

# ADRIENNE MARSHALL

Hydrologic Sciences and Engineering Program  
Department of Geology and Geological Engineering  
Colorado School of Mines  
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CV updated: March 2023

## EDUCATION

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Ph.D., Water Resources, University of Idaho	2016-2019
M.S., Energy and Resources, University of California, Berkeley	2014-2016
B.A., Biology (French Minor), Scripps College	2005-2009

## APPOINTMENTS

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Assistant Professor, Colorado School of Mines	Aug 2021-Present
Postdoctoral Fellow, Georgia Institute of Technology	Jan 2021-Aug 2021
Postdoctoral Fellow, University of Idaho	May 2019-Dec 2020
NSF IGERT Fellow, University of Idaho	2016-2018
Graduate Student in Extension, University of California, Berkeley	2015
Graduate Student Instructor, University of California, Berkeley	Fall 2014, Spring 2016
Field Science Educator, Naturebridge (Environmental education nonprofit)	2011-2014

## PUBLICATIONS

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ORCID: [0000-0001-5555-2548](https://orcid.org/0000-0001-5555-2548)

[Google scholar page](#)

\* = student co-author

*Published and peer-refereed*

- Lucash, M.S., **Marshall**, A.M., Weiss, S., McNabb, J., Nicolsky, D., FLerchinger, G., Link, T. E., Scheller, R., Romanovsky, V. (2023). Burning trees in frozen soil: Simulating fire, vegetation, soil, and hydrology in the boreal forests of Alaska. *Accepted for publication in Ecological Modelling*
- Strickfaden, K., **Marshall**, A.M., Svancara, L., Ausband, D., Link, T.E. (2023). Understanding the spatiotemporal distribution of snow refugia in the rain-snow transition zone of north-central Idaho. *Environmental Research Letters* 18(4). 044014. <https://dx.doi.org/10.1088/1748-9326/acbb90>
- Marshall**, A. M., & Lute, A. C. (2022). Climate change in the Columbia River Basin: Potential impacts on the Snake River Dams. *Idaho Law Review* 58(1):36-73.

14. **Marshall, A.M.**, E. Grubert (2022). Hydroelectricity modeling for low-carbon and no-carbon grids: Empirical constraints for optimization and dispatch models. *Earth's Future*. e2021EF002503. <https://doi.org/10.1029/2021EF002503>
13. Wei, L., Zhou, H., Hudak, A. T., Link, T. E., **Marshall, A. M.**, Kavanagh, K. L., Abatzoglou, J. T., Fekety, P. A., Byrne, J. C., Jain, T. B., Denner, R., Sandquist, J., Yu, X., Marshall, J. D. (2022). Harvest and forest succession have additive effects on anomalous streamflow increases in the northern Rockies, USA. *Journal of Hydrology*. 612:128230. <https://doi.org/10.1016/j.jhydrol.2022.128230>
12. **Marshall, A. M.**, & Chen\*, J. C. (2022). Influence of changing snowfall on complementarity of hydroelectric and solar power. *Environmental Research: Infrastructure and Sustainability*. 2(2):021001 <https://doi.org/10.1088/2634-4505/ac668f>.
11. Abatzoglou, J. T., **Marshall, A. M.**, Lute, A. C., & Safeeq, M. (2022). Precipitation Dependence of Temperature Trends Across the Contiguous US. *Geophysical Research Letters*, 49(4). <https://doi.org/10.1029/2021GL095414>
10. Grubert, E., & **Marshall, A.M** (2022). Water for energy: Characterizing co-evolving energy and water systems under twin climate and energy system nonstationarities. *WIREs Water*, e1576. <https://doi.org/10.1002/wat2.1576>
9. **Marshall, A. M.**, Link, T. E., Flerchinger, G. N., & Lucash, M. S. (2021). Importance of Parameter and Climate Data Uncertainty for Future Changes in Boreal Hydrology. *Water Resources Research*, 57(8), e2021WR029911. <https://doi.org/10.1029/2021WR029911>
8. Schweinsberg, M., M. Feldman, N. Staub ... **A.M. Marshall** ... (2021). Same data, different conclusions: Radical dispersion in empirical results when independent analysts operationalize and test the same hypothesis. *Organizational Behavior and Human Decision Processes*, 165, 228249. <https://doi.org/10.1016/j.obhdp.2021.02.003>
7. **Marshall, A. M.**, Link, T. E., Flerchinger, G. N., Nicolsky, D. J., & Lucash, M. S. (2021). Ecohydrological modeling in a deciduous boreal forest: Model evaluation for application in non-stationary climates. *Hydrological Processes*, e14251. <https://doi.org/10.1002/hyp.14251>
6. **Marshall, A.M.**, M. Foard, C.M. Cooper, P.E. Edwards, S.L. Hirsch, M. Russell, T.E. Link. (2020). Climate change literature and information gaps in mountainous headwaters of the Columbia River Basin. *Regional Environmental Change*. 20(4) 134. doi: 10.1007/s10113-020-01721-7
5. **Marshall, A.M.**, T.E. Link, A.P. Robinson, J.T. Abatzoglou. (2020). Higher snowfall intensity is associated with reduced impact of warming upon winter snow ablation. *Geophysical Research Letters*. 47(4) e2019GL086409. <https://doi.org/10.1029/2019GL086409>
4. **Marshall, A.M.**, J.T. Abatzoglou, T.E. Link, C.J. Tennant. (2019) Projected changes in inter-annual variability of peak snowpack amount and timing in the Western United States. *Geophysical Research Letters*. 46(15) 8882-8892. <https://doi.org/10.1029/2019GL083770>
3. **Marshall, A.M.**, T.E. Link, J.T. Abatzoglou, G.N. Flerchinger, D.G. Marks, L. Tedrow. (2019) Warming alters hydrologic heterogeneity: Simulated climate sensitivity of hydrology-based microrefugia in the snow-to-rain transition zone. *Water Resources Research*. 55(3) 2122-2141. <https://doi.org/10.1029/2018WR023063>
2. **Marshall, A.M.**, V. Butsic, J. Harte. (2018) The phenology of wilderness use: Backcountry recreation in a changing climate. *Weather, Climate, and Society*. 10(2) 209-223. <https://doi.org/10.1175/WCAS-D-17-0087.1>
1. **Marshall, A.M.**, R. Lutefeali, A. Raval, D.N. Chakravarti, B. Chakravarti. (2013) Differential hepatic protein tyrosine nitration of mouse due to aging effect on mitochondrial en-

ergy metabolism, quality control machinery of the endoplasmic reticulum and metabolism of drugs. *Biochemical and Biophysical Research Communications*. 430: 231-235. <https://www.sciencedirect.com/science/article/pii/S0006291X12021778>

*In review or revision*

2. Strickfaden, K.\*, **Marshall, A. M.**, Svancara, L. K., Ausband, D. E., Link, T. E. (n.d.). edger: An R package facilitating snow depth measurements at remote camera stations. *In review at Remote Sensing in Ecology and Conservation*.
1. Lucash, M.S., **A.M. Marshall**, S. Weiss, J. W. McNabb, D.J. Nicolsky, T.E. Link, G.N. Flerchinger. (n.d.). Burning trees in frozen soil: Simulating fire, vegetation, soil and hydrologic feedbacks in the boreal forests of Alaska. *Submitted to Ecological Modelling*.

## OUTREACH PUBLICATIONS

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2. Abatzoglou, J. T., **Marshall, A. M.**, Harley, G. L. (2021). Observed and Projected Changes in Idaho's Climate (Idaho Climate-Economy Impacts Assessment, p. 24). James A. & Louise McClure Center for Public Policy Research, University of Idaho. <https://bit.ly/3I4YVQP>
1. **Marshall, A.M.**, S. Kocher, A. Kerr. (2017) Adapting forests to climate change. UC Agriculture and Natural Resources Publication 8574. *Forest Stewardship Series*. <http://cecentralsierra.ucanr.edu/files/259563.pdf>

## SELECTED PRESENTATIONS

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†= Invited talk

25. You, J., **A.M. Marshall**, E. Grubert (December 2022). Introducing a Typology for U.S.-based Hydroelectric Dams. AGU Fall Meeting (poster presentation).
24. †**Marshall, A.M.** (September 2022). Mountain climate and a decarbonizing energy system: opportunities and challenges for hydropower. MtnClim Conference (Machida lecture).
23. †**Marshall, A.M.** (April 2022). Hydropower in the U.S.: Complexities of a decarbonizing grid, changing climate, and non-energy constraints. Arizona State University Hydrosystems Engineering Seminar Series.
22. **Marshall, A.M.** and Lute, A.C. (April 2022) Is snow intermittence increasing or decreasing? Competing effects of warming. Western Snow Conference (oral presentation).
21. †**Marshall, A.M.** (April 2022). From mountains to deserts: changing snow and flood intensity and intermittence. Women Advancing River Research.
20. **Marshall, A.M.**, Grubert E. (Dec 2021). Hydroelectricity modeling for low- and no-carbon grids: empirical constraints for optimization and dispatch models. AGU Fall Meeting (oral presentation)
19. †**Marshall, A.M.** (Nov 2021). Hydrologic modeling in discontinuous boreal permafrost: Model sensitivity and uncertainty in non-stationary climates. Colorado School of Mines van Tuyl Departmental seminar.
18. †**Marshall, A.M.** (Nov 2021). Hydropower in the U.S.: Complexities of a decarbonizing grid, changing climate, and non-energy constraints. Colorado School of Mines Environmental Engineering seminar.
17. **Marshall, A.M.**, M. Foard, C. Cooper, P.E. Edwards, M. Russell, S. L. Hirsch, T.E. Link. (April 2021) Climate change literature and information gaps in mountainous headwaters of the Columbia River Basin. Northwest Climate Conference. (oral presentation).

16. †**Marshall, A.M.** (April 2021) Boreal permafrost hydrology: Model sensitivity and uncertainty in non-stationary climates and multiple forest types. University of Idaho Soil and Water Systems Seminar (oral presentation).
15. Strickfaden, K., **A.M. Marshall**, L. Svancara, D. Ausband, T.E. Link (February 2021). The virtual measurement stake: An R package allowing for snow depth measurements at remote camera stations. Idaho Chapter of the Wildlife Society (oral presentation).
14. **Marshall, A.M.**, T.E. Link, G.N. Flerchinger, M.S. Lucash (December 2020). Ecohydrologic modeling in a boreal deciduous forest: model evaluation for application in non-stationary climates. AGU Fall Meeting (poster presentation).
13. †**Marshall, A.M.**, T.E. Link, A. Robinson, J.T. Abatzoglou (December 2019). Higher snowfall intensity reduces warming impacts on winter snow ablation: an update to an OSPA-winning presentation. AGU Fall Meeting (eLightning presentation).
12. **Marshall, A.M.**, T.E. Link, M.S. Lucash (December 2019). Energy and water balances in boreal forest with discontinuous permafrost: Implementation of a physically-based hydrological model at sites with varying disturbance histories. AGU Fall Meeting (poster presentation).
11. †**Marshall, A.M.**, T.E. Link, J.T. Abatzoglou, C. J. Tennant (December 2018). Climate-driven changes in interannual variability of snowpack amount and timing: interactive data visualizations for understanding complex patterns. AGU Fall Meeting (eLightning presentation).
10. **Marshall, A.M.**, T.E. Link, A. Robinson, J.T. Abatzoglou (December 2018). Higher Snowfall Intensity Reduces Warming Impacts on Mid-Winter Snow Ablation and Accumulation. AGU Fall Meeting (oral presentation). *Outstanding Student Presentation Award*.
9. **Marshall, A.M.**, J. Duffin, T.E. Link (December 2018). Interdisciplinary Graduate Education in Water Resources: Successes and Challenges and a Case Study Research Project from an IGERT Program. AGU Fall Meeting (poster presentation).
8. †**Marshall, A.M.**, J.T. Abatzoglou, T.E. Link, C. Tennant (October 2018). Climate-driven changes in interannual variability of snowpack amount and timing vary spatially and depend on snow-to-rain transition. MtnClim Conference (oral presentation).
7. **Marshall, A.M.**, T.E. Link, M.S. Lucash (June 2018). The simultaneous heat and water model: a physically-based hydrologic model for integration with LANDIS-II. 2018 Landis Conference and Training (oral presentation).
6. **Marshall, A.M.**, Link, T.E. (presenting author), Abatzoglou, J., Flerchinger, G., Marks, D., Tedrow, L. (February 2018). Warming increases spatial hydrological homogeneity: Sensitivity of fluxes in a catchment dominated by wind redistribution of snow. SnowHydro Conference (oral presentation).
5. Cooper, C., Edwards, P. Foard, M. Hirsch, S., Hovanceck, D., Link, T., **Marshall, A.M.**, Russell, M., Witinok-Huber, R. (October 2017). Climate change research in the mountainous headwater regions of the Columbia River Basin. Pacific Northwest Climate Conference (poster).
4. **Marshall, A.M.**, Link, T.E., Tedrow, L., and Flerchinger, G. (April 2017). Sensitivity of snow and hydrological dynamics to climate in a catchment characterized by wind-driven redistribution of snow. Western Snow Conference (oral presentation).
3. **Marshall, A.M.**, V. Butsic, J. Harte. (November 2016). The phenology of wilderness use: back-country recreation in a changing climate. MtnClim Conference (oral presentation).
2. Kerr, A.C., K.L. Steenwerth, P. Stine, J. Chambers, C. Fischer, L. Kiger, T. Hedt, O. Gonzales, R. Tse, A. Tse, A. Gunasekara, R. Henly, J.R. DeLaRosa, M. Battany, T. Pathak, D. Parker, M.

Schwartz, R. Tjeerdema, J. Kalansky, E. Kehmeier, A. Xides, **A.M. Marshall**, K. Jagannathan. (December 2015). Providing farmers, ranchers, and foresters in California with actionable climate information: opportunities and obstacles for California's USDA Regional Climate Sub Hub. American Geophysical Union Fall Meeting, San Francisco, CA (poster).

1. **Marshall, A.**, S. Kocher, A.C. Kerr, and P.A. Stine (October and November 2015). Climate change in California forests: updating the Forest Stewardship Series with impacts, adaptation, and mitigation strategies. University of California Agriculture and Natural Resources Strategic Initiatives Conference, Sacramento, CA and the Southwest Climate Summit, Sacramento, CA (poster).

*Declined speaking invitations: IUGG 2023*

## GRANTS AND FELLOWSHIPS

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### *Funded grants*

2023. **Adrienne Marshall (PI)**, Jordan Kern, Adrienne Kroepsch. Reservoir Dead Pool in California: Understanding sensitivities, consequences, and potential for risk mitigation. Alfred P. Sloan Foundation. \$250,000.

2022. **Adrienne Marshall (PI)**, Jordan Kern, Adrienne Kroepsch, Sean Turner. Reservoir dead pool in the western US: Probability and consequences of a novel extreme event. National Science Foundation. \$750,000.

2021. Emily Grubert; **subaward to Adrienne Marshall**. Hydroelectricity for low- and no-carbon grids. Carnegie Institution for Science. Subaward to Marshall: \$124,828

2019. Timothy Link, David Ausband, **Adrienne Marshall (co-PI)**, and Leona Svancara. Estimating the spatial and temporal extent of snowpack properties in complex terrain: leveraging novel data to adapt wildlife and habitat management practices to climate change. USGS Northwest Climate Adaptation Science Center, \$253,294.

### *Grants in review*

2023. The role of wildfire disturbance in altering cold-season energy-water fluxes. David Rey, Michele Walvoord, Graham Sexstone, **Adrienne Marshall (co-PI)**. Department of Energy. \$999,000 (Marshall: \$382,000)

2023. Glenn Tootle, Lisa Davis, **Adrienne Marshall (co-PI)**. Evaluating model selection impacts on forecast uncertainty in the Upper Colorado River Basin: Implications for USGS modeling and monitoring. USGS via CIROH. \$243,190 (Marshall: \$166,052)

## TEACHING

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2023-present. **Geological Fluid Mechanics**, Colorado School of Mines. Undergraduate course.

2021-present. **Integrated Surface Water Hydrology**, Colorado School of Mines. Graduate course.

2020. **Data Wizardry for Interdisciplinary Environmental Sciences**, University of Idaho. *Instructor of Record*. Graduate course.

2016. **Quantitative Aspects of Global Environmental Problems**, UC Berkeley. *Graduate Student Instructor*. Upper division undergraduate/graduate course.

2014. **Ecology and Society**, UC Berkeley. *Graduate Student Instructor*. Upper division undergraduate course.

## SERVICE

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### Students advised:

Arielle Koshkin (PhD, 2022-)

Alexa Yeo (co-advised with Eric Anderson; MS, 2022-)

Brian Pfaff (MS, 2021-)

### Committee member to:

Khaled Sabbagh (PhD, 2022-)

Hayden Jacobsen (PhD, 2022-)

Wilson Sauthoff (PhD, 2021-)

Sweta Rai (PhD, 2021-)

Jacob Slawson (PhD, 2021-)

Jonathan Quiroz (MS, 2021-)

Cole (Haden) Smith (MS, 2021-2022)

**Media Interviews and Publications:** *NPR Marketplace, Colorado Sun, Mines Magazine, E&E News, Scientific American, Popular Science, National Geographic, The Conversation, Boise State Public Radio, Utah Public Radio, Idaho Statesman, 610 KONA, Lake County News, The Climate CIRCulator, Kitsap Sun, The Inertia, PreventionWeb, Skagit Valley Herald, Missoulian, Idaho State Journal, Mountain West News, Wallowa County Chieftain, Climate Central*

**Journal Reviewer:** *Geophysical Research Letters; Water Resources Research; Journal of Geophysical Research: Atmospheres; Weather, Climate, and Society; Environmental Modelling and Software; Natural Hazards and Earth System Science (NHES); Journal of Hydrometeorology; HESS; Hydrological Sciences; Climate Dynamics; NPJ Climate and Atmospheric Science; Journal of Hydrology.*

**Proposal Reviewer:** National Science Foundation Hydrologic Sciences Program (panelist and ad-hoc); National Renewable Energy Laboratory H2O Competition; Swiss National Science Foundation (ad-hoc)

### Conference Organization:

- MtnClim Conference Steering Committee (2022)
- GU Fall Meeting session (2022). Frozen ground hydrology: Moving towards a process-based understanding.

### Outreach Presentations and workshops:

- Interactive visualization of critical zone data: The Shiny R package. (2022). *Expanding the Critical Zone Research Network Workshop*. Golden, CO.
- Climate change and snow in the western U.S.: Impacts of changing interannual variability and snowfall intensity. (2020) *Pacific Northwest Drought Early Warning System Webinar*.
- Climate Change Impacts on Snow in the Western U.S.: Implications for the Palouse. (2019) *Palouse Basin Water Summit*. Pullman, WA.
- Fun and Efficient Data Wrangling with R: An Introduction to the Tidyverse. University of Idaho Library Workshop Series. (2018). [https://github.com/adrienne-marshall/tidyverse\\_workshop](https://github.com/adrienne-marshall/tidyverse_workshop).

- Beautiful graphics with ggplot2. University of Idaho Library Workshop Series. (2017). [https://adrienne-marshall.github.io/ggplot2\\_workshop/](https://adrienne-marshall.github.io/ggplot2_workshop/).
- Climate change impacts, adaptation, and mitigation in the Marin Headlands. (2016). Nature-Bridge Staff Training.
- Climate change impacts, adaptation, and mitigation in Yosemite. (2015). NatureBridge Staff Training.

**Professional Affiliations:** American Geophysical Union, American Meteorological Society

## HONORS AND AWARDS

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2018. **University of Idaho Water Resources Student of the Year Award:** In recognition of academic achievement and contributions to the Water Resources Program.

2018. **American Geophysical Union Outstanding Student Presentation Award:** For the oral presentation, *Higher snowfall intensity reducing warming impacts on mid-winter snow ablation and accumulation*.

## PRODUCTS

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**Solute transport in soils:** A web application for teaching the physical processes governing solute transport in soils [https://adrienne-marshall.shinyapps.io/solute\\_transport/](https://adrienne-marshall.shinyapps.io/solute_transport/)

**Changing snowpack variability:** An interactive data visualization tool published as supplementary material to the article, *Projected Changes in Interannual Variability of Peak Snowpack Amount and Timing in the Western United States* <https://snowvariability.nkn.uidaho.edu/>