

# CAROLINE A. HAVRILLA

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ResearchGate: [Caroline Havrilla](#)

## Education:

- 2019      **University of Colorado Boulder**, Department of Ecology & Evolutionary Biology  
Ph.D., Ecology and Evolutionary Biology
- Doctoral research: *Towards a predictive framework for biocrust mediation of vascular plant performance and community structure*
- 2014      **University of Memphis**, Department of Biology, Memphis, TN  
B.S., Biological Sciences
- Undergraduate research: *Landscape genomics of native plant species in Arches and Canyonlands National Parks and the Mojave Desert Ecoregion*
- 2010      **Michigan State University**, Department of Education, East Lansing, MI  
B.A., Education

## Expertise:

plant ecology · soil ecology · global change · rangeland ecology · drylands · ecological restoration · spatial ecology · data science · community ecology · vegetation dynamics

## Research Focus:

I am a plant and soil ecologist working at the interface of community and ecosystem ecology. My research program seeks to understand the ecology of natural and managed dryland ecosystems and their responses to global change. I am currently particularly interested in exploring plant community vulnerability to climate change and predictors of restoration success across dryland ecosystems. I am committed to using science to support effective land management, decision-making, and public policy in a changing world.

## Professional Appointments:

- 2021 – *present*      **Assistant Professor.** Department of Forest and Rangeland Stewardship, Warner College of Natural Resources, Colorado State University, Fort Collins, CO.
- 2019 – 2020      **Postdoctoral Scholar.** Climate change and restoration impacts on grassland, shrubland, and woodland ecosystem dynamics in the southwestern US. Supervisors: Drs. John Bradford and Seth Munson. Southwest Biological Science Center, U.S. Geological Survey, Flagstaff, AZ.
- 2017 – 2019      **NSF GRIP Intern.** Remote sensing of plant and soil surface communities in sagebrush and pinyon-juniper woodland ecosystems in the southwestern US. Supervisor: Dr. Miguel Villarreal. Western Geographic Science Center, U.S. Geological Survey, Menlo Park, CA.
- 2014 – 2019      **NSF GRFP Fellow/Doctoral Researcher.** Effects of biocrusts on dryland plant productivity and community structure in dryland ecosystems. Advisor: Dr. Nichole Barger. Dept. Ecology and Evolutionary Biology, University of Colorado Boulder, Boulder, CO.
- 2012 – 2014      **Undergraduate Research Assistant/USGS Student Contractor.** Ecological genetics of native plant species for dryland restoration seed sourcing. Advisors: Dr. Takuyo Nakazato and Dr. Troy Wood. Dept. Biological Sciences, University of Memphis, Memphis, TN.

## Publications & Submitted Works (Total = 18)

† Denotes equal contribution, co-first authorship, student mentee authors are underlined

- Havrilla, C.A.**, Munson, S.M., Yackulic, E.O., Butterfield, B.J. (*In revision*). Ontogenetic trait shifts: Seedlings display high variability in trait values during early stages of development. *Functional Ecology*.
- Balazs, K.R., Munson, S.M., **Havrilla, C.A.**, Butterfield, B.J. (*In revision*). Bell curve trait distributions do not ring true: Directional environmental selection is common and amplified by aridity. *Journal of Ecology*.
- Cunliffe, A. M., Anderson, K., Boschetti, F., Brazier, R.E., Graham, H.A., Myers-Smith, I.H., Astor, T., Boer, M.M., Calvo, L., Clark, P.E., Cramer, M.D., Encinas-Lara, M.S., Escarzagua, S.M., Fernández-Guisuraga, J.M., Fisher, A.G., Gdulová, K., Gillespie, B., Griebel, A., Hanan, N.P., Hanggito, M.S., Haselberger, S., **Havrilla, C.A.**, Heilman, P., Ji, W., Karl, J.W., Kirchhoff, M., Kraushaar, S., Lyons, M.B., Marzloff, I., Mauritz, M.E., McIntire, C.D., Metzen, D., Méndez-Barroso, L.A., Power, S.C., Prošek, J., Sanz-Ablanedo, E., Sauer, K.J., Schulze-Brüninghoff, D., Šimová, P., Sitch, S., Smit, J., Steele, C.M., Suárez-Seoane, S., Tweedie, C.E., Vargas, S.A., Villarreal, M.L., Visser, F., Wachendorf, M., Wirnsberger, H., Wojcikiewicz, R. (*Under review*). Drone photogrammetry-derived canopy height predicts aboveground biomass across non-forest ecosystems. *Methods in Ecology & Evolution*.
- 2021 Faist, A.M., Antoninka, A.J., Barger, N.N., Bowker, M.A., Chaudhary, V.B., **Havrilla, C.A.**, Huber-Sannwald, Reed, S.C., Weber, B. (*In press*). Broader impacts for ecologists: biocrusts as a model system for education and outreach. *Frontiers in Microbiology*. doi: [10.3389/fmicb.2020.577922](https://doi.org/10.3389/fmicb.2020.577922)
- 2020 **Havrilla, C.A.**†, Villarreal, M.L.†, DiBiase, J.L., Duniway, M.C., Barger, N.N. (2020). Ultra-high-resolution mapping of biocrusts with unmanned aerial systems. *Remote Sensing in Ecology and Conservation*, 6(4): 441-456. doi: [10.1002/rse2.180](https://doi.org/10.1002/rse2.180)
- Havrilla, C.A.**, Munson, S.M., Laushman, K.M., McCormick, M.L., Balazs, K.R., Butterfield, B.J. (2020). RestoreNet: An emerging restoration network reveals controls on seeding success across dryland ecosystems. *Journal of Applied Ecology*, 57(11): 2191-2202. doi: [10.1111/1365-2664.13715](https://doi.org/10.1111/1365-2664.13715)
- Havrilla, C.A.**, Leslie, A.D., DiBiase, J.L., Barger, N.N. (2020). Biocrusts are associated with increased plant biomass and nutrition at seedling stage independently of root associated fungal colonization. *Plant and Soil*, 446: 331-342. doi: [10.1007/s11104-019-04306-4](https://doi.org/10.1007/s11104-019-04306-4)
- Eldridge, D.J., Reed, S.C., Travers, S., Bowker, M.A., Maestre, F.T., Ding, J. **Havrilla, C.A.**, Rodriguez-Caballero, E., Barger, N.N., Weber, B., Antoninka, A.J., Belnap, J., Chaudhary, V.B., Faist, A.M., Ferrenberg, S., Huber-Sannwald, E., Malam Issa, O., Zhou, Y. (2020). The pervasive and multifaceted influence of biocrusts on water in the world's drylands. *Global Change Biology*, 26(10): 6003-6014. doi: [10.1111/gcb.15232](https://doi.org/10.1111/gcb.15232)
- 2019 **Havrilla, C.A.**, Chaudhary, V.B., Antoninka, A.J., Belnap, J., Bowker, M.A., Eldridge, D.J., Leslie, A.D., Faist, A.M., Ferrenberg, S., Huber-Sannwald, E., Rodriguez-Caballero, E., Zhang, Y.M., Barger, N.N. (2019). Towards a predictive framework for biocrust mediation of plant performance: a meta-analysis. *Journal of Ecology*, 107(6): 2789-2807. doi: [10.1111/1365-2745.13269](https://doi.org/10.1111/1365-2745.13269)
- Zhou, X., Lu, X., Tao, Y., **Havrilla, C.A.**, Zhang, Y.M. (2019). Divergent responses of nitrous oxide, methane, and carbon dioxide exchange under pulses of nitrogen addition in a desert in Central Asia. *Catena*, 173: 29-37. doi: [10.1016/j.catena.2018.09.048](https://doi.org/10.1016/j.catena.2018.09.048)
- 2018 **Havrilla, C.A.** & Barger, N.N. (2018). Biocrusts and their disturbance mediate the recruitment of native and exotic grasses from a hot desert ecosystem. *Ecosphere*, 9(7): e02361. doi: [10.1002/ecs2.2361](https://doi.org/10.1002/ecs2.2361)
- Hund, A.K., Churchill, A.C., Faist, A.M., **Havrilla, C.A.**, Stowell, S.M., McCreery, H.F., Ng, J.,

Pinzone, C.A., Scordato, E.S.C. (2018). Transforming Mentoring in STEM by Training Early-Career Scientists to be Better Leaders. *Ecology & Evolution*, 8: 9962–9974. doi: [10.1002/ece3.4527](https://doi.org/10.1002/ece3.4527)

Barger, N.N., Gardner, T.A., & Sankaran, M. Chapter 3: Direct and indirect drivers of land degradation and restoration. In IPBES (2018): The IPBES assessment report on land degradation and restoration. Montanarella, L., Scholes, R., and Brainich, A. (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), Bonn, Germany. [https://ipbes.net/system/tdf/2018\\_ldr\\_full](https://ipbes.net/system/tdf/2018_ldr_full) \* I am internally listed as a contributing author and produced section 3.3.1.2: *Grazing land management: past, present, and future extent and management*

2017 **Havrilla, C.A.**, Faist, A.M., & Barger, N.N. (2017). Understory plant community responses to fuel reduction treatments and seeding in an upland piñon-juniper woodland. *Rangeland Ecology & Management*, 70(5): 609-620. doi: [10.1016/j.rama.2017.04.002](https://doi.org/10.1016/j.rama.2017.04.002)

Shryock, D.F., **Havrilla, C.A.**, DeFalco, L.A., Esque, T.C., Custer, N.A., Wood, T. E. (2017). Landscape genetic approaches to guide native plant restoration in the Mojave Desert. *Ecological Applications*, 27(2): 429-445. doi: [10.1002/eap.1447](https://doi.org/10.1002/eap.1447)

2016 Turbek, S., Chock, T. Donahue, K., **Havrilla, C.A.**, Oliverio, A. Polutchko, S. Shoemaker, L.G., Vimercati, L. (2016). Scientific writing made easy: A step-by-step guide to undergraduate writing in the biological sciences. *The Bulletin of the Ecological Society of America*, 97(4), 417-426. doi: [10.1002/bes2.1258](https://doi.org/10.1002/bes2.1258)

2015 Shryock, D.F., **Havrilla, C.A.**, DeFalco, L.A., Esque, T.C., Custer, N.A., Wood, T.E. (2015). Landscape genomics of *Sphaeralcea ambigua* in the Mojave Desert: a multivariate, spatially explicit approach to guide ecological restoration. *Conservation Genetics*, 16(6), 1303-1317. doi: [10.1007/s10592015-0741-1](https://doi.org/10.1007/s10592015-0741-1)

#### Book Chapters (Total = 1)

2020 McTavish, M.J, Cray, H.A., Murphy, S.D., Bauer, J.T., **Havrilla, C.A.**, Oebermann, M., Sayer, E.J. (2020). Sustainable management of grassland soils. In: Soils and Landscape Restoration. Stanturf, J.A., and Callahan, M.A. (eds.). pp. 95-124. Elsevier. doi: [10.1016/B978-0-12-813193-0.00004-7](https://doi.org/10.1016/B978-0-12-813193-0.00004-7)

#### Forthcoming Publications: In Preparation (Total = 4)

**Havrilla, C.A.** Bradford, J.B., Munson, S.M., Andrews, C., Yackulic, C. Sensitivity of perennial grasses to aridification in the western US. (*In prep* for *Global Change Biology*).

**Havrilla, C.A.**, Munson, S.M., Norris, Z. Soil inoculation effects on the recruitment of perennial grass species used in dryland restoration. (*In prep* for *Restoration Ecology*).

**Havrilla, C.A.**, Villarreal, M.L., & Barger, N.N. Fine-scale soil heterogeneity mediated by biocrusts and land use is correlated with plant community structure in semiarid ecosystems (*In prep* for *Oecologia*).

Weber, B., Belnap, J., Bowker, M., Antoninka, A.J., Barger, N.N., Eldridge, D., Faist, A.M., Ferrenberg, S., **Havrilla, C.A.**, Huber-Sannwald, E., Maestre, F.T., Malam Issa, O., Zhang, Y.M. What is a biological soil crust? (*In prep* for *Bioscience*).

#### **Fellowships and Awards:** (*Fellowships, Awards, and Honors Total: \$198,300*)

2019	Dissertation Completion Fellowship, CU Boulder Graduate School; \$19,000
2019	Finalist, University of California President's Postdoctoral Fellowship (UCPPF)
2017-19	National Science Foundation (NSF) Graduate Research Internship Program (GRIP) U.S. Geological Survey; \$10,000
2015-19	NSF Graduate Research Fellowship (GRFP); \$138,000
2018	EBIO Department One Semester Fellowship (CU Boulder); \$19,500
2018	Peer-Nominated for EBIO Excellence in Service Award (CU Boulder)

2013 Green Fee Fellowship, University of Memphis (University of Memphis); \$2,400  
 2013 Botany Scholarship Award (University of Memphis); \$1,200  
 2013 First Place Undergrad Poster Award, Annual Research Forum (U Memphis); \$200  
 2012 AmeriCorps Education Award; \$5,000  
 2007 Michigan Merit Award; \$3,000

### Research & Travel Grants: (Grants Total Awarded: \$147,400)

*Pending* Senior Personnel, “*Biological Responses to Environmental Variability Integration Institute (BREVII)*.”  
 PI: Osvaldo Sala (ASU), Co-PIs: Ferran Garcia-Pichel (ASU), Alan Knapp (CSU), Melinda Smith (CSU), Stephanie Bestelmeyer (Asombro Institute, Senior Personnel: Caroline Havrilla (CSU), Anping Chen (CSU), Daniel Cooley (CSU), Daniela Cusack (CSU), Kate Wilkins (CSU), Fabio Albuquerque (ASU), Becky Ball (ASU), Alison Louthan (KSU), Zak Ratajczak (KSU), Albert Barbaran (UofA), Wiliam Smith (UofA), Davoorika Guisija (UNM), Scott Collins (UNM), National Science Foundation Biological Integrative Institutes; \$12,496,782

2021-23 Principal Investigator, “*Establishing a co-produced rangeland restoration network: Testing techniques to increase native plant cover and ecosystem functioning across environmental and land use gradients in Colorado rangelands.*” USDA CSU Agricultural Experimental Station (AES) Hatch Grant; \$128,000

2018 CU Boulder Graduate School International Travel Grant; \$500  
 2015-18 EBIO Department Research Grants (CU Boulder); \$10,500  
 2017 Beverly Sears Graduate School Research Grant (CU Boulder); \$1,000  
 2017 EBIO Department Travel Grant (CU Boulder); \$500  
 2017 CU Boulder Graduate School Domestic Travel Grant; \$300  
 2017 AAAS CASE Workshop Travel Sponsorship (CU Boulder, CIRES); \$1,100  
 2016 Canyonlands Research Center Graduate Scholars Grant, The Nature Conservancy; \$2500  
 2015 CU Boulder United Government of Graduate Students Travel Grant; \$300  
 2013 College of Arts and Sciences Travel Enrichment Grant (U Memphis); \$500  
 2012-13 NSF MemphiSTEM Undergraduate Research and Travel Grants (U Memphis); \$2,800

### Presentations (selected):

“\*” denotes invited talks or sessions; student authors are underlined

2021 \* **Havrilla, C.A.**, Munson, S.M., McCormick, M.L., Butterfield, B.J. RestoreNet: An emerging restoration network for dryland restoration. *NOAA/U.S. Fish & Wildlife Service National Conservation Training Center Restoration Webinar Series*, Webinar/Oral Presentation (virtual), March 18, 2021.

2021 **Havrilla, C.A.**, Munson, S.M., McCormick, M.L., Laushman, K.M., Balazs, K.R., Butterfield, B.J. RestoreNet: Controls on seeding success across rangelands. *Society for Range Management Annual Meeting*, Oral Presentation (virtual), February 17, 2021.

2020 \* **Havrilla, C.A.**, Munson, S.M., McCormick, M.L. Laushman, K.M., Balazs, K.R., Butterfield, B.J. RestoreNet: A networked dryland restoration study reveals controls on seeding success across dryland ecosystems. *Colorado Plateau Native Plant Program Annual Meeting*, Oral Presentation, Vernal, UT, February 26, 2020.

2020 \* **Havrilla, C.A.**, Munson, S.M., McCormick, M.L. Laushman, K.M., Balazs, K.R., Butterfield, B.J. Overcoming barriers to dryland restoration. *2020 RestoreNet Annual Partner Meeting*. Oral Presentation, Flagstaff, AZ, February 20, 2020.

2020 \* **Havrilla, C.A.** Exploring biotic interactions between biocrusts and plants at multiple spatial scales. *USGS Southwest Biological Science Center Ecology Group Lunch and Learn*, Oral Presentation, Flagstaff, AZ, February 13, 2020.

- 2019 \* **Havrilla, C.A.**, Bradford, J.B., & Hartsell, J. Niche modeling for assessment of grass species and the grassland biome vulnerability to climate change across Southeast Utah Group Parks. *National Park Service Southwest Utah Group (SEUG) Grassland and Pinyon-Juniper Woodland Working Group Annual Meeting*, Oral Presentation, Moab, UT, December 5, 2019.
- 2019 \* **Havrilla, C.A.**, Winkler, D.E., Gornish, E., Massatti, R., Hartsell, J., Yakulick, E., Hosnel, R.K., Burdin, I., Ward, K., McCormick, M.L. Panel discussion: Challenges and solutions in dryland restoration. *Society for Ecological Restoration (SER) Southwest Chapter Annual Meeting*. Panel discussion, Tucson, AZ, November 9, 2019.
- 2019 \* **Havrilla, C.A.**, Munson, S.M., McCormick, M.L. Laushman, K.M., Balazs, K.R., Butterfield, B.J. RestoreNet: Restoration treatments and seed mixes drive restoration seeding success across dryland ecosystems. *Society for Ecological Restoration (SER) Southwest Chapter Annual Meeting*, Oral presentation, Tucson, AZ, November 9, 2019.
- 2019 **Havrilla, C.A.**, Chaudhary, V.B., Ferrenberg, S., Antoninka, A.J., Belnap, J., Bowker, M.A., Eldridge, E., Faist, A.M., Huber-Sannwald, Leslie, A.D., Rodriguez-Caballero, E., Zhang, Y.M., Barger, N.N. A meta-analysis of context-dependency in plant responses to biocrusts. *15<sup>th</sup> Biennial Conference of Science and Management on the Colorado Plateau and Southwest Region*, Oral Presentation, Flagstaff, AZ, September 11, 2019.
- 2019 **Havrilla, C.A.**, Munson, S.M., Laushman, K.M., McCormick, M.L., Balazs, K.R., Butterfield, B.J. RestoreNet: Insights for restoration seeding success across Southwest ecosystems. *15<sup>th</sup> Biennial Conference of Science and Management on the Colorado Plateau and Southwest Region*, Poster Presentation, Flagstaff, AZ, September 10, 2019.
- 2019 \* **Havrilla, C.A.** & Bradford, J. Planning climate vulnerability assessments of grassland ecosystems in Southeast Utah Group (SEUG) National Parks. SEUG Working Group, *15<sup>th</sup> Biennial Conference of Science and Management on the Colorado Plateau and Southwest Region*, Oral Presentation, Flagstaff, AZ, September 9, 2019.
- 2019 \* **Havrilla, C.A.**, Chaudhary, V.B., Ferrenberg, S., Antoninka, A.J., Belnap, J., Bowker, M.A., Eldridge, E., Faist, A.M., Huber-Sannwald, Leslie, A.D., Rodriguez-Caballero, E., Zhang, Y.M., Barger, N.N. When communities collide: a meta-analysis of context-dependency in vascular plant responses to biocrusts. *Biocrust4: Fourth International Workshop on Biological Soil Crusts*, Invited Keynote Talk, Stradbroke Island, New South Wales, Australia. August 27, 2019.
- 2019 \* **Havrilla, C.A.** & Barger, N.N. Deploying drones to implement and monitor restoration of degraded lands. *Intermountain Drone Ecology Network (IDEN) Meeting: Drones in Earth Science Research*. Oral Presentation. CU Boulder Earth Lab. Boulder, CO. April 30, 2019.
- 2018 \* **Havrilla, C.A.** When communities collide: Effects of biocrusts on plant productivity and community structure across dryland ecosystems. Boulder, CO. *CU Boulder Dept. Ecology & Evolutionary Biology Colloquium*. November 30, 2018.
- 2018 **Havrilla, C.A.**, Chaudhary, V.B., Ferrenberg, S., Antoninka, A.J., Belnap, J., Bowker, M.A., Eldridge, E., Faist, A.M., Huber-Sannwald, Leslie, A.D., Rodriguez-Caballero, E., Zhang, Y.M., Barger, N.N. When communities collide: biological soil crusts as a biological filter of dryland plant communities. *Ecological Society of America (ESA) Annual Meeting*, Oral Presentation, New Orleans, LA. August 8, 2018.
- 2018 \* Bowker, M.A., Antoninka, A.J., **Havrilla, C.A.**, Tucker, C. Completing the dryland puzzle: creating a predictive framework for biological soil crust function and response to climate change, Oral presentation, USGS Powell Center, Fort Collins, CO. June 29, 2018.

- 2018 **Havrilla, C.A.**, Barger, N.N., & Villarreal, M.L. Exploring relationships between biocrusts and vascular plant diversity with UAS remote sensing in Canyonlands, Utah, USA. *5<sup>th</sup> International Spatial Literacy Remote Sensing Professional Summer School (SPLITRS)* Poster Presentation, Prague, Czech Republic. June 13, 2018.
- 2018 **Havrilla, C.A.**, Chaudhary, V.B., Ferrenberg, S., Antoninka, A.J., Belnap, J., Bowker, M.A., Eldridge, E., Faist, A.M., Huber-Sannwald, Leslie, A.D., Rodriguez-Caballero, E., Zhang, Y.M., Barger, N.N. Vascular plant responses to biological soil crusts – a global meta-analysis. *EBIO Spring Symposium*, Oral Presentation, Boulder, CO. April 27, 2018
- 2017 \* **Havrilla, C.A.**, Barger, N.N., Villarreal, M.L. Exploring biocrust-plant diversity relationships with UASs (drones) in Canyonlands, Utah. *14<sup>th</sup> Biennial Conference for Science and Management on the Colorado Plateau and Southwest Region*, Oral Presentation, Flagstaff, AZ. September 13, 2017.
- 2017 **Havrilla, C.A.**, Bramer, H.L., Barger, N.N., Churchill, A.C. Biocrust responses to nitrogen deposition in dry and wet alpine meadows. *Ecological Society of America (ESA) Annual Meeting*, Poster Presentation, Portland, OR. August 7, 2017.
- 2017 \* **Havrilla, C.A.** & Villarreal, M.L. Exploring biocrust-plant diversity relationships with UASs in Canyonlands, Utah. *Western Geological Science Center Seminar Series*, Oral Presentation, Menlo Park, CA. July 27, 2017.
- 2016 **Havrilla, C.A.** & Barger, N.N. Biocrust mediation of grass germination and establishment. *Biocrust3: Third International Conference on Biological Soil Crusts*, Oral Presentation, Moab, UT, September 25, 2016.
- 2016 \* **Havrilla, C.A.**, Cruz, H.M., & Barger, N.N. Understory vegetation and soil responses to fuels-reduction treatments in an upland piñon-juniper woodland. Moab and Monticello, UT Bureau of Land Management (BLM) field offices, Oral presentation, May 2, 2016.
- 2015 \* **Havrilla, C.A.** & Barger, N.N. The role of biocrusts in regulating dryland plant communities and exotic plant invasibility, *13<sup>th</sup> Biennial Conference for Science and Management on the Colorado Plateau and Southwest Region*, Oral Presentation, Flagstaff, AZ. October 2015.
- 2013 **Havrilla, C.A.**, Nakazato, T., Wood, T.E. Landscape genetics of native plant species in Arches and Canyonlands National Park for restoration of degraded grasslands, *2013 Botany Conference*, Oral presentation, New Orleans, LA, July 2013.
- 2013 **Havrilla, C.A.**, Nakazato, T., Wood, T.E. Landscape genetics of native plant species in Arches and Canyonlands National Park for restoration of degraded grasslands, *National Native Seed Conference*, Oral presentation, Santa Fe, NM, April 2013.
- 2013 **Havrilla, C.A.** & Nakazato, T. Landscape genetics of native plant species in Arches and Canyonlands National Parks for restoration of degraded grasslands, *University of Memphis Annual Student Research Forum*, Poster presentation, Memphis, TN. April 2013.

### Teaching Experience:

#### Courses taught

Spring 2021 **Instructor**, RS 452: Rangeland Herbivore Ecology and Management, Colorado State University, Fort Collins, CO

#### Teaching assistantships & Guest lectures

- Spring 2019     **Guest Instructor & Grader**, EBIO 4141: Critical Thinking in Plant Ecology, Taught week-long case study: *Community Ecology in Dryland Ecosystems*, graded course examinations. University of Colorado Boulder, Boulder, CO.
- Spring 2018     **Guest Instructor**, EBIO 5800: Ecosystem Management, Taught week-long case study: *Management and Restoration Following Tamarisk Invasion of Riparian Corridors of the Southwestern U.S.* University of Colorado Boulder, Boulder, CO.
- Fall 2016       **Graduate Co-Instructor**, EBI 6100: Graduate Writing Seminar, University of Colorado Boulder, Boulder, CO.
- Spring 2015     **Graduate Teaching Assistant**, EBIO 1200: General Biology II + EBIO 1240 General Biology II Laboratory (EBIO 1240), University of Colorado Boulder, Boulder, CO.
- Fall 2014       **Graduate Teaching Assistant**, General Biology I (EBIO 1210) + Laboratory (EBIO 1230), University of Colorado Boulder, Boulder, CO.

Other instructional experience

- 2016-18       **NCAA Science Subject Tutor**, General Biology, Environment and Society, Scientific Writing, NCAA Athletics Department, University of Colorado Boulder, Boulder, CO.
- 2014           **Guest Instructor** (in Spanish), Climate Change Ecology, Proyecto de Investigación Arqueológico Regional Ancash (PIARA), Hualcayán, Ancash, Peru
- 2013-14       **Lead Academic Tutor**, Science and Spanish, Educational Support Program, University of Memphis, Memphis, TN
- 2011-13       **Teacher**, 6<sup>th</sup> and 8<sup>th</sup> grade Science and Language Arts, Teach for America, Southern Avenue Charter Middle School, Memphis, TN
- 2011           **Teacher**, 9<sup>th</sup> grade Mathematics, Teach for America, Summer Institute, Atlanta, GA

**Research Mentorship** (*n* = 52 students)

“\*” Denotes co-authored research grants with undergraduate mentees; Total co-authored grant awards to date = 14 (\$28,700)

Graduate Students (2 students)

- 2021-present     Amy Gill (Colorado State University, Dept. Forest and Rangeland Stewardship), Primary PhD Thesis Advisor
- 2021-present     Louisa Kimmell (Colorado State University, Dept. Forest and Rangeland Stewardship), Primary MS Thesis Advisor

Graduate Committee Membership (3 students)

- 2021-present     Maggie Ross (Colorado State University, Dept. Biology), MS Thesis Committee Member
- 2021-present     Mike Greisiger (Colorado State University, Dept. Forest and Rangeland Stewardship), MS Thesis Committee Member
- 2021-present     Becca Harris (Colorado State University, Dept. Forest and Rangeland Stewardship), MS Thesis Committee Member

Undergraduate Honors Thesis Students (3 students)

- 2021-present     Jessica Fagen (Colorado State University, Undergraduate Honors Thesis), Research mentor

- 2018-19 Rachael Merkt (University of Colorado Boulder, Undergraduate Honors Thesis: “*The influence of biological soil crusts on dryland vascular plant establishment in a greenhouse experiment;*” BSI Scholars Grant\*, UROP Independent Research Grant\*), Research co-mentor
- 2014-16 Hannah Cruz (University of Colorado Boulder, Undergraduate Honors Thesis: “*Fuel reduction treatment effects on soil in piñon-juniper woodlands;*” UROP Independent Research\*) [*Now in Graduate School*], Research co-mentor

#### Undergraduate Research Students (21 students)

- 2019-20 Hannah Haines (Northern Arizona University, NASA Space Grant Undergraduate Research Program)
- 2019 Marci Reynolds-Caballero (University of Arizona & USGS Southwest Biological Science Center)
- 2018-19 Jacob DiBiase (University of Colorado Boulder, EBIO Independent Study; BSI Scholars Grant\*, *two co-authored manuscripts*)
- 2017-19 Lindsey Foust (University of Colorado Boulder, EBIO Independent Study; UROP Independent Research Grant\*)
- 2016-18 Alexander Leslie (University of Colorado Boulder, UROP Assistantship\*, Powell Center Working Group, UROP Independent Research Grant\*, EBIO Independent Study, *two co-authored manuscripts*) [*Now in graduate school*]
- 2018 Luke Lemmons (University of Colorado Boulder, Independent Undergraduate Research)
- 2017-18 Christopher Manning (University of Colorado Boulder, UROP Independent Research Grant\*)
- 2017 Nora Apelgren (University of Colorado Boulder, Independent Undergraduate Research)
- 2017 Whitney Gabbert (University of Colorado Boulder, Powell Center Working Group, BSI Scholars Grant\*)
- 2017 Emma Brokyl (University of Colorado Boulder, Powell Center Working Group)
- 2017 Julius Gayo (University of Colorado Boulder, Powell Center Working Group)
- 2016-17 Allister Carter (University of Colorado Boulder, UROP Team Grant\*, UROP Assistantship\*)
- 2016-17 Jeremy Herder (University of Colorado Boulder, UROP Assistantship\*)
- 2016-17 Evelyn Beaury (University of Colorado Boulder, UROP Team Grant\*) [*Now in graduate school*]
- 2016-17 Karoline Dapprich (University of Colorado Boulder, Independent Undergraduate Research)
- 2015-17 Halle Bramer (University of Colorado Boulder, BSI Scholars Grant\*, UROP Assistantship\*)
- 2016 Joseph Holvey (University of Colorado Boulder, Independent Undergraduate Research)
- 2015-16 Ryan Byrne (University of Colorado Boulder, Independent Undergraduate Research)
- 2015-16 Laura Wegleitner (University of Colorado Boulder, Independent Undergraduate Research)
- 2015 Abaynesh Getahun (University of Colorado Boulder, Independent Undergraduate Research)
- 2015 Savannah Bernal (Otero Junior College, NSF Research Experience for Community College Students (RECCS) in Critical Zone Science)

#### Field Crew Leader (18 students)

- 2018 Utah – 4 undergraduates
- 2017 Utah – 4 undergraduates
- 2016 Utah/Colorado – 6 undergraduates
- 2015 Utah/Colorado – 4 undergraduates

#### High School Research Students (6 students)

- 2019-20 Zachary Norris (BASIS High School, Flagstaff, AZ; Senior Thesis Research Project: “*Using soil bio-inoculation to promote restoration seeding success across degraded southwest ecosystems;*” Nominated for 2019-20 BASIS Senior Project National Founders’ Prize)



- 2017 Adriana Iturbe (Lafayette High School, Lafayette, CO; CU Science Discovery STEM Research Experiences Summer Project: “*Drone detection of biological soil crusts in sagebrush and pinyon-juniper woodlands*”)
- 2017 Bianca Cano (Lafayette High School, Lafayette, CO; CU Science Discovery STEM Research Experiences Summer Project: “*Drone detection of biological soil crusts in sagebrush and pinyon-juniper woodlands*”)
- 2016-17 Benjamin Santos (Boulder High School, Boulder, CO; CU Science Discovery STEM Experiences Summer Project: “*Using drones to map and monitor biocrusts in drylands of the Southwestern US*”)
- 2016 Paul Rice (Evergreen High School, Evergreen, CO; CU Science Discovery STEM Research Experiences Summer Project: “*Using drones to map and monitor biocrusts in drylands of the Southwestern US*”)
- 2015 Priyanka Karki (Fairview High School, Boulder, CO; Girls Who Code Program, Independent student researcher)

### Working Groups & Specialized Training:

- 2021- present **USDA Collaborative Adaptive Rangeland Management (CARM) Project Team**, Working group member with the USDA-ARS, Fort Collins, CO.
- 2019-present **National Park Service Southeast Utah Group (SEUG) Grassland Drought Working Group**, Working group member, in collaboration with the National Park Service.
- 2017-20 **Completing the Dryland Puzzle: Creating a Predictive Framework for Biological Soil Crust Function and Response to Climate Change**, Working group member, John Wesley Powel Center for Analysis and Synthesis (USGS), Fort Collins, CO.
- 2016-18 **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)**. Co-authored a global assessment of grazing impacts on ecosystem function to inform international land management and public policy.
- 2017 **ComSciCon Rocky Mountain West 2017 Workshop**. Selected to attend a two-day science communication conference by CU Boulder, Boulder, CO. September 23-24, 2017.
- 2017 **AAAS Catalyzing Advocacy in Science and Engineering (CASE) Workshop**. Selected as a graduate student representative for a three-day intensive science policy workshop at the US capital on science policy and advocacy, culminating in meetings congressional staffers and Congresspersons. CU Boulder, American Association for the Advancement of Science (AAAS), Washington D.C. April 3-5, 2017.

### Specialized Training:

- 2021-22 **Fellow**, Faculty Institute for Inclusive Excellence (FIIE). Selected to Colorado State University, Fort Collins, CO, 2021-2022.
- 2018 **Participant**, Fifth International Spatial Literacy Remote Sensing (SPLITRS) Professional Summer School for Land Ecosystems and Natural Hazards, Czech University of Life Sciences, Prague, Czech Republic, June 11-16, 2018.
- 2017 **Participant**, ComSciCon Rocky Mountain West 2017 Workshop. Selected to attend a two-day science communication conference. CU Boulder, Boulder, CO. September 23-24, 2017.
- 2017 **Graduate Representative**, AAAS Catalyzing Advocacy in Science and Engineering (CASE)

Workshop. Selected as a graduate student representative for a three-day intensive science policy workshop at the US capital on science policy and advocacy, culminating in meetings congressional staffers and Congresspersons. CU Boulder, American Association for the Advancement of Science (AAAS), Washington D.C. April 3-5, 2017.

### Public Outreach & Stakeholder Engagement (selected):

- 2020 – *present* **Mentor**, CoNECTAR Program, served as a mentor to undergraduate and graduate students, provided guidance to mentees about graduate life, academia, work-life balance and beyond.
- 2018-19 **Science Mentor for Actionable Socio-Environmental Education (ASEE) Project**. Assisted with curriculum development, lesson-planning, and teaching for a semester-long program teaching middle school students about climate change, environmental sustainability, and social justice. Meadowlark Middle School, Erie, CO.
- 2017-19 **Pen Pal for Letters to a Pre-Scientist**. Exchanged bi-monthly letters during the school year with an elementary student discussing diverse topics in STEM. Oakland, CA.
- 2017-19 **Volunteer for Skype a Scientist**. Engaged with K-12 classrooms and adult science education groups, discussing science, pathways to science, and my experiences as a woman in STEM. Boulder, CO.
- 2018 **Science Instructor for Doris Duke Conservation Scholars Program (DDCSP)**. Served as a volunteer science instructor for a summer program immersing undergraduate students from underrepresented groups in conservation practices and multi-stakeholder conservation and land management issues in and around Bears Ears National Monument, Canyonlands, UT.
- 2017-18 **Science Mentor for Lens on Climate Change Program (NSF)**. Engaged students at Lafayette Middle School (CO) in scientific film production documenting the effects of climatic and environmental change on their lives and communities as part of a year-long NSF-funded program. Helped students access university resources such as labs, equipment, and expert knowledge. Lafayette, CO.
- 2015-18 **Evolution Outreach Committee Coordinator for a Teaching Controversial Topics Workshop**. Organized and coordinated an annual, one-day teaching controversial topics workshop focused on climate change and evolution that is geared towards middle school and high school science teachers held each year September at CU Boulder. Boulder, CO.
- 2016-17 **High school research mentor for CU Science Discovery Program**. Mentored local high school students through the CU Science Discovery program, which offers four-week introductory science laboratory experiences to local high school students with preference given to underserved student populations. Boulder, CO.
- 2016-17 **Co-organizer and volunteer for Evolution Museum Family Day**. Co-organized an annual, one-day event at the CU Boulder Museum of Natural History, which offered a variety of evolution-themed educational activities for families and community members. Boulder, CO.
- 2015-16 **Program Developer and Coordinator for Girls at the Museum Exploring Science (GAMES) Program**. Helped develop a program at the CU Boulder Museum of Natural Sciences to encourage underserved female Middle School students to pursue careers in STEM. Boulder, CO.
- 2015 **Coding and Science Mentor for Girls Who Code**. Mentored a local student from Fairview High School (CO) in science and coding in R. Boulder, CO.

- 2015 **Volunteer for Insect Educational Workshop.** Facilitated a “Moth Mania” family workshop at the CU Boulder Museum of Natural History for K-12 students and their families. September 2015, Boulder, CO.
- 2015 **Lead instructor for a K-12 Museum Pollination Workshop.** Designed, planned lessons for, and taught summer workshops on Colorado pollinators for K-2<sup>nd</sup> grade students at the CU Boulder Museum of Natural History. (May – Aug. 2015), Boulder, CO.
- 2014 **Science Education Volunteer for Proyecto de Investigación Arqueológico Regional Ancash (PIARA).** I worked in the Ancash Region in the highlands of Northern Peru as a guest instructor in climate change ecology in the Hualcayán primary and secondary schools and co-created science lesson plans for future use in schools in the region. (May – July 2014). Hualcayán, Ancash, Peru.

### Professional Service (selected):

- 2019 **Summit Moderator,** Climate 2020 Summit: Seven Generations for Arizona, facilitated a conference bringing together youth, community and tribal leaders, researchers, and decisionmakers to change the conversation about climate change in Arizona and work together toward statewide climate solutions. Nov. 15-16, 2019. Northern Arizona University, Flagstaff, AZ.
- 2019 **Conference Facilitator,** North American Forest Ecology Workshop (NAFEW), Facilitated a week-long international conference on forest and woodland ecology. June 23-27, 2019, Northern Arizona University, Flagstaff, AZ.
- 2017-19 **Co-Director,** Forum on Science Ethics and Policy (FOSEP), CU Boulder Chapter, Co-ordinated science policy guest lectures and professional development opportunities for graduate students, Boulder, CO.
- 2017-19 **Lab Eco-Leader,** CU Green Labs Project, CU Boulder; served as a lab liaison for the Eco Labs program which encourages on-campus water and energy use efficiency and recycling initiatives, Boulder, CO.
- 2016-19 **Committee Chair,** Colloquium Committee, EBIO Dept., CU Boulder; Coordinated weekly EBIO departmental colloquium seminar series hosting national and international speakers, Boulder, CO.
- 2016-19 **Program Officer,** Society for Ecological Restoration (SER) Student Association, CU Boulder, Boulder, CO.
- 2018 **Conference Volunteer,** ESA Southwest Chapter; Staffed the ESA Southwest Chapter’s information booth at the ESA Annual Meeting, New Orleans, LA.
- 2018 **Graduate Faculty Search Representative,** CU Boulder EBIO Dept., Represented EBIO grad student interests in departmental faculty search, Boulder, CO.
- 2016 **Management Symposium Facilitator,** Canyon Country Science and Management Symposium, Moab UT; Facilitated a regional meeting bringing together scientists and land managers from southeastern Utah to discuss regional science and management topics. Dec. 15, 2016. Moab, UT.
- 2014-16 **Grad Lunch Coordinator,** Colloquium Committee, EBIO Dept., CU Boulder, Organized weekly lunch for EBIO grad students and colloquium speakers. Boulder, CO.
- 2014-16 **Symposium Co-Organizer,** Spring Symposium Committee, EBIO Dept., CU Boulder,

Co-organized an annual, day-long research symposium for graduate and undergraduate students in the Department of Ecology and Evolutionary Biology. Boulder, CO.

- 2015 **Conference Symposium Co-organizer**, Biological Soil Crust Special Session, 13<sup>th</sup> Biennial Conference of Science and Management on the Colorado Plateau and Southwest Region; Co-organized a special symposium session for research talks on biocrust ecology and management. Oct. 5-8, 2015. Northern Arizona University, Flagstaff, AZ.

### Journals Refereed:

*Earth Surface Processes and Landforms*  
*Ecology*  
*Ecological Restoration*  
*Ecosphere*  
*Global Ecology and Conservation*  
*Journal of Ecology*  
*Journal of Applied Soil Ecology*  
*Journal of Rangeland Ecology and Management*  
*Journal of Vegetation Science*  
*Land Degradation and Development*  
*Plant and Soil*  
*Pedosphere*  
*Plant Ecology and Diversity*  
*Soil Biology and Biogeochemistry*

### Professional Affiliations

Society for Range Management  
Ecological Society of America  
Society for Ecological Restoration

### Technical Skills:

#### Specialized programs & programming languages:

- R: data management, statistical analyses, and data visualization including geospatial analyses and mapping
- Google Earth Engine (JavaScript): geospatial analysis, band math, time series analysis, and data visualization
- eCognition: remote sensing object-based image analysis
- Arc/QGIS: mapping and geospatial analysis
- MaxEnt: Species distribution modeling (run through ‘*maxent*’ and ‘*dismo*’ in R)

#### Advanced analyses:

- Ecological forecasting: remote sensing band math and time series analyses
- Quantitative meta-analysis
- Species distribution/ecological niche modeling
- Generalized linear mixed modeling