

DANIEL Z. ATWATER: CURRICULUM VITAE

Assistant Professor of Biology
Earlham College Greenhouse Manager

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EDUCATION

- Ph.D. Ecology & Evolutionary Biology.** 2012. The University of Montana:
“Interplay between competition and evolution in invaded and native plant
communities” GPA: 4.0.
- B.S. Organismal Biology, Honors.** 2004. University of Kansas GPA: 3.5.

EMPLOYMENT HISTORY

- Assistant Professor.** 2018–present. Earlham College, Department of Biology.
- Lecturer.** 2017. North Carolina State University, Department of Biological
Sciences.
- Affiliate Faculty.** 2017–present. Virginia Tech; Department of Plant Pathology,
Physiology & Weed Science.
- Postdoctoral Research Associate.** 2014–2017. Virginia Tech; Department of
Plant Pathology, Physiology & Weed Science. Advisor: Jacob Barney.
- Postdoctoral Research Associate.** 2012–2014. University of Nevada, Reno;
Department of Natural Resources and Environmental Science. Advisor:
Elizabeth Leger.
- Adjunct Instructor.** 2009 & 2012. The University of Montana, Department of
Organismal Biology and Ecology.
- Graduate Student and NSF Graduate Research Fellow.** 2007–2012. The
University of Montana, Department of Organismal Biology and Ecology.
Advisor: Ragan Callaway.
- Research Assistant.** 2006–2007. The University of Montana, Department of
Chemistry. Advisor: Klára Briknarová.
- Research Technician.** 2004–2007. Cornell University, Department of Clinical
Sciences. Advisor: Richard Goldstein, DVM, DACVIM (SAIM),
DECVIM-CA.
- Research Technician.** 2003–2004. University of Kansas, Department of Ecology
and Evolutionary Biology. Advisor: Craig Martin.
- NSF Summer REU.** 2003. Harvard University, Harvard Forest. Advisor: Aaron
Ellison.

Dual NSF Yearlong REUs. 2001–2003. University of Kansas, Department of Ecology and Evolutionary Biology. Advisor: Daphne Fautin.

PEER-REVIEWED PUBLICATIONS

25. Boheemen LA, **DZ Atwater** & KA Hodgins (2018). Rapid and repeated local adaptation to climate in an invasive plant. *New Phytologist* 00:000-000.
24. Gibson A, C Nelson & **DZ Atwater** (2018). Response of bluebunch wheatgrass to invasion: Differences in competitive ability among invader-experienced and naïve populations. *Functional Ecology* 32:1857-1866.
23. †**Atwater DZ**, C Ervine** & JN Barney (2018). Climatic niche shifts are common in introduced plants. *Nature: Ecology and Evolution* 2:34-43.
22. †**Atwater DZ**, W Kim**, DR Tekiela* & JN Barney (2017). Competition and propagule density influence the efficiency of sexual and clonal propagation of an invasive plant. *Invasive Plant Science and Management* 10:17-25.
21. †Yang L, RM Callaway & **DZ Atwater** (2017). Ecotypic diversity of a dominant grassland species resists exotic invasion. *Biological Invasions* 19:1483-1493.
20. †**Atwater DZ**, R Fletcher*, C Dickinson*, AH Paterson & JN Barney (2016). *Accepted*. Evidence for fine-scale habitat specialization in an invasive weed. *Journal of Plant Ecology* 10.1093/jpe/rtw124.
19. Sezen UU, Barney JN, **DZ Atwater**, GA Pederson, JF Pederson, JM Chandler, TS Cox, P Dotray, D Kopec, SE Smith, J Schroeder, SD Wright, Y Jiao, W Kong, V Goff, S Auckland, L Rainville, GJ Pierce, C Lemke, R Compton, C Phillips, A Kerr, M Mettler & AH Patterson (2016). Multi-phase US spread and habitat switching of a post-Columbian invasive, *Sorghum halepense*. *PLoS One* 11:e0164584.
18. †Luo W, RM Callaway & **DZ Atwater** (2016). Intraspecific diversity buffers the inhibitory effects of soil biota. *Ecology* 97:1913-1918.
17. Aschehoug ET, R Brooker, **DZ Atwater**, JL Maron, RM Callaway (2016). The mechanisms and consequences of interspecific competition among plants. *Annual Reviews in Ecology and Evolution* 47:263-281.
16. Fletcher RA**, RM Callaway & **DZ Atwater** (2016). An exotic invasive plant selects for increased competitive tolerance, but not competitive suppression, in a native grass. *Oecologia* 181:499-505.
15. †**Atwater DZ**, UU Sezen, V Goff, W Kong, AH Paterson & JN Barney (2016). Reconstructing changes in the genotype, phenotype, and climatic niche of an introduced species. *Ecography* 39:894-903.
14. Barney JN, MW Ho* & **DZ Atwater** (2016). Propagule pressure alone cannot always overcome biotic resistance: The role of density-dependent establishment in four invasive species. *Weed Research* 56:208-218.
13. †**Atwater DZ** & RM Callaway (2015). Testing the mechanisms of diversity-dependent overyielding in a grass species. *Ecology* 96:3332-3342.

12. Yang L, **DZ Atwater** & RM Callaway (2015) Root contact responses and the positive relationship between intraspecific diversity and ecosystem productivity. *Annals of Botany, Plants*. DOI: 10.1093/aobpla/plv053.
11. Sun Y, JM Stine, A Sharmin, **DZ Atwater**, JB Alexander Ross, K Briknarovà. (2015) Structural and functional characterization of the acidic region from the RIZ tumor suppressor. *Biochemistry* 54:1390-1400.
10. †**Atwater DZ**, JJ James & EA Leger (2014) Seedling root traits strongly influence field survival and performance of a common bunchgrass. *Basic and Applied Ecology* 16:128-140.
9. †**Atwater DZ**, CM Bauer** & RM Callaway (2011) Indirect positive effects ameliorate strong negative effects of *Euphorbia esula* on a native plant. *Plant Ecology* 212:1655-1662.
8. Thorpe AS, ET Aschehoug, **DZ Atwater** & RM Callaway (2011) Interactions among plants and evolution. *Journal of Ecology* 99:729-740.
7. Briknarovà K, **DZ Atwater**, JM Glicken, SJ Maynard & TE Ness (2011) The PR/SET domain in PRDM4 is preceded by a zinc knuckle. *Proteins* 79:2341-2345.
6. Rawlinson JE, RE Goldstein, AM Reiter, **DZ Atwater** & CE Harvey (2011) Association of periodontal disease with systemic health indices in dogs and the systemic response to treatment of periodontal disease. *Journal of the American Veterinary Medical Association* 238:601-609.
5. Janeczko S, **D Atwater**, E Bogel, A Grieter-Wilke, A Gerold, M Baumgart, H Bender, PL McDonough, SP McDonough, RE Goldstein & KW Simpson (2008) The relationship of mucosal bacteria to duodenal histopathology, cytokine mRNA, and clinical disease activity in cats with inflammatory bowel disease. *Veterinary Microbiology* 128:178-193.
4. Hutton TA, R Goldstein, B Njaa, **DZ Atwater**, Y Chang, & K Simpson (2008) The search for intact *Borrelia burgdorferi* bacteria in kidneys from dogs suspected of suffering from 'Lyme nephritis.' *Journal of Veterinary Internal Medicine* 22:860-865.
3. Goldstein RE, **DZ Atwater**, DM Cazolli, O Goldstein, CM Wade & K Lindbad-Toh (2007) Analysis of Inheritance, Mode of Inheritance and Candidate Genes for Primary Hyperparathyroidism in Keeshonden. *Journal of Veterinary Internal Medicine* 21:199-203.
2. †**Atwater DZ**, JL Butler & AM Ellison (2006) Spatial distribution and impacts of moth larvae on northern pitcher plants. *Northeastern Naturalist* 13:43-56.
1. Butler JL, **DZ Atwater** & AM Ellison (2005) Northern pitcher plants: A sink for red-spotted newts. *Northeastern Naturalist* 12:1-10.

* Graduate student author (5).

** Undergraduate student author (4).

† Paper on which I am corresponding author (11).

TEACHING EXPERIENCE (AS INSTRUCTOR OF RECORD)

6. Ecological Biology (2018). Earlham College.
5. Population and Community Biology (2018). Earlham College.
4. Introduction to Aikidō (2018). Earlham College.
3. Critical and Creative Thinking in the Life Sciences (2017). NCSU.
2. Applied Statistics in Ecology and Agriculture (2016). VT.
1. Plant Physiology (2008, 2009, 2012). UMT.

FORMAL GRADUATE MENTORSHIP

Becky Fletcher. 2016–present. Virginia Tech. Ph.D. committee. I also advised Ms. Fletcher when she was an undergraduate at The University of Montana.

Alyssa Smith. 2015–2017. Virginia Tech. Master’s committee. Ms. Smith defended in 2017 and is now a Ph.D. student and NSF Graduate Research Fellow at the University of Arizona.

UNDERGRADUATE MENTORSHIP

INDEPENDENT PROJECTS:

Wonjae Kim. 2014–2016. Funded by Virginia Tech Fralin Summer Undergraduate Research Fellowships program and a Weed Science Society of America Undergraduate Research Awards to Mr. Kim, to study dispersal in Johnsongrass. Mr. Kim has presented his findings at symposia and has written a publication documenting his findings, with another in preparation. I oversaw all aspects of his projects.

Eugene Dollete. 2014–2015. Funded by the North Carolina Biofuels Center to develop a landscape-scale bioenergy invasion risk model on a grant written by Jacob Barney. I worked with Mr. Dollette to develop and implement the model.

Evan Forr. 2014–2015. Funded by the North Carolina Biofuels Center to implement CUDA parallelization and improved raster handling in the bioenergy invasion risk model, on a grant written by Jacob Barney. I worked with Mr. Forr to implement his improvements to the model.

Carissa Ervine. 2014. Funded by USDA Controlling Weedy and Invasive Plants award to Jacob Barney. Ms. Ervine compiled a massive database of almost 14 million occurrence records of 1135 invasive species. I provided guidance on data acquisition and curation.

Emmanuel Matos-Negrón. 2011. Funded by an IM-SURE (Introductory Multicultural Summer Undergraduate Research Experience in Environmental Biology) grant to study community impacts of invasion, won by Mr. Matos-Negrón. He presented his work at an undergraduate

symposium at the University of Montana. I oversaw all aspects of the project.

Rebecca Fletcher. 2010–2011. Funded by a grant from the Howard Hughes Medical Institute to study evolution of competitive strategies during invasion. Ms. Fletcher's first-authored manuscript is published in *Oecologia* and has been presented at multiple research symposia. I oversaw all aspects of the project, including securing funding. She is now getting a Ph.D. in my postdoctoral lab.

Carolyn Bauer. 2008. Howard Hughes Medical Institute grant, obtained by Ms. Bauer to study indirect interactions in invasive species. Her work resulted in a publication in *Plant Ecology*. I oversaw all aspects of the project.

RESEARCH TECHNICIANS:

I have worked closely with a large number of undergraduate research technicians: Lyndsey Boyer, Stacy Fanning, Rebecca Fletcher, Annalisa Ingegno, Rose Peterson, Ryan Schmitt, and Bryce Wehan

GRANTS, AWARDS & HONORS

GRANT-WRITING EFFORT:

National Science Foundation Graduate Research Fellowship. 2008-2012
(\$120,000).

OTHER AWARDS AND HONORS:

The University of Montana Juried Student Art Awards. 2009. Two pieces selected for display.

University of Kansas Student of the Month. April 2004.

Sigma Xi, University of Kansas Chapter, Undergraduate Research Paper 1st Place. 2002.

J. Michael Young Award. 2002. (\$500).

University of Kansas OAS Scholarship. 1999–2003.

Coca-Cola Scholarship. 1999–2003.

National Merit Semifinalist. 1999.

PUBLIC PRESENTATIONS

22. **Atwater DZ** and JN Barney. 2016. Invasive species undergo major niche shifts as they cross continents. Weed Science Society of America and Southeastern Weed Science Society of America Joint Meeting, San Juan, PR (talk).
21. **Atwater DZ** and JN Barney. 2016. Major climatic niche shifts in over one thousand invasive species. Northeastern Plant Pest and Soils Conference, Philadelphia, PN (talk).

20. **Atwater DZ** and JN Barney. 2015. Evidence of massive deviations in the climatic niches of over one thousand introduced plant species. Ecological Society of America 100th Annual Meeting, 2015, Baltimore, MD (talk).
19. Barney JN, **DZ Atwater**, UU Sezen & AH Paterson. 2015. Invasion at the margins: Evidence of genetic, phenotypic, and niche shifts in a widespread invader. Ecological Society of America 100th Annual Meeting, 2015, Baltimore, MD (talk).
18. **Atwater DZ**, JN Barney, UU Sezen & AH Paterson. 2015. Phenotypic differentiation, plasticity, and a surprising habitat shift in one of the world's worst weeds. Weed Science Society of America Annual Meeting, 2015, Lexington, KY (talk).
17. **Atwater DZ**, JJ James & EA Leger. 2014. Seedling root traits and field performance of *Elymus elymoides*. Great Basin Native Plant Project Annual Meeting, Boise, ID (talk).
16. **Atwater DZ**, JJ James & EA Leger. 2013. Seeding root architecture strongly influences field performance of genotypes of a common bunchgrass (*Elymus elymoides*). Great Basin Consortium Conference, Reno, NV (poster).
15. **Atwater DZ**, RM Callaway & S Xiao. 2013. Winning plant competition: Why neighbor suppression might not help. Ecological Society of America 98th Annual Meeting, Minneapolis, MN (talk).
14. **Atwater DZ**. 2012. Interplay between competition and evolution in native and invaded plant communities. Dissertation defense. University of Montana Ecology Seminar Series, Missoula, MT (talk).
13. **Atwater DZ** & RM Callaway. 2010. One invasive plant adapts to the presence of another. University of Montana Organismal Biology and Ecology Seminar Series, Missoula, MT (talk).
12. **Atwater DZ** & RM Callaway. 2010. One invasive plant adapts to the presence of another. Ecological Society of America 95th Annual Meeting, Pittsburgh, PA (talk).
11. **Atwater DZ**, CM Bauer & RM Callaway. 2010. Can invasive plants protect native plants from herbivory? University of Montana Organismal Biology and Ecology Seminar Series, Missoula, MT (talk).
10. Dial K, **DZ Atwater**, T Dial, M Ellis, A Heers, L Holsinger, H Johnson, E Lahr, K McNight, J Maron, L Mullen, K Padian & B Snead. 2009. University of Montana Tanzania Trip 2009: Wildlife. University of Montana Wildlife and Ecology Seminar Series, Missoula, MT (talk).
9. **Atwater DZ**, CM Bauer & RM Callaway. 2009. Can invasive plants protect native plants from herbivory? Ecological Society of America 94th Annual Meeting, Albuquerque, NM (talk).
8. **Atwater DZ**. 2008. Do plant interactions cause evolutionary responses? University of Montana Organismal Biology and Ecology Seminar Series, Missoula, MT (talk).
7. Goldstein RE & **DZ Atwater**. 2006. Serological and circulating immune complex analysis in dogs naturally infected with *Borrelia burgdorferi*. American College of Veterinary Internal Medicine Annual Forum, Louisville, KY (poster).

6. Shanies TA, RE Goldstein, BJ Njaa, **DZ Atwater**, YF Chang & KW Simpson. 2005. The search for intact *Borrelia burgdorferi* bacteria in kidneys of dogs suspected of suffering from 'Lyme nephritis.' American College of Veterinary Internal Medicine Annual Forum, Baltimore, MD (poster).
5. **Atwater DZ**. 2004. The distribution of damage caused by two species of moths (*Exyra fax* and *Papaipema appassionata*) to the northern pitcher plant (*Sarracenia purpurea*). University of Kansas Honors Research Symposium, Lawrence, KS (talk).
4. **Atwater DZ**. 2003. The distribution of damage caused by two species of moths (*Exyra fax* and *Papaipema appassionata*) to the northern pitcher plant (*Sarracenia purpurea*). Harvard Forest Annual REU Symposium, Petersham, MA (talk).
3. **Atwater DZ**, & DG Fautin. 2003. Online common names database for Hexacorallia. University of Kansas Undergraduate Research Symposium (poster) and Sigma Xi University of Kansas Chapter Paper Competition, Lawrence, KS (talk).
2. **Atwater DZ**, & DG Fautin. 2002. Online biographical database of taxonomists of sea anemones. Society for Integrative and Comparative Biology Conference, Anaheim, CA (poster).
1. **Atwater DZ**, & DG Fautin. 2002. Online biographical database of taxonomists of sea anemones. University of Kansas Undergraduate Research Symposium, Lawrence, KS (poster).

ON-LINE SCIENTIFIC PUBLICATIONS

- Atwater DZ** & D Fautin. 2001. "Malacostraca" (On-line), Animal Diversity Web. Accessed February 13, 2009 at <http://animaldiversity.ummz.umich.edu/site/accounts/information/Malacostraca.html>.
- Atwater DZ** & D Fautin. 2001. "Hexactinellida" (On-line), Animal Diversity Web. Accessed February 13, 2009 at <http://animaldiversity.ummz.umich.edu/site/accounts/information/Hexactinellida.html>.

PRESS

- 2017 December 8. Michigan Public Radio Environment Report:** "Invasive plants can adapt to new climates in their quest for world domination". Article and interview (4 min.). <http://michiganradio.org/post/invasive-plants-can-adapt-new-climates-their-quest-world-domination>. Rebecca Williams.
- 2017 December 6. Inverse:** "We totally underestimated how terrifying America's invasive plants are". Article. <https://www.inverse.com/article/39062-invasive-plant-spread-u-s>. Yasmin Tayag.

2017 December 4. Nature Editorial: “Niche appeal: Grows well in sun and warmth—and shade and cold”. *Nature* 552:5-6. Editorial staff.

COMPUTER LANGUAGES

I am fluent in R, which I use for statistical modeling, simulation modeling, and species distribution models. I also have experience in SQL and NetLogo. I have extensive experience analyzing ecological data and working with very large datasets.

PROFESSIONAL SERVICE

Masters Committee. 2016–2017. Alyssa Smith. Virginia Tech.

Ph.D. Committee. 2016–present. Rebecca Fletcher. Virginia Tech.

Graduate Student Representative to the Faculty. 2011–2012. The University of Montana Department of Organismal Biology and Ecology.

Peer Review. I have peer reviewed over 30 papers for the following journals:
Basic and Applied Ecology; Biological Invasions; Biology Letters; Chemical Ecology; Ecological Modelling; Ecology Letters; Ecosphere; Functional Ecology; International Journal of Plant Sciences; Invasive Plant Science and Management; Journal of Ecology; Journal of Plant Ecology; Oikos; Perspectives in Plant Ecology, Evolution & Systematics; Plant Ecology; Plant Ecology & Diversity; Plant and Soil; Plant Species Biology; PLoS One; Scientific Reports.

Grant Review. One NSF DEB Full Proposal.