**Vegetation Change and Mesquite Management in Southern Arizona**

**Dan Robinett, January 2018**

Numerous studies using repeat photography show the extent and temporal scale of mesquite encroachment on grasslands in Southern Arizona during historic times. Mesquite invades grassland altering functional processes, fragmenting soil cover and increasing erosion. Mesquite is beneficial to many wildlife species, produces forage and shade for livestock, and has been used by people for fuel, building materials, food and landscaping. Mesquite was recognized as a problem on rangeland in Arizona by the 1930’s. Research into control of mesquite began on the Santa Rita Experimental Range (SRER) during the 40’s and 50’s. Initial experiments used control by treating individual plants. Later research evaluated prescribed fire, herbicides and mechanical methods for control of mesquite. Aerial applied herbicides in the 1950’s provided good control of mesquite and increased perennial grass production for nearly 20 years. Studies of small, paired watersheds on SRER in the 70’s and 80’s showed initial results suggesting mesquite control reduced erosion and increased density of perennial grasses at mid and higher elevations. At lower elevations there was little effect. A subsequent evaluation of the paired watersheds after 34 years of data collection showed no significant differences in sediment yield or runoff due to mesquite control. Later, studies focused on using the SRER long term vegetation monitoring data to evaluate the effectiveness of mesquite control. These studies showed that mesquite control at lower elevations on the SRER had no impact on perennial grass cover or production. They also showed a positive impact at mid to high elevation sites but suggested that a single brush control treatment would not return the system to functionality as mesquite became dominant again within 10 years. Additional studies suggested that leaving mature mesquite on site could provide a reservoir for native grass species in the face of invasion by Lehmann lovegrass. The most recent studies found that ecological site concepts and state and transition models are useful tools to help rangeland managers and ranchers make good decisions about mesquite control in the future.

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