Justin L. Penn

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EDUCATION

2020 **PhD**, Oceanography
University of Washington, Seattle
Dissertation title: "Biosphere Impacts of Ocean Hypoxia in Warming Climate"

2016 **MS**, Oceanography
University of Washington, Seattle

2012 **BS**, Environmental Science, Conservation Biology Minor
University of California, Los Angeles
Magna Cum Laude

RESEARCH INTERESTS

Climate change, ocean biogeochemistry, marine ecosystems, biodiversity, Earth system/ecosystem modeling, extinction, ocean deoxygenation, nitrogen cycle, O_2 minimum zones, paleoclimate, paleo/geobiology, ecophysiology, biogeography, metabolic theory, carbon cycle, tropical oceanography, fisheries, coral reefs.

PROFESSIONAL EXPERIENCE

2025 **Instructor**, Department of Ecology and Evolutionary Biology, Princeton University and Smithsonian Tropical Research Institute, Panama

2021 – **Postdoctoral Research Associate**, Department of Geosciences, Princeton University

2021 **Postdoctoral Scholar**, School of Oceanography, University of Washington, Seattle

2014 – 2020 **Graduate Research Assistant**, School of Oceanography University of Washington, Seattle

2015, 2017 **Teaching Assistant**, School of Oceanography University of Washington, Seattle

2013 – 2014 **Research Scientist & Engineer**, School of Oceanography University of Washington, Seattle

2012 – 2013 **Research Assistant**, Department of Atmospheric and Oceanic Science University of California, Los Angeles

2012 **Research Intern**, Institute of the Environment and Sustainability, Institute of Geophysics & Planetary Physics, University of California, Los Angeles

PUBLICATIONS

Al Aswad J.A., **Penn J. L.**, Monarrez P., Deutsch C., Payne. J. L., Physiology and climate change explain unusually high similarity across marine communities after end-Permian mass extinction *Science Advances.* (2025) 11, DOI: 10.1126/sciadv.adr4199

Penn. J. L., Deutsch C., Geographic and taxonomic patterns in aerobic traits of marine ectotherms. *Phil. Trans. R. Soc. B* (2024) 379 (1896), 20220487. https://doi.org/10.1098/rstb.2022.0487

Endress M. A., **Penn J. L.**, Boag T. H., Burford B. P., Sperling E. A., Deutsch C. Thermal optima in the hypoxia tolerance of marine ectotherms: physiological causes and biogeographic consequences. *PLOS Biology* (2024) 22 (1), e3002443. https://doi.org/10.1371/journal.pbio.3002443

Deutsch C., **Penn J. L.**, Lucey N. Climate, oxygen, and the future of marine biodiversity. *Annual Review of Marine Science* (2024) 16, 217-245. https://doi.org/10.1146/annurev-marine-040323-095231

Payne J. L., Al Aswad J. A., Deutsch C. A., Monarrez P. M., **Penn J. L.**, Singh P., Selectivity of mass extinctions: patterns, processes, and future directions. *Cambridge Prisms: Extinction* (2023).1,e12,1–11 https://doi.org/10.1017/ext.2023.10

Deutsch C., **Penn J. L.**, Verbek W. C. E. P., Inomura K., Endress M., Payne J. L. Impact of warming on aquatic body sizes explained by metabolic scaling from microbes to macrofauna. *Proceedings of the National Academy of Sciences*. 119 (2022). https://doi.org/10.1073/pnas.2201345119

Penn J. L., Deutsch C., Avoiding ocean mass extinction from climate warming. *Science.* 526, 524-526 (2022). DOI: 10.1126/science.abe903

C. Deutsch, **Penn J. L.**, Seibel B., Metabolic trait diversity shapes marine biogeography. *Nature*. 585 (2020), https://doi.org/10.1038/s41586-020-2721-y

Howard E. M., **Penn J. L.**, Frenzel H., Seibel B. A., Bianchi D., Renault L., Kessouri F., Sutula M. A., McWilliams J. C., Deutsch C., Climate-driven aerobic habitat loss in the California Current System, *Science Advances*. 6 (2020), DOI: 10.1126/sciadv.aay3188

Penn J. L., Weber T., Chang, B. X., Deutsch C., Microbial ecosystem dynamics drive fluctuating nitrogen loss in marine anoxic zones. *Proceedings of the National Academy of Sciences*. 16 (2019), https://doi.org/10.1073/pnas.1818014116

Penn J. L., Global warming blamed for Earth's largest mass extinction. *The Science Breaker*. (2019). https://doi.org/10.25250/thescbr.brk277

Penn J. L., Deutsch C., Payne. J. L., Sperling E.A., Temperature-dependent hypoxia explains biogeography and severity of end-Permian marine mass extinction. *Science*. 362 (2018), https://doi.org/10.1126/science.aat1327

Penn J. L., Weber T., Deutsch C., Microbial functional diversity alters the structure and function of oxygen deficient zones. *Geophysical Research Letters.* 43 (2016),

https://doi.org/10.1002/2016GL070438

GRANTS AND FELLOWSHIPS

2022–2025 Geophysical Fluid Dynamics Laboratory (GFDL) & Cooperative Institute for Modeling the Earth System (CIMES) Task III project; "Development and parametrization of a trait-based model of zooplankton diversity for marine food web and climate feedback studies", Co-PI, $284,000

2018 Program on Climate Change Fellowship, UW

HIGHLIGHTS, HONORS, AND AWARDS

2024 – 2026, 2015 – 2019 National Center for Atmospheric Research (NCAR) Computing Allocation

2022 *Science* Perspective by Malin Pinsky and Alexa Fredston on "Avoiding ocean mass extinction from climate warming."

2019 Ocean Carbon and Biogeochemistry Science Highlights: "Microbial ecosystem dynamics drive fluctuating nitrogen loss in marine anoxic zones"

2018 *Science* Perspective by Lee Kump on "Temperature-dependent hypoxia explains biogeography and severity of end-Permian marine mass extinction"

2016 Modeling a Living Planet Travel Scholarship, Princeton University

2013 Phi Beta Kappa, UCLA

2012 California Sea Grant Isaacs Scholarship

2012 Departmental Academic Achievement Award, Institute of the Environment and Sustainability, UCLA

2012 Departmental Highest Honors, Institute of the Environment and Sustainability, UCLA

INVITED TALKS

2025 Program on Climate Change Summer Institute: Paleoclimate Constraints on Future Climate University of Washington; "Modeling Biodiversity Dynamics under Climate Change."

2025 AIMEC Science Salon, Tohoku University, Japan; "Extinctions from Hypoxia in a Warming Ocean: Ancient Lessons for the Future."

2025 Scripps Ecology Seminar at UCSD; "Extinctions from Hypoxia in a Warming Ocean: Ancient Lessons for the Future."

2025 Seminar in the Department of Earth and Atmospheric Science, Cornell University; "Extinctions from Hypoxia in a Warming Ocean: Ancient Lessons for the Future."

2025 Earth, Atmospheric, and Planetary Sciences Department Lecture Series at MIT; "Extinctions from Hypoxia in a Warming Ocean: Ancient Lessons for the Future."

2025 Seminar at the School of Biological Sciences at Hong Kong University; "Hypoxia drove depth selectivity of marine extinction during the Paleocene-Eocene Thermal Maximum (PETM)."

2024 Seminar in Earth and Planetary Sciences at Stanford University; "Hypoxia drove depth selectivity of marine extinction during the Paleocene-Eocene Thermal Maximum (PETM)."

2024 School of Earth Sciences and Engineering, Nanjing University, China. "Climate warming and ocean hypoxia as drivers of end-Permian marine mass extinction: Implications for the future of biodiversity."

2024 Workshop on Earth's Evolution and Global Carbon Cycle, School of Earth Sciences and Engineering, Nanjing University, China; "Climate warming and ocean hypoxia as drivers of end-Permian marine mass extinction: Implications for the future of biodiversity."

2024 Bianchi Lab Group, Department of Oceanic and Atmospheric Science, University of California, Los Angeles, "Climate warming and ocean hypoxia as drivers of end-Permian marine mass extinction: Implications for the future of biodiversity."

2019 Chemical Oceanography seminar: University of Washington, Seattle. "Temperature-dependent hypoxia explains end-Permian extinction in the oceans."

2018 Paleobiology seminar: University of Washington, Seattle. "Temperature-dependent hypoxia explains end-Permian extinction in the oceans."

CONFERENCES

2024 Geological Society of America Connects, Anaheim, CA; "Climate, trait adaptation, and marine extinction patterns of the Paleocene-Eocene Thermal Maximum" (Talk).

2024 ESA Annual Meeting, Long Beach, CA; "Hypoxic storms promote species coexistence through competition on a tropical reef" (Talk).

2024 Ocean Sciences Meeting, New Orleans, LA; "Geographic and taxonomic patterns in aerobic traits of marine species" (Talk).

2022 Geological Society of America Connects, Denver, CO; "Avoiding ocean mass extinction from climate warming" (Invited).

2022 GENIE Symposium: Applications of the cGENIE (muffin) Earth System Model. University of California, Riverside (Attendee).

2020 Program on Climate Change Winter Symposium, University of Washington, Seattle. "Marine Extinction Risk from Climate Warming" (Talk).

2020 AAAS Annual Meeting, Seattle. "Marine Extinction Risk from Climate Warming" (Talk).

2019 Oceanography graduate and postdoc symposium: University of Washington, Seattle. "Temperature-dependent hypoxia explains end-Permian extinction in the oceans" (Poster).

2018 Gordon Research Conference: Global Change Biology, NH: "Temperature-dependent hypoxia explains end-Permian extinction in the oceans" (Poster).

2018 Gordon Research Seminar: Global Change Biology, NH: "Temperature-dependent hypoxia explains end-Permian extinction in the oceans" (Talk).

2017 Geological Society of America, Seattle, WA: "Temperature-dependent hypoxia explains end-Permian extinction in the oceans" (Talk).

2017 Ocean Science Meeting, Portland, OR: "Temperature-dependent hypoxia explains end-Permian extinction in the oceans" (Talk).

2016 American Geophysical Union Fall Meeting, San Francisco, CA: "Aerobic marine habitat loss during the Late Permian extinction" (Poster).

2016 Modeling a Living Planet: Princeton University, NJ: "Microbial ecosystem dynamics in marine O2 minimum zones" (Poster).

2016 Program on Climate Change Summer Institute: The Climate of Antarctica and the Southern Ocean, Friday Harbor, WA. (Attendee).

2014 American Geophysical Union Fall Meeting, San Francisco, CA: "Microbial competition for N intermediates drives oscillating N loss from marine oxygen deficient zones" (Talk).

2014 Gordon Research Conference: Marine Microbes, Boston, MA: "Modeling microbial ecosystem dynamics in marine anoxic zones" (Poster).

MEDIA COVERAGE

Communicating research findings to the public is a key part of increasing science accessibility and spreading awareness about climate change impacts. For my work on extinction, I've had the opportunity to convey my results to a broad audience by speaking with reporters, which led to coverage in >340 news outlets, including ***National Geographic***, ***New York Times 1***, ***2***, ***The Atlantic***, ***The Gaurdian 1***, ***2***, ***Scientific American***, ***The Independent***, ***Business Insider***, ***Forbes***, ***Seattle Times***, ***Smithsonian***, ***Newsweek***, ***Washington Post***, ***GeekWire***, ***Science News***, ***The Scientist***, ***Grist***, ***Mother Jones***, ***The Stranger***, ***My Northwest***, ***Futurity***, ***Seattle Met***, ***Yahoo!***, ***MSN***, ***NBC***, ***Gizmodo***, ***Bloomberg***, ***Wired***, ***USA today***.

2018, 2022 Radio Guest:

CBS News Radio L.A.

Radio Ecoshock with Alex Smith (106 stations)

"The Record" with Bill Radke, KUOW (NPR), Seattle, WA

BBC Radio 5 Live "Up All Night"

The "Texas Standard", KUT (NPR)

The Paper Boys Podcast, UW, Seattle

2018 ***Video Interview*** with Andrew Buncombe for The Independent

SERVICE ACTIVITIES

2024- PAGES PO_2 Early Career Network Representative

2024 *Session Moderator* for "Marine ecosystems across scales of space, time, and biology", Ocean Science Meeting, New Orleans, LA

2024 *Guest lecturer*, School of Earth Sciences and Engineering, Nanjing University, China (Feifei Zhang)

2018 ***Climate consultation*** with Governor Jay Inslee, Washington State Capitol, WA

2017 *Guest Lecturer*, Seattle University, Seattle, WA, ATM S220: Mass Extinctions (Doug Faust)

2010-2012 Volunteer Docent, Project 23, La Brea Tar Pits Page Museum, Los Angeles, CA.

TEACHING

2025 Princeton University, EEB 349: Semester in the Field Program, Tropical Biology in Panama: Tropical Marine Biodiversity in a Changing Ocean

2015, 2017 University of Washington, Ocean 215: Methods of Oceanographic Data Analysis in Python (Steve Riser)

FIELDWORK

2025 Smithsonian Tropical Research Institute, Bocas Del Toro, Panama: Zooplankton biodiversity, bacteria and nutrient surveys, and respirometry experiments

12/2016–
01/2017 R/V Sikuliaq, Eastern Tropical North Pacific: ARGO float deployment, zooplankton and nutrient sampling, algorithm development for CTD O2 sensor

2012	R/V Yellowfin, San Pedro Ocean Time-series (SPOT): Phytoplankton and nutrient sampling
2012	California Sea Grant Vessel, Santa Monica Bay Observatory (SMBO): Phytoplankton and nutrient sampling
2011	Monteverde Research Station, Costa Rica: Nutrient sampling of forest canopy throughflow
2010-2012	Excavator, Project 23, La Brea Tar Pits Page Museum, Los Angeles, CA.

Reviewer of journal articles in: Nature Communications, Geophysical Research Letters, Marine Chemistry, Environmental Research Letters.