

MICHIGAN DEPARTMENT OF CONSERVATION  
GAME DIVISION

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RESULTS OF 1962 DEAD DEER SURVEYS

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Summary

1. These surveys were designed to estimate the total number of dead deer in the woods in the Upper Peninsula and the northern Lower Peninsula in the spring of 1962.
2. Searches were made on 247 twenty-four-acre plots in the Upper Peninsula and 318 in the Lower Peninsula. Plots were located at random within strata in each of the Game Division Districts in Regions I and II.
3. Estimates of total dead deer on the ground at the time of the survey were 43,440 for the Upper Peninsula and 39,940 in the northern Lower Peninsula. Of these, 34,930 Upper Peninsula deer and 25,990 northern Lower Peninsula deer were judged to have died after November 15, 1961.
4. Starvation caused at least 10,070 losses in the Upper Peninsula and 13,320 in the northern Lower Peninsula.

METHODS

Surveys were carried out in both the Upper Peninsula and the northern Lower Peninsula to estimate the total number of dead deer on the ground in the spring of 1962.

Stratified random sampling was employed in essentially the same way as previous dead deer searches in 1955, 1956, 1959, and 1960. (Information Circular 101 gives a detailed explanation of stratification.) Every square mile in the northern two-thirds of the state was classified by field men into one of five levels of estimated deer abundance (strata). Then random samples of sections were drawn from each strata within each of the nine northern Game Division Districts. About sixty sections were drawn per District, and randomly located 24-acre plots were searched in these sections.

A total of 565 plots were searched, 247 in the Upper Peninsula and 318 in the northern Lower Peninsula. Each 24-acre plot consisted of a strip 132 feet wide by  $1\frac{1}{2}$  miles long, arranged in a rectangle  $\frac{1}{2}$  mile long by  $\frac{1}{4}$  mile wide.

Two-man crews were the basic working force. Crews were composed of personnel from the Department of Conservation, U. S. Forest Service, U. S. Fish and Wildlife Service, and interested private individuals. Data were gathered by 214 individuals, who walked about 1,700 man-miles on survey plots.

Each dead deer found was carefully examined by a competent biologist to determine the time and cause of death insofar as was feasible. The estimates given here are computed from only those deer which were believed to have died on the plots from November 15, to the time of the survey.

RESULTS

Field men assigned a specific cause of death only if definite evidence was available. Field autopsies were carefully done and we are quite certain that all deer assigned to a loss category actually died in the given manner. Known causes of mortality can be grouped conveniently into four classes: malnutrition, bullet wounds, dog and predator kills, and accidents and disease. All other deer were considered "unknown" as to cause of death. It was often possible, however, by examination of fat levels in the bone marrow, to state conclusively that certain animals did not starve, and to determine the approximate time of death from age, general condition, bone marrow, and relation of the carcass to fallen leaves and vegetation. But unfortunately, many of the carcasses found in the Upper Peninsula were in such poor condition that about all that could be said was that a deer died there. Using available clues, we can subdivide these unknown deer into three classes: (1) unknown, not starved, died fall or early winter, (2) unknown, died in late winter or spring, and (3) died after November 15, 1961 but cause and time unknown.

Dead deer surveys were also run in 1956, 1959, and 1960 in the Upper Peninsula and 1955, 1956, 1959, and 1960 in the northern Lower Peninsula. Comparisons, by cause of death, of estimates from previous surveys with 1962 results are given below. The estimates are probably conservative since undoubtedly some deer were missed by the searchers.

TABLE 1  
Dead Deer Surveys  
Estimates of Deer Losses

<u>Upper Peninsula</u>	<u>1956</u>	<u>1959</u>	<u>1960</u>	<u>1962</u>	
Starved	19,400	3,000	11,200	10,070	
Shot	7,300	6,600	2,100	2,730	
Dog and Predator kills	300	1,200	1,500	none found	
Accidents and disease	600	1,200	2,200	3,650	
Unknown, not starved, died fall or early winter	22,000	6,500	11,400	7,080	
Unknown, died late winter or spring	6,800	1,800	2,700	1,370	
After November 15, 1961 but cause and time unknown	<u>17,600</u>	<u>14,900</u>	<u>22,650</u>	<u>10,030</u>	
Total	<u>74,000</u>	<u>35,200</u>	<u>53,750</u>	<u>34,930</u>	
 <u>Northern Lower Peninsula</u>	 <u>1955</u>	 <u>1956</u>	 <u>1959</u>	 <u>1960</u>	 <u>1962</u>
Starved	5,270	16,600	13,100	8,350	13,320
Shot	15,320	5,700	6,500	10,050	4,260
Dog or predator kills	1,720	3,400	650	700	400
Accidents and disease	140	1,000	4,050	none found	none found
Unknown, not starved died fall or early winter	3,360	14,900	8,000	5,500	5,870
Unknown, died late winter or spring	1,290	none found	950	8,900	2,140
After November 15, 1961 but cause and time unknown	<u>none found</u>	<u>none found</u>	<u>650</u>	<u>none found</u>	<u>none found</u>
Total	<u>27,100</u>	<u>41,600</u>	<u>33,900</u>	<u>33,500</u>	<u>25,990</u>

## CAUSE OF MORTALITY

### STARVATION

Starvation is relatively easy to determine. The distinguishing characteristics are, general emaciated condition, absence of fat under the skin and subcutaneous fat, bone marrow thin and jelly like as opposed to the normal solid and inflexible bone marrow, and lastly no evidence of wounds made prior to death.

### BULLET WOUNDS

Bullet wounds are characterized holes in skin, blood stains on hair indicating bullet holes, shattered bones, extensive bloody areas under the skin and muscles, and considerable amount of blood and clots in the body cavities.

### DOG AND PREDATOR KILLS

Wounds inflicted on live animals are characterized by bleeding. Such animals will show bloody areas under the skin and in the flesh about the wound. Dogs inflict tear-wounds in the skin and flesh, most often about the rear legs of the deer, but may also attack other parts of the body as about the neck and the back. Damage done by dogs and scavengers feeding on carcasses of dead deer can be distinguished by the absence of blood-soaked flesh adjacent to the tears in the skin and flesh.

The magnitude of dog and predator kills varies with the relative nutrition of the herd and snow conditions. Fawns weakened by malnutrition or hampered by deep snow are easy prey for deer-running dogs. This type of mortality occurs primarily in late winter and spring.

### ACCIDENTAL KILLS

These are often obvious from the character of wounds and proximity of carcass to highways or railroads. Broken bones in absence of shot wounds, extensive bruised and hemorrhagic areas, skin abrasions, and the battered condition of the carcass are the principal keys to identification.

Deer may also die from collisions with fences, becoming caught in trees, falling through the ice and drowning, falls, etc. In most such instances, the cause of death is self-evident.

### DISEASE

Ordinarily deer deaths from disease constitute only a small portion of the losses each year. There has not been a known outbreak recently of the hemorrhagic disease which killed sizeable numbers of deer in some areas in the summer and fall of 1955.

Although most deer are infected with internal parasites, these cause few deaths each year.

### CAUSE OF DEATH UNKNOWN

The "unknown" deer constitute something of a problem. We have good reason to suspect, for instance, that the estimated number of deer in the starved category each year does not actually reflect the relative losses from malnutrition.

Spring weather conditions may delay the surveys more some years than others. Any delay allows scavengers more time to tear apart and scatter the carcasses, making an accurate appraisal difficult.

Because of the high fat content present in the bone marrow, overall condition of the carcass, and age in the case of fawns (determined by examining the teeth), it followed that most of the "unknown, not starved" deer died in the fall or early winter. As far as we know, the only major cause of mortality at this time of year is shooting during the hunting season, but the poor condition of the remains made it impossible to verify the presence of bullet wounds.

Similarly, we can determine that a number of the cause-unknown deer died in late winter or spring. We believe a good share of these deer died outright from malnutrition or from other causes as a result of their weakened condition. Unfortunately, not enough of the flesh remained to determine fat levels in the body, and upper legbones were gone or broken so that verification of starvation was impossible.

Remains of deer classified as "cause entirely unknown" were generally scattered and incomplete. This class undoubtedly includes deer from all five of the known loss categories.

Based on the knowledge of deer losses gained through many years of study, losses from unknown categories have been apportioned into the four known categories. The technique used involves a systematic application of deer mortality data obtained from several independent sources - deer killed on the highway, legal deer harvest, records of illegal deer shot, previous dead deer surveys, etc. The resulting estimates are given below.

YOU WILL NOTE THAT THE TOTAL LOSS FIGURES IN BOTH TABLES ARE THE SAME. THE DIFFERENCES ARE IN THE SEVERAL CATEGORIES. IN THE SECOND TABLE, THE LARGE NUMBER OF DEER DEAD FROM UNKNOWN CAUSES HAVE BEEN ASSIGNED TO THE CATEGORIES WHICH OUR RESEARCH INDICATES THEY MOST LOGICALLY FALL. THUS, THE SECOND TABLE GIVES A LESS DETAILED BUT A MORE REALISTIC AND A MORE EASILY UNDERSTOOD PICTURE OF DEER LOSSES.

TABLE 2  
Dead Deer Surveys  
Estimates by Cause of Death

<u>Upper Peninsula</u>	<u>1956</u>	<u>1959</u>	<u>1960</u>	<u>1962</u>	
Starved	34,050	7,000	23,000	15,640	
Shot	37,850	22,300	19,350	11,270	
Dog or predator kills	750	2,950	3,100	none found	
Accidents and disease	<u>1,350</u>	<u>2,950</u>	<u>8,300</u>	<u>8,020</u>	
Total	<u>74,000</u>	<u>35,200</u>	<u>53,750</u>	<u>34,930</u>	
<u>Northern Lower Peninsula</u>	<u>1955</u>	<u>1956</u>	<u>1959</u>	<u>1960</u>	<u>1962</u>
Starved	6,230	16,600	14,050	15,650	15,400
Shot	18,670	19,950	13,750	15,200	10,130
Dog or predator kills	2,030	3,400	750	1,300	460
Accidents and disease	<u>170</u>	<u>1,650</u>	<u>5,350</u>	<u>1,350</u>	none found
Total	<u>27,100</u>	<u>41,600</u>	<u>33,900</u>	<u>33,500</u>	<u>25,990</u>