JUSTIN KITZES

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BIOGRAPHY

Justin Kitzes is an Assistant Professor of Biological Sciences at the University of Pittsburgh. His research broadly examines how human alternation of natural habitat impacts species abundance and diversity at large spatial scales. His specific research interests include (a) bioacoustics, including developing and deploying acoustic recording hardware and machine learning classification models, (b) conservation, including conducting acoustic field surveys of populations at risk, and (c) spatial ecology, including developing theory and models to explain general biodiversity patterns. Dr. Kitzes received his Ph.D. from the University of California, Berkeley (Environmental Science, Policy, and Management) and his B.S. and M.S. degrees from Stanford University (Earth Systems).

EDUCATION

Ph.D., University of California, Berkeley 2012
Environmental Science, Policy and Management

B.S. and M.S., Stanford University 2005
Earth Systems

PROFESSIONAL HISTORY

University of Pittsburgh
Assistant Professor, Department of Biological Sciences 2017–

University of California, Berkeley
Data Science Fellow, Berkeley Institute for Data Science 2014–2017
Postdoctoral Scholar and Lecturer, Energy and Resources Group 2013–2017

GRANTS

Total of $3.6 million in extramural funding awarded since 2019. Amounts are total costs received by J. Kitzes, direct costs are listed in parentheses.

2023–2024	National Fish and Wildlife Foundation	Automated Acoustic Monitoring of Focal Bird Species in Dynamic Forest Restoration Blocks in the Delaware River Watershed II	PI	$173,241 ($160,756)
2023–2024	National Fish and Wildlife Foundation	Automated Acoustic Monitoring of Focal Bird Species in Dynamic Forest Restoration Blocks in the PA Wilds and Laurel Highlands III	PI	$81,940 ($76,350)

2022–2023	National Fish and Wildlife Foundation	Automated Acoustic Monitoring of Focal Bird Species in Dynamic Forest Restoration Blocks in the Delaware River Watershed I	PI	$162,194 ($147,447)
2022–2023	National Fish and Wildlife Foundation	Automated Acoustic Monitoring of Focal Bird Species in Dynamic Forest Restoration Blocks in the PA Wilds and Laurel Highlands II	PI	$183,568 ($170,598)
2021–2024	Gordon and Betty Moore Foundation	Beyond Biodiversity Monitoring: Expanding Automated Acoustic Survey Methods to Examine Fundamental Questions of Community Interactions, Population Processes, and Individual Movement	PI	$1,001,283 ($894,474)
2021–2026	National Science Foundation	BII: Uncovering mechanisms of amphibian resilience to global change from molecules to landscapes (to University of Pittsburgh)	Sub-award	$898,917 ($566,687)
2021–2022	National Fish and Wildlife Foundation	Automated Acoustic Monitoring of Focal Bird Species in Dynamic Forest Restoration Blocks in the PA Wilds and Laurel Highlands I	PI	$198,748 ($180,680)
2020–2022	NSERC	Developing regional-scale models of migratory bird movements to improve siting decisions for wind farms and other industrial infrastructure (to Acadia University)	Sub-award	$55,000 ($55,000)
2020–2021	USDA National Resources Conservation Service	Inventory and monitoring of relevant wildlife species across properties enrolled in NRCS conservation programs (to Indiana University of Pennsylvania)	Sub-award	$38,699 ($35,181)
2020–2022	Academic Data Science Alliance	AudioXD: Seeding a new multi-disciplinary, multi-university network of data scientists working with audio recordings	PI	$49,782 ($43,289)
2020	Gordon and Betty Moore Foundation	AudioXD additional support (Gift)	PI	$15,000
2019–2023	National Science Foundation	Locating and counting terrestrial wildlife with an open source, automated acoustic survey platform	PI	$643,272 ($433,064)
2019	Microsoft	AudioMoth fabrication support (Gift)	PI	$42,800
2019	National Geographic and Microsoft	Developing the first open source, scalable bird song classification software	PI	$91,089 ($71,956)

AWARDS & FELLOWSHIPS

John C. Mascaro Faculty Scholarship 2019
University of Pittsburgh, Mascaro Center for Sustainable Innovation ($10,000)

Data Science Fellowship 2014–2017
University of California Berkeley, Berkeley Institute for Data Science ($150,000)

Graduate Research Fellowship 2009–2012
National Science Foundation ($121,000)

PUBLICATIONS

Citations: 6,560, h-index: 26 (Google Scholar). Student and mentee authors are underlined.

Books

1. **Kitzes, J.** 2022. *Handbook of Quantitative Ecology*. University of Chicago Press.
2. **Kitzes, J.**, Turek, D., & Deniz, F. (Eds.) 2018. *The Practice of Reproducible Research: Case-Studies and Lessons from the Data-Intensive Sciences*. University of California Press.

Journal Articles

44. Chronister, L.M., Rhinehart, T.A., & **Kitzes, J.** *in press*. When birds sing at the same pitch, they avoid singing at the same time. Ibis.
43. Lapp, S., Larkin, J.L., Parker, H.A., Larkin, J.T., Shaffer, D.R., Tett, C., McNeil, D.J., Fiss, C.J., **Kitzes, J.** 2023. Automated recognition of ruffed grouse drumming in field recordings. Wildlife Society Bulletin, 47(1), e1395.
42. Rhinehart, T.A., Turek, D., **Kitzes, J.** 2022. A continuous-score occupancy model that incorporates uncertain machine learning output from autonomous biodiversity surveys. Methods in Ecology and Evolution, 13(8), 1778-1789.
41. Reeb, R.A., Aziz, N., Lapp, S.M., **Kitzes, J.**, Heberling, J.M., & Kuebbing, S.E. 2022. Using convolutional neural networks to efficiently extract immense phenological data from community science images. Frontiers in Plant Science, 12.
40. Nagy, R.C., Balch, J.K, …, **Kitzes, J.**, … [117 others]. 2021. Harnessing the NEON data revolution to advance open environmental science with a diverse and data-capable community. Ecosphere, 12(12), e03833.
39. **Kitzes, J.**, Blake, R., Bomabci, S., Chapman, M., Duran, S.M., Huang, T., Joseph, M.B., Lapp, S., Marconi, S., Oestreich, W.K., Rhinehart, T.A., Schweiger, A.K., Song, Y., Surasinghe, T., Yang, D., & Yule, K. 2021. Expanding NEON biodiversity surveys with new instrumentation and machine learning approaches. Ecosphere, 12(11), e03795.
38. Lapp, S., Wu, T., Richards-Zawacki, C., Voyles, J., Rodriguez, K.M., & **Kitzes, J.** 2021. Automated detection of frog calls and choruses by pulse repetition rate. Conservation Biology, 35(5), 1659-1668.

37. **Kitzes, J.**, Brush, M., & Walters, K. 2021. A unified framework for species spatial patterns: Linking the occupancy area curve, Taylor's Law, the neighborhood density function, and two-plot species turnover. Ecology Letters, 24(10), 2043-2053.

36. Chronister, L.M., Rhinehart, T.A., Place, A., & **Kitzes, J.** 2021. An annotated set of audio recordings of Eastern North American birds containing frequency, time, and species information. Ecology, 102(6), e03329.

35. Muñoz-Sáez, A., **Kitzes, J.**, & Merenlender, A.M. 2021. Bird-friendly wine country through diversified vineyards. Conservation Biology, 35(1), 274-284.

34. Shamon, H., Paraskevopoulou, Z., **Kitzes, J.**, Carda, E., Deichmanna, J.L., Boyce, A.J., & McShea, W.J. 2021. Using ecoacoustics metrices to track grassland bird richness across landscape gradients. Ecological Indicators, 120, 106928.

33. Rhinehart, T., Chronister, L., Devlin, T., & **Kitzes, J.** 2020. Acoustic localization of wildlife: current practices and future opportunities. Ecology and Evolution, 10(13), 6794-6818.

32. **Kitzes, J.**, & Schricker, L. 2019. The necessity, promise, and challenge of automated biodiversity surveys. Environmental Conservation, 46(4), 247-250.

31. **Kitzes, J.** 2019. Evidence for power-law scaling in species aggregation. Ecography, 42(6), 1224-1225.

30. **Kitzes, J.**, Berlow, E., Conlisk, E., Erb, K., Iha, K., Martinez, N., Newman, E. A., Plutzar, C., Smith, A. B., & Harte, J. 2017. Consumption-based conservation targeting: Linking biodiversity loss to economic consumption through a global wildlife footprint. Conservation Letters, 10(5), 531-538.

29. Wilson, G., Bryan, J., Cranston, K., **Kitzes, J.**, Nederbragt, L., & Teal, T. K. 2017. Good enough practices for scientific computing. PLoS Computational Biology, 13(6), e1005510.

28. Kelly, R., **Kitzes, J.**, Wilson, H., & Merenlender, A. 2016. Habitat diversity promotes bat activity in a vineyard landscape. Agriculture, Ecosystems and Environment, 223, 175-181.

27. **Kitzes, J.**, & Wilber, M. 2016. macroeco: Reproducible ecological pattern analysis in Python. Ecography 39, 361-367.

26. **Kitzes, J.**, & Shirley, R. 2016. Estimating biodiversity impacts without field surveys: A case study in northern Borneo. Ambio, 45(1), 110-119.

25. **Kitzes, J.**, & Harte, J. 2015. Predicting extinction debt from community patterns. Ecology, 96(8), 2172-2136.

24. Wilber, M., **Kitzes, J.**, & Harte, J. 2015. Scale collapse and the emergence of the power law species-area relationship. Global Ecology and Biogeography, 24(8), 883–895.

23. McGlinn, D., Xiao, X., **Kitzes, J.**, & White, E. 2015. Exploring the spatially explicit predictions of the Maximum Entropy Theory of Ecology. Global Ecology and Biogeography, 24(6), 675-684.

22. Harte, J., & **Kitzes, J.** 2014. Inferring regional-scale species diversity from small-plot censuses. PLoS ONE, 10(2), e0117527.

21. **Kitzes, J.**, & Harte, J. 2014. Beyond the species-area relationship: Improving macroecological extinction estimates. Methods in Ecology and Evolution, 5(1), 1-8.

20. **Kitzes, J.**, & Merenlender, A. 2014. Large roads reduce bat activity across multiple species. PLoS ONE, 5(1), 1-8.

19. **Kitzes, J.**, & Merenlender, A. 2013. Extinction risk and tradeoffs in reserve site selection for species of different body sizes. Conservation Letters, 6(5), 341-349.

18. **Kitzes, J.** 2013. An introduction to environmentally-extended input-output analysis. Resources, 2(4), 489-503.

17. Harte, J., **Kitzes, J.**, Newman, E., & Rominger, A. 2013. Taxon categories and the universal species-area relationship. The American Naturalist, 181(2), 282-287.

16. Ramage, B. S., **Kitzes, J.**, Marshalek, E. C., & Potts, M. D. 2013. Optimized Floating Refugia: A new strategy for species conservation in production forest landscapes. Biodiversity and Conservation, 22(3), 789-801.

15. Ramage, B. S., Marshalek, E. C., **Kitzes, J.**, & Potts, M. D. 2013. Conserving tropical biodiversity via strategic spatiotemporal harvest planning. Journal of Applied Ecology, 50(6), 1301–1310.

14. Barnosky, A. D., Hadly, E. A., Bascompte, J., Berlow, E. L., Brown, J. H., Fortelius, M., Getz, W. M., Harte, J., Hastings, A., Marquet, P. A., Martinez, N. D., Mooers, A., Roopnarine, P., Vermeij, G., Williams, J. W., Gillespie, R., **Kitzes, J.**, Marshall, C., Matzke, N., Mindell, D. P., Revilla, E., & Smith, A. B. 2012. Approaching a state shift in Earth's biosphere. Nature, 486, 52-58.

13. Leach, A. M., Galloway, J. N., Bleeker, A, Erisman, J.W., Kohn, R., & **Kitzes, J.** 2012. A nitrogen footprint model to help consumers understand their role in nitrogen losses to the environment. Environmental Development, 1, 40-66.

12. Galli, A., **Kitzes, J.**, Niccolucci, V., Wackernagel, M., Wada, Y., & Marchettini, N. 2012. Assessing the global environmental consequences of economic growth through the Ecological Footprint: a focus on China and India. Ecological Indicators, 17, 99-107.

11. Khagram, S., Nicholas, K. A., Bever, D. M., Warren, J., Richards, E. H., Oleson, K., **Kitzes, J.**, Katz, R., Hwang, R., Goldman, R., Funk, J., & Brauman, K. A. 2010. Thinking about knowing: conceptual foundations for interdisciplinary environmental research. Environmental Conservation, 37(4), 388-397.

10. **Kitzes, J.**, & Wackernagel, M. 2009. Answers to common questions in Ecological Footprint accounting. Ecological Indicators, 9(4), 812-817.

9. **Kitzes, J.**, Moran, D., Galli, A., Wada, Y., & Wackernagel, M. 2009. Interpretation and application of the Ecological Footprint: A reply to Fiala (2008). Ecological Economics, 68(4), 929-930.

8. **Kitzes, J.**, Galli, A., Bagliani, M., Barrett, J., Dige, G., Ede, S., et al. 2009. A research agenda for improving national Ecological Footprint accounts. Ecological Economics, 68(7), 1991-2007.

7. Moran, D. D., Wackernagel, M. C., **Kitzes, J. A.**, Heumann, B. W., Phan, D., & Goldfinger, S. H. 2009. Trading spaces: Calculating embodied Ecological Footprints in international trade using a Product Land Use Matrix (PLUM). Ecological Economics, 68(7), 1938-1951.

6. **Kitzes, J.**, Wackernagel, M., Loh, J., Peller, A., Goldfinger, S., Cheng, D., & Tea, K. 2008. Shrink and share: humanity's present and future Ecological Footprint. Philosophical Transactions of the Royal Society B, 363(1491), 467-475.

5. Moran, D. D., Wackernagel, M., **Kitzes, J. A.**, Goldfinger, S. H., & Boutaud, A. 2008. Measuring sustainable development – Nation by nation. Ecological Economics, 64(3), 470-474.

4. Niccolucci, V., Galli, A., **Kitzes, J.**, Pulselli, R., Borsa, S., & Marchettini, N. 2008. Ecological Footprint analysis applied to the production of two Italian wines. Agriculture, Ecosystems & Environment, 128(3), 162-166.

3. Galli, A., **Kitzes, J.**, Wermer, P., Wackernagel, M., Niccolucci, V., & Tiezzi, E. 2007. An exploration of the mathematics behind the ecological footprint. International Journal of Ecodynamics, 2(4), 250-257.

2. Wackernagel, M., **Kitzes, J.**, Moran, D., Goldfinger, S., & Thomas, M. 2007. The Ecological Footprint of cities and regions: comparing resource availability with resource demand. Environment and Urbanization, 18(1), 103-112.

1. **Kitzes, J. A.**, & Denny, M. W. 2005. Red algae respond to waves: morphological and mechanical variation in Mastocarpus papillatus along a gradient of force. The Biological Bulletin, 208, 114-119.

Book Chapters

5. **Kitzes, J.** 2018. Introduction. In J. Kitzes, D. Turek, & F. Deniz (Eds.), The Practice of Reproducible Research: Case Studies and Lessons from the Data-Intensive Sciences. Oakland, CA: University of California Press.

4. **Kitzes, J.** 2018. The basic reproducible workflow template. In J. Kitzes, D. Turek, & F. Deniz (Eds.), The Practice of Reproducible Research: Case Studies and Lessons from the Data-Intensive Sciences. Oakland, CA: University of California Press.

3. **Kitzes, J.** 2018. Analyzing bat distributions in a human-dominated landscape with autonomous acoustic detectors and machine learning models. In J. Kitzes, D. Turek, & F. Deniz (Eds.), The Practice of Reproducible Research: Case Studies and Lessons from the Data-Intensive Sciences. Oakland, CA: University of California Press.

2. Harte, J., & **Kitzes, J.** 2012. The use and misuse of species-area relationships in predicting climate-driven extinction. In L. Hannah (Ed.), Saving a Million Species: Extinction Risk from Climate Change (pp. 73-86). Washington, DC: Island Press.

1. Wackernagel, M., & **Kitzes, J.** 2008. Ecological Footprint. In S. Jorgensen & B. Fath (Eds.), Encyclopedia of Ecology (pp. 1031-1037). Amsterdam, The Netherlands: Elsevier.

PRESENTATIONS

Conference Presentations

A quantitative evaluation of the recording performance of the open source AudioMoth automated recording unit (Poster). Ecological Society of America, Annual Meeting, Montreal, Canada, August 2022.

Lessons learned from 31 case studies in the practice of reproducible research. Carnegie Mellon University, Open Science Symposium, Pittsburgh, PA, October 2020. [Remote]

A modified occupancy modeling approach to account for classification error in automated biodiversity surveys. Ecological Society of America, Annual Meeting, Salt Lake City, UT, August 2020. [Remote]

A simple statistical approach to accounting for classification error in automated biodiversity surveys. Society for Conservation Biology, North America Congress, Denver, CO, July 2020. [Remote]

Reflections on machine learning for (bio)acoustics. Moore-Sloane Data Science Environments, Annual Summit, Santa Fe, NM, November 2019.

Deriving biodiversity turnover from biodiversity scaling: A quantitative link between alpha and beta diversity. Ecological Society of America, Annual Meeting, Louisville, KY, August 2019.

*Scalable acoustic data processing with OpenSound*scape. USC Center for AI in Society, Symposium on AI for Conservation, Los Angeles, CA, February 2019.

OpenSoundscape: An integrated platform for large scale analysis of ecological sounds (Poster). Smithsonian Conservation Biology Institute, Workshop on Linking remote animal detection and movement data with macrosystem environmental datasets and networks, Front Royal, VA, October 2018.

Breaking the big data barrier in ecology: The promise of large-scale acoustic surveys. Moore-Sloane Data Science Environments, Annual Summit, Park City, UT, October 2018.

Making ecology more reproducible: Case studies and lessons from across the data-intensive sciences. Ecological Society of America, Annual Meeting, New Orleans, LA, August 2018.

New tech, taxa, and data for large scale ecology: Massive-scale acoustic surveys with OpenSoundscape (Poster). Gordon Research Conference, Unifying Ecology Across Scales, Biddeford, ME, July 2018.

Identifying and locating birds from field recordings. Moore-Sloane Data Science Environments, Annual Summit, New Orleans, LA, November 2017.

A spatially explicit stochastic process model predicts scaling in species aggregation. Ecological Society of America, Annual Meeting, Portland, OR, August 2017.

Reproducible ecological data analysis in Python with the macroeco package. Berkeley Institute for Data Science, Berkeley, CA, May 2016.

Predicting future extinction debt from present-day community patterns. American Society of Naturalists, Annual Meeting, Pacific Grove, CA, January 2016.

Deriving spatially-explicit beta diversity metrics from spatially-implicit, plot-based data. Ecological Society of America, Annual Meeting, Baltimore, MD, August 2015

Stop using the power law species-area relationship (and what to do instead). Ecological Society of America, Annual Meeting, Baltimore, MD, August 2015

Predicting extinction rates in space and time: A macroecological approach. Ecological Society of America, Annual Meeting, Sacramento, CA, August 2014

Linking biodiversity loss to economic consumption through a global wildlife footprint. Society for Conservation Biology, North America Congress, Missoula, MT, July 2014.

Predicting future extinction debt from present-day community patterns. Mathematics of Planet Earth 2013+, Berkeley, CA, May 2014.

A simple dynamic model for predicting variation in species spatial patterns (Poster). Workshop on Frontiers of Macroecological Theory, Berkeley, CA, February 2013.

California bats avoid roads. Wildlife Society Western Section, Annual Meeting, Sacramento, CA, January 2013.

The tradeoff between patch size and clustering in designing reserve networks. Society for Conservation Biology, North America Congress, Oakland, CA, July 2012.

Linking biodiversity loss to global consumption behavior: Preliminary results (Poster). National Academies Keck Futures Initiative, Conference on Ecosystem Services, Irvine, CA, November 2011.

Designing reserve networks for community persistence: An allometric community approach (Poster). Ecological Society of America, Annual Meeting, Austin, TX, August 2011.

Designing reserve networks for biodiversity persistence: An allometric community approach (Poster). University of California Berkeley Department of Environmental Science, Policy, and Management, Graduate Research Symposium, Berkeley, CA, May 2011.

National ecological footprint accounts: Measuring global demand for ecosystem goods and services. Bay Area Conservation Biology Symposium, Stanford, CA, February 2009.

A "constant global hectare" method for representing ecological footprint time trends. International Ecological Footprint Conference, Cardiff, United Kingdom. May 2007.

A research agenda for improving national ecological footprint accounts. International Ecological Footprint Conference, Cardiff, United Kingdom. May 2007.

Seminars

Automated acoustic sensors for surveying and protecting biodiversity at scale. Zoological Society of London, London, England, November 2022. [Remote]

Automated acoustic sensors for protecting biodiversity at scale. Harvard University, Quantitative Eco/evo/etho Discussions, Soft Math Lab, Cambridge, MA, February 2022. [Remote]

The challenge of measuring biodiversity loss on a changing planet. New York University, Center for Urban Science and Progress, Brooklyn, NY, June 2019.

Predicting species loss in multi-patch networks: Two new approaches from spatial macroecology. German Centre for Integrative Biodiversity Research (iDiv), iDiv Seminar Series, Leipzig, Germany, May 2019.

Predicting species loss in multi-patch networks: Two new approaches from spatial macroecology. Helmholtz Center for Environmental Research - UFZ, Leipzig, Germany, May 2019.

Measuring biodiversity loss on a changing planet with automated sensors and machine learning. University of Pittsburgh, School of Computing and Information Big Data Seminar Series, Pittsburgh, PA, January 2019.

Measuring and predicting biodiversity loss on a changing planet. University of Washington, eScience Institute, Seattle, WA, December 2018.

New methods for acoustic biodiversity surveys. Microsoft Research, AI for Earth Project Premonition Team, Redmond, WA, December 2018.

Measuring and predicting biodiversity loss on a changing planet. University of Pittsburgh, Department of Geology and Environmental Science, Pittsburgh, PA, November 2018.

Spatial ecology and biodiversity in complex landscapes: Scaling laws, turnover, and disturbance gradients. University of Pittsburgh, Department of Biological Sciences, Pittsburgh, PA, December 2016.

The changing face of field ecology: Remote sensing, software, and big data. Lawrence Berkeley National Laboratory, Berkeley, CA, March 2016.

Spatial ecology in human-altered habitats: Understanding and predicting the effects of global change on ecological communities. University of Tennessee, Department of Ecology & Evolutionary Biology, Knoxville, TN, February 2016.

Understanding and predicting the effects of global change on ecological communities. University of North Carolina, Biology Department, Chapel Hill, NC, February 2016.

Understanding and predicting the effects of global change on ecological communities: New approaches from theory and data science. University of California Santa Barbara, Department of Ecology, Evolution, and Marine Biology, Santa Barbara, CA, January 2016.

Understanding and predicting the effects of global change on biodiversity. Oregon State University, Department of Integrative Biology, Corvallis, OR, March 2015.

Understanding and predicting the effects of global change on biodiversity across space and time. Arizona State University, School of Life Sciences, Tempe, AZ, March 2015.

Conserving biodiversity with limited data: Insights from macroecology. University of California Santa Cruz, Environmental Studies, Santa Cruz, CA, December 2013.

Linking biodiversity loss to economic consumption with a global wildlife footprint. University of California Berkeley, Energy and Resources Group, Berkeley, CA, October 2013.

Practicing conservation with limited data: Insights from macroecology. University of California Berkeley, Department of Environmental Science, Policy, Management, Berkeley, CA, September 2013.

Sustainability accounting with the ecological footprint. University of California Berkeley, Geospatial Imaging and Informatics Facility, Berkeley, CA, March 2008.

Outreach and Other Presentations

Updates and suggestions for ARU monitoring in Dynamic Forest Restoration Blocks. University of Maryland and National Fish and Wildlife Foundation, February 2022.

Open science: What it is and why it's important. Resilience Institute Bridging Biological Training and Research, January 2022.

So you have ARU recordings – now what? Appalachian Mountains Joint Venture Technical Committee Meeting, August 2021.

Experience and advice for large-scale avian bioacoustic monitoring in NFWF-supported projects. University of Maryland and National Fish and Wildlife Foundation, February 2021.

Developing the first open source, scalable bird song classification software. National Geographic Society, Washington, DC, December 2018.

Book Launch: The Practice of Reproducible Research. Berkeley Institute for Data Science, January 2017. Organizer, Moderator, and Presenter.

Working Group on Open Science/Publishing. Berkeley Institute for Data Science, November 2015. Organizer, Moderator, and Presenter.

Identifying the upstream drivers of biodiversity loss through a global wildlife footprint. Wildlife Conservation Society, New York, NY, October 2014.

Bat ecology and conservation in human-dominated landscapes. Pepperwood Preserve, Santa Rosa, CA, June 2011.

The ecological footprint. University of California Berkeley, Beahrs Environmental Leadership Program, Berkeley, CA, June 2010.

The ecological footprint. KÖVET Association for Sustainable Economies, Budapest, Hungary, October 2009.

Ecological footprint accounting in China. Chinese Academy of Sciences, Beijing, China, January 2008.

Japan's national footprint accounts. Mizuho Information and Research Institute, Tokyo, Japan, March 2007.

Panelist and NGO representative. International Workshop on Ecosystem and Natural Capital Accounting, European Environment Agency, Copenhagen, Denmark, November 2006.

Ecological footprint accounts: Measuring human demand on the biosphere. United Nations, Commission on Sustainable Development 14th session, New York, NY, May 2006.

Ecological footprint roundtable discussion. Environment Agency Abu Dhabi, Abu Dhabi, United Arab Emirates. March 2006.

Ecological footprint accounting. OECD Workshop on Sustainable Materials Management, Seoul, South Korea, November 2005.

TEACHING

Courses Taught

University of Pittsburgh

Biostatistics (Undergraduate)	2019, 2022
Computational Biology Seminar (Undergraduate)	2022
Advanced Biostatistics (Graduate)	2021, 2023
Predoctoral Fellowships & Grants (Graduate)	2022

University of California, Berkeley

Modeling Ecological and Meteorological Phenomena (Graduate)	2013

Guest Lectures

University of Pittsburgh
School of Computing and Information CMPINF0999, Fall 2018
Biological Sciences BIOSC1540, Fall 2017
Biological Sciences BIOSC2361, Fall 2017

University of California Berkeley
Energy and Resources Group ER202, 2015
Energy and Resources Group ER101, 2012
Environmental Science, Policy and Management C193A, 2007
Earth and Planetary Sciences 80, 2007

Stanford University

Earth Systems 15SI, 2007
Biological Sciences 163H, 2007
Earth Systems 100, 2006

Workshops and Short Courses

Software Carpentry Two-Day Intensive Computing Workshop
Berkeley Institute for Data Science, Berkeley, CA, December 2015
Berkeley Institute for Data Science, Berkeley, CA, March 2014
University of California Berkeley, Energy and Resources Group, Berkeley, CA, January 2014
University of California Santa Barbara, Bren School, Santa Barbara, CA, January 2014
Stanford University, School of Earth Sciences, Stanford, CA, January 2014
University of California Berkeley, Energy and Resources Group, Berkeley, CA, April 2013
Lawrence Berkeley National Lab, Berkeley, CA, March 2013
University of California Berkeley, Department of Statistics, Berkeley, CA, October 2012
Lawrence Berkeley National Lab, Berkeley, CA, October 2012

Ecological Footprint Technical Training
WWF Belgium and Ecolife, Brussels, Belgium, May 2009
BioRegional Development Group, Wallington, United Kingdom, May 2007
Ministry of the Environment, Japan, Oakland, CA, February 2007
International Footprint Forum 2006, Colle di Valle, Italy, June 2006
Emirates Environmental Group, Dubai, United Arab Emirates, March 2006

MENTORSHIP

Graduate Students

Louis Freeland-Haynes	University of Pittsburgh	2022–
Sam Lapp	University of Pittsburgh	2022–
Tessa Rhinehart	Dissertation advisor, University of Pittsburgh	2021–
R. Patrick Lyon	Dissertation advisor, University of Pittsburgh	2021–
Lauren Schricker	Dissertation advisor, University of Pittsburgh	2018–2021
Marco Gonzalez	Committee member, University of Pittsburgh	2022–
Mayar Ahmed	Committee member, University of Pittsburgh	2022–
Amber Stanley	Committee member, University of Pittsburgh	2021–
Faith Rovenolt	Committee member, University of Pittsburgh	2021–
Hannah Assour	Committee member, University of Pittsburgh	2021–
Cheyenne Moore	Committee member, University of Pittsburgh	2021–2022
Amoi Campbell	Committee member (HMB), University of Pittsburgh	2020–2021
Lacey Rzodkiewicz	Committee member, University of Pittsburgh	2020–
David Clark	Committee member, University of Pittsburgh	2020–
Elizabeth Rudski	Committee member, University of Pittsburgh	2020–
Rachel Reeb	Committee member, University of Pittsburgh	2019–
Kevin Cassidy	Committee member, University of Pittsburgh	2019–2021
Tiffany Betras	Committee member, University of Pittsburgh	2018–2019

Michelle Spicer	Committee member, University of Pittsburgh	2018–2019
Lydia Katsis	External member, University of Southampton	2022–
Jeffery T. Larkin	External member (M.S.), UMass Amherst	2021–
Natia Javakhishvili	External member (M.S.), SUNY-ESF	2021–
Mallory Morgan	External member, Rensselaer Polytechnic Institute	2020–2021
Renata Diaz	External member, University of Florida	2018–2022

Undergraduate Students

Junshang Jia	University of Pittsburgh	2022
Carolyn Tett	University of Pittsburgh	2021–
Elias Paolone	University of Pittsburgh, Ecology and Evolution	2021
Sagar Vellalath	University of Pittsburgh	2021
Tiger Wu	University of Minnesota, Ind. and Syst. Engineering	2020
Talia Piretra	University of Pittsburgh, Bioinformatics	2020
Lauren Chronister	University of Pittsburgh, Ecology and Evolution	2019–2021
Anna Lippert	University of Pittsburgh, Biological Sciences	2019–2020
Madeline Hice	University of Pittsburgh, Environmental Science	2019
Sarah Heise	University of Pittsburgh, Molecular Biology	2019
Jiade Song	University of Pittsburgh, Industrial Engineering	2019
Jack Challiet	University of Chicago	2018
Tanvi Merengenti	Carnegie Mellon University	2018
Lydia Zimmerman	University of Pittsburgh, Biological Sciences	2018–2019
Aaron Lauer	University of Pittsburgh, Biological Sciences	2018
Madoc Smith	University of Pittsburgh, Mathematical Biology	2018
Kyle Walters	University of Pittsburgh, Mathematics	2017–2019
James Dunn	UC Berkeley, Public Health (thesis)	2015–2016
Rochelle Kelly	UC Berkeley, Environmental Science (thesis)	2012–2013
Benjamin Wheeler	UC Berkeley, Environmental Science (thesis)	2011–2012

Staff

Alexandra Syunkova	Research Assistant, University of Pittsburgh	2022–
Chapin Czarnecki	Research Assistant, University of Pittsburgh	2022–
Jatin Khilnani	Research Assistant, University of Pittsburgh	2021–
Louis Freeland-Haynes	Research Assistant, University of Pittsburgh	2021–2022
Lauren Chronister	Research Assistant, University of Pittsburgh	2021–
Samuel Lapp	Research Assistant, University of Pittsburgh	2019–2022
Trieste Devlin	Research Assistant, University of Pittsburgh	2019
Tessa Rhinehart	Research Programmer, University of Pittsburgh	2018–2021

PROFESSIONAL ACTIVITIES

Manuscript Reviewer

American Naturalist, Basic and Applied Ecology, Biometrics, BioScience, Conservation Biology, Conservation Letters, CRC Press, Earth's Future, Ecography, Ecological Economics, Ecological Modelling, Ecological Monographs, Ecology, Ecology and Evolution, Ecology Letters,

Environment and Development Economics, Environmental Monitoring and Assessment, Environmental Research Letters, F1000 Research, Global Ecology and Biogeography, Heredity, Journal of Biogeography, Journal of Cleaner Production, Journal of Environmental Management, Journal of Fish and Wildlife Management, Land Use Policy, Methods in Ecology and Evolution, Nature, Nature Climate Change, Nature Scientific Reports, PLoS ONE, Population Ecology, Proceedings of the Royal Society B, ReScience, Sustainability, Theoretical Ecology, Trends in Ecology & Evolution

Grant Reviewer

Israel Science Foundation, National Geographic Society, National Science Foundation (BIO, SBIR/STTR), Natural Environment Research Council UK, Sloan Foundation

University of Pittsburgh Service

Dept. of Biological Sciences Faculty Search Committee, Eco. and Evo.	2022–2023
Dept. of Biological Sciences Faculty Search Committee, Comp. Bio. (Teaching)	2022–2023
Dept. of Biological Sciences Faculty Search Committee, Comp. Bio.	2021–2022
Dept. of Biological Sciences, Advisory Committee	2021–2023
Dept. of Biological Sciences, Committee on Diversity, Inclusion, Equity	2019–
Mascaro Center for Sustainable Innovation, Sustainability Task Force	2018–
Faculty Search Committee, Mathematical and Computational Life Sciences	2018
Dept. of Biological Sciences, Undergraduate Research Committee	2017–2019

Other Professional Service

Academic Data Science Alliance, Advisory Board	2020–2023
Academic Data Science Alliance Career Development Network, Co-Chair	2019–2021
NEON, Breeding Landbird Technical Working Group	2018–
NEON, Data Standards Technical Working Group	2018–
Berkeley Institute for Data Science, Reproducibility Working Group	2014–2017
UNEP GEO-5 Report, Lead author, Biodiversity chapter	2010–2012
Society for Conservation Biology, North American Congress Committee	2010–2012
UC Berkeley Dept. of ESPM, Ecosystem Sciences Admissions Committee	2010–2012
Society for Conservation Biology, Ecological Footprint Committee	2008–2016