

## Bradley J. Butterfield

Assistant Research Professor  
Department of Biological Sciences &  
Merriam-Powell Center for Environmental Research  
Northern Arizona University

Flagstaff, AZ 86011-5640  
Bradley.Butterfield@nau.edu  
butterfieldlab.weebly.com

### Education

Ph.D. 2009 Plant Biology, Arizona State University, Tempe, AZ

Advisors: John Briggs and Ann Kinzig

Dissertation: Structure and dynamics of Sonoran Desert perennial plant communities

B.A. 2004 Biology, Rice University, Houston, TX

Advisors: Evan Siemann and William Rogers

Honors thesis: Growth of Chinese tallow tree (*Sapium sebiferum*) and four native trees under varying water regimes

### Professional Experience

2012 – Assistant Research Professor, Dept. of Biological Sciences and Merriam-Powell Center for Environmental Research, Northern Arizona University

2011 – 2012 Research Associate, Merriam Powell Center for Environmental Research, Northern Arizona University

2009 – 2010 Postdoctoral Scholar, Dept. of Environmental Science, UC Berkeley  
Advisor: Katharine Suding

### Publications

**Butterfield, B.J.**, Bradford, J.B., Munson, S.M. and Gremer, J.R. *In press*. Aridity increases belowground niche breadth in grass communities. *Plant Ecology*.

Hungate, B.A., Barbier, E.B., Ando, A.W., Marks, S.P., Reich, P.B., van Gestel, N., Tilman, D., Knops, J.M.H., Hooper, D.U., **Butterfield, B.J.** and Cardinale, B.J. *In press*. The economic value of grassland species for carbon storage. *Science Advances*.

Doherty, K.D., **Butterfield, B.J.** and Wood, T.E. *In press*. Matching seed to site by climate similarity: techniques to prioritize plant materials development and use in restoration. *Ecological Applications*.

Hultine, K.R., Williams, D.G., Dettman, D.L., **Butterfield, B.J.** and Puente-Martinez, R. 2016.

Stable isotope physiology of stem succulents across a broad range of volume-to-surface area ratio. *Oecologia* 182, 679-690.

**Butterfield, B.J.**, Copeland, S.M., Munson, S.M., Roybal, C.M. and Wood, T.E. 2016.

Prestoration: Using species in restoration that will persist now and into the future.

*Restoration Ecology*, doi:10.1111/rec.12381.

**Butterfield, B.J.** and Munson, S.M. 2016. Temperature is better than precipitation as a predictor of plant community assembly across a dryland region. *Journal of Vegetation Science* 27, 938-947.

Funk, J.L., Larson, J.E., Ames, G.M., **Butterfield, B.J.**, Cavender-Bares, J., Firn, J., Laughlin, D.C., Sutton-Grier, A.E., Williams, L. and Wright, J. 2016. Revisiting the Holy Grail: using plant functional traits to understand ecological processes. *Biological Reviews*, doi: 10.1111/brv.12275.

**Butterfield, B.J.**, Camhi, A.L., Rubin, R.L. and Schwalm, C.R. 2016. Tradeoffs and compatibilities among ecosystem services: Biological, physical and economic drivers of multifunctionality. *Advances in Ecological Research* 54, 207-243.

**Butterfield, B.J.**, Bradford, J., Armas, C., Prieto, I. and Pugnaire, F.I. 2016. Does the stress gradient hypothesis hold water? An assessment of vegetation effects on soil moisture and implications for plant-plant interactions. *Functional Ecology* 30, 10-19.

Spasojevic, M.J., **Butterfield, B.J.**, Bahlai, C.A., Bradley, B., Sistla, S., Tuanmu, M.-N., Wiederholdt, R. and Suding, K.N. 2016. Functional diversity increases resilience of forest productivity to fire: scaling up community assembly theory to the continental scale. *Global Change Biology*, 22, 1421-1432.

**Butterfield, B.J.** and Wood, T. 2015. Local adaptation and cultivation, but not ploidy, predict functional trait variation in *Bouteloua gracilis* (Poaceae). *Plant Ecology*, 216, 1-9.

Kikvidze, Z., Brooker, R.W., **Butterfield, B.J.**, et al. 2015. The effects of foundation species on community assembly: a global study on alpine cushion plant communities. *Ecology* 96, 2046-2069.

**Butterfield, B.J.** 2015. Environmental filtering increases in intensity at both ends of climatic gradients, though driven by different factors, across woody vegetation types of the southwest USA. *Oikos* 124, 1374-1382.

Schöb, C., Callaway, R.M., Anthelme, F., Brooker, R.W., Cavieres, L.A., et al., and **Butterfield, B.J.** 2014. The context dependence of beneficiary feedback effects on benefactors in plant facilitation. *New Phytologist*, 204, 386-396.

Schöb, C., Michalet, R., Cavieres, L.A., Pugnaire, F.I., Brooker, R.W., **Butterfield, B.J.**, et al. 2014. A global analysis of bi-directional interactions in alpine plant communities shows facilitators experience strong reciprocal fitness costs. *New Phytologist* 202, 95-105.

- Cavieres, L.A., R.W. Brooker, **Butterfield, B.J.**, *et al.* 2014. Facilitative plant interactions and climate simultaneously drive alpine plant diversity. *Ecology Letters* 17, 193-202.
- Spafford, R.D., Lortie, C.J. and **B.J. Butterfield**. 2013. A systematic review of arthropod community diversity in association with invasive plants. *NeoBiota* 16, 81-102.
- Butterfield, B.J.**, Cavieres, L.A., Callaway, R.M., Cook, B.J., Kikvidze, Z., Lortie, C.J., *et al.* 2013. Alpine cushion plants inhibit the loss of phylogenetic diversity in severe environments. *Ecology Letters*, 16, 478-486.
- Butterfield, B.J.** and R.M. Callaway. 2013. A functional-comparative approach to facilitation and its context-dependence. *Functional Ecology*, 27, 907-917.
- Butterfield, B.J.** and K.N. Suding. 2013. Single-trait functional indices outperform multi-trait indices in linking environmental gradients and ecosystem services in a complex landscape. *Journal of Ecology*, 101, 9-17.
- Clark, C.M., Flynn, D.F.B., **Butterfield, B.J.** and P.B. Reich. 2012. Testing the link between functional diversity and ecosystem functioning in a Minnesota grassland experiment. *PLoS ONE*, 7, e52821.
- Schöb, C., **Butterfield, B.J.** and F.I. Pugnaire. 2012. Foundation species influence trait-based community assembly. *New Phytologist*, 196, 824-834.
- Butterfield, B.J.** and J.M. Briggs. 2011. Regeneration niche differentiates functional strategies of desert woody plant species. *Oecologia*, 165, 477-478.
- Butterfield, B.J.**, Betancourt, J.L., Turner, R.M. and J.M. Briggs. 2010. Facilitation drives 65 years of vegetation change in the Sonoran Desert. *Ecology*, 91, 1132-1139.
- Butterfield, B.J.** 2009. Effects of facilitation on community stability and dynamics: Synthesis and future directions. *Journal of Ecology*, 97, 1992-1201.
- Butterfield, B.J.** and J.M. Briggs. 2009. Patch dynamics of soil-biotic feedbacks in the Sonoran Desert. *Journal of Arid Environments*, 73, 96-102.
- Butterfield, B.J.**, Rogers, W.E. and E. Siemann. 2004. Growth of Chinese tallow tree (*Sapium sebiferum*) and four native trees under varying water regimes. *Texas Journal of Science*, 56, 335-346.

## Grants Funded

- BLM. Integrated Monitoring and Seed Testing to Improve Restoration Outcomes on the Colorado Plateau. 2016-2021. **PI, \$430,378 (all NAU).**
- USGS. Building a restoration assessment and monitoring program for the Southwest. 2016-2020. **PI, \$152,358 (all NAU).**

USFS and BLM. Genetic and Environmental Regulation of Functional Traits: New Approaches for Restoration in a Changing Climate. 2015-2017. **PI, \$179,459 (all NAU).**

USGS. Measurements and Modeling to Inform Dryland Sustainability. 2014-2018. **PI, \$437,813 (all NAU).**

BLM. Ranking Native Plant Species and their Ecotypes for Use in Restoration on the Colorado Plateau. 2014-2015. **PI \$11,750 (all NAU).**

USGS. Using Environmental Tolerances to Predict Long-Term Vegetation Dynamics. 2013-2014. **PI \$18,303 (all NAU).**

AZ DEMA. Vegetation Survey and Floral Inventory of Camp Navajo. 2011-2012. **PI \$60,000 (all NAU).**

Frontiers in Life Sciences at ASU (Co-PI/President). "Dynamic Deserts: Resource Uncertainty in Arid Environments". A multidisciplinary conference sponsored by ASU School of Life Sciences (SoLS), Feb. 28-Mar. 1, 2009. **\$35,000.**

T&E Inc. Conservation Grant (PI). 2006. Influences of established vegetation and climatic factors on growth and survival of Sonoran Desert perennial plant seedlings. **\$2,450.**

ASU Graduate and Professional Student Association Research Grant (PI). 2006. Dynamics of plant-soil interactions in the Sonoran Desert. **\$785.**

## **Selected Presentations**

Prestoration: Using species in restoration that will persist now and into the future. Invited speaker, Society for Ecological Restoration Southwest Chapter Annual Meeting, Las Vegas, NV, 2016.

Can we prestore the Colorado Plateau? Colorado Plateau Biennial Conference of Sciences and Management, Flagstaff, AZ, 2015.

Environmental tolerances of woody vegetation across the Southwest USA. Colorado Plateau Biennial Conference of Sciences and Management, Flagstaff, AZ, 2013.

Interaction networks in desert plant communities. Invited speaker, Desert Botanical Garden Research Seminar, Phoenix, AZ, 2012

Linking environment to multiple ecosystem services: How best to represent functional diversity? Invited speaker, Symposium – Revisiting the Holy Grail: Using trait-based ecology as a framework for preserving, utilizing, and sustaining our ecosystems, ESA Annual Meeting, Portland, OR, 2012

Evolutionary history constrains ecological convergence in alpine plant communities on 5 continents. ESA Annual Meeting, Austin, TX, 2011

Phylo-functional facilitation. Invited speaker, Plant Interactions and Environmental Gradients Symposium, Benasque, Spain, 2010

Desert perennial plant functional strategies are related to facilitative response and precipitation variability. ESA Annual Meeting, Albuquerque, NM, 2009

Effects of facilitation on temporal community dynamics: Synthesis and future directions. Invited speaker, British Ecological Society Annual Symposium, Aberdeen, Scotland, 2009

Facilitation dominates 65 years of desert plant community dynamics. ESA Annual Meeting, Milwaukee, WI, 2008

Patch dynamics of soil biotic feedbacks in the Sonoran Desert. Research Insights in Semiarid Environments Symposium, University of Arizona, 2007

## **Teaching Experience**

Northern Arizona University, 2011-

Community Ecology

Ecological Niche Modeling

Teaching Associate, School of Life Sciences, Arizona State University, 2007-2008

Introductory biology lab

Ecology lab (field and analytical methods)

Undergraduate Mentor, School of Life Sciences, Arizona State University, 2007-2009

Individual instruction (2 students)

School of Life Sciences Undergraduate Research (SOLUR, 1 student)

Teaching Assistant, Rice University, Department of Biology, 2004

Ecology

## **Graduate Students and Post-Docs**

Advisor

Stella Copeland, NAU Biology, Post-Doc, 2016 –

Kathleen Balazs, NAU Biology, PhD, 2016 –

Carla Roybal, NAU Biology, MS, 2015 –

Committee Member

Lindsie McCabe, NAU Biology, PhD, 2015 –  
Andrew Smith, NAU Biology, MS, 2013 –  
Emily Borodkin, NAU Biology, MS, 2012 – 2016  
Lisa Dowling, NAU Forestry, MS, 2012 – 2014  
Lindsie McCabe, NAU Biology, MS, 2012 – 2014

## **Awards**

2009 Ecological Society of America (ESA) Southwest Chapter Travel Award  
2007 ESA Forrest Shreve Desert Ecology Award  
2004 – 2009 Jerome Aronson Plant Biology Fellow, Arizona State University (ASU)  
2004 Clark P. Read Award for Excellence in Ecology and Evolution, Rice University

## **Service**

2015 – NAU Liaison to Friends of Camp Colton  
2015 – Merriam-Powell REU Advisor  
2014 – Associate Editor, Plant Ecology  
2012 – Proposal reviewer: NSF Division of Environmental Biology  
2007 – Peer review manuscript reviewer  
2007 – 2008 Coordinator: Graduate Student Research Seminar, ASU School of Life Sciences  
2007 Founder and coordinator: Ecology and Evolutionary Biology Lunch at ASU  
2006 – 2007 Representative: Ecology and Evolution Graduate Students, ASU  
2006 – 2008 Mentor: Southwest Center for Education & Natural Environment (high school)  
2005 – 2009 Plant ecologist: School of Life Sciences Ask a Biologist  
2006 – 2009 Hike leader: School of Life Sciences Outreach Program