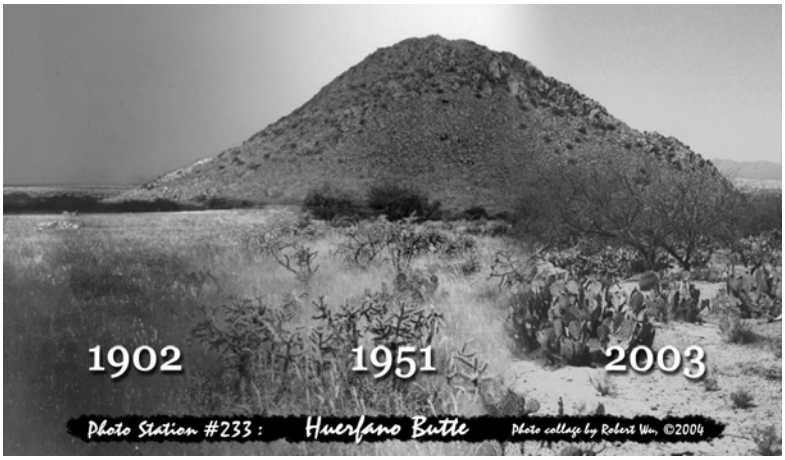
Santa Rita Experimental Range (SRER)

The Santa Rita Experimental Range (SRER) was established in 1902 as the first in a series of U.S. Department of Agriculture facilities dedicated to understanding the ecology of arid environments and developing methods for sustainable livestock grazing. Early accomplishments included the first systematic estimates of livestock carrying capacity based on net annual primary production in the United States and the first use of repeat photography to record changes in vegetation. The research program grew to include investigations in small mammal biology, soil moisture dynamics, and fire influences; as well as continuing research in grazing management and restoration of arid landscapes degraded by drought and overgrazing. These efforts produced a legacy of permanent research plots (>70), livestock exclosures (>30), rain gages (24 active), instrumented small watershed (8 active), repeat photography stations (110 active), and permanent vegetation transects (130 active). These facilities and accompanying datasets currently attract scientists from many disciplines (e.g. remote sensing, biogeochemistry, evolutionary ecology, and livestock management) because they provide unique opportunities to address questions that would otherwise require decades to establish.



In 1988, the University of Arizona assumed administration of the SRER following a land exchange between the state and federal governments. At that time, the continuation of research and educational uses was preserved in a state statute that prevents a change in use without legislative approval. The SRER is a member of the Organization of Biological Field Stations, the Arizona Field Station Network, and is on the registry of the Consortium of Regional Ecological Observatories. Numerous courses from University of Arizona and other institutions visit the SRER to expand the classroom experience, and K-12 uses are beginning.

Site characteristics. Located on the western flank of the Santa Rita Mountains (45 km south of Tucson, Arizona, 31.8 N, 110.9 W), the 21,500 ha SRER includes considerable variation in elevation (900-1450 m), precipitation (28-45 cm/y, ~50% occurring July-September), mean annual temperature (16-19º C). Thirty-two soil series are delineated as 24 mapping units (ages from recent Holocene to Early Pleistocene $2x10^6$ ybp) which are distributed across geomorphic surfaces ranging from mountain, fan terrace, basin floor and flood plain formations. Plant communities include Sonoran Desertscrub, Semi-Desert Grassland, and Oak Woodland. The flora includes 468 species, with greatest representation from the Poaceae (81 *spp.*), Asteraceae (72 *spp.*), and Fabaceae (61 *spp*). Unique features include the presence of a federally listed endangered cactus species, *Coryphantha scheeri* var. *robustispina*, and the recent spread of a non-native grass, *Eragrostis lehmanniana*. Because the eastern boundary of the SRER is contiguous with the Coronado National Forest, research and education opportunities can extend

the available elevation gradient to 2900 m. This additional elevation receives 45-75 cm/y of precipitation and includes the Montane Conifer Forest biotic community.

Research Focus. The SRER facilitates a variety of research activities in the tradition of a

natural history field station. There is no paid research staff or direct funding of research by the SRER. Therefore, all research activities are the result of proposals from independent scientists and students attracted to the natural setting, environmental gradients, juxtaposition of research and land use treatments, and research archives. Current research includes ecosystem biogeochemistry related to carbon sequestration, co-evolution of plants and pollinators, adaptive management of livestock grazing in a variable environments, and basic ecological investigations of organisms in an arid shrub-grass savanna. Funding sources for these projects includes NSF, NOAA, NASA, USDA, and EPA.

Preservation of the research legacy is paramount to the review and location of all research projects to ensure that contemporary projects do no harm to the legacy. In addition, access to the legacy is also critical for some research efforts. Therefore, we continue to make significant efforts to digitally archive the research documents and make them available on the Internet for users who are pursuing questions uniquely served by our legacy.

We support an annual research conference (Research Insights in Semi-Arid Environments---RISE) to facilitate communication among the diverse users and to build a community of collaborating scientists. Future efforts by the SRER will include increasing the availability of digital archives and expanding the rain gage network to include real-time delivery of meteorological and other environmental measures. Our goal is to attract and facilitate research and education users who are generating and pursuing knowledge about the ecology and management of arid environments.