

# Zachary L. Steel

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## EDUCATION

University of California, Davis, Ph.D. Ecology	2014–2018
University of California, Davis, M.S. Ecology	2008–2011
Whitman College, B.A. Biology	2002–2006

## EMPLOYMENT

### USDA Forest Service Rocky Mountain Research Station:

Research Biological Scientist 2022–Present

### University of California, Berkeley:

Post-doctoral Researcher 2019–2022

### University of California, Davis:

Graduate Student Researcher 2014–2018

Jr. Specialist Researcher 2012–2014

Fire Science Consortium Coordinator 2012–2013

### US Fulbright Program, Santiago, Chile:

Research Fellow 2011

### University of California, Davis:

Graduate Student Researcher 2008–2011

### University of California, Santa Cruz:

Assistant Biologist 2007–2008

### PRBO Conservation Sciences:

Biology Technician 2007–2008

## PUBLICATIONS

### Journal Articles

2023 – Francis, E. J., S. Pourmohammadi, **Z. Steel**, B. M. Collins, and M. D. Hurteau. “Proportion of forest area burned at high-severity increases with increasing forest cover and connectivity in western US watersheds”. *Landscape Ecology*.

2023 – Stephens, S.<sup>1</sup>, **Z. Steel**<sup>1</sup>, B. Collins, D. Fry, S. J. Gill, H. Rivera-Huerta, and C. N. Skinner. “Climate and fire removal impacts on tree recruitment in mixed conifer forests in Northwestern Mexico and California”. *Ecological Applications* 33(4):e2844.

<sup>1</sup>Authors contributed equally to this work

2023 – **Steel, Z. L.**, G. M. Jones, B. M. Collins, R. Green, A. Koltunov, K. L. Purcell, S. C. Sawyer, M. R. Slaton, S. L. Stephens, P. Stine, and C. Thompson. “Mega-disturbances cause rapid decline of mature conifer forest habitat in California”, *Ecological Applications* 33(2):e2763.

- 2023 – Weeks, J. M., H. Safford, J. Miller, **Z. Steel**, and E. Batzer. “High Severity Fire Drives Floristic Homogenization in Human-Altered Forests”, *Ecosphere* 14(2):e4409.
- 2023 – Williams, J., H. Safford, N. Enstice, J. Tangenberg, **Z. Steel**, and A. Paulson. “High severity burn area and proportion exceed historic conditions in forests of Sierra Nevada and adjacent ranges (USA)”. *Ecosphere* e4397.
- 2022 – Viljur, M. and 46 others including **Steel, Z. L.**. “The effect of natural disturbances on forest biodiversity: An ecological synthesis”, *Biological Reviews* 97(5):1930-1947.
- 2022 – Levine, J., B. Collins, **Z. L. Steel**, P. de Valpine, and S. Stephens. “High-severity fire risk heightened both on and near industrially managed forests”. *Frontiers in Ecology and the Environment* 20(7):397-404.
- 2022 – Safford, H., A. Paulson, **Z. Steel**, D. Young, and R. Wayman. “The 2020 California fire season: A year like no other, a return to the past, or a harbinger of the future?”. *Global Ecology and Biogeography* 31(10):2005-2025.
- 2022 – **Steel, Z. L.**, A. Fogg, R. Burnett, L. J. Roberts, H. D. Safford. 2022. “When bigger isn’t better – implications of large high-severity wildfire patches for avian diversity and community composition”. *Diversity and Distributions* 23(3):439-453.
- 2021 – **Steel, Z. L.**, B. M. Collins, D. B. Sapsis, and S. L. Stephens. “Quantifying pyrodiversity and its drivers”. *Proc. R. Soc. B* 288(1948).
- 2021 – **Steel, Z. L.**, M.J. Goodwin, M.D. Meyer, G.A. Fricker, H.S.J. Zald, M.D. Hurteau, and M.P. North. Do forest fuel reduction treatments confer resistance to beetle infestation and drought mortality? *Ecosphere* 12(1):e03344.
- 2021 – Jager, H., J. Long, R. Malison, B. Murphy, A. Rust, L. Silva, R. Sollman, **Z. Steel**, M. Bowen, J. Dunham, J. Ebersole, and R. Flitcroft. “Resilience of terrestrial and aquatic fauna to historical and future wildfire regimes in western North America”. *Ecology and Evolution* 11(18):12259-12284.
- 2021 – Stephens, S., S. Thompson, G. Boisrame, B. Collins, L. Ponisio, K. Rakhmatulina, **Z. Steel**, J. Stevens, K. Wilken, and J. van Wagtenonk. “Fire, water, and biodiversity in the Sierra Nevada: A possible triple win”. *Environmental Research Communications* 3(08):1004.
- 2021 – **Steel, Z. L.**, D. Foster, M. Coppoletta, J. M. Lydersen, B. Wing, S. L. Stephens, and B. M. Collins. “Ecological resilience and vegetation transition in the face of multiple large wildfires”. *Journal of Ecology* 109(9):3340-3355.
- 2019 – **Steel, Z. L.**, B. Campos, W. Frick, R. Burnett, and H. D. Safford. “The effects of wildfire severity and pyrodiversity on bat occupancy and diversity in fire-suppressed forests”. *Scientific Reports* 9, 16300.
- 2019 – Wilkins, L. G. E., K. R. Matthew, **Z. L. Steel**, S. C. Nussle, and S. M. Carlson. “Population dynamics of *Rana sierrae* at Dusy Basin: Influence of non-native predators, drought, and restoration potential”. *Ecosphere* 10(11):e02951.
- 2018 – **Steel, Z. L.**, M. Koontz, and H. Safford. “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.
- 2017 – **Steel, Z. L.**, A. E. Steel, J. Williams, J. H. Viers, P. Marquet, and O. Barbosa. “Patterns of bird diversity and habitat use in mixed vineyard-matorral landscapes of Central Chile”. *Ecological Indicators* 73:345-357.
- 2017 – Grof-Tisza, P., **Z. L. Steel**, E. Cole, M. Holyoak, and R. Karban. “Testing predictions of movement behavior in a hilltopping moth”. *Animal Behavioral* 133:161-168.
- 2017 – Grof-Tisza, P., **Z. L. Steel**, and R. Karban. “The spatial distribution and oviposition preference of the Ranchman’s tiger moth, *Platyprapia virginalis* (Lepidoptera: Arctiidae)”. *Journal of the Lepidopterists’ Society* 71(1):16-19.

- 2015 – **Steel, Z. L.**, H. D. Safford, and J. H. Viers. “The fire frequency-severity relationship and the legacy of fire suppression in California forests”. *Ecosphere* 6(1):1-23.
- 2013 – Schwartz, M.W., L. B. Smith, and **Z. L. Steel**. “Conservation investment for rare plants in urban environments”. *PLOS ONE* 8(12):e83809.
- 2012 – **Steel, Z. L.**, M. L. Bond, R. B. Siegel, and P. Pyle. “Avifauna of Sierra Nevada Network parks: Assessing distribution, abundance, stressors, and conservation opportunities for 145 bird species”. National Park Service, Fort Collins, Colorado. [Natural Resource Report NPS/SIEN/NRR—2012/506](#).
- 2011 – Siegel, R. B, R. L. Wilkerson, J. F. Saracco, and **Z. L. Steel**. “Elevational distribution of common bird species on the Sierra Nevada’s west slope”. *Western Birds* 42:2-26.

#### *In Review or Revision*

- Steel, Z. L.**, J. E. D. Miller, L. C. Ponisio, M. W. Tingley, K. Wilkin, R. Blakey, K. M. Hoffman, and G. Jones. “A roadmap for pyrodiversity science”. *Journal of Biogeography*.

#### *Outreach Documents & Software*

- 2021 – Meyer, M., Long, J., Safford, H. (editors) and 22 contributors including **Z. Steel**. “Postfire restoration framework for national forests in California”. USDA Forest Service Pacific Southwest Research Station. [PSW-GTR-270](#).
- 2021 – **Steel, Z. L.**, M. D. Meyer, M. P. North, A. Wuenschel, and S. M. Ostoja. “Reforestation tool for tree mortality landscapes.” In: Meyer, M.D.; Long, J.W.; Safford, H.D., eds. Postfire restoration framework for national forests in California. Gen. Tech. Rep. PSW-GTR-270. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 191-192. Appendix 7.
- 2021 – USFS Region 5 Climate Change Trend Assessments (8 reports). E.g.:  
Wuenschel, A., S. Gross, B. Estes, K. Merriam, H. Safford, S. Sawyer, **Z. Steel**, L. Wolf. Sierra National Forest Climate Change Trend Summary. Unpublished report. USFS Pacific Southwest Region, Vallejo CA.
- 2020 – **Steel, Z. L.**, M. Meyer, A. Wuenschel, S. Ostoja, and M. North. “Climate-wise reforestation toolkit”. Rshiny web application prepared for the US Forest Service, and the California Climate Hub. [Available online](#)
- 2018 – **Steel, Z. L.**, B. R. Campos, and H. D. Safford. “Bat occupancy in Sierra Nevada wildfire areas and implications for post-fire management”. Prepared for US Forest Service, Region 5. [PDF](#)
- 2018 – Campos, B. R., **Z. L. Steel**. FIRE-BAT spatial predictive tool. ArcGIS toolbox prepared for US Forest Service, Region 5. [Users Manual](#)
- 2017 – Campos, B. R., R. D. Burnett, and **Z. L. Steel**. “Bird and bat inventories in the Storrie and Chips fire areas 2015-2016: Final report to the Lassen National Forest”. Point Blue Conservation Science, Petaluma, CA. Point Blue Contribution No. 2142. [PDF](#)
- 2017 – Fogg, A. M, **Z. L. Steel** and R. D. Burnett. “Avian Monitoring in Freds and Power fires: Final Report”. Point Blue Conservation Science, Petaluma, CA. Point Blue Contribution No. 2138. [PDF](#)
- 2013 – Schwartz, M. W., et al. “Sensitive Animals - Appendix 15 to SEKI Natural Resources Condition Assessment”. Natural Resource Report NPS/SEKI/NRCA—2013/665. National Park Service. Fort Collins, Colorado. Assessments within:  
**Steel, Z. L.**, E. Reddy and R. Green. The American Pika - *Ochotona princeps*  
**Steel, Z. L.**, J. Shields. Sierra Nevada Bighorn Sheep - *Ovis canadensis sierrae*  
Copeland, S., K. Dybala, **Z. L. Steel**. California Condor - *Gymnogyps californianus*  
**Steel, Z. L.**, Sierra Nevada Chipmunks - *Tamias spp.*

- 2012 – **Steel, Z. L.**, O. Barbosa, and P. Marquet. “Biodiversidad de Aves y Carbono en el Paisaje Vinedo”. Three reports prepared for landowner partners in the Colchagua Valley, Chile.
- 2011 – **Steel, Z. L.**, M. Wilderson, P. Grof-Tisza, and K. Sulzner. “Assessing species and area vulnerability to climate change for the Oregon Conservation Strategy: Willamette Valley Ecoregion”. Prepared for the Oregon Department of Fish and Wildlife and the Defenders of Wildlife.

## SELECT PRESENTATIONS

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### *Invited talks*

- 2023 – Journal of Fire Ecology, *Effects of wildfire and prescribed fire on wildlife panel*
- 2022 – California Native Plant Society Conference, *Declining southern Sierra Nevada conifer forests in an age of mega-disturbances: applying remote sensing tools to inform mature forest conservation*
- 2021 – International Fire Ecology and Management Congress, *Forest resilience and transition in the face of successive large wildfires in California’s Sierra Nevada Mountains*
- 2021 – Berkeley EcoLunch Seminar, *Wildlife and wildfire: a love-hate relationship*
- 2021 – Yosemite National Park Forum, *Restoring pyrodiversity to benefit Sierra Nevada wildlife communities*
- 2021 – Western Section of the Wildlife Society Annual Meeting (**Plenary**), *Implications of changing fire patterns on habitats and wildlife*
- 2020 – Natural Areas Association Annual Meeting, *Implications of changing fire regimes for Sierra Nevada bat and bird communities*
- 2017 – Instituto Politécnico Nacional, CIIDIR-Unidad Oaxaca, Mexico, *Murcielagos en un paisaje caracterizado por incendios: Impactos en diversidad y uso de habitat*
- 2017 – Northwest Science Conference, *The influence of burn severity on bat species occurrence in post-fire landscapes*
- 2011 – Universidad Mayor, Santiago, Chile, *Mercados de carbono: una oportunidad potencial para biodiversidad en agroecosistemas*

### *Contributed talks*

- 2023 – International Association of Landscape Ecology, *Burning for biodiversity: Finding pyrodiversity optimums for multiple taxa in a managed wildfire area*
- 2022 – Yosemite National Park Hydroclimate Meeting, *The chiropteran fire pulse: vegetation and hydro-climate mediate changes in bat activity in Sierra Nevada wilderness*
- 2022 – International Association of Landscape Ecology, *Megadisturbances Cause Rapid Decline of Mature Forest Habitat in California*
- 2021 – International Association of Landscape Ecology, *Quantifying pyrodiversity and its drivers*
- 2020 – Ecological Society of America Annual Meeting, *What doesn’t kill you makes you stronger - or not: Conifer mortality following forest treatments and drought*
- 2019 – The Wildlife Society Annual Conference, *The Influence of Burn Severity and Pyrodiversity on Bat Communities in Sierra Nevada Forests*
- 2018 – Mediterranean Forest Ecosystems International Conference (MedPine6), *Changing patterns of severe wildfire lead to bird diversity declines & community transitions in conifer forests of California, USA*
- 2018 – Ecological Society of America Annual Meeting, *Bat species occupancy varies across a disturbance gradient; implications for a future of extreme wildfire events*

- 2017 – Ecological Society of America Annual Meeting, *The influence of spatial context and successional pathways on bird communities following high-severity wildfire*
- 2017 – Mediterranean Ecosystems Conference (MEDECOS), *Shifting patterns of California fire and forest landscapes in an era of global change*
- 2016 – Natural Areas Conference, *The Changing Landscape of California Fire: Trends in Burn Patterns and Post-Fire Forest Heterogeneity*
- 2011 – Buenos Aires Fulbright Regional Enhancement Seminar, *Carbon Sequestration: Risk or tool for biodiversity?*
- 2011 – Bay Area Conservation Biology Symposium, *Assessing species vulnerability to climate change in the Willamette Valley Ecoregion*

## SERVICE

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**Professional Society Memberships** (past or current): Ecological Society of America, The Wildlife Society, Natural Areas Association, International Association of Landscape Ecology - North America Chapter, Association for Fire Ecology, European Geosciences Union

**Journal Referee:** *Global Change Biology, Environmental Research Letters, Landscape Ecology, Current Landscape Ecology Reports, PLOS One, Ecosphere, Ecography, Diversity and Distributions, Ecology and Society, Forest Ecology and Management, Biological Conservation, Fire Ecology, Ecological Applications*

**Grant Referee:** *Joint Fire Science Program (2023).*

**Special Symposium co-organizer:** “Toward a comprehensive understanding of pyrodiversity: How landscape- scale heterogeneity in fire history influences biodiversity across taxa, fire regimes, and spatial scales.” International Association of Landscape Ecology 2021 meeting, Reno, NV

**Dissertation Committee Member:** For a PhD student of the Autonomous University of Baja California