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Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1440484
Project Title:	LTER: Long-Term Research on Grassland Dynamics-Assessing Mechanisms of Sensitivity and Resilience to Global Change
PD/PI Name:	John M Blair, Principal Investigator Sara G Baer, Co-Principal Investigator Walter K Dodds, Co-Principal Investigator Anthony Joern, Co-Principal Investigator Jesse B Nippert, Co-Principal Investigator
Recipient Organization:	Kansas State University
Project/Grant Period:	11/01/2014 - 10/31/2020
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Submitting Official (if other than PD\PI):	John M Blair Principal Investigator
Submission Date:	10/17/2015
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	John M Blair

Accomplishments

*** What are the major goals of the project?**

The Konza Prairie LTER Program (KNZ) is a comprehensive, interdisciplinary research program with the overarching goal of understanding the interactive effects of natural and altered drivers on grassland ecological dynamics, and to advance ecological theory through synthesis and integration of long-term datasets. In the most recent iteration of KNZ LTER funding (LTER VII), our focus is on assessing the mechanisms underlying sensitivity and resilience of this grassland ecosystem to a suite of critical forcing factors or 'drivers', by continuation of long-term manipulation of certain drivers, addition/alteration of novel drivers, and cessation of certain long-term experimental drivers to evaluate the strength of ecological legacy effects and feedbacks. KNZ will also continue to support numerous educational, training and outreach activities, contributeknowledge to address land-use and management issues in grasslands, and provides infrastructure and data in support of scientific pursuits across a broad range of disciplines.

Our core research site is the Konza Prairie Biological Station (KPBS), a 3487-ha area of native tallgrass prairie in the Flint Hills of NE Kansas. KPBS was established in 1971 and joined the LTER network in 1980. LTER funding supports collection of long-term data on processes such as hydrology, nutrient cycling, plant productivity and community composition. These long-term records provide unique insights into the dynamics of tallgrass prairie ecosystems, serve as a critical baseline for identifying and interpreting ecological responses to environmental changes, and are made available as a resource for the broader scientific community. The KNZ program encompasses studies at, and across, multiple ecological levels and a variety of spatial and temporal scales. Our unifying conceptual framework focuses on fire, grazing and climatic variability as essential and interactive factors determining the structure and function of mesic grasslands. The interplay of these natural disturbances leads to the complex, non-linear behavior characteristic of these grasslands. Because grazing and fire regimes are managed in grasslands worldwide, KNZ data are relevant for understanding and managing grasslands globally, and for addressing broader ecological issues including disturbance and ecosystem stability and resilience, top down vs. bottom up controls, and the interplay of mutualistic and antagonistic biotic interactions. In addition, because human activities alter key ecological drivers in these grasslands, we can use KNZ studies and data to address critical issues related to global change, including land-use and land-cover change, the ecology of invasions and restoration, and the direct and interect alteration of nutrient and water availability. Thus, the KNZ program, while initiated over 30 years ago to understand the effects of natural disturbances in this grassland, has sustained and immediate relevance for understanding and predicting the

consequences of global change for grasslands around the world.

A major goal of the KNZ LTER VII is the continuation of core watershed-level fire and grazing studies and associated long-term data collection to document both short-term and long-term dynamics in response to these treatments and a variable climate. The KNZ program is built around a long-term database on ecological patterns and processes derived from a fully replicated watershed-level experimental design, in place since 1977 with some modifications to accommodate new long-term studies initiated in LTER V and VI (e.g., watershed-level Fire Reversal and Season of Fire experiments, Riparian Woody Vegetation Removal experiment, Patch-Burn Grazing experiment). This unique experimental design includes replicate watersheds subject to different fire and grazing treatments. In addition to fire and grazing, climatic variability, climate extremes and directional climate change are key drivers of grassland dynamics, and important focal areas for KNZ activities. The collection of diverse data from common sampling locations facilitates integration among our research groups. Within core LTER watersheds, permanent sampling transects are replicated at various topographic positions, where ANPP, plant species composition, plant and consumer populations, soil properties, and key above- and belowground processes are measured. In addition, a number of long-term plot-level experiments allow us to address the mechanisms underlying responses to various fire and grazing regimes, including manipulations of fire and N availability (e.g. Belowground Plots Experiment, Chronic N Depositon experiment) and of climatic variables in both terrestrial (e.g. Irrigation Transect Study, Rainfall Manipulation Plots (RaMPs) Experiment, Extreme Drought in Grasslands Experiment) and aquatic (Experimental Stream Studies) habitats. In total, the Konza LTER Program is a rigorous ecological research program designed to elucidate patterns and processes important in grasslands, and address the potential impacts of global change in these ecosystems. Towards this end, we currently maintain >90 datasets associated with our long-term observational and experimental research activities, and use these data as a foundation for numerous shorter-term experiments focused on specific drivers and mechanisms.

In the first year (2014-2015) of this funding cycle (LTER VII, 2014-2020) we continue addressing fundamental ecological questions with an emphasis on assessing the mechanisms of sensitivity and resilience to global change, a theme relevant to understanding, managing and conserving grasslands worldwide. Our activities focus on long-term responses to drivers of global change most relevant to grasslands and grassland streams – *changes in land-use* (altered fire and grazing regimes) and *land-cover* (particularly increases in woody plant cover); *climate change* (altered precipitation patterns including response to extreme events) and *altered nutrient cycles* (changes in nutrient availability) in both terrestrial and aquatic environments; and *restoration ecology* (active management of the ecosystem state) – and we couple long-term observations with manipulative studies to evaluate the strength of biological legacies and feedbacks in conferring sensitivity or resilience of the ecosystem state to these drivers.

Specific goals for LTER VII are to:

1. Build upon our core LTER experiments and expand datasets on fire, grazing and climate variability to deepen and refine our understanding of the abiotic and biotic factors and feedbacks affecting grassland structure and function;

2. Develop a mechanistic and predictive understanding of grassland dynamics and trajectories of change in response to natural and anthropogenic drivers using long-term experiments and datasets, coupled with complementary shorter-term studies;

3. Conduct new syntheses using KNZ data and results from other sites to advance ecological theory, and expand the inference of KNZ research to other grasslands and biomes;

4. Train the next generation of ecologists, educate the public, and provide outreach to increase the relevance of KNZ long-term research to society.

Consistent with our goals as a long-term ecological research program, many of the long-term experiments and datasets initiated in previous LTER grants are being continued throughout the current funding period, while several new experiments and datasets were, and are, being modified or initiated, as detailed in the KNZ LTER VII proposal. The value of these long-term experiments and datasets continues to increase with time. In addition, results from these long-term studies have new relevance as we move towards evaluating the ecological impacts of a suite of global change phenomena occurring at the Konza LTER site and in grasslands worldwide. Below we highlight a few selected activities and findings from our most recent funding period.

*** What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities:

We continued the KNZ watershed-level fire experiments, and associated data collection and synthesis efforts, that have been central to our “core” LTER studies since the initiation of the Konza LTER program. This includes watershed-level manipulations of fire frequencies (1, 2, 4 and 20 year fire return intervals) and seasonal timing of fires (spring, summer, autumn and winter), and experiments to assess the potential for changes in fire treatments to reverse trajectories of land-cover change (the Fire Reversal experiment). We also continued to assess the interactive effects of fire and ungulate grazers (bison and cattle) on tallgrass prairie dynamics, using data from two large-scale grazing studies. Our studies of native ungulate grazers includes 10 watersheds with different fire frequencies (1, 2, 4 and 20 year fire return intervals) grazed by a bison heard managed to remove approx. 25% of mean annual ANPP. We also continue long-term studies of ecological responses to alternative cattle grazing practices (traditional season-long grazing on annually burned grasslands and an alternative patch-burn grazing system designed to enhance spatial and temporal heterogeneity to achieve conservation goals). These whole watershed fire and grazing treatments are focal areas for soil, water, plant and consumer sampling, remote sensing and GIS observations, flux tower and associated sensor network measurements, and groundwater and stream monitoring networks. Many of our core LTER datasets are based on documenting long-term responses to these watershed-level manipulations, which captures interactions with stochastically variable climatic conditions. For example, recent drought conditions offered the opportunity to examine sensitivity of multiple grassland ecosystem components to drying stress, and we took this chance to advance our understanding of drought responses in above and belowground plant production, and grazer behavior, under different grassland management treatments. In addition, the template of watersheds with varied fire-grazing treatments and varied grassland ecosystem states provides a unique platform for many smaller-scale experiments, including nutrient manipulations, grazing exclosures, rainfall manipulations, and species removals. Restoration research is ongoing, and includes another iteration of the Sequential Prairie Restoration experiment, continued data collection associated with the riparian Woody Plant Removal experiment, as well as additional research on the roles of heterogeneity, invasive species and local plant adaptation for grassland restoration states. As specified in our LTER VII proposal, we have also begun to

collect data on experimental extreme drought effects in the context of contrasting legacies of precipitation regime, initiated new experiments to evaluate threshold effects of and grassland resilience to changing nutrient availability, and begun new work on grazing lawns to study mechanisms of maintenance of this alternative grassland state in the grazed watersheds. Addtional details are provided in the attached 'Activities' pdf.

We also have been active in numerous activities to enhance the impacts of our long-term research within the broader ecological science community, the local community, and local and regional land managers. KNZ LTER data and case studies are increasingly used in a number of ecology courses and texts across the country, and our scientists are proactive in the broader synthesis of ecological data and concepts, and in communicating their research with other scientists. Our research platform directly and indirectly supports numerous post-doctoral, graduate and undergraduate research projects from across the country, including LTER-supported and site-based REU students from underrepresented groups. The SLTER and KEEP programs continue to organize educational activities within local K-12 schools and through teacher's workshops, and to provide adult docents opportunity to learn and disseminate information on the value and the natural history of the prairie ecosystem. Through our sustained relationship with The Nature Conservancy, and interaction with the local Flint Hills Discovery Center, we have hosted or enabled large public outreach events including the 2014 America's Grasslands Conference and 2015 TNC Grasslands of the World conference, and exhibits at the local museum. Local and regional land management groups also held workshops at Konza Prairie, with the active participation of our scientists; and we work to advise federal agencies (e.g. EPA) on air and water quality standards via direct interaction and data sharing. Through these and additional activities, outreach is an active and essential component of the KNZ LTER program.

Major IM activities in 2014-15:

During the last year, the KNZ IM focused on organizing and integrating long-term data, standardizing attribute codes, keywords and units with KNZ and LTER Network standards where applicable, and documenting more detailed metadata at the site and network level. We also expanded the KNZ data catalog with new LTER datasets and associated metadata; 12 new datasets are associated with a long-term, large-scale study of a Patch-Burn Grazing management system was created/organized /integrated into our information management system.

We continued to include an up-to-date list of all KNZ LTER-supported and LTER-related publications including journal articles, conference proceedings, books and book chapters, theses and dissertations, and electronic publications at the site/network levels. We created scripts to parse an EndNote Export file into a custom schema within their relational database. The publication online is searchable by key words, author name, and date. We link personnel with publications through a dynamic connection with our SQL Server database, making it easy for users to find specific personnel information and publications.

Based on comments by the KNZ LTER VII proposal review team in 2014 (July), we spent significant time on data cleaning, EML creating, and adding 24 eml packages to PASTA this year (a current total of 94 datasets, many of which include multiple related data packages). Our data catalog is now closely aligned with metadata in PASTA (except some short term studies). We also reviewed data files in PASTA, created/edited scripts to generate a csv file directly from our relational database, scheduled a time to automate update the new data for PASTA. We added more data information into database to meet multiple kinds of searches from our website, e.g, by browsing investigator, dataset code, core areas, and time frame.

KNZ is currently adopting/implementing the Drupal Environmental Information Management System (DEIMS), with assistance from Inigo San Gil (LTER MCM), for managing EML and web page content. DEIMS was developed by several LTER sites and the University of Michigan. With Inigo's help, we have been migrated all KNZ current web page content, EML files into MySQL database backend of Drupal, and DEIMS at develop server. When we complete the migration, all webpage content will be tagged to provide the user with a "no dead-ends" web experience, and the EML-export system will automatically generate fully PASTA-compliant attribute level EML files with all LTER KNZ dataset.

The KNZ IM (Yang XIA) participated in all LTER IMC activities includes the IM annual meeting, IM water cooler, IM Executive committee, and maintaining /managing the LTER climate and hydrology database as volunteer administrator.

Specific Objectives:

1. Maintain and expand core long-term experiments and data sets to better understand how natural and anthropogenic drivers (fire, grazing, climatic variability, nutrient availability and grassland restoration) affect grassland states and dynamics at multiple levels of ecological organization.

2. Evaluate the long-term rates, trajectories and underlying mechanisms/constraints of grassland response to altered drivers; with focus on drivers that past research has identified as most influential on ecological states.

3. Test complementary conceptual and theoretical models of ecosystem change over time, and identify mechanisms and feedbacks that support or differentiate directional, non-linear and threshold trajectories of change.

4. Measure grassland resilience to and recovery from altered drivers, identify feedbacks that support or constrain resilience and recovery, and understand whether recovery can be facilitated based on ecological

principles.

5. Determine which abiotic and biotic factors regulate community assembly and ecosystem state changes in restored prairie.

6. Lead and participate in synthesis and cross-site research activities, to evaluate the fundamental controls on ecosystem resistance and resilience to changes in key drivers, both within and among different grasslands and biomes.

7. Continue to update KNZ LTER database to meet requirements for the LTER Network Information System. Provide up-to-date, accurate LTER data to KNZ investigators and to the broader scientific community as quickly and efficiently as possible.

8. Continue KNZ education and outreach activities to achieve our broader impact goals. Continue and expand on-site science activities and enlist new classes and students. Provide opportunities for undergraduate research experiences and continue to support graduate student research and training. Contribute LTER data to address relevant environmental issues (e.g., prescribed fires and air quality, land-use and water quality). Expand science and art interactions as a novel way of increasing awareness of and interest in grassland ecology and grassland conservation.

Significant Results:

FIRE/GRAZING. We continue to demonstrate, and refine our undrstanding of, the interactive effects of fire and grazing with drought on grassland states and dynamics, both above and below ground. For eample, VanderWeide & Hartnett (2015) showed that simulated grazing underconditions of drought stress did not exacerbate the sensitivity of grass or forb reproductive potential to drought; however, belowground reproductive structures of forbs and sedges were as sensitive to drought as aboveground structures, while grasses were relatively insensitive both above and belowground. Raynor et al. (2015) demonstrated that land-scape level and local-scale bison foraging behavior is not only fire-dependent, but also driven by burning interval (i.e., time since last fire), since burning interval mediates the quality and quantity of standing forage. The timing of peak forage quality was also impacted by drought. This and additional work builds a stronger framework for understanding how land management affects multiple trophic levels in grassland ecosystems, and how land management impacts the sensitivity of the ecosystem to drought.

WOODY ENCROACHMENT. Ongoing work is addressing the trajectory of ecosystem change with respect to woody plant encroachment into the tallgrass prairie(Ratajczak et al. 2015 and others), and two recent studies have examined stream biological recovery during the year following active removal of woody riparian vegetation. Riparian soil fungal communities were distinct from stream bank and sediment communities under riparian vegetation, but following woody plant removal fungal distribution became more homogenous across the stream to upslope gradient; bacterial communities were structured along a landscape position gradient whether or not woody plants were present (Veach et al. 2015). Stream macroinvertebrate communities clearly rebounded to assemblages with a greater proportion of biofilm grazers, consistent with a decrease in canopy cover and greater importance of in-stream primary production as an energy source to the food web; however, secondary production remained elevated relative to the control open-canopy reach (Vandermyde & Whiles 2015). These studies suggest that some stream and riparian biota may revert to an open-canopy state quickly, while other aspects of the system show some lag in recovery. Further work will examine the possible mechanisms for this lag.

CLIMATE CHANGE. In addition to climate-relevant results from watershed fire-grazing studies noted above, we have furthered our understanding of variability in the hydrological template and biological sensitivity to climate variability. Costigan et al. (2015) capped off a detailed examination of the temporal and spatial variation in long-term stream flow data across the Konza prairie landscape with a conceptual template for understanding water movement through these watersheds: the temporally asynchronous patterns in high and low flows are likely driven by the porous and layered limestone geology, which creates a distribution of shallow groundwater residence times and a “fill and spill” dynamic in stream recharge. Also, recent studies revealed that senstivity of plant productivity to decrease water availability was greater aboveground than belowground, unlike more arid grasslands (Wilcox et al. 2015). Overall the predictability and sensitivity of responses to climate change may differ between aquatic and terrestrial portions of the ecosystem.

BIOGEOCHEMISTRY. Long-term observational and experimental data have been analyzed to show possible mechanisms for ecosystem controls on and responses to altered nutrient availability. Over 15 years of record, variation in stream water dissolved organic carbon (DOC) shows that in-stream production and in-stream and subsurface removal of DOC likely drive concentration; still, DOC export is driven primarily by stream flow and thus climatic variability (Ruegg et al. 2015). In uplands, new understanding of the physiological controls on plant responses to altered nutrient availability is emerging. Yu et al. (2015) show that the dominant native tallgrass prairie plants, with lower tissue nutrient content and greater homeostasis in this nutrient content, confer stability to community assemblage during interannual variation in water availability, but these homeostatic species decrease in dominance when nutrients are more available. Also, mycorrhizal-grass mutualistic symbiosis is strong when phosphorus (P) is limiting, but the relationship becomes netural or even parasitic under conditions of excess P or shortage in plant-derived C (Johnson et al. 2015). Thus, we are starting to identify key mechanisms of biotic feedback to ecosystem process under altered nutrient availability conditions.

RESTORATION. Ongoing restoration research has highlighed key biological controls on restoration success. Greer et al. (2015) demonstrated that an invasive grass, *Bothriochloa ischaemum*, is

allelopathic: its litter and leachate inhibited germination, growth and survival of the dominant native grass *Andropogon gerardii* with consequnces for restoratin success following invasion. Additional work on different ecotypes of this dominant grass showed that arid-adapted strains were less productive in more mesic environments, but most productive in their native soils; and that this may be related to their nitrogen storage physiology (Mendola et al. 2015). Ecosystem restoration can be better managed with this understanding of the importance of site-specific biological legacies to dominant plant productivity.

SYNTHESIS/CROSS-SITE. Finally, KNZ scientists have made significant efforts to place these site-specific lfindings into broader contexts. Dodds et al. (2015) presented a conceptual framework, using variation in hydrology and canopy cover across biome gradients to make predictions of biogeochemical or biodiversity changes among streams globally. Alternative hypotheses explaining sensitivity of mesic, semi-arid and arid grasslands to drought were evaluated by Knapp et al. (2015), and co-limitation by factors other than water was implicated as a stronger predictor of sensitivity than the physiological capacity for drought tolerance. Also, an evaluation of the stability mechanisms within mutualistic and trophic networks across climatic gradients suggested that intra-and interannual variation in temperature was an important factor that promoted food web stability under changing environmental conditions (Welti and Joern 2015). In sum, Konza research has contributed to the broader understanding of sensitivity and resilience of ecosystems.

Key outcomes or Other achievements:

Please see the significant results and impact sections for discussions of specific key research outcomes and acheivements, and see the supporting files, which provide more information on the activities and findings of individual research projects which have contributed to the overall progress of LTER VII in 2014-2015.

*** What opportunities for training and professional development has the project provided?**

The Konza LTER program continues to emphasize quality graduate student training. During the 2014-15 funding period, we provided stipends and other forms of non-financial support (vehicle use, site use, analytical laboratory use, attendance at regional/national meetings) for > 20 students, including many non-KSU as well as KSU graduate students. We continue to foster graduate research involving students attending Colorado State Univiersity, University of Kansas, Southern Illinois University, Oklahoma State University and others. In 2014-2015, 15 theses/dissertations were completed that included data and research from the Konza Prairie (typically, as the primary data source). Of these 15 dissertations, 7 were from non-KSU graduate students. This statistic is significant because it illustrates the breadth of our LTER program, and the level of training and support that extends beyond the host university (KSU).

The Konza LTER program also offers research experiences for a large number of undergraduate students. In the summer of 2015, we supported 3 LTER REU students with supplements [mentored by PI John Blair, and co-I's Jesse Nippert and Melinda Smith], and contributed additional support to the KSU/Konza REU site program. Summer 2015 was the 20th year that Konza Prairie and the Division of Biology at K-State have offered a 10-week summer undergraduate research program. Participants in the structured program included 9 students (4 from under-represented populations) supported by an NSF-funded REU Site grant (co-led by KNZ investigator Bruce Snyder) and several REU supplements, and 6 students supported by a related NSF-funded Undergraduate Research Mentoring (URM) program, co-led by KNZ investigator Ari Jumpponen. While research at the KNZ site is not mandatory for URM students, many URM students do conduct a portion of their research there. Examples of projects in 2015 include: investigation of the impacts of patch-burn grazing regimes on brood parasitism of grassland songbirds, investigating organic nutrient sources among biofilm and sediment microbial communities in grassland streams, linking severe storms to grassland bird mortality, the impacts of invasive grasses on grassland restoration practices, and the thermo-tolerance of several species of freshwater fish that live in grassland streams. The KSU URM program also integrates with the Konza Prairie LTER site REU program. Among the examples of these integration activities are: URM/REU mentor seminars to the REU and URM students; URM student presentations in REU grand finale symposium; shared data blitz in the Ecological Genomics forum; concurrent ethics training; and, participation in Konza Prairie LTER workshop.

Formal educational activities at the K-12 level began with the initiation of the Konza Environmental Education Program (KEEP) in 1996, and were greatly expanded with the initiation of the Konza Prairie Schoolyard LTER (SLTER) in 1998. The Konza Prairie Schoolyard LTER (SLTER) program is entering its 17th year as a science education program for K-12 teachers and their students, built around the successful Konza Prairie LTER program. Our SLTER program prospers with input from Konza LTER PIs and Kansas K-12 educators. The Konza Prairie SLTER program aims to educate students about ecology and global change, with emphasis on regional grasslands, by engaging students and teachers in realistic and relevant science-based activities focused on long-term data collection at our LTER site. These activities were designed to give students an understanding of ecology, provide them the opportunity to collect and interpret their own data. By sharing knowledge generated through long-term data collections we give teachers tools for connecting children to locally and regionally important ecosystems.

The KNZ SLTER program invites new teachers to our program with the Summer Teacher's Workshops. In 2015 we added three new teachers to our roster of SLTER-trained instructors, bringing the total number of trained area teachers to 94. These workshops serve to initiate new teachers into the Konza SLTER program. Teachers experience all of the science activities first-hand and are then assisted in the development of new curriculum that incorporates a class' visit to the Konza Prairie. The workshops are the single strongest tool we have to sell new teachers on the science education available to their students. Annually, over 1,000 students participate annually in a SLTER activity.

The impact of the Konza Environmental Education Program continues to grow within the community. We continue a partnership with the Manhattan/Ogden KS School District 383 to be a ready source of informal education – specifically addressing certain common core concepts that are easily experienced during a nature trail hike. Additionally, we have another partnership with the Flint Hills Discovery Center (Manhattan, KS) to co-host visiting school groups. Last year we hosted 2,274 students who experienced the tallgrass prairie of KNZ through an activity other than an SLTER event.

Konza Prairie maintains an active and enthusiastic group of volunteer docents who assist with the Environmental Education Program. Every year a group of 10 – 20 new docents are added to the group and these volunteers receive approximately 40 hours of in-depth training and education on the ecology, history, geology, and management of Konza Prairie and the tallgrass prairie. In exchange for this training they agree to volunteer their time and knowledge to the educational program and to the needs of the biological station. They are the first responders to requests for guided tours and educational opportunities and provide an invaluable resource to our site.

*** How have the results been disseminated to communities of interest?**

Konza LTER results are disseminated to the scientific community via publications in the peer-reviewed literature, through presentations at professional meetings and workshops, through seminars by KNZ scientists and students and via the KNZ and LNO LTER web sites. In addition, KNZ scientists have participated in a broad range of activities that go beyond the scientific community.

For example, KNZ data and findings are used in a number of undergraduate and graduate ecology courses at Kansas State University, the University of Kansas, University of Arizona, Colorado State University, and Ohio University, among others. In addition, KNZ findings are increasingly utilized in undergraduate ecology texts and supplementary teaching materials. For example, KNZ long-term studies are used to demonstrate the role of fire and grazing in grasslands in 'General Ecology, 2nd edition' by D.T. Krohne, and as an example of the importance of long-term research in the 'Ecology' text by Cain et al. KNZ studies on top-down regulation of plant community structure are featured in an introductory undergraduate biology text ('Life. The Science of Biology. 7th edition' by Purves, Sadava, Orians and Heller) and KNZ data and findings are highlighted in several upper-level and graduate texts including 'Freshwater Ecology' (W.K. Dodds), 'The Ecology of Plants' (Gurevitch, Scheiner and Fox), and 'Biogeochemistry. An Analysis of Global Change' (W.H. Schlesinger).

Data and insight from the Konza LTER Program is being used by resource managers for effective land stewardship. Currently, our research concerning the role of seasonal burning and fire intensity on woody encroachment is being used to inform the Great Plains Fire Science Exchange (http://www.gpfirescience.org/) and the Tallgrass Prairie and Oak Savanna Fire Science Consortium (http://www.tposfirescience.org/). Both of these non-profit groups focus on conservation issues and land management of Midwestern grasslands. In addition, many of the Konza investigators (e.g., Blair, Briggs, Joern, Hartnett) serve as scientific consultants for a regional cultural and natural history center, the 'Flint Hills Discovery Center' in Manhattan, KS.

KNZ graduate students and PIs have also co-authored several educational publications, based on LTER data, for the peer-reviewed ESA-supported Teaching Issues and Experiments in Ecology (TIEE) and other education-based outlets. Finally, Jill Haukos (director of the Konza Environmental Education program) is in the final stages of production of a Konza-centric children's book. This book will be included within the LTER Children's Book Series (http://www.lternet.edu/publications/Schoolyard). Jill's book will be published during next year's funding cycle.

Several other broader impacts and scientific extensions from the Konza LTER Program are discussed in further detail in the 'Broader Impacts' section of this annual report.

*** What do you plan to do during the next reporting period to accomplish the goals?**

We are nearing the end of our first year of funding for the LTER VII funding cycle. During the next year of our funding (year 2 of LTER VII: 2015-16), we will: 1) complete the collection, processing, and online data integration of samples collected in 2015; 2) continue data processing, data error checking and the entry of data into the KNZ LTER database and the LTER Network Information System; 3) continue to publish novel scientific literature based on KNZ LTER data and experiments; 4) continue to support the educational development and training of graduate and undergraduate students; 5) initiate new grazing lawn experiments and implement new treatment structure, as specified in the LTER VII proposal, in the Irrigation Transect and Belowgroud plot experiments in summer 2016, and 6) initiate planning and discussions in preparation for the mid-cycle NSF review (summer, 2017).

Supporting Files

Filename	Description	Uploaded By	Uploaded On
KNZ LTER Activities 2015.pdf	KNZ_Activities	John Blair	10/07/2015
KNZ LTER FINDINGS 2015.pdf	KNZ_Findings	John Blair	10/07/2015

Products

Books

Book Chapters

Blair, J.M., J. Nippert, and J. Briggs (2014). Grassland Ecology. *The Plant Sciences - Ecology and the Environment* R. Monson. Springer-Verlag. . Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Mandyam, K. and A. Jumpponen (2014). Unraveling the dark septate endophyte functions: Insights from the Arabidopsis model.. *Advances in Endophytic Research* Verma, V.C., Gange, A.C.. Springer-Verlag. Berlin. 115. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Inventions

Journals or Juried Conference Papers

Alexander, H.A., K.E. Mauck, A.E. Whitfield, K.A. Garrett, and C.M. Malmstrom. (2014). Plant-virus interactions and the agro-ecological interface.. *European Journal of Plant Pathology*. 138 529-537. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Avolio, M., C.C. Chang, J.J. Weis, and M.D. Smith. (2015). The effects of genotype richness and genomic dissimilarity of Andropogon gerardii on invasion resistance and productivity.. *Plant Ecology and Diversity*. 8 61-71. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Avolio, M.L., S.E. Koerner, K.J. La Pierre, K.R. Wilcox, G.W.T. Wilson, M.D. Smith, and S.L. Collins. (2014). Changes in plant community composition, not diversity, during a decade of nitrogen and phosphorus additions drive above-ground productivity in a tallgrass prairie.. *Journal of Ecology*. 102 1649-1660. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Baer, S.G., D.J. Gibson, A.M. Benscoter, L.K. Reed, R.E. Campbell, R.P. Klopf, J.E. Willand, and B.R. Wodika. (2014). No effect of seed source on multiple aspects of ecosystem functioning during ecological restoration: cultivars compared to local ecotypes of dominant grasses.. *Evolutionary*

Adaptations. 7 (323-335), . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Brown, S.P., A.M. Veach, A.R. Rigdon-Huss, K. Grond, S.K. Lickteig, K. Lothamer, A.K. Oliver, and A. Jumpponen. (2015). Scraping the bottom of the barrel: are rare high throughput sequences artifacts?. *Fungal Ecology*. 13 221-225. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

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Websites
Konza Prairie LTER program web site
http://www.konza.ksu.edu/knz/pages/home/home.aspx

This is the main website for the KNZ LTER program, and includes links to the KNZ documents, databases, and publications.

Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Blair, John	PD/PI	4
Baer, Sara	Co PD/PI	2
Dodds, Walter	Co PD/PI	2
Joern, Anthony	Co PD/PI	2
Nippert, Jesse	Co PD/PI	2
Boyle, Alice	Co-Investigator	1
Briggs, John	Co-Investigator	1
Brunsell, Nathaniel	Co-Investigator	1
Collins, Scott	Co-Investigator	1
Daniels, Melinda	Co-Investigator	1
Gido, Keith	Co-Investigator	1
Harrington Jr., John	Co-Investigator	1
Hartnett, David	Co-Investigator	2
Horne, Eva	Co-Investigator	1
Hutchinson, Stacy	Co-Investigator	1
Jensen, William	Co-Investigator	1
Johnson, Loretta	Co-Investigator	1
Jumponnen, Ari	Co-Investigator	1
Knapp, Alan	Co-Investigator	2
Macpherson, Gwendolyn	Co-Investigator	2

Name	Most Senior Project Role	Nearest Person Month Worked
Olson, KC	Co-Investigator	2
Rice, Charles	Co-Investigator	1
Sandercock, Brett	Co-Investigator	1
Smith, Melinda	Co-Investigator	2
Snyder, Bruce	Co-Investigator	1
Whiles, Matt	Co-Investigator	1
Wilson, Gail	Co-Investigator	1
Zeglin, Lydia	Co-Investigator	1
Zolnerowich, Gregory	Co-Investigator	1
Ferguson, Carolyn	Faculty	1
Garrett, Karen	Faculty	1
Gibson, David	Faculty	1
Goodin, Douglas	Faculty	1
Greer, Mitch	Faculty	1
Hope, Andrew	Faculty	1
Kaufman, Donald	Faculty	1
Kaufman, Glennis	Faculty	1
Koelliker, James	Faculty	1
Mather, Martha	Faculty	1
Mayfield, Mark	Faculty	1
McKane, Robert	Faculty	1
McLauchlan, Kendra	Faculty	1
Ocheltree, Troy	Faculty	1
Ransom, Michel	Faculty	1
Todd, Timothy	Faculty	1
Avolio, Meghan	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Koerner, Sally	Postdoctoral (scholar, fellow or other postdoctoral position)	2
LaPierre, Kimberly	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Laws, Angela	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Lemoine, Nate	Postdoctoral (scholar, fellow or other postdoctoral position)	12
Ratajczak, Zak	Postdoctoral (scholar, fellow or other postdoctoral position)	2

Name	Most Senior Project Role	Nearest Person Month Worked
Veach, Allison	Postdoctoral (scholar, fellow or other postdoctoral position)	12
Yu, Qiang	Postdoctoral (scholar, fellow or other postdoctoral position)	1
Haukos, Jill	Other Professional	12
Xia, Yang	Other Professional	9
Ackerfield, Jennifer	Graduate Student (research assistant)	1
Bonjour, Sophia	Graduate Student (research assistant)	1
Chaves Rodriguez, Francis	Graduate Student (research assistant)	12
Choppick, Parker	Graduate Student (research assistant)	1
Commerford, Julie	Graduate Student (research assistant)	1
Dietrich, John	Graduate Student (research assistant)	1
Felton, Andrew	Graduate Student (research assistant)	12
Forrestel, Elisabeth	Graduate Student (research assistant)	2
Gomez, Jesus	Graduate Student (research assistant)	12
Gray, Jess	Graduate Student (research assistant)	1
Griffin-Nolan, Robert	Graduate Student (research assistant)	1
Harris, Patrick	Graduate Student (research assistant)	3
Hoffman, Ava	Graduate Student (research assistant)	1
Horton, AJ	Graduate Student (research assistant)	3
Ling, Bohua	Graduate Student (research assistant)	1
Liu, Huan	Graduate Student (research assistant)	2
Manning, George	Graduate Student (research assistant)	3
Mino, Laura	Graduate Student (research assistant)	1
Morse, Nathan	Graduate Student (research assistant)	1
Notenbaert, Noortje	Graduate Student (research assistant)	12
O'Conner, Rory	Graduate Student (research assistant)	12
O'Keefe, Kim	Graduate Student (research assistant)	12
Rawitch, Michael	Graduate Student (research assistant)	1
Raynor, Edward	Graduate Student (research assistant)	12
Ricketts, Drew	Graduate Student (research assistant)	12
Scott, Drew	Graduate Student (research assistant)	4
Shoup, Logan	Graduate Student (research assistant)	1

Name	Most Senior Project Role	Nearest Person Month Worked
Slette, Ingrid	Graduate Student (research assistant)	1
Trentman, Matt	Graduate Student (research assistant)	12
Verheijen, Bram	Graduate Student (research assistant)	12
Welti, Ellen	Graduate Student (research assistant)	12
Wiggam-Ricketts, Shelly	Graduate Student (research assistant)	12
Wilcox, Kevin	Graduate Student (research assistant)	4
Williams, Emily	Graduate Student (research assistant)	12
Kuhl, Amanda	Non-Student Research Assistant	12
O'Neal, Patrick	Non-Student Research Assistant	12
Ramundo, Rosemary	Non-Student Research Assistant	12
Taylor, Jeff	Non-Student Research Assistant	12
Carrera-Martinez, Roberto	Research Experience for Undergraduates (REU) Participant	2
Culbertson, Katherine	Research Experience for Undergraduates (REU) Participant	2
Czerwinski, Mitchell	Research Experience for Undergraduates (REU) Participant	2
Gonzalez, Zeke	Research Experience for Undergraduates (REU) Participant	2
Harris III, Robert	Research Experience for Undergraduates (REU) Participant	2
Hoch, Braden	Research Experience for Undergraduates (REU) Participant	2
Leveritte, Kiana	Research Experience for Undergraduates (REU) Participant	2
Marquez, Yisel	Research Experience for Undergraduates (REU) Participant	2
O'Hare, Anna	Research Experience for Undergraduates (REU) Participant	2
Vilonen, Leena	Research Experience for Undergraduates (REU) Participant	2
Winnicki, Sarah	Research Experience for Undergraduates (REU) Participant	2

Full details of individuals who have worked on the project:

John M Blair
Email: jblair@ksu.edu
Most Senior Project Role: PD/PI
Nearest Person Month Worked: 4

Contribution to the Project: Dr. Blair is the Konza Prairie LTER lead PI and project director. Provides overall LTER project leadership and coordination. Research expertise in ecosystem ecology and terrestrial biogeochemistry; soil ecology, including decomposition, soil nutrient cycling, litter/soil/plant nutrient dynamics; effects of climate change and other disturbances on ecosystem processes; ecology of soil invertebrates; and restoration ecology.

Funding Support: None.

International Collaboration: No
International Travel: No

Sara G Baer
Email: sgbaer@siu.edu
Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 2

Contribution to the Project: Dr. Baer is a project co-PI and provides expertise on grassland restoration, particularly with respect to plant community dynamics and long-term changes in ecosystem properties and processes. She is responsible for directing research on grassland restoration ecology at the Konza site, including recovery of ecosystem properties in restored grasslands, and the influence of genotypic differences in cultivars and native vegetation on ecological processes in restored grasslands. Dr. Baer oversees the new Restoration Chronosequence study as part of the LTER VII project. Supported with a subcontract to Southern Illinois University.

Funding Support: NSF LTREB: The role of ecological heterogeneity in a long-term grassland restoration experiment. Provides partial support for a related restoration experiment initiated with non-LTER funds.

International Collaboration: No
International Travel: No

Walter K Dodds
Email: wkdodds@ksu.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: Konza LTER VII Co-PI. Dr. Dodds provides leadership for the Konza LTER aquatic research group. Research expertise in aquatic ecology; phycology; nutrient cycling and retention in streams; groundwater chemistry; watershed-level hydrologic export; water quality. Dr. Dodds is also leading the riparian vegetation removal study as part of the LTER VII funding cycle. This study will assess the impacts of riparian land-cover change on grassland streams.

Funding Support: None.

International Collaboration: No
International Travel: No

Anthony Joern
Email: ajoern@ksu.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: Konza LTER VI Co-PI. Provides expertise on insect population and community studies; plant-herbivore-predator interactions; long-term consumer population dynamics; responses of insect herbivores to fire and grazing; temporal dynamics in ecological studies. Oversees the Konza LTER tong-term grasshopper abundance dataset, and studies on the role of insect herbivores and climate change in mesic grasslands. Is co-leading the patch-burning grazing study, and assessing impacts of fire-grazing interactions on spatial patterning. Co-Director of the KSU Institute for Grassland Studies (with D. Hartnett).

Funding Support: This grant.

International Collaboration: No
International Travel: No

Jesse B Nippert
Email: nippert@ksu.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: Dr. Nippert is a co-PI on the Konza LTER VII project, and contributes expertise in plant ecology and ecophysiology, and plant responses to environmental variability and change. Dr. Nippert oversees the application of environmental sensor networks to assess spatial variability in microclimate, and plant responses on core LTER watersheds at the Konza Prairie LTER site. He is responsible for woody plant encroachment studies, and also directs the KSU Stable Isotope Mass Spectroscopy Laboratory, and provides expertise on the application of stable isotopes to ecological studies.

Funding Support: None.

International Collaboration: Yes, South Africa
International Travel: No

Alice Boyle
Email: aboyle@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in bird ecology and physiology; particular interest in reproduction, dispersal and energetics.

Funding Support: None.

International Collaboration: No

International Travel: No

John M Briggs
Email: jbriggs1@k-state.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Konza LTER investigator and Director of the Konza Prairie Biological Station (the primary research site for the Konza LTER program). Dr. Briggs oversees studies of grass-shrub interactions and the causes and consequences of woody plant encroachment into grasslands. Directs research into patterns and controls of ANPP in grasslands, as well as studies of the relationship between ANPP and species richness. Also provides expertise in database management, GIS and remote sensing studies.

Funding Support: NSF: Impacts of Spatially Heterogeneous Nitrogen to Grazer Distribution and Activity: Effects on Ecosystem Function in Tallgrass Prairie

International Collaboration: No
International Travel: No

Nathaniel Brunsell
Email: brunsell@ku.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in ecosystem and global C and water flux measurement and modeling; coordinates collection and analysis of data from the Ameriflux towers located on Konza Prairie.

Funding Support: None.

International Collaboration: No
International Travel: No

Scott Collins
Email: scollins@sevilleta.unm.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in grassland ecology and plant community ecology; ecological analyses of spatial and temporal dynamics; ecological responses to disturbance; analysis of species distribution and abundance; local-regional interactions; productivity-diversity relationships.

Funding Support: NSF Savannah Convergence Project

International Collaboration: Yes, South Africa
International Travel: No

Melinda Daniels
Email: mddaniel@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Dr. Melinda Daniels is an Associate Professor of Geography and new senior personnel with the Konza LTER program. Her research expertise is in fluvial geomorphology and she has initiated new measurements of stream morphology, erosion and sediment transport at the Konza Prairie LTER site.

Funding Support: Missouri Department of Conservation grant: Biotic integrity of prairie streams as influenced by patch burn grazing and riparian protection

International Collaboration: No
International Travel: No

Keith Gido
Email: kgido@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Provides expertise in aquatic ecology; stream communities and ecosystems; the effects of fish on stream ecosystem properties such as primary productivity, nutrient cycling, community structure (species richness and diversity), decomposition and transport of particulate organic matter (POM); impacts of altered hydrologic regimes on stream ecosystems. Oversees the LTER experimental stream facility. Coordinates regional assessments of stream fish communities.

Funding Support: NSF Macrosystem Project: Scale, Consumers, and Lotic Ecosystem Rates (SCALER): from decimeters to continents NSF Dissertation Research: Forecasting Global Warming Effects on Developmental Performance of Prairie Stream Fishes along the River Continuum.

International Collaboration: Yes, Australia
International Travel: No

John Harrington Jr.
Email: jharrin@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Dr. Harrington is a Professor of Geography with expertise in climatology and climate change, land-use/land-cover change, and natural resource applications of remote sensing and GIS. Dr. Harrington is leading many of the new social science related initiatives within our LTER program, and has been representing the KNZ LTER program at numerous LTER Network social science planning and cross-site activities (valuation of ecosystem services, impacts of land-cover change, etc.).

Funding Support: None.

International Collaboration: No
International Travel: No

David C Hartnett
Email: dchart@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: Expertise in grassland plant population ecology; the role of belowground bud banks in grassland communities; plant mycorrhizal interactions in grasslands; plant-herbivore interactions; fire ecology. Also involved in ILTER activities, and Co-Director of the Institute for Grassland Studies.

Funding Support: None.

International Collaboration: Yes, Botswana
International Travel: No

Eva Horne
Email: ehorne@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Research in behavioral ecology of grassland reptiles; responses of reptile and amphibian populations to fire and grazing. Dr. Horne also assists with administration of the Konza Prairie Biological Station, and coordination of research permits and projects at the site.

Funding Support: None.

International Collaboration: No
International Travel: No

Stacy Hutchinson
Email: sllhutch@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Dr. Hutchinson is a Professor of Biological and Agricultural Engineering, and has assumed responsibility for overseeing the water addition treatments and soil moisture monitoring in the long-term Irrigation Transect Experiment at the Konza site. This was previously the responsibility of Dr. Jim Koelliker until his retirement in 2010

Funding Support: None.

International Collaboration: No
International Travel: No

William Jensen
Email: wjensen1@emporia.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Dr. Jensen is an Associate Professor at Emporia State University. He is studying the effects of patch-burn grazing on

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brood parasitism of Dickcissel nests in the Flint Hills tallgrass prairie, and is responsible for collecting data on avian consumer responses to the patch-burn grazing experiment..

Funding Support: None.

International Collaboration: No
International Travel: No

Loretta Johnson
Email: johnson@k-state.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Provides research expertise in plant ecology, plant-soil interactions, and ecological genomics. Oversees a long-term water x N amendment experiment at Konza Prairie, and a cross-site study of the impacts of climate on success of local vs. non-local ecotypes of dominant grasses.

Funding Support: None.

International Collaboration: No
International Travel: No

Ari Jumponnen
Email: ari@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise on fungal ecology, particularly mycorrhizae and other endophytic fungi; diversity of soil microbial communities; application of molecular methods to characterize soil microbial communities.

Funding Support: None.

International Collaboration: No
International Travel: No

Alan Knapp
Email: alan.knapp@colostate.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: Provides research expertise in grassland ecology, plant ecology, physiological ecology, global change studies, plants-herbivore interactions, invasive species ecology. Dr. Knapp also provides leadership for LTER studies of plant productivity and responses to climatic variability and climate change, and conducts multi-site research involving SGS and KNZ LTER sites. Supported by a subcontract to Colorado State University.

Funding Support: NSF Savannah Convergence Project

International Collaboration: Yes, South Africa
International Travel: No

Gwendolyn Macpherson
Email: glmac@ku.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: Expertise in hydrogeology; subsurface hydrology; long-term studies of groundwater flux and biogeochemistry at Konza LTER site. Supported by a subcontract to the University of Kansas.

Funding Support: None.

International Collaboration: No
International Travel: No

KC Olson
Email: kcolson@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: KC Olson is a professor of animal science, who brings expertise on the physiology and management of cattle in mesic grasslands. Dr. Olson is an active participant in the new patch-burn grazing study, and will oversee assessment of animal performance as a

management-related aspect of this LTER study.

Funding Support: None.

International Collaboration: No
International Travel: No

Charles Rice
Email: cwrice@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in soil microbial ecology; responses of grassland microbial communities to fire, grazing climatic variability; soil C and N dynamics; denitrification in grasslands; effects of management on soil C sequestration. Contributor and author for IPCC AR4.

Funding Support: None.

International Collaboration: No
International Travel: No

Brett Sandercock
Email: bsanderc@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in bird ecology and conservation; particular interest in prairie chickens, shorebirds and gassland management impacts

Funding Support: None.

International Collaboration: No
International Travel: No

Melinda Smith
Email: melinda.smith@colostate.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: Associate Professor at Colorado State University conducting research on plant population and community dynamics at Konza Prairie, and the impacts of climate change. Directs site-based activities related to the multi-site Nutrient Network (NutNet) project.

Funding Support: NSF Savannah Convergence Project

International Collaboration: No
International Travel: No

Bruce Snyder
Email: basnyder@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in arthropod diversity and ecology; particular interest in earthworms; directs site-based REU program.

Funding Support: None.

International Collaboration: No
International Travel: No

Matt Whiles
Email: mwhiles@zoology.siu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in invertebrate ecology; research focused on assessment of patterns and controls of secondary productivity in grassland streams; ecology of soil invertebrates in grasslands. Participant in new riparian vegetation removal experiment. Supported by subcontract to Southern Illinois University.

Funding Support: NSF Macrosystem Project: Scale, consumers, and Lotic Ecosystem Rates (SCALER): from decimeters to continents Missouri Department of Conservation Grant: Biotic integrity of prairie streams as influenced by patch burn grazing and riparian protection

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International Collaboration: No
International Travel: No

Gail Wilson
Email: gail.wilson@okstate.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Gail Wilson provides expertise on the role of mycorrhizal fungi in grasslands, and is responsible for long-term studies of the impacts of of mycorrhizal fungi on plant community dynamics and on soil structure and C storage in grasslands. She is supported with subcontract to Oklahoma State University.

Funding Support: None.

International Collaboration: No
International Travel: No

Lydia Zeglin
Email: lzeglin@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Provides expertise in molecular microbial ecology; taxonomic and functional diversity of soil and stream microbiota in the context of ecosystem N and C cycles.

Funding Support: Kansas NSF EPSCoR First Award: Microbial mechanisms of drought tolerance and the implications for grassland soil carbon storage

International Collaboration: No
International Travel: No

Gregory Zolnerowich
Email: gregz@ksu.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in grassland insect biodiversity and insect systematics, particularly of parasitic wasps. Dr. Zolnerowich oversees the KSU Museum of Entomological and Prairie Arthropod Research, and provides expertise on electronic databasing of biological collections.

Funding Support: None.

International Collaboration: No
International Travel: No

Carolyn Ferguson
Email: ferg@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in plant systematics, plant population biology, and plant-pollinator interactions. Dr. Ferguson oversees the KSU Herbarium, and also provides expertise on electronic databasing of biological collections. Dr. Ferguson is also PI of GK-12 grant, which includes students and faculty scientists from the Konza LTER program.

Funding Support: None.

International Collaboration: No
International Travel: No

Karen Garrett
Email: kgarrett@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in the ecology and genomics of plant disease and other plant stressors; particular interest in mechanisms of native grass response to stress and disease.

Funding Support: None

International Collaboration: No

International Travel: No

David Gibson
Email: dgibson@plant.siu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in plant population and community ecology, including competition and interactions with exotic species.

Funding Support: None.

International Collaboration: No
International Travel: No

Douglas Goodin
Email: dgoodin@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Provides expertise on remote sensing of ecological data, including patterns of plant productivity and spatial distributions of grazing and fire effects; research on climatology in the Central Plains (Dr. Goodin serves on the LTER Climate Committee); research on the impacts of burning on air quality.

Funding Support: NSF: Impacts of Spatially Heterogeneous Nitrogen to Grazer Distribution and Activity: Effects on Ecosystem Function in Tallgrass Prairie

International Collaboration: No
International Travel: No

Mitch Greer
Email: mjgreer@fhsu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in grassland ecology and range management.

Funding Support: None.

International Collaboration: No
International Travel: No

Andrew Hope
Email: ahope@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in mammalogy; particularly phylogeography, speciation and climate impacts on evolutionary mechanisms of community assembly.

Funding Support: None.

International Collaboration: No
International Travel: No

Donald Kaufman
Email: dwkaufman@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Research focus is on the ecology of small mammals, and temporal and spatial dynamics of consumer populations in grasslands.

Funding Support: None.

International Collaboration: No
International Travel: No

Glennis Kaufman
Email: gkaufman@ksu.edu

Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in mammalogy; particularly the population and community dynamics of grassland mammals.

Funding Support: None.

International Collaboration: No
International Travel: No

James Koelliker
Email: koellik@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in hydrology, water quality, water supply and watershed simulation modeling.

Funding Support: None

International Collaboration: No
International Travel: No

Martha Mather
Email: mmather@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in fish ecology and management with focus on Great Plains taxa.

Funding Support: None.

International Collaboration: No
International Travel: No

Mark Mayfield
Email: markherb@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in plant systematics.

Funding Support: None.

International Collaboration: No
International Travel: No

Robert McKane
Email: McKane.Bob@epa.gov
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in modeling ecosystem services and tradeoffs for management decision making.

Funding Support: None.

International Collaboration: No
International Travel: No

Kendra McLauchlan
Email: mclauch@k-state.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in paleoecology; particularly climate change and nutrient cycles.

Funding Support: None.

International Collaboration: No
International Travel: No

Troy Ocheltree
Email: Troy.Ocheltree@colostate.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in range ecology; particularly plant-water relations.

Funding Support: None

International Collaboration: No
International Travel: No

Michel Ransom
Email: mdransom@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in pedogenesis and soil mineralogy.

Funding Support: None.

International Collaboration: No
International Travel: No

Timothy Todd
Email: nema@ksu.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Expertise in nematode ecology; particularly plant-nematode interactions and soil food web dynamics.

Funding Support: None.

International Collaboration: No
International Travel: No

Meghan Avolio
Email: meghan.avolio@gmail.com
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 2

Contribution to the Project: Former Ph.D. student at Yale University (Advisor: Melinda Smith). Research on grassland plant communities, mycorrhizae, climate change, nitrogen deposition, and genetic structure of plant communities. Now a postdoctoral fellow at the University of Utah.

Funding Support: None.

International Collaboration: No
International Travel: No

Sally Koerner
Email: sally.koerner@duke.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 2

Contribution to the Project: Former Ph.D. student at University of New Mexico, working with Scott Collins and Melinda Smith on community convergence in grassland ecosystems.

Funding Support: None.

International Collaboration: No
International Travel: No

Kimberly LaPierre
Email: lapierre.kimberly@gmail.com
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 2

Contribution to the Project: Former PhD student from Yale University, working with Melinda Smith on plant responses to altered nutrient availability and grazing (part of the cross-site NutNet project).

Funding Support: None

International Collaboration: No
International Travel: No

Angela Laws
Email: alaws@ksu.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 2

Contribution to the Project: Studies climate impacts on food web dynamics and species interactions in grasslands.

Funding Support: None.

International Collaboration: No
International Travel: No

Nate Lemoine
Email: lemoine.nathan@gmail.com
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 12

Contribution to the Project: Working with Melinda Smith on the influence of trophic interactions on plant community structure and function responses to climate change.

Funding Support: None.

International Collaboration: No
International Travel: No

Zak Ratajczak
Email: zaratajczak@gmail.com
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 2

Contribution to the Project: Former PhD student working with Jesse Nippert. Research area involves woody encroachment.

Funding Support: None.

International Collaboration: No
International Travel: No

Allison Veach
Email: amveach@ksu.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 12

Contribution to the Project: Grassland microbial ecologist working with Lydia Zeglin; working with soil microbial taxonomic and functional group turnover in response to climate change.

Funding Support: Kansas NSF EPSCoR First Award: Microbial mechanisms of drought tolerance and the implications for grassland soil carbon storage

International Collaboration: No
International Travel: No

Qiang Yu
Email: Qiang.Yu@colostate.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 1

Contribution to the Project: Working with Melinda Smith on the ecological stoichiometry of plants, particularly the role of homeostatis in reulating ecosystem structure, function and stability.

Funding Support: None.

International Collaboration: No
International Travel: No

Jill Haukos
Email: jhaukos@ksu.edu
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 12

Contribution to the Project: Director of the Konza Education Program (KEEP). Jill directs the K-12 education program, including the Konza Prairie SLTER program and serves as the KNZ LTER education representative for LNO activities. Jill also oversees the Konza docent program and some of the public outreach activities.

Funding Support: Konza Prairie Biological Sstation

International Collaboration: No
International Travel: No

Yang Xia
Email: yangx@ksu.edu
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 9

Contribution to the Project: LTER Information Manager. Responsibilities include data management, database design and implementation, and overseeing KNZ LTER computer network activities.

Funding Support: None.

International Collaboration: No
International Travel: No

Jennifer Ackerfield
Email: Jennifer.Ackerfield@colostate.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: Studies plant diversity and community ecology.

Funding Support: None.

International Collaboration: No
International Travel: No

Sophia Bonjour
Email: sophia.bonjour@siu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: Student with Matt Whiles at Southern Illinois University studying stream heterogeneity and food webs.

Funding Support: None

International Collaboration: No
International Travel: No

Francis Chaves Rodriguez
Email: fachaves@rams.colostate.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: PhD student (Advisor, Melinda Smith) studying the influence of species diversity and dominance on community structure and ecosystem function.

Funding Support: None.

International Collaboration: No
International Travel: No

Parker Choppick
Email: coppick@okstate.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: PhD student (Advisor, Gail Wilson) studying plant-mycorrhizal relationships in the context of native and invasive

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species interactions.

Funding Support: None.

International Collaboration: No
International Travel: No

Julie Commerford
Email: jcomm@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: Graduate student with Kendra McLauchlan at Kansas State Univeristy, studying drivers of historical patterns of vegetation change in grasslands using palynology.

Funding Support: None.

International Collaboration: No
International Travel: No

John Dietrich
Email: jdietri@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: MS student (Advisor, Melinda Smith) studying grasslands and plant community responses to changing environmental drivers.

Funding Support: None.

International Collaboration: No
International Travel: No

Andrew Felton
Email: felton12392@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: PhD student (Advisor, Melinda Smith) studying climate effects on plant community structure and function.

Funding Support: None

International Collaboration: No
International Travel: No

Elisabeth Forrestel
Email: elisabeth.forrestel@yale.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 2

Contribution to the Project: PhD student (Advisor, Melinda Smith at Colorado State University) working with population genetics in tallgrass plant species.

Funding Support: None.

International Collaboration: No
International Travel: No

Jesus Gomez
Email: jegomez@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: MS student from Puerto Rico working with Tony Joern on role of grassland disturbance on arthropod food webs.

Funding Support: None.

International Collaboration: No
International Travel: No

Jess Gray
Email: Jesse.Gray@colostate.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: PhD student (Advisor, Melinda Smith) studying trait-mediated effects of diversity at different scales and consequences for ecosystem function.

Funding Support: None.

International Collaboration: No
International Travel: No

Robert Griffin-Nolan
Email: robertgn13@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: PhD student (Advisor, Alan Knapp) working on plant physiological responses to drought and ecosystem drought sensitivity.

Funding Support: None.

International Collaboration: No
International Travel: No

Patrick Harris
Email: ptharris@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: MS student (Advisor, Sara Baer) working on the effects of deer-browsing on the plant community development and ecosystem functioning during prairie restoration.

Funding Support: None

International Collaboration: No
International Travel: No

Ava Hoffman
Email: avamariehoffman@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: PhD student (Advisor, Melinda Smith) working on how the ecology and genetics of dominant species influence ecosystem function.

Funding Support: None.

International Collaboration: No
International Travel: No

AJ Horton
Email: ajhorton11@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Graduate student from Colorado State University (advisor, Francesca Cutrufo). Quantifying the role of soil fauna on litter decomposition and soil C and N dynamics using isotope labeling.

Funding Support: None.

International Collaboration: No
International Travel: No

Bohua Ling
Email: bohual@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: MS student (Advisor, Douglas Gooodin) working on remote sensing of plant biomass and quality.

Funding Support: None.

International Collaboration: No
International Travel: No

Huan Liu
Email: huanliu82@ku.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 2

Contribution to the Project: Advisor Gwen Macpherson. Working on groundwater hydrology and geochemistry at the Konza LTER site.

Funding Support: None

International Collaboration: No
International Travel: No

George Manning
Email: gmanning4@siu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: PhD student (Advisor, Sara Baer) working on the role of inter-annual environmental variability on the development and trajectory of restored prairie plant communities.

Funding Support: None.

International Collaboration: No
International Travel: No

Laura Mino
Email: laura.mino@okstate.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: MS student (Advisor, Gail Wilson) working on mycorrhizal interactions in invasive and encroaching woody plant species.

Funding Support: None.

International Collaboration: No
International Travel: No

Nathan Morse
Email: morsen@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: MS student (Advisor, Andrew Hope) working on the phylogeography of small mammals and their parasites.

Funding Support: None.

International Collaboration: No
International Travel: No

Noortje Notenbaert
Email: noortjec@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: MS student (Advisor, Chuck Rice) working on the impacts of grazing and climate on soil greenhouse gas emissions.

Funding Support: None.

International Collaboration: No
International Travel: No

Rory O'Conner
Email: rory9@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: PhD student (Advisor, Jesse Nippert) working on the mechanisms of woody plant establishment in grasslands.

Funding Support: None

International Collaboration: No
International Travel: No

Kim O'Keefe
Email: kokeefe@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: PhD student (Advisor, Jesse Nippert) studying how mechanisms of plant water use affect ecosytem processes.

Funding Support: None.

International Collaboration: No
International Travel: No

Michael Rawitch
Email: myrawitch@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: Student with Gwen MacPherson at the University of Kansas studying carbon dioxide flux in prairie streams.

Funding Support: None.

International Collaboration: No
International Travel: No

Edward Raynor
Email: ejraynor@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: Anthony Joern and John Briggs are co-advisors. Research subject is herbivore foraging with an emphasis on bison.

Funding Support: None.

International Collaboration: No
International Travel: No

Drew Ricketts
Email: arickett@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: PhD student (advisor, Brett Sandercock) working with small mammal responses to patch burn grazing.

Funding Support: None.

International Collaboration: No
International Travel: No

Drew Scott
Email: dascott@siu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 4

Contribution to the Project: MS student (Advisor, Sara Baer) working on development of soil aggregate structure and consequence for seed germination and biomass of plant functional groups during prairie restoration.

Funding Support: None

International Collaboration: No
International Travel: No

Logan Shoup
Email: logan.shoup@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: MS student (Advisor, Matt Whiles) studying ecological differences between headwater streams of contrasting prairie regions.

Funding Support: None.

International Collaboration: No
International Travel: No

Ingrid Slette
Email: ingrid.slette@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: PhD student (Advisor, Alan Knapp) working on historical effects of climate change on grassland carbon cycling.

Funding Support: None.

International Collaboration: No
International Travel: No

Matt Trentman
Email: mtrentman@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: MS student (Advisor, Walter Dodds) working on nitrogen cycling in streams.

Funding Support: None.

International Collaboration: No
International Travel: No

Bram Verheijen
Email: bramverheijen@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: PhD student (Advisor, Brett Sandercock) working on a 3-year study at Konza Prairie LTER site to test the potential benefits of patch-burn grazing for grassland vertebrates.

Funding Support: None.

International Collaboration: No
International Travel: No

Ellen Welti
Email: elwelti@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: PhD student (Advisor, Tony Joern) working on mechanisms of food web stability.

Funding Support: None

International Collaboration: No
International Travel: No

Shelly Wiggam-Ricketts
Email: wiggie@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: PhD student (Advisor, Greg Zolnerowich) working on effects of fire regime on grassland pollination dynamics.

Funding Support: None.

International Collaboration: No
International Travel: No

Kevin Wilcox
Email: wilcoxkr@rams.colostate.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 4

Contribution to the Project: Colorado State University PhD student, advisor Alan Knapp. Dissertation topic will be looking for ecological generality in savanna grassland ecosystems

Funding Support: None.

International Collaboration: No
International Travel: No

Emily Williams
Email: ejwillia@ksu.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: MS student (Advisor, Alice Boyle) working with dispersal and migratory behavior of the Grassland Sparrow.

Funding Support: None.

International Collaboration: No
International Travel: No

Amanda Kuhl
Email: akuhl@ksu.edu
Most Senior Project Role: Non-Student Research Assistant
Nearest Person Month Worked: 12

Contribution to the Project: Research assistant and field crew leader.

Funding Support: None.

International Collaboration: No
International Travel: No

Patrick O'Neal
Email: poneal@ksu.edu
Most Senior Project Role: Non-Student Research Assistant
Nearest Person Month Worked: 12

Contribution to the Project: Fire/bison management and field technician.

Funding Support: None

International Collaboration: No
International Travel: No

Rosemary Ramundo
Email: ramundo@ksu.edu
Most Senior Project Role: Non-Student Research Assistant
Nearest Person Month Worked: 12

Contribution to the Project: LTER analytical lab supervisor, research coordinator.

Funding Support: None.

International Collaboration: No
International Travel: No

Jeff Taylor
Email: jht@ksu.edu
Most Senior Project Role: Non-Student Research Assistant
Nearest Person Month Worked: 12

Contribution to the Project: Field technician.

Funding Support: None.

International Collaboration: No
International Travel: No

Roberto Carrera-Martinez
Email: roberto.carrera@upr.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at University of Puerto Rico, Mayaguez (mentored by Bruce Snyder). Studied invasive earthworms at Konza Prairie.

Funding Support: Kansas State Biology REU: Ecology and Evolution in Changing Environments

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Katherine Culbertson
Email: kculbertson@college.harvard.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Harvard University (mentored by Lydia Zeglin). Studied stream order and canopy cover influences on stream biofilm organic matter utilization.

Funding Support: Kansas State Biology REU: Ecology and Evolution in Changing Environments

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Mitchell Czerwinski
Email: maczerw@ilstu.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Illinois State Univeristy (mentored by John Blair). Studied effects of biomass removal on seedling establishment in restored prairie.

Funding Support: None.

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Zeke Gonzalez
Email: zekegonza@gmail.com
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at University of Maryland (mentored by Keith Gido). Studied thermal tolerances of Central Stoneroller and Southern Red-Bellied Dace.

Funding Support: Kansas State Biology REU: Ecology and Evolution in Changing Environments

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International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Robert Harris III
Email: harrisr@carleton.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Carleton College (mentored by David Haukos). Studied grassland management effects on Regal Fritillary populations.

Funding Support: Kansas State Biology REU: Ecology and Evolution in Changing Environments

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Braden Hoch
Email: bhoch@ksu.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Kansas State Univeristy (mentored by Jesse Nippert). Studied Cornus drummondii gas exchange and transpiration.

Funding Support: None.

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Kiana Leveritte
Email: kleveritte6876@mytu.tuskegee.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Tuskegee University (mentored by Brett Sandercock). Studied effects of patch-burn grazing on songbird nesting.

Funding Support: Kansas State Biology REU: Ecology and Evolution in Changing Environments

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Yisel Marquez
Email: yiselmarquez@mail.weber.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Weber State University (mentored by Alice Boyle). Studied effects of severe storms on grassland birds.

Funding Support: Kansas State Biology REU: Ecology and Evolution in Changing Environments

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Anna O'Hare
Email: anna.ohare@okstate.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Oklahoma State University (mentored by Gail Wilson). Studied grassland restoration following removal of non-native invasive grasses.

Funding Support: Kansas State Biology REU: Ecology and Evolution in Changing Environments

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Leena Vilonen
Email: leenavilonen2016@u.northwestern.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Northwestern University (mentored by Melinda Smith). Studied effects of woddy plant expansion on belowground C and N processes.

Funding Support: None

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Sarah Winnicki
Email: winnic_s1@denison.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 2

Contribution to the Project: Undergraduate at Denison University (mentored by Alice Boyle). Studied Grasshoper Sparrow mating and cooperative care influence on aggregation.

Funding Support: Kansas State Biology REU: Ecology and Evolution in Changing Environments

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
Colorado State University	Academic Institution	Fort Collins, CO
Department of Energy	Other Organizations (foreign or domestic)	USA
University of Kansas	Academic Institution	Lawrence, KS
Kansas State University	Academic Institution	Manhattan, KS
NOAA	Other Organizations (foreign or domestic)	USA
Oklahoma State University	Academic Institution	Stillwater, OK
Southern Illinois University at Carbondale	Academic Institution	Carbondale, IL
State of Kansas	State or Local Government	Kansas
The Nature Conservancy	Other Nonprofits	Kansas

Name	Type of Partner Organization	Location
US EPA	Other Organizations (foreign or domestic)	USA
USGS	Other Organizations (foreign or domestic)	USA

Full details of organizations that have been involved as partners:

Colorado State University

Organization Type: Academic Institution
Organization Location: Fort Collins, CO

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Dr. Alan Knapp (Biology Department, Colorado State University) collaborates on many aspects of the Konza LTER program. His research includes studies of grassland ecology, responses to climatic variability and climate change, and the ecology of plant invasions. Knapp's LTER research is supported by a subcontract to Colorado State University,which also provides support for students participating in cross-site research that utilizes the Konza Prairie LTER site and database. Dr. Melinda Smith is an LTER collaborator and participates in several aspects of Konza LTER research, including studies of plant community dynamics, the ecology of plant invasions, genomic responses of plants to climate change, and comparisons of the ecology of North American and South African grasslands. Dr. Smith and her students also oversee the NutNet project at Konza as apart of a multi-site study of the effects of nutrient amendments and herbivory on herbaceous community and ecosystem dynamics. The Konza LTER program provides a subcontract to CSU and logistical support for these studies.

Department of Energy

Organization Type: Other Organizations (foreign or domestic)
Organization Location: USA

Partner's Contribution to the Project:
Financial support
In-Kind Support
Collaborative Research

More Detail on Partner and Contribution: The Konza LTER program provides partial support for two CO2 flux towers,which are part of the Ameriflux network of net C exchange measurement sites. DOE provides some financial and logistical support for tower operations and data processing.

Kansas State University

Organization Type: Academic Institution
Organization Location: Manhattan, KS

Partner's Contribution to the Project:
In-Kind Support
Facilities

More Detail on Partner and Contribution: KSU owns a portion of the Konza Prairie Biological Station, and provides access and use of the field site and associated on-site facilities. KSU also provide campus lab facilities, and computer server and network support through a partnership between the KNZ LTER program and the KSU Physics Computer Support Center, where KNZ network servers are housed. KSU provides support for operation of the Environmental Chemistry Laboratory in Bushnell Hall, which is used for LTER water sample analyses. KSU also provides support in the form of available assistantships for graduate students conducting KNZ research.

NOAA

Organization Type: Other Organizations (foreign or domestic)
Organization Location: USA

Partner's Contribution to the Project:
Facilities
Collaborative Research

More Detail on Partner and Contribution: Konza Prairie is part of the U.S. Climate Reference Network (USCRN). USCRN is a network of climate stations developed as part of a National Oceanic and Atmospheric Administration (NOAA) initiative. Its primary goal is to provide future long-term homogeneous observations of temperature and precipitation that can be coupled to long-term historical observations for the detection and attribution of present and future climate change.

Oklahoma State University

Organization Type: Academic Institution
Organization Location: Stillwater, OK

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: The Konza LTER program provides a subcontract to Oklahoma State University to support collaborative research with Dr. Gail Wilson. Dr. Wilson's research focuses primarily on the role of mycorrhizae in grasslands, and the the ecology of Bothriochloa bladhii (Caucasian bluestem), an important invasive grass species.

Southern Illinois University at Carbondale

Organization Type: Academic Institution
Organization Location: Carbondale, IL

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Collaborative Konza LTER research is supported by subcontracts to SIU collaborators: (1) Dr. Matt Whiles and students to support research on stream invertebrate ecology and soil macroinvertebrate ecology; (2) Dr. Sara Baer and students to support research on grassland restoration ecology.

State of Kansas

Organization Type: State or Local Government
Organization Location: Kansas

Partner's Contribution to the Project:
Financial support
Facilities

More Detail on Partner and Contribution: The state of Kansas provides an operating budget for Konza Prairie Biological Station personnel and general site maintenance.

The Nature Conservancy

Organization Type: Other Nonprofits
Organization Location: Kansas

Partner's Contribution to the Project:
Facilities
Collaborative Research

More Detail on Partner and Contribution: Konza Prairie Biological Station is a Nature Conservancy site, established on land purchased by The Nature Conservancy and managed by the Division of Biology at KSU. Konza LTER scientists interact with TNC scientists and officers on a broad range of management-related issues, including grassland conservation, restoration ecology, and grazing management.

US EPA

Organization Type: Other Organizations (foreign or domestic)
Organization Location: USA

Partner's Contribution to the Project:
Facilities
Collaborative Research

More Detail on Partner and Contribution: The US EPA jointly operates a CASTNet (Clean Air Standards and Trends Network) and AMoN (ammonia monitoring) site located at the Konza Prairie LTER site. The Konza Prairie LTER program provides site support and the EPA provides analytical services and compiles data on atmospheric nutrient concentrations and dry deposition rates, and tropospheric ozone concentrations. The EPA Region 7 office also supports a collaborative modeling project, which is using using Konza LTER data to build linked models of hydrology and biogeochemistry that can be used to assess the effects of alternate land-use scenarios in the Flint Hills region. This project is led by Dr. Bob McKane (EPA) in collaboration with KNZ scientists.

USGS

Organization Type: Other Organizations (foreign or domestic)
Organization Location: USA

Partner's Contribution to the Project:
Facilities

Collaborative Research

More Detail on Partner and Contribution: The USGS collects and provides data on the hydrology and chemistry of Kings Creek, a USGS benchmark stream located on the Konza Prairie LTER site, and the Konza LTER program facilitates the transfer of these data to the Hydro-DB database. The Konza LTER site is also a part of the USArray component of the USGS EarthScope project- a continental-scale seismic observatory.

University of Kansas

Organization Type: Academic Institution
Organization Location: Lawrence, KS

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Dr. Gwen Macpherson (Dept of Geology) and her students conduct collaborative research on groundwater hydrology and chemistry as part of the Konza Prairie LTER program. We also provide a subcontract and logistical/technical support to Dr. Nathaniel Brunsell (Dept of Geography), who oversees flux tower operations at the Konza site. Dr. Brunsell's research addresses the role of land-use/land-cover change land surface heterogeneity in vegetation, moisture, soil type, topography on water and energy fluxes from local to regional scales. This research uses a combination of field measurements, remote sensing and numerical modeling, and is integrated with flux tower studies at the Konza LTER site.

What other collaborators or contacts have been involved?
Nothing to report

Impacts

What is the impact on the development of the principal discipline(s) of the project?

The Konza Prairie LTER Program is a comprehensive, interdisciplinary research program designed to contribute to synthetic activities and conceptual and theoretical advances in ecology, and to further an understanding of ecological processes in grasslands. Examples of specific recent contributions to the discipline of ecology are provided in the attached 'Konza LTER Findings' file. Here, we summarize in more general terms the contributions of the Konza LTER program to the advancement of ecology. Konza LTER scientific findings continue to be published in a broad range of high quality journals. In the 2014-2015 period, the KNZ program produced or contributed to 95 publications: 78 refereed journal articles (including 10 currently in press), 2 book chapters, and 15 dissertations and theses. These publications cover topics ranging from the ecophysiology of individual organisms to regional patterns of productivity to consequences of global change in grasslands. Within the past year, Konza LTER scientists continued to publish high-quality articles in disciplinarily focused (e.g., Freshwater Science and New Phytologist), general ecology (Ecology and Journal of Ecology) and high impact journals (e.g., Nature Communications). In addition to site-based science, Konza publications include substantial contributions to multi-site, collaborative ecological research, and the widespread use of Konza LTER data and resources by the broader ecology community. For example, Konza LTER data were used in several recent multi-site or synthetic efforts, such as: a meta-analysis of long-term experiments of ecosystem sensitivity to chronic resource alterations (Smith et al. 2015 and Smith et al. *in press*); a cross-site study conceptual framework to assess mechanisms driving lotic stream systems (Dodds et al. 2015); a global analysis of the linkages between plant diversity and microbial diversity in grasslands (Prober et al. 2015); assessment of the above and below-ground sensitivity of grasslands to altered rainfall patterns (Wilcox et al. 2015); and a cross-site assessment of differential sensitivity of grassland productivity to regional drought in the western US (Knapp et al. 2015).

What is the impact on other disciplines?

The Konza Prairie LTER program and our core research experiments attract numerous scientists from a broad spectrum of scientific disciplines beyond ecology. We have long-term collaborations with many physical scientists from the University of Kansas. Gwen Macpherson is a hydrogeochemist whose research includes ongoing long-term studies of groundwater chemistry sampled via permanent wells located on Konza Prairie. Within the past year, Dr. Pamela Sullivan (Geography, KU) began additional subsurface geochemistry research at Konza. Sullivan's work focuses on the interface of freshwater resources – changing climate – vegetation dynamics, and she will be collaborating with Macpherson, Blair, and Nippert. Dr. Andrea Brookfield (Kansas Geological Survey) is a geohydrologist with an emphasis on groundwater modelling. Brookfield has begun collecting data at Konza, attending annual meetings, and making regular contributions. An atmospheric scientist from the University of Kansas (Nate Brunsell) uses Konza sites to study the effects of surface heterogeneity on land atmosphere interactions, and is employing a Large Aperture Scintillometer (LAS) to measure sensible heat fluxes over longer path lengths that span Konza watersheds with ongoing C flux measurements. A recent hire at K-State includes Dr. Eduardo Santos, whose research is also focused on land-atmosphere interactions. The work by Brunsell and Santos compares plot-based vegetation measurements with data from eddy covariance stations and satellite derived estimates of surface energy fluxes. Two hydrologists from Biological and Agricultural Engineering (Dr. Stacy Hutchinson and Dr. Tricia Moore) maintain and contribute to the 'Irrigation Transect Experiment'. Contributions by Hutchinson and Moore have provided numerous training opportunities for Biological and Agricultural Engineering and Hydrology students. Konza Prairie has also become a research platform for several collaborative teams of ecologists and molecular biologists that are part of the KSU Ecological Genomics Initiative. Many of these interdisciplinary teams are using the Konza LTER site and associated long-term experiments to address questions related to the genetic mechanisms underlying plant and animal responses to environmental constraints. The KNZ LTER patch-burn grazing experiment is being done in collaboration with Dr. KC Olson, a grazing animal nutritionist that is using the experiment to assess the impacts of alternate grassland management practices on animal nutrition and animal health. Other contributions to disciplines outside the traditional realm of ecology include the operation of flux towers at the Konza site, which has provided data used by micrometeorologists, climatologists, remote sensing scientists and modelers. We also collaborate with atmospheric chemists and modelers from the EPA CASTNet program in sampling concentrations of selected airborne particles and using these to model dry deposition rates, and in 2006, two new seismographs were installed on the site to facilitate ongoing geologic research by USGS scientists and their collaborators. We also collaborate with NASA scientists in the maintenance and operation of a Cimel sun photometer at the Konza site.

What is the impact on the development of human resources?

The Konza Prairie LTER VII program makes significant contributions to human resource development in science, engineering and technology. Our program has a long history of undergraduate training and exposure to scientific research for local KSU students. Amanda Kuhl mentors > 10 students year-round that assist in the collection and measurement of the long-term productivity plots on KNZ. In addition training of undergraduates includes support of the local REU program (details provided in the 'Accomplishments' section of this report). Indirectly, we support the development of undergraduates via the use of Konza LTER data in ecology classes and text books. As documented elsewhere in this report, we also train numerous graduate students, and provide valuable experience in interdisciplinary research and the synthetic use of long-term datasets. In addition to supporting KSU graduate students, the Konza Prairie LTER site is widely utilized by graduate students from other institutions. During the 2014-2015 funding period, the site was used by graduate students from the University of Kansas, University of New Mexico, University of California - Santa Cruz, Southern Illinois University, Colorado State University, Oklahoma State University, University of Nebraska, and the University of Missouri. We also hosted field trips for students from many regional colleges and universities, and in the last year we hosted a summer student training field trip organized by Haskell Indian Nations University. The Konza Environmental Education program, and the Konza Prairie Schoolyard LTER Program, provide formal and informal research experiences and science education to public groups, children and K-12 teachers, as well as training experience for a graduate student in the College of Education (see: 'Accomplishments' section of this report). Konza LTER research in restoration ecology was used by local high school teachers to develop educational activities as part of Howard Hughes funded teacher training program. KNZ PI Blair served as consultant and advisor for a local high school teacher (Shane Neel), who is establishing an educational prairie restoration research site as part of his Masters of Education degree program. Finally, the Konza LTER site continues to be used in conjunction with the NSF-funded Girls Researching Our World (GROW) program (www.ksu.edu/grow/), with several KSU scientists and students leading educational activities for 7th and 8th grade girls.

What is the impact on physical resources that form infrastructure?

The Konza LTER program provides a research platform for scientists and students from around the world. The 3,487-ha Konza Prairie Biological Station (KPBS), located in the Flint Hills of NE Kansas, is the core research site for the KNZ program. In addition to providing the watershed-level fire and grazing treatments, agricultural fields, restored prairie, stream network and weirs, KPBS includes several buildings in the headquarters area that support LTER research. The on-site Ecology Laboratory (2,400 ft2) includes (1) a wet/dry lab with sinks, fume hood, refrigerators, balances, etc., (2) two large multi-purpose work rooms with bench space and sinks for processing samples, drying ovens, refrigerators and freezers, and equipment storage, and (3) and a large researchers' shop equipped with a variety of tools and field supplies. Other station buildings include a fire station and maintenance building, a large storage building for equipment, and a residence occupied by the site foreman year round. The 4,650-ft2 Hulbert Center houses a library/conference room, administrative offices, classroom and teaching laboratory (used primarily for K-12 activities), reference herbarium and animal collections, and a kitchen and dormitory-style housing for 15 visitors. Two small guest cottages (each with 2-bedrooms living room, bath, kitchen, and laundry facilities), can accommodate up to 5 persons/cottage. A larger cottage, built in 2012, can accommodate up to 12 guests, expanding the capacity of on-site accommodations to 37 visiting researchers.

With support from an NSF Field Stations and Marine Laboratories (FSML) grant, Kansas NSF EPSCoR, the Kansas Agricultural Experiment Station, KSU, and private foundations, major site improvements and building renovations have ensured that KNZ remains a modern biological station. These include new housing for visiting students and scientists (included above), an on-site meeting and conference center, and improved Internet capabilities. With funding from an NSF-FSML grant and additional support from KSU and a private donor, an historic limestone barn at the KPBS headquarters was transformed into a multipurpose meeting facility for on-site conferences, workshops, and educational programs. The historic stone barn was renovated in 2008 and has the Cortelyou Lecture Hall (1,750 ft2) with a seating capacity of ~100 persons fully equipped with A/V equipment and wireless internet. An additional large multi-purpose room (1,850 ft2) is designed as flexible space for varied uses including additional meeting space, workshops, scientific posters and other research displays, social gatherings, and education programs for large groups. All lab and office buildings at KPBS have T1 Internet connectivity to the KSU campus. In addition, there is a wireless link to KPBS from campus with multiple wireless access points (802.11abg) that provide coverage to >60% of the 3,487-ha site.

Other LTER infrastructure, maintained by KPBS, includes the outside perimeter fence (29.8 km), the interior bison management area enclosed by 16.4 km of "New Zealand" fence, 98 small (25-m2) grazing exclosures, 11.7 km of fence for cattle research, 26.4 km of access roads and 61 km of fireguards separating the experimental watershed units. KPBS maintains several general-purpose vehicles on-site, as well as specialized equipment (tractors, fire trucks, mowers, soil augers, etc.). KPBS makes staff and equipment available to assist with KNZ research activities, including mowing fireguards, installing equipment, soil coring, etc. KPBS staff also coordinates the fire management plan and implementation of prescribed burning of watersheds and experimental plots, and the management of bison and cattle herds for KNZ grazing treatments. The headquarters area include a corral and handling facilities for managing the bison herd (hydraulic chute, electronic scales, etc.), which is essential for LTER grazing studies. Other field equipment and instrumentation on site includes the main KNZ weather station, a network of 11 rain gauges, two eddy flux towers for quantifying ecosystem-level C and water vapor flux, four weirs and associated stream gauging equipment (updated in 2012 to Sutron Constant Flow Accubar® bubble gages and recorders with wireless connectivity), 46 wells for measuring groundwater levels and chemistry, numerous TDR probes, neutron access tubes and tension lysimeters for soil water measurements. Related equipment co-supported by other programs includes a USGS stream monitoring station, a NASA CIMEL Sun Photometer, 2 seismometers (USGS), an aerosol and ozone monitoring facility (CASTNet), and a NOAA Climate Reference Network (CRN) weather station. These facilities add significantly to data for LTER research and education programs, and for regional and cross-site studies. KPBS is also a core site for National Ecological Observatory Network (NEON), which is now fully built-out and operational (completed during the 2014-15 cycle). NEON will provide additional unique measurement capabilities and data at KPBS, which will complement many KNZ LTER studies.

In addition to facilities at KPBS, a wide-range of modern laboratory facilities are available on the nearby KSU campus approximately 15 km from KPBS (e.g., Analytical Chemistry Labs, Stable Isotope Lab, Center for Ecological Genomics, Core Sequencing and Genotyping Facility, Lipodomics Center, Gene Expression and Microarray Facility, a BioSafety Level 3 Facility for invasive species and infectious disease studies, etc.). The majority of core LTER laboratory space and analytical equipment are located in Bushnell Hall (Biology), including space and equipment for preparing plant, soil and water samples for analysis (drying ovens, grinders, shaker tables, block digestors, vacuum filtration systems). Bushnell Hall also houses an extensive collection of prairie plant specimens in the KSU Herbarium, and these specimens are now electronically databased and georeferenced. Some specific equipment and facilities available for LTER research are located within other Departments (Agronomy, Biological and Agricultural Engineering, Plant Pathology, Geography), reflecting the interdisciplinary nature of our research. Some major analytical instruments available for KNZ investigators include: 2 Alpkem autoanalyzers (FlowSolution IV) for liquid samples, Carlo-Erba 1500 automated C/N analyzer for solid samples, Shimadzu TOC 500 analyzer for dissolved C, a Hitachi U2900 automated dual-beam spectrophotometer, several gas chromatographs with electron capture, flame ionization and thermal conductivity detectors, a Nikon compound microscope with epifluoresence and video imaging capabilities, 4 LiCor 6400 Portable Photosynthetic Systems, 2 LiCor 8100 systems dedicated for soil CO2 flux measurements, a LiCor 1600 null-balance porometer for stomatal conductance, and 3 pressure chambers (PMS model 1000) for measuring plant water potential, 4 Tektronix cable testers (model 1502B) coupled to Campbell CR10 data loggers for TDR soil moisture measurements, 2 Troxler (model 3221) neutron probe gauges for soil moisture determinations, a back-pack mounted

minirhizotron (Bartz Technology Co) camera system, and Trimble GPS units. Eight multi-parameter sonds (YSI 6000) are used for monitoring oxygen and temperature in 3 watersheds. Cold storage facilities for holding samples are available, as are sample preparation rooms for drying and grinding plant and soil samples. Climate controlled greenhouse space is available on the KSU campus. In addition, other “typical” laboratory instruments (balances, microscopes, etc.) are available in individual investigator laboratories.

What is the impact on institutional resources that form infrastructure?

KNZ investigators continue to support grassland research through the local (KSU) Grasslands Institute and through hosting society meetings (e.g., the Second America's Grasslands Conference).

What is the impact on information resources that form infrastructure?

KNZ resources are used to support the hardware and software associated with the KNZ web site and data portal.

What is the impact on technology transfer?
Nothing to report.

What is the impact on society beyond science and technology?

The Konza Prairie LTER program contributes to increased public awareness of ecological and environmental issues (e.g., biodiversity conservation, habitat loss, ecosystem services, restoration ecology, etc.) through outreach and public education activities, such as the Konza Prairie biennial Visitors' Day and our docent-led public education programs. In June 2015, KNZ hosted the ‘Grasslands of the World’ conference, organized by The Nature Conservancy and attended by over 200 (non-academic) participants. This event raised conservation awareness of global grasslands (e.g., savanna, steppe, prairie, etc.) and included presentations by several KNZ investigators. KNZ investigators have been featured speakers at national and international conferences with emphases on sustainability and conservation. Dr. Sara Baer will be a featured speaker at an upcoming North American Prairie Conference, and Dr. Jesse Nippert was an invited speaker focused on grassland responses to global change at an AAAS-sponsored ‘Frontiers of Science’ meeting in Muscat, Oman in Dec. 2014.

Konza LTER scientists conduct an annual fire-training course for researchers and local land managers (35-40 participants/year). In addition, the Konza LTER Program is increasingly called upon to provide data relevant to resource management and regulatory policy. Dr. John Briggs is an invited speaker at the ‘Effects of Fall Burning Workshop’ in Oct. 2015 – an event sponsored by the National Park Service and The Nature Conservancy. Locally, Konza scientists continue to serve as consultants for the Flint Hills Discover Center, and we participate in Kansas Agricultural Experiment Station public education events by providing information on the ecological consequences of various grassland management practices (e.g., fire frequency and grazing). At the regional level, Konza Prairie scientists are advising EPA Region 7 staff and scientists on the ecological benefits of fire in maintaining native tallgrass prairie habitat and diversity and contributing important long-term data to guide the development of the Flint Hills regional smoke management plan. This issue has become very important, as the potential impacts of grassland burning on regional air quality have been receiving increasing scrutiny. Konza grazing studies are also providing data that will inform ranchers and land managers of the potential benefits of alternative management strategies. In May, 2015, Briggs hosted a group of senior executives from McDonald’s Corporation to discuss beef sustainability and conservation of grasslands. KNZ scientists have been instrumental in the development of a management plan for the Nachusa Grasslands Nature Conservancy Site in Illinois. Baer, Blair, and Scott Collins have met with Nachusa staff and provided input on the development of a science and management plan. In the international arena, Konza Scientists have provided information on grassland management to scientists and park resource managers from South Africa, Botswana, China, Australia, and Hungary, with many of these visits focusing on resource management issues of public concern.

The Konza Prairie LTER database is also being used to address other issues relevant to regulatory policy. Long-term data on Konza Prairie streamwater quality provides a baseline for regional water quality in the absence of agricultural practices or other disturbances. LTER data on soil chemistry is also being incorporated into ongoing studies to evaluate the potential of grassland management practices to increase soil C sequestration to offset atmospheric CO2 loading.

Finally, the Konza Prairie LTER site, and the unique watershed fire and grazing treatments, have been the focus of several art- and humanities-related activities. For example, the Konza Prairie Biological Station continues to provide on-site housing for a Visiting Writers series, in conjunction with the KSU English Department, as part of KNZ's contribution to the LTER Ecological Reflections program. Other examples of humanities outreach include participation by KNZ investigators (Horne and Hutchinson) at the March, 2015 LASER Event (**L**eonardo **A**rt **S**cience **E**vening **R**endezvous) at K-State. LASER events serve to inspire creativity between science and art, and encourage interdisciplinary networking. During Fall 2014, KNZ investigator Nippert was a contributor to the documentary “When the Wells Run Dry” by filmmakers Steve Lerner and Reuben Aaronson. The documentary focuses on the inter-connection of Flint Hills Ranchers with the tallgrass prairie, with a particular emphasis on how drought threatens both livelihoods and ecological legacies. A screening of the documentary will occur in October 2015 at the Beach Museum of Art (Manhattan, KS) with commentary and Q&A by the filmmakers and Nippert following the presentation.

Changes/Problems

Changes in approach and reason for change
Nothing to report.

Actual or Anticipated problems or delays and actions or plans to resolve them
Nothing to report.

Changes that have a significant impact on expenditures
Nothing to report.

Significant changes in use or care of human subjects
Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards
Nothing to report.