

Dr. Emily J. Francis

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Education

2013 B.A., Magna cum Laude, Ecology and Evolutionary Biology | Princeton University
2019 Ph.D, Environmental Earth System Science | Stanford University

Appointments

2024 - present Assistant Professor | Colorado State University, Dept. of Forest and Rangeland Stewardship
2022 - 2023 Research Assistant Professor | University of New Mexico, Dept. of Biology
2021 - 2022 Postdoctoral Fellow | University of New Mexico, Dept. of Biology
2019 - 2021 Postdoctoral Fellow | University of Texas at Austin, Dept. of Integrative Biology
2014 Research Intern | Smithsonian Tropical Research Institute

Grants as PI

Awarded

2025-2030 USDA USFS Joint Venture Agreement \$96,000
Title: Assessing status, trends, and impacts on America's forest resources
Principal Investigator: **Emily Francis**
RMRS Partners: Zachary Steel and Mark Ditmer

2024-2025 Save the Redwoods League \$96,685
Title: Detecting coast redwoods throughout their natural range to support conservation planning
Principal Investigator: **Emily Francis**

In review

2026-2027 Joint Fire Science Program Graduate Research Innovation \$24,996
Title: Comparing wildfire and prescribed fire effects on forest structure and the spatiotemporal effectiveness of fuels treatments across Northern New Mexico forests
Principal Investigator: **Emily Francis**
Student Investigator: Colin Mast

Small Grants, Fellowships, and Awards

2023	NSF Workshop on Forest Resiliency and Data Synthesis, Travel Grant	\$500
2023	NSF Workshop on Forest Resiliency and Data Synthesis, Travel Grant	\$500
2019	NSF NEON-ESA Early Career Scholar, Travel Grant	\$1,220
2015-2018	Stanford Graduate Fellowship in Science and Engineering	\$230,908
2017	Stanford Earth, Energy, and Environmental Sciences Certificate for Outstanding Achievement in Mentoring	\$300
2015	NSF Graduate Research Fellowship Program Honorable Mention	
2014	Smithsonian Tropical Research Institute Internship Grant	\$2,400
2013	Clean Air Cool Planet Climate Fellowship on Whitebark Pine Mortality in the Absaroka-Beartooth Wilderness Area, MT	\$5,000
2012	Princeton Senior Thesis Research Grant	\$500
2011	Princeton Hellenic Studies Internship Grant	\$2,000

Publications

*graduate student advisee **postdoctoral advisee, ***undergraduate advisee

- 2026 Banerjee, S.**, Mast, C.N.* and **Francis, E.J.** 2026. Mapping coastal redwoods (*Sequoia sempervirens*) across their natural range: an updateable and field-validated distribution map using Sentinel satellite data and cloud computing. *GIScience & Remote Sensing*, 63 (1): 2613558.
- 2025 Hurteau, M.D., Jung, C.G., **Francis, E.J.**, Dobrowski, S.Z., Littlefield, C.E., and Parks, S.E. 2025. Decreasing landscape carbon storage in western US forests with 2° C of warming. *Environmental Research: Ecology*, 4: 041001.
- Francis, E.J.**, Jung, C.G., Hicke, J.A., and Hurteau, M.D. 2025. Modeling probability of bark-beetle mortality as a function of watershed host species presence and density. *Forest Ecology and Management*, 580: 122549.
- 2023 Atkins, J.W., Bhatt, P., Carrasco, L., **Francis, E.J.**, Garabedian, J.E., Hakkenberg, C.R., Hardiman, B.R., Jung, J., Koirala, A., LaRue, E.A., Oh, S., Shao, G., Shugart, H.H., Spiers, A., Stovall, A.E.L., Surasinghe, T.D., Tai, X., Zhai, L., Zhang, T., and Krause, K. 2023. Integrating forest structural diversity measurement into ecological research. *Ecosphere*, 14:e4633.

- Francis, E.J.** Pourmohammadi, P., Steel, Z.L., Collins, B.M., and Hurteau, M.D. 2023. Proportion of forested area burned at high severity increases with increasing forest cover and connectivity in western US watersheds. *Landscape Ecology* 38, 2501-2518.
- Francis, E.J.** Lutz, J.A., and Farrior, C.E. 2023. Elevated mortality rates of large trees allow for increased frequency of intermediate trees: a hypothesis supported by demographic model comparison with plot and LiDAR data. *Forest Ecology and Management*, 540: 121035.
- 2020 **Francis, E.J.**, Asner, G.P., Mach, K.J., and Field, C.B. 2020. Landscape scale variation in the hydrologic niche of California coast redwood. *Ecography*, 43: 1305-1315.
- Nelson, R., **Francis, E.**, Berry, J., Cornwell, W., and Anderegg, L. 2020. The role of climate niche, geofloristic history, habitat preference and allometry on wood density within a California plant community. *Forests* 11 (1): 105
- 2019 **Francis, E.J.**, and Asner, G.P. 2019. High-resolution mapping of redwood (*Sequoia sempervirens*) distributions in three Californian Forests. *Remote Sensing* 11 (3): 1-19.
- 2018 Martin, R.E, Asner, G.P., **Francis, E.J.**, Ambrose, A., Baxter, W., Das, A., Vaughn, N.R., Paz-Kagan, T., Dawson, T.E, Nydick, K.R., and Stephenson, N.L. 2018. Remote measurement of canopy water content in giant sequoias (*Sequoiadendron giganteum*) during drought. *Forest Ecology and Management* 419-420: 279-290.
- Ambrose, A. Dawson, T., Baxter. W., Martin, R., **Francis, E.**, Asner. G.P., Nydick, K.R., and Dawson, T.E. 2018. Leaf and crown-level adjustments help giant sequoias maintain favorable water status during severe drought. *Forest Ecology and Management* 419-420: 257-267.
- Lalonde, S. J., Mach, K.J., Anderson, C.M., **Francis, E.J.**, Sanchez, D.L., Stanton, C.Y., Turner, P.A., and Field, C.B. 2018. Forest management in the Sierra Nevada provides limited carbon storage potential: an expert elicitation. *Ecosphere*. 9(7):1-15.
- 2017 **Francis, E.J.**, Muller-Landau, H.C., Wright, S.J., Iida, Y., Visser, M., Fletcher, C., Rahman, A.K, and Hubbel, S.P. 2017. Quantifying the role of wood density in explaining interspecific variation in growth of tropical trees. *Global Ecology and Biogeography* 26: 1078-1087.
- In review Vallet, L.**, Mast, C.N.*, Banerjee, S.**, Zald, S.J., Hurteau, M.D., Jones, G.M., **Francis, E.J.** 4D-FUELS: A LiDAR to satellite system for mapping and monitoring forest structure and fuels.

Mast, C.N.* , Vallet, L.** , Zald, H.S.J., Hurteau, M.D., Jones, G.M., Woolsey, G.A., Tinkham, W.T., Hoffman, C.M., **Francis, E.J.** Methods and Implications of canopy base height characterization for modeling crown fire potential.

Hwang, K., Chang, C.G. **Francis, E.J.**, and Hurteau, M.D. +2 °C of warming and disturbance cause a widespread decline in western US forest carbon storage.

Boone, H.M., van den Bosch, M., Stillman, A., **Francis, E.J.**, Ditmer, M., Steel, Z.L. Implications of active forest management on western US birds.

Steel, Z.L., Boone, H.M., McTigue, L., Cappello, C., van den Bosch, M., Stillman, A., Foster, V., Ditmer, M.A., **Francis, E.J.** Range-wide effects of vegetation management on a rapidly declining woodland bird species.

Published Datasets and Software

- 2026 Banerjee, S.** , Mast, C.N.* and **Francis, E.J.** 2026. Dataset for – Mapping Coastal Redwoods (*Sequoia sempervirens* across their natural range: an updateable and field-validated distribution map using Sentinel satellite data and cloud computing. *Dryad*.
<https://doi.org/10.5061/dryad.34tmpg4xf>.
- 2025 **Francis, E.J.**. 2025. Code for: Modeling the probability of bark beetle-caused mortality as a function of watershed-scale host species presence and basal area. <https://doi.org/10.5281/zenodo.13716539>.
- 2023 **Francis, E.J.** and Hurteau, M.D. 2023. Supporting code and data for: Proportion of forested area burned at high severity increases with increasing forest cover and connectivity in western US watersheds. *Dryad*
<https://doi.org/10.5061/dryad.qrfj6q5k7>.
- 2020 **Francis, E.J.**, Asner, G.P., Mach, K.J., and Field, C.B. 2020. Data for: Landscape scale variation in the hydrologic niche of California coast redwood. <https://doi.org/10.5061/dryad.fbg79cns5>.

Invited Talks

- 2025 **Francis, E.J.** Measuring changing forest disturbance regimes. Invited Plenary Speaker, American Society for Photogrammetry and Remote Sensing Southwest Region Technical Meeting. San Diego State University Geography Department. San Diego, CA.
- 2024 **Francis, E.J.** Quantifying changing forest disturbance regimes. SAF Alpha Chapter. Fort Collins, CA.

- 2024 **Francis, E.J.** Quantifying changing forest disturbance regimes. Colorado Forest Restoration Institute. Fort Collins, CA.
- 2023 **Francis, E.J.** Quantifying changing forest disturbance regimes. UC Santa Barbara Ecology, Evolution and Marine Biology Seminar Series. Santa Barbara, CA.
- 2022 **Francis, E.J.** Understanding Changing Dynamics of Forest Structure, Composition, and Disturbance. The Ohio State University, School of Environment and Natural Resources.
- 2019 **Francis, E.J.** Quantifying the role of hydrology in redwood distributions at the landscape scale. San Francisco State University Department of Geography. San Francisco, CA.
- 2018 **Francis, E.J.** The roles of trait and environmental variation in forest ecology. Department of Integrative Biology Special Seminar Series, University of Texas at Austin. Austin, TX.
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Contributed Talks

- 2025 Mast, C.N.* , Steel, Z.S., **Francis, E.J.** Drivers of high-severity burn area vary across historic fire regimes in western US conifer forests. Association for Fire Ecology 11th International Fire and Management Congress. New Orleans, LA.
- Vallet, L.** , Mast, C.N.* , Banerjee, S.** , Zald, S.J., Hurteau, M.D., Jones, G.M., **Francis, E.J.** A satellite-based system for mapping and monitoring fuel structure in southwestern US forests. Association for Fire Ecology 11th International Fire and Management Congress. New Orleans, LA.
- Vallet, L.** , Mast, C.N.* , Zald, H.S.J., Hurteau, M.D., Jones, G.M., Woolsey, G.A., Tinkham, W.T., Hoffman, C.M., **Francis, E.J.** A scalable lidar workflow for mapping forest structure and fuels in the western US. Association for Fire Ecology 11th International Fire and Management Congress. New Orleans, LA.
- 2023 **Francis, E.J.**, Pourmohammadi, P., Steel, Z.L., Collins, B.M., and Hurteau, M.D. Proportion of forest area burned at high-severity increase with increasing forest cover and connectivity in western US watersheds. Ecological Society of America Annual Meeting. Portland, OR.
- 2020 **Francis, E.J.**, Lutz, J.A., and Farrior, C.E. Integrating LiDAR measurements of canopy structure, forest inventory data, and a simple forest dynamics model to understand fundamental drivers of forest canopy structure. American Geophysical Union Fall Meeting, Remote Meeting.
- 2018 **Francis, E.J.**, Muller-Landau, H.C., Wright, S.J., Iida, Y., Visser, M., Fletcher, C., Rahman, A.K, and Hubbel, S.P. Quantifying the role of wood

density in explaining interspecific variation in growth of tropical trees. Ecological Society of America Meeting, New Orleans, LA.

- 2017 **Francis, E.J.**, and Asner, G.P. The Roles of Fog and Topography in Redwood Forest Hydrology. American Geophysical Union Fall Meeting, New Orleans, LA.
- 2013 **Francis, E.J.**, Grigri, M.*, Logan, J.A., and MacFarlane, W. Ground-truthing an aerial survey of Whitebark pine mortality in the Absaroka-Beartooth Wilderness. Whitebark Pine Society Annual Meeting, Bozeman, MT. *first two authors contributed equally.
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Contributed Posters

- 2025 Zwick, A.M.***, Woodward, B., Vorster, T., Touma, D., **Francis, E.J.** The Fog-Fire Nexus: Conceptualizing coastal fog's influence on wildfire and implications for coastal forest resilience. Society of American Foresters National Convention. Hartford, CT.
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Teaching

- 2025 Instructor, Forest and Natural Resource Biometry (Fall Semester). Co-Instructor, Advanced Forest Ecology (Spring Semester). Colorado State University.
- 2024 Instructor, Forest and Natural Resource Biometry. Colorado State University
- 2017 Teaching Assistant. Ecophysiology. Stanford University Graduate and Undergraduate Course. Professors: Dr. Alexandra Konings and Dr. Joe Berry.
- 2016 Teaching Assistant. Stanford Wrigley Hawaii Program in Earth Sciences, Life Sciences, and Hawaiian Culture. Professor: Dr. Peter Vitousek.
- 2011 Teaching Assistant. Marine Biology. Princeton University and Bermuda Institute of Ocean Sciences Undergraduate Course. Professors: Dr. James Gould and Dr. Samantha de Putron
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Advising and Mentoring

- Graduate Students Colin Mast (PhD student, 2024 – expected 2028), Taryn Dowden (Masters Student, 2025-expected 2027)
- Postdoctoral Researchers Lilian Vallet (2024-Expected 2027), Subham Banerjee (2024-2025),
- Undergraduate Researchers Ashley Zwick (2025-expected 2026), Rebecca Nelson (2019-2020), Talia Trepte (2017), Jackie Mogensen (2016)
- Graduate Student Committees Benjamin Helms (MS student, FRS), William Radecki (PhD Student, FRS), Ada Neupane (PhD Student, GDPE), Phoebe Lin (MS Student, Atmospheric Sciences), Josh Carrell (PhD student, FRS)

Hiring Committees Forest Stand Dynamics Analyst in FRS (2024), Wildfire and Disturbance Ecology Postdoc (2025), Postdoctoral Researcher in Forest and Wildfire Geospatial Science (2024)

Reviewer and Editor

Editor Ecological Applications, Guest Subject Matter Editor

Reviewer Forest Ecology and Management, Journal of Applied Ecology, Functional Ecology, Frontiers in Ecology and the Environment, Geophysical Research Letters, Remote Sensing Applications: Society and Environment, Remote Sensing of Environment, PLOS One, Proceedings of the National Academy of Sciences

Grant Reviewer National Science Foundation (Ad hoc reviewer)

Service, Extension and Outreach

2026- Forestry Representative, Undergraduate program committee, Forest and Rangeland Stewardship Department CSU

2025-present WCNR Representative, Committee on Responsibilities and Standing of Academic Faculty (CoRSAF), Colorado State University

2023 - 2027 Organized and ran a series of collaborative meetings with partners from the Santa Fe and Carson National Forests Fuels Program, the Center for Biological Diversity, and WildEarth Guardians.

2024 Invited Guest Speaker, Colorado Forest Restoration Institute Staff Meeting

2024 Invited Guest Speaker, CSU's SAF Alpha Chapter Group Meeting

2024 Participant, CSU – Los Alamos National Lab Meeting on Wildfire Research

2024 Co-Lead, Ecosystem Area of WESTFIRE

2019 Invited Speaker, Muir Woods National Park Monthly Staff Meeting.

2019 Invited Speaker, Peninsula Open Space Trust Staff Meeting.

2019 Invited Speaker. Grassroots Ecology California Naturalist Program.

2018 Invited Speaker. Patagonia Technology and Environmental Research Event Series.

2018 Invited Speaker. Grassroots Ecology Summer Internship Program.

2018 Speaker, Save the Redwoods League Staff Meeting.

2014 Member. Jasper Ridge Advisory Committee.

2014 Guest Lecturer (in Spanish). Smithsonian Tropical Research Institute Summer Program for Panamanian College Students.

2013 Presenter. North Star Academy Charter School 8th grade Science Class.

Public Engagement with Journalists

2023	Sempervirens Fund. Redwoods and Climate.
2020	National Park Service. Coast Redwoods vs. Climate Change.
2019	The Revelator, Newsletter for the Center for Biology Diversity. Can California's Iconic Redwoods Survive Climate Change?

Working Groups

2023	Forest Resiliency Data Synthesis Working Group	CU Boulder
2020	Exploring New Dimensions of Forest Ecosystems with Structural Diversity	Remote