Featured Investigator - Rhonda Skaggs

Rhonda Skaggs is a professor of agricultural economics and agricultural business at New Mexico State University. She received her bachelor's and master's degrees from Colorado State University and Ph.D. in economics from Utah State University. She joined NMSU's faculty in 1989, and began her association with the Jornada Basin LTER project in 2005. Her research at NMSU includes work on irrigation, the southwest chile pepper industry, environmental attitudes, and U.S.-Mexico cattle trade. She currently teaches two food and agricultural policy-oriented courses at NMSU. Both her teaching and research work include a strong focus on the changing structure of farming and ranching in the United States. Dr. Skaggs is particularly interested in the natural resource management impacts of structural changes in the farm sector. In August 2005, she attended a meeting of LTER-affiliated social scientists held in Athens, GA. The conference introduced her to the contributions that social scientists are making to LTER projects around the United States, and she returned to Las Cruces with many ideas of how to contribute to the Jornada LTER. She is currently advising an LTER-funded student pursuing a master's degree in agricultural economics at NMSU. The student, Nathaniel Gallegos, is working on his thesis which deals with the factors that influence economic growth and development, with emphasis on the Jornada region.

Sabbatical Visitor - Keith Killingbeck

Keith Killingbeck from the Department of Biological Sciences at the University of Rhode Island is spending the 2006 calendar year with the science staff of the USDA-ARS and the Jornada Basin LTER at NMSU. This is sabbatical number three at NMSU for Keith who in 1986 first developed a long-standing interest in the ecology of ocotillo (*Fouquieria splendens*), a C3 drought-deciduous desert shrub. Aspects of its nutrient dynamics, energy allocation to reproductive and vegetative tissues, patterns of stem segment growth, multiple growth forms, and age estimation are the focus of continued fieldwork, data analysis, and manuscript writing. Preparation of additional manuscripts on topics ranging from the effects of fire on endangered orchids to the use of non-native plants as indices of ecosystem disturbance are also goals during his stay in what has become his home-away-from-home.

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JORNADA TRAILS

Jornada Basin Long-Term Ecological Research Program

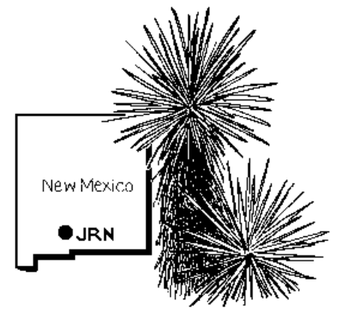
Volume 10, Issue 1, April 2006

Schoolyard LTER Program Expands Throughout New Mexico

K-12 teachers and students all over New Mexico are now learning environmental science through the Jornada Basin Schoolyard LTER program (SLTER). With additional funding from New Mexico EPSCoR, staff developed a series of hands-on schoolyard experiments that help students learn about water (precipitation, evaporation, infiltration, irrigation practices, weather conditions, and the value of long-term data). Each experiment includes teacher materials, sample graphs, bilingual student pages, and correlations with state science standards. Kits containing all of the supplies needed to do the activities are available for teachers to borrow and use with their classes.

Now that the activities have been developed and tested, teachers are attending workshops to learn the program. "We were overwhelmed by the number of teachers who signed up for the first workshops," said Stephanie Bestelmeyer, Jornada SLTER Coordinator and Executive Director of the Chihuahuan Desert Nature Park. "Within one week of sending out the flyer for an Albuquerque workshop, we had all 30 slots filled and 160 teachers on the waiting list. We added more workshops to help meet the tremendous need."

So far, five workshops have been held in Roswell, Las Cruces, El Rito, and Albuquerque, and the workshops and new activities have received rave reviews. On an anonymous evaluation, one teacher wrote, "Excellent workshop and activities! I like that it uses authentic data and that students will interact with their environment." Five additional workshops will be held from May to September 2006.



The Jornada Basin LTER Program is an NSF funded and USDA Agricultural Research Service supported project.

Do Small Mammals Contribute to Desertification? by Brandon Bestelmeyer

There is a long-held notion that small mammals reinforce the limitation of perennial grass establishment with increasing shrub cover. Consequently, rodent eradications programs were undertaken several times on the Jornada in the early 20th century. The idea that rodents accelerate perennial grass decline is based on the observation that rodent and rabbit densities increase with shrub cover and that grass establishment declines with increasing shrub cover, but there are few experiments that link these patterns. Brandon Bestelmeyer, Deb Peters, and Nellie Khalil tested the hypothesis that herbivore-related mortality of seedlings of the dominant perennial grass *Bouteloua eriopoda* (black grama) would be highest in shrub-dominated portions of grassland-shrubland ecotones. We tested the hypothesis in two Chihuahuan Desert LTER sites (Jornada and Sevilleta) featuring similar shrub encroachment patterns, but different shrub species (mesquite and creosotebush, respectively) and different abundances of small mammals (high and low, respectively). We also examined the assumption that the abundances of herbivorous rodents and rabbits are highest in shrub-dominated areas. Within each site, we transplanted *B. eriopoda* seedlings in grass-dominated, middle, and shrub-dominated positions of replicate ecotones during the time of year (mid-summer) when they would naturally appear; we then monitored seedling fates. We found that the hypothesis was supported at the Jornada: seedlings were killed by mammals in greater numbers in shrubland than in grassland or middle ecotone positions. At the Sevilleta, however, most seedlings were killed in middle ecotone positions. The abundance patterns of herbivores did not parallel patterns of seedling herbivory across the ecotones or between sites. We conclude that seedling herbivory is an important process and is related to vegetation composition, but the mechanisms underlying the relationship are not clear. We speculate that variation in small mammal foraging behavior may contribute to seedling herbivory patterns. We also support the idea that grassland restoration strategies in the Chihuahuan Desert need to account for the native herbivore activities and that of their predators. Contact Brandon Bestelmeyer (bbestelm@nmsu.edu) for more information.

Nellie Khalil prepares a tray of black grama seedlings for the experiment.

Soil Carbon Management in the Southwest by Joel Brown

The Department of Energy, through the Regional Sequestration Partnerships, is funding several groups to identify opportunities for geologic, terrestrial, and oceanic sequestration to reduce carbon dioxide levels in the atmosphere. The Jornada Experimental Range in partnership with Texas A&M and the Natural Resources Conservation Service is leading the analysis for cropland and rangeland in the southwestern U.S. The project integrates biophysical and land use and management information to identify high priority areas and management scenarios that can be implemented to increase the amount of carbon stored in the soil. A unique aspect of the southwestern project is that it includes analysis of existing USDA conservation programs that can be used to optimize soil carbon increase while simultaneously achieving other conservation goals on private land. The project started in 2005 and runs through 2010. Contact: Joel Brown, email joelbrow@nmsu.edu.

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Jornada Trails is a biannual publication of the Jornada Basin Long-Term Ecological Research (LTER) Program, sponsored by the National Science Foundation. Stories and story ideas are welcome. Send them to:

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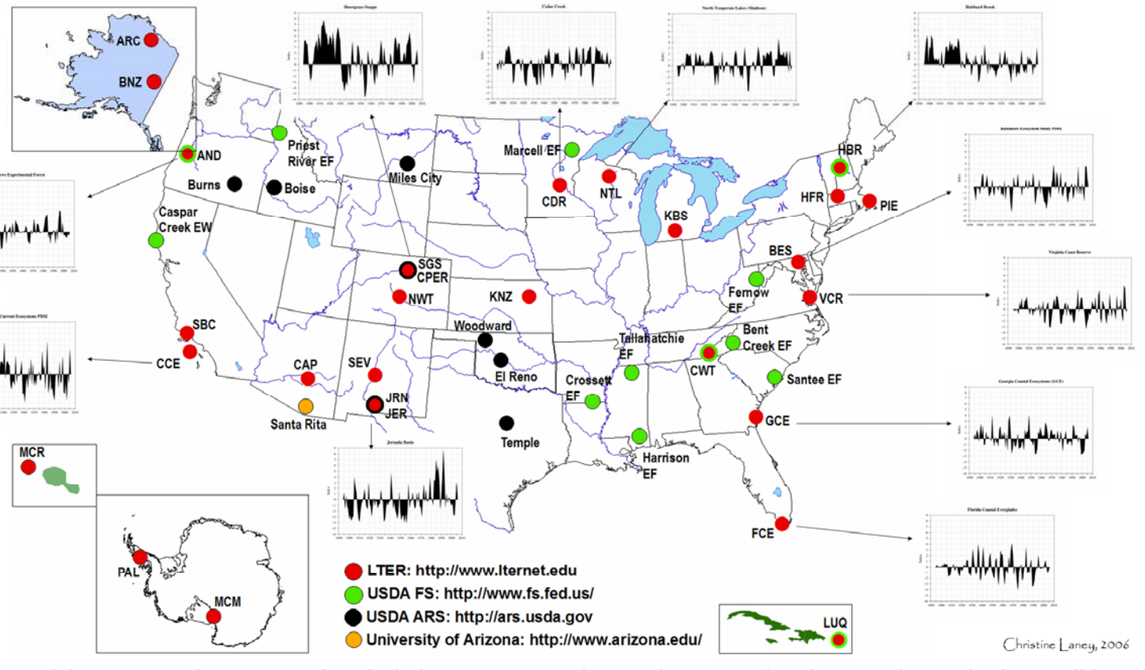
Jornada Trails also appears on the World Wide Web at http://jornada.nmsu.edu

Newsletter by Valerie K. LaPlante and Kris M. Havstad

Trends in Long-Term Ecological Research Project

The Jornada is leading a project named "Trends", a large synthesis effort focused on improving the accessibility and use of long-term data (see figure below as an example). The goals of the Trends project are to create a platform for synthesis by making long-term data easily accessible, and to illustrate the utility of this platform in addressing within-site and network-level scientific questions. The project is a collaboration among federal and state agencies: at present, data have been synthesized for all 26 LTER sites: 8 USDA-Agricultural Research Service rangeland sites, 9 USFS Experimental Forests, and 1 University of Arizona site. Four types of data are being synthesized: 1) climate and physical variability, including disturbances, 2) human population and economy, 3) biogeochemistry, and 4) biotic structure, including biodiversity. Two products are being created: 1) a book to be published by Oxford University Press on trends in long-term data within and among sites, and examples that illustrate the value of long-term data in addressing important questions, and 2) a web page containing derived data and metadata that are easily accessible for synthetic analyses. The project leader (Deb Peters; debpeter@nmsu.edu), and the project coordinator (Christine Laney; chrlaney@nmsu.edu) can be contacted for more information.



Trends participants are shown as colored circles across North America, Antartica (PAL and MCM), the Caribbean (LUQ), and the French Polynesian Islands (MCR). Examples of long term data on Palmer Drought Severity Indices for eleven of these sites are shown. The graphs show the Palmer Index (+/- 9) by year for 1895 - 2006.

Ecology in an Era of Globalization: ESA Meeting in Merida, Mexico

A number of Jornada scientists participated in the recent Ecological Society of America Meeting held in Merida, Mexico January 8-12, 2006. The globalization theme of the meeting was particularly relevant to Jornada research and our expanding interests. Jeff Herrick co-organized the meeting with José Sarukhán from the National University of México. Ed Fredrickson, Deb Peters, and Osvaldo Sala led workshops, Ed and Brandon Bestelmeyer presented talks (Brandon's in Spanish!), and Mike Duniway presented a poster. Look for a series of interesting papers from this meeting in an upcoming issue of *Frontiers in Ecology and the Environment.*

Jornada Scientist Awarded McMaster Fellowship

Between June and October 2005 Dr. Dean M. Anderson (USDA-ARS, Jornada Experimental Range) visited the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) JM Rendel Laboratory in Rockhampton, Australia as part of a McMaster Fellowship to evaluate and develop virtual fencing applications. The McMaster Fellowship project objective was to initiate Australia's first large scale virtual fencing trial. In addition, other important outcomes were achieved through Dean's visit. In particular a detailed behavioral description of cattle response to virtual fencing was completed. Several manuscripts have been written or are being prepared for submission. Throughout the visit there was an opportunity to refine some of the equipment and methods being used to develop a virtual fencing platform for use in Australia. Some of the practical limitations of virtual fencing were also explored. Dean has been invited back to CSIRO in 2006 to continue this collaboration.

Plant-Animal Interactions by Rick Estell

Shrub invasion into desert grasslands is an ongoing concern for ecologists and land managers. These shrubs typically contain chemicals that make them unpalatable for livestock and wildlife. Tarbush is a shrub that has invaded productive soils in the northern Chihuahuan Desert. For several years, we have been using tarbush as a model invasive shrub to explore the chemicals involved in plant-animal interactions. From a chemical standpoint, not all tarbush are alike. Sheep and goats select some tarbush plants and avoid others based on the concentration of volatile chemicals on the leaves. When we removed these chemicals using organic solvents, lambs ate more tarbush. Furthermore, when we removed these chemicals from tarbush and added them to a palatable food, animals ate less. We are now examining effects of individual compounds to determine if specific chemicals are critical drivers of diet selection. To date, we have tested effects of 23 volatile chemicals (primarily terpenoids) on intake by lambs, and two more compounds are currently being examined. Only four chemicals (camphor, alpha-pinene, camphene, and caryophyllene oxide) reduced the amount of food eaten. By learning which specific compounds drive diet selection, we hope to ultimately be able to manipulate browsing behavior of livestock and other herbivores.

Sixteenth Annual Jornada Symposium Program, Jornada Basin Research

Thursday, July 13, 2006, Wooton Hall - NMSU Campus

8:00 am Registration and poster set up

8:20 am Welcome/Introductions - Kris Havstad and Deb Peters, USDA-ARS Jornada Experimental Range and Jornada LTER

8:40–10:00 am
- Deb Peters, USDA-ARS Jornada Experimental Range
- Bill Schlesinger, Duke University, Nicholas School of the Environment and Earth Sciences
- Greg Okin, University of Virginia, Environmental Sciences
- Derek Bailey, NMSU, Animal and Range Sciences

10:30-11:50 am
- Osvaldo Sala, Brown University, Center for Environmental Studies
- Brandon Bestelmeyer, USDA-ARS Jornada Experimental Range
- Heather Throop, NMSU, Biology
- Lucinda Hernandez, Instituto National de Ecologia, Mexico

1:20-2:40 pm
- Rhonda Skaggs, NMSU, Ag Economics and Ag Business
- Jerry Barrow, USDA-ARS Jornada Experimental Range
- Javier Martinez-Nevarez, Universidad Autonoma de Chihuahua, Mexico
- Dale Gillette, NOAA, Atmospheric Sciences Modeling

3:00-4:00 pm
- Keith Killingbeck, University of Rhode Island, Biology
- Mary Nichols, USDA-ARS Southwest Watershed Research Unit, Tucson, AZ
- Ed Fredrickson, USDA-ARS Jornada Experimental Range

5:30-9:00 pm Social and Dinner - Jornada Experimental Range Headquarters

See http://usda-ars.nmsu.edu for registration information.