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*Iowa State Conservation Commission*

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# Status and Management of the White-tailed Deer in Iowa, 1954-1962

PAUL D. KLINE<sup>1</sup>

*Abstract:* Data regarding populations, hunting, harvest, and biology of Iowa deer (*Odocoileus virginianus*) gathered by the State Conservation Commission is presented from four ecologically distinct areas. Following 10 consecutive hunting seasons, deer are more abundant and better distributed than before. Abundance through the state is not consistent with available forest habitat. Separate seasons have been permitted for deer of any sex or age by shotgunners and archers on a statewide basis most years. Harvests during recent years have averaged near 20% of an increasing population. Hunting success for gunners during 3-day seasons has been near 45-50%.

Bucks outnumber does in the harvest. Fawns comprise 41.7% of the bag. Only 5.8% of the bag has been of deer aged 4½ years or older. Bucks reach maximum weight after 3½ years of age; does at 3½. Weights and antler development reveal significant differences in size and condition exist among deer from four Areas. Weights and antler size average greater for years 1954-62 than in 1953, the first open season.

Deer populations in Northeast Iowa are expected to remain stable. Populations in Northern Iowa are believed controlled by hunting more than in other areas because of less protective cover and terrain in northern regions. Southern Iowa is believed to offer the greatest potential for population expansion.

## INTRODUCTION

Iowa is primarily an agricultural state. Fully 94% of the total land area is in farms. Seventy three percent is cultivated, 9% is in permanent pastures, and much of the remainder is in cities, roads, etc. Only 7.3% of the land surface is wooded. It is truly a wonder that in such an environment a large forest or forest-edge dwelling species as white-tailed deer (*Odocoileus virginianus*) can survive and prosper. But the deer has prospered, and at the present time occupies every county in the state.

Responsibility for management of deer is vested in the Iowa State Conservation Commission. It is the purpose of this paper to record information gathered by this organization regarding deer populations, hunting regulations and harvest, and biological studies for years 1954 through 1962. Sanderson and Speaker (1954) have recorded the early history of deer in Iowa through 1953.

## METHODS

*Population Estimates.* Every year during late February conservation officers are asked to record their estimate of deer numbers in their respective territories and to mark on county maps where deer occur. These data are used to determine areal

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and statewide trends in deer populations. These estimates are made at a time when populations are near the annual low. They do not take into account summer increment through reproduction and, therefore, are below actual populations which occur during fall hunting seasons.

For every deer known killed by highway traffic, poaching, disease, or other miscellaneous causes, other than those legally shot during hunting seasons, a report is filed by the local conservation officer. These reports include the time; how deer were killed; sex, age, weight; and information relating to vehicular-deer collisions. It is assumed that the number of these accidental deaths is related to deer abundance. Compilation of the reports is used as an indication of population trends from year to year.

*Harvest.* Licensed hunters are required to return a report at the close of each hunting season. Information reported includes whether or not they hunted and bagged a deer, county in which they hunted, number of hours spent hunting, number of deer seen, and sex and age of deer killed. About 98% of the licensed hunters normally cooperate in this project.

Landowners or tenants, and their progeny, are permitted to hunt deer by legal means on their property without a license. However, if they transport the deer from their property they are required to have affixed a metal tag which they obtain from the local conservation officer. Officers report at the close of the hunting season the number of these seals issued. Also, they estimate and report numbers of deer legally taken by unlicensed hunters and not tagged for transportation.

Together, these data provide needed information on the deer harvest in Iowa each year.

*Biological Data.* Each year biologists and game managers examine as many deer as practicable during the hunting season. Territories for checking are assigned so that deer from all portions of Iowa are examined. Sex, age, and county of kill are recorded for each deer. Weights in pounds, antler sizes, and general condition are recorded whenever possible. Deer are aged by examination of the lower teeth (Severinghaus, 1949). Antler beam diameters are obtained by averaging two measurements at right angles to each other, taken 1 inch above the burr. The data are transferred to Keysort cards to facilitate use. Compilation gives age and sex ratios. Weights and antler measurements are used for comparisons of condition for various portions of Iowa (Severinghaus, 1955).

*Delineation of Areas.* The state is divided into 4 ecologic areas to permit evaluation of population trends and hunting take, and

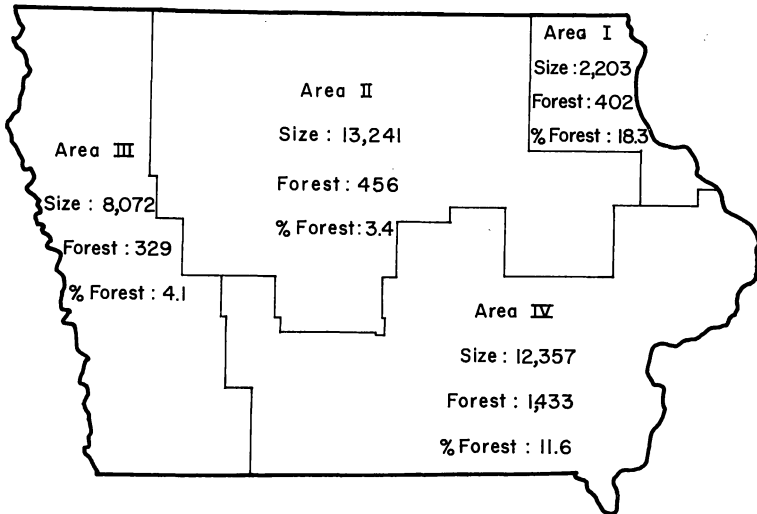


Fig. 1. Delineation of four areas showing total size and portion forested in thousands of acres.

to compare herd condition from varying portions of Iowa (Fig. 1). Soils, topography, and plant geography were considered in making this division (Brown, 1936; Kline, 1958; Shimek, 1948).

Area I, termed the "Driftless" area is characterized by steeply rolling terrain, dendritic drainage, and relatively heavy forest cover. Area II, the "Northern Glaciated", is, in general, the most recently glaciated portion of Iowa. It is characterized by poorly developed natural drainage, flat or gently rolling terrain, fertile and slightly alkaline soils, and has little forest cover. Area II is the prime agricultural portion of Iowa. Area III, the "Western Loess," has gentle to steeply rolling terrain, deep loess soils, and little forest cover. Drainage of most of Area III is into the Missouri River as opposed to drainage into the Mississippi River from the other three Areas. Area IV, the "Southern Loess", has gentle to steeply rolling terrain, well developed drainage, acid and relatively infertile soils, and moderate forest cover. The exact delineation of these areas does not follow the political boundaries as is shown in Fig. 1. Since most of the data are recorded by county it is expedient to use county boundaries, however.

## RESULTS

*Populations.* The statewide winter deer population dropped from 11,892 in 1954 to 10,684 in 1955, remained stable through 1958, then climbed annually to 15,957 in 1962 (Table 1). The population in Area I remained fairly stable throughout 9 years.

Area II populations declined annually from 1954 to 1958, then climbed to a level slightly below that of 1954 during 1959 through 1962. Area III populations declined from 1954 to 1957, then arose during 1958-62 to a level well above that of 1954. Populations in Area IV remained stable from 1954 to 1957, then climbed annually to a level almost double that of 1954. Increase in statewide populations is due primarily to increases in southern and western Iowa. The record of miscellaneous kills by vehicular collisions, etc. indicated populations in 1962 were higher than those of 1954 (Table 1).

Table 1. Conservation officer deer population estimates by years for four areas and known statewide miscellaneous kills

Year	Population estimates by areas				Statewide	Misc. kills (Vehicular)
	I	II	III	IV		
1954	1,930	3,309	3,286	3,367	11,892	310
1955	1,477	2,947	3,235	3,025	10,684	306
1956	1,980	2,801	2,683	3,357	10,821	419
1957	2,060	2,511	2,487	3,236	10,294	345
1958	2,075	2,358	2,720	3,490	10,643	438
1959	1,895	2,578	3,360	3,893	11,726	508
1960	2,316	3,077	3,330	4,378	13,101	753
1961	2,190	2,911	3,721	5,333	14,155	839
1962	2,275	2,975	4,630	6,077	15,957	939
Number counties	5	37	21	36	99	99

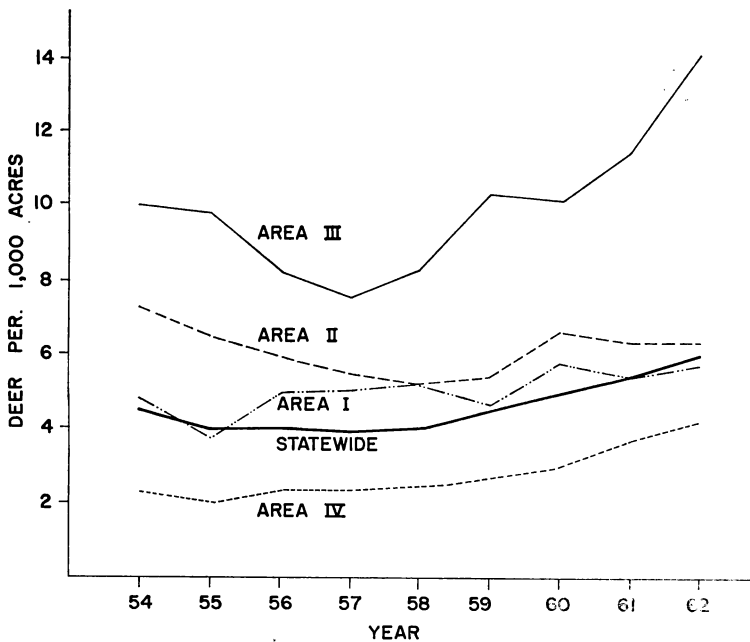


Fig. 2. Winter deer populations per 1,000 acres of forest for four areas, 1954-62.

Figure 2 compares deer abundance per 1,000 acres of forest land for four areas. It demonstrates deer stocking is not consistent with forest habitat available. For example, in 1962, Area III had 14.1 deer per 1,000 acres of forest land, while Area IV had only 4.2.

*Hunting.* Deer hunting has been permitted annually starting in 1953. Separate seasons for gun and archery hunting have been held annually, beginning in 1954. During 1954, 51½ counties were opened to gunners and 57 counties for archers. From 1955 through 1962 hunting has been permitted in all counties. In 1954 farmers, tenants, and their progeny were required to have a license to hunt on their property. No license has been required for these persons since 1954.

Table 2. Iowa deer hunting regulations, 1954-62.

Year	Gun			Bow		
	Number of Licenses Sold	Days of Hunting	Shooting Hours	Number of Licenses Sold	Days of Hunting	Shooting Hours
1954	3,788	3	9:00-4:00	92	12	9:00-4:00
1955	5,586	3	9:00-4:00	414	23	6:30-4:00
1956	5,440	2	8:00-4:00	1,280	31	6:30-5:00
1957	5,942	2	8:00-4:00	1,228	31	6:30-5:00
1958	6,000	2	8:00-4:00	1,380	30	6:30-5:30
1959	6,000	2	8:00-4:00	1,627	31	6:30-5:30
1960	7,000	3	8:00-4:00	1,772	44	6:30-5:30
1961	8,000	3	8:00-4:00	2,191	48	6:30-5:30
1962	10,000	3	8:00-4:00	2,404	51	6:30-5:30

The number of licenses for gun hunters was unlimited in 1954. In 1955 a limit was set on the number of gun licenses sold. Drawings have been held each season for licenses when the number of applications exceeded the number of permits available. No drawings were held from 1955 through 1957, but have been held annually since. No limits have been set on the numbers of archery permits sold. Numbers of licenses sold, days of hunting, and shooting hours for nine seasons appear in Table 2.

No restrictions have been placed on sex or age of deer taken by hunters. Season limits have been one deer. Gunhunters have been permitted to use shotguns only of 20, 16, 12, and 10 gauges.

The tendency has been for relaxing archery regulations and expansion of bowhunting over nine seasons. Gun regulations have been relaxed each year beginning in 1960. This leniency is consistent with increasing numbers of deer in Iowa.

*Harvest.* Statewide harvests for three types of hunters through nine seasons is shown in Table 3. Increased kill by licensed and unlicensed gun hunters during recent years is consistent with more lenient regulation and an increasing deer population. The number of deer shot each season on 4 areas (Fig. 3) correlates with changes in deer abundance in each of the areas.

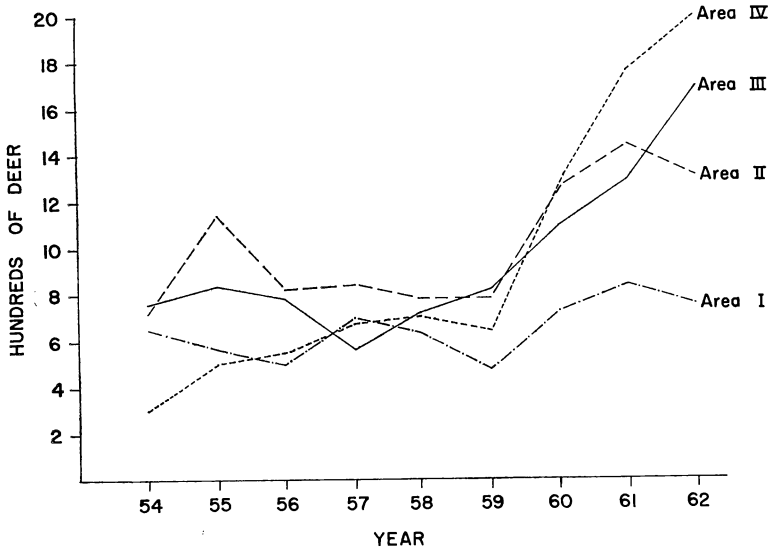


Fig. 3. Total numbers of deer legally shot on four areas, 1954-62.

Estimated fall populations (Table 3) are computed from fawn/adult age ratios. As 41.7% of the total deer aged have been fawns, the fawn/adult ratio is 0.715. This indicates that the potential summer increment in Iowa is 71.5%. Therefore, a factor of 1.715 x winter populations was used to calculate estimated fall populations. The figures presented in Table 3 are maximal in every case because they do not compensate for mortality from winter to fall. For the same reason, the percentages of deer harvested (Table 3) are minimal. Legal kill has ranged near 20% of the deer herd during three recent seasons.

Table 3. Legal harvests of deer, 1954-62, compared to estimated fall populations and per cent of deer harvested

Year	Harvest by type of hunter			Estimated fall population	Per cent of population harvested
	Licensed gun	Unlicensed bow	Unlicensed gun		
1954	2,414	10	...	<20,395	>11.9
1955	2,438	58	568	<18,323	>16.7
1956	1,990	117	561	<18,558	>14.4
1957	2,171	138	480	<17,654	>15.8
1958	2,115	160	588	<18,253	>15.7
1959	1,935	259	541	<20,110	>13.6
1960	3,248	279	814	<22,468	>19.3
1961	4,032	367	964	<24,276	>22.1
1962	4,281	404	1,018	<27,366	>20.8

The total legal harvest for 9 seasons is 31,950 deer, of which 24,624 (77.1%) have been taken by licensed gun hunters, 5,534 (17.3%) by unlicensed gun hunters, and 1,792 (5.6%) by archers.

The kill by unlicensed gun hunters represents 22.5% of the kill by licensed gunners.

Hunting success for gun and bow hunters is shown in Table 4. In general, the percentage of successful hunters reflects length of season; and, in some instances, weather conditions during the various seasons. It appears that under past regulations, with a 3-day season, 45-50% of the gun hunters can be expected to bag a deer.

Table 4. Per cent of licensed hunters who bagged a deer, 1964-62

Year	Hunter success	
	Gun	Bow
1954	63.7	10.9
1955	43.6	14.0
1956	39.2	9.1
1957	36.8	11.4
1958	38.4	12.4
1959	33.1	16.2
1960	45.9	16.0
1961	51.6	17.1
1962	43.5	16.9

*Sex and Age Ratios.* Males outnumber females in the bag through age 3½ (Table 5). Thereafter, females are most numerous. Sex ratios for fawns and for all adults (1½ or older) are nearly identical.

Table 5. Deer sex ratios, 1954-62

Age	Males		Females	
	Number	Per cent	Number	Per cent
Fawn	927	53.6	801	46.4
1½	585	55.3	472	44.7
2½	371	49.3	381	50.7
3½	218	59.2	150	40.8
4½	75	48.7	79	51.3
5½ plus	41	47.7	45	52.3
All adults	1,290	53.4	1,127	46.6

Age ratios for both sexes are shown in Table 6. The 41.7% fawns is higher than the 27.4% reported by Sanderson and Speaker (op. cit.). It indicates productivity is very high. On the other hand, mortality is also high, as only 5.8% of all deer checked were aged 4½ or older.

Table 6. Deer age ratios, 1954-62.

Age	Number		Per cent total		
	Males	Females	Males	Females	Both sexes
Fawns	927	801	41.8	41.5	41.7
1½	585	472	26.4	24.5	25.5
2½	371	381	16.7	19.8	18.1
3½	218	150	9.8	7.8	8.9
4½	75	79	3.4	4.1	3.7
5½ plus	41	45	1.8	2.3	2.1
Totals	2,217	1,928	Total deer		4,145

A contingency table of deer by age classes for 4 areas shows significant differences from expected age classes does exist in



age ratios from the 4 areas (Chi-square = 46.93, .001 = 37.697, 15 d. f.). Most of the variation from expected values occurs in Area I. This is difficult to explain unless bias is introduced because of the possibility that hunters tend to transport large deer to check stations for ageing and weighing. Proportionately more deer were examined at check stations in Area I than in Areas II, III, and IV. However, this cannot be the total answer as more fawns were checked from Area I than from other areas.

*Weights.* Calculated live weights (hog-dressed weight x 1.272) for five age classes by sex are shown in Table 7. Males are consistently heavier than females. Males appear to reach maximum weight after 3½ years, probably 4½ to 5½; females reach maximum weight near age 3½ years.

Table 7. Calculated average live weights of deer, 1954-62

Age Class	Male		Female	
	Number	Weight in pounds	Number	Weight in pounds
Fawns	355	100.4	288	90.9
1½	209	163.5	155	137.3
2½	138	194.8	127	150.1
3½	104	211.4	60	155.5
4½ plus	71	227.0	57	151.9

To compare weights as indication of condition for four areas, data from fawn males only was used. This group offered a larger sample than any other age and sex class. Mean hog-dressed weights were: Area I, 76.2; Area II, 82.9; Area III, 81.2; and

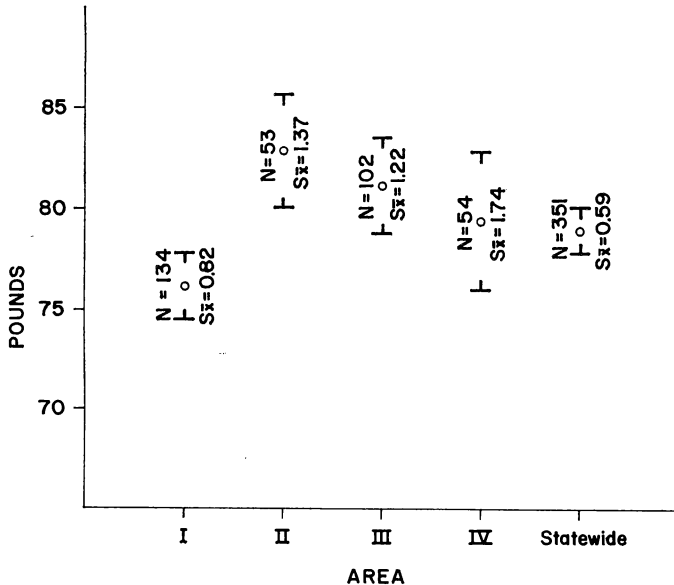


Fig. 4. Mean hog-dressed weights of male fawns: Comparison of areas by plotting means and 2 Sx, 1954-62.

Area IV, 79.5 pounds. The differences between Area I as compared to Areas II and III were significant (Fig. 4). Judging from these weights deer from northern and western Iowa are in better condition than deer from the more heavily wooded areas of Eastern and Southern Iowa.

Mean weight of male fawns from each year (1954-62) are greater than the mean for 1953 (Fig. 5). These means, plotted to 2 standard errors show differences between 1953 and all other years, except 1955, are significant. Only 15 male fawns were weighed in 1955, a small sample; hence, the large standard error.

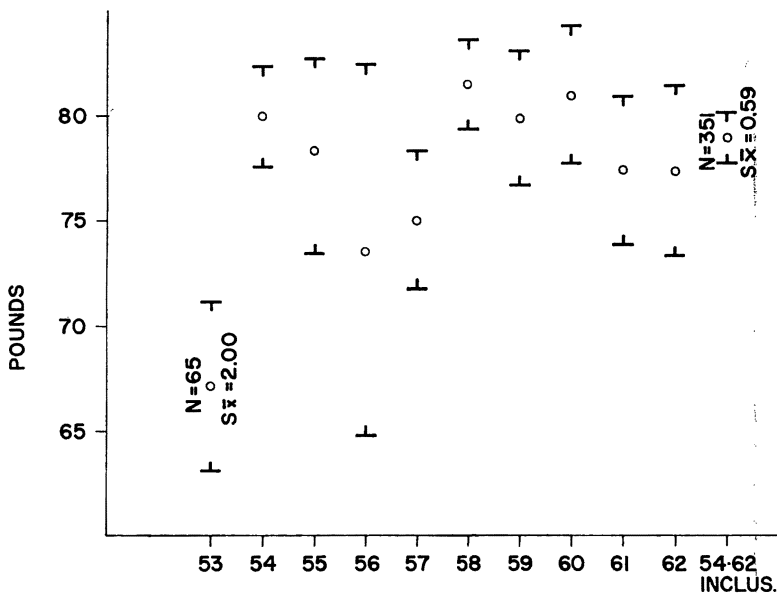


Fig. 5. Mean hog-dressed weights of male fawns; Comparison of years by plotting means and 2  $S_x$ , 1953-62.

*Antler Measurements.* Mean beam diameters and number of points per antler increase with age through  $4\frac{1}{2}$  years (Table 8). Comparison of mean beam diameters of  $1\frac{1}{2}$ -year old bucks (Fig. 6) from four areas shows bucks from Area I have smaller antlers (0.86 inches) than bucks from Areas II (0.91), III (0.94), and IV (0.90). These data confirm the belief that deer from Area I are smaller than those from other areas. These differences were significant only between means from Areas I and III, and between the means for Area I and the entire state.

Comparison of mean beam diameters of bucks aged  $1\frac{1}{2}$  years for 10 years, 1953-62, indicated smaller antlers occurred in 1953 than for most other years. The mean for 1953 was 0.86 inches; for 1954-62 combined, 0.91 inches. These data confirm the be-

Table 8. Antler beam diameters (inches) and number of points per antler: Left antlers only for four age groups, 1954-62

Age class	Average beam diameter	Average number points
1½	0.91 (410) <sup>1</sup>	3.2 (460)
2½	1.23 (266)	4.1 (291)
3½	1.40 (174)	4.6 (193)
4½	1.53 (50)	5.1 (60)

<sup>1</sup> Figures in parentheses represent numbers in sample.

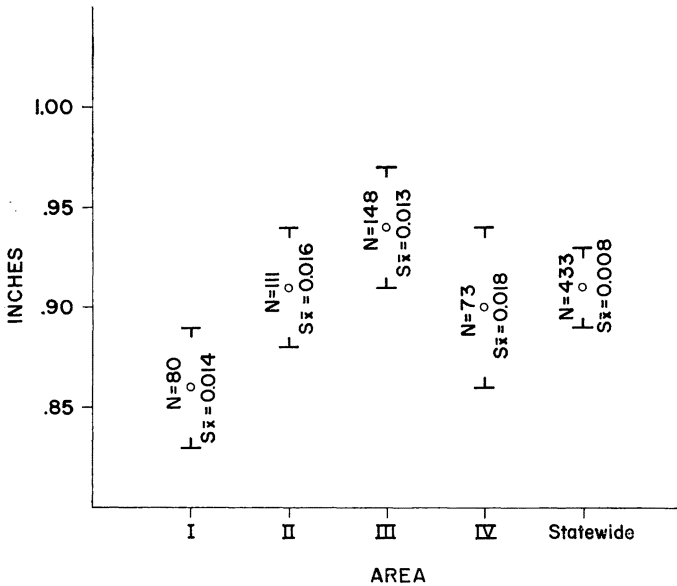


Fig. 6. Mean antler beam diameters of 1½ year bucks: Comparison of areas by plotting means and 2 Sx, 1954-62.

lief that deer taken after 1953 were larger and in better condition. However, the differences, using antler measurements, were not significant.

### DISCUSSION

Consecutive annual deer seasons have been held in Iowa starting in 1953. During nine seasons, 1954-62, 31,950 deer have been legally harvested. The statewide population, meanwhile, increased 34.2%. One of the advantageous results of annual hunting was a tendency for dispersal of large concentrations, and consequently, less conflict with agricultural interests. Few complaints of deer damage have been submitted to the State Conservation Commission in recent years. Many were received prior to the 1953 season (Sanderson and Speaker, op. cit.). Deer, although more numerous than in 1953, are better distributed through the state.

On the basis of the data, populations in Area I probably are near maximum consistent with habitat and hunting pressure.

Populations in Area II probably have been controlled by hunting. The sparse forest areas available and "easy" terrain as compared to other Areas make these populations most vulnerable to hunting. If deer hunting in Area II was curtailed for a few years these populations probably would increase tremendously. At the same time increase in Area II might be in conflict with agricultural interests.

The Southern Loess (Area IV) has the greatest potential for increased populations. That Area has considerable forest cover in comparison to Areas II and III. Deer have increased considerably in recent years in area IV despite annual hunting. Based on forest habitat available, I believe they should continue to increase until a level near that of Area I is reached, even if hunting is continued.

Dispersion of large herd concentrations following the 1953 season is reflected by heavier deer with greater antler development. This is an expected occurrence as in any given locality of former concentration there is less competition for food.

It has already been noted that deer from Areas II and III are bigger and have larger antlers than deer from Areas I and IV. Possibly, this reflects better habitat, including soils. Also, it is possible that deer from Northern and Western Iowa represent an inherently larger sub-species than deer from Eastern and Southern Iowa. This is possible as the original sources of deer stocked in Iowa since 1900 has varied in different parts of the state. (Sanderson and Speaker, op. cit.).

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