

# SIGNIFICANT MORTALITY FACTORS OF DEER ON CRAB ORCHARD NATIONAL WILDLIFE REFUGE

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ABSTRACT. — One hundred thirty-four (22 percent) of 601 white-tailed deer (*Odocoileus virginianus*) marked, released and subsequently observed on Crab Orchard National Wildlife Refuge during 1962-68 were known mortalities. Hunter harvests (49 percent) of deer that moved off the study area was the major loss while roadkills (28 percent) ranked second. Loss among yearling and older males average 20 percent through the 6 to 7-year class; that for corresponding females was 5 percent indicating a differential mortality rate between sexes.

In a study of the population dynamics, ecology and life history of the deer on Crab Orchard National Wildlife Refuge (CONWR) from July, 1962, through December, 1968, an attempt was made to establish causes of known mortalities of marked deer. The study area included the approximately 18,000-acre inviolate portion of CONWR which supported an estimated population of 2,250 deer (Autry, 1967) in January, 1966, when a controlled harvest (Roseberry et al., 1969) yielded 1,109 deer of which 154 were marked.

## METHODS

Four hundred sixty-three of the 687 deer (67 percent) during this study were 1½ years old or less when captured and marked (Hawkins et al., 1967a and b; 1968); aging was according to Severinghaus (1949). For record keeping purposes all deer

were arbitrarily assigned a birth date of June 1.

Most information on mortality was afforded through roadkills and hunter harvests. Other losses were reported by people working in various capacities on or near the study area. When a mortality was discovered a cursory examination was made to determine cause of death when not obvious.

Percentage mortality by sex and age was determined using only deer marked and subsequently observed (601) rather than all deer marked (687). This eliminated from consideration deer that may not have survived capture or that lost markers.

## RESULTS AND DISCUSSION

Six hundred eighty-seven deer were marked and released on the study area from 1962 through 1968; 601 of these (74 adult bucks, 125 adult does, 74 yearling bucks, 95 yearling does, 130 buck fawns and 103 doe fawns) were subsequently observed one or more times. One hundred thirty-four of the 601 (22 percent) were known mortalities during the study period.

The major mortality factor was hunter harvest which accounted for 49 percent of the loss (Table 1); since these deer were killed off the study area a high dispersal rate from

TABLE 1.—Aspects of deer mortality on Crab Orchard National Wildlife Refuge, 1962-68.

Sex and Age	Hunter Harvests		Roadkills		Dog Kills		Illegal Kills		Injuries		Unknown	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Male Fawn.....			2	5	3	33					2	11
Yearling Buck.....	32	49	12	32							2	11
Adult Buck.....	17	26	12	32	2	22	2	100	2	100	6	37
Female Fawn.....	1	2	2	5	3	33						
Yearling Doe.....	5	8	4	11							3	16
Adult Doe.....	10	15	6	16	1	11					5	26
Totals.....	65		38		9		2		2		18	
Percentage Mortality by Cause.....	49		28		7		1		1		13	

CONWR was indicated. The most important non-hunting factor was roadkills; with the omission of hunter harvests, roadkills accounted for 55 percent of the mortality. November, which includes the main time of the rut, was the major period of such loss. Investigators in Maine (1954:1) contributed 45 percent of all non-hunting mortalities to cars and trains. Wilson (1956:4) reported such losses as 50 percent of all non-hunting mortality in New Hampshire; however, he felt this to be too high because of bias in reporting roadkills.

Dogs contributed 7 percent to the total mortality (Table 1); two-thirds of this occurred in 1964. At this time a concentrated dog removal effort was begun and over 100 dogs were collected during 1964 through 1966 (unpubl. data, Coop. Wildl. Res. Lab.). Most of the deer known to be attacked by dogs were in corral traps or were injured; dogs did not appear to be an important mortality factor of healthy, free-ranging deer. However, harassment was considerable in the winter of 1964-65 when the feral dog population was probably the highest. Although Progulské and Baskett (1958:191) considered harassment severe in Missouri, few deaths of deer were directly attributable to dogs. It seems likely that if the dog population had not been checked on CONWR it might have become an important mortality factor of even healthy deer as reported by others (Bennitt and Nagel, 1937; Shaw and McLaughlin, 1951; Barick, 1953; Ward, 1954; Brazda, 1957; and Wilson, 1954).

The cause of death could not be determined for 13 percent of the total

deer mortality (Table 1). No loss could be attributed to parasites, diseases or malnutrition, but these aspects were not evaluated in detail.

Yearling and older bucks were predominant among hunter-harvested deer and roadkills (Table 1). This is explained by a higher dispersal rate and greater mobility of bucks, especially yearlings. About 80 percent of the yearling bucks disperse annually (unpubl. data, Coop. Wildl. Res. Lab.); of these, about 23 percent are harvested or otherwise mortalities off the study area (Hawkins et al. In manuscript). The majority of losses to dogs were fawns, suggesting their greater vulnerability. All illegal kills were adult bucks possibly showing selectivity for large antlered deer. Two deer found dead from injuries were adult bucks; the majority of deer in which the cause of death was unknown were adults.

For yearling and older bucks, the mortality rate averaged 20 percent through the 6 to 7-year age class (Table 2) whereas corresponding does, showed only a 5 percent loss. This differential mortality was manifested only for animals moving off the study area; there was no significant difference in loss between the sexes on the refuge. Field observations on CONWR show a substantial disparity of yearling and older bucks compared with corresponding does (unpubl. data, Coop. Wildl. Res. Lab.). Likewise, during a public controlled hunt on CONWR during January, 1966, a significantly higher proportion of the yearling and older deer harvested were does. Taber and Dasmann (1954:314) observed more doe than buck yearlings (100 to 64) in a population of black-tailed

TABLE 2.—Percentage mortality of deer by sex and age classes, Crab Orchard National Wildlife Refuge, 1962-68.

Age Class (Years)	Bucks		Does	
	Number Mortalities/ Number Marked and Subsequently Observed <sup>1</sup>	Percentage Mortality	Number Mortalities/ Number Marked and Subsequently Observed <sup>1</sup>	Percentage Mortality
0-1.....	7/132	5	6/109	6
1-2.....	46/179	26	12/175	7
2-3.....	23/98	23	7/170	4
3-4.....	11/53	21	5/131	4
4-5.....	2/18	11	3/94	3
5-6.....	2/11	18	5/56	9
6-7.....	2/9	22	0/27	0
7-8.....	0/6	0	1/16	6
8-9.....	1/1	100	0/2	0
9-10.....	0/0	0	1/2	50

<sup>1</sup> Includes a few that were not observed but for which the time and cause of death were known.

deer; they contributed this to a differential mortality rate of buck over doe fawns. Robinette et al. (1957: 12-14) reported a sex ratio of 3.04 does per buck in mule deer and contributed it to greater winter-loss among males.

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