

# HUNTING SEASON MOVEMENTS OF WHITE-TAILED DEER ON FORT SILL MILITARY RESERVATION, OKLAHOMA

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*Abstract:* Low hunter success in conjunction with a high population index prompted a 2-year study to test the hypothesis that white-tailed deer (*Odocoileus virginianus*) were moving to the adjacent refuge during hunting season. Of 5 males and 14 females, only 2 females used the refuge in a manner inconsistent with preseason use. Daytime use areas increased during hunting season. Daytime use area of bucks did not differ from that of does, but a greater percentage of bucks made excursions 3 - 9 km from their daytime use area. Discrepancy between hunter success and population index was attributed to low vulnerability due to use of extensive blackjack - post oak (*Quercus marilandica* - *Quercus stellata*) cover type during the day and to high visibility on spotlight counts due to concentration of deer in meadows at night.

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Studies by Kammermeyer and Marchinton (1976) and Zagata and Haugen (1973) revealed shifts of white-tailed deer to wildlife refuges during hunting season. Low hunter success and a high population index on Quanah Range relative to 2 other ranges (Table 1) on Fort Sill Military Reservation (FSMR), Oklahoma led to the hypothesis that deer were moving to the adjacent Wichita Mountains National Wildlife Refuge (WMNWR) during hunting season. Such movements could create management problems by preventing adequate harvest. This study was initiated to determine movements of Quanah Range deer with respect to WMNWR.

Table 1. Spotlight population index (deer observed/mile driven) and hunter success (kill/manday) during gun season for each of 3 artillery ranges on Fort Sill Military Reservation, 1978.<sup>a</sup>

	East Range	West Range	Quanah Range
Deer observed/mile driven	1.19	1.37	1.62
Harvested/manday	0.13	0.15	0.11

<sup>a</sup>Data collection techniques described by Stout (1978, unpubl. rep., Fish and Wildl. Branch, Fort Sill Military Reservation, Okla.).

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## METHODS

Quanah Range (5860 ha), FSMR shares a 13.1 km fenced border with WMNWR in southwestern Oklahoma. Deer have been regularly observed to pass over and under the 2.4 m high fence at numerous locations. Quanah Range has rolling topography with a mixture of blackjack - post oak forest and mixed grass prairies as described by Bartush and Garner (1979).

Summer capture was necessary to insure that deer leaving FSMR the previous autumn had adequate time to return. Captures were made at night during June to September 1979 and July to August 1980, utilizing spotlights and telemetered darts (Wildlife Materials, Inc., Carbondale, Illinois) propelled by Cap-Chur guns (Palmer Chemicals Equipment Co., Douglasville, Georgia [use of named products does not constitute endorsement]). Darts contained 300 - 900 mg xylaxene or 10 mg succinylcholine chloride.

Deer were marked with aluminum ear tags (National Band and Tag Co., Newport, Kentucky) and colored vinyl ear streamers (after several transmitter failures) and equipped with battery- or solar-powered transmitters (Wildlife Materials, Inc., Carbondale, Illinois). Sex, age by tooth wear and eruption (Severinghaus 1949), general health, date, time, and location were recorded. After they were marked, deer immobilized with xylaxene were forced to the nearest cover that would shade them from anticipated sunshine or were aroused the next morning and forced into shade.

Instrumented deer were monitored 2 to 5 times/week from August to December each year to determine pre hunting season and hunting season daytime use areas. Locations were plotted on topographic maps. A version of the modified minimum area method (Dickinson and Garner 1979) was used to determine areas. Half the length of the longest home range axis was used as the maximum distance between points in determining outer boundaries. Areas were determined with a compensating polar planimeter.

Area computations were made when at least 10 locations were determined. Deer lacking minimum number of locations for pre season and/or season daytime use areas were dropped entirely from computation of means and comparisons. An additional deer sustaining a leg wound early in the hunting season was dropped from comparisons. Although inclusion of deer with only 1 computed area would have contributed to a better estimate of respective daytime use area means, the objective was to illustrate changes from pre season to hunting season for deer about which both pre season and hunting season information was available.

Incidental nocturnal locations obtained during capture were dropped from area determinations because they were generally outside daytime use areas. Nocturnal

locations, which were available for few deer and only for the preseason period, greatly biased preseason home ranges. Daytime locations represent areas deer occupy while hunters are in the field.

Preseason period was August to mid-October and hunting season was mid-October to December. Although archery deer season opened 1 October, significant hunting pressure did not develop until the popular mid-October opening of primitive firearms deer season (unpubl. data). The 2-week primitive firearm season was followed by 5 weekends of gun deer hunting ending in mid-December. Wild turkey (*Meleagris gallopavo*) and bobwhite quail (*Colinus virginianus*) hunters were also afield in November and December.

## RESULTS AND DISCUSSION

Eight does (1 yearling and 7 older does) and 2 bucks (yearlings) were transmitters in 1979 and 10 does (2 yearlings and 8 older does) and 4 bucks (yearlings) in 1980.

Eight transmitter malfunctions, 1 transmitter loss due to loose application, and early hunting mortalities reduced number of home daytime use area determinations.

Hunting season daytime use areas were larger than preseason daytime use areas for does and bucks in 13 of 15 comparisons (Table 2, Fig. 1), similar to Sparrowe and Springer's (1970) results. Daytime use areas of deer whose transmitters malfunctioned before close of hunting season are not depicted in Figure 1. Each preseason and hunting season daytime use area represents data from 1 autumn. Buck B-4 was killed by an archer and has no hunting season use area. Preseason daytime use areas for does averaged  $101.7 \pm 25.0$  ha (range 6 - 259 ha) and hunting season daytime use areas averaged  $208.7 \pm 39.3$  ha (range 21 - 473 ha). Preseason daytime use areas for bucks averaged  $61.8 \pm 14.2$  ha (range 36 - 85 ha), and hunting season daytime use areas averaged  $189.5 \pm 37.9$  ha (range 127 - 258 ha). Daytime use areas of bucks did not differ from those of does ( $P > 0.05$ ). There were no deer migrations as were found by Schmautz (1949) in Montana, Bartless (1950) in Michigan, and Olsen (1938) in Minnesota. In his review of the literature, Siglen (1965) found that deer in the South usually did not shift home ranges seasonally. Our results are similar. Instead, deer generally expanded their daytime use areas. Expansion of daytime use areas during hunting season may be due to factors other than hunting pressure, such as rutting behavior, search for a decreasing food source, and/or normal yearling dispersal mechanisms.

Total home ranges are undoubtedly larger than daytime use areas recorded in this study. Daytime use areas do not include nocturnal locations (usually outside diurnal home ranges) and span a brief period of time (approximately 2.5 months preseason and 2.5 months hunting season).

Seven deer made excursions of 3 - 9 km: does D-2, D-3, D-4 and D-13 and bucks B-1, B-2, and B-5 (Fig. 1). Two deer, doe D-4 in year 2 and buck B-1, made long excursions before hunting season. Motivations for these excursions are unknown. Localized pressure from deer archery hunters or military activity may be factors. Buck B-1 made the trip from southwest to northeast Quannah Range at least 3 times before season.

Factors other than hunting pressure may have prompted an increased number of excursions during hunting season. Hunting pressure is strongly suspected because

Table 2. Preseason and hunting daytime use areas for white-tailed deer on Quanah Range, Fort Sill Military Reservation, Oklahoma computed by a version of the modified minimum area method (Dickinson and Garner 1979).

Bucks	Preseason Daytime Use Area	Hunting Season Daytime Use Area	Does	Preseason Daytime Use Area	Hunting Season Daytime Use Area
B-2	64 <sup>a</sup>	258	D-1	160	422
	21 <sup>b</sup>	14		22	32
B-3	36	184	D-3	47	21
	16	13		Year 1	15
B-5	85	127	D-3,	134	473
	27	30	Year 2	25	27
			D-4,	13	130
			Year 1	11	27
			D-4,	259	184
			Year 2	28	32
			D-5	83	136
				22	22
			D-8	37	84
				22	21
			D-10	65	195
				22	20
			D-11	6	93
				10	25
		D-12	241	312	
			23	28	
		D-13	149	205	
			25	31	
		D-14	26	249	
			24	26	
Mean Area (ha)	61.7	189.7	Mean	101.7	208.7

<sup>a</sup> Daytime use area in hectares.

<sup>b</sup> Number of locations.

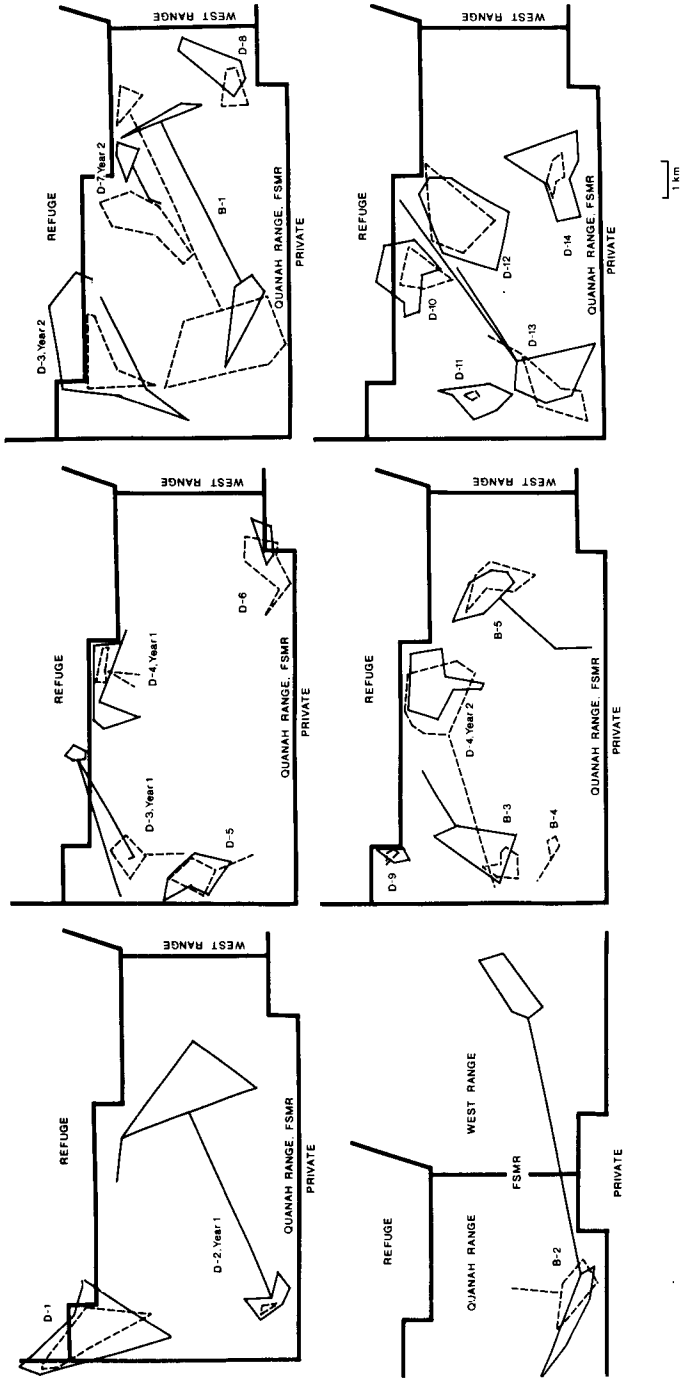


Fig. 1. Preseason (dashed line) and season (solid line) home range of white-tailed deer on Quannah Range, Fort Sill Military Reservation, Oklahoma.

long in-season movements usually coincided with weekends when weekend-only gun deer hunting was permitted. Long hunting season movements from home ranges are generally comparable to those found by Sparrowe and Springer (1970) in South Dakota and Kammermeyer and Marchinton (1976) in Georgia and are at variance with findings of Claggett (1976) in Pennsylvania and Marshall and Whittington (1968) in Georgia where deer did not make long excursions.

Two deer made movements to WMNWR inconsistent with preseason use. Doe D-3 moved to the refuge after 2 days of hunting season in year 1, having never been found there previously. She returned to Quanah Range only once during season and did not return again until April. She returned to the refuge in year 2 after hunting season opened and alternated between Quanah Range and the refuge during season. Doe D-10 went to the refuge at least 3 times during hunting season. Three other deer left Quanah Range 1 or more times during hunting season. Buck B-2 went to West Range where hunting was also open, and 2 does, D-1 and D-6, visited off FSMR during season as was consistent with preseason use.

Since movement of a significant number of deer to WMNWR is not occurring, the apparent discrepancy between poor hunter success and high population index must be attributed to other reasons. Evidence that deer generally utilize forest cover in the day suggests deer may be less vulnerable to hunting mortality on Quanah Range than on East or West Ranges because it has more extensive forest areas. Also, concentration of deer in prairies at night on Quanah Range may bias the deer observed/mile driven population index from preseason spotlight surveys.

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