BRIAN BECKAGE

Curriculum Vitae

CURRENT POSITION

Professor
Department of Plant Biology &
Department of Computer Science
University of Vermont
Burlington, VT 05405
(802) 598-9685 / email: Brian.Beckage@uvm.edu

EXPERTISE

Ecological systems; Complex systems; Climate change; Computational ecology; Bayesian Statistics; Data modeling; Agent-based modeling; System Dynamics modeling.

EDUCATION

Duke University, Department of Botany, Durham, NC: 1995-2000.
Ph.D., September 2000. Advisor: Dr. James S. Clark
Dissertation: Seedling recruitment in Southern Appalachian forests: Does spatial heterogeneity maintain species diversity?

Duke University, Institute of Statistics and Decision Sciences, Durham, NC: 1998-2000.
M.S., September 2000. Advisor: Dr. Michael Lavine
Thesis: A long-term study of red maple (*Acer rubrum* L.) seedling survival in Southern Appalachian forests: The effects of canopy gaps and shrub understories.

University of Central Florida, Department of Biology, Orlando, FL: 1992-1995.
M.S., August 1995. Advisor: Dr. I. Jack Stout
Thesis: The effects of repeated burning on the distribution and abundance of flowering plants in central Florida sandhills.

Cornell University, Department of Civil and Environmental Engineering, Ithaca, NY: 1985-1989. B.S., May 1989

PROFESSIONAL EXPERIENCE

Fellow**,** Gund Institute for Environment**,** University of Vermont, Burlington, VT. Sep 2019-present.

Professor**,** University of Vermont, Department of Computer Science, Burlington, VT. Sep 2017-present. Secondary appointment.

Professor**,** University of Vermont, Department of Plant Biology, Burlington, VT. Sep 2014-present.

Associate Professor**,** University of Vermont, Department of Plant Biology, Burlington, VT. Sep 2009-2014.

Sabbatical Fellow, National Institute for Mathematical and Biological Synthesis, Knoxville, TN. Jan 2010 – Jul 2010.

Assistant Professor**,** University of Vermont, Department of Plant Biology, Burlington, VT. Sep 2003-Sep 2009.

Postdoctoral Research Associate**,** University of Tennessee, Department of Ecology and Evolutionary Biology, Knoxville, TN. Nov 2001-Dec 2003. Advisor: Dr. Louis Gross

Postdoctoral Research Associate**,** Louisiana State University, Department of Biological Sciences, Baton Rouge, LA. Jun 2000-Nov 2001. Advisor: Dr. William Platt

PUBLICATIONS

92. Eyster, Harold N. and **Brian Beckage**. 2024. Space-for-time substitutions exaggerate urban bird–habitat ecological relationships. Journal of Animal Ecology. https://doi.org/10.1111/1365-2656.14194.

91. Wiltshire, Serge, Patrick J. Clemins and **Brian Beckage**. 2024. Granularity of model input data impacts estimates of carbon storage in soils. 2024. Plos Climate. https://doi.org/10.1371/journal.pclm.0000363

90. Wiltshire, S., **Beckage, Brian**, Callahan, C., Chase, L., Conner, D., Darby, H., Kolodinsky, J., Kraft, J., Neher, D., Poleman, W., Ricketts, T., Tobin, D., von Wettberg, E., & Niles, M. 2024. Regional food system sustainability: Using team science to develop an indicator-based assessment framework. Journal of Agriculture, Food Systems, and Community Development, 14(1), 1–24. https://doi.org/10.5304/jafscd.2024.141.011

89. Eyster, Harold N, and **Brian Beckage**. 2024. Applying a deep learning pipeline to classify land cover from low-quality historical RGB imagery. PeerJ Computer Science. DOI 10.7717/peerj-cs.2003.

88. Gross, Louis J. and **Brian Beckage**. 2023. Use of computer systems and models. Editor(s): Simon A Levin, Encyclopedia of Biodiversity (Second Edition), Academic Press, Pages 213–220,ISBN 9780123847201, https://doi.org/10.1016/B978-0-12-384719-5.00305-1.

87. Holthuijzen, Maike, Dave Higdon, **Brian Beckage** and Patrick J. Clemins. Novel application of a process convolution approach for calibrating output from numerical models. 2023. Environmetrics. https://doi.org/10.1002/env.2822.

86. **Beckage, Brian**, K. Lacasse, K. T. Raimi, and D. Visioni. 2023. Integrating risk perception with climate models to understand the potential deployment of solar radiation modification to mitigate climate change. Working Paper 23-22. Resources for the Future.

85. Christopher J Picard, Jonathan M Winter, Charlotte F Cockburn, Janel Hanrahan, Patrick J Clemins and **Brian Beckage**. 2023. Twenty-first century increases in total and extreme precipitation across the Northeastern United States. Climatic Change: 176(6), 72. https://doi.org/10.1007/s10584-023-03545-w.

84. Wiltshire, Serge, Sarah Grobe, and **Brian Beckage**. 2023. A Historically driven spinup procedure for soil carbon modeling. Soil Systems. Soil Systems 2023, 7(2), 35. https://doi.org/10.3390/soilsystems7020035.

83. Eyster, Harold N, and **Brian Beckage**. Arboreal urban cooling is driven by leaf area index, leaf boundary layer resistance, and dry leaf mass per leaf area: evidence from a system dynamics model. Atmosphere. https://doi.org/10.3390/atmos14030552.

82. Wiltshire, Serge and **Brian Beckage**. 2023. Integrating climate change into projections of soil carbon sequestration from regenerative agriculture. Plos Climate. https://doi.org/10.1371/journal.pclm.0000130.

81. **Beckage, B.,** Moore, F. C., and K. Lacasse. Incorporating human behavior into Earth system modeling. 2022. Nature Human Behavior. DOI 10.1038/s41562-022-01478-5. https://rdcu.be/cZOHQ.

80. Molofsky, Jane, Daniel Park, David M. Richardson, Stephen R. Keller, **Brian Beckage**, Jennifer Mandel, James Boatwright and Cang Hui. 2022. Optimal differentiation to the edge of trait space (EoTS). Evolutionary Ecology. https://doi.org/10.1007/s10682-022-10192-7.

79. Tsai, Yushiou, Hope M. Zabronsky, Asim Zia and **Brian Beckage**. Efficacy of riparian buffers in phosphorus removal: a meta-analysis. Frontiers in Water. 2022. https://doi.org/10.3389/frwa.2022.882560

78. Shin, Yoon Ah, Katherine Lacasse, Louis Gross, **Brian Beckage**. How coupled is coupled human-natural systems research? 2022. Ecology and Society. https://doi.org/10.5751/ES-13228-270304

77. Eyster, Harold N, **Brian Beckage**. Conifers May Ameliorate Urban Heat Waves Better Than Broadleaf Trees: Evidence from Vancouver, Canada. *Atmosphere*. 2022; 13(5):830. https://doi.org/10.3390/atmos13050830

76. Holthuijzen, Maike, **Brian Beckage**, Patrick J. Clemins, Dave Higdon and Jonathan M. Winter. Robust bias-correction of precipitation extremes using a novel hybrid empirical quantile mapping method: advantages of a linear correction for extremes 2022. Theoretical and Applied Climatology. https://doi.org/10.1007/s00704-022-04035-2.

75. Asim Zia, Andrew W. Schroth, Jory S. Hecht, Peter Isles, Patrick J. Clemins, Scott Turnbull, Patrick Bitterman, Yushio Tsai, Ibrahim N. Mohammed, Gabriela Bucini, Elizbeth M.B. Doran, Christopher Koliba, Arne Bomblies, **Brian Beckage**, Jonathan Winter, Elizabeth C. Adair, Donna M. Rizzo, William Gibson, and George Pinder. 2022. Climate change-legacy phosphorus synergy hinders lake response to aggressive water policy targets. Earth's Future. https://doi.org/10.1029/2021EF002234.

74. Wiltshire, S. and **B. Beckage**. Estimating potential carbon sequestration through regenerative agriculture and afforestation in the U.S. state of Vermont. 2022. PLOS Climate. https://doi.org/10.1371/journal.pclm.0000021.

73. Moore, F. C., K. Lacasse, K. J. Mach, Y. A. Shin, L. J. Gross, and **B. Beckage**. Determinants of Emissions Pathways in the Coupled Climate-Social System. Nature. 2022. https://doi.org/10.1038/s41586-022-04423-8.

72. Pereira, L. M., D. R. Morrow, V. Aquila, **B. Beckage**, S. Beckbesinger, L. Beukes, H. J. Buck, C. J. Carlson, O. Geden, A. P. Jones, D. P. Keller, K. J. Mach, M. Mashigo, J. B. Moreno-Cruz, D. Visioni, S. Nicholson, and C. H. Trisos. 2021. From fAIrplay to climate wars: making climate change scenarios more dynamic, creative, and integrative. Ecology and Society 26(4):30. https://doi.org/10.5751/ES-12856-260430.

71. Hanrahan, J., J. Langlois, L. Cornell, H. Huang, J. Winter, P. Clemins, **B. Beckage**, and C. Bruyère. 2021. Examining the impacts of Great Lakes' temperature perturbations on simulated precipitation in the northeastern United States. Journal of Applied Meteorology and Climatology 60(7): 935-949. https://doi.org/10.1175/JAMC-D-20-0169.1.

70. Jebari, J., O. O. Táíwò, T. M. Andrews, V. Aquila, **B. Beckage,** M. Belaia, M. Clifford, J. Fuhrman, D. P. Keller, K. J. Mach, D. R. Morrow, K. T. Raimi, D. Visioni, S. Nicholson, C. H. Trisos. 2021. From moral hazard to risk-response feedback. Climate Risk Management, Volume 33: doi.org/10.1016/j.crm.2021.100324.

69. **Beckage, B.,** T. Buckley, and M. Beckage. 2021. Prevalence of mask wearing in northern Vermont in response to SARS-CoV-2. Public Health Reports: doi.org/10.1177/00333549211009496.

68. Hui, C., Richardson, D.M., Landi, P. Henintsoa O. Minoarivelo, H. E. Roy, G. Latombe, X. Jing, P. J. CaraDonna, D. Gravel, **B. Beckage** & J. Molofsky. 2021. Trait positions for elevated invasiveness in adaptive ecological networks. Biological Invasions. doi.org/10.1007/s10530-021-02484-w.

67. Holthuijzen, M., **B. Beckage**, P.J. Clemins, D. Higdon, and J. M. Winter. 2021. Constructing high-resolution, bias-corrected climate products: a comparison of methods. Journal of Applied Meteorology and Climatology. https://doi.org/10.1175/JAMC-D-20-0252.1.

66. **Beckage**, **B**., K. Lacasse, J. M. Winter, L. J. Gross, N. Fefferman, F. M. Hoffman, S. S. Metcalf, T. Franck, E. Carr, A. Zia, and A. Kinzig. 2020. The Earth has humans, so why don't our climate models? Climatic Change: https://doi.org/10.1007/s10584-020-02897-x

65. Braun, B., B. Taraktas, **B. Beckage**, J. Molofsky. 2020. Simulating phase transitions and control measures for network epidemics caused by infections with presymptomatic, asymptomatic, and symptomatic stages. PLOS One. https://doi.org/10.1371/journal.pone.0238412

64. Pugh, T. A. M., Rademacher, T., Shafer, S. L., Steinkamp, J., Barichivich, J., **Beckage**, **B.**, Haverd, V., Harper, A., Heinke, J., Nishina, K., Rammig, A., Sato, H., Arneth, A., Hantson, S., Hickler, T., Kautz, M., Quesada, B., Smith, B., and Thonicke, K. Understanding the uncertainty in global forest carbon turnover. 2020. Biogeosciences: 17, 3961–3989, https://doi.org/10.5194/bg-17-3961-2020.

63. Verrico, B.M., Weiland, J., Perkins, T.D., **Beckage, B.** and Keller, S.R., 2020. Long-term monitoring reveals forest tree community change driven by atmospheric sulphate pollution and contemporary climate change. Diversity and Distributions, 26(3), pp.270-283. https://doi.org/10.1111/ddi.13017

62. Huanping, H., J. M. Winter, E. C. Osterberg, J. Hanrahan, C. L. Bruyère, P. Clemins, and **B. Beckage.** 2020. Simulating precipitation and temperature in the Lake Champlain basin using a regional climate model: Limitations and uncertainties. Climate Dynamics. DOI 10.1007/s00382-019-04987-8

61. Clemins, P.J., Bucini, G., Winter, J.M., **Beckage, B.,** Towler, E., Betts, A., Cummings, R. and Chang Queiroz, H., 2019. An Analog Approach for Weather Estimation Using Climate Projections and Reanalysis Data. *Journal of Applied Meteorology and Climatology*, *58*(8), pp.1763-1777.

60. Fowler, N.L. and **B. Beckage**. 2019. Savannas of North America. Peer reviewed chapter in Herbivores and savanna plant communities, edited by P. Scogings. Wiley.

59. **Beckage**, **B.**, G. Bucini, L.J. Gross, W.J. Platt, S.I. Higgins, N.L. Fowler, M.G. Slocum, and C. Farrior. 2019. Water limitations, fire, and savanna persistence: A conceptual model. Peer reviewed chapter in Herbivores and savanna plant communities, edited by P. Scogings. Wiley.

58. Divíšek, J., Chytrý, M., **Beckage**, **B.**, Gotelli, N.J., Lososová, Z., Pyšek, P., Richardson, D.M. and Molofsky, J., 2018. Similarity of introduced plant species to native ones facilitates naturalization, but differences enhance invasion success. *Nature communications 9*(1): 4631.

57. **Beckage**, **B.**, L. J. Gross, K. Lacasse, E. Carr, S. Metcalf, J. Winter, P. Howe, N. Fefferman, T. Franck, A. Zia, A. Kinzig, and F. Hoffman. 2018. Linking models of human behavior and climate alters projected climate change. Nature Climate Change. https://doi.org/10.1038/s41558-017-0031-7.

56. Bucini, G., **B. Beckage**, and L. J. Gross. 2017. Climate seasonality, fire and global patterns of tree cover. Frontiers of Biogeography, 9(2). DOI 10.21425/F59233610.

55. Collins, A.R., **B. Beckage**, and J. Molofsky. 2017. Small scale genotypic richness stabilizes plot biomass and increases phenotypic variance in the invasive grass *Phalaris arundinacea*. Journal of Plant Ecology. DOI 10.1093/jpe/rtx056.

54. Huanping, H., J. M. Winter, E. C. Osterberg, R. M. Horton, **B. Beckage**. 2017. Total and extreme precipitation changes over the northeastern United States. J. Hydrometeor., 18, 1783–1798. https://doi.org/10.1175/JHM-D-16-0195.1

53. Bucini, G., **B. Beckage**, and L. J. Gross. 2017. Climate seasonality, fire and global patterns of tree cover. Frontiers of Biogeography, 9(2). DOI 10.21425/F59233610.

52. Zia, A., A. Bomblies, A. W. Schroth, C. Koliba, P. D. F. Isles, Y. Tsai, I. N. Mohammed, G. Bucini, P. J. Clemins, S. Turnbull, M. Rodgers, A. Hamed, **B. Beckage**, J. Winter, C. Adair, G. L. Galford, D. Rizzo and J. Van Houten. 2016. Coupled impacts of climate and land use change across a river–lake continuum: insights from an integrated assessment model of Lake Champlain's Missisquoi Basin, 2000–2040. Environmental Research Letters: 11(11): http://dx.doi.org/10.1088/1748-9326/11/11/114026

51. Platt, W. J., D. P. Ellair, J. M. Huffman, S. E. Potts, and **B. Beckage**. 2016. Pyrogenic fuels produced by savanna trees can engineer humid savannas. Ecological Monographs 86(3): 352-372.

50. Winter, J. M., **B. Beckage**, G. Bucini, R. M. Horton, and P. J. Clemins. 2016. Development and evaluation of high-resolution climate simulations over the mountainous northeastern United States. Journal of Hydrometeorology 17(3): 881-89

49. Tsai, Y., A. Zia, C. Koliba, J. Guilbert, G. Bucini, **B. Beckage**. 2015. Land Use Policy 49: 161-176. An Interactive land use transition agent-based model (ILUTABM): Endogenizing human-environment interactions at watershed scales.

48. Palacio-Lopez, K., **B. Beckage**, S. Scheiner and J. Molofsky. 2015. The ubiquity of phenotypic plasticity in plants: a synthesis. Ecology and Evolution. DOI: 10.1002/ece3.1603.

47. Guilbert, J., A. K. Betts, D. M. Rizzo, **B. Beckage**, and A. Bomblies. 2015. Characterization of increased persistence and intensity of precipitation in the Northeastern United States. Geophysical Research Letters. DOI: 10.1002/2015GL063124.

46. Betts, A.K., R. Desjardins, D. Worth and **B. Beckage**. 2014. Climate coupling between temperature, humidity, precipitation and cloud cover over the Canadian Prairies. J. Geophys. Res. Atmos., 119, doi:10.1002/2014JD022511.

45. A. Zia, S. Kauffman, C. Koliba, **B. Beckage**, G. Vattay, and A. Bomblies. 2014. From the habit of control to institutional enablement: Re-envisioning governance of social ecological systems from the perspective of complexity sciences. Complexity, Governance & Networks DOI: 10.7564/14-CGN4.

44. Guilbert, J., **B. Beckage**, J. M. Winter, R. M. Horton, T. Perkins, and A. Bomblies. 2014. Impacts of projected climate change over the Lake Champlain Basin in Vermont. Journal of Applied Meteorology and Climatology 53: 1861-1875.

43. Tang, G., **B. Beckage**, and B. Smith. 2014. Potential future dynamics of carbon fluxes and pools in New England forests and their climatic sensitivities: a model-based study**.** Global Biogeochemical Cycles 28(3): 286-299.

42. Tsai, Y., Zia, A., Koliba, C., Bucini, G., Guibert, J., and **Beckage**, **B.** 2013. Impacts of Land Managers' Decisions on Landuse Transition within Missisquoi Watershed Vermont: An Application of Agent-based Modeling System. *IEEE International Systems Conference,* Orlando, Florida. Peer-reviewed conference paper.

41. **Beckage**, **B.**, S. Kauffman, A. Zia, C. Koliba and L. Gross. 2013. More complex complexity: Exploring the nature of computational irreducibility across physical, biological, and human social systems. Peer reviewed book chapter in *Irreducibility and Computational Equivalence: 10 Years After the Publication of Wolfram's A New Kind of Science.* Springer Verlag.

40. Gross, L. and **B. Beckage**. 2012. Toward a metabolic scaling theory of crop systems. PNAS 109 (39): 15535-15536.

39. Eppinga, M. B., Pucko, C. A., Baudena, M., **Beckage, B.**, & Molofsky, J. 2012. A new method to infer vegetation boundary movement from 'snapshot'data. *Ecography*. 35: 001–014.

38. **Beckage**, **B.**, L. Gross, W. Platt, W. Godsoe, and D. Simberloff. 2012. Individual variation and weak neutrality as determinants of species diversity. Frontiers of Biogeography 3(4): 145-155.

37. Tang, G., **B. Beckage**, and B. Smith. 2012. The potential transient dynamics of forests in New England under historical and projected future climate change. Climatic Change DOI 10.1007/s10584-012-0404-x.

36. **Beckage**, **B.**, L. Gross, and S. Kauffman. 2011. The limits to prediction in ecological systems. Ecosphere 2(11):125. doi:10.1890/ES11-00211.1.

35. Pucko, C., **B. Beckage**, T. Perkins, and W. Keeton. 2011. Species shifts in response to climate change: Individual or shared responses? Journal of the Torrey Botanical Society 138(2): 156-176.

34. **Beckage**, **B.**, L. Gross, and W. Platt. 2011. Grass feedbacks on fire stabilize savannas. Ecological Modelling 222: 2227-2233.

33. Tang, G., **B. Beckage**, B. Smith, and P. Miller. 2010. Estimating potential forest NPP, biomass and their climatic sensitivity in New England using a dynamic ecosystem model. Ecosphere 1(6): 1-20 (Article 18).

32. Slocum, M.G., W.J. Platt, **B. Beckage**, S.L. Orzell, and W. Taylor. 2010. Accurate quantification of seasonal rainfall and associated climate-wildfire relationships. Journal of Applied Meteorology and Climatology 49: 2559-2573.

31. Slocum, M., **B. Beckage**, W. Platt, S. Orzell, and W. Taylor. 2010. Effect of climate on wildfire size: A cross-scale analysis. Ecosystems 13: 828-840.

30. Tang, G., and **B. Beckage**. 2010. Projecting the distribution of forests in New England in response to climate change. Diversity and Distributions 16: 144-158.

29. Stevens, J., and **B. Beckage**. 2010. Fire effects on demography of the invasive shrub Brazilian pepper (*Schinus terebinthifolius*) in Florida pine savannas. Natural Areas Journal 30: 53-63.

28. **Beckage**, **B.**, W. Platt, and L. Gross. 2009. Vegetation, fire and feedbacks: A disturbance-mediated model of savannas. The American Naturalist 174(6): 805-818.

27. Stevens, J., and **B. Beckage**. 2009. Fire feedbacks facilitate invasion of pine savannas by Brazilian pepper (*Schinus terebinthifolius*). New Phytologist 184: 365-375.

26. **Beckage**, **B.**, and C. Ellingwood. 2008. Fire feedbacks with vegetation and alternative stable states. Complex Systems 18: 159-173.

25. Gavin, D. G., **B. Beckage**, and B. Osborne. 2008. Forest dynamics and the growth decline of red spruce and sugar maple on Bolton Mountain, Vermont: A comparison of modeling methods. Canadian Journal of Forest Research 38(10): 2635-2649.

24. **Beckage**, **B.**, B. D. Kloeppel, J. A. Yeakley, S. F. Taylor, and D. C. Coleman. 2008. Differential effects of understory and overstory gaps on tree regeneration. Journal of the Torrey Botanical Society 135(1): 1-11.

23. **Beckage**, **B.**, B. Osborne, C. Pucko, D. G. Gavin, T. Siccama, and T. Perkins. 2008. An upward shift of a forest ecotone during 40 years of warming in the Green Mountains of Vermont, USA. Proceedings of the National Academy of Sciences 105(11): 4197-4202.

22. **Beckage**, **B.**, L. Joseph, P. Belisle, D. Wolfson, and B. Platt. 2007. Bayesian change-point analyses in ecology. New Phytologist 174: 456-467.

21. Slocum, M. G., W. J. Platt, **B. Beckage**, R. Panko, and J. B. Lushine. 2007. Decoupling natural and anthropogenic fire regimes: A case study in Everglades National Park. Natural Areas Journal 27: 41-55

20. *Battaglia, L. L., and **B. Beckage**. Large-Scale Disturbances and Ecological Communities in the Southeast US. White Paper, Department of Defense, Southeast Region Threatened, Endangered, and At-Risk Species (TER-S) Workshop, March 2007.

19. Platt, W. J., J. M. Huffman, M. G. Slocum and **B. Beckage**. 2006. Fire Regimes and Trees in Florida Dry Prairie Landscapes. Land of Fire and Water: The Florida Dry Prairie Ecosystem. Proceedings of the Florida Dry Prairie Conference. Reed F. Noss, Editor.

18. **Beckage**, **B.**, and L. J. Gross. 2006. Overyielding and species diversity: What should we expect? New Phytologist 172: 140-148.

17. **Beckage, B.,** L. J. Gross, and W. J. Platt. 2006. Modelling responses of pine savannas to climate change and large-scale disturbance. Applied Vegetation Science 9: 75-82

16. **Beckage**, **B.**, M. Lavine, and J. S. Clark. 2005. Survival of tree seedlings across space and time: estimates from long-term count data. Journal of Ecology 93: 1177-1184.

15. **Beckage**, **B.**, W. J. Platt, and B. Panko. 2005. A climate-based approach to the restoration of fire dependent ecosystems. Restoration Ecology 13: 429-431.

14. **Beckage**, **B.**, and J. S. Clark. 2005. Does predation contribute to tree diversity? Oecologia 143: 458-469.

13. **Beckage**, **B.**, J. Comiskey, and S. Duke-Sylvester. 2005. Natural fire regimes in southern Florida. Natural Areas Journal 25: 6-8.

12. Rock, J. H., **B. Beckage**, and L. J. Gross. 2004. Population Recovery following Differential Harvesting of *Allium tricoccum* Ait. in the Southern Appalachians. Biological Conservation 16: 227-234.

11. **Beckage**, **B.**, W. J. Platt, M. G. Slocum, and B. Panko. 2003. Influence of the El Niño-Southern Oscillation on fire regimes in the Florida Everglades. Ecology 84: 3124-3130.

10. **Beckage**, **B.** and J. S. Clark. 2003. Seedling survival and growth of three southern Appalachian forest tree species: the role of spatial heterogeneity. Ecology 84: 1849-1861.

9. **Beckage**, **B.**, and W. J. Platt. 2003. Predicting severe wildfire years in the Florida Everglades. Frontiers in Ecology and the Environment 1: 235-239.

8. HilleRisLambers, J., J. S. Clark, and **B. Beckage**. 2002. Density-dependent mortality and the latitudinal gradient in species diversity. Nature 417: 732-735.

7. Platt, W., **B. Beckage**, B. Doren, and H. Slater. 2002. Interactions of large-scale disturbances: prior fire regimes and hurricane-induced mortality of savanna pines. Ecology 83(6): 1566-1572.

6. Lavine, M., **B. Beckage**, and J. S. Clark. 2002. Statistical modeling of seedling mortality. Journal of Agricultural, Biological, and Environmental Statistics 7: 21-41.

5. Clark, J. S., **B. Beckage**, J. HilleRisLambers, I. Ibanez, S. LaDeau, J. MacLachlan, J. Mohan, and M. Rocca. 2001. The role of dispersal in plant migration. In *Encyclopedia of Global Environmental Change, Vol. 3.* H. A. Mooney and J. Canadell, editors.

4. **Beckage**, **B.**, J. S. Clark, B. Clinton, and B. Haines. 2000. A long-term study of tree seedling recruitment in Southern Appalachian forests: the effects of canopy gaps and shrub understories. Canadian Journal of Forest Research 30: 1617-1631.

3. **Beckage**, **B.**, and I. J. Stout. 2000. The effects of repeated burning on species richness in Florida sandhills: A test of the intermediate disturbance hypothesis. Journal of Vegetation Science 11: 113-122.

2. Clark, J. S., **B. Beckage**, P. Camill, B. Cleveland, J. HilleRisLambers, J. Lichter, J. MacLachlan, J. Mohan, and P. Wyckoff. 1999. Interpreting recruitment limitation in forests. American Journal of Botany 86: 1-16.

1. *__Beckage__, **B.** and W. S. Gain. 1995. Littoral vegetation. *in* "Water budgets, water quality, and analysis of nutrient loading of the winter park chain of lakes, Central Florida 1989-1992". G. G. Phelps and E. R. German. USGS Water Resources Investigations report 95-4108. Tallahassee, FL. 96pp.

GRANTS AND FELLOWSHIPS

Beckage, Brian (PI), Katherine Lacasse, Suzanne Lenhart, Charles Sims, and Karim Chichakly. April 2023. $999,978. NSF RAISE_IHBEM: Putting humans into the equation: Integrating social,behavioral, economic, & epidemiological models. Declined. Being revised for April 2024 submission.

Beckage, Brian (PI), Katherine Lacasse, Jonathan Winter, Asim Zia, and Kaitlin Raimi. 2022. $1, 599,453. NSF DISES: Integrating human behavior and spatial incoherence of emissions and impacts into Earth system dynamics. Declined. Being revised for Nov 2023 submission.

Beckage, Brian (PI). $25,474. 2024. Modeling the direct and indirect effects of wildfires on climate change. Vermont Space Grant Consortium (VTSGC) Small Scale Grant Program and Vermont NASA EPSCoR.

Beckage, Brian (PI). $24,663. 2022. Integrating human behavior and spatial incoherence of greenhouse gas emissions and climate impacts into Earth system dynamics. Vermont Space Grant Consortium (VTSGC) Small Scale Grant Program and Vermont NASA EPSCoR.

Beckage, Brian (PI), Asim Zia, Jon Erikson, Deb Neher, Joshua Faulkner. $50,000. 2022. Using a systems perspective to build a sustainable food and agricultural system for Vermont. Food Systems Research Center Sustainability Metrics Planning Grant.

Beckage, Brian (PI). $24,663. 2022. Integrating human behavior and spatial incoherence of greenhouse gas emissions and climate impacts into Earth system dynamics. Vermont Space Grant Consortium (VTSGC) Small Scale Grant Program and Vermont NASA EPSCoR.

Beckage, Brian (PI), and Harold Eyster. Assessment of the co-benefits between Nature-based Climate Solutions and migratory birds in urban landscapes. Environment and Climate Change Canada $80,002. December 2022 to March 2023

Beckage, B. (PI), Daniele Visioni, Katherine Lacasse, and Kaitlin Raimi. Integrating solar radiation management into coupled models of the human and climate systems**.** Resources for the Future nonprofit research institution. $10,000 honorarium. Feb 2022 to Nov 2022.

Beckage, B. (PD). USDA Hatch. $107,500. A system dynamics approach to modeling payment for ecosystem services in agricultural landscapes. Oct 2020 to Sep 2025.

Beckage, B. (PI), and K. Lacasse. Putting people into climate models: A multi-model approach to integrating human behavior and climate change. Working group and postdoctoral associate supported by SESYNC synthesis center. Funds held by synthesis centers: $250,000. Sep 2019-Sep 2022.

Beckage, B. (Climate team leader). NSF EPSCoR grant: Basin resilience to extreme events (BREE). $20,000,000. 2016 to 2021.

Beckage, B. (PD). USDA Hatch. $107,500. Uncertainty in climate change projections and forecasting the future of Vermont forests. Oct 2015 to Sep 2020.

Beckage, B. (Climate team leader). NSF EPSCoR grant: Adaptation to Climate Change in the Champlain Basin: New understanding through complex systems. $20,000,000. 2011-2016.

Beckage, B. (PI), L. Gross, and A. Zia. Integrating Human Risk Perception of Global Climate Change into Dynamic Earth System Models. Working group jointly supported by SESYNC and NIMBioS synthesis centers. Funds held by synthesis centers: $200,000. June 2013-Jan 2017.

Beckage, B. (PI). NSF (Award 0950347). $355,000. Linking models to data to investigate patterns and process in savannas. May 2010-Aug 2015.

Beckage, B. (PI). National Institute for Mathematical and Biological Synthesis. $26,900. Using models to investigate patterns, process, and climate change in savannas. Sabbatical fellowship. Jan 2010 to Jul 2010.

Beckage, B. (PI). DOE NICCR. $310,048. Using historical change to predict future distribution of high elevation forests in northern New England. Apr 2008 to Apr 2011.

Beckage, B. (PI). Vermont EPSCoR. $49,894. Investigating the dynamics of savanna communities through computer simulation. Jan 2008 to Jul 2009.

Beckage, B. (PD). USDA Hatch. $60,000. Historical change and functional control of montane forest distribution in northern New England. Oct 2007 to Oct 2010.

Beckage, B. (PI). NSF (DEB 0606801). $50,000. Linking Landscape models of fire, vegetation, and global climate change in the Florida Everglades. Apr 2006 to Apr 2008.

Platt, W. J., M. Slocum, and B. **Beckage**. (Co-PI). DOD. $552,247. Landscape fire models for the Avon Park Air Force Range. Sep 2004 to Sep 2009.

Beckage, B. (PD). USDA NRI (05-02250). $100,000. Brazilian pepper, fire and the invasibility of pinelands: exploring nonlinear effects through simulation. Oct 2005 to Oct 2009.

Beckage, B. USDA Hatch. (PD). $60,000. Impact of global climate change on forests in the Green Mountains of Vermont. Oct 2004 to Oct 2007.

Beckage, B. (PI). $100,000. Modeling the effects of hurricane and fire disturbances on the population dynamics of south Florida slash pine. NSF Postdoctoral Research Fellowship in Biological Informatics (DBI 0107553). Jan 2002 to Jan 2004.

Beckage, B. (PI) and W. J. Platt. $150,000. The effects of hurricane-fire interactions on the population dynamics of South Florida Slash Pine. National Park Foundation and Andrew W. Mellon Foundation Research Grant. Jan 2001-Jan 2004.

PROGRAMMING LANGUAGES

R statistical programming language. (Expert)

Wolfram language (Mathematica). (Expert)

Python. (Proficient)

NetLogo (Expert)

Stella (Expert)

TEACHING

HCOL 2000 (undergraduate) Complexity, climate change, and human systems, University of Vermont.

PBIO 3750 (undegraduate) & PBIO 5750 (graduate) Climate change ecology, University of Vermont.

PBIO 3940 (undegraduate) & PBIO 5940 (graduate) Ecological modeling, University of Vermont.

PBIO 6940 (graduate) Data modeling for the environmental sciences, University of Vermont.

WORKSHOPS, SYMPOSIA, PROFESSIONAL SERVICE, AND SYNTHETIC ACTIVITIES

USDA National Climate Change Roadmap Expert Group. May - June 2023. Provided guidance to USDA in establishing climate change research priorities.

Invited keynote speaker, LOOPS-5 Workshop on Conceptualizing and Navigating Earth Resilience in the Anthropocene, Stockholm Resilience Centre, Stockholm, Sweden. March 2023. All expenses covered by the Stockholm Resilience Centre for an in person presentation.

Invited by Nature Human Behaviour to provide a review paper on incorporating human behavior into climate models. June 2022.

Invited keynote speaker, Linking Human and Earth System Models for Global Change Analysis, workshop at Aspen Climate Change Institute. July 2021.

Mathematics of Human Environmental Systems, Banff International Research Station for Mathematical Innovation and Discovery, January 2021.

Symposium co-organizer and presenter, Theory in Ecology: Adding Humans to the Equations, Ecological Society of American, Louisville, KY, August 2019.

Workshop co-organizer and presenter, Ecology and the Data Science Bandwagon: Broadening Undergraduate Quantitative Education, Ecological Society of American, Louisville, KY, August 2019.

Participant, August 2019, 30 years of complexity, Santa Fe Institute, August 2019

Invited Participant, Regulating for the Seventh Generation: Tribal Nations and Environmental Law. University of Connecticut, School of Law. Oct 2018.

Participant, System Dynamics Society, Iceland, August 2018.

Workshop leader, Current Issues in Statistical Ecology, NIMBioS, University of Tennessee, 15-17 May 2015.

Short-term visitor, National Institute for Mathematical and Biological Synthesis. University of Tennessee. July 2014, November 2013, August 2013, August 2012. Collaborated with scientific staff on modeling projects.

Participant. Python programming for scientists and engineers. Enthought, Austin, TX. September, 2013.
Participant. Complex networks. Sante Fe Institute. September, 2013.
Participant. Quantitative evaluation of downscaled data. National Center for Atmospheric Research, Boulder, CO. August, 2013.
Participant. Workshop on Weather Research and Forecasting model. National Center for Atmospheric Research, Boulder, CO. July 2013.
Organizer. Working group meeting, Annapolis, MD, SESYNC. June 2013.
Participant. Advanced programing in R. Brigham Young University, Summer Institute of Applied Statistics. June 2013.
Speaker and organizer. Introduction to Bayesian Data Analysis. The International Biogeography Society Annual Meeting. Miami, 2013.
Participant. PALEON meeting, University of California, Berkeley. December 2012.
Short-term visitor, National Institute for Mathematical and Biological Synthesis. University of Tennessee. July, 2012.
Panelist, NSF Population and Community Ecology, Spring 2011.
Speaker and symposium organizer: Theory and dynamics of savanna systems. ESA, August 2011.
Speaker in symposium: Static and dynamic approaches to modelling diversity and complexity. ISEM, October 2009.
Handling Editor, Oecologia, 2008-2010.
Panelist, NSF DDIG, Spring 2007.
Speaker and symposium organizer: Forecasting future ecosystem states in a time of global change: from models to management. ESA, August 2008.
Speaker in symposium: Design and analysis of multi-factor experiments. ESA, August 2006
Speaker in workshop: Application of paleoecological information to restoration and management of the Everglades ecosystem. Greater Everglades Ecosystem Restoration Conference, June 2006.
Speaker in workshop on uncertainty in ecology, Mathematical Biosciences Institute, Ohio State University, April 2006
Participant in workshop on spatial ecology, University of Miami, January 2005
Secretary, Statistical Section of ESA, 2004-2006;
Speaker in symposium: Pine savannas and the role of disturbance in a time of global change. ESA, August 2003
Participant in working group: A new synthesis of demography and dispersal, National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara. Fall 2001 and Spring 2002.

UNIVERSITY LEADERSHIP

Executive Council, Faculty Senate University of Vermont. 2 terms.

Graduate Executive Committee, University of Vermont. 1 term.

Professional Standards Committee, University of Vermont. 1 term.

Incentive Based Budget Committee, United Academics, University of Vermont. 1 term.

Executive Council, United Academics, University of Vermont. 1 term.

Delegates Assembly, United Academics, University of Vermont. 2 terms.

RESEARCH LEADERSHIP

Working group leader, Resources for the Future. Integrating solar radiation management into coupled models of the human and climate systems. Led team of 4 researchers. 2022 to 2024.

Working group leader, Socio-Environmental Synthesis Center (SESYNC). Putting people into climate models: A multi-model approach to integrating human behavior and climate change. Led team of 10-12 researchers. 2019 to 2022.

Science leader, Climate Team, NSF EPSCOR project: Basin resilience to extreme events (BREE). Supervised a small team (5-8) of researchers. 2016 to 2021

Working group leader, National Institute for Mathematical and Biological Synthesis (NIMBioS) and the Socio-Environmental Synthesis Center (SESYNC). Integrating Human Risk Perception of Global Climate Change into Dynamic Earth System Models. Led team of 10-12 researchers. 2013 to 2017.

Science leader, Climate Team, NSF EPSCOR project: Adaptation to Climate Change in the Champlain Basin: New understanding through complex systems. Supervised a small team (5-8) of researchers. 2011 to 2016