

PHILIP A. FAY

Research Ecologist
USDA-ARS Grassland, Soil and Water Research Laboratory
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Research Interests

Grassland ecosystem ecology: Carbon cycling, climate change, plant physiological, population, and community ecology.

Education

B.Sc. Biology, Kansas State University, 1982.
M.S. Biology, Northern Arizona University, 1987. (T.G. Whitham).
Ph.D. Biology, Kansas State University, 1992. (D.C Hartnett).
Post-doctoral, Kansas State University, 1992-1998. (A.K. Knapp).

Awards and Recognitions

State of Kansas Scholar 1977-1981.
Second Century Scholarship 1977-1978.
Sartorius Memorial Scholarship 1978.
National Science Foundation Graduate Fellowship, Honorable Mention 1985.
James Ackert Graduate Student Award 1989.
John C. Frazier Award for Botanical Research 1990.
Phi Kappa Phi.

Professional Appointments

Research Ecologist (GS-14), USDA ARS Grassland, Soil, and Water Research Laboratory, Temple, TX 2009-present.
Research Affiliate/Senior Research Fellow, Environmental Sciences Institute, University of Texas at Austin, 2008 – present.
Research Ecologist (GS-13), USDA ARS Grassland, Soil, and Water Research Laboratory, Temple, TX 2005-2009.
Research Associate, Natural Resources Research Institute, University of Minnesota Duluth 2002-2005.
Graduate Faculty, Department of Biology, University of Minnesota Duluth, 2002-2005.
Adjunct Assistant Professor, Kansas State University, Division of Biology 2002- present.
Research Assistant Professor, Kansas State University, Division of Biology, 1998-2002.
Research Associate, Kansas State University, Division of Biology, 1992-1998.
Teaching Assistant, Kansas State University, Division of Biology, 1987-1992.
Biological Laboratory Technician (Insects), United States Department of Agriculture, Grain Marketing Research Laboratory, 1987.
Research and Teaching Assistant, Northern Arizona University, Department of Biological Science, 1983-1987.
Research Assistant, Department of Plant Pathology, Kansas State University, 1982-1983.

Teaching Experience

Laboratories in: General Biology, General Botany, Human Anatomy and Physiology, Organismic Biology, Ornithology, Plant Physiology, Graduate Seminar in Plant Ecophysiology.

Funding

USDA-NIFA Enhancing Ecosystem Services from Agricultural Lands: 09/01/2010 – 08/31/2014 \$499,300. The sustainability of ecosystem services in switchgrass monocultures, improved pasture, and low input-high diversity grassland (Award # 2010-65615-20632) P.A. Fay, H.W. Polley, J.R. Kiniry, V.L. Jin, M.-V. V. Johnson.

National Science Foundation Plant Genome Program: 09/01/2009 – 08/31/2012 \$4,566,087. GEPR: The physiological genomics of *Panicum*: exploring switchgrass responses to climate change. T.E. Juenger, C. Hawkes, T.H. Keitt, P.A. Fay.

Department of Energy Program for Ecosystem Research, 09/01/04 – 08/31/07. \$57,236 (subcontract). Bridging the divide: linking genomics to ecosystem responses to climate change. M.D. Smith, J.F. Bai, J.M. Blair, P.A. Fay, K.A. Garrett, S.H. Hulbert, A.K. Knapp, J.E. Leach, S.E. Travers.

National Science Foundation 03/01/04 – 02/28/09. \$300,000. LTREB: Long-term ecosystem responses to more extreme precipitation patterns and warming. A.K. Knapp, J.M. Blair, S.L. Collins, P.A. Fay, M.D. Smith

National Science Foundation, 09/01/02 – 08/31/06. \$447,214. Climatic variability and ecosystem response: precipitation patterns, soil moisture dynamics, and productivity in tallgrass prairie. P.A. Fay.

National Institute for Global Environmental Change, 01/01/02 – 06/30/05. \$390,203. Belowground responses to multiple climate change factors: Interactive effects of warming and more extreme precipitation patterns on grassland ecosystems. J.M. Blair, A.K. Knapp, P.A. Fay.

National Science Foundation, 03/05/02 – 08/31/04. \$240,367. Collaborative Research: Effects of environmental variation on plant disease in the tallgrass prairie. K. Garrett, P.A. Fay.

National Science Foundation Long-Term Ecological Research Program, 2000. \$25,000. 2000-2001 LTER Supplement Request of IBN 96-32851: Enhancement of soil research capabilities at the Konza Prairie LTER site. P.A. Fay, A.K. Knapp, J.M. Blair.

National Institute for Global Environmental Change, 1999-2002. \$358,374. Belowground responses to manipulation of precipitation timing and amounts in a grassland ecosystem. J.M. Blair, A.K. Knapp, P.A. Fay.

United States Department of Agriculture, NRICGP, 1999-2002. \$391,846. Grassland ecosystem response to the experimental manipulation of precipitation. A.K. Knapp, J.M. Blair, P.A. Fay.

The Nature Conservancy, 1995-1997. \$20,207. Proposal to Identify Great Plains Invertebrates for the Nature Conservancy Ecosystem Research Project. P.A. Fay, V.F. Wright, H.D. Blocker, D.C. Hartnett.

Fort Riley Natural Resources Branch. 1995-1996. \$62,560. Fort Riley Process-level Carrying Capacity Research: Plant Communities, Net Primary Productivity, and Soil Nutrient Dynamics Compared on Fort Riley and an Undisturbed Benchmark Site. P.A. Fay, J.M. Blair, A.K. Knapp, P.S. Gipson.

U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, 1994-1995. \$72,315 The capacity of Fort Riley, Kansas tallgrass prairie to support military training activity- preliminary analysis. P.S. Gipson, P.A. Fay, H. Abel, J.M. Blair, J.M. Briggs, J.F. Cully, P.S. Gipson, C.S. Guy, A.K. Knapp, C. Phillips.

National Science Foundation Doctoral Dissertation Improvement Award, 1990-1992. \$6,870. Influence of resource limitation on plant responses to herbivory: responses of *Silphium integrifolium* to gall insect attack. P.A. Fay, D.C. Hartnett.

Publications

1. Rico, C., J. Pittermann, H.W. Polley, M. Aspinwall, P. Fay. 2013. The effect of sub-ambient to elevated (CO_2)_{atm} on vascular function in *Helianthus annuus*: Implications for plant response to climate change. *New Phytologist* (Accepted 4/16/2013).
2. Aspinwall, M.J., D.B. Lowry, S.H. Taylor, T.E. Juenger, C.V. Hawkes, M.-V.V. Johnson, J.R. Kiniry, P.A. Fay. 2013. Productivity and leaf functional trait associations among genotypes of a dominant

- polyploidy C_4 grass are linked to latitude of origin. *New Phytologist* (Accepted 4/19/2013).
3. Jin, V.L., R.L. Haney, P.A. Fay, H.W. Polley. 2013. Soil type and moisture regime control microbial C and N mineralization in grassland soils more than atmospheric CO_2 -induced changes in litter quality. *Soil Biology & Biochemistry* 58:172-180.
 4. Grace, J.B., P.B. Adler, E.W. Seabloom, E.T. Borer, H. Hillebrand, Y. Hautier, A. Hector, W.S. Harpole, L.R. O'Halloran, T.M. Anderson, J.D. Bakker, C.S. Brown, Y.M. Buckley, S.L. Collins, K.L. Cottingham, M.J. Crawley, E.I. Damschen, K.F. Davies, N.M. Decrappeo, P.A. Fay, J. Firn, D.S. Gruner, N. Hagenah, V.L. Jin, K.P. Kirkman, J.M.H. Knops, K.J. La Pierre, J.G. Lambrinos, B.A. Melbourne, C.E. Mitchell, J.L. Moore, J.W. Morgan, J.L. Orrock, S.M. Prober, C.J. Stevens, P.D. Wragg, L.H. Yang. 2012. Response to Comments on "Productivity is a poor predictor of plant species" (technical comment). *Science* 335:1441-c.
 5. Fay, P.A., V.L. Jin, D.A. Way, K.N. Potter, R.A. Gill, R.B. Jackson, H.W. Polley. 2012. Soil-mediated effects of subambient to increased carbon dioxide on grassland productivity. *Nature Climate Change* 2:742-746.
 6. Polley, H.W., V.L. Jin, P.A. Fay. 2012. CO_2 -caused change in plant species composition rivals the shift in vegetation between mid-grass and tallgrass prairies. *Global Change Biology* 18:700-710.
 7. Kiniry, J.R., L.C. Anderson, M.-V. V. Johnson, K.D. Behrman, M. Brakie, D. Burner, R.L. Cordsiemon, P.A. Fay, F.B. Britsch, J.H. Houx III, C. Hawkes, T. Juenger, J. Kaiser, T.H. Keitt, J. Lloyd-Reilley, S. Maher, R. Raper, A. Scott, A. Shadow, C. West, Y. Wu, L. Zibilske. 2012. Perennial biomass grasses and the Mason-Dixon Line: Comparative productivity across latitudes in the Southern Great Plains. *BioEnergy Research* DOI: 10.1007/s12155-012-9254-7.
 8. Polley, H.W., V.L. Jin, P.A. Fay. 2012. Feedback from plant species change amplifies CO_2 enhancement of grassland productivity. *Global Change Biology* 18:2813-2823.
 9. Fay, P.A., H.W. Polley, V.L. Jin, M.J. Aspinwall. In Press. Productivity of well-watered *Panicum virgatum* does not increase with CO_2 enrichment. *Journal of Plant Ecology* doi: 10.1093/jpe/rts007.
 10. Fay, P.A., J.M. Blair, M.D. Smith, J.B. Nippert, J.D. Carlisle, A.K. Knapp. 2011. Relative effects of precipitation variability and warming on tallgrass prairie ecosystem function. *Biogeosciences* 8: 3053-3068.
 11. Adler, P.B., E.W. Seabloom, E.T. Borer, H. Hillebrand, Y. Hautier, A. Hector, W.S. Harpole, L.R. O'Halloran, J.B. Grace, T.M. Anderson, J.D. Bakker, L. A. Biederman, C.S. Brown, Y.M. Buckley, L.B. Calabrese, C.-J. Chu, E.E. Cleland, S.L. Collins, K.L. Cottingham, M. J. Crawley, E.I. Damschen, K.F. Davies, N.M. DeCrappeo, P.A. Fay, J. Firn, P. Frater, E.I. Gasarch, D.S. Gruner, N. Hagenah, J. HilleRisLambers, H. Humphries, V.L. Jin, A.D. Kay, K.P. Kirkman, J.A. Klein, J.M.H. Knops, K. J. La Pierre, J.G. Lambrinos, W. Li, A.S. MacDougall, R.L. McCulley, B.A. Melbourne, C.E. Mitchell, J.L. Moore, J.W. Morgan, B. Mortensen, J.L. Orrock, S.M. Prober, D.A. Pyke, A.C. Risch, M. Schuetz, M.D. Smith, C.J. Stevens, L.L. Sullivan, G. Wang, P.D. Wragg, J.P. Wright, L.H. Yang. 2011. Productivity is a poor predictor of plant species richness. *Science* 333(6050):1750-1753.
 12. Kelley, A.M., P.A. Fay, H.W. Polley, R.A. Gill, R.B. Jackson. 2011. Atmospheric CO_2 and soil extracellular enzyme activity: a meta-analysis and CO_2 gradient experiment. *Ecosphere* 2(8):1-20.
 13. Firn, J., J.L. Moore, A.S. MacDougall, E.T. Borer, E.W. Seabloom, J. HilleRisLambers, W.S. Harpole, E.E. Cleland, C.S. Brown, J.M.H. Knops, S.M. Prober, D.A. Pyke, K.A. Farrell, J.D. Bakker, L.R. O'Halloran, P.B. Adler, S.L. Collins, C.M. D'Antonio, M.J. Crawley, E.M. Wolkovich, K.J. La Pierre, B.A. Melbourne, Y.

- Hautier, J.W. Morgan, A.D.B. Leakey, A. Kay, R. McCulley, K. Davies, C.J. Stevens, C.-J. Chu, K.D. Holl, J.A. Klein, P.A. Fay, N. Hagenah, K.P. Kirkman, Y.M. Buckley. 2011. Abundance of introduced species at home predicts abundance away in temperate grasslands. *Ecology Letters* 14:274-281.
14. Izaurralde, R.C., J.A. Morgan, A.M. Thompson, P.A. Fay, H.W. Polley, J.L. Hatfield. 2011. Climate impacts on agriculture: Implications for forage and rangeland production. *Agronomy Journal* 103:371-381.
 15. Manzoni, S., G. Vico, G. Katul, P.A. Fay, H.W. Polley, S. Palmroth, A. Porporato. 2011. Optimizing stomatal conductance for maximum carbon gain under water stress: A meta-analysis across plant functional types and climates. *Functional Ecology* doi:10.1111/j.1365-2435.2010.01822.x.
 16. Manzoni, S., G. Katul, P.A. Fay, H.W. Polley, A. Porporato. 2011. Modeling the vegetation-atmosphere carbon dioxide and water vapor interactions along a controlled CO₂ gradient. *Ecological Modeling* 222:653-665.
 17. Polley, H.W., J.A. Morgan, P.A. Fay. 2011. Application of a conceptual framework to assess variability in rangeland responses to atmospheric CO₂ enrichment. *Journal of Agricultural Science* 149:1-14.
 18. Johnson, M.-V.V., J.R. Kiniry, H. Sanchez, H.W. Polley and P.A. Fay. 2010. Comparing biomass yields of low-input high diversity communities with managed monocultures across the central United States. *Bioenergy Research* 3(4): 353-361.
 19. Polley, H.W., P.A. Fay, V.L. Jin, G.F. Combs. 2010. CO₂ enrichment increases element concentrations in grass mixtures by changing species abundances. *Plant Ecology* doi:10.1007/s11258-010-9874-y.
 20. Travers, S.E., Z. Tang, D. Caragea, K.A. Garrett, S.H. Hulbert, J.E. Leach, J. Bai, A. Saleh, A.K. Knapp, P.A. Fay, J. Nippert, P.S. Schnable and M.D. Smith. 2010. Variation in gene expression of *Andropogon gerardii* in response to altered environmental conditions associated with climate change. *Journal of Ecology* 98(2): 374-383.
 21. Yang, Y., J. Fang, P.A. Fay, J.E. Bell and C. Ji. 2010. Rain use efficiency across a precipitation gradient on the Tibetan Plateau. *Geophysical Research Letters* 37:L15702 doi:10.1029/2010GL043920.
 22. Fay, P.A. 2009. Invited Commentary: Precipitation variability and primary productivity in water-limited systems: how plants 'leverage' precipitation to 'finance' growth. *New Phytologist* 181: 5-8.
 23. Fay, P.A., A.M. Kelley, A.C. Procter, V.L. Jin, R.B. Jackson, H.B. Johnson, H.W. Polley. 2009. Primary productivity and water balance of grassland vegetation on three soils in a continuous CO₂ gradient: Initial results from the Lysimeter CO₂ Gradient Experiment. *Ecosystems* 12:699-714 doi: 10.1016/j.actao.2009.06.007.
 24. Fay, P.A., M.J. Schultz. 2009. Germination, survival, and growth of grass and forb seedlings as affected by soil moisture variability. *Acta Oecologia* 35: 679-684 doi: 10.1016/j.actao.2009.06.007
 25. Nippert, J.B., P.A. Fay, J.D. Carlisle, A.K. Knapp, M.D. Smith. 2009. Ecophysiological responses to two dominant grasses to altered temperature and precipitation regimes. *Acta Oecologia* 35: 400-408.
 26. Wilkinson, M., R.K. Monson, N. Trahan, S. Lee, E. Brown, R.B. Jackson, H.W. Polley, P.A. Fay, R. Fall. 2009. Leaf Isoprene emission rate as a function of atmospheric CO₂ concentration. *Global Change Biology* 15:1189-1200.
 27. Knapp, A.K., C. Beier, D.D. Briske, A.T. Classen, Y. Luo, M. Reichstein, M.D. Smith, S.D. Smith, J.E. Bell, P.A. Fay, J.L. Heisler, S.W. Leavitt, R. Sherry, B. Smith and E. Weng. 2008. Consequences of more extreme precipitation regimes for terrestrial ecosystems. *Bioscience* 58(9): 811-821.
 28. Fay, P.A., D.M. Kaufman, J.B. Nippert, J.D. Carlisle, C.W. Harper. 2008. Changes in grassland ecosystem function due to extreme precipitation events: Implications for responses to climate change. *Global Change Biology*, 14: 1600-1608.

29. Polley, H.W., H.B. Johnson, P.A. Fay, J. Sanabria. 2008. Initial response of evapotranspiration from tallgrass prairie vegetation to CO₂ at subambient to elevated concentrations. *Functional Ecology* 22: 163-171.
30. Nippert, J.B., P.A. Fay, A.K. Knapp. 2007. Photosynthetic traits in C₃ and C₄ grassland species: responses in microcosm vs. field environments. *Environmental and Experimental Botany* 60(3): 412-420.
31. Travers, S.E., M.D. Smith, J. Bai, S.H. Hulbert, J.E. Leach, P.S. Schnable, A.K. Knapp, G.A. Milliken, P.A. Fay, A. Saleh, K.A. Garrett. 2007. Ecological genomics: making the leap from model systems in the lab to native populations in the field. *Frontiers in Ecology and the Environment* 5(1): 19-24.
32. Porporato, A., G. Vico, P.A. Fay. 2006. Superstatistics of hydro-climatic fluctuations and interannual ecosystem productivity. *Geophysical Research Letters* 33: L15402.
33. Fay, P.A., H.L. Throop. 2005. Branching responses in *Silphium integrifolium* (Asteraceae) following mechanical or gall damage to apical meristems and neighbor removal. *American Journal of Botany* 92: 954-959.
34. Harper, C.W., J.M. Blair, P.A. Fay, A.K. Knapp, J.D. Carlisle. 2005. Increased rainfall variability and reduced rainfall amount decreases soil CO₂ flux in a grassland ecosystem. *Global Change Biology* 11: 322-334.
35. Huxman, T.E., M.D. Smith, P.A. Fay, A.K. Knapp, M.R. Shaw, M.E. Loik, S.D. Smith, D.T. Tissue, J.C. Zak, J.F. Weltzin, W.T. Pockman, O.E. Sala, B. Haddad, J. Harte, G.W. Koch, S. Schwinning, E.E. Small, and D.G. Williams. 2004. Convergence across biomes to a common rain-use efficiency. *Nature* 429: 651-654.
36. Goodin, D.G., P.A. Fay, M.M. McHugh. 2003. Climate variability at a tallgrass prairie site at multiple time scales: Konza Prairie Biological Station. Pp 411-423 In: D. Greenland et al., eds, *Climatic Variability and Ecosystem Response*. New York, Oxford University Press.
37. Fay, P.A. Insect diversity in two burned and grazed grasslands. 2003. *Environmental Entomology* 32: 1099-1104.
38. Fay, P.A., J.D. Carlisle, A.K. Knapp, J.M. Blair, S.L. Collins. 2003. Productivity responses to altered rainfall patterns in C₄ dominated grasslands. *Oecologia* 137: 245-251.
39. Fay, P.A., A.K. Knapp, J.M. Blair, J.D. Carlisle, B.T. Danner, J.K. McCarron. 2003. Precipitation and terrestrial ecosystems: mesic grassland case study. Pp 147-163 In: *Precipitation Impacts on Terrestrial Ecosystems*, J. Weltzin and G. McPherson, editors. University of Arizona Press.
40. Quist, M.C., P.A. Fay, C.S. Guy, A.K. Knapp, B.N. Rubenstein. 2003. Military training effects on terrestrial and aquatic communities on a grassland military installation. *Ecological Applications* 13:432-442.
41. Weltzin, J.F., M.E. Loik, S. Schwinning, D.G. Williams, P.A. Fay, B. Haddad, J. Harte, T.E. Huxman, A.K. Knapp, G. Lin, W.T. Pockman, M.R. Shaw, E.E. Small, M.D. Smith, S.D. Smith, D.T. Tissue, J.C. Zak. 2003. Assessing the response of terrestrial ecosystems to potential changes in precipitation. *Bioscience* 53:941-952.
42. Fay, P.A., J.D. Carlisle, B.T. Danner, M.S. Lett, J.K. McCarron, C. Stewart, A.K. Knapp, J.M. Blair, S.L. Collins. 2002. Altered rainfall patterns, gas exchange, and growth in grasses and forbs. *International Journal of Plant Sciences* 163: 549-557.
43. Goodin, D.G., P.A. Fay, M.J. McHugh. 2002. Climate variability at multiple time scales: implications for productivity in tallgrass prairie. *Proceedings of the 15th Conference on Biometeorology and Aerobiology*, American Meteorological Society, pp 312-316.

44. Knapp, A.K., P.A. Fay, J.M. Blair, S.L. Collins, M.D. Smith, J.D. Carlisle, C.W. Harper, B.T. Danner, M.S. Lett and J.K. McCarron. 2002. Rainfall variability, carbon cycling and plant species diversity in a mesic grassland. *Science* 298: 2202-2205.
45. Fay, P.A., J.D. Carlisle, A.K. Knapp, J.M. Blair, S.L. Collins. 2000. Altering rainfall timing and quantity in a mesic grassland ecosystem: design and performance of rainfall manipulation shelters. *Ecosystems* 3: 308-319.
46. Throop, H.L., P.A. Fay. 1999. Effects of fire, browsers, and gallers on New Jersey Tea (*Ceanothus herbaceus*) growth and reproduction. *The American Midland Naturalist* 141: 51-58.
47. Fay, P.A., A.K. Knapp. 1998. Responses to short-term shade in soybean leaves: Effects of leaf position and drought stress. *International Journal of Plant Sciences* 159: 805-811.
48. Hartnett, D.C., P.A. Fay. 1998. Plant Populations: Patterns and Processes. pp 81-100 In: *Grassland dynamics: Long-term ecological research in tallgrass prairie*. A.K. Knapp, J.M. Briggs, S.L. Collins, editors. Oxford University Press.
49. Kaufman, D.W., P.A. Fay, G.A. Kaufman, J.L. Zimmerman. 1998. Diversity of Terrestrial Macrofauna. pp 101-112 In: *Grassland dynamics: Long-term ecological research in tallgrass prairie*. A.K. Knapp, J.M. Briggs, S.L. Collins, editors. Oxford University Press.
50. Kaufman, D.W., G.A. Kaufman, P.A. Fay, J.L. Zimmerman, E.W. Evans. 1998. Animal Populations and Communities. pp 113-139 In: *Grassland dynamics: Long-term ecological research in tallgrass prairie*. A.K. Knapp, J.M. Briggs, S.L. Collins, editors. Oxford University Press.
51. Knapp, A.K., P.A. Fay. 1997. Plant strategies for coping with variable light regimes. In: *Mechanisms of environmental stress resistance in plants*. A.S. Basra, R.K. Basra, eds, Harwood Academic Publishers, Amsterdam.
52. Fay, P.A., R.W. Preszler, T.G. Whitham. 1996. The functional resource for a galling adelgid. *Oecologia* 105: 199-204.
53. Fay, P.A., A.K. Knapp. 1996. Photosynthetic and stomatal responses to light in a cool season and a warm season prairie forb. *International Journal of Plant Sciences* 157: 303-308.
54. Fay, P.A., D.C. Hartnett, A.K. Knapp. 1996. Plant tolerance of gall-insect attack and gall-insect performance. *Ecology* 77: 521-534.
55. Fay, P.A., A.K. Knapp. 1995. Stomatal and photosynthetic responses to shade in sorghum, soybean, and eastern gamagrass. *Physiologia Plantarum* 94: 613-620.
56. Fay, P.A., R.J. Samenus, Jr. 1993. Gall wasp (Hymenoptera:Cynipidae) mortality in a spring tallgrass prairie fire. *Environmental Entomology* 22: 1333-1337.
57. Fay, P.A., A.K. Knapp. 1993. Photosynthetic and stomatal responses of *Avena sativa* to a variable light environment. *American Journal of Botany* 80: 1369-1373.
58. Fay, P.A., D.C. Hartnett, A.K. Knapp. 1993. Increased photosynthesis and water potential in *Silphium integrifolium* galled by cynipid wasps. *Oecologia* 93: 114-120.
59. Fay, P.A., D.C. Hartnett. 1991. Constraints on growth and allocation patterns of *Silphium integrifolium* (Asteraceae) caused by a cynipid gall wasp. *Oecologia* 88: 243-250.
60. Fay, P.A., T.G. Whitham. 1990. Within-plant distribution of a galling adelgid (Homoptera:Adelgidae): the consequences of conflicting survivorship, growth, and reproduction. *Ecological Entomology* 15: 245-254.
61. Reichman, O.J., P.A. Fay. 1983. Comparison of the diets of a caching and a non-caching rodent. *American Naturalist* 122: 576-581.

Abstracts and Presentations (since 1999)

Meckel, H., S. Schwinning, P.A. Fay. 2012. Mechanisms of competitive suppression of native grasses by johnsongrass. 97th Annual Meeting, Ecological Society of America (ESA), August 5-10, 2012, Portland, OR.

Fay, P.A., H.W. Polley, J.A. Morgan, D.R. Lecain, B.A. Newingham, R.S. Nowak, S.D. Smith. 2012. Atmospheric CO₂ effects on productivity: feedbacks from soil moisture and species change in mesic, semi-arid, and arid systems. Geophysical Research Abstracts, European Geosciences Union, April 22-27, 2012, Vienna, Austria.

Fay, P.A., V.L. Jin, R.B. Jackson, R.A. Gill, D. Way, H.W. Polley. 2011. Nonlinear and threshold responses of grassland productivity and species composition to increased CO₂ vary with soil type. EOS Trans. AGU, Fall Meeting, December 5-9, 2011, San Francisco, CA.

Fay, P.A., H.W. Polley. 2011. Resource limitation of ANPP responses to increased CO₂ differs among soils. Grasslands in a Global Context International Symposium, September 12-14, 2011, Kansas State University, Manhattan, KS.

Fay, P.A., H.W. Polley, V.L. Jin, R.A. Gill, R.B. Jackson, D. Way. 2011. Rising atmospheric CO₂ effects on productivity and plant composition differs among soils in southern plains tallgrass prairie. 96th Annual Meeting, Ecological Society of America (ESA), August 7-12, 2011, Austin, TX.

Blair, J.M., P.A. Fay, A.K. Knapp, M.D. Smith, S.L. Collins. 2010. Assessing the impacts of altered rainfall timing and warming in a mesic grassland ecosystem. 95th Annual Meeting, Ecological Society of America (ESA), August 1-6, 2010, Pittsburgh, PA.

Gill, R.A., V.L. Jin, P.A. Fay, H.W. Polley, A. Kelley, R.B. Jackson. 2010. The sensitivity of nutrient availability to changes in atmospheric CO₂ as influenced by soil type. 95th Annual Meeting, Ecological Society of America (ESA), August 1-6, 2010, Pittsburgh, PA.

Heisler-White, J., J. Morgan, W. Parton, J. Blair, N. Chiariello, J. Dukes, P. Fay, C. Field, S. Hoeppe, M. Hovenden, A. Knapp, Y. Luo, S. Niu, E. Pendall, V. Suseela, S. Wang. 2010. Modeled effects of warming on ecosystem carbon and water dynamics along a moisture gradient. 95th Annual Meeting, Ecological Society of America (ESA), August 1-6, 2010, Pittsburgh, PA.

Kelley, A.M., A.C. Procter, R.A. Gill, P.A. Fay, H.W. Polley, R.B. Jackson. 2010. Soil microbial responses to a subambient to elevated gradient of atmospheric CO₂. 95th Annual Meeting, Ecological Society of America (ESA), August 1-6, 2010, Pittsburgh, PA.

Procter, A.C., P.A. Fay, R.A. Gill, H.W. Polley, R.B. Jackson. 2010. Soil type determines response of soil microbial activity to an atmospheric CO₂ gradient. 95th Annual Meeting, Ecological Society of America (ESA), August 1-6, 2010, Pittsburgh, PA.

Jin, V.L., R.L. Haney, P.A. Fay, H.W. Polley. 2009. Soil moisture regime and soil type affect the decomposition of graminoid litter grown under three levels of atmospheric CO₂. 94th Annual Meeting, Ecological Society of America (ESA), August 2-7, 2009, Albuquerque, NM.

Fay, P.A., H.W. Polley, V.L. Jin. 2008. Aboveground net primary productivity and rainfall use efficiency of grassland on three soils after two years of exposure to a subambient to superambient CO₂ gradient. EOS Trans. AGU, 89(53), Fall Meet. Suppl., December 15-19 2008, San Francisco, CA.

Fay, P., Polley, W., Wilsey, B., Tiner, K., Jin, V. 2008. Plant composition and the effects of temperature, soil moisture, and aboveground biomass on soil respiration in grassland. Geophysical Research Abstracts, European Geosciences Union, April 13-18, 2008, Vienna, Austria.

Manzoni, S., P. Fay, G. Katul, W. Polley, A. Porporato. 2008. Modeling plant-atmosphere carbon and water fluxes along a CO₂ gradient. EOS Trans. AGU, 89(53), Fall Meet. Suppl., December 15-19 2008, San Francisco, CA.

Jin, V.L., Fay, P.A., Polley, H.W., Jackson, R.B., Gill, G.R. 2008. Soil-specific C and N responses to changing atmospheric CO₂ concentrations in a mesic grassland ecosystem. Proceedings of the Ecological Society of America, August 3-8, 2008, Milwaukee, WI.

Kelley, A., Fay, P.A., Jin, V.L., Polley, H.W., Jackson, R.B. 2008. Interaction of soil type and carbon dioxide concentration in grassland soil pore water nitrogen concentrations. Proceedings of the Ecological Society of America, August 3-8, 2008, Milwaukee, WI.

Procter, A., Kelley, A., Fay, P.A., Jin, V.L., Polley, H.W., Jackson, R.B. 2008. Soil type interacts with soil respiration in prairie exposed to a gradient CO₂. Proceedings of the Ecological Society of America, August 3-8, 2008, Milwaukee, WI.

Jin, V.L., P.A. Fay, W.H. Polley, H.B. Johnson, C.S. Romanek. 2008. Changes in pedogenic carbonate accumulation under altered atmospheric CO₂ in a mesic calcareous grassland. EOS Trans. AGU, 89(53), Fall Meet. Suppl., December 15-19 2008, San Francisco, CA.

Polley, H.W., Fay, P.A. 2008. Change is in the air: impacts of the historical and predicted increase in atmospheric CO₂ on pasture and prairie. Proceedings of the Society for Range Management, January 26-31, 2008, Louisville, KY.

Polley, H.W., H.B. Johnson, P.A. Fay. 2007. Response of evapotranspiration from tallgrass prairie vegetation to CO₂ at subambient to elevated concentrations. 92nd Annual Meeting, Ecological Society of America (ESA), August 5-10, 2007, San Jose, CA.

Blair, J.M., P.A. Fay, A.K. Knapp, M.D. Smith, J.D. Carlisle. 2007. Interactive effects of warming and altered rainfall timing on ecosystem processes in tallgrass prairie. 92nd Annual Meeting, Ecological Society of America (ESA), August 5-10, 2007, San Jose, CA.

Fay, P.A. 2007. Photosynthetic water use efficiency and biomass of *Sorghastrum nutans* (C₄) and *Solidago canadensis* (C₃) in three soils along a CO₂ concentration gradient. 92nd Annual Meeting, Ecological Society of America (ESA), August 5-10, 2007, San Jose, CA.

Fay, P.A., D. Hui, A. Procter, V.L. Jin, H.B. Johnson, H.W. Polley, R.B. Jackson. 2007. Photosynthetic water use efficiency and biomass of *Sorghastrum nutans* (C₄) and *Solidago Canadensis* (C₃) in three soils along a CO₂ concentration gradient. European Geosciences Union General Assembly, April 15-20, 2007, Vienna, Austria.

Fay, P.A., D. Hui, A. Procter, H.B. Johnson, H.W. Polley. 2006. Photosynthetic water use efficiency in *Sorghastrum nutans* (C₄) and *Solidago Canadensis* (C₃) in three soils along a CO₂ concentration gradient. EOS Trans. AGU, 87(52), Fall Meet. Suppl., December 11-15 2006, San Francisco, CA.

Hui, D., P.A. Fay, A. Procter, H.B. Johnson, H.W. Polley, R.B. Jackson. 2006. Response of soil respiration to a subambient to elevated CO₂ gradient in grassland ecosystems. EOS Trans. AGU, 87(52), Fall Meet. Suppl., December 11-15 2006, San Francisco, CA.

Smith, M., S. Travers, K. Garrett, J. Bai, S. Hulbert, A. Knapp, J. Leach, P.A. Fay. 2006. Ecological genomics: making the leap from model systems in the lab to native populations in the field. 91st Annual Meeting, Ecological Society of America (ESA), August 6-11, 2006, Memphis, TN.

- Fay, P.A., D.M. Kaufman, J.B. Nippert, J.M. Blair, S.L. Collins, A.K. Knapp, M.D. Smith, J.D. Carlisle. 2006. Ecosystem response to rainfall variability and warming in a mesic grassland. European Geosciences Union General Assembly, April 2-7, 2006, Vienna, Austria.
- Collins, S.L., L. Calabrese, M.D. Smith, P.A. Fay. 2005. Climate drivers and rate of change in mesic and arid grasslands. 90th Annual Meeting, Ecological Society of America, Montreal, Quebec, Canada.
- Fay, P.A., M.D. Smith, S.E. Travers, J.B. Nippert, J.M. Blair, S.L. Collins, A.K. Knapp, J.F. Bai, K.A. Garrett, S.H. Hulbert, J.E. Leach. 2005. Ecological responses to precipitation quantity and frequency in grasslands: Pattern and process from the gene to the ecosystem. 90th Annual Meeting, Ecological Society of America, Montreal, Quebec, Canada.
- Kaufman, D.M., C.W. Harper, J.B. Nippert, P.A. Fay, J.M. Blair. 2005. Ecosystem responses to rain-event quantity, interval, and event size in model grassland assemblages. 90th Annual Meeting, Ecological Society of America, Montreal, Quebec, Canada.
- Fay, P.A., D.M. Kaufman, J.M. Blair, S.L. Collins, A.K. Knapp, M.D. Smith, J.B. Nippert, C.W. Harper. 2005. Rainfall variability and ecosystem response in a mesic grassland. European Geosciences Union General Assembly, April 24 – 29 2005, Vienna, Austria. Geophysical Research Abstracts 7: 11155.
- Knapp, A.K., J.M. Blair, P.A. Fay, M.D. Smith, S.L. Collins, J.M. Briggs. 2005. Long-term responses of a mesic grassland to manipulation of rainfall quantity and pattern. 20th International Grassland Congress, June 26 – July 1, 2005, Dublin, Ireland.
- Smith, M.D., J.F. Bai, J.M. Blair, P.A. Fay, K.A. Garrett, S.H. Hulbert, A.K. Knapp, J.E. Leach, S.E. Travers. 2004. Bridging the divide: Linking genomics to ecosystem responses to climate change. Genes in Ecology, Ecology in Genes Symposium, Kansas Ecological Genomics program, Oct 2-3, Overland Park, KS.
- Fay, P.A., J.D. Carlisle, C.W. Harper, M.D. LaRosh, J.B. Nippert, J.M. Blair, A.K. Knapp, S.L. Collins. 2004. Productivity, photosynthesis and soil respiration responses to rainfall and temperature manipulations in tallgrass prairie. 89th Annual Meeting, Ecological Society of America, Portland, OR.
- Knapp, A.K., J.M. Blair, P.A. Fay, J.B. Nippert, M.D. Smith, J.M. Briggs, S.L. Collins. 2004. Contrasting responses of a mesic grassland to interannual and seasonal precipitation patterns. Invited Symposium: Interannual climate variability: how temporal signatures can drive ecosystem processes. 89th Annual Meeting, Ecological Society of America, Portland, OR.
- Nippert, J.B., P.A. Fay, A.K. Knapp. 2004. Tallgrass prairie plant species exhibit photosynthetic differences in a non-limiting resource environment. 89th Annual Meeting, Ecological Society of America, Portland, OR.
- Fay, P.A., A. Joern, J.L. Jonas. 2004. Heterogeneity and diversity in grassland ecosystems: implications for insect diversity. Invited Symposium: Entomology in Prairie Ecosystems. Annual Meeting, North Central Branch, Entomological Society of America, Kansas City, MO.
- Nippert, J.B., P.A. Fay, A.K. Knapp. 2003. Tallgrass prairie plant species exhibit photosynthetic differences in a non-limiting resource environment. LTER All Scientist Meeting, Seattle, WA.
- McCarron, J.K., K.A. Garrett, P.A. Fay, S.P. Dendy, H.M. Alexander, B.M. Broeckelman. 2003. The effect of altered rainfall patterns on leaf rust severity in *Solidago canadensis*. 88th Annual Meeting, Ecological Society of America, Savannah, GA.
- Harper, C., J. Blair, P.A. Fay, A. Knapp, J. Carlisle. 2002. Altered rainfall patterns affect soil respiration, nitrogen availability, and decomposition in a tallgrass prairie ecosystem. Proceedings of the 87th Annual

Meeting, Ecological Society of America (ESA), August 4-9, 2002, Tucson, AZ.

Fay, P.A., A.K. Knapp, J.M. Blair, S.L. Collins, C.W. Harper. 2001. Rainfall manipulations mirror topography effects on productivity and water relations in tallgrass prairie. 86th Annual Meeting, Ecological Society of America, Madison, WI.

Carlisle, J.D., P.A. Fay, A.K. Knapp, J.M. Blair. 2000. Grassland responses to altered rainfall regimes: Mechanisms for productivity and species composition responses to increased inter-rainfall intervals. 85th Annual Meeting, Ecological Society of America, Snowbird, UT.

Fay, P.A., J.M. Blair, J.D. Carlisle, A.K. Knapp, M.S. Lett. 2000. Initial plant productivity and species composition responses to lengthened inter-rainfall intervals in a grassland: possible consequences of altered rainfall patterns. 85th Annual Meeting, Ecological Society of America, Snowbird, UT.

Quist, M.C., P.A. Fay, C.S. Guy, A.K. Knapp, B.N. Rubenstein, C. Phillips. 2000 The influence of disturbance from military training activities on terrestrial-aquatic linkages in a tallgrass prairie ecosystem. 65th North American Wildlife & Natural Resource Conference, National Military Fish & Wildlife Association, Rosemont, IL.

Fay, P.A., J.D. Carlisle, J.K. Koelliker, J.M. Blair, A.K. Knapp. 1999. The importance of timing: Aboveground net primary productivity in tallgrass prairie depends on when rain falls and on quantity. 84th Annual Meeting, Ecological Society of America, Spokane, WA.

External Reviewer Services

American Journal of Botany, American Midland Naturalist, Austral Ecology, Biotropica, Department of Energy, Ecology, Ecological Applications, Environmental Management, European Journal of Entomology, International Journal of Plant Sciences, National Science Foundation, New Phytologist, Oecologia, Prairie Naturalist, Restoration Ecology, United States Department of Agriculture, National Geographic Society.

Invited Seminars (Since 1992)

Penn State University Department of Crop and Soils, February 2011

University of Texas San Antonio Department of Biology, March, 2010

Texas A&M University Department of Ecosystem Science and Management, October, 2008

Texas State University Department of Biology, May 2007

Texas A&M University Department of Rangeland Ecology and Management, May 2007

Texas State University San Marcos, Department of Biology, May 2007

New Mexico State University Department of Biology, March 2007

University of Texas School of Biological Sciences, January 2007

University of Minnesota Duluth Department of Biology, January 2005

Duke University, Center on Global Change, November 2004

University of Tennessee, Department of Biology, January 2004

USDA-ARS Grassland Soil, and Water Research Laboratory, February 2003

University of Nebraska Lincoln, School of Natural Resource Sciences, October 2002

USDA-ARS United States Water Conservation Laboratory, July 2002

University of Minnesota-Duluth, Department of Biology, March 2002.

University of Memphis, Department of Biology, February 2002.

Texas Tech University, Department of Biology, January 2002.

Portland State University, Department of Biology, January 2002.

USDA-ARS Southern Weed Science Research Unit, May 2001.

USDA-ARS Eastern Oregon Agricultural Research Center, July 2000.

USDA-ARS Grazinglands Research Laboratory, February 2000.

Kansas State University, Division of Biology, February 2000.
Central States Entomology Society 75th Annual Meeting, Manhattan, KS May 1999.
American Chemical Society 53rd Southwest Regional Meeting, Tulsa, OK. October 1997.
Kansas State University, Department of Entomology, October 1997.
Emporia State University, Department of Biology, January 1994.
Kansas State University, Department of Entomology, October 1993.
University of Central Arkansas, Department of Biology, November 1992.
Kansas State University, Department of Entomology, January 1992.

Mentoring

L. Reichmann, post-doc, 2012 - present
M. Aspinwall, post-doc, 2010 – present
V.L. Jin, post-doc, 2006 - 2009
D.M. Kaufman, post-doc, 2004 - 2006
C. Harper (co-advised with J.M. Blair) M.S. student 2002
B. Darby, REU, summer 2001
B.N. Rubenstein (co-advised with J.M. Blair, A.K. Knapp), M.S. student 2000
C. Stewart, REU, summer 1999
J.S. Pike, REU, summer 1998
E. Zacharias, REU, summer 1997
H.L. Throop, REU, summer 1996

Memberships

Ecological Society of America
American Geophysical Union