

# 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:

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| Research Biological Scientist | 2022–Present |
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### University of California, Berkeley:

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| Post-doctoral Researcher | 2019–2022 |
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### University of California, Davis:

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| Graduate Student Researcher | 2014–2018 |
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| Jr. Specialist Researcher | 2012–2014 |
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| Fire Science Consortium Coordinator | 2012–2013 |
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### US Fulbright Program, Santiago, Chile:

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| Research Fellow | 2011 |
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### University of California, Davis:

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| Graduate Student Researcher | 2008–2011 |
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### University of California, Santa Cruz:

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| Assistant Biologist | 2007–2008 |
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### PRBO Conservation Sciences:

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| Biology Technician | 2007–2008 |
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## PUBLICATIONS

### Journal Articles

Accepted – **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*.

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*.

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, *Platypreria 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/NIEN/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*

- Weeks, J. M., H. Safford, J. Miller, **Z. Steel**, and E. Batzer. “High Severity Fire Drives Floristic Homogenization in Human-Altered Forests”, *Ecosphere*.

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*.

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*.

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

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".

### **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 – 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. Ostojia, 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.

## TEACHING

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### *Graduate & Post-graduate Teaching:*

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|---|-------------------|
| Fire Effects on Wildlife – CA State Parks Fire Ecology training         | April 2022        |
| Guest Lecturer – UCD, Fire Ecology                                      | Winter 2020-2022  |
| Guest Lecturer – UCB, Fire Ecology Seminar                              | Spring 2020       |
| Co-Instructor – UCD, Fire Ecology                                       | Winter 2018       |
| Guest Lecturer – UCD, Ecogeomorphology                                  | Springs 2014–2018 |
| Certificate of Completion – UCD Foundations of Teaching workshop series | Fall 2017         |
| Guest Lecturer – American River College, Experimental Design            | Spring 2017       |
| Teaching Assistant – UCD, Trees and Forests; PLS 144                    | Fall 2015         |
| Teaching Assistant – UCD, Trees and Forests; PLS 144                    | Fall 2014         |

### *Mentoring:*

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| Undergraduate Mentor – Student research experience                        | Spring 2019-Present |
| Undergraduate Mentor – Association for Women in Science Mentoring program | 2019                |
| High School Mentor – Student & Landowner Education Stewardship program    | 2015–2016           |
| Undergraduate Mentor – Student research experience                        | Summer 2009         |

### *Outdoor Education:*

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| Naturalist/Raft Guide – UCD, Outdoor & Watershed Sciences programs | 2013-2018         |
| Teacher/Scientist – Earthwatch citizen science programs            | 2013              |
| Naturalist/Kayak Guide – San Juan Islands, WA                      | Summers 2006-2007 |

### *Undergraduate Teaching:*

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|---|-------------|
| Teaching Assistant – Whitman College, Genetics; BIO 205 | Fall 2005   |
| Teaching Assistant – Whitman College, Ecology; BIO 277  | Spring 2005 |

## AWARDS

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### *Grants written & funded:*

- 2020-2023 – *Implications of increasing the scale of managed wildfire on forest carbon stocks and pyrodiversity.* Funded by California Department of Forestry and Fire Protection (CALFIRE). \$422,000
- 2017-2018 – *Ecological implications of wildfire and forest restoration on birds and bats (phase II).* Funded by US Forest Service. \$122,000
- 2014-2017 – *Ecological implications of wildfire and forest restoration on birds and bats (phase I).* Funded by US Forest Service. \$127,000
- 2011 – *Quantifying avian habitat use and carbon stocks in Chilean vineyards.* Funded by US Fulbright Program. \$17,000

### ***Fellowships received:***

- 2014-2018 (7 quarters) – *Graduate Group of Ecology Fellowship*. Funded by UC Davis. \$79,000
- 2017 – *Ecology Student Endowment*. Funded by UC Davis. \$1500
- 2010 – *Graduate Group of Ecology Fellowship*. Funded by UC Davis. \$11,000
- 2002-2006 – *Walter Brattain Merit scholarship*. Funded by Whitman College. \$32,000
- 2001-2002 (2 awards) – *Governor's college scholarship*. Funded by State of California. \$2000

## **SELECT PRESENTATIONS**

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### ***Invited talks***

- 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, *Murciélagos en un paisaje caracterizado por incendios: Impactos en diversidad y uso de hábitat*
- 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***

- 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:** Ecological Society of America, The Wildlife Society, Natural Areas Association, International Association of Landscape Ecology, Association for Fire Ecology

**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*

**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