

144.3 Sonoran Savanna Grassland

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Savanna grasslands, while never extensive in the Southwest, once occupied favorable sites within Shreve's (1951) Plains of Sonora and Foothills of Sonora subdivisions of the Sonoran Desert (Fig. 78). Certain areas within the Altar and Santa Cruz valleys in Arizona were, or approached Sonoran savanna grassland, as did suitable areas in extreme north-central Sonora (Fig. 79). These subtropical fire-climax grasslands were encountered between 90 m and 1,000 m elevation on level plains and at intervals along the larger river valleys on deep, fine textured soils (Brown, 1884; Stephens, 1885; Ligon, 1942, 1952; Brown and Ellis, 1977).

J.T. Wright, who collected the grassland-affiliated Masked Bobwhites at Rancho Noria de Pesqueira, Sonora, in 1931, told Tomlinson (1972) "that the country at that time consisted of wide, grass-covered valleys with certain grasses reaching over the heads of the native white-tailed deer." Brand (1936) mapped large areas in central and eastern Sonora as *Sonoran mesquite-grassland*, and Shreve (1951) in a description of certain areas in the central portion of the *Plains of Sonora* states that "Grasses often form as much as 75% of this cover, which gives an aspect of abundant verdure after the period of summer rain." Because of grazing by livestock these grasslands were greatly altered or destroyed largely by 1900 in Arizona, and after 1940 in Sonora (Tomlinson, 1972; Brown and Ellis, 1977). Whatever the past situation, these habitats with few exceptions are now perhaps more properly classified as Sonoran desertscrub or Sinaloan thornscrub (Fig. 80). Exceptions are small areas not shown on the color map. While they are small in geographic extent, these few relicts are of great biotic and historic interest.

Past accounts and recent investigation of those "grassland llanos" that are considered to be the least altered indicate that the principal grass species were summer-active root perennials (Fig. 81). Of these grasses, the principal species encountered today are Rothrock Grama (*Bouteloua rothrockii*) and three-awns (*Aristida hamulosa*, *A. wrightii*, *A. ternipes*, *A. californica*, and others). Other characteristic species are the subtropic gramas *Bouteloua aristidoides*, *B. radicata*, *B. filiformis*, *B. parryi*, and *B. barbata*, the False Grama (*Cathastecum erectum*), Tanglehead Grass (*Heteropogon contortus*), and windmill grasses (*Chloris* spp.). Sod-forming or other perennial grasses of warm temperate semidesert grassland when present are usually restricted to favored sites along drainages and on north-facing slopes; e.g., Curly-mesquite Grass (*Hilaria belangeri*), Vine Mesquite Grass (*Panicum obtusum*), and Side-oats Grama (*Bouteloua curtipendula*). Herbaceous shrubs were important in the grassland composition and include ragweeds (*Ambrosia*), purslane (*Portulaca*), several spurges (*Euphorbia*), spiderling (*Boerhaavia*), Janusia (*Janusia gracilis*), species of *Isomeris*, Croton (*Croton sonorae*), and a pigweed (*Amaranthus palmeri*). Most of the dry-tropic scrub species prevalent and characteristic of semidesert grassland such as Palmilla, Sotol, agaves, Burroweed, and Snakeweed are lacking.

Trees and scrub components, while always present, vary in composition and density from site to site. In the southern and eastern portions of Sonoran savanna grassland, an enormous variety of tropic-subtropic thorny shrubs and trees may be present. At the northern limits, Mesquite (*Prosopis velutina*) is often the primary or exclusive treeform constituent. Other important tree or tall shrub species are Ironwood (*Olneya tesota*), paloverdes (*Cercidium microphyllum*, *C. floridum*, *C. praecox*), and locally the Retama (*Parkinsonia aculeata*), Jito



Figure 78. Sonoran savanna grassland within Shreve's "Plains of Sonora" subdivision of the Sonoran Desert, Rancho Carrizo, Sonora, ca. 610 m elevation. Summer aspect, 1968. The principal grasses are Rothrock Grama (*Bouteloua rothrockii*) and threawn (*Aristida*); the trees are paloverdes (*Cercidium microphyllum*, *C. floridum*). The shrub in the immediate center foreground is an acacia (*Acacia angustissima*). This area, which was habitat for the Masked Bobwhite (*Colinus virginianus ridgwayi*), has since been increasingly invaded by scrub. Photograph by R.E. Tomlinson.

(*Forchammeria watsoni*), *Guaiacum coulteri*, *Atamisquea emarginata*, and acacias (*Acacia angustissima*, *A. farnesiana*, and others). Depending on location and site, the following may be important scrub-shrub species: Tomatillo (*Lycium brevipes*), *Caesalpinia pumila*, *Croton sonorae*, Desert Hackberry (*Celtis pallida*), Kidneywood (*Eysenhardtia orthocarpa*), *Coursetia glandulosa*, Tree Ocotillo (*Fouquieria macdougalii*), Limberbush (*J. cardiophylla*) and other species of *Jatropha*, and species of *Cassia*. Along the drainages and flood plains, trees and shrubs may form dense thickets with numerous tangles of vines.

The larger cacti, while present, are not prevalent, and are usually one of four species of cholla (*Opuntia thurberi*, *O.*

arbuscula, *O. fulgida*, *O. leptocaulis*), Sina (*Rathbunia alamosensis*), Senita (*Lophocereus schottii*), Pitahaya or Organ Pipe (*Stenocereus thurberi*), less frequently Saguaro (*Carnegiea gigantea*).

The monthly and seasonal precipitation for eight locations in, near, and just outside of Sonoran savanna grassland is summarized in Table 17. Mean annual precipitation ranges from 275 mm to 525 mm—more commonly between 300 and 500 mm. The greater percentage of this precipitation falls during the July through September period and will average over 150 mm.

Freezes, while to be expected any winter, are not of long duration and rarely drop much below -4° C. Killing frosts are

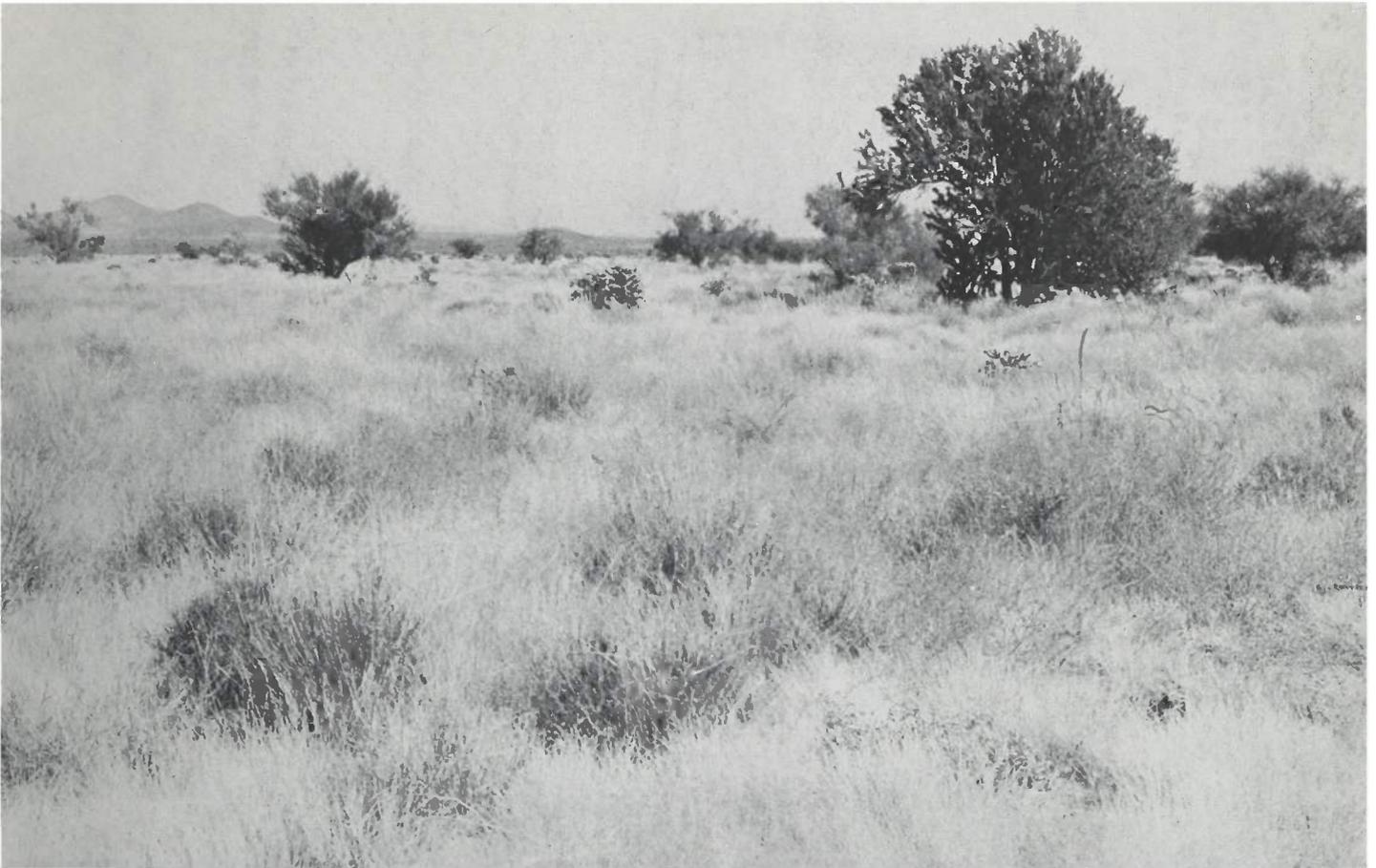


Figure 79. Sonoran savanna grassland in northern Altar Valley, Pima County, Arizona, ca. 945 m elevation. October, 1970. This community and others, now virtually destroyed in Altar and Santa Cruz Valleys, Arizona, were the northernmost representatives of Sonoran savanna grassland which had primary residence in north-central Sonora. The shrubs mixed with three-awn grasses and forbs are mostly Burroweed—a temperate species not characteristic of the subtropic Sonoran savanna grassland. The overstory trees however, are such distinctly Sonoran species as Ironwood, Blue Paloverde, and Velvet Mesquite.

Table 17. Precipitation data from 7 stations in the Southwest within and directly adjacent to former Sonoran Savanna Grassland.

Station	Elevation (in m)	Mean monthly precipitation in mm												Total	Total July thru Sept.	Percent of total
		J	F	M	A	M	J	J	A	S	O	N	D			
Punta de Agua, Son. 28°25' 110°25'	220	26	9	5	6	—	13.7	107	124	59	43	7	30	431	290	67
Suaqui, Son. 29°11' 109°41'	250	31	16	11	5	3	27	163	141	53	27	12	30	519	356	69
La Colorado, Son. 29°48' 110°35'	390	22	15	5	1	1	14	106	112	36	10	9	26	357	255	71
Mazatan, Son. 29°00' 110°09'	550	28	18	9	2	0	37	150	—	134	26	7	26	502	348	69
Rancho Carizzo, ¹ Son. 30°03' 111°15'	732	16	7	8	2	—	7	96	121	43	14	8	21	344	260	76
Bacoachi, Son. 30°30' 109°58'	1,050	7	19	13	5	3	19	132	112	34	24	16	29	436	279	64
Tumacacori, AZ 31°34' 111°03'	996	21	15	17	6	3	10	101	92	34	18	15	30	361	226	63

¹Data from Tomlinson, (1972).



Figure 80. Former Sonoran savanna grassland converting to a Sonoran desertscrub association on Palo Alto Ranch, Altar Valley, Arizona, ca. 975 m elevation. This site, which is similar to the one shown in Figure 79, was known to be "open prairie" in 1885. The overstory trees are mesquite and Foothill Paloverde; the understory, Burroweed and Pigweed (*Amaranthus palmeri*). The grasses are annual grammas (*Bouteloua*), Poverty Three-awn (*Artistida divaricata*), and Rothrock Grama (*Bouteloua rothrockii*).



Figure 81. Former Sonoran savanna grassland near Benjamin Hill, Sonora, ca. 671 m elevation. December, 1968. A dense grassland composed mostly of subtropic three-awns and Rothrock Grama then extended to the wooded drainages.

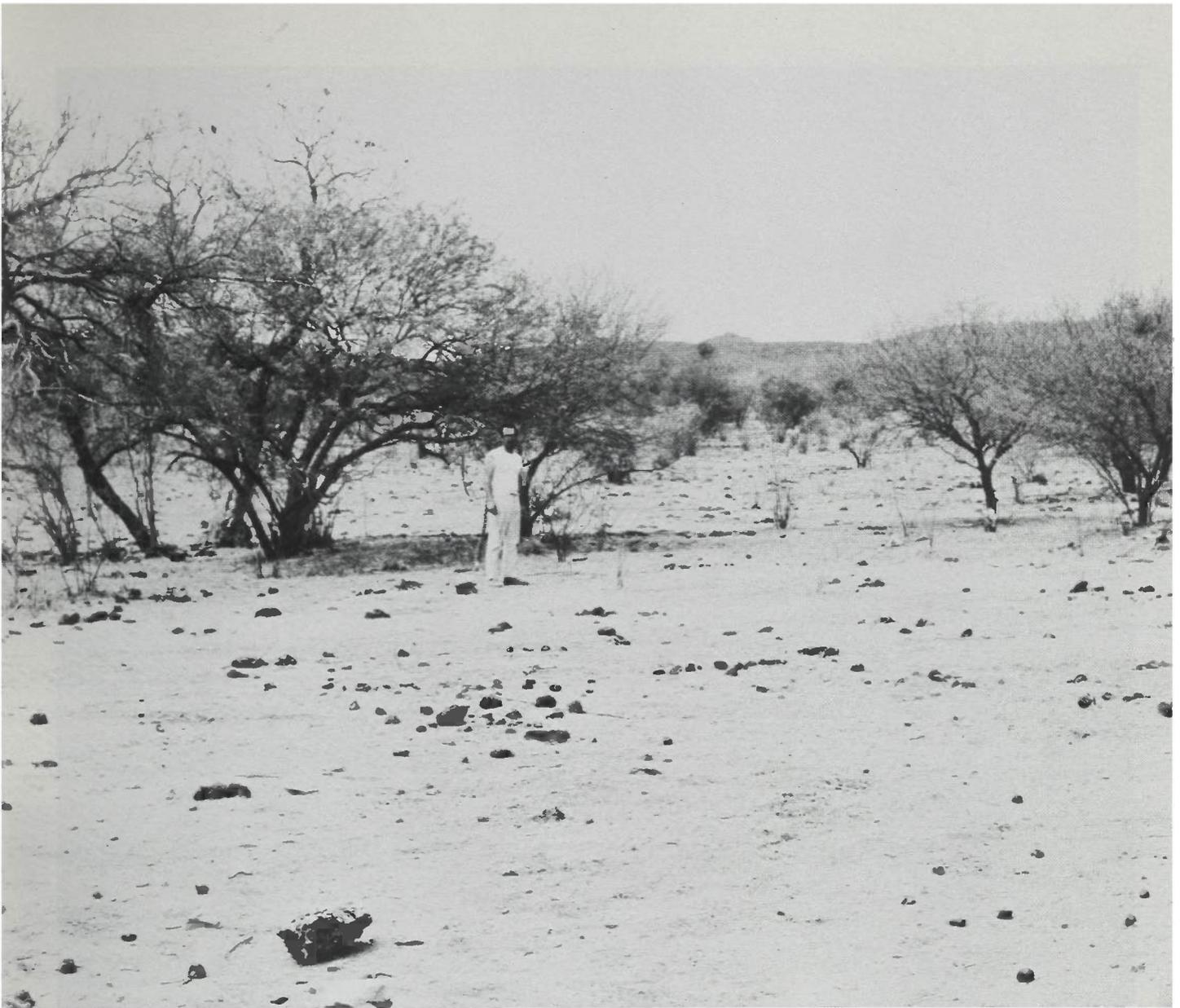


Figure 82. Sonoran savanna grassland in the process of being transformed to Sinaloan thornscrub near Mazatán, Sonora, ca. 457 m elevation. This photograph, taken in 1964, shows the effects of heavy grazing on a former savanna grassland; numerous young sprouts of *Acacia* are already becoming established and with the lack of fuel and absence of fire, these and successive generations of scrub have joined the overstory (principally *Mesquite* and *Sonoran Paloverde*) to form dense thornscrub. Photograph by Steve Gallizioli.

therefore infrequent.

From November to the abrupt onset of the summer rains the following year, the landscape becomes increasingly desolate and bare. Cattle have eaten the last vestiges of grass and except for dried and leafless scrub, groundcover is almost nonexistent (Fig. 82). By late June temperatures in the late afternoon commonly exceed 38°C and the humidity gradually rises. Usually the summer rains begin during the first half of July and last through September; if summer moisture is adequate, growth is rapid and continues through October. Grasses and forbs spring up and develop rapidly, trees and shrubs develop leaves and several species commence blooming—those that haven't bloomed in spring. The amount of herbaceous growth is determined by the generosity of the rains and little or no growth may occur in some years.

The transformation of these grasslands to thornscrub and desertscrub has resulted in the displacement of an interesting and unique subtropic grassland fauna including a number of invertebrates. While these changes have benefitted some scrub-adapted animals, e.g., the Javelina and Antelope Jack-rabbit (*Lepus alleni*), other subtropic grassland affiliated vertebrates appear to have been negatively affected, e.g., the Caracara (*Caracara cheriway*) and White-tailed Hawk (*Buteo albicaudatus*). The numbers and distribution of three endemic animals, the Masked Bobwhite Quail (*Colinus virginianus ridgwayi*), the Rufous-winged Sparrow (*Aimophila carpalis*), and the Sonoran Green Toad (*Bufo retiformis*) are greatly reduced, and the Masked Bobwhite is now faced with extinction (Brown and Ellis, 1977).