Matthew Kekoa Lau, PhD.

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MA'O Organic Farms

Lecturer
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Education

- Postdoctoral Fellow, Harvard University, Harvard Forest, 2014-2017
- Ph.D. Biology, Northern Arizona University, IGERT Fellow, 2014
  - *Title*: The evolution of ecological networks.
  - *Awarded* Outstanding Dissertation (NAU Biological Sciences)
  - *Advisor*: Thomas G. Whitham
- M.S. Biology, Northern Arizona University, 2008
  - *Thesis*: Host species and site contribute to variation in foliar endophyte abundance, diversity and community composition.
  - *Advisor*: Nancy C. Johnson
- B.S. Biology, Humboldt State University, 2004
  - *Emphasis*: Fungal Ecology
  - *Advisors*: Nathan J. Sanders and Terry W. Henkel
  - *Advanced Study*: Harvard Forest REU, Summer 2003, Aaron M. Ellison

Grants, Awards and Fellowships

- USDA NRCS Grant, Project Konohiki (MA'O Organic Farms), 2022-2024
- Young Scholar Grant (Chinese Academy of Sciences), 2021-2023
- President's International Fellowship Initiative (Chinese Academy of Sciences), 2019–2021
- External Research Fellow (Harvard University), 2018–2021
- ARCS Foundation Scholarship (Phoenix Chapter), 2013–2014
- Chateaubriand Fellowship (French Embassy), 2011–2012
- NSF IGERT Fellowship (Northern Arizona University), 2008–2010
- ARCS Foundation Scholarship (Phoenix Chapter), 2007–2008
- ARCS Foundation Scholarship (Phoenix Chapter), 2006–2007
- Northern Arizona University Minority Student Development Fellowship, 2005–2008

Teaching Experience

- Climate Smart Agriculture Workshop Series, Farm Expansion Experience (FE'E) Program, Summer 2022
- Sustainable Community Food Systems in Hawai'i (University of Hawai'i West O'ahu), Fall 2022
- Agroecology (University of Hawai'i West O'ahu), Spring 2022 Ecological Foodways (Lasell University), 2019-2021
- Statistical Computing in R (Harvard Forest, Harvard University), Summer 2015-2018
- Seminar on Ethics in Computational Ecology (Harvard Forest, Harvard University), Summer 2014
- BIO326L Ecology Lab (Northern Arizona University), Fall 2012–Spring 2013
- Introduction to Programming in R (University of North Carolina Wilmington), Summer 2011
- BIO181 Introductory Biology: The Unity of Life (Northern Arizona University), Fall 2010
- BIO680 Introduction to Ecological Analyses in R (Northern Arizona University), Fall 2008 and Fall 2009

Research Positions

- Research Fellow, Institute of Applied Ecology, Chinese Academy of Science, 2019-2021
- External Research Fellow, Harvard University, 2018-2021
- Postdoctoral Research Fellow, Harvard Forest (Aaron M. Ellison), Spring 2014-2018
- Visiting Researcher, Community Genetics Laboratory (Richard Michalet), Fall 2011
- Visiting Researcher, Systems Ecology and Ecoinformatics Lab (Stuart Borrett), Summer 2011
- Research Assistant, Cottonwood Ecology Group (Dr. Thomas G. Whitham), 2010–2011
- Research Assistant, The Soil Ecology Lab (Dr. Nancy C. Johnson), 2005–2008
- Research Assistant, Humboldt State University Ant Ecology Lab (Dr. Nathan J. Sanders), 2003

Computer Software and Language Proficiencies

Computer: R, Python, Matlab, LaTeX, HTML, Bash, ruby, Emacs, git, MacOS, Linux/Unix and Windows

Human: English (native speaker), French (not fluent), Mandarin (not fluent), Spanish (not fluent) and Hawaiian (not fluent).

Contributed Software

Matthew K. Lau (2019) Rclean: The Rclean Package (v1.1.7). https://docs.ropensci.org/Rclean http://doi.org/10.5281/zenodo.3665732

Matthew K. Lau (2018) Rclean: A Tool for Writing Cleaner, more Transparent Code (v1.0.1). https://cran.r-project.org/package=Rclean http://doi.org/10.5281/zenodo.1208640

Thomas Pasquier, and Matthew K Lau. (2018). ProvTools/encapsulator: create a capsule for scientific projects (v0.1.1). http://doi.org/10.5281/zenodo.1199232

Matthew K. Lau, Nathan Justice and Aaron M. Ellison (2018) Virtual pitcher plant microecosystem simulator (v1.0.0). https://harvardforest.shinyapps.io/virtualpitcherplant/ http://doi.org/10.5281/zenodo.1226372

Matthew K. Lau, Stuart R. Borrett, Pawandeep Singh and David E. Hines (2017) enaR: Tools for Ecological Network Analysis. R package version 3.0.0.

Matthew K. Lau and Raj Whitlock (2009) DiversitySampler: Functions for re-sampling a community matrix to compute diversity indices at different sampling levels.. R package version 2.0.

Matthew K. Lau (2009) DTK: Dunnett-Tukey-Kramer Pairwise Multiple Comparison Test Adjusted for Unequal Variances and Unequal Sample Sizes. R package version 3.0.

Publications

- Lau MK, Liu B, Liang Y (In Prep) The network structure of forest landscapes embodied in trade in China is highly regional and modular.
- Lau MK, Liang Y (In Prep) Review of the application of network structural analyses to landscape extended multi-regional input-output models.
- Lau MK, Lamit LJ, Borrett SR, Bowker MA, Naesbourg R, Whitham TG (In Review at *Nature Ecology and Evolution*) Genotypic variation in a foundation tree species influences lichen interaction network structure.
- Trisoviç A, Pasquier TFJ-M, Lau MK, Seltzer M, Crocas M (2022) A large-scale study on quality and reproducibility of research outputs in R. Nature Scientific Data 9(1): 60.
- Liu B, Wang X, Lau MK, and Liang Y (In Review at *Journal of Biogeography*) Divergent evolutionary tendency in functional traits of boreal forest understory vascular plant species.
- Naesborg R, Lau MK, Michalet R, Williams C, Whitham TG (Accepted) Tree genes affect rock lichen and plant understory communities: An example of trophic-independent interactions. Ecology.
- Ma T, Liang Y, Sunde M, Lau MK, Liu B, Wu M, He H (2021) Assessing the effects of climate variable and timescale selection on uncertainties in dryness/wetness trends in conterminous China. International Journal of Climatology.
- Liu B, Biswas S, Yang J, Liu Z, He H, Liang Y, Lau MK, Fang Y, and Han S (2020) Forest Ecology and Management. 473: 118307.
- Lau MK, Pasquier FJ-M, Seltzer M (2020). Rclean: A Tool for Writing Cleaner, More Transparent Code. Journal of Open Source Software, 5(46), 1312, https://doi.org/10.21105/joss.01312.
- Lau MK, Ellison AM, Nguyen A, Penick C, DeMarco B, Gotelli NJ, Sanders NJ, Dunn R and Helms Cahan S (2019) Draft Aphaenogaster genomes expand our view of ant genome size variation across climate gradients. PeerJ 7:e6447.
- Lau MK, Baiser B, Northrop A, Gotelli NJ & Ellison AM (2018) Regime shifts and hysteresis in the pitcher-plant microecosystem. Ecological Modeling. 382: 1-8.
- Pasquier T, Lau MK, Han X, Fong E, Lerner BS, Boose ER, Crosas M, Ellison AM, Seltzer M (2018) Sharing and Preserving Computational Analyses for Posterity with `encapsulator`. IEEE CiSE 20: 111. https://doi.org/10.1109/MCSE.2018.042781334
- Pasquier T, Lau MK, Trisovic A, Boose ER, Couturier B, Crosas M, Ellison AM, Gibson V, Jones CR, Seltzer M (2018) If these data could talk. Nature Sci. Data. 4: 170114.
- Ikeda, Dana H. and Max, Tamara L. and Allan, Gerard J. and Lau, Matthew K. and Shuster, Stephen M. and Whitham, Thomas G. (2017) Genetically informed ecological niche models improve climate change predictions. Glob. Chang. Biol. 23:164-176.
- Keith AR, Bailey JK, Lau MK & Whitham TG (2016) Genetics-based interactions of foundation species affect community diversity, stability and network structure. Proc. R. Soc. B. 281.
- Lau MK, Borrett SR, Baiser B, Gotelli NJ & Ellison AM (2017) Ecological network metrics: opportunities for synthesis. Ecosphere. 8: e01900.
- Lau MK, Borrett SR, Keith AR, Shuster SM & Whitham TG (2016) Genotypic variation in foundation species generates network structure that may drive community dynamics and evolution. Ecology. 97: 733-742.
- Floate KD, Godbout J, Lau MK, Whitham TG, Isabel N (2016) Plant-herbivore interactions in a trispecific hybrid swarm of cottonwoods: Genetic similarity and the hybrid bridge hypothesis. New Phytologist. 209: 832-844.
- Lamit LJ, Busby PE, Lau MK, Compson ZG, Wojtowicz T, Keith AR, Zinkgraf MS, Schweitzer JA, Shuster SM, Gehring CA, Whitham TG (2015), Tree genotype mediates covariance among communities from microbes to lichens and arthropods. Journal of Ecology 103: 840–850.
- Smith DS, Lamit LJ, Lau MK, Gehring CA & Whitham TG (2015) Change of plant traits by introduced elk negatively affects associated arthropod communities and network structure. Acta Oecologia 67: 8-16.

- Smith DS, Lau MK, Jacobs R, Monroy JA, Shuster SM, & Witham TG (2015) Introduced elk alter traits of a native plant and its plant-associated arthropod community. Oecologia DOI 10.1007/s00442-015-3362-y.
- Borrett SR & Lau MK (2014) enaR: An R package for Ecosystem Network Analysis. Methods in Ecology and Evolution 5: 1206-1213.
- Lau MK (2014) BOOK REVIEW: Grounding ecological networks. Ecology. 95:2681–2682.
- Flores-Rentería L, Lau MK, Lamit LJ, & Gehring CA (2014) An elusive ectomycorrhizal fungus reveals itself: A new species of Geopora (Pyronemataceae) associated with *Pinus edulis*. Mycologia. DOI 10.3852/13-263.
- Lamit LJ, Lau MK, Sthultz CM, Wooley SC, Whitham TG, & Gehring CA Tree genotype and genetically based growth traits structure twig endophyte communities. American Journal of Botany. DOI 10.3732/ajb.1400034.
- Ikeda DH, Bothwell HM, Lau MK, O'Neill G, Grady K, Ferrier SM, Allan G, Shuster SM & Whitham TG (2013) A genetics-based Universal Community Transfer Function for predicting the impacts of climate change on future communities. Functional Ecology 28:65–74.
- Lau MK, Arnold EA & Johnson NC (2013)Factors influencing communities of foliar fungal endophytes in riparian woody plants. Fungal Ecology 6: 365–378.
- Álvarez-Sánchez FJ, Johnson NC, Antoninka AJ, Chaudhary VB, Lau MK, Owen SM, Sánchez-Gallen I, Guadarrama P, & Castillo S (2012) Large-scale diversity patterns in spore communities of arbuscular mycorrhizal fungi. In M. Pagano, editor, *Mycorrhiza: Occurrence in Natural and Restored Environments*, Nova Science Publishers, New York (USA).
- Bowker MA, Muñoz A, Martinez T & Lau MK 2012 Rare drought-induced mortality of juniper is enhanced by edaphic stressors and influenced by stand density. Journal of Arid Environments 76:9–16.
- Lau MK, Whitham TG, Lamit LJ & Johnson NC (2010) Ecological & Evolutionary Interaction Network Exploration: Addressing the Complexity of Biological Interactions in Natural Systems with Community Genetics and Statistics. JIFS 7:17–25
- Price LB, Johnson KE, Aziz M, Lau MK, Bowers J, Ravel J, Keim PS, Serwadda D, Wawer MJ & Gray RH (2010) The effects of circumcision on the penis microbiome. PLoS One 5(1):e8422.
- Chaudhary VB, Lau MK & Johnson NC (2008) Macroecology of microbes – biogeography of the Glomeromycota. In V. Ajit, editor, *Mycorrhiza* (3rd Edition), Springer-Verlag, Germany.
- Ellison AM, Chen J, Diaz D, Kammerer-Burnham C & Lau M (2005) Changes in ant community structure and composition associated with hemlock decline in New England. Pages 280-289 in B. Onkenand and R. Reardon, editors. *Proceedings of the 3rd Symposium on Hemlock Woolly Adelgid in the Eastern United States.* U.S. Department of Agriculture – U.S. Forest Service – Forest Health Technology Enterprise Team, Morgantown, West Virginia.

Presentations

- Lau MK (2022) Project Konohiki: Collaborative Farmer Education in Hawai'i. Sustainable Agriculture Education Society Meeting, University of Ohio.
- Lau MK, Liu B, & Liang Y (2020) Networks of forest trade in the Anthropocene. CSU San Bernadino.
- Lau MK (2020) Using R for open-science. University of Peshwar, Pakistan.
- Lau MK (2019) Ecological Foodways: Landscape Opportunities at the Intersection of Food, Ecology, and Culture. ASLA, San Diego, CA (USA).
- Lau MK (2019) Genetic variation in a foundation tree generates ecological network structure. International Conference on Fire Disturbance Ecology, North East University, Cheng Chun (China).
- Lau MK (2019) Evolution of Ecological Networks: Climate Change and Human Landscapes. Institute of Applied Ecology, Chinese Academy of Sciences, Shenyang, China.
- Lau MK (2018) Automated code cleaning can help address the Reproducibility Crisis. Institute of Quantitative Social Sciences, Harvard University.

- Lau MK (2018) Ecological Network Evolution in the Anthropocene. Departmental Seminar, Institute of Applied Ecology, Chinese Academy of Sciences, Shenyang (China).
- Lau MK (2018) Ecological Network Evolution in the Anthropocene. Invited Speaker, North West Polytechnical University, Xian (China).
- Lau MK, Gotelli NJ, Ellison AM (2017) Provenance for reproducible multi-level foodwebs. Invited: Alfred Wagner Institute Symposium on Applied Foodweb Research. Sylt, Germany.
- Lau MK & Ellison AM *Temporal scales of coupled ecosystem processes provide a benchmark for alternate ecosystem states Photosynthesis and decomposition in a model micro-ecosystem.*, Ecological Society of America Meeting (ESA), Baltimore, MD, August 2015
- Lau MK *Evolution and Ecological Networks: Merging Community Genetics and Network Ecology.* Ecological Society of America Meeting (ESA), Baltimore, MD, August 2015
- Lau MK, Borrett SR *enaR: Free, open-source tools for ecological network analysis.* Ecological Society of America Meeting (ESA), Minneapolis, MN, August 2013
- Lau MK, Lamit LJ, Gehring CA, and Whitham TG *Cottonwood genetics influence lichen interaction network structure.* Université Bordeaux 1, Talence, France, December 2011
- Whitham TG, Lau MK, Lamit LJ, Smith DS, Busby PE, Schweitzer JA, Gehring CA, Allan GJ, Shuster SM and Newcombe G * A Community Genetics Approach for Understanding Microbial Community Structure and Feedbacks on a Foundation Tree Species.* Ecological Society of America Meeting (ESA), Pittsburgh, PA, August 2010
- Lau MK, Keith AR and Whitham TG *Network structure is linked to the community stability of canopy arthropods associated with Populus angustifolia.* Ecological Society of America Meeting (ESA), Pittsburgh, PA, August 2010
- Lau MK, Johnson NC, Whitham TG, Hagenauer LE, Lamit LJ and Lonsdorf EV *A Community Genetics Approach for Understanding Complex Biological Interactions.* 7th International Symposium on Integrated Field Science, Tohoku University, Sendai, Japan, October 2009
- Lau MK, Hagenauer LE and Whitham TG *Assemblage-structuring force of species interactions varies spatially and temporally: Co-occurrence analysis of canopy arthropod distributions.* Ecological Society of America Meeting (ESA), Albuquerque, NM, August 2009
- Lau MK, Johnson NC *Fungal foliar endophyte communities exhibit host species fidelity in woody plants of Arizona riparian forests.* Ecological Society of America Meeting (ESA), Milwaukee, WI, August 2008
- Lau MK *Unusual absence of asymptomatic fungal leaf endophytes of Populus fremontii: a potential phytochemical mechanism.* (poster) Ecological Society of America Meeting (ESA), San Jose, CA, August 2007
- Whitewater L, Lau MK, Johnson NC *Investigating the potential for local adaptation of the arbuscular mycorrhizal fungus* . (poster) REU Summer Research Symposium, Northern Arizona University, Aug 2007.
- Lau MK, Johnson NC *Do AMF cultivate their favorite bacteria? A hypothesis for a potential mechanism of AMF adaptation.* (poster) 5th International Conference on Mycorrhiza (ICOM5), Granada, Spain, July 2006

Professional Activities

Reviewer

- *Nature Ecology and Evolution*
- *Pedobiologia*
- *Ecological Modeling*
- *PNAS*
- *Ecology Letters*

- *PLoS One*
- *PLoS Computational Biology*
- *Ecological Monographs*
- *Ecology*
- *Journal of Ecology*
- *Botany* (formerly *The Canadian Journal of Botany*)
- *Acta Oecologia*
- *Nature*

Professional Memberships

- Society for Conservation Biology (SCB)
- British Ecological Society (BES), 2008
- American Association for the Advancement of Science (AAAS)
- Ecological Society of America (ESA)

Professional Service

- Workshop Organizer, Ecological Foodways: Landscape Opportunities at the Intersection of Food, Ecology, and Culture (ASLA), San Diego, CA, 2019.
- Workshop Organizer, Introduction to Ecological Network Analysis, Ecological Society of America Meeting (ESA), Baltimore, MD, 2015.
- Workshop Coordinator, EU Sponsored White Paper Workshop on Foundation Species Genetics Research Directions, Flagstaff, AZ Spring 2011
- Meeting Organizer, Western Mycorrhiza Gathering, Flagstaff, AZ, 2008
- Workshop Organizer, IGERT Workshop: Bayesian Statistics in Ecology, Flagstaff, AZ, 2007
- Meeting Organizer, Soil Ecology Society Conference, Moab, UT, 2007