

## **John M. Blair**

Division of Biology – Kansas State University  
Manhattan, KS 66506  
785-532-7065 – jblair@ksu.edu

### **Education**

Ph.D.	1987	University of Georgia, Athens, GA	Entomology (Ecology emphasis)
M.S.	1983	Kent State University, Kent, OH	Biology
B.S.	1980	Kent State University, Kent, OH	Biology

### **Positions Held**

2008-present	Edwin G. Brychta Professor of Biology, Division of Biology, Kansas State University
2006-present	University Distinguished Professor, Division of Biology, Kansas State University
2001-2006	Professor, Division of Biology, Kansas State University
1999-present	Director and PI, Konza Prairie Long-Term Ecological Research (LTER) Program
1997-2001	Associate Professor, Division of Biology, Kansas State University
1992-1997	Assistant Professor, Division of Biology, Kansas State University
1991-1992	Research Scientist, Dept Entomology (Soil Ecology Program), Ohio State University
1988-1991	Senior Researcher, Dept Entomology (Soil Ecology Program), Ohio State University
1987-1988	Postdoctoral Associate, Department of Entomology, University of Georgia

### **Research Interests**

Ecosystem ecology and terrestrial biogeochemistry; Grasslands and global change; Soil ecology, including decomposition, soil nutrient cycling, litter/soil/plant nutrient dynamics; Effects of climate change and other disturbances on ecosystem processes; Restoration ecology; Ecology of soil invertebrates.

### **Membership in Professional Societies**

American Institute of Biological Sciences  
Ecological Society of America  
International Soil Science Society  
Soil Ecology Society (President, 1996-97)

### **Professional Activities, Recognition and Awards**

Member, National Ecological Observatory Network (NEON, Inc.) Board of Directors, 2009-2012  
Member, Review Panel, NSF Frontiers in Integrated Biology Research Program, 2007  
Invited Participant, North American Carbon Project, 2006-present  
Member, LTER Network Science Conference Committee, 2005-2006  
Invited Participant, Interagency Ecosystems Working Group for the Climate Change Science Plan, 2004  
Member, LTER Network Science Working Group (Biogeochemistry), 2004-2005  
Member, National Ecological Observatory Network (NEON) Design Consortium, Science and Human Dimensions Committee, Biogeochemical Cycles Subcommittee, 2004-2005  
Member, Review Panel, EPA STAR Fellowship Program, 2004  
Member, Review Panel, NSF BE-Coupled Biogeochemical Cycles Program, 2003-2004  
Member, College of Reviewers for the Canada Research Chairs Program, 2002-present  
Member, LTER Coordinating Committee/Science Council, 1999-present  
Member, Review Panel, NSF Integrated Rsrch Challenges in Environ Biol Program, 1999-2000  
Recipient, W. L. Stamey Undergraduate Teaching Award, College of Arts and Sciences, KSU, 1998  
Member, Review Panel, NASA/NSF/DOE/USDA/EPA/NOAA TECO Program, 1998  
Member, Editorial Board, Ecology (Ecological Society of America), 1997-2000  
Member, NSF site review teams, RTG program (1994), LTER program (1997)  
President, Soil Ecology Society, 1996-1997  
Member, Editorial Board, Applied Soil Ecology (Elsevier), 1995-1997  
Member, Review Panel, NSF Dissertation Research Award Program, 1995  
Member, Editorial Board, Biology and Fertility of Soils (Springer-Verlag), 1994-1997

Member, Review Panel, USDA/NRICGP Forest/Rangeland/Crop Ecosystems Program, 1993  
Fellowship recipient, OECD Cooperative Research Project on Biological Resource Management, 1990  
Recipient, Outstanding Ph.D. Student Award, Department of Entomology, UGA, 1987  
Recipient, University of Georgia Competitive University-Wide Assistantships, 1985-1987  
Recipient, University of Georgia Foundation Scholarship Award, 1983

### **University Service**

Associate Director for Faculty Development, KSU Division of Biology, 2008-present  
Member, Dean of Arts and Sciences Search Committee, KSU, 2008-2009  
Chair, Tenure and Promotion Committee, KSU Division of Biology, 2007-present  
Member, College Committee on Planning, KSU College of Arts and Sciences, 2003-2006  
Member, Dean's Advisory Committee, KSU College of Arts and Sciences, 2002-2005  
Member, Tenure and Promotion Committee, KSU Division of Biology, 2001- 2007  
Member, Konza Environmental Educational Program (KEEP) Advisory Committee, 1999-present  
Member, Konza Prairie Biological Station Advisory Committee, 1995-present  
Member, Graduate Affairs Committee, KSU Division of Biology, 1994-2008

### **Educational Activities**

#### **Courses Taught**

Principles of Biology (BIOL 198), 1992 - present  
Fundamentals of Ecology (BIOL 529), 1993 - present  
Ecology Laboratory (BIOL 632), 2003 - present  
Nutrient Dynamics (BIOL 826), 1994 - present  
Presentations in Ecology (BIOL 862), 1994 - 2002

#### **Graduate Students Advised**

Heather A. O'Lear, M.S. 1996, Kansas State University  
Chris Bakker, M.S. 1998, University of Groningen - local supervisor for visiting student  
Mac A. Callaham, Ph.D. 2000, Kansas State University (currently Research Ecologist, USDA Forest Service, Athens, GA)  
Mark D. Norris, M.S. 2000, Kansas State University (currently Assistant Professor, Environmental Science & Biology, SUNY Brockport, NY)  
Sara G. Baer, Ph.D. 2001, Kansas State University (currently Assistant Professor, Plant Biology, Southern Illinois University, Carbondale, IL)  
Chris W. Harper, M.S. 2002, Kansas State University (currently employed by The Nature Conservancy)  
G.F. (Ciska) Veen, M.S. 2004, University of Groningen - local supervisor for visiting student (Ph.D., University of Groningen, The Netherlands)  
Duane Kitchen, Ph.D. 2005, Kansas State University (currently Associate Professor, Biology, Rockford College, Rockford, IL)  
Duncan McKinley, Ph.D. 2006, Kansas State University (currently Postdoctoral Associate, Smithsonian Environmental Research Center, Edgewater, MD)  
Kathryn N. Schmitt McCain, Ph.D. 2008, Kansas State University (currently Resource Scientist, Missouri Dept of Conservation, Jackson, MO)  
Elske Koppenaar, M.S. 2004, University of Groningen - local supervisor for visiting student (currently Ph.D. student, University of Groningen, The Netherlands)  
Steven Rostkowski, M.S. (in progress), Kansas State University  
Dan Carter, Ph.D. (in progress), Kansas State University

Served on the supervisory committees of an additional 34 graduate students in the Division of Biology, 23 graduate students in other departments at KSU, and 6 graduate students at other Universities.

### Post Doctoral Associates

Wilfred Singogo (1993-94)

Clarence Turner (1994-95)

### Undergraduate Students Mentored in Research

Jack Shaw, NSF REU, 1993

Jeffery Neel, NSF REU, 1994

Rita Schartz, NSF REU, 1994

Greg Shenk, NSF LTER, 1995

Casey Wright, NSF, 1996

Stephanie Huff, Cntr Basic Cancer  
Resrch, 1997

Mandy Stone, NSF REU, 1998

Karoline Jarr, NSF REU, 1998

Jessica Allewalt, NSF REU, 1999

Anna Fiedler, NSF REU, 2000

Judd Patterson, NSF LTER, 2003

Matt LaRosh, NSF LTER, 2003-04

Brian Hollaway, NSF REU, 2004

Patrick Mollett, K-INBRE, 2005-06

Aaron Berdanier, NSF REU, 2006

Lauren Gillespie, NSF REU, 2007

Andres Andrade, NSF REU, 2007

Lori Wadell, NSF REU 2008

### Publications – Journal Articles (names of my students are underlined)

Jangid, K.; M.A. Williams, A.J. Franzluebbbers, J.M. Blair, D.C. Coleman and W.B. Whitman. *In press*. Development of soil microbial communities during tallgrass prairie restoration. *Soil Biology & Biochemistry*.

Buis, G.M., J.M. Blair, D.E. Burkepille, C.E. Burns, A.J. Chamberlain, P. Chapman, S.L. Collins, R.W.S. Fynn, N. Govender, K. Kirkman, M.D. Smith and A.K. Knapp. 2009. Controls of aboveground net primary production in mesic grasslands and savannas: An interhemispheric comparison. *Ecosystems* 12:982–995.

Heisler-White, J.L., J.M. Blair, E.F. Kelly, K. Harmony and A.K. Knapp. 2009. Contingent productivity responses to more extreme rainfall regimes across a grassland biome. *Global Change Biology* DOI: 10.1111/j.1365-2486.2009.01961.x.

Kitchen, D.J., J.M. Blair and M.A. Callaham, Jr. 2009. Annual fire and mowing alter biomass, depth distribution, and C and N content of roots and soil in tallgrass prairie. *Plant and Soil* 323:235-247.

Melzer, S.E., A.K. Knapp, K.P. Kirkman, M.D. Smith, J.M. Blair and E.F. Kelly. 2009. Fire and grazing impacts on silica production and storage in grass dominated ecosystems. *Biogeochemistry* DOI: 0.1007/s10533-009-9371-3.

Reed, H.E., J.M. Blair, D. Wall and T.R. Seastedt. 2009. Persistent effects of past burn regimes on decomposition in response to reduced precipitation in tallgrass prairie. *Applied Soil Ecology* 42:79-85.

Baer, S.G. and J.M. Blair. 2008. Grassland establishment under varying resource availability: A test of positive and negative feedback. *Ecology* 89:1859-1871.

Macpherson, G.L., J.A. Roberts, J.M. Blair, M.A., Townsend, D.A. Fowle and K.R. Beisner. 2008. Increasing shallow groundwater CO<sub>2</sub> and limestone weathering, Konza Prairie, USA. *Geochimica et Cosmochemica Acta* 72:5581-5599.

Marshall, J.D., J.M. Blair, D. Peters, G. Okin, A. Rango and M. Williams. 2008. Predicting and understanding ecosystem responses to climate change at continental scales. *Frontiers in Ecology and the Environment* 6:273-280.

McKinley, D.C. and J.M. Blair. 2008. Woody plant encroachment by *Juniperus virginiana* in a mesic native grassland promotes rapid carbon and nitrogen accrual. *Ecosystems* 11:454-468.

McKinley, D.C., C.W. Rice and J.M. Blair. 2008. Conversion of grassland to coniferous woodland has limited effects on soil nitrogen cycle processes. *Soil Biology & Biochemistry* 40:2627-2633.

- Veen, G.F., J.M. Blair, M.D. Smith and S.L. Collins. 2008. Influence of grazing and fire frequency on small-scale plant community structure and resource variability in native tallgrass prairie. *Oikos* 117:859-866.
- Norris, M.A., J.M. Blair and L.C. Johnson. 2007. Altered ecosystem nitrogen dynamics as a consequence of land cover change in tallgrass prairie. *American Midland Naturalist* 158:432-445.
- Jones, K.L., T.C. Todd, J. L. Wall-Beam, J.D. Coolon, J.M. Blair and M.H. Herman. 2006. Molecular approach for assessing responses of microbial-feeding nematodes to burning and chronic nitrogen enrichment in a native grassland. *Molecular Ecology* 15:2601-2609.
- Reed, H., T.R. Seastedt and J.M. Blair. 2005. Ecological consequences of C<sub>4</sub> grass invasion of a C<sub>4</sub> grassland: A dilemma for management. *Ecological Applications* 15:1560-1569.
- Baer, S.G., J.M. Blair, S.L. Collins and A.K. Knapp. 2005. Soil heterogeneity effects on tallgrass prairie community heterogeneity: an application of ecological theory to restoration ecology. *Restoration Ecology* 13:413-424.
- Briggs, J.M., A.K. Knapp, J.M. Blair, J.L. Heisler, G.A. Hoch, M.S. Lett and J.K. McCarron. 2005. An ecosystem in transition: causes and consequences of the conversion of mesic grassland to shrubland. *BioScience* 55:243-254.
- Harper, C.W., J.M. Blair, P.A. Fay, A.K. Knapp and J.D. Carlisle. 2005. Increased rainfall variability and reduced rainfall amount decreases soil CO<sub>2</sub> flux in a grassland ecosystem. *Global Change Biology* 11:322-334.
- Lett, M.S., A.K. Knapp, J.M. Briggs and J.M. Blair. 2004. Influence of shrub encroachment on aboveground net primary productivity and carbon and nitrogen pools in a mesic grassland. *Canadian Journal of Botany* 82:1363-1370.
- Baer, S.G., J.M. Blair, S.L. Collins and A.K. Knapp. 2004. Plant community responses to resource availability and heterogeneity during restoration. *Oecologia* 139:617-629.
- Heisler, J.L., J.M. Briggs, A.K. Knapp, J.M. Blair and A. Seery. 2004. Direct and indirect effects of fire on shrub expansion in a mesic grassland. *Ecology* 85:2245-2257.
- Silletti, A.M., A.K. Knapp and J.M. Blair. 2004. Competition and coexistence in grassland co-dominants: responses to neighbor removal and resource availability. *Canadian Journal of Botany* 82:450-460.
- Al-Deeb, M.A., G.E. Wilde, J.M. Blair and T.C. Todd. 2003. Effect of *Bt* corn for corn rootworm control on nontarget soil microarthropods and nematodes. *Environmental Entomology* 32:859-865.
- Baer, S.G., J.M. Blair, A.K. Knapp and S.L. Collins. 2003. Soil resources regulate productivity and diversity in newly established tallgrass prairie. *Ecology* 84:724-735.
- Bakker, C., J.M. Blair and A.K. Knapp. 2003. A comparative assessment of potential mechanisms influencing plant species richness in grazed grasslands. *Oecologia* 137:385-391.
- Callahan, M.A., Jr., J.M. Blair, T.C. Todd, D.J. Kitchen, and M.R. Whiles. 2003. Macroinvertebrates in North American tallgrass prairie soils: Effects of fire, mowing, and fertilization on density and biomass. *Soil Biology & Biochemistry* 35:1079-1093.
- Fay, P.A., J.D. Carlisle, A.K. Knapp, J.M. Blair and S.L. Collins. 2003. Productivity responses to altered rainfall patterns in a C<sub>4</sub>-dominated grassland. *Oecologia* 137: 245-251.
- McCarron, J.K., A.K. Knapp, and J.M. Blair. 2003. Soil C and N responses to woody plant expansion in a mesic grassland. *Plant and Soil* 257:183-192.
- Baer, S.G., D.J. Kitchen, J.M. Blair and C.W. Rice. 2002. Changes in ecosystem structure and function in a chronosequence of grasslands restored through the Conservation Reserve Program. *Ecological Applications* 12:1688-1701.

- Callaham, M.A., Jr., M.R. Whiles and J.M. Blair. 2002. Annual fire, mowing and fertilization effects on two cicadas (Homoptera: Cicadidae) in tallgrass prairie. *American Midland Naturalist* 148:90-101.
- Fay, P.A., J.D. Carlisle, B.T. Danner, M.S. Lett, J.K. McCarron, C. Stewart, A.K. Knapp, J.M. Blair and S.L. Collins. 2002. Altered rainfall patterns, gas exchange and growth in C<sub>3</sub> and C<sub>4</sub> grassland species. *International Journal of Plant Sciences* 163:549-557.
- 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.
- Callaham, M.A., Jr., J.M. Blair and P.F. Hendrix. 2001. Different behavioral patterns of the earthworms *Octolasion tyrtaeum* and *Diplocardia* spp. in tallgrass prairie soils: potential influences on plant growth. *Biology and Fertility of Soils* 34:49-56.
- Norris, M.D., J.M. Blair and L.C. Johnson. 2001. Land cover change in eastern Kansas: litter dynamics of closed-canopy eastern redcedar forests in tallgrass prairie. *Canadian Journal of Botany* 79:214-222.
- Norris, M.D., J.M. Blair, L.C. Johnson and R.B. McKane. 2001. Assessing changes in biomass, productivity, and C and N stores following *Juniperus virginiana* forest expansion into tallgrass prairie. *Canadian Journal of Forest Research* 31:1940-1946.
- Baer, S.G., C.W. Rice and J.M. Blair. 2000. Assessment of surface soil quality in field planted to native grasses with short- and long-term enrollment in the CRP. *Journal of Soil and Water Conservation* 55:142-146.
- Blair, J.M., S.L. Collins and A.K. Knapp. 2000. Ecosystems as functional units in nature. *Natural Resources & Environment* 14:150-155. Invited essay.
- Fay, P.A., J.D. Carlisle, A.K. Knapp, J.M. Blair and 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.
- Callaham, M.A. Jr. and J.M. Blair. 1999. Influence of differing land management on the invasion of North American tallgrass prairie soils by European earthworms. *Pedobiologia* 43:507-512.
- Hendrix, P.F., M.A. Callaham, Jr., S.L. Lachniet, J.M. Blair, S.W. James and X. Zou. 1999. Stable isotopic studies of resource utilization by nearctic earthworms (*Diplocardia*, Oligochaeta) in subtropical savanna and forest ecosystems. *Pedobiologia* 43:818-823.
- Knapp, A.K., J.M. Blair, J.M. Briggs, S.L. Collins, D.C. Hartnett, L.C. Johnson and E.G. Towne. 1999. The keystone role of bison in North American tallgrass prairie. *BioScience* 49:39-50.
- O'Lear, H.A. and J.M. Blair. 1999. Responses of soil microarthropods to changes in soil water availability in tallgrass prairie. *Biology and Fertility of Soils* 29:207-217.
- Todd, T.C., J.M. Blair and G.A. Milliken. 1999. Effects of altered soil water availability on a tallgrass prairie nematode community. *Applied Soil Ecology* 13:45-55.
- Collins, S.L., A.K. Knapp, J.M. Briggs, J.M. Blair and E. Steinauer. 1998. Modulation of diversity by grazing and mowing in native tallgrass prairie. *Science* 280:745-747.
- Knapp, A.K., S.L. Conard and J.M. Blair. 1998. Determinants of soil CO<sub>2</sub> flux from a sub-humid grassland: effect of fire and fire history. *Ecological Applications* 8:760-770.
- Blair, J.M. 1997. Fire, N availability, and plant response in grasslands: A test of the transient maxima hypothesis. *Ecology* 78:2359-2368.
- Turner, C.L., J.M. Blair, R.J. Scharztz and J.C. Neel. 1997. Soil N availability and plant response in tallgrass prairie: Effects of fire, topography and supplemental N. *Ecology* 78:1832-1843.

- Blair, J.M., M.F. Allen, R.W. Parmelee, D.A. McCartney and B.R. Stinner. 1997. Changes in soil N pools in response to earthworm population manipulations under different agroecosystem treatments. *Soil Biology & Biochemistry* 29:361-367.
- Ketterings, Q.M., J.M. Blair and J.C.Y. Marinissen. 1997. Effects of earthworm activity on soil aggregate stability and carbon and nitrogen storage in a legume cover crop nitrogen-based agroecosystem. *Soil Biology & Biochemistry* 29:401-408.
- Stinner, B.R., D.A. McCartney, J.M. Blair, R.W. Parmelee and M.F. Allen. 1997. Effects of organic and inorganic fertilized agroecosystems and earthworm manipulations on crop and weed biomass. *Soil Biology & Biochemistry* 29:423-426.
- Nokes, S.E., N.R. Fausey, S. Subler and J.M. Blair. 1997. Stand, yield, weed biomass, and surface residue cover comparisons between three cropping/tillage systems on a well-drained silt loam soil in Ohio, USA. *Soil and Tillage Research* 44:95-108.
- O'Lear, H.A., T.R. Seastedt, J.M. Briggs, J.M. Blair and R.A. Ramundo. 1996. Fire and topographic affects on decomposition rates and nitrogen dynamics of buried wood in tallgrass prairie. *Soil Biology & Biochemistry* 28:323-329.
- Willems, J.J.G.M., J.C.Y. Marinissen and J.M. Blair. 1996. Effects of earthworms on nitrogen mineralization. *Biology and Fertility of Soils* 23:57-63.
- Dodds, W.K., J.M. Blair, G.M. Henebry, J.K. Koelliker, R. Ramundo and C.M. Tate. 1996. Nitrogen transport from tallgrass prairie by streams. *Journal of Environmental Quality* 25:973-987.
- Blair, J.M., P.J. Bohlen, C.A. Edwards, B.R. Stinner, D.A. McCartney and M.F. Allen. 1995. Manipulation of earthworm populations in field experiments in agroecosystems. *Acta Zoologica Fennica* 196:48-51.
- Subler, S., J.M. Blair and C.A. Edwards. 1995. Using anion exchange membranes to measure soil nitrate availability and net nitrification. *Soil Biology & Biochemistry* 27:911-917.
- Bohlen, P.J., R.W. Parmelee, J.M. Blair, C.A. Edwards and B.R. Stinner. 1995. Efficacy of methods for manipulating earthworm populations in large-scale field experiments in agroecosystems. *Soil Biology & Biochemistry* 27:993-999.
- Blair, J.M., R.W. Parmelee and R.L. Wyman. 1994. A comparison of forest floor invertebrate communities of four forest types in the northeastern U.S. *Pedobiologia* 38:146-160.
- Blair, J.M., D.A. Crossley, Jr. and L.C. Callaham. 1992. Incorporation of exogenous <sup>15</sup>N in decomposing litter and movement through the forest floor profile: Effects of litter quality and microarthropods. *Biology and Fertility of Soils* 12:241-252.
- Blair, J.M., D.A. Crossley, Jr., and L.C. Callaham. 1991. A litterbasket technique for measurement of nutrient dynamics in forest floor. *Agriculture, Ecosystems and Environment* 34:465-471.
- Crossley, D.A., Jr and J.M. Blair. 1991. A high-efficiency, "low-technology" Tullgren-type extractor for soil microarthropods. *Agriculture, Ecosystems and Environment* 34:187-192.
- Blair, J.M., R.W. Parmelee and M.H. Beare. 1990. Decay rates, nitrogen fluxes and decomposer communities of single- and mixed-species foliar litter. *Ecology* 71:1976-1985.
- Blair, J.M., D.A. Crossley, Jr. and S. Rider. 1989. Effects of naphthalene on microbial activity and nitrogen pools in soil-litter microcosms. *Soil Biology & Biochemistry* 21:507-510.
- Parmelee, R.W., M.H. Beare, and J.M. Blair. 1989. Decomposition and nitrogen dynamics of surface weed residues in no-tillage agroecosystems under drought conditions: Influence of resource quality on the decomposer community. *Soil Biology & Biochemistry* 21:97-103.
- Beare, M.H., J.M. Blair and R.W. Parmelee. 1989. Resource quality and trophic response to simulated throughfall: Effects on decomposition and nutrient flux in a no-tillage agroecosystem. *Soil Biology & Biochemistry* 21:1027-1036.

Blair, J.M. 1988. Nitrogen, phosphorus and sulfur dynamics in decomposing deciduous leaf litter in the southern Appalachians. *Soil Biology & Biochemistry* 20:693-701.

Blair, J.M. 1988. Nutrient release from decomposing foliar litter of three tree species with special reference to calcium, magnesium and potassium dynamics. *Plant and Soil* 110: 49-55.

Blair, J.M., and D.A. Crossley, Jr. 1988. Litter decomposition, nitrogen dynamics and litter microarthropods in a southern Appalachian hardwood forest eight years following clearcutting. *Journal of Applied Ecology* 25:683-698.

Blair, J.M., and B.A. Foote. 1984. Resource partitioning in five sympatric species of *Scatella* (Diptera: Ephydriidae). *Environmental Entomology* 13:1336-1339.

### **Publications – Book Chapters**

McKinley, D.C., M.D. Norris, L.C. Johnson, and J.M. Blair. 2008. Biogeochemical changes associated with *Juniperus virginiana* encroachment into grasslands. Pages 170-187 In *Ecological Studies Series 196 - Western North American Juniperus Communities: A Dynamic Vegetation Type* (O.W. Van Auken ed.), Springer-Verlag, NY.

Knapp A.K., J.K. McCarron, A.M. Silletti, G.A. Hoch, J.L. Heisler, M.S. Lett, J.M. Blair, J.M. Briggs, and M.D. Smith. 2008. Ecological consequences of the replacement of native grassland by *Juniperus virginiana* and other woody plants. Pages 156-169 In *Ecological Studies Series 196 - Western North American Juniperus Communities: A Dynamic Vegetation Type* (O.W. Van Auken ed.), Springer-Verlag, NY.

Bohlen, P.J., R.W. Parmelee and J.M. Blair. 2004. Integrating the effects of earthworms on nutrient cycling across spatial and temporal scales. Pages 161-180 In *Earthworm Ecology, 2<sup>nd</sup> Ed.* (C.A. Edwards, ed.). CRC Press, St. Lucie Press, Boca Raton, Florida.

Fay, P.A., A.K. Knapp, J.M. Blair, J.D. Carlisle, J.K. McCarron, B.T. Danner. 2003. Rainfall timing, soil moisture dynamics, and plant responses in a mesic tallgrass prairie ecosystem. Pages 147-163 In *Changing Precipitation Regimes and Terrestrial Ecosystems. A North American Perspective.* (J.F. Weltzin and G.R. McPherson, eds.), University of Arizona Press.

Blair, J.M., T.C. Todd and M.A. Callahan, Jr. 2000. Responses of grassland soil invertebrates to natural and anthropogenic disturbances. Pages 43-71 In *Invertebrates as Webmasters in Ecosystems* (D.C. Coleman and P.F. Hendrix, eds.), CAB International Press.

Coleman, D.C., J.M. Blair, E.T. Elliott and D.H. Wall. 1999. Soil invertebrates. Pages 349-377 In *Standard Soil Methods for Long Term Ecological Research* (G.P. Robertson, C.S. Bledsoe, D.C. Coleman and P. Sollins, eds.) Oxford University Press, New York.

Harmon, M.E., K.J. Nadelhoffer and J.M. Blair. 1999. Measuring decomposition, nutrient turnover and stores in plant litter. Pages 202-240 In *Standard Soil Methods for Long Term Ecological Research* (G.P. Robertson, C.S. Bledsoe, D.C. Coleman and P. Sollins, eds.) Oxford University Press, New York.

Robertson, G.P., D. Wedin, P.M. Groffman, J.M. Blair, E. Holland, K.J. Nadelhoffer and D. Harris. 1999. Soil carbon and nitrogen availability: Nitrogen mineralization, nitrification, soil respiration potentials. Pages 258-271 In *Standard Soil Methods for Long Term Ecological Research* (G.P. Robertson, C.S. Bledsoe, D.C. Coleman and P. Sollins, eds.) Oxford University Press, New York.

Parmelee, R.W., P.J. Bohlen and J.M. Blair. 1998. Earthworms and nutrient cycling processes: Integrating across the ecological hierarchy. Pages 123-143 In *Earthworm Ecology* (C.A. Edwards, ed.). CRC Press, St. Lucie Press, Boca Raton, FL.

Blair, J.M., T.R. Seastedt, C.W. Rice and R.A. Ramundo. 1998. Terrestrial nutrient cycling in tallgrass prairie. Pages 222-243 In *Grassland Dynamics: Long-Term Ecological Research in Tallgrass Prairie* (A.K. Knapp, J.M. Briggs, D.C. Hartnett and S.L. Collins, eds.), Oxford University Press, NY.

Knapp, A.K., J.M. Briggs, J.M. Blair and C.L. Turner. 1998. Patterns and controls of aboveground net primary productivity in tallgrass prairie. Pages 193-221 In *Grassland Dynamics: Long-Term Ecological Research in Tallgrass Prairie* (A.K. Knapp, J.M. Briggs, D.C. Hartnett and S.L. Collins, eds.) Oxford University Press, NY.

Rice, C.W., T.C. Todd, J.M. Blair, T.R. Seastedt, R.A. Ramundo and G.W.T. Wilson. 1998. Belowground biology and processes. pp 244-264 In *Grassland Dynamics: Long-Term Ecological Research in Tallgrass Prairie* (A.K. Knapp, J.M. Briggs, D.C. Hartnett and S.L. Collins, eds.), Oxford University Press, NY.

Blair, J.M., P.J. Bohlen and D.W. Freckman. 1996. Soil invertebrates as indicators of soil quality. Pages 283-301 In *Methods for Assessing Soil Quality* (J.W. Doran and A.J. Jones, eds), SSSA Special Publication No. 49, Soil Science Society of America, Inc., Madison, WI.

Hendrix, P.F., D.A. Crossley, Jr., J.M. Blair and D.C. Coleman. 1990. Soil biota as components of sustainable agroecosystems. Pages 637-654 In *Sustainable Agricultural Systems* (C.A. Edwards, R. Lal, P. Madden, R.H. Miller and G. House, eds.), Soil and Water Conservation Society, Ankeny, Iowa.

Blair, J.M., R.W. Parmelee and P. Lavelle. 1995. Influences of earthworms on biogeochemistry. Pages 125-156 In *Earthworm Ecology and Biogeography in North America* (P.F. Hendrix, ed.). CRC Press, Inc., Lewis Publishers, Boca Raton, FL.

Stinner, B.R. and J.M. Blair. 1990. Agronomic and ecological characteristics of innovative cropping systems. Pages 123-140 In *Sustainable Agricultural Systems* (C.A. Edwards, R. Lal, P. Madden, R.H. Miller and G. House, eds.), Soil and Water Conservation Society, Ankeny, Iowa.

### **Publications – Proceedings and Special Publications**

Baer, S.G., J.M. Blair and A.K. Knapp. 1999. Manipulation of soil resource heterogeneity in a tallgrass prairie restoration. Pages 78-87 In *Proceedings of the Sixteenth North American Prairie Conference* (J.T. Springer, ed.), University of Nebraska at Kearney, Kearney, NE.

Knapp, A. K., J. M. Blair and J. M. Briggs. 1998. Long-term ecological consequences of varying fire frequency in a humid grassland. Pages 173-178 In *Fire in Ecosystem Management: Shifting the Paradigm from Suppression to Prescription* (T.L. Pruden and L.A. Brennan, eds.), Tall Timbers Fire Ecology Conference, No. 20, Tall Timbers Research Station, Tallahassee, FL.

Su, H., J.M. Briggs, A.K. Knapp, J.M. Blair, and J.R. Krummel. 1996. Detecting Spatial and temporal patterns of aboveground production in a tallgrass prairie using remotely-sensed data. Pages 2361-2365 In *1996 International Geoscience and Remote Sensing Symposium Proceedings*, IEEE (Institute of Electrical and Electronics Engineers, Inc.), Vol. IV.

Nokes, S.E., J.M. Blair and S. Subler. 1993. Evaluation of crop and weed growth differences between management systems at the Ohio MSEA for 1991 and 1992. Pages 292-294 In *Agricultural Research to Protect Water Quality (Proceedings of the Conference, Feb. 21-24, 1993, Minneapolis, Minnesota)*. Soil and Water Conservation Society, Ankeny, IA.

Subler, S., J.M. Blair, C.A. Edwards, S.E. Nokes and M. McCort. 1993. Nitrogen cycling in newly established chisel-plow and ridge-till corn systems at the Ohio MSEA: Differences in fertilizer use efficiency. Pages 530-532 In *Agricultural Research to Protect Water Quality (Proceedings of the Conference, Feb. 21-24, 1993, Minneapolis, Minnesota)*. Soil and Water Conservation Society, Ankeny, IA.

### **Publications – Educational**

Nippert, J.B., and J.M. Blair. Comparing the influence of precipitation, fire, and topography on plant productivity in the tallgrass prairie. *Teaching Issues and Experiments in Ecology*, Vol. 3: Issues: Data Set #1 [[http://tiee.ecoed.net/vol/v3/issues/data\\_sets/konza/abstract.html](http://tiee.ecoed.net/vol/v3/issues/data_sets/konza/abstract.html)]. 2005.

### **Major Grants Funded (approx. \$30M in funded projects; \$13M as PI and \$17M as Co-PI)**

Collaborative research: Convergence and contingencies in savanna grasslands. M.D. Smith (PI-Yale) A.K. Knapp (PI-CSU), and S.L. Collins (PI-UNM), J.M. Blair (PI-KSU)

Funding Agency: NSF  
Duration: 2009 - 2012  
Award Amount: \$707,000 (\$64,063 KSU portion)

LTER VI: Grassland dynamics and long-term trajectories of change. J.M. Blair (PI), W.K. Dodds, D.C. Hartnett, A. Joern, J.B. Nippert and others

Funding Agency: NSF Long-Term Ecological Research Program  
Duration: 2008 – 2014  
Award Amount: \$5,640,000

Collaborative Research: Interactive effects of altered rainfall timing and elevated temperature on soil communities and processes. J.M. Blair (PI), and A.K. Knapp

Funding Agency: DOE/NICCR  
Period Covered: 2007 – 2010  
Award Amount: \$502,552 (\$365,992 KSU portion)

Grassland structure and function in response to warming and more extreme precipitation patterns. A.K. Knapp (PI), J.M. Blair (Co-PI), and M.D. Smith

Funding Agency: UDSA/NRI Managed Ecosystems Program  
Period Covered: 2007 – 2010  
Award Amount: \$399,648 (\$148,108 to KSU)

En-Gen: Ecological genomics of soil nematode community responses: Model and non-model approaches. M.H. Herman (PI), K.L. Jones, T.C. Todd and J.M. Blair (Co-PI)

Funding Agency: NSF Environmental Genomics Program  
Period Covered: 2007 – 2010  
Award Amount: \$622,598

Understanding and forecasting ecological change: Causes, trajectories and consequences of environmental change in the Central Plains. W.K. Dodds (PI), J.M. Blair (Co-PI), and J. Harrington

Funding Agency: NSF EPSCoR Program  
Period Covered: 2006 – 2009  
Award Amount: \$3,488,700

Collaborative research: Convergence and contingencies in savanna grasslands. A.K. Knapp (PI-CSU), J.M. Blair (PI-KSU), M. Smith (PI-Yale) and S.L. Collins (PI-UNM)

Funding Agency: NSF Ecology & Ecosystems Programs  
Period Covered: 2005 – 2008  
Award Amount: \$830,000 (\$150,000 KSU portion)

Collaborative research: LTREB- Long-term ecosystem responses to more extreme precipitation patterns and warming. J.M. Blair (PI-KSU) and A.K. Knapp (PI-CSU)

Funding Agency: NSF LTREB Program  
Period Covered: 2005 – 2010  
Award Amount: \$300,000 (\$202,065 KSU portion)

Effects of altered rainfall timing and warming on soil processes and plant responses in a grassland ecosystem. J.M. Blair (PI), A.K. Knapp and P.A. Fay

Funding Agency: DOE/NICCR  
Period Covered: 2006 – 2007  
Award Amount: \$135,837

Effects of altered rainfall timing and warming on soil processes and plant responses in a grassland ecosystem. J.M. Blair (PI), A.K. Knapp and P.A. Fay

Funding Agency: DOE/NIGEC

Period Covered: 2005 – 2006  
Award Amount: \$133,500

Bridging the divide: Linking genomics to ecosystem responses to climatic change. M.D. Smith (PI), J. Bai, J.M. Blair (Co-PI), P.A. Fay, K. Garrett, S. Hulbert, A.K. Knapp, J. Leach and S. Travers.

Funding Agency: DOE, Office of Science (BER), Program for Ecosystem Research  
Period Covered: 2004 – 2007  
Award Amount: \$1,484,939

Strategically positioning K-State to benefit from NSF's CUAHSI and NEON programs. D.R. Steward (PI), J.M. Blair (Co-PI) and J. K. Koelliker.

Funding Agency: KSU Provost's Targeted Excellence Program  
Period Covered: 2005 – 2007  
Award Amount: \$381,790

Functional genomic approaches to study organismal response to global environmental change. M. Herman (PI), L.C. Johnson (PI), J.M. Blair (Co-PI) and others.

Funding Agency: NSF EPSCoR Program  
Period Covered: 2003 – 2006  
Award Amount: \$2,091,528

Ecosystem responses to experimental warming and more extreme precipitation patterns. A.K. Knapp (PI) and J.M. Blair (Co-PI)

Funding Agency: UDSA/NRI Managed Ecosystems Program  
Period Covered: 2003 – 2007  
Award Amount: \$300,000

Climatic variability and ecosystem response: Precipitation patterns, soil moisture dynamics, and productivity in tallgrass prairie. J.M. Blair (PI) and P.A. Fay

Funding Agency: NSF Ecosystems Program  
Period Covered: 2002 – 2006  
Award Amount: \$447,214

LTER V: Long-term research on grassland dynamics and global change. J.M. Blair (PI), J.M. Briggs, D.C. Hartnett, L.C. Johnson, A.K. Knapp and others

Funding Agency: NSF Long-Term Ecological Research Program  
Duration: November 1, 2002 – October 31, 2009  
Award Amount: \$4,680,000 (original request) + \$641,722 (supplemental funding)

Belowground responses to multiple climate change factors: Interactive effects of warming and more extreme precipitation patterns on grassland ecosystems. J.M. Blair (PI), A.K. Knapp and P.A. Fay.

Funding Agency: DOE/NIGEC  
Duration: July 1, 2002 – Sept 30, 2005  
Award: \$394,475

Scaling up the ecosystem consequences of forest expansion in the Great Plains region: A renewal proposal. L.C. Johnson (PI), K. Price, J.M. Blair (Co-PI), and R.B. McKane.

Funding Agency: NASA/Land Cover and Land-Use Change Research  
Duration: October 15, 2001 – October 14, 2004  
Award Amount: \$575,000

International collaboration to assess comparative responses of South African and North American grasslands to fire. A.K. Knapp (PI) and J.M. Blair (Co-PI)

Funding Agency: NSF International Studies Program  
Duration: February 15, 2000 – February 14, 2001  
Award: \$26,232

Acquisition of an isotope ratio mass spectrometer in the KSU-UK-CU Consortium. L.C. Johnson (PI), J.M. Blair (Co-PI), W.K. Dodds, G.L. Macpherson and V. Terwilliger

Funding Agency: National Science Foundation  
Duration: September 1, 1999 – August 31, 2001  
Award: \$169,400

Grassland ecosystem responses to the experimental manipulation of precipitation. A.K. Knapp (PI), J.M. Blair (Co-PI) and P.A. Fay

Funding Agency: USDA/NRI Ecosystems Program  
Duration: September 1, 1999 – August 31, 2002  
Amount: \$253,500

Belowground responses to manipulation of precipitation timing and amounts in a grassland. J.M. Blair (PI), A.K. Knapp and P.A. Fay

Funding Agency: DOE/NIGEC  
Duration: July 1, 1999 – June 30, 2002.  
Amount: \$331,000

The Tallgrass Prairie of the Flint Hills: A documentary. D.C. Hartnett (PI), J.S. Altman, A.G. Larrabee, A.K. Knapp and J.M. Blair (Co-PI)

Funding Agency: NSF Informal Science Education Program  
Duration: July 1, 1998 - June 30, 2000  
Amount: \$383,780

Land-cover change in the Great Plains: Predicting the impacts of regional forest expansion on biogeochemical processes. L. Johnson (PI), J.M. Briggs, J.M. Blair (Co-PI), C.W. Rice, J. Ham and R.B. McKane.

Funding Agency: NASA/Land Cover and Land-Use Change Research  
Duration: May 1, 1997 - April 30, 2000.  
Amount: \$485,000

Evaluating the role of resource heterogeneity in restoring grasslands. A. Knapp (PI) & J.M. Blair (Co-PI).

Funding Agency: NSF Basic Research in Conservation and Restoration Biology  
Duration: February 1, 1997 - September 30, 2000.  
Amount: \$178,196

Experimental manipulation of variability in precipitation in grasslands. A. Knapp (PI) & J. Blair (Co-PI).

Funding Agency: USDA/NRICGP Ecosystems Program  
Duration: September 1, 1996 - August 30, 1999  
Amount: \$288,915

Acquisition of two controlled environmental chambers. L.C. Johnson (PI), A.K. Knapp, J.M. Blair (Co-PI), D.C. Hartnett, C.R. Rice and T.C. Todd.

Funding Agency: USDA/NRICGP Equipment Program  
Duration: September 1, 1996 - August 31, 1997  
Amount: \$49,171

Long-term ecological research in tallgrass prairie: The Konza Prairie LTER Program. A.K. Knapp (PI), J.M. Briggs, J.M. Blair (Co-PI) D.C. Hartnett, L.C. Johnson, D.W. Kaufman, and W.K. Dodds.

Funding Agency: NSF Long-Term Ecological Research Program  
Duration: October 15, 1996 - October 14, 2002  
Amount: \$3,360,000 (original request) + 703,236 (supplemental funding)

Acquisition of high performance liquid chromatograph and gas chromatograph/mass spectrometer for studying dissipation of organic contaminants. A.P. Schwab (PI), with M.K. Banks, J.M. Blair (Co-PI), L.C. Davis, L. Erickson, F. Oehme and J. Pickrell.

Funding Agency: National Science Foundation  
Duration: October 15, 1994 - October 14, 1995  
Amount: \$100,000

The capacity of Ft. Riley tallgrass prairie to support military training activity- Preliminary analysis. P.S. Gipson (PI), A.K. Knapp, P.A. Fay, J.M. Blair (Co-PI), J.M. Briggs and others.

Funding Agency: USA/CERL  
Duration: September 13, 1994 - May 1, 1997  
Amount: \$154,380

Use of remotely sensed data on phenological activity and heterogeneity to detect changes in grassland species composition in response to stress. J.M. Briggs (PI), C.L. Turner, J.M. Blair (Co-PI), W.K. Dodds, D.G. Goodin, G.M. Henebry, M.D. Nellis and A.K. Knapp.

Funding Agency: Environmental Protection Agency  
Duration: October 1, 1994 - September 30, 1997  
Amount: \$210,842

Effects of record precipitation inputs on soil-plant nitrogen relationships in tallgrass prairie. J.M. Blair (PI) and C.L. Turner.

Duration: November 1, 1993 - March 31, 1995  
Funding Agency: National Science Foundation  
Amount: \$59,900

Effects of altered soil moisture and temperature on soil communities, primary producers and ecological processes in grasslands. J.M. Blair (PI), C.W. Rice, T.C. Todd and A.K. Knapp.

Funding Agency: DOE/NIGEC Great Plains Regional Center  
Duration: July 1, 1993 - October 31, 1996.  
Amount: \$234,850

Effects of earthworms on nitrogen cycling processes and decomposer community structure in organic-based and conventional agroecosystems. B.R. Stinner (PI), J.M. Blair (Co-PI) and C.A. Edwards.

Funding Agency: National Science Foundation  
Duration: January 31, 1991 - February 1, 1996  
Amount: \$733,093 (\$94,341 transferred to KSU, J.M. Blair PI)

Effects of resource quality and microarthropods on forest floor nitrogen dynamics. D.A. Crossley, Jr. (PI) and J.M. Blair (Co-PI).

Funding Agency: National Science Foundation  
Duration: September 1, 1989 - August 31, 1992  
Amount: \$220,000

The influence of microarthropod-microbial interactions on forest floor nitrogen dynamics. D.A. Crossley, Jr. (PI) and J.M. Blair (Post-doc and author).

Funding Agency: National Science Foundation  
Duration: December 1, 1987 - November 30, 1988  
Amount: \$80,000

### **Invited Presentations and Seminars (last five years only)**

Blair, J.M. Assessing impacts of climate change on ecosystem processes in grasslands. Steppe Ecosystems and Climate and Land Use Changes – Vulnerability, Feedbacks and Possibilities for Adaptation. Institute for Meteorology and Climate, Garmisch-Partenkirchen, Germany, November, 2009. Invited workshop presentation.

Blair, J.M. Ecological consequences of changing fire and grazing regimes for grassland conservation. Regional and Global Network of Grassland Ecosystem Research: Issues and Perspectives, Chinese Academy of Sciences, Beijing, China, August, 2009. Invited symposium presentation.

- Blair, J.M. Grassland responses to fire, grazing and climate: How long-term research can contribute to management of grasslands in a changing world. 35<sup>th</sup> Natural Areas Conference, Nashville, TN, October, 2008. Invited symposium presentation.
- Knapp, A.K., M.D. Smith and J.M. Blair. Climate change and tallgrass prairie. Joint Meeting of the Society for Rangeland Management and the American Forage and Grassland Council, Louisville, KY, January 2008. Invited symposium presentation.
- Blair, J.M. Long-term ecological research at the Konza Prairie. American Ecological Engineering Society conference, Manhattan, KS, May 24, 2007. Invited presentation.
- Knapp, A.K., J.M. Blair, J.M. Briggs, J.D. Carlisle, S.L. Collins, P.A. Fay and M.D. Smith. Responses of a mesic grassland to the manipulation of rainfall quantity and pattern. TERRAC EPRECOT Precipitation workshop, Elsinore, Denmark, May, 2006. Invited workshop presentation.
- Burke, I.C., W.K. Lauenroth, J.M. Blair and E. Bonitti. Why do we care about nitrogen in semi-arid grasslands? ASA-CSSA-SSSA meeting, Salt Lake City, UT, November 2005. Invited symposium presentation.
- Callahan, M.A. Jr., T.C. Todd, J.M. Blair, C.W. Rice, D.J. Kitchen and M. Williams. Long-term studies of soils and soil biota in a Kansas tallgrass prairie: Stories that only time can tell. ASA-CSSA-SSSA meeting, Salt Lake City, UT, November 2005. Invited symposium presentation.
- Knapp, A.K., J.K. McCarron, A.M. Silletti, M.D. Smith, G.A. Hoch, M.S. Lett, J.M. Blair and J.M. Briggs. Ecological consequences of the displacement of native grassland by *Juniperus virginiana*. Southwestern Association of Naturalists, San Antonio, Texas, April 2004. Invited symposium presentation.

### **Contributed Presentations (last five years only)**

- Hoover, D.L., G. Buis, A. Chamberlain, R.W.S. Fynn, D.E. Burkepile, T. Schreck, J.M. Blair, M.D. Smith, S.L. Collins and A.K. Knapp. Large ungulate herbivory and ANPP in South African and North American savanna grasslands. Ecological Society of America meeting, Albuquerque, NM, August 2009.
- Knapp, A.K., S.L. Collins, M.D. Smith, J.M. Blair, J.M. Briggs and J.K. Koelliker. Trajectories of grassland ecosystem change in response to altered precipitation patterns. Ecological Society of America meeting, Albuquerque, NM, August 2009.
- Kelly, E.F., A.K. Knapp, S.W. Blecker, S.E. Melzer, R.L. McCulley, C.M. Yonker, O.A. Chadwick, M.D. Smith, J.M. Blair, K. Kirkman, and N. Govender. Mobilization of silica in terrestrial grassland ecosystems and the potential impact on the global silica cycle. Ecological Society of America meeting, Milwaukee, WI, August 2008.
- Knapp, A.K., G. Buis, R.W.S. Fynn, K. Kirkman, N. Govender, J.M. Blair, C.E. Burns, S.L. Collins, and M.D. Smith. Convergence and contingency in patterns and controls of productivity in South African and North American savanna grasslands. Ecological Society of America meeting, Milwaukee, WI, August 2008.
- Collins, S.L., M.D. Smith, R.W.S. Fynn, K. Kirkman, P.D. Wragg, J.M. Blair, C.E. Burns, and A.K. Knapp. Patterns and controls of community structure in South African and North American grasslands: Convergence and contingency. Ecological Society of America meeting, Milwaukee, WI, August 2008.
- Blair, J.M., P.A. Fay, A.K. Knapp, M.D. Smith and J.D. Carlisle. Interactive effects of warming and altered rainfall timing on ecosystem processes in tallgrass prairie. Ecological Society of America meeting, San Jose, CA, August 2007.
- Heisler, J.L., A.K. Knapp, G.M. Kelly and J.M. Blair. Climate change in the Great Plains: More extreme precipitation patterns impact ecosystem function differentially across the central US. Ecological Society of America meeting, San Jose, CA, August 2007.

- Schmitt McCain, K.M., and J.M. Blair. Effects of dominant grass removal on plant diversity in restored tallgrass prairie. Ecological Society of America meeting, San Jose, CA, August 2007.
- Jumpponen, A., K.L. Jones, and J.M. Blair. 2007. Use of a massively parallel sequencing strategy to assess soil eukaryote responses to altered precipitation and warming. Mycological Society of America meeting, Baton Rouge, LA, August 2007.
- Kitchen, D.J., and J.M. Blair. Temporal variation in fine root production and mortality is influenced by prescribed fire and mowing in tallgrass prairie. Soil Ecology Society Meeting, Moab, UT, April 2007.
- Baer, S.G., and J.M. Blair. Manipulating soil resources in restoration: complex feedbacks between above- and belowground processes influence community and ecosystem changes over time. Ecological Society of America, Memphis, TN, August 2006.
- Baker, P., A.K. Knapp and J.M. Blair. Are invasive exotic grasses more productive than the native grasses they displace. Ecological Society of America, Memphis, TN, August 2006.
- Kitchen, D. and J.M. Blair. Effects of annual fire and mowing on fine root dynamics in tallgrass prairie. Ecological Society of America, Memphis, TN, August 2006.
- McKinley, D.C., J.M. Blair, L.C. Johnson and C.W. Rice. Changes in C and N cycling with forest encroachment into mesic grassland. Ecological Society of America, Memphis, TN, August 2006.
- Fay, P.A., D.M. Kaufman, J.M. Blair, S.L. Collins, A.K. Knapp, M.D. Smith, J.B. Nippert and J.D. Carlisle. Ecosystem response to rainfall variability and warming in a mesic grassland. European Geophysical Union, Vienna, Austria, April 2006.
- Blair, J.M., L.C. Johnson and A.K. Knapp. Fire-induced changes in soil N and C dynamics in tallgrass prairie. Tall Timbers 23<sup>rd</sup> Fire Ecology Conference, Bartlesville, OK, October, 2005.
- Blair, J.M., J.M. Briggs, S.L. Collins and A.K. Knapp. Linking short-term dynamics to long-term patterns and processes in grasslands. Ecological Society of America / International Congress of Ecology, Montreal, Canada, August 2005.
- Fay, P.A., M. Smith, S. Travers, J. Nippert, J. Blair and K. Garrett. Ecological responses to precipitation quantity and frequency in grasslands: Pattern and process from the gene to the ecosystem. Ecological Society of America / International Congress of Ecology, Montreal, Canada, August 2005.
- Kaufman, D., C. Harper, J. Nippert, P. Fay and J. Blair. Ecosystem responses to rainfall quantity and variability in model grassland assemblages. Ecological Society of America / International Congress of Ecology, Montreal, Canada, August 2005.
- McKinley, D., J.M. Blair and L.C. Johnson. Changes in nitrogen cycling and carbon storage with forest encroachment into tallgrass prairie. Ecological Society of America / International Congress of Ecology, Montreal, Canada, August 2005.
- Knapp, A.K., J.M. Blair, P.A. Fay, M.D. Smith, S.L. Collins and J.M. Briggs. Long-term responses of a mesic grassland to manipulation of rainfall quantity and pattern. XX International Grassland Congress, Dublin, Ireland, June 2005.
- Fay, P.A., D.M. Kaufman, J.M. Blair, S.L. Collins, A.K. Knapp, M.D. Smith, J.B. Nippert and C.W. Harper. Rainfall variability and ecosystem response in a mesic grassland. European Geophysical Union, Vienna, Austria, April 2005.
- Baer, S.G, Blair, J.M. and R. Garcia. Linking resource constraints to aboveground productivity, belowground biomass and soil carbon accrual during seven years of prairie restoration. Soil Ecology Society, Argonne, IL, May 2005.
- Kitchen, D.J. and J. M. Blair. Linkages between aboveground management practices and belowground processes in tallgrass prairie: effects of annual fire and mowing on root dynamics. Soil Ecology Society, Argonne, IL, May 2005.

- Baer, S.G., J.M. Blair, J. Patterson and S.L. Collins. Long-term changes in diversity and productivity in restored prairie with altered nitrogen availability and plant rooting depth. Ecological Society of America, Portland, OR, August 2004.
- Fay, P.A., J.D. Carlisle, C.W. Harper, M. LaRosh, J.B. Nippert, J.M. Blair, A.K. Knapp, S.L. Collins. Productivity, photosynthesis and soil respiration responses to rainfall and temperature manipulations in tallgrass prairie. Ecological Society of America, Portland, OR, August 2004.
- Knapp, A. K., J.M. Blair, P.A. Fay, J. Nippert, M.L. Smith, J.M. Briggs and S.L. Collins. Contrasting responses of a mesic grassland to interannual and seasonal precipitation patterns. Ecological Society of America, Portland, OR, August 2004.
- McKinley, D.C., J.M. Blair and L.C. Johnson. Altered soil nitrogen cycling following *Juniperus virginiana* encroachment into tallgrass prairie. Ecological Society of America, Portland, OR, August 2004.
- McKinley, D.C., J.M. Blair and L.C. Johnson. Changes in soil nitrogen cycling dynamics following *Juniperus virginiana* encroachment into tallgrass prairie. Southwestern Association of Naturalists, San Antonio, TX, April 2004.

### **Description of Research**

My research focuses on ecosystem dynamics, including patterns and controls of plant productivity, decomposition and soil organic matter dynamics, and nutrient cycling in both natural and managed terrestrial ecosystems. I have conducted both laboratory studies and field-based research aimed at understanding the patterns and controls of organic matter and nutrient dynamics in a variety of ecosystems, including temperate forests, agroecosystems, and grasslands. Much of my current research is directed at understanding the biological and physical factors controlling ecosystem processes in grasslands, and how these processes are altered by the direct and indirect effects of human activities. Listed below are a few current research projects.

#### **Grassland ecosystems and climate change**

The structure and function of grassland ecosystems in the Central Plains are strongly influenced by an extremely variable continental climate. This is especially true in tallgrass prairie, where many of the defining characteristics of the ecosystem are a result of interactions of climate with fire and grazing. Within grasslands, the importance of both amounts and timing of precipitation inputs as forcing functions for grassland ecosystems makes them particularly vulnerable to the changes in precipitation predicted by global climate change models. For the Central Plains region, these predictions generally include decreased summer precipitation, increased temperatures and, perhaps most importantly, increased variability in both the amounts and timing of rainfall events. This is particularly important, since climatic variability is at least as important as mean climate values in determining the structure and function of grassland ecosystems. Major goals of my research in this area are to determine how key belowground patterns and processes are altered in response to two key aspects of predicted climate change -- (1) altered timing of rainfall events, and (2) increases in mean annual temperature -- and to identify the potential consequences of these responses for grassland ecosystem structure and function. Our approach to addressing these problems includes irrigation transects, reciprocal soil core transplants between sites with different climates, and large, field-scale Rainfall Manipulation Plots in which the timing and amounts of individual rainfall events, and mean annual temperature, can be experimentally manipulated to assess the independent and interactive effects of altered precipitation regimes and warming on soil and ecosystem-level processes. These effects are being integrated with measurements of plant ecophysiological processes, plant genomic responses, and plant community dynamics, which will provide unique insights into the importance of the climate change in mesic grasslands worldwide.

#### **Responses of soil processes and plant productivity to topography, fire and grazing in tallgrass prairie**

The cycling and availability of nutrients, especially nitrogen (N), affects both the structure and dynamics of tallgrass prairie ecosystems. Nutrient availability can limit productivity and alter species composition of tallgrass prairie plant communities, affect plant physiological responses to the environment, determine nutritional quality for herbivores, and influence rates of litter decomposition. This portion of my research program focuses on soil N dynamics in relation to patterns of plant productivity, N uptake and nitrogen use efficiency on watersheds being intensively studied as part of the Konza LTER effort, as well as in small-plot

experiments. Quantifying the effects of topographic position and fire frequency on spatial and temporal patterns of soil N availability, net N mineralization and plant responses are major components of this research. Litter decomposition studies also are being done to address the effects of resource quality, topographic position, and frequency of burning on above- and below-ground decomposition processes in tallgrass prairie ecosystems. I have also conducted studies of the effects of native ungulate grazers (bison) on spatial and temporal patterns of resource availability and plant responses. These studies are targeted at providing increased understanding of landscape-level patterns and controls of soil N availability and soil-plant N relationships in tallgrass prairie ecosystems.

### **Convergence and contingencies in savanna grasslands in North America and South Africa.**

The distribution, structure and function of savannas and mesic grasslands (savanna grasslands) worldwide are a product of three interacting drivers - fire, grazing by large herbivores, and extreme climatic fluctuations. Although all savanna grasslands share these drivers, fire and grazing may affect ecosystem structure and function in fundamentally different ways in southern Africa (SA) and North America (NA). These differences have been attributed to the contingent factors of greater age, longer evolutionary history, lower soil fertility, and greater diversity of plants and large herbivores in SA. An alternative hypothesis is that differences in methods and approaches used to study these systems, and a strong NA bias in the number of studies of savanna grasslands, has led to differing perspectives on the role of these drivers. It's important to differentiate between these alternatives. If the impacts of shared and fundamental ecosystem drivers - fire and grazing regimes, which are being extensively altered by humans worldwide - truly differ with age and evolutionary history, this calls into question our basic understanding of savanna grasslands and our ability to forecast change and maintain ecosystem services. This research is focused on quantifying, in directly comparable ways, ecosystem and community responses to fire and grazing in savanna grasslands of SA and NA, and to identify those ecological processes that are similar (convergent), despite potential contingent factors of differing evolutionary history, herbivore diversity and soil fertility.

### **Restoration ecology**

Many critical ecosystem attributes recover very slowly following restoration efforts. For example, plant species richness and diversity in restored ecosystems is usually much lower than in comparable undisturbed ecosystems, and may take decades or longer to approach undisturbed ecosystem levels. In grasslands, it is relatively easy to restore the dominant C<sub>4</sub> grasses, but difficult to establish the diverse C<sub>3</sub> forb populations characteristic of native grasslands. Most grassland restorations occur where soil resources have been homogenized (e.g., agricultural fields). In contrast, most native ecosystems exhibit high spatial heterogeneity in resources, which is assumed to enhance plant species diversity (e.g., individual plant species may alter and maintain levels of resources (such as soil N) that differ from unvegetated areas or from beneath other species). We have established a long-term field experiment, in which soil N and soil depth (water availability) are altered in a spatially explicit fashion to better understand the abiotic and biotic constraints ("filters") to the re-assembly of diverse tallgrass prairie communities, with the dual goals of advancing the theory and practice of ecological restoration. Additional studies are underway to assess the role of aboveground competition for light and belowground mutualistic associations (mycorrhizae) on the ability of forb species to colonize an established grassland matrix. These experiments will provide new insights into the role of resource heterogeneity and biotic interactions in the restoration of ecosystems.

### **Ecological consequences of woody vegetation expansion into grasslands**

Forest encroachment and the expansion of woody plants into grasslands is a worldwide phenomenon, and an important land-cover change in the grasslands of North America. Increased woody plant cover can be directly attributed to changes in land management and may be indirectly facilitated by other factors (e.g., altered climate, N deposition, habitat fragmentation). My students and I have been assessing the consequences of ecosystem conversion from C<sub>4</sub> grass to C<sub>3</sub> woody plant dominance. In particular, we have focused on the ecological effects of eastern redcedar (*Juniperus virginiana*) expansion into areas that were historically native grasslands. The conversion of grassland to redcedar woodland can result in relatively rapid changes losses of species diversity, increases in NPP, and increases in C and N storage. We are currently assessing changes in soil processes, particularly C and N cycling, associated with conversion of grasslands to forests, since these changes in ecosystem functioning have the potential to alter regional C storage and other biogeochemical processes.