Grassland and Mesquite on the Santa Rita Experimental Range: An Historical Perspective

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We will address three topics: 1) change in grassland and mesquite abundance since 1900, 2) the dynamics of grass and mesquite abundance in the 21 years since a large fire in June 1994, and 3) patterns of grass and mesquite response to mesquite control practices.

We use evidence from the Santa Rita Experimental Range including 1) repeat photography since 1904, 2) vegetation monitoring since 1953, 3) precipitation patterns since 1900, 4) livestock use since 1916, and 5) reports of historic mesquite removal experiments.

These patterns may have implications for expectations for grass responses following control of mesquite, and for restoration efforts intended to increase grass.

Since 1900, mesquite abundance has increased from ~5-10% canopy cover to ~20-35% cover in the former open grasslands above 3500 ft elevation, but since 1990 the rate of mesquite increased has slowed considerably. At lower elevations, mesquite cover was already approaching 20% in 1900, and has increased relatively less than at higher elevations.

Interestingly, grass abundance is not related to the abundance of mesquite on long-term monitoring sites. Across loamy upland, sandy loam upland and sandy loam deep ecological sites in both the 40-1 and 41.3 Major Land Resources Areas (MLRAs) there is very little difference in grass basal cover among sites with 0% to 45% mesquite cover.

Following the 1994 fire, mesquite cover returned to pre-burn amounts within 6 years, and perennial grass abundance was similar for burned and unburned sites.

Across the Santa Rita, grass abundance declined from an average of 5% in 1991 to 0.5-1.5% since 2003. This pattern is consistent with the very wet period in the early 1980s and the persistent dry and warm conditions since 1996. This decline appears to be independent of mesquite cover. Further, the livestock use has been relatively light since 1996 at <1.5 animals per 100 acres, and declining to < 1.0 since 2007.

Given these patterns, what are realistic expectations in the response of grass abundance following the removal of mesquite or the application of prescribed burns? Further, given that grass is more likely to grow beneath mesquite than would be expected randomly, does this present guidance for focusing grass restoration efforts beneath mesquite canopies?