FAWN MORTALITY IN THE NORTH KINGS DEER HERD: SOME PRELIMINARY RESULTS

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ABSTRACT.

The North Kings Deer Herd has declined from an estimated 17,000 animals in the late 1940's to a recent estimate of 3400. Simulation modeling indicates a current net loss of 2.4 percent per year. The primary problem is a lack of recruitment due to an estimated loss of 61 percent of the fawns in the first three months of life. Fourteen newborn fawns were tagged with mortality sensing transmitters during 1978 and 1979. The total fawn loss from this sample approximated the estimated losses from the herd based on composition counts. Six (43 percent) of the tagged fawns were killed by predators, four (29 percent) by mountain lions alone. Based on these data, simulation modeling indicates that mountain lion predation alone could be preventing an increase in the North Kings Deer Herd. We recommend further study of the mountain lion in the area where fawns are currently being studied.

INTRODUCTION

The numbers of migratory mule deer (Odocoileus hemionus) on the Sierra Nevada's west slope have declined dramatically since the 1950's. The North Kings Deer Herd, which is representative of this decline, was estimated at 17,000 animals in the late 1940's (Longhurst et al. 1952). In the mid-1970's, it was estimated at 3400 animals (Bertram and Remple 1977). Since 1970 a coordinated interagency program of studies has sought to determine the cause of the decline and to develop methods to increase deer numbers.

Fawn survival appears to be a major problem (Salwasser et al. 1978). The fetal rate in the herd averages 168 fawns per 100 does, based on spring doe collections. The fawns are born in late June and early July, soon after the does arrive on the summer range. Based on seven years of composition counts recorded by the California Department of Fish and Game, an average of 79 percent of the annual fawn crop is lost before the next spring migration begins. Late summer herd composition counts averaged 62 fawns per 100 does, indicating a loss of 61 percent of the fawns on the summer range. Early winter counts indicated the loss of another 14 percent of the original number of fawns, and an additional 4 percent are lost before the spring migration. This leaves less than 35 of the original 168 fetuses alive as yearlings.

METHODS AND MATERIALS

In 1978 we began a study of deer-cattle interactions on the North Kings Deer Herd summer range. A major effort was to characterize fawn habitat by capture and radio-tagging of 14 newborn fawns, seven in 1978 and seven in 1979, and monitoring their movements throughout the summer. The fawns were located by radio at least once each day, and on several occasions during summer, every 15 minutes over a 24-hour period.

The radio transmitters used on the fawns were equipped with a mortality sensor (signal changes after 1 hour of no movement). Each time a monitored transmitter was found to be in the mortality mode, an immediate search was begun to determine whether the fawn was actually dead. If so, the remains and the surrounding area were examined for evidence of the cause of death. When death was not obviously a result of predation, the remains were taken to an animal health laboratory for necropsy.

RESULTS AND DISCUSSION

Among the 14 fawns monitored during 1978 and 1979, six (43 percent) lived through the summer period and migrated to the winter range, and eight (57 percent) did not survive (Tables 1, 2). Herd composition counts for the same two years indicated a 59 percent fawn loss during the summer range period. We believe it is particularly significant that 43 percent of the radio-tagged fawns were killed be predators, and that 29 percent were killed by mountain lions (Felis concolor).

Table 1. Mortality of fawns radio-tagged and monitored, summer 1978, North Kings Deer Herd.

FAWN NO.	CAPTURE DATE	CAPTURE AGE (days)	CAPTURE WEIGHT (kg)	AGE AT DEATH (days)	CAUSE OF DEATH
78-1	July 5	6	5.8	15	Mountain Lion
78-2	July 7	1	2.8	4	Kidney disease
78-3	July 9	2	3.2	112 ?	Unknown
78-4	July 9	4	4.8	(1/)	--
78-5	July 12	2	4.8	71	Mountain Lion
78-6	July 12	6	4.8	(1/)	--
78-7	July 20	12	5.5	(1/)	--
Means	--	4.7	4.3	50.5	--

1/ Survived--migrated to winter range.

In 1975 a simulation model for estimating the population of the North Kings Herd was developed. The model suggests a downward trend in the population since 1975. The current simulated trend to the potential trend without mountain lion kills, with all other parameters of the population held constant, was compared also. We recognize, of course, that our results are based on a small sample and that further information might change our estimate of the rate of lion kill fawns.

The simulated trend of the herd's population shows it proceeding downward at the rate of 2.5 percent per year (Fig. 1). In the absence of mountain lion kills, the trend would be upward at the rate of 7.4 percent per year. If the herd sustained only half the rate of lion predation indicated by our sample, or 15 percent of the fawns during the summer season, the herd population would, on the average, grow by 0.5 percent per year. The yearly growth rate, however, is projected to increase, averaging 3.3 percent over the last 5 years simulated. Results of this simulation modeling suggest that with deer and mountain lion populations at their present levels, mountain lion predation alone is enough to cause a decline in the deer herd.

Table 2. Mortality of fawns radio-tagged and monitored, summer 1979, North Kings Deer Herd.

FAWN NO.	CAPTURE DATE	CAPTURE AGE (days)	CAPTURE WEIGHT (kg)	AGE AT DEATH (days)	CAUSE OF DEATH
79-1	June 26	3	3.4	15	Mountain Lion
79-2	June 29	1	3.0	70	Coyote
79-3	July 3	8	5.0	(1/)	--
79-4	July 3	10	4.5	36	Mountain Lion
79-5	July 3	6	3.3	9	Bear
79-6	July 6	6	3.8	(1/)	--
79-7	July 13	14	5.8	(1/)	--
Means	--	6.8	4.1	32.5	--

1/ Survived--migrated to winter range.

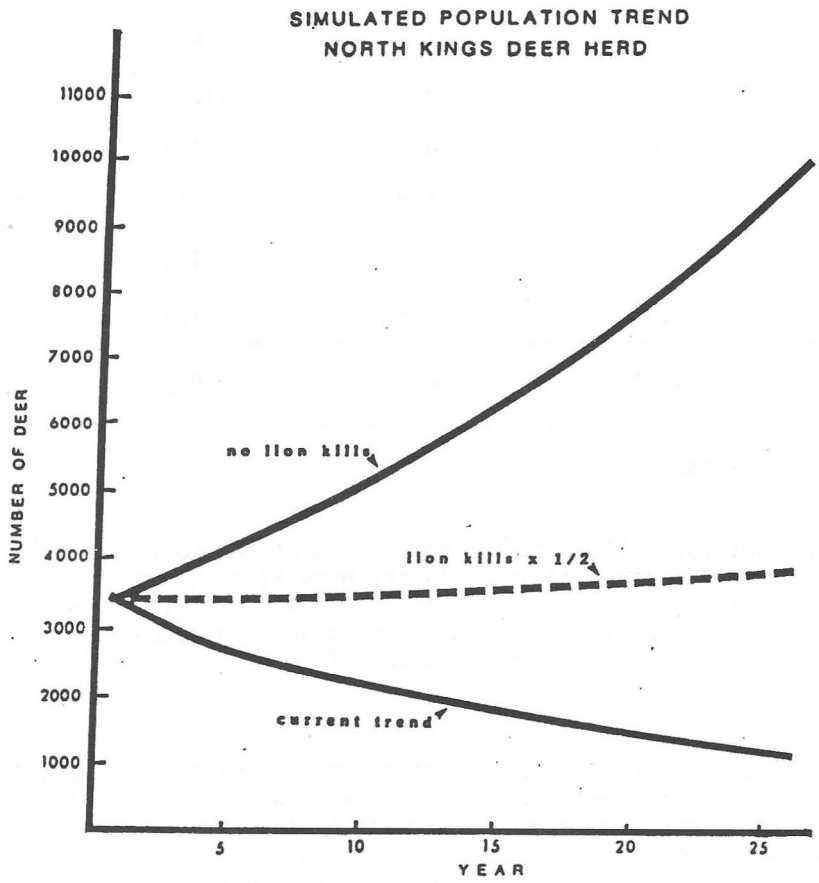

Figure 1. Simulated population trend of the North Kings Deer Herd under present conditions, with one-half the current lion predation, and with no lion predation.

Let me emphatically stress here that we do not believe that mountain lion predation was a major contributor to the decline of the deer herd from its estimated high of 17,000 animals in the late 1940's to the present estimate of 3400. Our simulation modeling indicates that if the herd had about 8000 deer it would maintain itself or even increase with the present level of mountain lion predation. This assumes that the mountain lion's social system would limit further increase in its population even with increasing numbers of deer.

In conclusion I wish to make a disclaimer and a recommendations. First the disclaimer: These are preliminary results based on limited data. We do not believe the data are sufficient at this time to say with confidence that mountain lion predation is preventing an increase in the North Kings Deer Herd. Other important questions also remain to be addressed.

Now the recommendation: We have long puzzled over the failure of the North Kings Deer Herd to respond positively to the numerous habitat improvements in its range. We believe our results, even though preliminary, are of sufficient potential significance to demand more intensive research into predator losses in this deer herd. As a first priority, we recommend that a limited number of mountain lions be radio-tagged and tracked in areas where we are currently studying radio-tagged fawns. We must learn something about the size of the lion home range and daily and seasonal movement patterns in the western Sierra Nevada before we can begin to assess properly the potential impact of lion predation on deer population dynamics.

LITERATURE CITED

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