

Curriculum Vitae (abbreviated)
January 2022

Dr. Julie E. Keister

Professor

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Education

1989 B.S. Biology, University of North Carolina at Chapel Hill, Chapel Hill, NC

1996 M.S. Marine-Estuarine-Environmental-Sciences, Chesapeake Biological Laboratory, University of Maryland System, Solomons, MD.

2008 Ph.D. Biological Oceanography, College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR.

Employment

2021- Professor, School of Oceanography, University of Washington, Seattle, WA

2021- Adjunct Professor, School of Aquatic and Fishery Sciences (SAFS), UW, Seattle, WA

2014-2021 Associate Professor, School of Oceanography, University of Washington, Seattle, WA

2016-2021 Adjunct Associate Professor, School of Aquatic and Fishery Sciences (SAFS), UW, Seattle, WA

2008-2014 Assistant Professor, School of Oceanography, University of Washington, Seattle, WA

2012-2016 Adjunct Assistant Professor, School of Aquatic and Fishery Sciences (SAFS), UW, Seattle, WA

2003-2008 Ph.D. Candidate, Biological Oceanography, Oregon State University, Corvallis, OR

2002-2003 Senior Faculty Research Assistant, Hatfield Marine Science Center, Newport, OR

1998-2002 Faculty Research Assistant, Hatfield Marine Science Center, Newport, OR

Current Research Funding

2020-2023 *"Ecosystem impacts of the jellyfish Aurelia labiata in Puget Sound: insights from mesocosms, monitoring, and ecosystem modeling."* J. Keister (Lead), C. Greene, I. Kaplan, K. Sobocinski, H. Morzaria-Luna. Funded by WA Sea Grant.

2020-2022 *"Drivers of inter-annual variability in zooplankton feeding in the Strait of Georgia: A combined model-observation approach."* S. Allen (Lead) and J. Keister. Funded by the UBC-UW Collaborative Research Mobility Award.

2019-2023 *"Puget Sound Zooplankton Monitoring Program."* J. Keister (Lead). Funded by Washington DNR via WA Dept. of Fish and Wildlife.

2019-2023 *"Washington State Ocean Acidification Center biological monitoring."* J. Keister. Funded by the WA Ocean Acidification Center.

2019-2023 *"Marine zooplankton analysis and reporting for King County's Marine Monitoring Program."* J. Keister. Funded by King County.

2018-2022 *"Metagenomic fluctuations of zooplankton and ichthyoplankton communities in the Salish Sea: association with water chemistry."* J. Keister (Lead), C. Stepien. Funded by WA Sea Grant.

2017-2023 *"Causes and consequences of hypoxia and pH impacts on zooplankton: Linking movement behavior to vertical distribution."* J. Keister (Lead), D. Grünbaum, J. Mickett. Funded by NSF.

Peer-Reviewed Journal Articles

(*) denotes former graduate student, (+) post-doc; (**) undergraduate student author.

2021 Khangaonkar T., A. Nugraha, S.K. Yun, L. Premathilake, **J.E. Keister**, and J. Bos. Propagation of the 2014–2016 Northeast Pacific Marine Heatwave through the Salish Sea. *Frontiers in Marine Sciences* 8:787604. doi: 10.3389/fmars.2021.787604.

- 2021 +Hiltunen, M., U. Strandberg, A.K. Winans, D.A. Beauchamp, M. Kotila, M.T. Brett, and **J.E. Keister**. Taxonomic, temporal, and spatial variation in zooplankton fatty acid composition in Puget Sound, WA, USA. *Estuaries and Coasts*: doi.org/10.1007/s12237-021-00973-8
- 2021 *Keil, K.E., T. Klinger, **J.E. Keister**, and A.K. McLaskey. Estimating relative sensitivities of zooplankton to ocean acidification in a temperate coastal sea. *Frontiers in Marine Sciences*: https://doi.org/10.3389/fmars.2021.613778.
- 2021 *McLaskey, A.K. and **J.E. Keister**. An integrated field-laboratory investigation of the effects of low oxygen and pH on North Pacific krill (*Euphausia pacifica*). *Marine Biology* 168(43): 10.1007/s00227-021-03845-8.
- 2020 Khangaonkar, T., A. Nugraha, P. Lakshitha, **J.E. Keister**, and A. Borde. Projections of algae, eelgrass, and zooplankton ecological interactions in the inner Salish Sea – for future climate and altered oceanic states. *Journal of Ecological Modeling*: 441, 109420, doi.org/10.1016/j.ecolmodel.2020.109420..
- 2020 *Moriarty, P.E., T.E. Essington, J.K. Horne, **J.E. Keister**, S. Parker-Setter, and +M. Sato. Unexpected food web responses to low dissolved oxygen in an estuarine fjord. *Ecological Applications*: doi.org/10.1002/eap.2204.
- 2020 *McLaskey, A.K., **J.E. Keister**, and L. Yebra. Individual growth rate (IGR) and aminoacyl-tRNA synthetases (AARS) activity as individual-based indicators of growth rate of North Pacific krill, *Euphausia pacifica*. *Journal of Experimental Marine Biology and Ecology* 527: 151360, doi.org/10.1016/j.jembe.2020.151360.
- 2020 **Herrmann, B. and **J.E. Keister**. Species composition and distribution of jellyfish in a seasonally hypoxic estuary, Hood Canal, Washington. *Diversity*, 12, 53: doi:10.3390/d12020053.
- 2020 **Keister, J.E.**, A.K. Winans, and B. Herrmann. Zooplankton community response to seasonal hypoxia: a test of three hypotheses. *Diversity*, 12, 21: doi:10.3390/d12010021.
- 2020 Schwing, F.B., M.J. Sissenwine, H. Batchelder, H.G. Dam, J. Gómez-Gutiérrez, **J.E. Keister**, H. Liu, J.O. Peterson. William (Bill) Peterson's contributions to ocean science, management, and policy. *Progress in Oceanography* 182: 102241.
- 2019 Engström-Öst, J., O. Glippa, R.A. Feely, M. Kanerva, **J.E. Keister**, S.R. Alin, B.R. Carter, A.K. McLaskey, K.A. Vuori, and N. Bednaršek. Eco-physiological responses of copepods and pteropods to ocean warming and acidification. *Nature Scientific Reports* 9:4748: doi.org/10.1038/s41598-019-41213-1.
- 2019 *McLaskey, A.K., P. McElhany, S. Bush, M. Maher, A. Winans, and **J.E. Keister**. Early life stages of *Calanus pacificus* are neither exposed nor sensitive to low pH waters. *Journal of Plankton Research* 41(6): 893–896.
- 2019 †Li, L., **J.E. Keister**, T.E. Essington, and J. Newton. Vertical distribution and abundance of *Euphausia pacifica* in relation to oxygen and temperature in a seasonally hypoxic fjord. *Journal of Plankton Research* 41(2): 188-202.
- 2019 *McLaskey, A.K., **J.E. Keister**, †K.L. Schoo, M.B. Olson, and B. Love. Direct and indirect effects of elevated CO₂ are revealed through shifts in phytoplankton, copepod development, and fatty acid accumulation. *PLoS ONE* 14(3): e0213931. doi.org/10.1371/journal.pone.0213931.
- 2018 *Ruz, P., P. Hidalgo, R. Escribano, **J.E. Keister**, L. Yebra, B. Franco-Cisterna. Hypoxia effects on females and early stages of *Calanus chilensis* in the Humboldt Current ecosystem (23°S). *Journal of Experimental Marine Biology* 498: 61-71.
- 2016 †Sato, M., J.E. Horne, S. Parker-Setter, T. Essington, **J.E. Keister**, *P. Moriarty, †L. Li, J. Newton. Impacts of oxygen on fish and zooplankton prey distributions in a coastal fjord. *Marine Ecology Progress Series* 560: 57–72.
- 2016 *McLaskey, A.K., **J.E. Keister**, P. McElhany, B. Olson, S. Bush, A. Winans. Development of *Euphausia pacifica* (krill) larvae is impaired under pCO₂ levels currently observed in the Northeast Pacific. *Marine Ecology Progress Series* 555: 65-78.
- 2016 **Grodzins, M., *P.M. Ruz, and **J.E. Keister**. Effects of oxygen depletion on field distributions and laboratory survival of the marine copepod *Calanus pacificus*. *Journal of Plankton Research* doi:10.1093/plankt/fbw063.

- 2015 *Sato, M., J.E. Horne, S. Parker-Stetter, **J.E. Keister**. Acoustic classification of coexisting taxa in a coastal ecosystem. *Fisheries Research* 172: 130–136.
- 2015 *Ruz, P., P. Hidalgo, *S. Yáñez, R. Escribano, **J.E. Keister**. Egg production and hatching success of *Calanus chilensis* and *Acartia tonsa* in the northern Chile upwelling zone (23°S), Humboldt Current System. *Journal of Marine Systems* 148: 200–212.
- 2014 Hirst A.G., **J.E. Keister**, A.J. Richardson, P. Ward, R.S. Shreeve, R.V. Escribano. Re-assessing copepod growth results from the Moulting Rate Method. *Journal of Plankton Research* doi:10.1093/plankt/fbu045.
- 2014 Chiba, S., E. Di Lorenzo, *A. Davis, **J.E. Keister**, B. Taguchi, Y. Sasai, H. Sugisaki. Large-scale climate control on transport and zooplankton biogeography in the Kuroshio Oyashio Extension region. *Geophysical Research Letters* 40: 5182-5187, doi:10.1002/grl.50999.
- 2013 E. Di Lorenzo, *V. Combes, **J.E. Keister**, P.T. Strub, A. Thomas, P.J.S. Franks, M. Ohman, A. Bracco, S. Bograd, W.T. Peterson, F. Schwing, S. Chiba, B. Taguchi, S. Hormazabal, C. Parada. Synthesis of Pacific Ocean Climate and Ecosystem Dynamics. *Oceanography* 26(4): 68-81, doi.org/10.5670/oceanog.2013.76.
- 2013 Ross, T., **J.E. Keister**, and A.L. Lopes. On the use of high-frequency broadband sonar to classify biological scattering layers from a cabled observatory in Saanich Inlet, British Columbia. *Methods in Oceanography* doi:10.1016/j.mio.2013.05.001.
- 2013 **Keister, J.E.** and L.B. Tuttle. Effects of bottom-layer hypoxia on spatial distributions and community structure of zooplankton in a sub-estuary of Puget Sound, WA, USA. *Limnology and Oceanography* 58: 667-680.
- 2011 **Salmi, M., H.P. Johnson, I. Leifer, and **J.E. Keister**. Behavior of methane seep bubbles over a pockmark on the Cascadia Continental Margin. *Geosphere* 7: 1273-1283, doi:10.1130/GES00648.1.
- 2011 **Keister, J.E.**, E. Di Lorenzo, C.A. Morgan, *V. Combes, and W.T. Peterson. Zooplankton species composition is linked to ocean transport in the Northern California Current. *Global Change Biology*, doi: 10.1111/j.1365-2486.2010.02383.x.
- 2010 **Keister, J.E.**, D.L. Pascual, J. Clasen, K. Hopfensperger, N. Kelly, J. K. Llopiz, S.M. Moseman, and L.E. Petes. Climate and anthropogenic change in aquatic environments: a cross-ecosystem perspective. p. 1-16. In P.F. Kemp [ed.], *Eco-DAS VIII Symposium Proceedings*. ASLO: doi:10.4319/ecodas.2010.978-0-9845591-1-4.1.
- 2009 **Keister, J.E.**, T.J. Cowles, W.T. Peterson, and C.A. Morgan. Do upwelling filaments result in predictable biological distributions in coastal upwelling ecosystems? *Progress in Oceanography* 83: 303-313.
- 2009 **Keister, J.E.**, W.T. Peterson, and S.D. Pierce. Zooplankton distribution and cross-shelf transport of carbon in an area of complex mesoscale circulation in the northern California Current. *Deep-Sea Res. I*, doi:10.1016/j.dsr.2008.09.004.
- 2008 **Keister, J.E.** and P.T. Strub. Spatial and interannual variability in mesoscale circulation in the northern California Current System. *Journal of Geophysical Research* C04015, doi:10.1029/2007JC004256.
- 2008 Suchman, C.L., E.A. Daly, **J.E. Keister**, W.T. Peterson, and R.D. Brodeur. Prey selection and predation potential of scyphomedusae in a highly productive upwelling region. *Marine Ecology Progress Series* 358: 161-172.
- 2005 Huyer, A., J.H. Fleischbein, **J. Keister**, P.M. Kosro, N. Perlin, R.L. Smith, and P.A. Wheeler. Two coastal upwelling domains in the Northern California Current System. *Journal of Marine Research* 63: 901-929.
- 2005 **Keister, J.E.**, T.B. Johnson, C.A. Morgan, and W.T. Peterson. Biological indicators of the timing and direction of warm-water advection during the 1997/98 El Niño off the central Oregon coast, USA. *Marine Ecology Progress Series* 295: 43-48.
- 2003 **Keister, J.E.** and W.T. Peterson. Zonal and seasonal variations in zooplankton community structure off the central Oregon coast, 1998-2000. *Progress in Oceanography* 57: 341-361.
- 2003 Peterson, W.T. and **J.E. Keister**. Interannual variability in copepod community composition at a coastal station in the northern California Current: a multivariate approach. *Deep Sea Research II* 50: 2499-2517.

- 2003 Breitburg, D.L., A. Adamack, K.A. Rose, S.E. Kolesar, M.B. Decker, J.E. Purcell, **J.E. Keister**, and J.H. Cowan, Jr. The pattern and influence of low dissolved oxygen in the Patuxent River, a seasonally hypoxic estuary. *Estuaries* 26 (2A): 280-297.
- 2002 Peterson, W.T., **J.E. Keister**, and L.R. Feinberg. The effects of the 1997-99 El Niño/La Niña events on hydrography and zooplankton off the central Oregon coast. *Progress in Oceanography* 54: 381-398.
- 2002 Peterson, W.T. and **J.E. Keister**. The effect of a large cape on distribution patterns of coastal and oceanic copepods off Oregon and northern California during the 1998-1999 El Niño-La Niña. *Progress in Oceanography* 53: 389-411.
- 2000 **Keister, J.E.**, E.D. Houde, and D.L. Breitburg. Effects of bottom-layer hypoxia on abundances and depth distributions of organisms in Patuxent River, Chesapeake Bay. *Marine Ecology Progress Series* 205: 43-59.

Book Chapters

- 1999 Iverson, T.K., **J.E. Keister**, and R.D. McDonald. Summary of the Evaluation of Fish Passage through Three Surface Spill Gate Designs at Rock Island Dam in 1996. *In: Innovations in Fish Passage Technology*. AFS Publications, M. Odeh, Ed, 224 pp.

Select Non-Refereed Publications, Reports, Databases, and Other Products

- 2020 Fisher, J., D. Kimmel, T. Ross, S. Batten, E. Bjorkstedt, M. Galbraith, K. Jacobson, **J. Keister**, A. Sastri, K. Suchy, S. Zeman, and I. Perry. Copepod responses to, and recovery from, the recent marine heatwave in the Northeast Pacific. *PICES Press* vol. 28(1): 65-70.
- 2019 Greene, C., B. Curry, J. Newton, **J. Keister**, I. Kemp, D. Beauchamp, E. Lessard, K. Stark, and G. Hannach. Linking environmental and biotic variation to growth and survival of juvenile Chinook salmon in Puget Sound. SSMSP Technical Report. Available at: <https://marinesurvivalproject.com/resources>.
- 2019 **Keister, J.E.**, A.K. Winans, B. Herrmann, J. Bos, and I. Kemp. Bottom-up links to juvenile salmon growth and survival in Puget Sound, WA, USA. . North Pacific Anadromous Fish Commission Technical Report No. 15: 106–107 <https://npafc.org/technical-report/>; <https://npafc.org/workshop-presentations-2019/>
- 2019 Winans, A., B. Herrmann, M. Hiltunen, U. Strandberg, M. Brett, and **J.E. Keister**. Quantifying juvenile salmon prey quality and exploring trophic linkages in Puget Sound, WA, USA. North Pacific Anadromous Fish Commission Technical Report No. 15: 107–108. <https://npafc.org/technical-report/>; <https://npafc.org/workshop-presentations-2019/>
- 2019 Puget Sound Zooplankton database: Publicly provided database of mesozooplankton species composition, abundance, and biomass from 16 sites in Puget Sound and the San Juan Islands, collected, ~bi-weekly, 2014-2019, as part of the Salish Sea Marine Survival Project. Available at <https://green2.kingcounty.gov/ScienceLibrary/Document.aspx?ArticleID=556>
- 2018 **Keister, J.** and M. Crewson. Improving salmon survival forecasts through prey field monitoring and indicator development. Final report to the NOAA Saltonstall-Kennedy program, 17 Dec. 2018. Available at: http://faculty.washington.edu/jkeister/jk_pubs.php.
- 2019 Hiltunen, M., U. Strandberg, **J. Keister**, D. Beauchamp, and M. T. Brett. Fatty acid composition of zooplankton prey for juvenile salmonids in Puget Sound. SSMSP Technical Report. Available at: <https://marinesurvivalproject.com/resources>.
- 2018 Connelly, K.A. J.R. Gardner, M.M. Gamble, J.W. Chamberlin, A. Winans, **J.E. Keister**, and D.A. Beauchamp. Marine survival of Puget Sound Chinook: size-selective mortality growth limitation and bioenergetics of sub-yearling Chinook salmon in Puget Sound, Washington. SSMSP Technical Report. Available at: <https://marinesurvivalproject.com/resources>.

- 2017 **Keister, J.E.**, B. Herrmann, and A. Winans. The Zooplankton Monitoring Program, 2014-2015. SSMSP Technical Report. Available at: <https://marinesurvivalproject.com/resources>.
- 2017 Chamberlin, J., M. Gamble, K. Connelly, J. Gardner, R. Barsh, M. O'Connell, **J. Keister**, D. Beauchamp, M. Schmidt, B. Beckman, and K. Warheit. Assessing early marine growth in juvenile Chinook salmon: factors affecting variability in individual growth in Northern Puget Sound. SSMSP Technical Report. Available at: <https://marinesurvivalproject.com/resources>.
- 2017 Ohman, M., N. Mantua, **J. Keister**, M. Garcia-Reyes, and S. McClatchie. "ENSO impacts on ecosystem indicators in the California Current System." *CLIVAR Variations*, 15(1): 8-15.
- 2015 Kemp, I. and **J.E. Keister**. Zooplankton community patterns in Puget Sound: description of a 20-year qualitative dataset. SSMSP Technical Report. Available at: <https://marinesurvivalproject.com/resources>.
- 2013 **J.E. Keister**. *Zooplankton Sampling Protocol. A procedural guide to developing zooplankton monitoring programs in the Salish Sea*. Developed for the Salish Sea Marine Survival Program at the request of regional agencies and tribes to promote consistent sampling protocols throughout the Salish Sea, 9 pp. Available at: http://faculty.washington.edu/jkeister/jk_outreach.php. Used by >15 groups in the Salish Sea and coastal Washington.
- 2013 *Identification guide to the zooplankton of Puget Sound*. Developed a pictorial guide in collaboration with Washington Sea Grant for use by regional outreach and education groups. Available from WA Sea Grant and at <https://lltk.org/zooplankton-puget-sound/>. Distributed to >250 users to date.
- 2012 **Keister, J.E.**, D. Bonnet, R. Escibano, D.L. Mackas, S. Chiba, C. Johnson. Zooplankton population connections, community dynamics, and climate variability. An Introduction to the Proceedings of the 5th International Zooplankton Production Symposium. *ICES Journal of Marine Science* 69: 347-350, doi: 10.1093/icesjms/fss034.

Edited Volumes

- 2019 The Effects of Hypoxia on Marine Food Webs and Ecosystems: 8 articles published in a special issue of *Diversity*, <https://www.mdpi.com/si/25846>.
- 2012 Zooplankton Population Connections, Community Dynamics, and Climate Variability: Proceedings of the 5th International Zooplankton Production Symposium: 16 articles published in the *ICES Journal of Marine Science* 69(3): 347-492. <https://academic.oup.com/icesjms/issue/69/3>