservation Science Seminar (*virtual*)**
Multiscale Approaches for Reconciling Competing Mechanisms of Ecosystem Dynamics
- May 2021: Hawaii Institute of Marine Biology: Schmidt Summer Program in Marine Science (*virtual*)**
Multiscale Approaches for Reconciling Competing Mechanisms of Ecosystem Dynamics
- April 2021: Sea Otter Research and Conservation Symposium, (*virtual*)
Changes in Kelp Canopy Cover Associated with Sea Otter Recovery in the Northeast Pacific
- November 2020: Western Society of Naturalists, (*virtual*)
Understanding the Role of Seawater Nitrate: Essential for Successful Bull Kelp Restoration
- August 2020: International Marine Conservation Congress, (*virtual*)
Leveraging Technology to Support Adaptive Management of Kelp
- June 2020: Society Industrial & Applied Mathematics: Mathematics of Planet Earth, (*virtual*)**
Patterns and Dynamics in Spatially Explicit Ecological Systems
- February 2020: Ocean Sciences Meeting, San Diego, CA^^
Nutrient availability and programmed senescence spatially structure the dynamics of an ecosystem engineer
- November 2019: Western Society of Naturalists, Ensenada, Baja California, Mexico**
KelpWatch: A Publicly Available Tool for Visualization and Analysis
- October 2019: Eastern Pacific Ocean Conference, Fallen Leaf Lake, CA
Disentangling Potential Global Change Trends from low Frequency Climate Oscillations in Marine Environments
- April 2019: World Aquaculture Society Annual Meeting, New Orleans, LA**
SAMS: Scalable Aquaculture Monitoring System
- March 2019: Society for Restoration Ecology Annual Meeting, Santa Barbara, CA**

- Effects and Recovery from the Montecito Debris Flow on the Carpinteria Salt Marsh
- January 2019: Dept. Biology Seminar, East Carolina University, Greenville, NC**
Multiscale approaches reconcile competing mechanisms of ecosystem dynamics
 - November 2018: Western Society of Naturalists, Tacoma, WA
Separating Potential Global Change Trends from Low Frequency Climate Oscillations in Northeast Pacific Kelp Forests
 - October 2018: Duck Unlimited Canada, Winnipeg, Manitoba, Canada**
Spatiotemporal Trends in Vegetation and Water over Diverse Scales through Remote Sensing
 - October 2018: LTER All Scientists Meeting, Asilomar, CA – *(poster)*
Separating Potential Global Change Trends from Low Frequency Climate Oscillations in Northeast Pacific Kelp Forests
 - June 2018: Association for the Sciences of Limnology and Oceanography Summer Meeting, Victoria, British Columbia, Canada^^
Separating Potential Global Change Trends from Low Frequency Climate Oscillations in Northeast Pacific Kelp Forests
 - April 2018: Dept. Environmental Sciences Seminar, University of Virginia, Charlottesville, VA**
Insights into the dynamics of giant kelp forests across large spatiotemporal scales
 - March 2018: Ecology, Evolution & Marine Biology Seminar, UC Santa Barbara, Santa Barbara, CA**
Insights into the dynamics of giant kelp forests across large spatiotemporal scales
 - February 2018: Ocean Sciences Meeting, Portland OR – *(poster)*
Using Simulated Hyperspectral Data to Identify the Practical Limits of Discrimination of Coral Reef Benthic Composition
 - February 2018: University of Alaska Fisheries Seminar Series, Juneau, AK**
Insights into the dynamics of giant kelp forests across large spatiotemporal scales
 - November 2017: Western Society of Naturalists, Pasadena, CA^^
Sea Otter Recolonization Associated with Regional Increase in Giant Kelp Canopy
 - October 2017: HypsIRI Science Workshop, Cal Tech, Pasadena, CA
Using HypsIRI to Identify Benthic Composition and Bleaching in Shallow Coral Reef Ecosystems
 - September 2017: Bodega Bay Marine Laboratory Seminar Series, Bodega Bay, CA**
UAV Eelgrass Surveys Over Drakes Estero, Point Reyes National Seashore, w/ Max Castorani
 - August 2017: Ecological Society of America, Portland, OR** – *(flash talk)*
Hyperspectral remote sensing: Unlocking process in a marine foundation species
 - August 2017: Ecological Society of America, Portland, OR
Scale dependence of bottom-up versus demographic controls on the dynamics of giant kelp forests
 - May 2017: NASA Biodiversity and Ecological Forecasting Meeting, Washington D.C.
Using HypsIRI to Identify Benthic Composition and Bleaching in Shallow Coral Reef Ecosystems
 - November 2016: Western Society of Naturalists, Monterey, CA
Scale dependence of bottom-up vs. demographic controls on the dynamics of giant kelp forests
 - February 2016: Ocean Sciences Meeting, New Orleans, LA
Assessment of Giant Kelp Physiological State Using Airborne Hyperspectral Imagery
 - January 2016: Pacific Anomalies Workshop II, Seattle, WA – *(poster)*
Decreases in Standing Biomass and Physiological State of Giant Kelp Canopy During the 2014-2015 Warming Event in the Santa Barbara Channel
 - November 2015: Western Society of Naturalists, Sacramento, CA
Long-term Monitoring of Giant Kelp Biomass Dynamics Exposes Nonlinear Relationships with Environmental Drivers
 - October 2015: SBC LTER Midterm Review, UCSB, Santa Barbara, CA
Regional dynamics of giant kelp using remote sensing
 - October 2015: HypsIRI Science Workshop, Cal Tech, Pasadena, CA
Potential of the HypsIRI mission for monitoring the physiological condition of giant kelp forests
 - June 2015: International Ocean Colour Meeting, San Francisco, CA – *(poster)*
Remote monitoring of giant kelp biomass and physiological condition: An evaluation of the potential for the Hyperspectral Infrared Imager (HypsIRI) mission
 - December 2014: American Geophysical Union, San Francisco, CA – *(poster)*
Remote monitoring of giant kelp biomass and photosynthetic condition: An evaluation of the potential for the Hyperspectral Infrared Imager (HypsIRI) mission

- November 2014: Western Society of Naturalists, Tacoma, WA
Temporal and spatial variability in the photosynthetic condition of giant kelp
- November 2014: Western Society of Naturalists, Tacoma, WA – *(poster)*
Remote monitoring of giant kelp biomass and photosynthetic condition: An evaluation of the potential for the Hyperspectral Infrared Imager (HyspIRI) mission
- November 2014: SBC LTER All Scientists Meeting, UCSB, Santa Barbara, CA
Temporal and spatial variability in the photosynthetic condition of giant kelp
- October 2014: HyspIRI Science Workshop, Cal Tech, Pasadena, CA
Remote monitoring of giant kelp biomass and photosynthetic condition: An evaluation of the potential for the Hyperspectral Infrared Imager (HyspIRI) mission
- November 2013: Western Society of Naturalists, Oxnard, CA
Primary drivers of giant kelp biomass in California
- November 2013: SBC LTER All Scientists Meeting, UCSB, Santa Barbara, CA
Primary drivers of giant kelp biomass in California
- May 2013: HyspIRI Science Symposium, Goddard Space Flight Center, Greenbelt, MD
Hyperspectral Remote Sensing of Giant Kelp in the Santa Barbara Channel
- March 2013: LTER Student Symposium, Scripps Institute of Oceanography, La Jolla, CA
Hyperspectral Remote Sensing of Giant Kelp in the Santa Barbara Channel
- November 2012: Western Society of Naturalists, Seaside, CA
Seasonal biomass patterns of giant kelp across its dominant range in the NE Pacific
- September 2012: LTER All Scientists Meeting, Estes Park, CO – *(poster)*
Regional variability of giant kelp canopy biomass dynamics in the NE Pacific
- March 2012: Oxford Interdisciplinary Desert Conference, Oxford, England
Variation of Carbon Exchange over Multiple Temporal Scales in an Arid Shrub Ecosystem
- September 2011: MEDECOS XII, UCLA, Los Angeles, CA
Spatial and Temporal Differences of Leaf Litter Transport in an Arid Shrub Ecosystem
- April 2011: European Geosciences Union, Vienna, Austria
Vertical and Lateral Carbon Flux in Leaf Litter in an arid ecosystem near La Paz, Mexico
- November 2009: Western Society of Naturalists, Seaside, CA
Comparative Carbon Flux in Marine and Terrestrial Subtropical Ecosystems in Magdalena Bay, MX

Technical Skills:

- AAUS Scientific Diver (>100 scientific dives)
- FAA UAS Part 107 Remote Pilot (*Active Since December 2016, >250 mission flown w/ color camera, multispectral, hyperspectral, & thermal sensors*)
- Matlab (*Very Advanced*)
- R (*Advanced*)
- ENVI (*Advanced*)
- Python (*Intermediate*)
- QGIS (*Intermediate*)
- Javascript (*Intermediate*)
- Arduino - Microcontrollers (*Intermediate*)

Outreach:

- Lead Scientist for *KelpWatch* with The Nature Conservancy
A publicly available visualization and data tool for canopy forming kelps in the NE Pacific
- Scientist for FloatingForests.org
Global giant kelp forest mapping by citizen scientists

Press:

- *What does it look like when an ecosystem collapses? Kelp can show us*, *Scientific American*, July 21, 2022
- *An ocean of opportunity*, *Oceanus Magazine*, December 7, 2021
- *Monitoring the collapse of kelp forests*, NASA Earth Observatory, (*Feature Article*), June 4, 2021

- *Ninety-five percent of bull kelp forests have vanished from 200-mile stretch of California Coast*, Yale Climate Connections, May 25, 2021
- *Satellite Imagery Shows Northern California Kelp Forests Have Collapsed*, Smithsonian, March 11, 2021
- *Spotting Salmon Spawning by Drone: Advancements in Redd Mapping*, FISHBIO, November 30, 2020
- *Autonomous Aquaculture's Kelp Crusaders*, InsideUnmannedSystems, November 5, 2020
- *Kelp Help*, UCSB Current, July 6, 2020
- *The kelps are alright: Studies reveal resilience in kelp forests*, Mongabay, April 2, 2020
- *Remote South American Kelp Forests Surveyed for the First Time Since 1973*, Phys.org, March 11, 2020
- *Satellite Data Boosts Understanding of Climate Change's Effects on Kelp*, Phys.org, March 5, 2020
- *Testing the Waters*, UCSB Current, July 9, 2019
- *Sustainable Ocean Development*, UCSB Current, March 5, 2018
- *Cultivating Marine Biomass*, UCSB Current, September 19, 2017
- *Kelp Helping Kelp*, UCSB Current, January 25, 2017
- *Kelp Beats the Heat*, UCSB Current; ScienceDaily; Eurekalert, December 13, 2016
- *Finding Floating Forests: It Takes an Online Village to Map Massive Kelp*, NASA Earth Observatory (Feature Article), December 19, 2014

- NASA Earth Observatory: Image of the Day
 - January 5, 2015 – *Floating Forests Revealed*
 - January 12, 2015 – *Finding Cortez*
 - January 16, 2015 – *Kelp Losing Their Grip on the Seafloor*