

## CURRICULUM VITÆ

William Austin Rutherford

University of Arizona  
School of Natural Resources and the  
Environment  
1064 E. Lowell St.  
Tucson, AZ 85719 USA

E-mail: [arutherford@email.arizona.edu](mailto:arutherford@email.arizona.edu)  
Tel: (317) 437-8696  
Web of Science ResearcherID: AAI-2776-2020  
ORCID iD: 0000-0002-0336-5756

### EDUCATION

---

**Ph.D. in Natural Resources** 2016 – *Present*

**Emphasis: Ecology, Management, and Restoration of Rangelands**

University of Arizona, Tucson, AZ

*Advisor: Steven R. Archer*

*Committee: Osvaldo Sala, Willem van Leeuwen, Michael Crimmins*

Dissertation: Early establishment and proactive management of a shrub invader: applying big data methods to small plants

**Geographic Information Science Graduate Certificate** 2018

University of Arizona, Tucson, AZ

*Advisor: Willem van Leeuwen*

**B.S. in Biology** 2008 – 2011

Indiana University, 107 S Indiana Avenue, Bloomington, IN 47405

*Advisers: Heather Reynolds and Jonathan Bauer*

Thesis: Drought stress relations between invasive *Euonymus fortunei* and five natives in a simulated mesic forest understory

### PROFESSIONAL EXPERIENCE

---

**Ph.D. Student/Graduate Research Assistant. University of Arizona (UA),  
School of Natural Resources and the Environment (SNRE).** 2016 – *Present*

Projects and Skills:

- Design and implementation of field and controlled environment experiments examining shrub establishment in the Sonoran Desert;
- Geospatial analysis of woody plant encroachment and vegetation habitats in semi-arid and arid ecosystems.

**Roots for Resilience Research Assistantship in Data Science. UA, co-led by the Arizona Institutes for Resilience, CyVerse, and the UA Data Science Institute.** Spring 2021

Projects and Skills:

- Introduce CyVerse and its potential applications to UA SNRE faculty;
- Identify tools and concepts from open science and data science for use in Natural Resources research to foster new interdisciplinary research partnerships;
- Press: [CyVerse News](#)

**Biological Science Technician (GS-0404-05). U.S. Geological Survey (USGS)  
Canyonlands Research Station, Moab, UT. Supervisor, Erika Geiger. 40hr/wk.**

**2013 – 2016**

Projects and Skills:

- Worked on a variety of experiments with aims on how local, regional, and global change factors are affecting terrestrial ecosystems. Examples include, Department of Energy funded research on climate change effects on vegetation and biological soil crusts;
- Remote sensing data collection and analysis for quantifying dryland energy balance and it's relation to biological soil crusts;
- Remote sensing data collection on Colorado Plateau vegetation communities and soils;
- Multi-spectral remote sensing data acquisition (field and airborne) to examine vegetation trends and health;
- Soil mapping and characterization to study livestock grazing impacts;
- MS Access relational databases and R scripts for data organization and analysis.

**Botany Intern. Conservation and Land Management Internship Program, Bureau of Land Management (BLM), Carson City, NV. Supervisor, Dean Tonenna.**

**2012-2013**

Projects and Skills:

- Assisting BLM Rangeland Management Specialists in data collection and developing plans and proposals;
- Threatened and Endangered and/or rare plant population surveys;
- Post-wildfire vegetation monitoring and fire intensity mapping;
- Invasive plant and weed population monitoring and control;
- Collecting and processing plant seed for the BLM *Seeds of Success* program.

**Undergraduate Research Assistant. Indiana University, Dept. of Biology.  
Supervisor, Jonathan Bauer.**

**2009 –2011**

Projects and Skills:

- Invasive and native plant establishment response to drought;
- Invasive and native plant species responses to arbuscular mycorrhizal fungi and rhizobia inoculations;
- Invasive species management in mesic deciduous forest.

## **HONORS & AWARDS**

---

- Department of Interior STAR (Special Thanks for Achieving Results) Award. 2015.
- UA SNRE Outstanding Graduate Teaching Assistant Award. 2018-2019.
- Society for Range Management Annual Meeting PhD Poster Competition (1<sup>st</sup> Place). 2019.
- International Arid Lands Consortium Graduate Lightning Talk Competition (Finalist). 2021.
- Honorable Mention Poster (Research Insights in Semi-arid Ecosystems Symposium). 2018.

---

**GRANTS & SCHOLARSHIPS *non-UA total: \$187,237; UA total: \$49,731***

---

- USDA NIFA-AFRI-Education and Workforce Development Predoctoral Fellowship. 2021-2023: \$111,527
  - Managing from a distance: conservation of semi-arid grasslands through machine learning
  - PD: Rutherford; Mentor: Steve Archer
- USDA Renewable Resources Extension Act-National Focus Fund Project. 2020-2022: \$50,000
  - PD: Elise Gornish; Co-PDs: Steve Archer & Sheila Merrigan
  - Rutherford: spearheaded proposal development, drafting, and project management
- Western SARE (Sustainable Agriculture Research and Education) Graduate Student Grant. 2019-2021: \$24,949
- [Carson Scholars](#) Program Scholarship. 2018: \$5,000
- Global Change Summer Research Award ([GC Award SNRE Press](#)). 2020: \$1,500
- Senior Data Science Ambassadorship (Data Science Institute). 2020-2021: \$1,000
- Data Science Ambassadorship (Data Science Institute). 2019-2020: \$1,000
- Bartley P. Cardon Scholarship (UA). 2020: \$1,180
- Harry Wayne Springfield Endowment (UA). 2017: \$1,000; 2018: \$2,100; 2019: \$2,200; 2020: \$14,332; 2021: \$7,692
- Bill Ross Scholarship (UA). 2018: \$1,800
- UA Graduate College Fellowship. 2017: \$1,000; 2018: \$1,000; 2019: \$1,000
- Graduate Arizona Financial Aid Trust Award. 2020: \$3,000
- Horton E. Noon Memorial Scholarship (UA). 2021: \$800
- H. Lynn and Marjorie M. Anderson Scholarship (UA). 2018: \$319; 2020: \$614
- Clifford W. Carstens, Jr. Scholarship (UA). 2018: \$946
- E. Ray Cowden Scholarship (UA). 2016: \$534; 2017: \$1,714
- South Central Climate Science Center Early Career Professional Development Training. 2016: \$761

---

**PROFESSIONAL SOCIETIES**

---

- Ecological Society of America (2017 – *present*)
- Society for Range Management (2017 - *present*)
- Society for Ecological Restoration (2019- *present*)
- Honor Society of Phi Kappa Phi (2019- *present*)

---

**TEACHING EXPERIENCE**

---

**Graduate Teaching Assistant, RNR 200: *Conservation of Natural Environments*, UA (Fall 2018)**

- Course assignment refinements/improvements
- Development of grading schemes for essay assignments
- Grading essays and exams including commenting/editing essays for student writing improvement
- Introduction and explanation of assignments to class, followed by comprehensive Q&A sessions

**Data Science Ambassador, UA College of Agriculture and Life Sciences (2019-2020)**

- [Data/Software Carpentry](#) Unix/Git/R workshop helper and organizer
- R/RStudio consulting and student instruction
- Provide data management and storage resources to Faculty
- [Machine Learning Literacy Project](#) Coach
- [Research Bazaar Arizona](#) Virtual Conference (2020) R and ggplot2 assistant

**Senior Data Science Ambassador**, UA College of Agriculture and Life Sciences (2020-2021)

- Data/Software Carpentry Unix/Git/R workshop helper and organizer
- University of Arizona Faculty and Student R/RStudio consulting and instruction
- Institute for Tribal Environment Professionals [Tribal Exchange Network](#) 2020 Virtual Data Academy and Conference Instructor
- Taught Tribal Natural Resource Professionals on how to apply the R programming language to their own unique data manipulation, organization, and visualization tasks.
- Co-Organizer & Helper/Instructor Coordinator - Research Bazaar Arizona Virtual Conference (2021)

**Osher Lifelong Learning Institute Lecturer**, UA Fall 2020

- A non-credit lifelong learning program open to all adults over the age of 50 as an affiliate of the University of Arizona through the office of Continuing and Professional Education.
- Taught an introduction to Rangelands, Range Science, and personal research summary
- Title: “*The rise of mesquite shrubs in Sonoran Desert grasslands: a story of rain, cows, ants and rats*”

**TEACHING/DEPARTMENTAL TRAINING**

---

- **Title XI Training**, UA (*Annual*)
- **Teaching Assistant Training Online**, UA (*Fall 2018*)
- **Federal Education Right Protection Act Training**, UA (*Fall 2018*)
- **College of Agriculture & Life Sciences Teaching Assistant Workshop**, UA (*Fall 2018*)
- **Data Carpentry Online Instructor Training** (*Fall 2019*)
- **CyVerse Foundational Open Science Skills Training** (Spring 2021)

**PROFESSIONAL SERVICE & OUTREACH**

---

**Manuscript Reviewer** (number of manuscripts):

*Plant and Soil* (2)

*Arctic, Antarctic, and Alpine Research* (1)

*Remote Sensing of Environment* (1)

*Ecological Applications* (2)

*Geoderma* (1)

**Graduate Student Member**, UA SNRE Data Literacy Career Track Professor of Practice Search Committee, 2021.

**Ecology, Management, and Restoration of Rangelands Representative**, SNRE Natural Resources Graduate Student Organization. Elected to provide the Rangeland graduate student perspective to SNRE Director and Faculty on upcoming policies and initiatives, as well as develop and facilitate graduate student social events, 2020-2021.

**(Senior) Data Science Ambassador**, University of Arizona Data Science Institute program to serve as a resource within the College of Agriculture and Life Science to develop trainings/data literacy programs and aid researchers and educators with data science related questions through consults, training, and/or lessons, 2019-2021.

**Judge**, University of Arizona Graduate and Professional Student Council grant program reviewing applications for student travel, seminars/workshops, and research projects, 2019.

**Judge**, High School Youth Forum Oral Presentations at the Society for Range Management annual meeting, where students from the western US and Canada get the opportunity to gain experience giving professional presentations on a variety of rangeland topics, 2019, 2020. Canceled in 2021 due to COVID-19 pandemic.

**Judge**, St. Michael's School 6<sup>th</sup>-8<sup>th</sup> Grade Science Fair Presentations, where students apply the scientific method on a variety of topics of their choice, 2019-2021.

**Co-developer**, BLM informational pamphlets. Designed and published pamphlets on native versus invasive vegetation and rangeland monitoring for distribution to the public, 2012.

**Instructor**, Truckee Meadows Outdoor Education Program. BLM and The Nature Conservancy cooperative program to teach Reno, NV inner city youth about ecological restoration and environmental science, spring and fall 2012.

## MENTORING

---

Tierra Seca (UA Student Club, Society for Range Management Chapter)	2016 - <i>Present</i>
<ul style="list-style-type: none"> <li>Aid in undergraduate student professional development                             <ul style="list-style-type: none"> <li>Offer guidance on federal agency employment and/or graduate school applications</li> </ul> </li> <li>Volunteering at club fundraising events</li> </ul>	

### Undergraduate Student Researchers

- James Pagan**, UA, *Fall 2016 – Spring 2018*
- Jodi Poole**, UA, *Fall 2017*
- Sara Amiot**, UA, *Spring 2018 – Fall 2018*
- William Gray**, UA, *Fall 2018 – Spring 2020*

## PUBLICATIONS AND PRESENTATIONS

---

### *Referred Journal Articles*

Weber-Grullon, L, L Gherardi, **WA Rutherford**, SR Archer, OE Sala (2020) Woody-plant encroachment: Precipitation, herbivory and grass-competition interact to affect shrub recruitment. *Ecological Applications*. (In Review, submitted 2020-09-24).

Smith, WK, MP Dannenberg, D Yan, S Herrmann, ML Barnes, GA Barron-Gafford, JA Biederman, S Ferrenberg, AM Fox, AR Hudson, JF Knowles, N MacBean, DJP Moore, PL Nagler, SC Reed, **WA Rutherford**, RL Scott, X Wang, J Yang (2019) Remote sensing of drylands: Progress, challenges and opportunities. *Remote Sensing of the Environment*. 233, 111401; doi: [10.1016/j.rse.2019.111401](https://doi.org/10.1016/j.rse.2019.111401).

**Rutherford, WA**, TH Painter, J Belnap, GS Okin, C Flagg, SC Reed (2017) Albedo feedbacks to future climate via climate change impacts on dryland biocrusts. *Scientific Reports*. 7, 44188; doi: [10.1038/srep44188](https://doi.org/10.1038/srep44188).

Press: [USGS Press Release](#); [High Country News](#); [Arizona Daily Sun](#); [The Daily Wildcat](#)

*Presentations (Oral and Poster)*

- Rutherford, WA** and SR Archer. (2021) Evaluating shrub proliferation in the Sonoran Desert. Oral/Lightning Talk; International Arid Lands Consortium, Virtual Meeting.  
*\*\*Finalist in Graduate Student Lightning Talk Competition (1 of 2 from U.S. Institutions of Higher Education)*
- Rutherford, WA**, SR Archer, L. Weber-Grullon, OE Sala. (2021) Shrub (*Prosopis velutina*) recruitment in Sonoran grasslands: precipitation, not herbaceous cover, matters most. Poster presentation; 74<sup>th</sup> Annual Society for Range Management Meeting, Virtual Meeting.
- Rutherford, WA** and SR Archer. (2020) Evaluating shrub proliferation risk on Sonoran Desert rangelands. Invited Oral/Inspire presentation; Ecological Society of America Annual Meeting, Virtual Meeting.
- Rutherford, WA**, SR Archer, L. Weber-Grullon, OE Sala. (2020) Monsoon season precipitation variation, not herbaceous cover, controls shrub (*Prosopis velutina*) recruitment in Sonoran grasslands. Poster presentation; Ecological Society of America Annual Meeting, Virtual Meeting.
- Rutherford, WA**, SR Archer. (2020) Predicting Woody Plant Encroachment Risk on Sonoran Desert Rangelands. Poster Presentation; 73<sup>rd</sup> Annual Society for Range Management Meeting, Denver, CO.
- Rutherford, WA**, SR Archer, L. Weber-Grullon, OE Sala. (2020) Velvet mesquite recruitment in Sonoran grasslands: grass utilization is of little consequence to Monsoon season precipitation variation. Oral presentation; AZ Section-Society for Range Management Winter Meeting, Wickenburg, AZ.
- Rutherford, WA**, SR Archer. (2019) Evaluating Shrub Encroachment Risk on Sonoran Desert Rangelands. Poster Presentation; Society for Ecological Restoration-Southwest, Tucson, AZ.
- Mathis, KA, **WA Rutherford**, SR Archer. (2019) The role of ant seed dispersers in woody plant encroachment in arid grasslands. Oral Presentation; Entomological Society of America, St. Louis, MO.
- Jones, S, **WA Rutherford**, SR Archer. (2019) Evaluating Woody Plant Encroachment in Sonoran Grasslands for Brush Management Planning. Oral presentation (co-presented by Jones and Rutherford); Science on the Sonoita Plain Symposium, Sonoita, AZ.
- Rutherford, WA**, SR Archer, L. Weber-Grullon, OE Sala. (2019) Shrub recruitment in Sonoran grasslands: grass utilization is of little consequence to intra-seasonal precipitation variation. Poster presentation; 72<sup>nd</sup> Annual Society for Range Management Meeting, Minneapolis, MN.  
*\*\*1<sup>st</sup> Place PhD Poster Presentation Competition*
- Rutherford, WA**, SR Archer, WJD van Leeuwen (2018) A Decision Support Tool for Predicting Risk of Woody Plant Encroachment on Rangelands. Poster presentation; Southwest Vegetation Management Association Annual Meeting and 15<sup>th</sup> Annual Research Insights in Semiarid Ecosystems (RISE) Symposium, Tucson, AZ. *\*\*RISE Honorable Mention Poster Award Winner*
- Rutherford, WA**, SR Archer. (2018) Rise of the shrubs: Fire regimes in the Sonoran Desert. Oral Presentation; University of Arizona Borderlands Science Café, Tucson, AZ. As part of series: *A Song of Ice (and Floods) and Fire: Consequences of a Changing Climate on Our Ecosystems and Societies.*

- Rutherford, WA**, SR Archer, L. Weber-Grullon, OE Sala. (2018) Shrub (*Prosopis velutina*) recruitment in a semi-arid grassland: precipitation-herbivory interactions reveal few constraints. Poster presentation; Ecological Society of America Annual Meeting, New Orleans, LA.
- Rutherford, WA**, KA Mathis, L. Weber-Grullon, OE Sala, SR Archer. (2017) Does seed predation limit velvet mesquite (*Prosopis velutina*) recruitment in grasslands? Poster presentation; 14<sup>th</sup> Annual Research Insights in Semiarid Ecosystems (RISE) Symposium, Tucson, AZ.
- Weber-Grullon, L, OE Sala, **WA Rutherford**, SR Archer. (2017) Woody-plant encroachment in the Chihuahuan Desert: Mechanisms of invasion and opportunities for containment. Poster; Ecological Society of America Annual Meeting, Portland, OR.
- Reed, SC, S Ferrenberg, C Tucker, **WA Rutherford**, T Wertin, T McHugh, E Morrissey, C Kuske, R Mueller, J Belnap. (2016) Abiotic and biotic controls over biogeochemical cycles in drylands: Insights from climate change and nitrogen deposition experiments on the Colorado Plateau. Invited Oral Presentation; American Geophysical Union Fall Meeting, San Francisco, CA.
- Rutherford, WA**, TH Painter, J Belnap, GS Okin, C Flagg, SC Reed. (2016) The energy of biocrusts: how climate change disturbances in drylands may induce large, novel global climate change feedbacks. Oral presentation; 3<sup>rd</sup> International Workshop on Biological Soil Crusts (Biocrust3), Moab, UT.
- Rutherford, WA**, SC Reed, S Ferrenberg, and J Belnap. (2015) Seasonal precipitation effects on the native grass, *Pleuraphis jamesii*, on the Colorado Plateau. Oral presentation; 13<sup>th</sup> Biennial Conference of Science & Management on the Colorado Plateau & Southwest Region, Flagstaff, AZ.
- Reed, SC, S Ferrenberg, T Wertin, A Darrouzet-Nardi, **WA Rutherford**, C Tucker, J Belnap. (2015) Dryland feedbacks to climatic change: Results from a climate manipulation experiment on the Colorado Plateau. Invited Oral Presentation; American Geophysical Union Fall Meeting, San Francisco, CA.
- Rutherford, WA**, Flagg C, Painter TH, Okin GS, Belnap J, Reed SC. (2014) Climate and physical disturbance effects on the spectral signatures of biological soil crusts: implications for future dryland energy balance. Poster; American Geophysical Union Fall Meeting, San Francisco, CA.
- Bauer, JT, **WA Rutherford**, RE Stoops, HL Reynolds. (2013) *Euonymus fortunei*: Back-seat driver of environmental change? Poster; Ecological Society of America Annual Meeting, Minneapolis, MN.
- Bauer, JT, **WA Rutherford**, RE Stoops, HL Reynolds. (2013) *Euonymus fortunei*: driver or passenger of environmental change? Oral presentation; Indiana Academy of Sciences Annual Meeting, Indianapolis, IN.
- Bauer, JT, **WA Rutherford**, RE Stoops, HL Reynolds. (2013) Impacts and management of *Euonymus fortunei* (Purple Wintercreeper). Poster; Science, Practice, & Art of Restoring Native Ecosystems Conference, East Lansing, MI.
- Rutherford, WA**, JT Bauer, RE Stoops, HL Reynolds. (2011) Consequences of *Euonymus fortunei* invasion for native plants and herbivores and initial results of management efforts. Poster; Indiana Academy of Science Annual Meeting, Indianapolis, IN.

## PROFESSIONAL REFERENCES

---

**Steven Archer, Ph.D.**

Professor, School of Natural Resources and the Environment, University of Arizona  
Building-ENR2  
1064 E. Lowell Street, Tucson, AZ 85719  
Phone: 520-626-8791  
Email: sarcher@arizona.edu

**Sasha Reed, Ph.D.**

Research Ecologist, USGS-Canyonlands Research Station  
2290 S. West Resource Blvd., Moab, UT 84532  
Phone: 435-719- 2334  
Email: screed@usgs.gov

**Erika Geiger, Ph.D.**

Supervisory Biologist, Canyonlands Research Station - USGS  
2290 S. West Resource Blvd., Moab, UT 84532  
Phone: 435-719-2359  
Email: egeiger@usgs.gov

**Dean Tonenna**

Botanist, Bureau of Land Management  
Carson City District Office, Sierra Front Field Office  
5665 Morgan Mill Road  
Carson City, NV 89701  
Phone: 775-885-6189  
Email: dtonenna@blm.gov

**Jonathan Bauer, Ph.D.**

Assistant Professor, Miami University, Ohio  
392 Pearson Hall  
Oxford, OH 45056  
Phone Number: 513-529-4261  
Email Address: bauerjt@MiamiOH.edu