Thirty Years of Rotation Grazing in the Mojave Desert

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Temperatures nearly reach 120 degrees F in summer and drought reigns supreme during May, June and July. That's on a so-called normal year. On dry years, which are frequent, the droughts may last months with higher than normal temperatures. On wetter than normal years, the ground becomes covered with filaree (Erodium cicutarium), red brome (Bromus rubens), and other annuals. The creosote bush (Larrea divaricata), bursage (Ambrosia dumosa), and Joshua Tree (Yucca brevifolia) turn from browns, whites and pale greens to true green. The foliage is abundant and is good livestock feed in winter and spring.

The precipitation generally ranges from 3 inches per year during the dry cycle to 14 inches in a wet cycle or El Nino event.

The Mojave Desert is not prime livestock country, but sheep and cattle have, during the 1800s and 1900s, used it for grazing, especially in the winter and spring prior to moving to mountain pastures.

The Beaver Dam Slope Allotment is located in northwest Arizona on the Arizona Strip. Like many other areas administered by the Bureau of Land Management, it had a three pasture deferred rotation grazing implemented on it in 1969. This system's goal was to begin curing some of the ill's of overgrazing, caused by season-long grazing or continuous grazing.

So, the question begs an answer: Did this rotation grazing make a difference or better yet, did rotation grazing change the plant species frequency?

Some History

The allotment is grazed from December to June. Two pastures are rested during the growing season every other year. One pasture is used from December to March, and receives growing season rest for nine months every year, which includes the spring growing season. Hughes (1982) reported on the effect of the first ten to twelve years of operating under the grazing system on the forage species. The allotment has six key areas and they showed the following in 1982: (Trend, from 1974 to 1982, was measured in 1 x 3 foot plots, using cover as the indicator):

- WARM SEASON GRASSES (Big galleta): Occurred in five of the six key areas. Big galleta decreased in three key areas, did not change in one, and increased in one.
- COOL SEASON GRASSES (Squirreltail and Indian ricegrass): One or both of these cool seasons occurred in five of six of the key areas. Three of the key areas lost all cool season grasses. The other two key areas had a slight decrease.
- BROWSE (Bursage and winterfat): Winterfat occurred and increased in one key area. Bursage occurred in four of the six key areas and increased in all key areas.
- NON-FORAGE SPECIES were turpentine bush (Thamnosma montana), banana yucca (Yucca bacata), goldenhead (Acamptopappus spp.), snakeweed (Gutierrezia spp.), creosotebush, white burrobush (Hymenoclea salsola), and various cactus. These are all natives to the Mojave Desert, but, none were included in the small trend plots, however, they were all present in the key area.

The other study carried out on the key areas was utilization of forage species. Utilization of forage by herbivores is measured by the Grazed Class Method. The method uses photo guides of key species to make utilization estimates (Schumetz, et al. 1963). The estimates reflect herbage removed but also show herbage remaining. The range of utilization from 1970 to 1983 was 10 to 80%. Most of this was in the light category with some heavy to near severe utilization levels occurring through the thirteen years.

The Shivwits Resource Area grazing environmental statement (ES) on the Arizona Strip was completed in 1980. Prescribed average utilization was set at 50%; but it was becoming obvious that in the hot, dry Mojave Desert, occasional high utilization, that is any use that exceeded 50%, was harmful to forage species. The trend and utilization studies seem to indicate that an average utilization at 35% and less provided an opportunity for the forage to recover during wet cycles. Heavy utilization during the spring growing season would put forage at a disadvantage with non-forage plants in the coming heat and drought. Also, this is prime desert tortoise habitat and it's listing as a threatened species would mandate the need for lower utilization levels by livestock. Utilization levels from 1984 to 1996 went down to a range from 10 to 44%, compared to the 1970 to 1983 utilization levels of 10 to 80%.
A New Look

Plant species were measured by the pace frequency method as described in Despain et al. 1991 during 1982 to 1996. Vegetation data was placed in two categories: key species (all forage plants) and non-key (all non-forage plants) to determine if there were any trend differences caused by grazing or if changes were due to other factors (i.e. weather). My rationale on this was if forage species showed the same trend as non-forage species it meant the grazing system was affording the same growth opportunity to forage as non-forage species. If forage species decreased while non-forage species increased, then grazing management would be the suspect cause.

The Findings

Frequency data is displayed in Figure 1. The data shows that all key areas show parallel trends between the forage and non-forage, increasing or decreasing generally in response to the precipitation (Figure 2). There is a general correlation to the amount of precipitation. The 1982–83 period was wet and the frequency of all plant species in the 1982–85 period increased. The frequency of the vegetation...
decreased in the drier 1988–91 period and also with the dry year of 1996.

**An Interpretation as to the Grazing System**

So did the grazing system work? I say yes. The trend of the forage species was similar to that of the non-forage species. When the non-forage species were increasing due to favorable weather conditions so did the forage species, even though forage species received grazing at some point in the grazing cycle. Lower utilization levels seemed to allow a trend similar to that of ungrazed non-forage plants. However, did the grazing system make a difference or increase forage plant frequency? This of course was the objective of the allotment management plan. The only difference between the 1982 and 1996 frequency readings is that frequency of the non-forage species was down by notable quantities of 20% or more. The forage species remained at the same frequency in 1996 as in 1982. The plant community where the Beaver Dam Slope allotment exists is stable with the usual fluctuations caused by climate as seen in Figure I. The grazing system appears to have little affect on the forage plant community unless utilization levels go into the heavy or severe levels; and then the effect of forage species reduction or loss occurs as reported in The Shivwits Resource Area grazing ES and Hughes (1982).

**Bibliography**


