

Michael J. Koontz

Research Scientist
mikoontz@gmail.com
Phone: (410) 370-1815

Earth Lab/CIRES
University of Colorado Boulder
Boulder, CO 80304

<https://michaeljkoontz.weebly.com/>

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

- Research Scientist; Earth Lab/CIRES; University of Colorado Boulder 2/2021 - present
Postdoctoral Researcher; Earth Lab/CIRES; University of Colorado Boulder 2019 - 2021

SUBMITTED WORK

4. **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. Minor revisions requested for *Ecosphere*.
GitHub repository: <https://github.com/mikoontz/neon-drone-workflow>
3. Young, Derek J. N., **Michael J. Koontz**, and Jonah M. Weeks. Optimizing aerial imagery collection and processing parameters for drone-based individual tree mapping in structurally complex conifer forests. Minor revisions requested for *Methods in Ecology and Evolution*.
EcoEvoRxiv preprint: <https://doi.org/10.32942/osf.io/p7ygu>
2. 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. Revisions requested for *Ecology*.
EcoEvoRxiv preprint: <https://doi.org/10.32942/osf.io/6x3as>
1. Joseph, Maxwell B., Anna I. Spiers, **Michael J. Koontz**, Nayani Ilangakoon, Kylen Solvik, Nathan Quaderer, et al. Ten simple rules for working with high resolution remote sensing data. In review with the Peer Communities In Ecology.
EcoEvoRxiv preprint: <https://doi.org/10.31219/osf.io/kehqz>

PUBLICATIONS

14. 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. 2022. *Nature*. <https://doi.org/10.1038/s41586-021-04325-1>
*Equally contributing second authors
13. **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
GitHub repository: <https://github.com/mikoontz/local-structure-wpb-severity>

12. 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/meaganoldfather/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

National Science Foundation Division of Biological Infrastructure	In Review
<i>Title:</i> "Collaborative Research: High-resolution aerial forest mapping infrastructure and database to support forest and disturbance ecology research"	(\$154,767)
<i>Team:</i> Derek J. N. Young, Michael J. Koontz (co-PI), Tyson L. Swetnam	
Gordon and Betty Moore Foundation	2020 - 2022
<i>Title:</i> "Megafires: Conditions associated with large, destructive California wildfires"	(\$152,075)
<i>Team:</i> 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
<i>Title:</i> "Using drones to link spatial features of forests and bark beetle-induced mortality at broad spatial scales"	(\$7,500)
<i>Team:</i> 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
<i>Title:</i> "Assessing forest spatial structure and bark beetle spread using small, unmanned aerial systems (sUAS)"	(\$19,420)
<i>Team:</i> Michael J. Koontz (Project lead), Malcolm P. North, Chris J. Fettig, Leif A. Mortenson, Andrew M. Latimer, and Connie I. Millar	

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.	
<i>Teaching assistant</i>	
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
<i>Guest lecturer</i>	
“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
“High quality plots using base R graphics” Davis R Users Group (D-RUG)	2015
“Invasion Biology” LIFE320 Ecology, Colorado State University	2013
<i>Formal training</i>	
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]
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.	
DeCastro, Amy, and Michael J. Koontz . Calculating surface area from a broad-extent, fine-grain digital surface model using Google Earth Engine.	

INVITED TALKS

- Koontz, Michael J.**, Andrew M. Latimer, Leif A. Mortenson, Christopher 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. 2020 (remote)
<https://www.youtube.com/watch?v=HOgBQKSuh8>
- 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, Christopher 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, L^AT_EX

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	
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