Abstracts

The Ecological Society of America
84th Annual Meeting

Riverpark Convention Center
Spokane, Washington
August 8–12, 1999

Legacies, Landscapes and Limits: Bridging Borders

HERNANDEZ, L.,[1] R. R. PARMENTER,[2] J. VANDE CASTLE,[2] D. C. LIGHTFOOT,[2] and M. FRIGGENS.[2] [1]Instituto de Ecología, A.C., Durango, Durango 34100 Mexico; [2]University of New Mexico, Albuquerque, NM 87131 USA. **Does El Niño affect coyote diets in the Chihuahuan Desert?**

It is assumed that coyotes are generalists, but this assumption arises from short-term studies. Many studies indicate that coyotes are capable of switching their diet according to resources availability. In desert ecosystems, weather variability among years has an important effect on plant productivity and other biotic communities that represent potential prey of many predators. Part of this weather variability could be explained by the ENSO phenomenon. Climate records from Sevilleta National Refuge show that during the warm phase episodes (called El Niño) rains from October through May increase by 53% and in the cold phase (La Niña) precipitation decreases by slightly more than half. The repercussions of this variability to desert carnivores have yet to be evaluated. An approach to determine if predators are responding to these weather changes is through the analysis of diet changes relative to prey availability. In our long term study of coyote diets, rodents, leporids and plants were the main items consumed. However differences among years and seasons existed in each category. For juniper berries, use reflected seasonal and annual productivity. For rodents and leporids, use did not clearly reflect availability. These data indicate coyotes maybe optimizing foraging efforts by selecting prey that gives them the greatest return on their energy investment (e.g., leporids) regardless of availability. Other food sources of low energy return (e.g., juniper berries) are used based more on availability.

HERRERA, J., A. K. ENSZ, and A. L. WILKE. Truman State University, Kirksville, MO 63501 USA. **The benefits of a meticulous food cache: The use of the banner-tailed kangaroo rat (*Dipodomys spectabilis*).**

Banner-tailed kangaroo rats (*Dipodomys spectabilis*) at Sevilleta National Wildlife Refuge store large volumes of developing *Sporobolous cryptandrus* seeds as 4–5 cm stem sections (seed "sticks") still attached to their rachis and enveloped by a leaf sheath. The kangaroo rats arrange these seed sticks vertically and pack them in bundles nestled against the top and bottom walls of cul-de-sacs dug within their dens. We hypothesized that kangaroo rats store the seeds as organized, layered and vertically arranged sticks to reduce losses to seed thieves, including microfungi. We discovered that simulated and similarly stored seed sticks containing sterile millet seeds placed in kangaroo rat dens contained fewer fungal species compared with millet seeds stored in other configurations. Furthermore, although the alpha diversity of fungal species within the millet seed sticks remained stable, beta similarity indices show that more layering or seed separation (within seed sticks) decreases the similarity among fungal communities. Our provisional appraisal of our data indicates that, in the short term (11 d), microfungal alpha diversity seems unrelated to the number of layers protecting the millet seeds or the depth at which the seeds are stored. Currently, we suggest that the number of protective layers separating stored seeds from abiotic or biotic (e.g., microarthropods) microbial vectors, reduce the probability of cosmopolitan dominant microbes infecting stored seeds, and thus prolong the homogenizing of microbial communities in the food store.

HESSL, A. E. University of Arizona, Tucson, AZ 98721 USA. **Aspen, elk, and fire: Ecological processes and management in northwestern Wyoming, 1807–1998.**

Multiple lines of evidence indicate that quaking aspen is failing to regenerate both sexually and vegetatively in the intermountain west. This lack of regeneration has been attributed to fire suppression, ungulate pressure, and climate change. The purpose of this study is to isolate the effects of fire, elk browsing, climatic variation, and land management regimes on aspen regeneration in northwestern Wyoming over the last 200+ years. As part of this study, I developed a network of stand age structures distributed across a gradient of varying elk use and fire regimes (both natural and prescribed). These age structures describe the spatial and temporal pattern of aspen recruitment in relation to human and biophysical drivers. Aspen regeneration in northwestern Wyoming has occurred episodically in the 20th century, however no single variable is associated with these patterns. High elk numbers between 1940 and 1950 are associated with low levels of aspen recruitment during the same period. However, other periods of low aspen recruitment may be related to changes in land management. Cumulative effects of land management in this century are explored and the pathways leading to the emergence of new management eras and the successes and failures of these eras with respect to ecological processes and patterns are characterized.

HICKS, W. T., and M. E. HARMON. Oregon State University, Corvallis, OR 97331 USA. **Modeling asymbiotic nitrogen fixation in woody debris as a nitrogen input in Pacific Northwest forests.**

Asymbiotic nitrogen fixation is known to occur in woody debris; however, the importance of this process as a nitrogen input for forests is poorly understood. We constructed a mechanistic simulation model driven by temperature, moisture, oxygen concentration, and substrate quality to estimate annual nitrogen fixation rates in logs over a year. Temperature and moisture are direct inputs, whereas respiration and oxygen diffusion determine oxygen concentrations within logs. Acetylene reduction (AR) calibrated with $^{15}N_2$ was used to construct response curves and indices for input variables. Log level responses were scaled up to the stand level using inventories of woody debris mass by species and decay class. Preliminary AR results show nitrogen fixation rates are optimum at 30°C, 3% oxygen, and 100% or greater wood moistures. Nitrogen fixation rates appear to peak in moderately decayed wood with little activity in late decay stages. Our model estimates a hypothetical 1.5 Mg log decaying for 200 yr can fix 0.27 kg N. Model results demonstrate seasonal changes in nitrogen fixation rates spanning an order of magnitude. Preliminary stand level estimates of nitrogen fixed by woody debris of 1 kg N/ha/year agree with other studies. This modeling analysis illustrates sensitive areas and directs future research needs.

HIEMSTRA, C. A.,[1] G. E. LISTON, and W.A. REINERS.[1] [1]University of Wyoming, Laramie, WY 82071 USA; [2]Colorado State University, Fort Collins, CO 80523 USA. **Wind redistribution of snow at treeline, Medicine Bow Mountains, Wyoming.**

Treeline ecotone areas in the Rocky Mountains exhibit heterogeneous snow distribution resulting from interactions between variable topography, vegetation, and wind. This heterogeneity has lasting and complex effects on vegetational patterns and biotic processes. Our study area, called Libby Flats, is a flat ridge at 3300 m elevation in the Medicine Bow Mountains of Wyoming. Winters on Libby Flats are characterized by subfreezing temperatures, abundant snow, and strong westerly winds (averaging 10 m/s). During the 1997–1998 snow season, snow distribution patterns were modeled over a 6.4-km² area on Libby Flats using the 1999 Liston and Sturm SnowTran-3D model. This model requires two elements for three-dimensional snow depth modeling: land surface and meteorological data. The land surface is a 5-m resolution Digital Elevation Model (DEM) with trees overlaid on the DEM. The second element, meteorological data, consists of daily temperatures, precipitation amounts, wind directions, wind speeds, and relative humidity. With these elements, the model calculates snow movement across the landscape in terms of saltation, suspension, and sublimation. Spatially referenced snow depth field data collected over the 1997–1998 winter were used for model validation. Comparisons show that the model can reproduce heterogeneous snow depths at a spatial resolution of 5 m. The model simulations provide us with a foundation for spatially modeling growing season length, vegetation composition, water budgets, primary productivity, chemical input rates, mineralization, and decomposition on Libby Flats.

HIERRO, J. L.,[1] L. C. BRANCH,[1] K. L. CLARK,[1] and D. VILLARREAL.[2] [1]University of Florida, Gainesville, FL 32611 USA; [2]Universidad Nacional de La Pampa, Santa Rosa, La Pampa Argentina. **Effects of a colonial, burrowing rodent on the structure and dynamics of woody vegetation in semiarid scrub of central Argentina.**

We assessed how the plains vizcacha (*Lagostomus maximus*, family Chinchillidae), a large colonial rodent, alters the structure and dynamics of woody vegetation in a semiarid scrub ecosystem. Shrubs are typically larger and shrub biomass is greater on colonial burrow systems and in the surrounding areas grazed by vizcachas than in the ungrazed matrix. This pattern of woody vegetation structure results from the interactions of intense herbivory by vizcachas and fire, because vizcachas reduce fine fuels and, consequently, the fire frequency in grazed areas. Grass and herb biomass in grazed areas was 2 ± 1 g/m² (mean ± 1SD)and 190 ± 106 g/m² in ungrazed areas at peak biomass in summer 1999. Estimated ages of aboveground stems of the dominant shrub *Larrea divaricata* were 24 ± 4 yr vs. 7 ± 2 yr in 10 grazed sites and adjacent ungrazed areas. Redistribution of resources by vizcachas also may alter shrub dynamics. For example, *Larrea* on colonial burrows experienced less water stress than shrubs in other areas during the growing season in 1998–1999, and rates of net nitrogen (N) mineralization in soils were higher in burrows when compared to