Avery Driscoll

averydriscoll.github.io | 507-250-7473 | averywdriscoll@gmail.com

EDUCATION

PhD, Soil and Crop Sciences **Dec. 2025**
Colorado State University, Fort Collins, CO
Advisor: Dr. Nathaniel D. Mueller
Dissertation title: *Towards practice-based GHG emissions accounting: Impacts of US irrigation*

BS, Environmental Studies, *summa cum laude* **May 2018**
Westminster College, Salt Lake City, UT

ACADEMIC APPOINTMENTS

Postdoctoral Research Associate **Jan. 2026 (anticipated)**
Agronomy Department, Purdue University, West Lafayette, IN
Mentor: Dr. Yichao Rui

RESEARCH FOCUS

I study food-energy-water systems, with a particular interest in the interactive effects of climate change and agricultural management practices on greenhouse gas emissions, ecosystem function, and agricultural productivity. I use a range of data synthesis approaches to address these questions at regional to global scales, leveraging plant-to-ecosystem scale field measurements, government databases, remote sensing, process-based models, statistical models, and machine learning.

PUBLICATIONS

*co-first authors
†Undergraduate mentee

18. †McGill, K.*, **Driscoll, A.W.***, N.D. Mueller. Systematic underrepresentation of soil moisture extremes by biogeochemical models in irrigated croplands. (In Prep).

17. Kannenberg, S.A., W.L. Anderegg, S. Coffield, **A.W. Driscoll**, J.M. Mathias, C. Wu. The present and future of US forest carbon allocation and turnover time. (In Prep)

16. **Driscoll, A.W.**, J.A. Johnson, J.E. Blumberg, A.E. King, S.A. Spawn-Lee, N.D. Mueller. Global greenhouse gas co-benefits of US irrigated agriculture. (Submitted).

15. †Lengyl, T., **A.W. Driscoll**, †I. Jahromi, J.R. Ehleringer (2025). Climate gradients underlie geographical variations in iWUE and $\delta^{15}N$ values of *Encelia*. *Plant-Environment Interactions.* doi: 10.1002/pei3.70080.

14. Hu, C.C., **A.W. Driscoll**, Y.W. Kuang, E.N.J. Brookshire, X.T. Lü, C.J. Chen, W. Song, R. Mao, C.Q. Liu, B.Z. Houlton, X.Y. Liu (2024). Surface temperature regulated global nitrogen-use patterns of terrestrial plants. *Nature Communications.* doi: 0.1038/s41467-024-50674-6

13. **Driscoll, A.W.**, L.T. Marston, S. Ogle, N.J. Planavsky, M.A.B. Siddik, S. Spencer, S. Zhang, N.D. Mueller (2024). Hotspots of irrigation-related US greenhouse gas emissions from multiple pathways. *Nature Water.* doi: 10.1038/s44221-024-00283-w

12. **Driscoll, A.W.**, R.T. Conant, L.T. Marston, E. Choi, N.D. Mueller (2024). Greenhouse gas emissions from US irrigation pumping and implications for climate-smart irrigation policy. *Nature Communications.* doi: 10.1038/s41467-024-44920-0

11. Yang, Y., Z. Jin, N.D. Mueller, **A.W. Driscoll**, R.R. Hernandez, S. Grodsky, L. Sloat, M. Chester, Y.G. Zhu, D. Lobell (2023). Sustainable irrigation and climate feedbacks. *Nature Food.* doi: 0.1038/s43016-023-00821-x

10. Kannenberg, S.A., M.L. Barnes, D.R. Bowling, **A.W. Driscoll**, J.S. Guo, W.L. Anderegg (2023). Quantifying the drivers of ecosystem carbon-water cycling across the soil-plant-atmosphere continuum. *Agricultural and Forest Meteorology.* doi: 10.1016/j.agrformet.2022.109269

9. **Driscoll, A.W.***, S.J. Leuthold*, E. Choi, S.M. Clark, D. Cleveland, M. Dixon, M. Hsieh, J. Sitterson, N.D. Mueller (2022). Divergent impacts of crop diversity on caloric and economic yield stability. *Environmental Research Letters*. doi: 10.1088/1748-9326/aca2be

8. Ehleringer, J.R., **A.W. Driscoll** (2022). Intrinsic water-use efficiency influences establishment in *Encelia farinosa*. *Oecologia*. doi: 10.1007/s00442-022-05217-5

7. Kannenberg, S.A.*, **A.W. Driscoll***, J.R. Ehleringer, W.L. Anderegg (2021). Rapid increases in shrubland and forest intrinsic water-use efficiency during an ongoing megadrought. *Proceedings of the National Academy of Sciences*. doi: 10.1073/pnas.2118052118

6. **Driscoll, A.W.**, S.A. Kannenberg, J.R. Ehleringer (2021). Long-term nitrogen isotope dynamics in *Encelia farinosa* reflect plant demographics and climate. *New Phytologist*. doi: 10.1111/nph.17668

5. **Driscoll, A.W.**, N.Q. Bitter, J.R. Ehleringer (2021). Interactions among intrinsic water-use efficiency and climate influence growth and flowering in *Encelia farinosa*. *Oecologia*. doi: 10.1007/s00442-020-04825-3

4. Kannenberg, S.A., **A.W. Driscoll**, D. Malesky, W.L. Anderegg (2021). Rapid and surprising dieback of Utah juniper in the four corners region due to acute drought stress. *Forest Ecology and Management.* doi: 10.1016/j.foreco.2020.118639

3. **Driscoll, A.W.**, N.Q. Bitter, D.R. Sandquist, J.R. Ehleringer (2020). Multi-decadal records of intrinsic water-use efficiency in the desert shrub *Encelia farinosa* reveal strong responses to climate change. *Proceedings of the National Academy of Sciences*. doi: 10.1073/pnas.2008345117

2. Bitter, N.Q., D.P. Fernandez, **A.W. Driscoll**, J.D. Howa, J.R. Ehleringer (2020). Distinguishing the region-of-origin of roasted coffee beans with trace element ratios. *Food Chemistry*. doi: 10.1016/j.foodchem.2020.126602

1. **Driscoll, A.W.**, J.D. Howa, N.Q. Bitter, J.R. Ehleringer (2019). A predictive spatial model for roasted coffee using oxygen isotopes of α-cellulose. *Rapid Communications in Mass Spectrometry*. doi: 10.1002/rcm.8626

GRANTS AND FELLOWSHIPS

Improving representation of irrigation in land surface models using in situ soil moisture measurements. Colorado State University Climate Adaptation Partnership, 2025. $7,500 grant for post-baccalaureate research associate salary.

Graduate Research Fellowship, National Science Foundation, 2021-2026. $147,000

Interdisciplinary Training, Education, and Research in Food-Energy-Water Systems Traineeship, National Science Foundation, 2021-2026. $68,000 plus tuition

Travel Grant, AI Institute for Climate-Land Interactions, Mitigation, Adaptation, Tradeoffs and Economy, 2024. $2,200

National Research Traineeship Communicating Research Travel Grant, Center for Communicating Science, Virginia Polytechnic and State University, 2022. $1,000

AWARDS

Outstanding Publication Award for "Hotspots of irrigation-related US greenhouse gas emissions from multiple pathways", 2025. Warner College of Natural Resources, Colorado State University

Graduate Student Showcase Top Scholar Award, Colorado State University College of Agricultural Sciences, 2022. $500

PROFESSIONAL EXPERIENCE

Research Fellow
Project Drawdown, 2024-ongoing
Evaluated potential climate change mitigation strategies in the land and food sectors through novel analysis and literature synthesis and developed associated public-facing web materials (see "Other Publications" section)

Consultant
Ehleringer Lab, University of Utah, 2021-ongoing
Provided undergraduate mentorship, analysis, and writing related to desert plant ecophysiology; led field team for annual monitoring trips near Death Valley National Park; collaborated on development of NSF LTREB proposal for ongoing monitoring

Consultant
Vestaron, 2023
Analyzed and advised on avoided land use change and associated greenhouse gas emissions from potential biopesticide deployment

Research Assistant
Ehleringer Lab, University of Utah, 2018-2021
Led data analysis, field work, and sample processing related to desert plant ecophysiology and biogeochemistry using stable isotopes, eddy covariance, plant hydraulics, and other methods

Research Assistant

Rodale Institute, Kutztown, PA, fall 2020
Conducted field work and analyzed data at an organic, nonprofit research farm

Consultant
IsoForensics, 2018-2019
Conducted region-of-origin analysis for coffee, hair, and other materials for business client use in lawsuits and product verification

Lecture Coordinator
Institute for Mountain Research, Westminster College, Salt Lake City, UT, 2017-2018
Recruited diverse speakers, advertised, and organized logistics for a monthly lecture series

Community Outreach Intern
Salt Lake City Sustainability Department, 2017
Communicated city sustainability policy to residents; assisted with policy research on food system sustainability and green infrastructure

PRESENTATIONS

†Undergraduate mentee

†McGill, K., A.W. Driscoll, N.D. Mueller, E.F. Kelly. **Improving model representation of irrigation using in-situ soil moisture data.** American Geophysical Union Annual Meeting 2025. Poster presentation.

Driscoll, A.W., J.A. Johnson, J.E. Blumberg, A.E. King, S. A. Spawn-Lee, N.D. Mueller. Net Greenhouse Gas Impacts of US Irrigation: Integrating Local Emissions and Global Land Sparing. European Geophysical Union General Assembly 2025. PICO presentation.

Kannenberg, S.A., W.L. Anderegg, **A.W. Driscoll**, J.M. Mathias, C. Wu. The present and future of US forest carbon allocation and turnover time. European Geophysical Union General Assembly 2025. Oral Presentation.

Driscoll, A.W., J.A. Johnson, J.E. Blumberg, A.E. King, N.D. Mueller. Crop Production and Avoided Land Use Change Attributable to US Irrigation. American Geophysical Union Annual Meeting 2024. Poster presentation.

Mueller, N.D., **A.W. Driscoll**, E. Kinnebrew, Y. Qin, Climate tradeoffs and land use benefits of US irrigation. American Geophysical Union Annual Meeting 2024. Invited oral presentation.

Mueller, N.D., **A.W. Driscoll,** L.T. Marston, S. Ogle, N.J. Planavsky, M.A.B. Siddik, S. Spencer, S. Zhang, Climate tradeoffs and land use benefits of US irrigation. Global Land Programme Annual Meeting 2024. Invited oral presentation.

Mueller, N.D., **A.W. Driscoll**. Sustaining and decarbonizing irrigated agriculture. Soil Carbon Solutions Center Annual Symposium 2024. Invited oral presentation.

Driscoll, A.W. Greenhouse gas emissions accounting for practices with cross-sector impacts. Colorado Department of Public Health and Environment GHG Inventory Team 2024. Invited oral presentation.

†McGill, K., †J. Hedrick, **A.W. Driscoll**. Evaluating Model Representation of Soil Moisture in Irrigated Fields. Colorado State University Celebrating Undergraduate Research and Creativity Showcase 2024. Poster presentation with College of Natural Sciences Top Honors Award.

†Hedrick, J., K. †McGill, **A.W. Driscoll**. Models underrepresent soil moisture variance on irrigated farmland relative to in-situ and remotely sensed data. Colorado State University Celebrating Undergraduate Research and Creativity Showcase 2024. Poster presentation.

Driscoll, A.W., L.T. Marston, S. Ogle, N.J. Planavsky, M.A.B. Siddik, S. Spencer, S. Zhang, N.D. Mueller. Greenhouse gas emissions from US Irrigation. American Geophysical Union Annual Meeting 2023. Oral presentation.

Driscoll, A.W., L.T. Marston, S. Ogle, N.J. Planavsky, M.A.B. Siddik, S. Spencer, S. Zhang, N.D. Mueller. Impacts of Irrigation on US Agricultural Greenhouse Gas Emissions. American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America International Annual Meeting 2023. Oral presentation.

Driscoll, A.W., R.T. Conant, L. Marston, E. Choi, N.D. Mueller. Greenhouse gas emissions from energy use for irrigation in the US. American Geophysical Union Annual Meeting 2022. Poster presentation.

Kannenberg, S.A., M.L. Barnes, D.R. Bowling, **A.W. Driscoll**, J.S. Guo, W.L. Anderegg. Drivers of dryland carbon-water cycling across the soil-plant-atmosphere continuum. American Geophysical Union Annual Meeting 2022. Invited oral presentation.

Driscoll, A.W., R.T. Conant, L. Marston, E. Choi, N.D. Mueller. Greenhouse gas emissions from energy use for irrigation. Colorado State University Graduate Student Showcase 2022. Poster presentation.

Driscoll A.W. Does adapting to climate change make it worse? The carbon costs of irrigation. National Science Foundation National Research Traineeship Annual Meeting 2022. Invited oral presentation.

Driscoll A.W., N.D. Mueller. Greenhouse gas emissions from irrigation in the US: The carbon cost of climate adaptation. National Science Foundation National Research Traineeship Annual Meeting 2022. Poster presentation.

Kannenberg, S.A., W.L. Anderegg M.L. Barnes, **A.W. Driscoll**, J.S. Guo. What drives variability in carbon-water dynamics? The value of soil moisture for predicting plant water potential and ecosystem fluxes. Ecological Society of America Annual Meeting 2022. Oral presentation.

Mueller, N.D., E. Choi, **A.W. Driscoll**, E. Kinnebrew, L. Kabeshita. Adapting agriculture to a changing climate. American Geophysical Union Global Environmental Change Early Career Climate Change Mitigation and Adaptation Webinar Series 2022. Invited group oral presentation.

Driscoll, A.W. and N.D. Mueller. Irrigation expansion for climate adaptation: tensions and synergies between adaptation and mitigation. American Geophysical Union Hydrology Days 2022. Oral presentation.

Driscoll, A.W. and S.A. Kannenberg. Megadrought in the Mojave: What We've Learned from Four Decades of Shrub Surveys. Bureau of Land Management Mojave Desert Native Plant Program 2022. Invited oral presentation.

Driscoll, A.W., A. Benson, Y. Rui. Reducing tillage in organic soybean systems: integrating lessons from short- and long-term trials. Rodale Institute 2020. Invited oral presentation.

Kannenberg, S.A., M.J. Campbell, **A.W. Driscoll**, D. Malesky, K.L. Kerr, W.R.L. Anderegg. Why is the hardiest tree in the west dying: a paradigm shift in piñon-juniper woodlands. Ecological Society of America 2020. Oral presentation.

Driscoll, A.W. and J. Podis. Reproductive effects of environmentally realistic cadmium exposures on *Daphnia magna.* Westminster Undergraduate Research Conference 2018. Poster presentation.

TEACHING AND MENTORSHIP

Guest Instructor
Data Science and Global Change Biology*, Harvey Mudd College, Fall 2025*
Ecosystem Ecology*, West Virginia University, Fall 2024, 2025*
Environmental Data Science: Food and Agriculture*, Colorado State University, Spring 2023, 2024*

Teaching Assistant
Global Agriculture and Environmental Change, Colorado State University, Spring 2023

Research Mentor
Post-baccalaureate research associate, Department of Ecosystem Science & Sustainability, Colorado State University, 2025
Primary mentor for full-time post-baccalaureate data analyst, culminating in manuscript submission

Undergraduate Research Thesis, University of Utah School of Biological Sciences, 2022-2024
Primary mentor for two senior undergraduates, culminating in manuscript publication

Skills for Undergraduate Participation in Ecological Research, Department of Ecosystem Science & Sustainability, Colorado State University, 2023-2024
Primary mentor for two junior undergraduates, culminating in poster presentations

SERVICE AND OUTREACH

Reviewer
Proceedings of the National Academy of Sciences, Biogeosciences, Nature Communications, Nature Water, Earth's Future, Agricultural Water Management, Plant Biology

Soil and Crop Science Graduate Leadership Committee Academic Opportunity Chair
Colorado State University, Soil and Crop Sciences, 2023-2025
Provided resources related to academic achievement and campus engagement for graduate students

Growing Food Security Leadership Team
Colorado State University Agricultural Experiment Station and Rams Against Hunger, 2022-2024
Managed field operation and student volunteers for food production on underutilized land at the Agricultural Experiment Station for donation to the student food pantry

Sustainability in Graduate School Panelist
Colorado State University School of Global Environmental Sustainability, 2023 and 2024
Spoke on 6 panels for undergraduates interested in graduate school in sustainability-related fields

Promoting Geoscience Research, Education, and Success Mentor
Colorado State University and PROGRESS Team, 2023
Provided ongoing professional mentorship to female-identifying undergraduates in the Earth and Environmental Sciences

Spur Campus Food, Energy, and Water Center Volunteer
Colorado State University and National Western Stock Show, 2023
Discussed my research and the aims of the CSU Food, Energy, and Water Center with public visitors to the Denver Spur Campus during the National Western Stock Show event

Climate Leadership Summit Volunteer
Colorado State University and the Poudre Valley School District, 2022-2023
Guided high school students as they planned a summit for >200 high school students interested in climate science and policy and hosted a roundtable discussion during a breakout session

Graduate Research Fellowship Application Support Volunteer
Colorado State University Institute for Teaching and Learning, 2022-2023
Served on a panel for prospective and provided written feedback on draft application materials

Soil and Crop Science Transfer Student Mentor
Colorado State University, 2022
Helped undergraduate transfer students build campus connections and identify opportunities for research and professional development

Science Fair Mentor
Oraculi Inc., Rochester, MN, 2020-2022
Mentored underserved middle and high school students as they develop their first science fair projects through one-on-one weekly meetings and feedback over the course of three months

Farmer
Native Hill Farms, Fort Collins, CO, 2022-2023
Copper Moose Farms, Park City, UT, seasonal, 2016-2020
WiMo Farms, Longmont, CO, summer, 2020
Finca Sagrada, Vilcabamba, Ecuador, winter, 2018

OTHER PUBLICATIONS

Drawdown Explorer
Public-facing online library of climate mitigation solutions: *drawdown.org/explorer*
Lead author: Improve Nutrient Management, Protect Forests, Protect Peatlands, Protect Grasslands, Restore Forests, and Improve Irrigation
Contributing author: Improve Annual Cropping, Improve Rice Production, Protect Coastal Wetlands, Improve Forest Management, Deploy Biomass Crops on Degraded Land

5th National Climate Assessment, Technical Contributor
US EPA, 2021-2023
Conducted structured literature search and guided text development based on identified themes for agricultural topics in the Northern Great Plains chapter.

MEDIA AND COMMUNICATIONS TRAININGS

Employing Model-Based Reasoning in Socio-Environmental Synthesis
Colorado State University, 2023
One-week intensive workshop focused on developing effective transdisciplinary collaborations, engaging non-academic stakeholders, and model-building for addressing wicked environmental problems.

Written Communications Training for Food-Energy-Water Researchers
Colorado State University, 2023
Two-day training, with one day focused on written research communication for broad non-academic audiences and one day focused on academic grant writing.

Communicating Research Workshop
Center for Communicating Science, Virginia Polytechnic and State University, 2022
Six-week workshop on effective oral public-facing science communication for 20 selected National Research Traineeship recipients.

Media Coverage

"Irrigation emits greenhouse gases. Now Colorado researchers know how much and where the top emitters are." Shannon Mullane for the *Colorado Sun*. Aug. 5, 2024.

"New CSU research catalogs greenhouse gas emissions tied to energy use for interbasin water transfers." Christopher Outcalt for the *CSU Source*. Aug. 5, 2024.

"CSU researchers quantify greenhouse gas emissions from U.S. irrigation pumping." Christopher Outcalt for the *CSU Source*. Feb. 2, 2024.

"How Coffee Farmers in Hawaii Fought Counterfeit Kona Beans." Virgina Hughes for *The New York Times*. Jan. 24, 2024.

"Desert shrubs cranked up water use efficiency to survive a megadrought." Paul Gabrielson for the *University of Utah News*. Dec. 20, 2021.

"Rising temps put desert shrubs in high-efficiency mode." Paul Gabrielson for the *University of Utah News*. July 23, 2020.