

Sevilleta LTER (SEV)

The Sevilleta LTER (SEV) Program addresses ecological concepts and theory through a comprehensive and interdisciplinary research program in central New Mexico. The Sevilleta National Wildlife Refuge (SNWR), the core LTER research site, is positioned at the intersection of several major biotic zones, including Chihuahuan Desert grassland and shrubland to the south, Great Plains grassland to the north and east, piñon-juniper woodland and mixed conifer forests in the mountains, Colorado Plateau shrub-steppe to the north and west, and riparian vegetation along the middle Rio Grande Valley. Since its inception in 1988, SEV LTER research has focused extensively on patch and boundary structure between these biomes. Research has been conducted at multiple ecological levels and a variety of spatial and temporal scales.



The transition zone between Chihuahuan Desert shrubland and grassland at the SEV LTER site. (Photo: S. Collins)

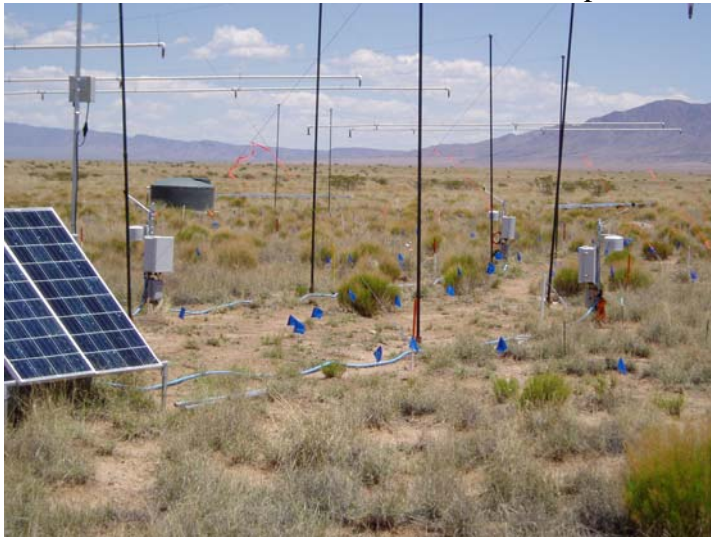
Our studies are linked by an overarching theme that considers **how abiotic drivers and constraints affect dynamics and stability in aridland populations, communities and ecosystems.**

Site characteristics. The SEV LTER is located 80 km south of Albuquerque, New Mexico, U.S.A. (35° 10' 25.99" N by 106° 55' 31.42" W, 1433 to 2743 m a.s.l.) in the northern Chihuahuan Desert. The research sites include the 92,060-ha Sevilleta National Wildlife Refuge which is managed by the US Fish and Wildlife Service for the purposes of conservation, research and education. Recently, SEV LTER research has expanded to areas in the riparian corridor along the Middle Rio Grande from Cochiti Dam near Santa Fe, NM south to Elephant Butte Reservoir at Truth or Consequences, NM. The climate of the area is characterized by an abundance of sunshine, a wide range between day and night temperatures, and low relative humidity. Annual precipitation is 250 mm with 60% occurring during the summer monsoon from July through September. Year-to-year variation in seasonal and annual precipitation is quite high in response to El Niño Southern Oscillation cycles and the vagaries of the North American Monsoon. Average annual temperatures range from 12.8°C at high-elevation Cerro Montosa to 15.4°C near the Rio Salado. January minimum temperature averages -7.1°C and the July maximum averages 34.5°C. Like at the Jornada LTER, extreme droughts occur on an approximately 50 year cycle, perhaps in response to changes in the Pacific Decadal Oscillation.

The SNWR is located in a rift valley which is bisected by the Rio Grande channel and several floodplain terraces. The eastern boundary of the Refuge occurs in the Los Piños Mountains which are formed by eastern tilting fault-block processes. The area is underlain by an active magma body which is less than 20 km below the surface. Many basaltic features occur in the region, particularly along the western edge of the SNWR from lava flows emerging along a north-south oriented fissure. Upland soils are nutrient poor sandy loams to clay loams with a calcium carbonate layer at depth. The depth of the petrocalcic layer varies with site position and soil age.

More than 800 species of plants, 75 species of amphibians and reptiles, 188 species of birds, 68 species of mammals, and 500 taxa of ground dwelling arthropods have been documented at the SNWR. Dominant plant species monitored in long-term research plots representing different biomes include *Bouteloua eriopoda* (black grama), *Larrea tridentata* (creosote bush), *Juniperus monosperma* and *Pinus edulis* (one-seed juniper and piñon pine), and *Bouteloua gracilis* (blue grama). Cattle grazing has been excluded from the SNWR since 1973, and the vegetation has recovered to pre-grazing levels.

Research Focus. One of the original LTER hypotheses was that the grassland to shrubland boundary at the SNWR resulted from an interaction between climate forcing, soils, biogeochemistry and herbivores. To assess this complex hypothesis, our LTER Program conducts studies on soil structure and development, soil C and N pools and fluxes, vegetation



patch structure and species interactions, and the role of consumers among habitats and especially across the grassland to shrubland transition zone. In addition, the SEV LTER has established several long-term manipulative experiments to assess the effects of climate change, nitrogen deposition, and severe and prolonged wet and dry years on community and ecosystem processes.

Infrastructure at the SEV LTER monsoon experiment plots, where the effects of elevated precipitation and nitrogen deposition are being studied. (Photo: D. Moore)