# MEGAN SEARS

Ph.D. Candidate, Watershed Science
Colorado State University, Fort Collins, Colorado
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## EDUCATION

2022-present **Ph.D. Watershed Science** (*anticipated defense May 2025)*
Colorado State University (CSU)

2019-2022 **M.S. Watershed Science**
CSU

2010-2014 **B.A. Geology and Environmental Studies**
Guilford College

## RESEARCH EXPERIENCE

Project Name: Post-fire rainfall effects on streamflow in small watersheds in the Cameron Peak and East Troublesome burn areas

- Analyzing the relationship between summer rainfall intensity and elevation
- Assessing the reliability of Multi-Radar/Multi-System (MRMS) gridded data and precipitation gauges for identifying runoff-producing storms
- Identifying drivers of streamflow magnitude and timing responses to rainfall post-fire using statistical analyses
- Determining geomorphometric and hydrological catchment features (e.g., watershed delineations and hypsometric analyses) via GIS analysis
- Conducted snow surveys in burned and unburned areas
- Collected streamflow measurements to develop stage-discharge rating curves
- Synthesized streamflow, snow, and meteorological measurements
- Programmed several Campbell Scientific sensors (e.g., soil moisture and four-component net radiometer)
- Installed and maintained weather stations

Project Name: Modeling streamflow in a semi-arid watershed using gridded and observed climate data

- Determining differences between gridded and observed meteorological data across an elevation gradient
- Conducting streamflow model calibrations and evaluating differences in model parameters
- Running Ages (a spatially distributed streamflow model) to estimate daily streamflow over a 10-year period
- Analyzing differences in hydrologic processes between model runs
- Determining model accuracy

Project Name: The effects of temperature-elevation gradients on snowmelt in a high-elevation watershed

- Conducted snow surveys to understand spatiotemporal variability in snow depth, snow density, and SWE
- Installed and maintained temperature and relative humidity sensors across an elevation gradient
- Analyzed air temperature, relative humidity, and precipitation data
- Conducted linear regressions between air and dew point temperatures and elevation
- Ran temperature and radiation index snowmelt models with observed and estimated data

Project Name: Resource Stewardship Strategy for climate change at various national parks

- Analyzed historical gridded monthly climate data to understand long-term trends
- Parsed several global climate models with different representative concentration pathways to select plausible and divergent climate futures
- Edited a water balance model (modified Thornthwaite approach) R package and updated a temperature index snowmelt model function within an R package
- Conducted literature reviews of natural resources in national parks impacted by climate change
- Prepared presentations on climate change and adaptation for park managers

## PROFESSIONAL AND ACADEMIC POSITIONS

| | |
|---|---|
| 2022-present | **Hydrologic Research Assistant** |
| | Water Management Research Unit, Agricultural Research Service, United States Department of Agriculture |
| 2020-present | **Research Assistant** |
| | The Department of Ecosystem Science and Sustainability (ESS), CSU |
| Fall 2023 | **Co-instructor** |
| | Watershed Measurements (WR 417), ESS, CSU |
| Spring 2023 | **Co-lead** |
| | Diversity, Equity, and Inclusions Graduate Student Group Study, ESS, CSU |
| Spring 2022 | **Teaching Assistant** |
| | Introduction to Environmental Data Science (ESS 580A7), ESS, CSU |
| Fall 2021 | **Teaching Assistant** |
| | Snow hydrology (WR 474) and Introduction to GIS |
| | (NR 322), ESS, CSU |
| 2020-2021 | **Climate Change Adaptation Assistant** |
| | Climate Change Response Program, National Park Service |
| 2018-2020 | **Geologist II** |
| | Tetra Tech, Inc., Fort Collins, Colorado |
| 2014-2018 | **Staff Geologist** |
| | Terracon Consultants, Inc., Fort Collins, Colorado, and Charlotte, North Carolina |

## PUBLICATIONS

Brooks, P., Solomon, D.P., Kampf, S., Warix, S., Bern, C., Barnard, D., Barnard, H., Carling, G.T., Carroll, R.W.H., Chorover, J., Harpold, A., Lohse, K., Meza, F., McIntosh, J., Neilson, B., **Sears, M.**, & Wolf, M. (2025). Mountain groundwater predominates during snowmelt runoff in the western United States. *Manuscript in review at Nature Water.*

Bonnell, R., McGrath, D., Tarricone, J., Marshall, H.P., Bump, E., Duncan, C., Kampf, S., Lou, Y., Olsen-Mikitowicz, A., **Sears, M.**, Williams, K., Zeller, L., & Zheng, Y. (2024). Evaluating L-band InSAR snow water equivalent retrievals with repeat ground-penetrating radar and terrestrial lidar surveys in northern Colorado. The Cryosphere, 18(8), 3765-3785. https://doi.org/10.5194/tc-18-3765-2024.

Miller, Q., Barnard, D., **Sears, M.**, Hammond, J., & Kampf, S. (2024). Variability in Hydrologic Response to Wildfire between Snow Zones in Forested Headwaters. *Manuscript in review at Hydrological Processes.*

Peterson, D.A., Kampf, S.K., Puntenney-Desmond, K.C., Fairchild, M.P., Zipper, S., Hammond, J.C., Ross, M., & **Sears, M.G.** (2024). Predicting Streamflow Duration From Crowd-Sourced Flow Observations. Water Resources Research, 60(1), e2023WR035093. https://doi.org/10.1029/2023WR035093.

Barnard, D.M., Green, T.R., Mankin, K.R., DeJonge, K.C., Rhoades, C.C., Kampf, S.K., Giovando, J., Wilkins, M.J., Mahood, A.L., **Sears, M.G.**, Comas, L.H., Gleason, S.M., Zhang, H., Fassnacht, S.R., Harmel, R.D., & Altenhofen, J. (2023). Wildfire and climate change amplify knowledge gaps linking mountain source-water systems and agricultural water supply in the western United States. Agricultural Water Management, 286, 108377. https://doi.org/10.1016/j.agwat.2023.108377.

McGrath, D., Zeller, L., Bonnell, R., Reis, W., Kampf, S., Williams, K., Okal, M., Olsen-Mikitowicz A., Bump, E., **Sears, M.**, & Rittger, K. (2023). Declines in peak snow water equivalent and elevated snowmelt rates following the 2020 Cameron Peak wildfire in Northern Colorado. Geophysical Research Letters, 50(6), e2022GL101294. https://doi.org/10.1029/2022GL101294.

Kampf, S.K., McGrath, D., **Sears, M.G.**, Fassnacht, S.R., Kiewiet, L., Hammond, J.C. (2022). Increasing wildfire impacts on snowpack in the western U.S. Proceedings of the National Academy of Sciences of the United States of America, 119(39), 1–7. https://doi.org/10.1073/pnas.2200333119.

**Sears, M.G.** (2022). The effects of temperature-elevation gradients on snowmelt in a high-elevation watershed (Master's thesis, CSU).

## PRESENTATIONS

Kampf, S., **Sears, M.**, Miller, Q., Barnard, D., Nelson, P. (2024). Variability in hydrogeomorphic responses to fire across snow zones. Establishing Direction in Postfire Debris Flow Science conference, California Fire Science Consortium.

Barnard, D.M., **Sears, M.**, Kipka, H., Green, T.R., Mankin, K. (2023). Gridded versus station datasets yield divergent hydrological responses when modeling streamflow in a Colorado watershed. AGU Hydrology Days Conference.

**Sears, M.** and Kampf, S. (2023). How much do mulch applications affect rainfall runoff in small catchment within Cameron Peak and East Troublesome wildfires. Colorado Watershed Assembly, Sustaining Colorado Watersheds Conference. *(poster)*

**Sears M.** and Kampf, S. (2023). Post-fire stream response to rainfall at Bennett Creek tributaries. American Geophysical Union (AGU) Hydrology Days Conference. *(oral)*

**Sears, M.**, Kampf, S., Barnard, D. (2023). Post-fire rainfall effects on streamflow in small watersheds in the Cameron Peak and East Troublesome burn areas. AGU Fall Meeting 2023, H13F-02. *(oral)*

**Sears, M.G.** and Fassnacht, S.R. (2021). Near-surface air temperature gradients for a small snow-dominated watershed in Colorado. AGU Hydrology Days Conference. *(oral)*

McGrath D., Zeller, L., Bonnell, R., Bump, E., Olsen-Mikitowicz, A., Kampf, S., **Sears, M.**, Rittger, K. (2021). Losses exceed gains: Impacts of the Cameron Peak wildfire (CO) on high-elevation snow accumulation and ablation. AGU Fall Meeting 2021, H52A-08.

## PUBLISHED DATA

Kampf, S., **Sears, M.**, Miller, Q., Puntenney-Desmond, K., Barnard, D., Green, T., Erskine, R., Sitterson, J., Kiewiet, L., Reis, W., McGrath, D. (2022). Cameron Peak Fire stream and weather data WY2021, HydroShare, http://www.hydroshare.org/resource/a15f503ab00b4980a4bfbe7e8552f9a3.

Kampf, S., **Sears, M.**, McGrath, D., Puntenney-Desmond, K., Kiewiet, L. (2021). Cameron Peak Fire snow data, HydroShare, http://www.hydroshare.org/resource/13e188aed675492c9a21421910100ec9.

## GRANTS, SCHOLARSHIPS, AND AWARDS

- Recipient of National Institutes for Water Resources grant (2022)
- CSU Warner College Outstanding Teaching Assistant (2021-2022)
- CSU ESS Davis A. Falletti Memorial Award (2021-2022)
- CSU Natural Resource Ecology Laboratory and ESS Graduate Student of the Year (2021)
- Recipient of the Hill Memorial Fellowship at CSU (2020, 2021, 2022)
- Recipient of the Bob and Nedra Dils Scholarship (2021)
- Recipient of National Institutes for Water Resources grant (2020)
- Recipient of the Lee and Hillary MacDonald Graduate Scholarship in Watershed Science at CSU (2020)
- Named Terracon Emerging Corporate Leader responsible for progressive strategic planning (2017)

## TECHNICAL SKILLS

- Expert R skillset
- Experienced with Google Earth Engine, Java, Git, and Python
- Competent at using ArcGIS, Arduino, AutoCAD, ENVI, gINT, HEC-HMS, JMP, Microsoft Office, Minitab, ProUCL, and other software
- Experienced with many environmental field instruments including Campbell dataloggers and sensors
- Conducted many snow surveys measuring snow depth, density, and SWE
- Competent at designing and applying stream characterization methods including cross-sectional surveys, discharge measurements, macro-invertebrate assessments, stream habitat assessments, velocity profiles, deriving stream metabolism, and using conservative tracers (e.g., salt slugs)

## REVIEWER FOR

- Journal of Geophysical Research: Atmospheres
- Hydrological Sciences Journal
- Hydrological Processes
- Peer review for external USGS publication

## PROFESSIONAL DEVELOPMENT

- CSU ESS Diversity, Equity, and Inclusion Committee graduate student representative (2022-2024)
- CSU ESS GSO President (2023-2024)
- Founded the CSU ESS Graduate Student Organization (GSO; 2023)
- Successfully presented a project proposal for CSU ESS gradute student office renovation to CSU University Facility Fee Advisory Board for $162,000 (2023)
- Unmanned aircraft system remote pilot (certificate number 4696617) under the Department of Transporation Federal Aviation Administration (2022)
- Completed American Institute for Avalache Research and Education recreational avalanche training (2020)