

Wildlife Plant Community Preference in the Chihuahuan Desert

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An important part of public land management is obtaining the proportions of different seral stages that provide the most benefit to society. Understanding how various wildlife species respond to different seral stages is critical to developing sound wildlife management strategies. Recent surveys by the United State Department of Interior-Bureau of Land Management (BLM) indicate about that 33% of the Chihuahuan Desert in New Mexico is grassland in a late seral stage, about 40% is mixed grass-shrub communities in a mid seral stage, and about 27% is shrubland in an early seral stage.

We evaluated the relative numbers of primary wildlife species on Chihuahuan Desert upland ranges in grassland, mixed grass-shrub, and shrubland communities over a 2-year period on a 10,000 acre contiguous area in southern New Mexico with similar soils and precipitation. This information provides insight into habitat needs of Chihuahuan Desert upland mammals and birds.

Location

The study was on the Chihuahuan Desert Rangeland Research Center 15 miles north of Las Cruces, New Mexico. This area receives 9.5 inches average annual precipitation and is dominated by sandy loam soils. A detailed description of the study area is provided by Nelson (1996). We used four adjoining pastures, each about 2,500 acres in size, containing varying amounts of open grassland (late seral), mixed grass-shrub (mid-seral) and shrubland (early seral) communities (Table 1). Open grasslands are dominated by black grama and dropseeds. Mixed grass-shrub areas are dominated by dropseeds, threeawns, broom snakeweed, and honey mesquite. On shrubland areas, the primary plants are honey mesquite, broom snakeweed, and fluffgrass. Two pastures were grazed year-long by cattle at a conservative stocking rate (30–35% use of forage), and 2 were grazed year long at a moderate rate (40–45% use).

Five transects were established in each pasture. They were 1 mile in length and evenly distributed across each pasture. From spring 1993 through fall 1994 wildlife on these transects were evaluated seasonally by a strip census. This involved walking the transects in early morning and recording wildlife observed approximately 50 yards on either side and 50 yards to the front of the transect. The plant community (grassland, mixed grass-shrub, shrubland) associated with each wildlife sighting was tabulated. The proportion of total observations for each wildlife species for each plant community (Table 2) was divided by the proportion of total area for each plant community (Table 1) to obtain a preference index.

Findings

The survey showed the mixed grass-shrub community was preferred by most wildlife species (Table 3). This applied to both mammals and birds. Pronghorn, coyotes, jackrabbits, mourning doves, and scaled quail all showed a definite preference for the mixed grass-shrub community over grassland or shrubland. In contrast cottontail rabbits, and most species of songbirds preferred the shrubland community. Open grasslands were the least preferred plant community by wildlife. Only meadowlarks and barn owls preferred open grasslands over mixed grass-shrub and shrubland communities.

Discussion

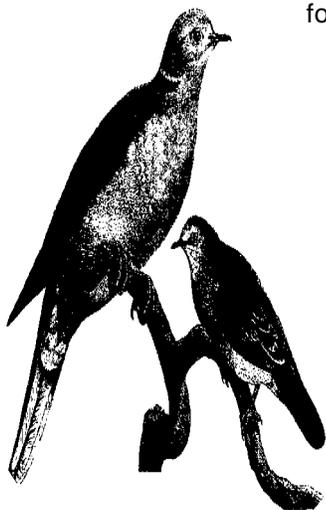
Smith et al. (1996) and Bock et al. (1984) have shown upland wildlife populations in the Chihuahuan and Sonoran Deserts, particularly those of songbirds and jackrabbits, tend to be higher on mixed grass-shrub than on grassland or shrubland communities. Pronghorn, mourning doves, and scaled quail are important game animals in the Chihuahuan Desert. Smith et al. (1996) and this study show these animals are favored by mid- or late-seral conditions, rather than the climax communi-

Table 1. Percentages of open grassland, mixed grass-shrub, and shrubland on pastures used for wildlife surveys on Chihuahuan Desert Rangeland Research Center southcentral New Mexico.

Pasture number	Open grassland	Mixed grass-shrub	Shrubland
15	59	35	6
4	49	51	0
14	55	21	24
1	40	51	9
x	51	39	10

ty. Pronghorn appear to be favored by Chihuahuan Desert rangelands with about 55 to 70% remaining climax vegetation (Clemente 1993). This plant community involves widely scattered shrubs that provide food and cover for pronghorn, but the shrubs are not so dense as to impair pronghorn visibility and movement. Pronghorn foods such as scarlet globemallow and croton have high availability.

Mourning doves depend heavily on shrubs such as honey mesquite for nesting, and utilize forbs such as red-root pigweed and croton for food (Davis and Anderson 1973). They generally avoid dense stands of grass for feeding because their visibility is impaired, and preferred foods tend to be low in availability. The data indicate mixed grass-shrub communities are better mourning dove habitat than degraded shrublands. This may be due to higher croton (also known as doveweed) availability in the mixed grass-shrub community (Nelson 1996).



This study is consistent with Saiwana et al. (1998), showing scaled quail populations are highest in mid-seral communities (about 50% remaining climax vegetation). Scaled quail depend on honey mesquite and broom snakeweed for feed and cover (Davis and Banks 1973). Scattered bunchgrasses such as mesa dropseed and red threeawn provide concealment cover without impeding mobility. Lack of cover may explain why scaled quail had lower preference for degraded shrubland than mixed grass-shrub communities.

Blacktailed jackrabbits were the primary mammal en-

countered. Other studies have shown blacktailed jackrabbit populations are highest under mid-seral conditions. They depend heavily on honey mesquite and cactus, for food and cover. Open grasslands without shrubs support few jackrabbits (Daniel et al. 1993). Conversely the low preference of blacktailed jackrabbits for degraded shrublands in this study could be due to lack of cover which increases their vulnerability to avian predators.

Management Implications

This study shows Chihuahuan Desert upland rangelands in mid-seral condition (about 50% remaining climax vegetation) support more wildlife species and higher wildlife numbers than those near climax (open grasslands) or those in an early seral stage (degraded shrublands). This is due to the greater diversity in plant species composition and vegetation structure associated with mid-seral rangelands.

Study pastures 4 and 15 (Table 1) grazed by cattle at a conservative rate (30 to 35% use of forage) have successional advanced from mid-seral (35–40% climax) to late seral conditions (55–65% climax) over the past 30 years (Holechek et al. 1994). Moderate grazing

Table 2. Wildlife sightings on open grassland, mixed grass-shrub, and shrubland communities on the Chihuahuan Desert Rangeland Research Center in southcentral New Mexico (spring 1993 through fall 1994).

Wildlife species	Number of sightings		
	Grassland	Shrub-grass	Shrubland
Pronghorn	0	17	0
Coyote	0	6	0
Jackrabbit	42	116	16
Cottontail	3	21	10
Morning dove	7	30	2
Scaled quail	2	34	0
Meadowlark	25	5	1
Western kingbird	2	39	6
Loggerhead shrike	6	15	8
Sparrow/juncos	68	223	93
Mockingbird	0	20	9
Lark bunting	40	83	0
Hummingbird	0	3	0
Crissal thrasher	0	3	0
Scotts oriole	0	0	1
Cactus wren	0	2	3
Pyroloxia	0	4	2
Cliff swallow	0	1	0
Unknown	1	4	5
Marsh hawk	1	4	0
Redtailed hawk	1	7	0
Swainson hawk	3	15	1
American kestrel	0	6	0
Golden eagle	0	1	0
Barn owl	3	0	0
Roadrunner	0	0	0
Raven	4	25	0
Nighthawk	0	0	0
Total sightings	208	684	157

Table 3. Wildlife preference for open grassland, mixed grass-shrub, and shrubland plant communities on the Chihuahuan Desert Rangeland Research Center in south-central New Mexico (spring 1993 through fall 1994).

Wildlife species	Preference factor		
	Grassland	Grass-grass	Shrubland
Pronghorn	0	2.56	0
Coyote	0	2.56	0
Black-tailed jackrabbit	0.47	1.72	0.90
Cottontail	0.18	1.59	2.90
Mourning dove	0.35	1.97	0.50
Scaled quail	0.12	2.41	0.00
Meadowlark	1.59	0.41	0.30
Western kingbird	0.08	2.24	1.30
Loggerhead shrike	0.41	1.33	2.81
Sparrow/juncos	0.35	1.49	2.40
Mockingbird	0.00	1.77	3.10
Lark bunting	0.65	1.72	0.00
Hummingbird	0.00	2.56	0.00
Crissal thrasher	0.00	2.56	0.00
Scotts oriole	0.00	0.00	10.00
Cactus wren	0.00	1.03	6.00
Pyroloxia	0.00	1.71	3.33
Cliff swallow	0.00	2.56	0.00
Unknown songbirds	0.20	1.03	5.00
Total songbirds	0.37	1.54	2.10
Marsh hawk	2.00	2.05	0.00
Redtailed hawk	0.25	2.26	0.00
Swainson hawk	0.31	2.03	0.50
American kestrel	0.00	2.56	0.00
Golden eagle	0.00	2.56	0.00
Barn owl	1.96	0.00	0.00
Total Raptors	0.37	2.03	0.20
Roadrunner	0.00	0.00	0.00
Raven	0.27	2.21	0.00
Nighthawk	0.00	0.00	0.00
Total birds	0.39	1.64	1.60
Total mammals	0.37	1.77	1.10
Total wildlife	0.39	1.67	1.50

(40–45% use) on pastures 1 and 14 has given fairly stable seral conditions with about 35–40% climax vegetation remaining. Limited research indicates financial returns from cattle production are higher under conservative grazing (Holechek 1992) but moderate grazing appears to maximize upland wildlife populations (Nelson 1996).

From a multiple use standpoint maintaining large areas of late seral rangeland appears desirable in the Chihuahuan Desert (Holechek 1991). Rangeland in this condition provides high quality wildlife habitat, maintains soil stability, and provides a reasonable return from livestock production. Early seral shrubland communities provide important habitat for a few wildlife species, and add diversity to rangeland landscapes. A recommendation is that 5–10% of the public rangelands in the Chihuahuan Desert be kept in early seral shrubland. Presently climax grasslands occur on about 2–3% of the Chihuahuan Desert (McCormick and Galt 1993). A recommendation is to increase their proportion to 30–40%. This would help threatened wildlife species that depend on climax conditions such as the aplomado falcon, in-

crease plant community diversity, and increase the forage base for ranching operations (Holechek 1996).

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