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Research Brief for Resource Managers

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Spanish Goats Harm Type-converted Land in Arizona

Severson, K.E. and L.F. Debano. 1991. Influence of Spanish goats on vegetation and soils in Arizona chaparral. Journal of Range Management 44:111-117.

Severson and DeBano wrote in 1991 that *"Research has shown that conversion of chaparral to herbaceous vegetation improves water yield, increases forage production, improves wildlife habitat, and provides more aesthetically pleasing landscapes that have a reduced fire hazard."* Managing Arizona chaparral in the 1990's meant controlling shrubs to mimic a brush-free or savanna-like habitat, much like California's practice of type-converting chaparral to grassland. Managers used fire, chemicals and many mechanical methods as tried and true conversion tools, but the effects of using Spanish goats for biological control had not been quantified.

A wagon wheel design of 17-paddock allotments and a four-unit control area were established on a 435-acre study site in Greenback Valley, Arizona, on the Conway Ranch. The vegetation was a shrub live oak-mixed shrub community. The dominant species was the shrub live oak *(Quercus turbinella*), with Desert ceanothus *(Ceanothus greggii*) and Pringle manzanita *(Arctostaphylos pringlei*) the next most abundant. A 600 head Spanish goat herd was rotated through these paddocks for the study. Changes in vegetation, soils and litter were monitored over the 4 ½ year period of the study.

With four different goat grazing treatments at different stocking rates, Severson & Debano showed goat grazing reduced total shrub cover 10-15%, with no differences between stocking rates. They also found that grazing had negative effects on range quality with the goats in direct food competition for preferred forage shrubs with local ungulates. Preferred food plants shared by goats and deer were hollyleaf buckthom, Wrights silktassel, desert ceanothus, menodora *(Menodora scabra*), and birchleaf mountain mahogany *(Cercocarpus betuloides*). Further, there was a decrease in forage cover, which meant there was an increase in soil erosion potential. Increased goat stocking rates also decreased soil nitrogen levels, decreased soil phosphorus levels, and decreased litter cover. The authors concluded that *"[in] the final analysis, it appears that any goat browsing management strategy must be sufficiently comprehensive to protect both the vegetation and soil resource."*

Management Implications

- Goat browsing did not increase perennial grass cover and was minimally effective at reducing total shrub cover after 4 ½ years (10-15%) in Arizona chaparral.
- Goats preferentially browsed on the same plants that were important deer forage and preferred plants were responsible for most of the decline in total shrub cover.
- Goat browsing increased the amount of exposed soils and the potential for erosion.