Michael J. Koontz

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Education

Ph.D., Ecology; University of California, Davis — 2014 - 2019
Committee: Andrew Latimer, Malcolm North, Connie Millar

M.Sc., Ecology; Colorado State University — 2012 - 2014
Committee: Ruth Hufbauer, Tom Hobbs, Brett Melbourne

B.Sc. with highest honors, Biology; University of Hawaii at Hilo — 2007 - 2009
Advisors: Patrick Hart, Rebecca Ostertag

Professional Experience

Ecosystem Monitoring and Forecasting Lead; Vibrant Planet — 10/2022 - present
Research Scientist I; Earth Lab/CIRES; University of Colorado Boulder — 2/2021 - present
Postdoctoral Researcher; Earth Lab/CIRES; University of Colorado Boulder — 2019 - 2021

Submitted Work

1. Mahood, Adam L., Joseph, Maxwell B., Anna I. Spiers, **Michael J. Koontz**, Nayani Ilangakoon, Kylen Solvik, et al. Ten simple rules for working with high resolution remote sensing data. Recommended Article in Peer Communities In Ecology. Revisions requested for Global Ecology and Biogeography.
EcoEvoRxiv preprint: https://doi.org/10.31219/osf.io/kehqz
Peer Communities In Ecology recommendation: https://doi.org/10.24072/pci.ecology.100102

Publications

18. Mahood, Adam L., Joseph, Maxwell B., Anna I. Spiers, **Michael J. Koontz**, Nayani Ilangakoon, Kylen Solvik, et al. 2023. Ten simple rules for working with high resolution remote sensing data. *Peer Community Journal*. 3: e4. https://www.doi.org/10.24072/pcjournal.223
Peer Communities In Ecology recommendation: https://doi.org/10.24072/pci.ecology.100102

17. **Koontz, Michael J.**, Victoria M. Scholl, Anna I. Spiers, Megan E. Cattau, John Adler, Joe McGlinchy, Tristan Goulden, Brett A. Melbourne, and Jennifer K. Balch. Democratizing macroecology: integrating unoccupied aerial systems with the National Ecological Observatory Network. *Ecosphere*. 13: e4206.
GitHub repository: https://github.com/mikoontz/neon-drone-workflow

16. Balch, Jennifer K., John T. Abatzoglou*, Maxwell B. Joseph*, **Michael J. Koontz***, Adam L. Mahood*, Joseph McGlinchy*, Megan E. Cattau, and A. Park Williams. 2022. Warming weakens the nighttime barrier to global fire. *Nature*. 602: 442-448.
https://doi.org/10.1038/s41586-021-04325-1
*Equally contributing second authors

15. Mahood, Adam L., **Michael J. Koontz**, and Jennifer K. Balch. 2022. Fuel connectivity, burn severity, and seedbank survivorship drive the grass fire cycle in a semi-arid shrubland. *Ecology*. e3968. https://doi.org/10.1002/ecy.3968
EcoEvoRxiv preprint: https://doi.org/10.32942/osf.io/6x3as

14. Young, Derek J. N., **Michael J. Koontz**, and Jonah M. Weeks. 2022. Optimizing aerial imagery collection and processing parameters for drone-based individual tree mapping in structurally complex conifer forests. *Methods in Ecology and Evolution*. 13: 1447-1463.
https://doi.org/10.1111/2041-210X.13860

13. **Koontz, Michael J.**, Andrew M. Latimer, Leif A. Mortenson, Christopher J. Fettig, and Malcolm P. North. 2021. Cross-scale interaction of host tree size and climatic water deficit governs bark beetle-induced tree mortality. *Nature Communications*. 12: 129. https://doi.org/10.1038/s41467-020-20455-y
*Editor's Highlight in Climate Change Impacts
GitHub repository: https://github.com/mikoontz/local-structure-wpb-severity

12. Oldfather, Meagan F., **Michael J. Koontz**, Daniel F. Doak, and David D. Ackerly. 2021. Range dynamics mediated by compensatory life stage responses to experimental climate manipulations. *Ecology Letters*. 24 (4): 772-280. https://doi.org/10.1111/ele.13693
GitHub repository: https://github.com/meaganfoldfather/experimental-ivesia-ipms

11. Nagy, Chelsea R., Jennifer K. Balch, and 118 co-authors. 2021. Harnessing the NEON data revolution to advance open environmental science with a diverse and data capable community. *Ecosphere*. 12 (12): e03833. https://doi.org/10.1002/ecs2.3833

10. Iglesias, Virginia, Anna E. Braswell, Maxwell B. Joseph, Caitlin McShane, Matthew W. Rossi, Megan E. Cattau, **Michael J. Koontz**, Joe McGlinchy, R. Chelsea Nagy, Jennifer K. Balch, Stefan Leyk, and William R. Travis. 2021. Risky development: increasing exposure to natural hazards in the United States. *Earth's Future*. 9 (7): e2020EF001795. https://doi.org/10.1029/2020EF001795

9. **Koontz, Michael J.**, Malcolm P. North, Chhaya M. Werner, Stephen E. Fick, and Andrew M. Latimer. 2020. Local forest structure variability increases resilience to wildfire in dry western U.S. coniferous forests. *Ecology Letters*. 23 (3): 483-494. https://doi.org/10.1111/ele.13447
GitHub repository: https://github.com/mikoontz/remote-sensing-resistance

8. Parks, Sean A., Lisa M. Holsinger, **Michael J. Koontz**, Luke Collins, Ellen Whitman, Marc-André Parisien, Rachel A. Loehman, Jennifer L. Barnes, Jean-François Bourdon, Jonathan Boucher, Yan Boucher, Anthony C. Caprio, Adam Collingwood, Ron J. Hall, Jane Park, Lisa B. Saperstein, Charlotte Smetanka, Rebecca J. Smith, and Nick Soverel. 2019. Giving ecological meaning to satellite-derived fire severity metrics across North American forests. *Remote Sensing*. 11: 1735. https://doi.org/10.3390/rs11141735
*Editor's Choice article

7. Smithers, Brian V., Meagan F. Oldfather, **Michael J. Koontz**, Jim Bishop, Catie Bishop, Jan Nachlinger, and Seema N. Sheth. 2019. Community turnover by composition and climatic affinity across scales in an alpine system. *American Journal of Botany*. 107: 239-249. https://doi.org/10.1002/ajb2.1376

6. **Koontz, Michael J.**, Meagan F. Oldfather, Brett A. Melbourne, and Ruth A. Hufbauer. 2018. Parsing propagule pressure: number, not size, of introductions drives colonization success in a novel environment. *Ecology and Evolution*. 8 (16): 8043-8054. https://doi.org/10.1002/ece3.4226
GitHub repository: https://github.com/mikoontz/ppp-establishment

5. Steel, Zachary L., **Michael J. Koontz**, and Hugh D. Safford. 2018. The changing landscape of wildfire: burn pattern trends and implications for California's yellow pine and mixed conifer forests. *Landscape Ecology*. 33 (7): 1159-1176. https://doi.org/10.1007/s10980-018-0665-5

4. Oldfather, Meagan F., Matthew N. Britton, Prahlad D. Papper, **Michael J. Koontz**, Michelle M. Halbur, Celeste Dodge, Alan L. Flint, Lorraine E. Flint, and David D. Ackerly. 2016. Effects of topoclimatic complexity on the composition of woody plant communities. *AoB Plants*. 8: plw049. https://doi.org/10.1093/aobpla/plw049

3. Hufbauer, Ruth A., Marianna Szücs, Emily Kasyon, Courtney Youngberg, **Michael J. Koontz**, Christopher Richards, Ty Tuff, and Brett A. Melbourne. 2015. Reply to Wootton and Pfister: the search for general context should include synthesis with laboratory model systems. *Proceedings of the National Academy of Sciences*. 112 (44): E5904. https://doi.org/10.1073/pnas.1517210112

2. Hufbauer, Ruth A., Marianna Szücs, Emily Kasyon, Courtney Youngberg, **Michael J. Koontz**, Christopher Richards, Ty Tuff, and Brett A. Melbourne. 2015. Three types of rescue can avert extinction in a changing environment. *Proceedings of the National Academy of Sciences*. 112 (33): 10557-10562. https://doi.org/10.1073/pnas.1504732112

1. Cole, Rebecca J., Creighton M. Litton, **Michael J. Koontz**, and Rhonda K. Loh. 2012. Vegetation recovery 16 years after feral pig removal from a wet Hawaiian forest. *Biotropica*. 44: 463-471. https://doi.org/10.1111/j.1744-7429.2011.00841.x

Refereed Book Chapters

1. Miller, Jesse E. D., Carly D. Ziter, and **Michael J. Koontz**. 2021. Fieldwork in landscape ecology. Invited chapter in *The Routledge Handbook of Landscape Ecology*. eds. Robert A. Francis, James D. A. Millington, George L. W. Perry and Emily S. Minor. Routledge. pp. 219-229.
   EcoEvoRxiv preprint: https://doi.org/10.32942/osf.io/h8gsq

Research Grants (awarded)

Yosemite National Park — 2023 - 2024

Title: "Predicting the next beetle attack" — ($46,480)

Team: **Michael J. Koontz** (CU Boulder PI), Chad Anderson, Lacey Hankin, Jennifer Anderson, Garrett Dickman

Gordon and Betty Moore Foundation — 2023 - 2024

Title: "Developing methods to measure and strengthen landscape resilience to extreme wildfire events" — ($60,517)

Team: **Michael J. Koontz** (CU Boulder PI), Amy DeCastro, Malcolm P. North, Andrew M. Latimer

National Science Foundation Division of Biological Infrastructure — 2022 - 2025

Title: "Collaborative Research: High-resolution aerial forest mapping infrastructure and database to support forest and disturbance ecology research" — ($154,767)

Team: Derek J. N. Young, **Michael J. Koontz** (co-PI), Tyson L. Swetnam

Gordon and Betty Moore Foundation — 2020 - 2022

Title: "Megafires: Conditions associated with large, destructive California wildfires" — ($152,075)

Team: **Michael J. Koontz** (CU Boulder PI), Malcolm P. North, Andrew M. Latimer, Jennifer K. Balch, Amy DeCastro

U.S. Forest Service Western Wildlands Environmental Threat Assessment Center — 2018

Title: "Using drones to link spatial features of forests and bark beetle-induced mortality at broad spatial scales" — ($7,500)

Team: **Michael J. Koontz** (Project lead), Malcolm P. North, Chris J. Fettig, Leif A. Mortenson, Andrew M. Latimer, and Connie I. Millar

U.S. Forest Service Western Wildlands Environmental Threat Assessment Center — 2017

Title: "Assessing forest spatial structure and bark beetle spread using small, unmanned aerial systems (sUAS)" — ($19,420)

Team: **Michael J. Koontz** (Project lead), Malcolm P. North, Chris J. Fettig, Leif A. Mortenson, Andrew M. Latimer, and Connie I. Millar

Research Grants (seeking the right funding source)

U.S. Forest Service Forest Health and Protection — Not awarded

Title: "Monitoring iconic Great Basin bristlecone pine and limber pine susceptibility to bark beetles by linking field, drone, and satellite observations" — ($101,722)

Team: **Michael J. Koontz** (CU Boulder PI), Barbara Bentz, Beverly Bulaon

National Science Foundation FAIR Open Science Research Coordination Networks — Not awarded*

Title: "FAIROS RCN: Disciplinary Improvements through Community Standards for Open and FAIR Drone Data" — ($161,873)

Team: Justin Ridge, David Johnston, **Michael J. Koontz** (co-PI), Sophia Lafferty-Hess, Shila Nordone, Jarlath O'Neil-Dunne

*Ranked as "highly competititve"

The Boulder County Parks and Open Space Department — Not awarded

Title: "Fine-scale effects of forest structure treatments on the severity of the Calwood Fire" — ($10,000)

Team: **Michael J. Koontz** (PI), Meagan Oldfather

Open Education Resources

Michonneau, François, and 104 co-authors. 2019. Data Carpentry R Ecology Lesson v2019.06.1. Zenodo. https://doi.org/10.5281/zenodo.3264888

O'Brien, Lauren, Joseph Stachelek, Tracy Teal, Dev Paudel, Paul Miller, Anne Fouilloux, Chris Prener, Ethan P. White, Katrin Leinweber, **Michael J. Koontz**, and Whalen. 2019. Data Carpentry: Introduction to Geospatial Concepts v2019.06.1. Zenodo. https://doi.org/10.5281/zenodo.3258814

Peek, Ryan A. and **Michael J. Koontz**. 2018. R for Data Analysis and Visualization in Science (R-DAVIS) v1.0.0. GitHub. https://gge-ucd.github.io/R-DAVIS/

Koontz, Michael J. and Ryan A. Peek. 2017. Data Carpentry Week: Introduction to R. v1.0.0. GitHub. https://mikoontz.github.io/data-carpentry-week/

Teaching Experience

Lead or Co-lead Instructor

ECL298 R for Data Analysis and Visualization in Science (R-DAVIS) — 2018

A quarter-long, 2-credit graduate course at the University of California, Davis teaching scientific computing skills (data/project management, version control, reproducible workflows using the programming language R) to 25+ ecologists. Adopted as part of the required curriculum for the graduate program.

Data Carpentry: Data Analysis and Visualization in R for Ecologists — 2018

A 1.5 hour workshop teaching scientific computing skills to undergraduates in Boulder, Colorado.

Data Carpentry: Geospatial Workshop — 2018

A 2-day workshop teaching spatial data science skills in Davis, California.

Data Carpentry Week: Introduction to R — 2017

A week-long workshop teaching scientific computing skills to 25+ learners as part of the Data Intensive Biology Summer Institute at the University of California, Davis.

ECOL592 Introduction to R — 2014

A semester-long, 1-credit graduate course teaching data manipulation and visualization using R to 20+ grad students, professors, postdocs, undergraduates, and local professionals learners at Colorado State University.

Teaching assistant

Data Skills in R, Cornerstone Research — 2016

PLS206 Applied Multivariate Modeling; University of California, Davis — 2016

R Bootcamp; University of California, Davis — 2015

LIFE320 Ecology, Colorado State University — 2013

LIFE102 Biology Laboratory, Colorado State University — 2012

Guest lecturer

"Introduction to R, RStudio, and project management for researchers" CU Boulder Undergraduate Evolution. 2022

"Wildfire and insect outbreak effects on forest structure and composition" CU Boulder Undergraduate Ecology. 2021 (remote)

"Local variability of vegetation structure increases resilience to wildfire" CU Boulder Undergraduate Ecology. 2020 (remote)

"A workflow for measuring forest structure and carbon stocks using drone-derived imagery" CU Boulder Graduate Geography. 2020

"Introduction to R, RStudio, and project management for researchers" CU Boulder Undergraduate Evolution. 2018

"High quality plots using base `R` graphics" Davis `R` Users Group (D-RUG) 2015

"Invasion Biology" LIFE320 Ecology, Colorado State University 2013

Formal training

Educational psychology & instructional design, SoftwareCarpentry 2016

Current Collaborations

Koontz, Michael J., Malcolm P. North, Amy DeCastro, Jennifer K. Balch, and Andrew M. Latimer. Fine-scale drivers of California megafires. [GitHub]

Koontz, Michael J., Zachary L. Steel, Andrew M. Latimer, and Malcolm P. North. Initial wildfire suppression efforts select for more extreme fuel and climate burning conditions in Sierra Nevada forests. [GitHub]

Provost, Mikaela, Jan Ng, Jessica Rudnick, Linda Estelí Méndez Barrientos, Steven P. Lee, **Michael J. Koontz**, and Emilio A. Laca. Novel integration of holistic review and statistical analysis to rank applications in an R1 STEM graduate program.

DeCastro, Amy, **Michael J. Koontz**, and Jennifer K. Balch. Local-scale predictors of fire spread across the U.S.

Merchant, Thomas, Elisa Van Cleemput, **Michael J. Koontz**, and Katherine Suding. Fire-mediated changes in efficiency and sensitivity of net primary productivity in the Great Basin.

Huesca, Margarita, **Michael J. Koontz**, Alexander Koltunov, Yuhan Huang, Andrew M. Latimer, and Yufang Jin. Tree mortality assessment using imaging spectroscopy data in the Sierra Nevada mountains.

Invited Talks

Koontz, Michael J.. 2023. Democratizing macroecology with advances in technology, cyberinfrastructure, and education. Earth and Biological Systems Directorate at Pacific Northwest National Laboratory 2023

Koontz, Michael J.. 2023. Harmonizing field, drone, and satellite data to monitor forest pests at management-relevant scales. Ecological Society of America Annual Meeting. Organized Oral Session: New approaches to age-old problems: data science for pest ecology at the landscape scale. 2023

Koontz, Michael J., Andrew M. Latimer, Leif A. Mortenson, Christiopher J. Fettig, and Malcolm P. North. 2021-11-09. Drone-enabled forestry: drivers of tree mortality across multiple scales in a hot drought. Yosemite Forum. 2021 (remote)

Koontz, Michael J.. 2020-09-14. Understanding where wildfires and insects kill trees using drones and satellites. CIRES @ Home. https://www.youtube.com/watch?v=HOgBQKSuhu8 2020 (remote)

Koontz, Michael J., Andrew M. Latimer*, Leif A. Mortenson, Christopher J. Fettig, Malcolm P. North. 2019-11-14. Differential response of a tree-killing bark beetle to forest structure across a gradient of climatic water deficit. California Forest Pest Council Annual Meeting. Davis, CA. 2019
*Presenting author

Koontz, Michael J., Andrew M. Latimer, Leif A. Mortenson, Christiopher J. Fettig, and Malcolm P. North. 2019-04-30: Differential response of a tree-killing bark beetle to forest structure across a gradient of climatic water deficit. Intermountain Drone Ecology Network workshop, Boulder, CO. 2019

Koontz, Michael J., Malcolm P. North, Christopher J. Fettig, Leif A. Mortenson, Constance I. Millar, Malcolm P. North. 2018-03-22. Using drones to link spatial structure of forests and insect outbreaks. University of California Cooperative Extension North Coast Forest Health Meeting. Eureka, CA. 2018

Koontz, Michael J., Andrew M. Latimer, Christopher J. Fettig, Leif A. Mortenson, Constance I. Millar, Malcolm P. North. 2017-11-15. Using drones to go beyond stand density: Spatial features of western pine beetle-attacked forests. California Forest Pest Council Annual Meeting. Davis, CA. 2017

Skills and Proficiencies

Data manipulation and visualization in R: `tidyverse` (`dplyr`, `ggplot2`, `tidyr`), `data.table`, `tmap`

GIS: Google Earth Engine JavaScript and Python APIs, `R` (`raster`, `sf`, `lidR`), Structure from Motion photogrammetry (Pix4Dmapper, Agisoft Metashape), QGIS, CloudCompare

Remote sensing: Drones, multispectral sensors, FAA-licensed Remote Pilot (2017 to present)

Inference: Hierarchical modeling in `R` using Bayesian frameworks (`brms`, NIMBLE) and maximum likelihood (`lme4`), population dynamics in `R` (simulations, integral projection models)

Fieldwork: Vegetation plot establishment, tree stem mapping using laser instruments, GLORIA multi-summit approach

Version control: git, GitHub

Dynamic documents: RMarkdown, LaTeX

Awards and Honors

NSF Graduate Research Fellowship ($132,000)	2013 - 2018
Plant Sciences Graduate Student Researcher Fellowship ($200,905)	2015 - 2019
Graduate Group in Ecology Fellowship ($58,172)	2014 - 2016
Plant Sciences Graduate Student Travel Award ($1,000)	2018
Nominated for Outstanding Graduate Student Teaching Award	2017
Plant Sciences Graduate Student Travel Award ($1,000)	2016
College of Agriculture Ag Day Scholarship ($1,000)	2014
Front Range Student Ecology Symposium 3rd Place Oral Presentation	2014
Colorado State Graduate Degree Program in Ecology Travel Award ($500)	2014
Ynez Morey and Chuck Reagin Memorial Entomology Scholarship ($1,000)	2013
Colorado State University Graduate Fellowship ($1,500)	2012
CSU Programs for Research and Scholarly Excellence Fellowship ($2,339)	2012
University of Hawaii at Hilo Outstanding Senior in Biology	2009
Hawaii Audubon Society Rose Shuster Taylor Scholarship ($1,838)	2008
AmeriCorps Education Award ($4,750)	2006

Service and Outreach

Cal-Wood Education Center Science Advisory Panel 2022 - present

GLORIA Great Basin (https://www.gloriagreatbasin.org/)

- Secretary, Board Member, Data Manager 2017 - present
- Volunteer 2013 - present

Graduate Group in Ecology Diversity Committee 2015 - 2019

Manuscript reviewer

- Environmental Research Letters, Forests, Remote Sensing in Ecology and Conservation, Journal of Theoretical Biology, Ecography, Oikos, Global Ecology and Biogeography, Landscape Ecology

Software reviewer

- rOpenSci `R` packages (ccafs), Google Earth Engine code (fire severity methodology)

Professional Memberships

Ecological Society of America 2014 - present

American Alpine Club 2016 - present