

SHARON A. BILLINGS

DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY, KANSAS BIOLOGICAL SURVEY
UNIVERSITY OF KANSAS, LAWRENCE KS 66047; 785-864-1560, *sharonb@ku.edu*

EDUCATION

- Ph.D. 1998. Duke University Nicholas School of the Environment, Durham, NC.
M.S. 1996. Duke University Nicholas School of the Environment, Durham, NC.
B.A. 1991. University of New Hampshire, Durham, NH, *Summa cum laude*.
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ACADEMIC POSITIONS

- Associate Chair, Graduate Program*, Dept. of Ecology and Evolutionary Biology, KU. 2012-present.
Associate Professor/Associate Scientist, Dept. of Ecology and Evolutionary Biology, Kansas Biological Survey, KU. 2009–present.
Visiting Scientist, Earth Sciences Department, Memorial U. of Newfoundland. 2011.
Graduate Admissions Director, Dept. of Ecology and Evolutionary Biology, KU. 2009-2011.
Assistant Professor/Assistant Scientist, Dept. of Ecology and Evolutionary Biology, KBS, KU. 2003–2009.
Research Assistant Professor, Dept. of Biological Sciences, U. Arkansas. 2002–2003.
Post-Doctoral Scholar, U. Arkansas Stable Isotope Laboratory. 1999–2002.
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FELLOWSHIPS AND SCHOLARSHIPS

- NASA Earth System Science Graduate Fellowship. 1995–1998
Governor's Success Full Tuition Scholarship, University of New Hampshire. 1987–1991
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RESEARCH FOCUS

My research characterizes the features governing nitrogen, carbon, and water fluxes in terrestrial ecosystems, and how these dynamics are influenced by environmental change. I focus on global-scale perturbations (*e.g.*, changed precipitation patterns and temperature regimes, elevated carbon dioxide, altered nitrogen availability) in an effort to predict how Earth's biogeochemical cycles – and their dependencies on each other – will function in the future. Such work is critical for understanding the atmospheric composition and ecosystem production of our planet.

PUBLICATIONS

(* indicates invited, italics indicate students or post-docs working under my supervision)

45. Richter, D.deB, Bacon, A.R., **Billings, S.A.**, Binkley, D., Buford, M., Callahan, M.A., Curry, A.E., Fimmen, R.L., Grandy, A.S., Heine, P.R., Hofmockel, M., Jackson, J.A., Lemaster, E., Li, J.W., Markewitz, D., Mobley, M.L., Morrison, M.W., Strickland, M.S.,

- Waldrop, T., and Wells, C.G. 2014. Evolution of Soil, Ecosystem, and Critical Zone Research at the Calhoun Experimental Forest, in Hayes, D.C., Stout, S., Hoover, A., and Crawford, R. *Research for the Long-Term: The interplay of societal need and research on USDA Forest Service Experimental Forests and Ranges*. Springer Verlag, NY.
44. Greenfield, L.G., Gregorich, E.G., van Kessel, C., Baldock, J.A., Beare, M.H., **Billings, S.A.**, Clinton, P.W., Condon, L.M., Hill, S., Hopkins, D.W., Janzen, H.H. 2013. Acid hydrolysis to define a biologically-resistant pool is compromised by carbon loss and transformation. *Soil Biology and Biochemistry* 64:122-126.
43. Ziegler, S.E., **Billings, S.A.**, Lane, C.S., Li, J., Fogel, M.L. 2013. Warming alters routing of labile and slower-turnover carbon through distinct microbial groups in boreal forest organic soils. *Soil Biology and Biochemistry* 60:23-32.
42. Lehmeier, C.A., Min, K., Niehues, N.D., Ballantyne IV, F., **Billings, S.A.** 2013. Temperature-mediated changes of exoenzyme-substrate reaction rates and their consequences for the carbon to nitrogen flow ratio of liberated resources. *Soil Biology and Biochemistry* 57:374-382.
41. **Billings, S.A.**, Ballantyne IV, F. 2013. How interactions between microbial resource demands, soil organic matter stoichiometry, and substrate reactivity determine the direction and magnitude of soil respiratory responses to warming. *Global Change Biology* doi:10.1111/gcb.12029.
40. **Billings, S.A.**, Ziegler, S.E., Schlesinger, W.H., Benner, R., Richter, D.deB. 2012. Predicting carbon cycle feedbacks to climate: Integrating the right tools for the job. *Eos* 93:188-189.
39. Li, J., Ziegler, S.E., Lane, C., **Billings, S.A.** 2012. Warming-enhanced preferential mineralization of humified boreal forest soil organic matter: Interpretation of soil profiles along a climate transect using laboratory incubations. *Journal of Geophysical Research – Biogeosciences* 117, G02008, doi:10.1029/2011JG001769.
38. Tiemann, L.K., **Billings, S.A.** 2012. Tracking C and N flows through microbial biomass with increased soil moisture variability. *Soil Biology and Biochemistry* 49:11-22.
37. *Grandy, A.S., Fraterrigo, J.M., **Billings, S.A.** 2012. Soil ecosystem resilience and recovery, in Wall, D.H., Bardgett, R.D., Behan-Pelletier, V., Herrick, J.E., Jones, H., Ritz, K., Six, J., Strong, D.R., and van der Putten, W.H. *Soil Ecology and Ecosystem Services*. Oxford University Press, UK.
36. *Richter, D.deB. Bacon, A.R., Mobley, M.L., Richardson, C.J., Andrews, S.S., West, L., Wills, S., **Billings, S.A.**, and 26 others. 2011. Human-soil relations are changing rapidly: Proposals from SSSA's cross-divisional soil change working group. *Soil Science Society of America Journal* 75:1-6.
35. ***Billings, S.A.**, Phillips, N. 2011. Forest biogeochemistry and drought. In: Levia, D.F., Carlyle-Moses, D.E. and Tanaka, T. (Eds.), *Forest Hydrology and Biogeochemistry: Synthesis of Past Research and Future Directions*. Ecological Studies Series, No. 216, Springer-Verlag, Heidelberg, Germany, pp. 581-597.
34. Tiemann, L.K., **Billings, S.A.** 2011. Changes in variability of soil moisture alter microbial community C and N resource use. *Soil Biology and Biochemistry* 43:1837-1847.
33. Drake, J., Gallet-Budynek, A. Hofmockel, K. Bernhardt, E. **Billings, S.A.**, Jackson, R. Johnsen, K., Lichter, J., Phillips, R., McCarthy, H., Moore, D., McCormack, M.L. Palmroth,

- S. Oren, R., Phippen, J., Pritchard, S., Treseder, K., Schlesinger, W., DeLucia, E., Finzi, A. 2011. Increases in the flux of carbon belowground stimulate nitrogen uptake and sustain the long-term enhancement of forest productivity under elevated CO₂. *Ecology Letters* 14:349-357, doi: 10.1111/j.1461-0248.2011.01593.x.
32. Tiemann, L.K., **Billings, S.A.** 2011. Indirect effects of nitrogen amendments on organic substrate quality increase enzymatic activity driving decomposition in a mesic grassland. *Ecosystems* 14:234-247, doi:10.1007/s10021-010-9406-6.
 31. Ziegler, S.E., **Billings, S.A.** 2011. Soil nitrogen status as a regulator of carbon substrate flows through microbial communities with elevated CO₂. *Journal of Geophysical Research – Biogeosciences* 116, G01011, doi:10.1029/2010JG001434.
 30. Grandy, A.S., **Billings, S.A.**, Richter, de B.D. 2010. Saving our soils. *Frontiers in Ecology and the Environment* 8:171.
 29. **Billings, S.A.**, Buddemeier, R.W., Richter, de B.D., van Oost, K., Bohling, G. 2010. A simple method for estimating the influence of eroding soil profiles on atmospheric CO₂. *Global Biogeochemical Cycles* Vol. 24, GB2001, doi:10.1029/2009GB003560.
 28. **Billings, S.A.**, Lichter, J., Ziegler, S.E., Hungate, B.A., Richter, de B.D. 2010. A call to investigate drivers of soil organic matter retention vs. mineralization in a high CO₂ world. *Soil Biology and Biochemistry* 42:665-668. [Featured on the Institute of Physics Environmental Research Web (<http://environmentalresearchweb.org/>) March 25, 2010.]
 27. Smith, V., Sturm, B.S.M., deNoyelles, F.J., **Billings, S.A.** 2010. The ecology of algal biodiesel production. *Trends in Ecology and Evolution* 25:301-309, doi:10.1016/j.tree.2009.11.007.
 26. Goedhart, C.M., Pataki, D.E., **Billings, S.A.** 2010. Seasonal variations in plant nitrogen relations and photosynthesis along a grassland to shrubland gradient in Owens Valley, California. *Plant and Soil* 327:213-223.
 25. York, H.A., **Billings, S.A.** 2009. Stable-isotope analysis of diet in the short-tailed fruit bats (Chiroptera: Phyllostomidae: *Carollia*). *Journal of Mammalogy* 90:1469-1477.
 24. **Billings, S.A.** 2008. Biogeochemistry: Nitrous oxide in flux. *Nature* 456:888.
 23. **Billings, S.A.**, Richter, D. 2008. The science of global soil change: Networking for our future. *Eos: Transactions of the American Geophysical Union* 89:151.
 22. Richter, D., **Billings, S.A.** 2008. Strengthening the world's long-term soil research base. *International Union of Soil Scientists Bulletin* 112:10-12.
 21. Lichter, J., **Billings, S.A.**, Ziegler, S.E., Gaindh, D., Ryals, R., Finzi, A.C., Jackson, R.B., Stemmler, E.A., Schlesinger, W.H. 2008. Soil carbon sequestration in a pine forest after nine years of atmospheric CO₂ enrichment. *Global Change Biology* 14:2910-2922. [Selected as a research highlight by *Nature Reports Climate Change* 3:2.]
 20. Pataki, D.E., **Billings, S.A.**, Naumburg, E., Goedhart, C.M. 2008. Water sources and nitrogen relations of grasses and shrubs in phreatophytic communities of the Great Basin Desert. *Journal of Arid Environments* 72:1581–1593.
 19. Tiemann, L., **Billings, S.A.** 2008. Carbon controls on nitrous oxide production with changes in substrate availability in a North American grassland. *Soil Science* 173:332–341.

18. Bijoor, N.S., Czimeczik, C., Pataki, D., **Billings, S.A.** 2008. The effects of temperature and fertilization on nitrogen cycling and community composition of an urban lawn. *Global Change Biology* 14:2119–2131. [Selected as a research highlight by *Nature* 454:670.]
17. **Billings, S.A.**, Ziegler, S.E. 2008. Altered patterns of soil carbon substrate usage and heterotrophic respiration in a pine forest with elevated CO₂ and N fertilization. *Global Change Biology* 14:1–12.
16. Haavik, L., Stephen, F., Fierke, M., Salisbury, V., Leavitt, S., **Billings, S.A.** 2008. Dendrochronological parameters of northern red oak (*Quercus rubra* Fagaceae) infested with red oak borer (*Enapholodes rufulus* (Haldeman) (Coleoptera: Cerambycidae)). *Forest Ecology and Management* 255:1501–1509.
15. **Billings, S.A.**, Gaydoss, E. 2008. Soil nitrogen and carbon dynamics in a fragmented landscape experiencing forest succession. *Landscape Ecology* 23:581–593.
14. Schaeffer, S.M., **Billings, S.A.**, Evans, R.D. 2007. Laboratory incubations reveal potential responses of soil nitrogen cycling to changes in soil C and N availability in Mojave Desert soils exposed to elevated atmospheric CO₂. *Global Change Biology* 13:854–865. [DOI 10.1111/j.1365-2486.2007.01324.x]
13. **Billings, S.A.** 2006. Soil organic matter dynamics and land use change at a grassland/forest ecotone. *Soil Biology and Biochemistry* 38:2934–2943.
12. **Billings, S.A.**, Richter, D.D. 2006. Changes in stable isotopic signatures of soil nitrogen and carbon during forty years of forest development. *Oecologia* 148: 325–333. [DOI 10.1007/s00442-006-0366-7]
11. **Billings, S.A.**, Brewer, C.M., Foster, B. 2006. Incorporation of plant residues into soil organic matter fractions with grassland management practices in the North American Midwest. *Ecosystems* 9:805–815 DOI: 10.1007/s10021-006-0080-7.
10. **Billings, S.A.**, Ziegler S. 2005. Linking microbial activity and soil organic matter transformations in forest soils under elevated CO₂. *Global Change Biology* 11:203–212.
9. **Billings, S.A.**, Schaeffer, S.M., Evans, R.D. 2004. Soil microbial activity and N availability with elevated CO₂ in Mojave Desert soils. *Global Biogeochemical Cycles* 18:GB1011. [DOI:10.1029/2003GB002137]
8. **Billings, S.A.**, Zitzer, S., Weatherley, H., Schaeffer, S.M., Charlet, T., Arnone, J., Evans, R.D. 2003. Effects of elevated CO₂ on green tissue and litter quality in an intact Mojave Desert ecosystem. *Global Change Biology* 5:729–735.
7. **Billings, S.A.**, Schaeffer, S.M., Evans, R.D. 2003. Nitrogen fixation by biological soil crusts and free-living bacteria in an intact Mojave Desert ecosystem with elevated CO₂ and added soil carbon. *Soil Biology and Biochemistry* 35:643–649.
6. Schaeffer, S.M., **Billings, S.A.**, Evans, R.D. 2003. Responses of nitrogen dynamics in an intact Mojave Desert ecosystem to manipulations in soil carbon and nitrogen availability. *Oecologia* 134:547–553.
5. **Billings, S.A.**, Schaeffer, S.M., Zitzer, S., Evans, R.D. 2003. Trace N gas losses and N mineralization in an intact Mojave Desert ecosystem with elevated CO₂. *Soil Biology and Biochemistry* 34:1777–1784.

4. **Billings, S.A.**, Schaeffer, S.M., Zitzer, S., Charlet, T., Smith, S.D., Evans, R.D. 2002. Alterations of nitrogen dynamics under elevated CO₂ in an intact Mojave Desert ecosystem: evidence from δ¹⁵N. *Oecologia* 131:463–467.
 3. Yarie, J., **Billings, S.** 2002. Carbon balance of the taiga forest within Alaska: present and future. *Canadian Journal of Forest Research* 32:757–767.
 2. **Billings, S.A.**, Richter, D., Yarie, J. 2000. Sensitivity of soil methane fluxes to an altered precipitation regime in boreal forest soils. *Soil Biology and Biochemistry* 32:1431–1441.
 1. **Billings, S.A.**, Richter, D., Yarie, J. 1998. Soil carbon dioxide fluxes and profile concentrations in two boreal forests. *Canadian Journal of Forest Research* 28:1773–1783.
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EXTERNAL FUNDING

1. Asking tough questions about intensive soil management. Co-PI with D. Richter, Duke U. PI. Wallace Genetic Foundation. 2012–2013.
2. ETBC: Temperature sensitivity of substrate decomposition from enzymes to microbial communities. PI with F. Ballantyne, co-PI. NSF Ecosystems. 2010–2013.
3. Soil carbon dynamics with climate change in boreal forests of Newfoundland and Labrador. PI. Canadian Provincial Funds, Humber River Basin Project with in-kind support from Canadian Forest Service. 2009–2012.
4. Facilities to enhance research and teaching at the University of Kansas Field Station. PI with D. Kettle, B. Foster. NSF Field Stations and Marine Laboratories. 2011–2014.
5. Purchase of a cyber-enhanced regional 500 MHz solid-state NMR spectrometer. Co-PI with Dr. Joseph Heppert (PI), and Drs. Gary Meints, Eric Munson, and Jeffrey White (co-PIs, KU). NSF Chemical Instrumentation Program. 2009–2013.
6. Dissertation research: Beyond the black box: Understanding the relationship between microbial community structure and function under environmental stress and disturbance. PI with Lisa Tiemann, Ph.D. student. NSF DDIG. 2009–2011.
7. Soil carbon dynamics with climate change in boreal forests of Newfoundland and Labrador. PI. Canadian Provincial Funds, Humber River Basin Project with in-kind support from Canadian Forest Service. 2008–2009.
8. Assessing predisposition to red oak borer-induced oak mortality using dendrochronological techniques. PI. Department of Agriculture, US Forest Service. 2006–2009.
9. Ecoforecasting ecological change: Causes, trajectories and consequences of environmental change in the Central Plains. Co-leader of Biogeochemistry section. National Science Foundation EPSCoR. 2006–2009.
10. Enhancement of research and education facilities at the University of Kansas Field Station. Co-PI. NSF Field Stations and Marine Laboratories. 2005–2008.
11. Linking microbial activity and soil organic matter transformations in forest soils under elevated CO₂. PI. Department of Energy, National Institute for Global Environmental Change. 2005–2007.

12. Fragmented woody plant invasions in grass ecosystems and soil carbon and nitrogen cycling.
 PI. National Science Foundation EPSCoR First Award. 2004–2005.

INVITED TALKS, SEMINARS, AND WORKSHOP CONTRIBUTIONS

- 2013 Newfoundland and Labrador Boreal Ecosystem Latitudinal Transect workshop on soil organic matter dynamics and climate change, Memorial University of Newfoundland
- 2012 European Cooperation in Science and Technology (COST) Terrabites workshop on Dynamic Global Soil Modeling, University of Cordoba, Spain
 Soil Organic Matter 5, Ascona, Switzerland
- 2011 Department of Biology, Memorial University of Newfoundland
- 2010 Newfoundland-Labrador Boreal Ecosystem Latitudinal Transect development workshop, Canadian Forest Service, Corner Brook, Newfoundland
 Future Geochemical Research directions workshop at Carnegie Institute of Washington
- 2009 Long-term Soil Experiments workshop on Global Soil Change, Duke U.
 Ecology, Evolution, and Organismal Biology Dept., Iowa State U.
 Dept. of Biological Sciences, Emporia State U.
 North American Carbon Program meeting, Colorado Springs, Colorado
- 2008 Humber River Basin Project conference, Canadian Forest Service and Memorial U. of Newfoundland
- 2007 School of Forest Resources and Environmental Science, Michigan Technological U.
 Duke Forest Free-Air Carbon Enrichment Belowground Synthesis workgroup, Duke U.
 Long-term Soil Experiments conference for Global Soil Change, Duke U.
 Soil Carbon Erosion workshop, Kansas Geological Survey, Lawrence, KS
 North American Carbon Program meeting, Colorado Springs, Colorado
- 2006 International Union of Forest Researchers' Organization (IUFRO) Canopy Processes traveling meeting (invited to co-convene)
- 2005 Evolutionists' Club, U. Kansas
 Dept. of Biology, U. Arkansas
 Duke Forest Free-Air Carbon Enrichment workshop, Duke U.
 Geology Dept., U. Kansas
 National Ecological Observatory Network (NEON) meeting for Central Plains researchers, U. Oklahoma
 Biosphere-Atmosphere Stable Isotope Network (BASIN) workshop, Tucson, AZ
- 2004 University of Kansas Field Station, U. Kansas
 Environmental Science Dept., Haskell Indian Nations U.
- 2003 Dept. of Biology, Kansas State U.

Dept. of Ecology and Evolutionary Biology, U. Kansas
 School of Biological Sciences, Washington State U.
 2002 South Dakota School of Mines and Technology
 2001 Antioch New England Graduate School
 School of Forest Resources and Environmental Science, Michigan Technological U.
 1999 Dept. of Biology, U. Arkansas
 The Woods Hole Research Center, Woods Hole, MA

PRESENTATIONS AT CONFERENCES

(* indicates invited, italics indicate students or post-docs working under my supervision)

- ***Billings, S.A.**, Ziegler, S.E. 2013. Soil organic matter feedbacks to climate: NL-BELT as a model system. Workshop on the Newfoundland and Labrador Boreal Ecosystem Latitudinal Transect, St. John's, Newfoundland, Canada.
- ***Billings, S.A.**, Ziegler, S.E. 2012. Nitrogen status and temperature as drivers of SOM decay, fate, and formation. Annual meeting of the American Geophysical Union, San Francisco, CA.
- Ziegler, S.E., **Billings, S.A.**, Lane, C.S., *Li, J.*, Fogel, M.L. 2012. Warming alters microbial routing of labile and slower-turnover carbon in boreal forest organic soils. Annual meeting of the American Geophysical Union, San Francisco, CA.
- Min, K.*, Lehmeier, C., Tatarko, A., Ballantyne, F., **Billings, S.A.** 2012. Temperature sensitivity of organic substrate decay varies with pH. Annual meeting of the American Geophysical Union, San Francisco, CA.
- Lehmeier, C.*, *Min, K.*, Felton, R., Song, C., Shinogle, H., Ballantyne, F., **Billings, S.A.** 2012. Temperature effects on microbial carbon use efficiency and $\delta^{13}\text{C}$ of respired CO_2 : Assessment with continuous culture and CO_2 -exchange techniques. Annual meeting of the American Geophysical Union, San Francisco, CA.
- ***Billings, S.A.**, Ziegler, S.E., Ballantyne IV, F., *Lehmeier, C.A.*, *Li, J.*, Lane C. 2012. Soil warming consequences across timescales: from enzyme kinetics to biogeochemical indicators. Bi-annual meeting of Soil Organic Matter 5 (SOM5), Ascona, Switzerland.
- Laganière, J., **Billings, S.A.**, Edwards, K., Ziegler, S.E. 2012. Elemental and isotopic composition of boreal forest SOM reservoirs along a climate transect: Indicators of enhanced SOM decay rates with warming. Annual meeting of the Canadian Soil Science Society, Québec City, Québec.
- Mobley, M.L., Richter, D.deB., Heine, P.R., **Billings, S.A.** 2011. Soil carbon change during fifty years of old-field forest development. Oosting Ecology Seminar, Duke University, Durham, NC.
- Li, J.*, Ziegler, S., **Billings, S.A.** (2011). Interaction of organic N availability and warming on microbial mineralization of labile and slow turnover organic matter in two boreal forest soils. Annual meeting of the American Geophysical Union, San Francisco, CA.
- Lehmeier, C.*, Niehues, N., Ballantyne, F., **Billings, S.A.** (2011) Temperature sensitivity of three substrate-enzyme reactions of soil-ecological significance. Annual meeting of the American Geophysical Union, San Francisco, CA.

- Sonderegger, D., Koyama, A., Jin, V., **Billings, S.A.**, Ogle, K., Evans, R.D. (2011) Leaf $\delta^{15}\text{N}$ as a temporal integrator of nitrogen-cycling processes at the Mojave Desert FACE experiment. Annual meeting of the American Geophysical Union, San Francisco, CA.
- Reed, A.S., Stephen, F.M., **Billings, S.A.** (2011) To live or to die? Evidence of variable drivers of wood $\delta^{13}\text{C}$ reveal different responses to disturbance in co-occurring oaks. Annual meeting of the American Geophysical Union, San Francisco, CA.
- ***Billings, S.A.**, Ziegler, S.E., *Li, J.*, Lane, C. (2011) Nitrogen as a mediator of SOM decomposition in a changing climate: Linking microbial ecology, organic geochemistry, and stable isotopes. Annual meeting of the Ecological Society of America Meeting, Austin, TX.
- Li, J.*, Ziegler, S.E., **Billings, S.A.** (2011) Extracellular enzyme expression and mineralization of humified soil organic matter with warming along a boreal climate transect. Enzymes in the Environment: Ecology, Activity and Applications Conference, Bad Nauheim, Germany.
- ***Billings, S.A.**, *Li, J.*, Ziegler, S.E., Lane, C. (2011) Linking biogeochemical time scales to understand boreal soil responses to climate change. Humber River Basin Project annual networking conference, Corner Brook, Newfoundland, Canada.
- *Ziegler, S.E., Lane, C., **Billings, S.A.**, *Li, J.* (2011) Linking aquatic and terrestrial biogeochemistry to assess the impact of climate warming on boreal carbon reservoirs. Humber River Basin Project annual networking conference, Corner Brook, Newfoundland, Canada.
- Li, J.*, Ziegler, S.E., Lane, C., **Billings, S.A.** (2010) Warming, nitrogen availability and site variation interact to govern soil microbial substrate choice and CO₂ release along a boreal forest transect. Annual meeting of the American Geophysical Union, San Francisco, CA.
- Tiemann, L.*, **Billings, S.A.** (2010) N₂O production vs. consumption and enzymatic temperature sensitivities across seasons. Annual meeting of the American Geophysical Union, San Francisco, CA.
- Billings, S.A.**, *Tiemann, L.K.* (2010) Soil warming and N₂O production and consumption: differential enzymatic responses? Annual meeting of the Ecological Society of America meeting, Pittsburgh, PA.
- Mobley, M.L., Heine, P.R., **Billings, S.A.**, Lajtha, K., Kramer, M.G., Richter, D.D. (2010) Soil carbon change during fifty years of old-field forest development. Annual meeting of the Ecological Society of America meeting, Pittsburgh, PA.
- Tiemann, L.K.*, Ballantyne IV, F., **Billings, S.A.**, Dermeyer P. (2010) Environmental and genetic controls on net nitrous oxide production vs. consumption during denitrification. Annual meeting of the Ecological Society of America meeting, Pittsburgh, PA.
- Ballantyne IV, F., **Billings, S.A.** (2010) A theoretical framework for linking extracellular enzymes to rates of SOM decomposition and CO₂ production. Annual meeting of the Ecological Society of America meeting, Pittsburgh, PA.
- Li, J.*, Ziegler, S.E., Lane, D., **Billings, S.A.** (2010) Warming enhanced microbial mineralization of slow-turnover soil organic matter along a boreal forest transect. Annual meeting of the Ecological Society of America meeting, Pittsburgh, PA.
- Tiemann, L.K.*, Ballantyne IV, F., **Billings, S.A.**, Dermeyer P. (2010) Linking gene regulation of nitrogen metabolism to soil N₂O dynamics. Gordon Conference on Ecological Metabolism, Brunswick, ME.

- Reed, A.S., Billings, S.A.* (2010) Tree-ring stable isotope and growth impacts of climate variability: predicting the future from the past. Annual meeting of the European Geosciences Union, Vienna, Austria.
- Li, J., Billings, S.A., Ziegler, S.E.* (2010) Effects of soil warming on boreal forest soil organic matter composition, cycling and fate along the Newfoundland and Labrador Boreal Ecosystem Latitudinal Transect (NL-BELT). Humber River Basin Project annual networking conference, Corner Brook, Newfoundland, Canada.
- Ziegler, S.E., Billings, S.A., Li, J., Lane, C.S.* (2010) Developing watershed-scale indicators for boreal forest soil organic matter change with climate warming. Humber River Basin Project annual networking conference, Corner Brook, Newfoundland, Canada.
- Billings, S.A., Ziegler, S.E., Li, J.** (2009) Tracking the influence of global change on soil C. Annual meeting of the American Geophysical Union, San Francisco, CA.
- Tiemann, L., Billings, S.A.* (2009) Soil moisture disturbance influences microbial community function and structure with impacts on soil carbon and nitrogen dynamics. Soil Ecology Bi-annual Meeting, Burlington, Vermont.
- Reed, A., Billings, S.* (2009) Stable isotope evidence of northern red oak (*Quercus rubra*) susceptibility to disturbance events. Ecological Society of America annual meeting, August 2009, Albuquerque, New Mexico.
- Tiemann, L., Billings, S.A.* (2009) Soil moisture availability and variability dictate soil organic carbon and nitrogen dynamics in Kansan grasslands. NSF EPSCoR Ecoforecasting annual symposium, Lawrence, KS.
- Reed, A., Billings, S.A.* (2009) Patterns of tree growth and tree-ring stable isotopes across a precipitation gradient in the Midwest. NSF EPSCoR Ecoforecasting annual symposium, Lawrence, KS.
- *Billings, S.A., Ziegler, S.E.** (2009) Enhanced turnover and slower formation of “stable” pools of soil organic C in forest soils with elevated CO₂. North American Carbon Program Investigators’ meeting, San Diego, CA.
- Billings, S., Barich, D., Munson, E.** (2008) Soil carbon transformations with warming in five North American ecosystems. American Geophysical Union annual meeting, San Francisco, CA.
- *Billings, S.** (2008) Ecosystem warming and carbon release: Why we need soil transplants in cold places. Humber River Basin Project Annual Conference, Corner Brook, Newfoundland, Canada.
- Billings, S.** (2008) Forecasting C dynamics in the Great Plains: Stories of precipitation and land use. NSF EPSCoR Ecoforecasting annual symposium, Lawrence, KS.
- Tiemann, L., Billings, S.* (2008) Nitrogen amendments and woody encroachment drive enzymatic activity driving decomposition in a mesic grassland. Ecological Society of America annual meeting, Madison, Wisconsin.
- Tiemann, L., Billings, S.* (2008) Nitrogen amendments and woody encroachment increase enzymatic activity driving decomposition in a mesic grassland. NSF EPSCoR Ecoforecasting annual symposium, Lawrence, KS.
- Reed, A., Billings, S.* (2008) Radial response to climate: Oak growth patterns across a precipitation gradient. NSF EPSCoR Ecoforecasting annual symposium, Lawrence, KS.
- Tiemann, L., Billings, S.* (2008) Nitrogen amendments and woody encroachment increase enzymatic activity driving decomposition in a mesic grassland. NSF EPSCoR Prairie Retreat, March 2008, Manhattan, KS.

- Reed, A., Billings, S.* (2007) Moisture availability as an influence on the stable oxygen and carbon isotopes of *Quercus rubra* tree-rings. Ecological Society of America annual meeting, August 2007, San Jose, California.
- Tiemann, L., Billings, S.* (2007) Grassland and forest soil organic matter transformations and microbial function in the North American Midwest. Ecological Society of America annual meeting, August 2007, San Jose, California.
- Goedhart, C., Pataki, D.E., **Billings, S.** (2007) Controls on plant gas exchange across a grassland to shrubland gradient in Owens Valley, California. Ecological Society of America annual meeting, August 2007, San Jose, California.
- Pataki, D.E., **Billings, S.**, Naumburg, E., Goedhart, C. (2007) Water sources and nitrogen relations of grasses and shrubs in phreatophytic communities of the Great Basin Desert. Ecological Society of America annual meeting, August 2007, San Jose, California.
- Billings, S.A.**, Ziegler, S.E. (2007) Influences of elevated CO₂ and N fertilization on soil organic carbon cycling in a pine forest soil. Canadian Meteorological and Oceanographic Society annual meeting, May 2007.
- Billings, S.** and *Tiemann, L.* (2007) Nitrogen and carbon dynamics in the changing Great Plains landscape. NSF EPSCoR Ecoforecasting meeting, April, 2007, Manhattan, KS.
- Tiemann, L.* and **Billings, S.** (2007) Grassland and forest soil nitrogen transformations and microbial function in the North American Midwest. EPSCoR Ecoforecasting meeting, April, 2007, Manhattan, KS.
- ***Billings, S.A.**, Ziegler, S.E. (2007) Organic C dynamics in a pine forest soil with elevated CO₂ and N fertilization. North American Carbon Program conference, Colorado Springs, Colorado, January 2007.
- ***Billings, S.A.**, *Haavik, L.*, Stephen, F., Fierke, M., Salisbury, V., Leavitt, S. (2006) Dendrochronological parameters of northern red oak (*Quercus rubra* Fagaceae) subjected to a major forest disturbance (red oak borer, *Enapholodes rufulus*). International Union of Forest Researchers' Organization. Canopy Processes traveling meeting in northeastern United States, October 2006.
- York, H., **Billings, S.A.** (2006) Stable isotope analysis of diet in the short-tailed fruit bats (Chiroptera: Phyllostomidae: *Carollia*). Poster presentation at the North American Symposium on Bat Research, North Carolina, October 2006. [Note: H. York was not my student, nor was I on her committee, but I advised her on the presentation of these stable isotope data.]
- York, H., **Billings, S.A.** (2006) Stable isotope analysis of diet in the short-tailed fruit bats (Chiroptera: Phyllostomidae: *Carollia*). Poster presentation at the 86th Annual Meeting of the American Society of Mammalogists, Massachusetts, June 2006. [Note: H. York was not my student, nor was I on her committee, but I advised her on the presentation of these stable isotope data.]
- Billings, S.**, *Brewer, C.*, Foster, B. (2005) Incorporation of plant residues into soil organic matter fractions with grassland management practices in the North American Midwest. Poster presentation at the Ecological Society of America Meeting, August, 2005.
- Billings, S.**, Richter, D.D. (2005). Stable isotopic signatures of soil organic nitrogen and carbon during forty years of forest development. Poster presentation at American Geophysical Union Meeting, May 2005.
- Billings, S.** (2004) Assessing soil organic matter distribution and stable isotopic composition: The impact of land use change on carbon dynamics. Poster presentation at American

Geophysical Union Meeting, December 2004. Eos. Trans. AGU, 2004 Fall Meeting Supplement, Abstract #8092.

Billings, S., Schaeffer, S., Evans, R.D. (2002) Net N and C mineralization and soil microbial biomass with elevated CO₂ in a Mojave Desert ecosystem. Poster presentation at American Geophysical Union Meeting, December 2002. Eos. Trans. AGU, 2002 Fall Meeting Supplement, Abstract #B11B-0736.

Billings, S., Schaeffer, S., Evans, R.D. (2001) Elevated CO₂ alters soil nitrogen dynamics in an intact Mojave Desert ecosystem. Poster presentation at American Geophysical Union Meeting, December 2001. Eos. Trans. AGU, 2001 Fall Meeting Supplement, Abstract #B51B-0209.

Billings, S., Schaeffer, S., Charlet, T.N., Zitzer, S.F., Smith, S.D., Evans, R.D. (2001) Perturbations to nitrogen cycling in response to elevated CO₂ in an intact Mojave desert ecosystem. Poster presentation at Ecological Society of America Annual Meeting, August 2001. Abstract in: 86th Annual ESA Abstracts.

Billings, S., Schaeffer, S., and Evans, R.D. (2000) Response of soil nitrogen and CO₂ dynamics to elevated CO₂ in a Mojave Desert ecosystem. Talk given at Ecological Society of America Annual Meeting, August 2000. Abstract in: 85th Annual ESA Abstracts.

Schaeffer, S.M., **Billings, S.A.,** and Evans R.D. (2000). Nitrogen dynamics in arid ecosystems in response to carbon and nitrogen addition. Talk given at Ecological Society of America Annual Meeting, August 2000. Abstract in: 85th Annual ESA Abstracts.

Yarie, J., **Billings, S.** (2000) Carbon balance of the Alaskan taiga forest. Presentation at the International Science Conference “The Role of Boreal Forests and Forestry in the Global Carbon Budget,” May 8-12, 2000, Edmonton, Alberta, Canada.

Billings, S., Richter, D., Yarie, J. (1997) Soil respiration in the boreal forest: linking soil CO₂ to moisture availability. Talk given at Soil Science Society of America Annual Meeting, October 1997.

Billings, S., Richter, D., Yarie, J. (1997) Soil carbon gases and water relations in the boreal forest. Talk given at Ecological Society of America Annual Meeting, August 1997. Abstract in: 82nd Annual ESA Abstracts.

TEACHING

Forest Ecosystems

Climate Change in the Arctic, NSF-IGERT course

Principles of Ecology

Field and Laboratory Methods for Ecology

GRADUATE STUDENTS

Kyungjin Min, Ph.D. aspirant, 2011–present

Alexis Reed, Ph.D., 2007–2012

Lisa Tiemann, Ph.D., 2006–2011

Elizabeth Gaydess, M.S., 2004–2006

POST-DOCS

Kate Buckeridge, 2013-present

Christoph Lehmeier, 2011-2013

Jianwei Li, 2009-2012

MEMBERSHIPS

American Geophysical Union

Ecological Society of America

Soil Science Society of America

EDITORIAL SERVICE

Associate Editor and contributor to development of *Soil*, a new journal of the European Geophysical Union, 2013-present

Associate Editor, *Biogeochemistry*, 2012-present

Editorial Advisory Board, *Global Change Biology*, 2010-present

Subject Editor, *Frontiers in Terrestrial Microbiology*, 2010-present

OTHER NATIONAL OR INTERNATIONAL SERVICE

Contributing member of NASA's Science Definition Team for the Arctic and Boreal Vulnerability Experiment, 2013-present

National Science Foundation Ecosystem Program panel, 2013

Co-convener of "Global Soil Change" session at annual meeting of the American Geophysical Union, San Francisco, CA, December 2012

Collaborator, Canada's Natural Sciences and Engineering Research Council (NSERC) Collaborative Research and Training Experience (CREATE) program on climate change, 2010-present

Canadian Forest Service partner for Newfoundland and Labrador Boreal Ecosystem Latitudinal Transect (NL-BELT), 2008-present

National Ecological Observatory Network (NEON) Science and Education Coordinating Committee 2009-present

National Science Foundation Ecosystems Program panel, 2010

National Science Foundation Geobiology and Low-Temperature Geochemistry panel, 2010

National Science Foundation Office of Polar Programs panel, 2009

Co-convener of "Global Soil Change" session at annual meeting of the American Geophysical Union, San Francisco, CA, December 2009

Invited contributor to North American Carbon Program meetings, websites, and discussion groups, 2006–2008

Workshop organizer for International Union of Forestry Research Organizations 2006 workshop on forest canopy processes, multiple experimental forests in NE United States, October 2006

National Science Foundation Long-term Ecological Research Program site reviewer for Shortgrass Steppe LTER, Ft. Collins, CO, July 2005

Contributor to series of interviews by *Science* magazine (*Science* 315:1781, 30 March 2007) on Department of Energy funding for elevated CO₂ research, 2007

Proposal reviewer for National Science Foundation, USDA Soils and Soils Biology Program, USDA McIntire-Stennis Program, Department of Energy, Kearney Foundation Carbon Program, U.S. Civilian Research and Development Foundation, Department of Defense

Manuscript reviewer for *Global Change Biology*; *Soil Biology and Biochemistry*; *Journal of Geophysical Research – Biogeosciences*; *Oecologia*; *Ecology*; *Functional Ecology*; *Arctic, Antarctic, and Alpine Research*; *Ecosystems*; *Biogeochemistry*; *Biogeosciences*; *Plant and Soil*; *Forest Ecology and Management*; *Science of the Total Environment*; *New Phytologist*; *Plant Physiology*; *Rapid Communications in Mass Spectrometry*; *Journal of Arid Environments*; *Soil Science*; *Canadian Journal of Remote Sensing*; *Transactions on Geoscience and Remote Sensing*; *Journal of Hydrology*; *Plant Ecology*; *Canadian Journal of Forest Research*; *Soil Science Society of America*; *Environmental Science and Technology*; *Geoderma*; *Global Biogeochemical Cycles*; *Agricultural and Forest Meteorology*; *Springer-Verlag book series*
