

DAVID ALLEN

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RESEARCH INTERESTS

Ecology of Lyme disease; Forest ecology; Theoretical ecology

APPOINTMENTS

- 2020– Associate Professor, Biology Department, Middlebury College, Middlebury, VT
- 2015–2020 Assistant Professor, Biology Department, Middlebury College, Middlebury, VT
- 2012–2015 Visiting Assist. Professor, Biology Department, Middlebury College, Middlebury, VT
- Spring 2012 Visiting Associate in Science Instruction, Biology Department, Middlebury College

EDUCATION

- 2011 PhD in Ecology, University of Michigan, Ann Arbor, MI
- 2004 MS in Applied Mathematics, University of Michigan, Ann Arbor, MI
- 2003 BA in Mathematics, Vassar College, Poughkeepsie, NY

TEACHING EXPERIENCE

BIOL 0140 Ecology and Evolution

Fall 2012 (87); Fall 2013 (87); Fall 2014 (75); Fall 2015 (73); Fall 2016 (77); Fall 2018 (78); Fall 2019 (36); Spring 2021 (36); Fall 2021 (104)

BIOL 0211 Biostatistics

Winter 2014 (36); Fall 2018 (20); Fall 2020 (25)

BIOL 0323 Plant Community Ecology

Spring 2013 (15); Spring 2014 (28); Spring 2015 (22); Spring 2016 (8); Spring 2017 (26); Spring 2019 (14); Spring 2020 (28); Spring 2021 (16); Spring 2022 (28)

BIOL 0490 Seminar in Plant Ecology

Spring 2013 (6); Spring 2014 (9); Spring 2016 (7); Winter 2019 (12); Spring 2020 (6)

FYSE 1413 Lyme Disease

Fall 2014 (12); Fall 2016 (15)

BIOL 1230 Data Science Across Disciplines

Winter 2021 (15)

SCHOLARLY PRODUCTS

Peer-reviewed publications

* denotes undergraduate student

- In review M. Verdú, ...**D. Allen**, ...et al. RecruitNet: A global database of plant recruitment networks. *In review*.
- In press C. Piloniot, ..., **D. Allen**, ..., *et al.* Distribution of biomass dynamics in relation to tree size in forests across the world. *New Phytologist*. *In press*.
- 2022 H. Baldwin*, B. Borgmann–Winter*, W.J. Landesman, and **D. Allen**. 2022. A Geographic Information System approach to map tick exposure risk at a scale for public health intervention. *Journal of Medical Entomology* 59: 162–172.
- 2021 S. Davies, ..., **D. Allen**, ..., *et al.* 2021. ForestGEO: Understanding forest diversity and dynamics through a global observatory network. *Biological Conservation* 253: 108907.
- A. Kim, **D. Allen**, and S. Couch*. 2021. The forestecology R package for fitting and assessing neighborhood models of the effect of interspecific competition on the growth of trees. *Ecology and Evolution* 11: 15556–15572.
- B. Sedio, ..., **D. Allen**, ..., *et al.* 2021. Chemical similarity of co-occurring trees decreases with precipitation and temperature in North American forests. *Frontiers in Ecology and Evolution* 9: 679638.
- M. Weemstra, J. Zambrano, **D. Allen**, and M. N. Umaña. 2021. Tree growth increases through opposing above- and belowground resource strategies. *Journal of Ecology* 109: 3502–3512.
- 2020 **D. Allen**, C. Dick, R. Burnham, I. Perfecto, and J. Vandermeer. 2020. The Big Woods research plot at the Edwin S. George Reserve, Pinckney, MI, USA. *Miscellaneous Publications of the Museum of Zoology*. University of Michigan. 207.
- **D. Allen** and A. Kim. 2020. A permutation test and spatial cross-validation approach to assess models of interspecific competition between trees. *PLOS One* 15: e0229930.
- B. Borgmann–Winter and **D. Allen**. 2020. How the distance between drag-cloth checks affects the estimate of adult and nymphal *Ixodes scapularis* (Acari: Ixodidae) density. *Journal of Medical Entomology* 57: 623–626.
- C. Merenstein*, J. Ward, and **D. Allen**. 2020. *Diplorickettsia* bacteria in an *Ixodes scapularis* tick, Vermont, USA. *Emerging Infectious Diseases* 26: 1036–1038.
- 2019 **D. Allen**, B. Borgmann–Winter*, L. Bashor*, and J. Ward. 2019. The density of the Lyme disease vector, *Ixodes scapularis* (blacklegged tick), differs between the Champlain Valley and Green Mountains, Vermont. *Northeastern Naturalist* 26: 545–560.
- D.N.L. Menge, ..., **D. Allen**, ..., *et al.* 2019. Patterns of nitrogen-fixing tree abundance in forests across Asia and America. *Journal of Ecology* 107: 2598–2610.
- 2018 **D. Allen**, C. Dick, E. Strayer*, I. Perfecto, and J. Vandermeer. 2018. Scale and strength of oak-mesophyte interactions in a transitional oak-hickory forest. *Canadian Journal of Forest Research* 48: 1366–1372.
- J. Lutz, ..., **D. Allen**, ..., *et al.* 2018. Global importance of large-diameter trees. *Global Ecology and Biogeography*. 27: 849–864.
- T. Ong, **D. Allen**, and J. Vandermeer. 2018. Huffaker revisited: spatial heterogeneity

- and the coupling of ineffective agents in biological control. *Ecosphere* 9: e02299.
- 2015 P. Ryan, D. West, K. Hattori, S. Studwell*, **D. Allen**, and J. Kim. 2015. The influence of metamorphic grade on arsenic in metasedimentary bedrock aquifers: A case study from Western New England, USA. *Science of the Total Environment* 505: 1320–1330.
- 2014 Z. Brym, **D. Allen**, and I. Ibáñez. 2014. Community control on growth and survival of an exotic shrub. *Biological Invasions* 16: 2529–2541.
- D. Jackson, **D. Allen**, I. Perfecto, and J. Vandermeer. 2014. Self-organization of background habitat determines the nature of population spatial structure. *Okios* 123: 751–761.
- 2013 A. Belasen, E. Burkett, A. Injaian, K. Li, **D. Allen**, and I. Perfecto. 2013. Effect of sub-canopy on habitat selection in the blue-spotted salamander (*Ambystoma laterale-jeffersonianum* unisexual complex). *Copeia* 2013: 254–261.
- 2012 S. Jha, **D. Allen**, H. Liere, I. Perfecto, and J. Vandermeer. 2012. Mutualisms and population regulation: mechanism matters. *PLOS One* 7: e43510.
- 2011 Z. Brym, J. Lake, **D. Allen**, and A. Ostling. 2011. Plant functional traits suggest novel ecological strategy for an invasive shrub in an understory woody plant community. *Journal of Applied Ecology* 48: 1098–1106.
- S. Yitbarek, J. Vandermeer, and **D. Allen**. 2011. The combined effects of exogenous and endogenous variability on the spatial distribution of ant communities in a forested ecosystem (Hymenoptera: Formicidae). *Environmental Entomology* 40: 1067–1073.
- 2009 **D. Allen**, J. Vandermeer, and I. Perfecto. 2009. When are habitat patches really islands? *Forest Ecology and Management* 258: 2033–2036.

Software

- 2021 A. Kim, **D. Allen**, and S. Couch*. forestecology: methods and data for forest ecology model fitting and assessment. [R package. Version 0.2.0.](#)
- M. Stokowski* and **D. Allen**. IxPopDyMod: a framework for tick population and infection modeling. [R package. Version 0.2.0.](#)

Data sets

- 2019 **D. Allen**, J. Vandermeer, C. Dick, I. Perfecto, and R. Burnham. Michigan Big Woods research plot data [Data set]. [University of Michigan – Deep Blue Data.](#)

PRESENTATIONS

Invited talks

- 2021 S. Abe, **D. Allen**, C. Anderson, A. Lyford, and C. Myers. 2021. Data science across disciplines: a teaching adventure in five acts. Midd.Data Lightning Talk. Middlebury College, Middlebury, Vermont. May 20, 2021.
- **D. Allen**. 2021. Applying for an NIH R15 grant. Grant Writing Workshop. Vermont Biomedical Research Network. On Zoom. November 6, 2021.
- 2020 **D. Allen**. 2020. Towards a thermal biology of tick-borne disease. Biology Department Seminar. University of Vermont, Burlington, Vermont. October 5, 2020.
- **D. Allen**. 2020. What drives Lyme disease risk in Vermont? Biology Department Seminar. Middlebury College, Middlebury, Vermont. February 14, 2020.
- 2019 **D. Allen**. 2019. What drives Lyme disease risk in Vermont? Current Topics in Science

Speaker Series. Northern Vermont University–Johnson, Johnson, Vermont. September 25, 2019.

- 2018 **D. Allen.** 2018. Differences in juvenile blacklegged tick (*Ixodes scapularis*) phenology with elevation: implications for Lyme disease. Natural Science Department Seminar. Castleton University, Castleton, Vermont. September 21, 2018
- **D. Allen.** 2018. Differences in juvenile blacklegged tick (*Ixodes scapularis*) phenology with elevation: implications for Lyme disease. Biology Department Seminar. Green Mountain College, Poultney, Vermont. October 31, 2018
- 2012 **D. Allen.** 2012. Spatial pattern and succession in a Michigan forest. Biology Department Seminar. Middlebury College, Middlebury, Vermont. April 13, 2012.

International and national conferences

* denotes Middlebury College student

- 2019 **D. Allen.** 2019. Larval blacklegged tick phenology changes with elevation: implications for Lyme disease. Ecology and Evolution of Infectious Disease. Princeton, NJ.
- 2017 **D. Allen** and A. Kim. 2017. Estimating species-specific competition coefficients with a Bayesian hierarchical model of the neighborhood effect of competition on tree growth. Ecological Society of America Annual Meeting. Portland, OR.
- L. Bashor* and **D. Allen.** 2017. The effect of elevation on *Borrelia burgdorferi* infection rate of *Ixodes scapularis* ticks and two *Peromyscus* host species in Addison County, VT. Ecological Society of America Annual Meeting. Portland, OR.
- M. Tremblay–Franco, N. Cabaton, **D. Allen**, C. Canlet, R. Gautier, S. Hamdi, D. Zalko, and C. Combelles. 2017. Study of the follicular metabolome in the bovine by ¹H-NMR. Conférence de Spectrométrie de Masse, Métabolomique et Fluxomique & Electrophorèse et Analyse Protéomique. Paris, France.
- 2016 **D. Allen.** 2016. Species-specific recruitment limitation and response to canopy opening in a midsuccessional oak forest. Ecological Society of America Annual Meeting. Ft. Lauderdale, FL.
- 2010 **D. Allen.** 2010. Systematic deviation from the predictions of metabolic theory in a transitional *Quercus-Carya* forest. Ecological Society of America Annual Meeting. Pittsburgh, PA.
- J. Lake, A. Ostling, **D. Allen**, G. Barabas, Z. Brym, A. Maguire, and D. Cummins. 2010. Do trait trade-offs drive coexistence through their effects on demography of temperate forest trees? Ecological Society of America Annual Meeting. Pittsburgh, PA.
- 2009 **D. Allen.** 2009. Self-organized spatial pattern formation in *Hamamelis virginiana*. Ecological Society of America Annual Meeting. Albuquerque, NM.

Regional conferences

- 2019 M. Perlman* and **D. Allen.** 2019. Soil moisture and soil texture as predictors of American beech and sugar maple in an old growth hardwood forest in Middlebury, VT. Northeast Natural History Conference. Springfield, MA.
- 2018 **D. Allen.** 2018. Calculating Lyme disease's R_0 along an elevation gradient in central Vermont, USA. Vermont Tick and Tick-borne Disease Professionals Meeting. Vermont Department of Health. Colchester, VT.
- E. Feldman*, M. Real*, and **D. Allen.** 2018. Parameterization of a spatially-explicit forest model SORTIE for Addison County, Vermont. Northeast Natural History Con-

ference. Burlington, VT.

- P. Ryan, J. Kim, E. Norris*, and **D. Allen**. 2018. Tracing groundwater flow by inorganic hydrogeochemistry: a tool to understanding PFOA migration in a fractured rock aquifer. 53rd Annual Meeting of the Northeastern Section of the Geological Association of America. Burlington, VT.
- 2017 **D. Allen**. 2017. Blacklegged tick density and *Borrelia burgdorferi*-infection in Addison County, VT. Vermont Tick and Tick-borne Disease Professionals Meeting. Vermont Department of Health. Burlington, VT.
- B. Borgmann-Winter*, M. Hickey*, N. Job*, G. Zhang*, and **D. Allen**. 2017. Effects of elevation and forest fragment size on *I. scapularis* abundance and *Borrelia burgdorferi* infection rate. New England Regional IDEa Conference. Burlington, VT.

GRANTS

Total of \$474,958 direct costs

Ongoing support

- 2020 National Institute of Allergy and Infectious Diseases R15: A climate and host community driven *Ixodes* population and infection dynamics model. \$250,000. September 2020 – August 2023. R15AI153834.

Completed support

- 2019 Vermont Genetics Network Project Grant: *OspC* type and tick seasonality's effect on virulence of the Lyme disease agent. \$75,000. June 2019–May 2020.
- 2018 Vermont Genetics Network Pilot Grant: Development and field parameterization of a climate-driven Lyme dynamics model. \$24,982. June 2018–May 2019.
 - Anderson Endowment for Biosphere Studies: Resolving the incidence of Lyme disease bacterium (*Borrelia burgdorferi*) in two cryptic species of wild mice. \$25,000. September 2018 – August 2021. Co-PI with Steve Trombulak.
- 2017 Vermont Genetics Network Project Grant: Effect of elevation and forest area on *Ixodes* density and *Borrelia*-infection. \$74,988. June 2017–May 2018.
- 2016 Vermont Genetics Network Pilot Grant: Black-legged tick density and *Borrelia*-infection proportion along an elevation gradient. \$24,988. June 2016–May 2017.

STUDENT RESEARCH

Theses

- 2022 S. Ameer. Fall 2021–Winter 2022.
- 2021 E. Clinton. Fall 2020–Spring 2021. Using a landscape permeability metric to assess the impacts of different residential land development patterns on ecological connectivity in Chittenden County, VT.
 - W. Galloway. Fall 2020–Spring 2021. SMAP and blacklegged ticks: testing whether remotely sensed soil moisture can predict *Ixodes scapularis* host-seeking behavior by monitoring microclimates
- 2020 C. Howe. Fall 2019–Fall 2020. A tale of two mice: reservoir competence of cryptic *Peromyscus* species for *Borrelia burgdorferi*, the Lyme disease agent, in central Vermont.
 - G. Houde. Fall 2019–Spring 2020. The potential effects of predator community and

- deer abundance on *Ixodes scapularis* density and infection with *Borrelia burgdorferi*.
- G. Savitsky. Fall 2019–Spring 2020. Impact of beech bark disease on beech tree photosynthetic capacity.
 - 2018 B. Borgmann–Winter. Fall 2017–Spring 2018. Environmental determinants of tick-borne disease risk in the Champlain Valley, Vermont.
 - 2017 L. Bashor. Fall 2016–Spring 2017. The effect of elevation on determinants of Lyme disease risk in Vermont.
 - E. Feldman. Spring 2017–Fall 2017. Parameterization of the sortie light and recruitment submodels for hemlock-hardwood forests of Addison County, Vermont.
 - S. Zavoico. Fall 2017. Small-scale spring migrations of Svalbard reindeer.
 - 2016 A. Taylor. Fall 2015–Spring 2016. Evaluating spatial and temporal patterns of bishop pine (*Pinus muricata*) mortality on Santa Cruz Island, CA.
 - 2013 G. Lui. Fall 2012–Spring 2013. Carbon storage dynamics in a Middlebury, VT willow biomass plantation and associated lands.

Non-thesis research students

- 2021 Cindy Cardona, Matthew Silverman, Myles Stokowski, and Allison Suddaby
- 2020 Shaun Christean, Jenn Crandall, Brent Edwards, and Olivia Olson
- 2019 Annie Benson, Selin Everett, Janet Sanchez, Harman Singh, and Jules Struzyna
- 2018 Harper Baldwin, Robert Cassidy, Evan Fedorov, and Morgan Perlman
- 2017 Tarim Contin–Kennedy, Elias Guerra, Nina Job, and Matthew Reala
- 2016 Casey Harlow
- 2015 Alia Johnson, Ben Henry, Raquel Reisinger, and Lindsay Warne
- 2014 Courtney Devoid, Spencer Hardy, and Kevin Tenenbaum
- 2013 Carey Favalaro, Kevin Tenenbaum, and Cori West
- 2012 Jess Poracky and Kevin Tenenbaum

SERVICE

Departmental service

- *Biology department chair*: Two academic years (2021–2022, 2022–2023).
- *Biology 500–701 coordinator*: Coordinated biology department student research course. Four academic years (2014–2015, 2015–2016, 2016–2017, 2020–2021).

Appointed college-wide committees

- *Lands advisory committee*: Group of faculty and staff that is consulted by the board of trustees and College administration regarding important land use decisions on the College’s lands. Four academic years (2016–2017, 2017–2018, 2018–2019, 2019–2020, 2020–2021).
- *First year seminar steering committee*: 2016–2017.
- *Faculty advisory board for the Middlebury School Abroad in Cameroon*: Including spring 2017 site visit. 2016–2017, 2018–2019.

- *Environmental council*: Group of students, staff and faculty whose mission is to engage and support members of the College community in advancing leadership in sustainability and environmental citizenship. Four academic years including two as co-chair (2014–2015, co-chair 2015–2016, co-chair 2016–2017, 2018–2019).
- *Laboratory Safety Committee*: 2019–2020.
- *Recombinant DNA Safety Committee*: 2020–2021
- *Midd.Data steering committee*: 2020–2021
- *Institutional Animal Care and Use Committee*: 2021–2022

Search committees

- 2022 Biology department visiting neurophysiologist
- 2018 Biology department tenure-track aquatic ecologist
- 2016 Biology department tenure-track microbial ecologist
- 2015 Biology department visiting associate in science instruction
- 2014 Mathematics department tenure-track statistician
- 2014 Biology department tenure-track microbial ecologist

REVIEWER

Ad hoc manuscript review

American Naturalist (×2); Biomedical and Environmental Sciences; BioScience; Experimental and Applied Acarology; Journal of Insect Science; Journal of Quantitative Analysis of Sports (×4); Journal of Theoretical Biology (×5)

Ad hoc grant review

- 2021 National Institutes of Health. Study Section ZRG1 AIDC (80). Infectious Diseases and Immunology R15 review. March 15, 2021.
- Agence Nationale de la Recherche. French national research funding agency. Reviewed proposal for the “Maladies infectieuses et environnement” call. June 2021.
- M.J. Murdock Charitable Trust. Reviewed a proposal for the “Murdock College Research Program for Natural Sciences.” October 2021.

MEDIA COVERAGE

- 2021 [WDEV: Health Care Today](#): April 16, 2021.
- [Entomology Today](#): December 3, 2021.
- 2019 [Burlington Free Press](#): September 5, 2019.
- [Atlas Obscura](#): August 28, 2019.
- [The Conversation](#): August 7, 2019.
- [VPR Vermont Edition](#): June 24, 2019.
- 2018 [Middlebury College Newsroom](#): July 5, 2018
- 2017 [WCAX news](#): June 8, 2017
- [Addison Eagle](#): June 26, 2017
- [VPR Vermont Edition](#): July 25, 2017

ARTISTIC COLLABORATION

- 2017 *I Never Know When Things are Ending*. Performed in a dance piece choreographed by Mellon Interdisciplinary Choreographer [Maree ReMalia](#). This piece was performed twice, at the Middlebury College faculty dance concert on April 6, 2017 and at the Movement Matters final show on April 20, 2017.
- 2015 *Figure Study*. Collaboration with the letterpress artist [Sarah Bryant](#). This artist book explores ways of displaying and comparing population data. Letterpress printed and hand bound in an edition of 35.
- One of five finalists for the biennial [Minnesota Center for Book Arts Prize](#).
 - Purchased by the special collections libraries of California Polytechnic State University, Wellesley College, University of Washington St. Louis, Savannah College of Art and Design, University of Wisconsin Milwaukee, Florida State University, Indiana University, Northwestern University, Scripps College, University of Alabama, UCLA Biomedical Library, UC San Diego, University of Florida, Wesleyan University, and Yale University.

BASEBALL WORK

* denotes Middlebury College student

Publications (not peer-reviewed)

- 2014 **D. Allen** and K. Tenenbaum*. 2014. A theoretical blueprint for improving MLEs. Pages 374–384 in *The Hardball Times Baseball Annual 2015*. CreateSpace Publishers.
- 2013 **D. Allen** and K. Tenenbaum*. 2013. Game theory modeling of the batter-pitcher confrontation. Pages 273–280 in *The Hardball Times Baseball Annual 2014*. CreateSpace Publishers.
- 2012 **D. Allen**. 2012. Cat and mouse with a runner on first. Pages 279–288 in *The Hardball Times Baseball Annual 2013*. Acta Sports, Chicago, Illinois.
- 2010 **D. Allen**. 2010. Cliff Lee transformed. Pages 49–54 in *Mariners Annual 2010*. Maple Street Press, Hanover, Massachusetts.
- 2009 **D. Allen**. 2009. Where was that pitch? Pages 159–166 in *The Hardball Times Baseball Annual 2010*. Acta Sports, Chicago, Illinois.

Talks

- 2014 K. Tenenbaum* and **D. Allen**. 2014. Scouting Bayes: a Bayesian forecast with scouting priors. SABR Analytics Conference. Phoenix, Arizona.
- 2013 K. Tenenbaum* and **D. Allen**. 2013. Nash equilibrium solution for fastball locations in two-strike counts. SABR Analytics Conference. Phoenix, Arizona.
- **D. Allen** and K. Tenenbaum*. 2013. Game theory and the batter-pitcher confrontation. Saberseminar. Boston, MA.
- 2011 **D. Allen**. 2011. Disentangling success in baseball with ball-tracking technologies. Skill vs. luck: disentangling success in complex systems. Ann Arbor, Michigan.
- 2010 **D. Allen**. 2010. Using PITCHf/x to measure pitch success by location. New Technologies in Baseball Panel at SABR 40. Atlanta, Georgia.
- **D. Allen**. 2010. Using FIELDf/x to assess fielders' routes to fly balls. PITCHf/x Summit 2010. San Francisco, California.

2009 **D. Allen.** 2009. Creating contour and heat-map graphs to display PITCHf/x data. PITCHf/x Summit 2009. San Francisco, California.