Michael J. Koontz

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Education

Ph.D., Ecology; University of California, Davis — 2014 - 2019

Committee: Andrew Latimer, Malcolm North, Connie Millar

Dissertation: The effect of vegetation spatial structure on forest resilience to wildfire and bark beetle disturbance in the Sierra Nevada, California

M.Sc., Ecology; Colorado State University — 2012 - 2014

Committee: Ruth Hufbauer, Tom Hobbs, Brett Melbourne

Thesis: The eco-evolutionary consequences of multiple introductions for colonizing individuals

B.Sc. with highest honors, Biology; University of Hawaii at Hilo — 2007 - 2009

Concentration: Ecology, Evolution, and Conservation Biology

Professional Experience

CU Boulder Earth Lab/CIRES Research Scientist	2/2021 - present
CU Boulder Earth Lab/CIRES Postdoctoral Research Associate	2019 - 2021
UC Davis Department of Plant Sciences Graduate Student Researcher	2015 - 2019
UC Davis Graduate Group in Ecology Fellow	2014 - 2016
NSF Graduate Research Fellow	2013 - 2018

Publications

12. 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. Risky development: increasing exposure to natural hazards in the United States. *Earth's Future*. 9 (7): e2020EF001795. https://doi.org/10.1029/2020EF001795

11. Oldfather, Meagan F., **Michael J. Koontz**, Daniel F. Doak, 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

10. **Koontz, Michael J.**, Andrew M. Latimer, Leif A. Mortenson, Christopher J. Fettig, 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: https://www.nature.com/collections/hcfhgcahdc
GitHub repository: https://github.com/mikoontz/local-structure-wpb-severity

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**. In press. Fieldwork in landscape ecology. Invited chapter in *The Routledge Handbook of Landscape Ecology.*
EcoEvoRxiv preprint: https://doi.org/10.32942/osf.io/h8gsq

Submitted work

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 uncrewed aerial systems with the National Ecological Observatory Network. Revisions requested for *Ecosphere.*
GitHub repository: https://github.com/mikoontz/neon-drone-workflow

Balch, Jennifer K., John T. Abatzoglou*, Maxwell B. Joseph*, **Michael J. Koontz***, Adam L. Mahood*, Joseph McGlinchy*, Megan E. Cattau, and A. Park Williams. Warming weakens the nighttime barrier to global fire. Revisions in review for *Nature.*
*Equally contributing second authors

Mahood, Adam L., **Michael J. Koontz**, and Jennifer K. Balch. Fuel connectivity, burn severity, and seedbank survivorship drive the grass fire cycle in a semi-arid shrubland. Submitted to *Ecology.*
EcoEvoRxiv preprint: https://ecoevorxiv.org/6x3as/

Joseph, Maxwell B., Anna I. Spiers, **Michael J. Koontz**, Nayani Ilangakoon, Kylen Solvik, Nathan Quarderer, Joe McGlinchy, Victoria M. Scholl, Lise St. Denis, Chelsea Nagy, Anna Braswell, Matthew W. Rossi, Lauren Herwehe, Leah Wasser, Megan E. Cattau, Virginia Iglesias, Adam Mahood, Fangfang Yao, Stefan Leyk, and Jennifer K. Balch. Ten simple rules for working with high resolution remote sensing data. Submitted to *BioScience.*
EcoEvoRxiv preprint: https://osf.io/kehqz/

Research Grants

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, Brandon M. Collins, 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

Open Educational Resources

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

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 2019

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/ 2018

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/ 2017

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

"Wildfire and insect outbreak effects on forest structure and composition" CU Boulder Undergraduate Ecology (*remote lecture*)	2021 (upcoming)
"Understanding where wildfires and insects kill trees using drones and satellites" CIRES Science @ Home (*remote lecture*)	2020
"Local variability of vegetation structure increases resilience to wildfire" CU Boulder Undergraduate Ecology (*remote lecture*)	2020
"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., 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]

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

Young, Derek J. N., **Michael J. Koontz**, and Jonah M. Weeks. Optimizing drone flight and imagery processing parameters for individual tree detection.

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.

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.

Invited Talks

Koontz, Michael J., Andrew M. Latimer, Christopher J. Fettig, Leif A. Mortenson, Malcolm P. North. 2019-11-14. Drone-enabled forestry: drivers of tree mortality across multiple scales in a hot drought. Yosemite Forum. (*remote presentation*) — 2021 (upcoming)

Koontz, Michael J., Andrew M. Latimer*, Christopher J. Fettig, Leif A. Mortenson, 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, 2019-4-30: 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

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

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

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