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Deer in Iowa - 1984

Annual Progress Report
Wildlife Research and Surveys Project
Federal Aid Project No. W-115-R

Study No. 13
Job No. 1: Deer Harvest Survey

Study No. 15
Job No. 1: Winter Population Estimate
Job No. 2: Miscellaneous Mortality Survey
Job No. 3: Winter Aerial Survey
Job No. 4: Sex and Age Ratio Survey

by

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ABSTRACT

A new record high harvest of 39,355 deer was set in 1984. An estimated 33,449 deer were taken by shotgun hunters, 5,599 by archers and 307 during a special muzzleloader season. Excellent weather during the season along with increased license issue, higher any-sex license quotas and an excellent fall deer population were responsible for the new record. A total of 96,474 shotgun, 21,648 bow and arrow and 1,644 special muzzleloader licenses were issued. Success rates were high with 65% of the paid shotgun any-sex hunters harvesting a deer compared to 47% of the free landowner-tenant shotgun hunters. Bucks-only hunters recorded averages of 31% for paid and 25% for landowner-tenants. Archers reported a success rate of 27% with the special muzzleloader hunters the lowest at 22%. The season provided over 600,000 days of hunting recreation for the Iowa sportsman. Mean expectation of life for does was calculated from a sample of teeth submitted by successful hunters and was generally comparable to previous years. A sample of any-sex hunters reported that 46% of their harvest was composed of adult does, 17% adult bucks and 37% fawns. Population trends during 1984 indicated increases in most regions of the state. There were 6,177 deer reported killed in deer-vehicle accidents for a 12% increase from 1983. Winter population estimates were also up by 12% and aerial surveys were up by 45% on comparable survey areas.

ACKNOWLEDGEMENTS

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HUNTING SEASON REGULATIONS

Shotgun

Two separate shotgun seasons were held in 1984 with the first being held from 1-4 December and the second from 8-14 December. Hunters were required to select only 1 of the 2 seasons with an option to apply for an any-sex license in 1 of 10 different hunting zones (Fig. 1) or select a statewide buck-only license. A quota on any-sex licenses was set for each hunting zone with twice as many any-sex licenses issued for the second season in 7 of the 10 zones. This was necessary to entice hunters into applying for the second season. In the other 3 hunting zones, the entire any-sex quota was issued for the second season to help equalize hunter numbers, harvest and success rates between the 2 seasons. Any-sex licenses were issued by randomized computer drawing with preference given to valid applications containing certificates issued to buck-only license recipients in 1983. About 44% of hunters receiving certificates in 1983 returned them with their 1984 applications. If the any-sex quota for any zone and season combination could not be filled from applications with certificates, it was filled by a random drawing from noncertificate holders. All unsuccessful applicants in the any-sex license drawing received a statewide buck-only license. Buck-only license recipients were also issued a certificate giving them preference in the 1985 drawing for any-sex licenses. Landowner-tenants were issued free shotgun licenses at the same buck-only to any-sex ratio as determined by the application rates of paid shotgun hunters in each zone and season combination.

A "party hunting" rule was initiated in 1984 stating that the bag limit was one deer for each hunter in the party who had a valid deer transportation tag. This allowed any party member to shoot a deer as long as it was legally tagged within 15 minutes after it was killed or before the carcass was moved in any manner. The possession limit remained at 1 deer per season. All other shotgun regulations remained the same as in previous years.

Bow and Arrow

The 56-day archery season was held from 6 October to 30 November. Licenses were available from county recorders and from the Iowa Conservation Commission license section. All other bow and arrow regulations remained the same as in previous years.

Muzzleloader

A special muzzleloader-only season was initiated in 1984. Dates for this special season were 15-21 December. A quota of 1500 any-sex licenses was distributed by random drawing with the remaining hunters being issued a buck-only license.

HUNTING SEASON RESULTS

Hunter Report Card Survey

A post-season hunter report card was sent to 27% of the licensed hunters (22% of the paid shotgun hunters and 56% of the landowner-tenants) to obtain information on harvest, success rate, sex ratio, hunting effort, crippling rate, and area hunted. A reminder questionnaire was sent to hunters not responding to the first mailing within 1 month. About 77% of the shotgun hunters responded to the survey. Harvest results of nonrespondents were estimated by assigning them the same success rate as those returning the reminder mailing. Success rates were calculated on the basis of active hunters only. Post-season report cards were also sent to 1,977 archers of which 68% returned complete information.

License Issue

There were 79,697 paid shotgun licenses issued in 1984 (Table 1), an increase of 5% from 1983. This is a new record high paid shotgun license issue and demonstrates the increasing interest in the sport of deer hunting in Iowa. In addition, 16,777 free landowner-tenant shotgun licenses were issued, an 11% increase from the previous year. A total of 96,474 shotgun licenses were issued, representing a 6% increase from 1983. Increased license issue is probably a result of favorable publicity about the increasing deer population.

Approximately 58% of all shotgun licenses were issued for the first hunting season. This is the same percentage as in 1983 which demonstrates hunter interest in being the first one in the field. This first season percentage would have been even higher without the buck-only first season requirement in hunting zones 1, 2 and 10. Many hunters responded to the buck-only first season by applying for the second season because some any-sex licenses were available.

The highest buck-only to any-sex license ratio occurred in hunting zones 7 (13/1), 8 (8/1) and 5 (6/1) during the first season. The lowest ratio occurred during the second season when many zones reported a 1/1 ratio because of higher any-sex license quotas and lower hunter application rates (Table 2).

There were 21,648 bow and arrow licenses issued in 1984, an increase of 9% from the previous year (Table 3). This is another record high archery license issue and continues the upward trend in demand for this sport. In addition, there were 1,644 special muzzleloader-only deer licenses issued making a grand total of 119,766 deer hunters in Iowa.

Harvest

Another record high harvest was set in 1984 with a total estimated harvest of 39,355 deer. This is an increase of 11% from the 1983 harvest of 35,619 deer. Higher any-sex license quotas, increased license issue, an excellent fall deer population and good weather during the shotgun seasons were responsible for the increase. An estimated 33,449 (+802) deer were harvested by shotgun hunters with 18,688(+697) taken the first season and 14,761 (+398) taken the second. Harvest allocation between seasons was excellent with 58% of the hunters hunting first season and taking 56% of the total harvest. Twice as many any-sex licenses in the second season helped overcome the lower success rates in that season. Shotgun harvest and success rates varied by zone and season (Table 4).

Archers harvested an additional 5,599(+614) deer which was a new record high harvest. Increased hunter numbers and excellent deer numbers were responsible for this new record. Muzzleloader hunters harvested 307(+21) deer during their special season.

Distribution of the harvest by day of the season was estimated from deer tooth envelopes returned by successful hunters. About 66% of the first season harvest and 56% of the second occurred on weekends. Excellent weather during most of the 1984 shotgun season produced good hunter pressure and deer harvest on weekdays as well (Table 5).

Hunter Success

Success rates were slightly lower than the record setting success rates of 1983. Shotgun hunters had a higher success rate during the first season than in the second (Table 6). Shotgun success rates were generally higher than any previous year except 1983. Excellent weather and high deer densities were responsible for these high rates.

Paid shotgun any-sex hunters averaged 65% success compared to 47% for landowner-tenants (Table 1). Buck-only hunters recorded lower success rates as expected, with averages of 31% for paid and 25% for landowner-tenants. Overall, active shotgun hunters averaged 39% success during the season. The highest shotgun success rates were reported in southern Iowa (hunting zones 4 and 6) which is a switch from the traditionally high success zones in the northern part of the state (Table 4). Archery success rates were 27%, a slight reduction from the previous year. Muzzleloader hunters had the lowest success rate with 22% for active hunters.

Another measure of hunter success is the number of hours of hunting required to harvest a deer. Paid buck-only shotgun hunters averaged 73 hours of hunting to bag a deer compared to 64 in 1983 and 102 in 1982. Paid any-sex shotgun hunters averaged 35 hours of hunting deer compared to 30 hours in 1983 and 37 hours in 1982. These figures are again better than any previous year with the exception of 1983.

Archers required 216 hours of hunting to bag a deer which is essentially the same as in 1982 and 1983. Early corn harvest during the past 3 years is probably responsible since this concentrates deer into timbered habitat where they are more vulnerable.

Muzzleloader hunters required an average of 117 hours of hunting to harvest a deer. Most muzzleloader hunters had an any-sex license but apparently had some trouble harvesting a deer because of their primitive weapon or the late season.

Sex Ratio of the Harvest

An estimated 9,219 does were harvested by shotgun hunters compared to 8,078 in 1983. This 14% increase in doe harvest was primarily due to an increase in any-sex license quotas. An additional 1,735 does were harvested by archers and 167 by muzzleloaders for a total of 11,121 (Table 7). Does accounted for 28% of the shotgun, 31% of the archery and 55% of the muzzleloader harvest.

Hunter Effort

The percentage of shotgun hunters that did not hunt in 1984 was lower than the previous 3 seasons (Table 8). This is probably due to the mild weather during the shotgun season. Did not hunt rates, as usual, were higher during the second season compared to the first. Free landowner-tenant hunters continued their high rate of not hunting especially those with second season buck-only licenses.

Those hunters that entered the field hunted longer than they did in the previous 4 years (Table 9). This again was due to the mild weather during the shotgun season. The higher number of days and hours hunted during the second season indicates that hunters take advantage of the longer season. The deer season provided over 600,000 days of hunting recreation with shotgun hunters in the field for 283,000 days, archers 336,000 and muzzleloaders 9,000 days. Hunters obtained over 3 million hours of recreation from the season.

Crippling Rate

In 1984, about 10% of the shotgun hunters reported crippling a deer. Crippling rates were about the same during both shotgun seasons. Paid shotgun hunters reported a higher crippling rate (11%) than landowner-tenants (7%). About 15% of the archers and 8% of the muzzleloaders reported they crippled a deer during the season. Crippled deer may recover from their wounds or are harvested by other hunters and therefore, only a portion of them can be considered a loss in addition to the tagged harvest.

Years of Hunting Experience

Shotgun hunters were asked how many years they had hunted deer in Iowa. About 51% of the respondents had hunted deer for only 1 to 5 years and 25% for 6-10 years. Only about 6% of the hunters had gone to the fields for more than 20 years. Success rates, as expected, were dependent on years of hunting experience. Hunters with only 1-5 years of experience had the lowest success rates. Success rates increased until after 15 years when they stabilized. Hunters with the highest success rates were in the 16-20 year category.

SEX AND AGE COMPOSITION

Age Composition

About 24,000 any-sex shotgun hunters were sent deer tooth envelopes along with their license. A total of 3,626 teeth were returned for aging by the tooth sectioning technique (Low and Cowan 1963). The reported harvest of these any-sex hunters consisted of 37% fawns.

Mean expectation of life (MEL) was calculated only for females to reduce the cost of the survey. MEL for does was generally comparable to previous years (Table 10).

MEL for does varied by hunting zone (Table 11). MEL was highest for hunting zones 1, 7, 9 and 4 and lowest in 3, 2 and 10.

The age of the oldest doe submitted in the tooth sample was 15 1/2 years. About 10% of the does sampled were 5 1/2 years old or older.

Sex Ratio

Does comprised 50% of the fawn harvest and 65% of the total harvest reported by any-sex hunters returning tooth envelopes. This sample of hunters also reported that 17% of their harvest was adult bucks while 46% was adult does. Sex ratio of the any-sex harvest may be biased because of hunter selectivity or differential vulnerability, but changes in annual sex ratio trends may be indicated by this survey.

MISCELLANEOUS MORTALITY

There were 6,667 deer reported lost to various mortality factors other than legal harvest in 1984. Traffic accidents were the major cause of mortality with 6,177 deer lost compared to 5,335 in 1983. Other mortality included 198 known illegal losses, 29 to dog predation and 263 to such accidents as mowing, entanglement in fences, trains, etc.

The number of deer killed in traffic accidents appears to be a good population trend indicator when related to number of vehicle miles traveled on Iowa's highways. An estimated 12.4 billion vehicle miles were driven on Iowa's rural roads and highways in 1984 (Iowa Department of Transportation). A new record high 500 deer killed/billion miles traveled was reported, an increase of 12% from 1983 (Table 12).

Sex ratio trends in the traffic kill may be an indicator of sex ratio trends in the population if vulnerability and behavior are considered constant between years. In 1984, 58% of the traffic kill was does compared to 57% in 1983 (Table 12).

Deer killed/billion vehicle miles traveled can be calculated to provide regional population trends for deer survey units which correspond closely to hunting zones (Gladfelter 1977). Trends have fluctuated, but are generally upward in most survey units during 1977-84 (Table 13). The largest increases compared to 1983 (22-29%) were in northcentral (unit 2), southcentral (unit 4) and eastcentral (unit 7) Iowa. Decreases of 1 to 25% were recorded in northern (unit 10), western (unit 3) and northeastern (unit 9) Iowa. The remaining survey units recorded increases of 3-14%.

The major peak in traffic mortality occurred from October through December (Fig. 2). This high mortality period corresponds to the peak in rutting activity. November is the only month that the number of bucks killed by vehicles exceeded number of does (Fig. 2). The lowest deer kill occurred in July and August when does were caring for their young and bucks were relatively inactive.

WINTER POPULATION ESTIMATE

Conservation officers annually estimate the number of wintering deer in their assigned territories. The 1984-85 winter population estimate was 64,500 deer, a 12% increase from the previous year. The open winter complicated this survey procedure because deer were scattered rather than concentrated in traditional wintering areas. Winter estimates increased in 67 counties, decreased in 28 counties and remained unchanged in 4 compared to the 1983-84 estimates. The largest increases were reported in eastcentral (survey unit 8) and southeastern (survey unit 6) Iowa (Table 14). Small decreases were reported in northcentral (survey unit 2) and western (survey unit 3) Iowa.

AERIAL SURVEY

Aerial surveys (Gladfelter 1983) were completed in 72 counties during the 1984-85 winter. A total of 5,982 deer were counted compared to 3,853 in 1983-84. When comparisons are made between areas surveyed during both years, a 45% increase was recorded for 1984-85. Most regions of the state indicated population increases except portions of central and northeastern Iowa. Comparable surveys were not available for northwestern, western and southeastern Iowa because of lack of proper survey conditions during one of the last two years.

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TABLES AND FIGURES

Table 1. Comparison of statewide results of shotgun deer seasons in Iowa, 1953-84.

Year	Season length in days	Licenses issued		No. deer harvested		Total shotgun harvest	% success			
		Paid Shotgun	Landowner Shotgun ¹	Paid Shotgun	Landowner Shotgun		Paid Shotgun		Landowner Shotgun ¹	
							Any-sex	Bucks-only	Any-sex	Bucks-only
1953	5	3,772	-----	2,401	1,606	4,007	61	---	---	---
1954	3	3,778	-----	1,827	586	2,413	64	---	---	---
1955	3	5,586	-----	2,438	568	3,006	44	---	---	---
1956	2	5,440	-----	2,000	561	2,561	39	---	---	---
1957	2	5,997	-----	2,187	480	2,667	37	---	---	---
1958	2	6,000	-----	2,141	588	2,729	38	---	---	---
1959	2	5,999	-----	1,935	541	2,476	33	---	---	---
1960	3	7,000	-----	3,188	804	3,992	46	---	---	---
1961	3	8,000	-----	4,033	964	4,997	52	---	---	---
1962	3	10,001	-----	4,281	1,018	5,229	44	---	---	---
1963	2,3	12,001	-----	5,595	1,018	6,613	48	---	---	---
1964	2,4	15,993	-----	7,274	1,750	9,024	47	---	---	---
1965	2,4	17,491	-----	6,588	1,322	7,910	39	---	---	---
1966	2,4	20,811	-----	9,070	1,672	10,742	45	---	---	---
1967	2,3	20,812	21,121	7,628	2,764	10,392	39	---	19	---
1968	2,3	20,485	24,796	9,052	3,890	12,941	48	---	21	---
1969	2,3	18,000	23,476	6,952	2,779	10,731	41	---	21	---
1970	2,3	18,000	21,697	8,398	4,345	12,743	49	---	26	---
1971	2	18,000	10,522	7,779	2,680	10,459	45	---	31	---
1972	2,4	19,000	11,205	7,741	2,738	10,485	44 ²	30	34 ²	20
1973	5	27,530	9,686	10,017	2,191	12,208	58	31	40	25
1974	5	33,772	16,329	11,720	4,097	15,817	64	29	48	27
1975	4,7	56,003	17,821	15,300	3,650	18,950	60	23	43	22
1976	4,7	60,197	17,818	11,725	2,525	14,250	48	17	37	17
1977	4,7	58,715	16,289	10,737	2,051	12,788	47	16	34	16
1978	4,7	51,934	15,699	12,815	2,353	15,168	55	21	39	20
1979	4,7	55,718	10,504	14,178	1,971	16,149	56	21	45	24
1980	4,7	64,462	12,858	16,511	2,346	18,857	56	21	42	22
1981	4,7	69,529	14,068	19,224	2,354	21,578	55	24	40	21
1982	4,7	74,331	15,431	19,269	2,472	21,741	59	20	41	21
1983	4,7	75,918	15,067	27,078	3,297	30,375	66	31	50	29
1984	4,7	79,697	16,777	29,912	3,537	33,449	65	31	47	25

¹ These data have been collected since 1967 when landowner-tenants were first required to obtain a permit.

² Percent success was calculated, for comparison purposes, for any-sex hunting zones 1, 2, and 4 only.

Table 2. License issue by type of hunter, zone, season and ratio of bucks-only to any-sex licenses sold in 1984.

Season 1					
Hunting zone	Paid shotgun			Landowner-tenant	
	Bucks-only	Any-sex	B.O./A.S. ratio	Bucks-only	Any-sex
1	2709	none	-	496	none
2	1262	none	-	263	none
3	2446	525	5/1	324	69
4	5149	1200	4/1	1017	237
5	5266	850	6/1	1318	213
6	3571	1300	3/1	779	284
7	6908	525	13/1	1406	107
8	3213	400	8/1	608	76
9	6044	1000	6/1	1159	192
10	1996	none	-	425	none
No zone	2508	-	-	-	-
Total	41,072	5,800		7,795	1,178

Season 2					
Hunting zone	Paid shotgun			Landowner-tenant	
	Bucks-only	Any-sex	B.O./A.S. ratio	Bucks-only	Any-sex
1	1756	1000	2/1	329	187
2	1290	825	2/1	227	145
3	763	1050	1/1	147	201
4	1821	2400	1/1	498	656
5	2401	1700	1/1	787	556
6	912	2600	1/1	226	644
7	4347	1050	4/1	1084	261
8	1536	800	2/1	410	213
9	1285	2000	1/1	312	486
10	1261	750	2/1	273	162
No zone	1278	-	-	-	-
Total	18,650	14,175		4,293	3,511

Table 3. Comparison of statewide results of archery deer seasons in Iowa, 1953-84.

Year	Season length in days	Licenses issued	No. of deer harvested	% success
1953	5	10	1	10
1954	12	92	10	11
1955	21	414	58	14
1956	31	1,284	117	10
1957	31	1,227	138	11
1958	30	1,380	162	12
1959	31	1,627	255	16
1960	44	1,772	277	16
1961	48	2,190	367	17
1962	51	2,404	404	17
1963	51	2,858	538	19
1964	51	3,687	670	19
1965	51	4,342	710	17
1966	51	4,576	579	13
1967	62	4,413	791	19
1968	62	5,136	830	17
1969	62	5,465	851	16
1970	62	5,930	1,037	18
1971	51	6,789	1,232	19
1972	51	6,916	1,328	20
1973	53	10,506	1,822	18
1974	51	12,040	2,173	19 ¹
1975	52	12,296	2,219	19 ¹
1976	56	12,522	2,350	20
1977	56	12,994	2,400	20
1978	56	12,809	2,957	25
1979	56	13,378	3,305	26
1980	56	15,398	3,803	26 ²
1981	56	17,258	4,368	26
1982	56	18,824	4,720	26
1983	56	19,945	5,244	28
1984	56	21,648	5,599	27

¹ Average % success from 1970-73 was used to estimate success in 1974 and 1975.

² % success from 1979 was used for 1980 success rate.

Table 4. Harvest and success rates for active shotgun hunters by hunting zone, season and license type, 1984.

Hunting zone	Season 1		Season 2		Total harvest
	Bucks-only harvest (% success)	Any-sex harvest (% success)	Bucks-only harvest (% success)	Any-sex harvest (% success)	
1	1391(39)	none	450(22)	761(68)	2602
2	780(39)	none	357(23)	576(63)	1713
3	809(29)	350(63)	251(24)	613(55)	2023
4	2083(37)	941(69)	791(36)	1617(58)	5432
5	1887(32)	612(61)	653(23)	1050(52)	4202
6	1664(37)	1007(67)	482(34)	1822(61)	4975
7	1948(24)	401(67)	979(22)	708(57)	4036
8	820(22)	275(61)	303(16)	527(55)	1925
9	1947(31)	894(77)	447(29)	1480(66)	4768
10	879(35)	none	327(25)	567(67)	1773
Total	14,208(32)	4,480(67)	5,040(26)	9,721(60)	33,449

Table 5. Percentage distribution of the 1984 shotgun deer harvest by day of season.

Day	Season 1 harvest	Cumulative %	Season 2 harvest	Cumulative %
Saturday	38	38	31	31
Sunday	28	66	25	56
Monday	18	84	10	66
Tuesday	16	100	9	75
Wednesday			7	82
Thursday			7	89
Friday			11	100

Table 6. Success rates for active shotgun hunters, 1980-84.

Type of hunter	Bucks-only					Any-sex				
	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984
<u>Season 1</u>										
Paid shotgun	23	26	20	34	33	59	63	59	72	70
Landowner-tenant	24	23	22	31	28	46	49	46	56	56
<u>Season 2</u>										
Paid shotgun	18	19	21	25	27	54	51	58	64	63
Landowner-tenant	18	18	18	26	18	41	37	39	48	43

Table 7. Comparison of antlered, antlerless, and doe harvest for 1953-84.

Year	Total harvest	Antlered harvest	Antlerless harvest ¹	Doe harvest
1953	4,008	1,580	2,428	1,858
1954	2,423	781	1,642	1,009
1955	3,064	1,046	2,018	1,460
1956	2,678	964	1,714	1,234
1957	2,805	884	1,921	1,316
1958	2,891	828	2,063	1,360
1959	2,731	959	1,772	1,176
1960	4,269	1,348	2,921	1,881
1961	5,364	1,599	3,765	2,512
1962	5,703	1,709	3,994	2,814
1963	7,151	2,117	5,034	3,366
1964	9,694	2,486	7,208	4,846
1965	8,620	2,668	5,952	3,886
1966	11,321	3,101	8,220	5,392
1967	11,183	3,110	8,073	5,361
1968	13,771	3,583	10,188	6,808
1969	11,582	3,034	8,548	5,456
1970	13,780	3,612	10,168	6,951
1971	11,691	3,091	8,600	5,735
1972	11,813	3,697	8,116	5,294
1973	14,030	6,796	7,234	4,875
1974	17,990	9,071	8,919	6,607
1975	21,169	13,141	8,028	6,037
1976	16,600	10,255	6,345	4,779
1977	15,188	10,157	5,031	3,553
1978	18,125	11,567	6,558	4,565
1979	19,454	12,378	7,026	4,986
1980	22,660	14,657	8,003	5,723
1981	25,946	16,927	9,019	6,544
1982	26,461	15,943	10,518	7,849
1983	35,619	22,753	12,866	9,719
1984	39,355	24,487	14,868	11,121

¹ Antlerless harvest includes male fawns.

Table 8. Percent of shotgun hunters that did not hunt, 1980-84.

Type of hunter	Bucks-only					Any-sex				
	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984
<u>Season 1</u>										
Paid shotgun	5	8	10	10	6	4	3	4	4	3
Landowner-tenant	28	36	42	39	34	19	15	18	18	14
<u>Season 2</u>										
Paid shotgun	7	10	10	14	8	4	5	5	5	4
Landowner-tenant	35	44	48	48	47	25	28	30	31	26

Table 9. Shotgun hunter effort, 1980-84.

Type of hunter	Hours/hunter					Days/hunter				
	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984
<u>Season 1</u>										
Paid shotgun	19	20	19	19	21	2.8	2.9	2.9	2.8	3.0
Landowner-tenant	11	12	11	11	12	2.3	2.4	2.3	2.3	2.4
<u>Season 2</u>										
Paid shotgun	23	24	24	22	25	3.6	3.7	3.8	3.5	3.9
Landowner-tenant	13	13	12	11	13	2.7	2.8	2.8	2.6	2.7

Table 10. Statewide mean expectation of life for does (in years), 1978-84.

Age class	Year						
	1978	1979	1980	1981	1982	1983	1984
Fawn	2.02	2.11	2.12	2.12	2.15	2.11	2.13
1 1/2	1.81	1.85	1.83	1.89	1.85	1.87	1.78
2 1/2	1.72	1.75	1.72	1.80	1.67	1.81	1.78
3 1/2	1.43	1.54	1.52	1.52	1.56	1.53	1.52
4 1/2	1.10	1.18	1.13	1.15	1.12	1.17	1.13
5 1/2+	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Table 11. Mean expectation of life for does (in years), by hunting zone in 1984.

Hunting zone	Sample size	MEL					
		Fawn	1 1/2	2 1/2	3 1/2	4 1/2	5 1/2
1	141	2.44	1.92	1.87	1.66	1.06	0.50
2	105	1.98	1.49	1.42	1.26	1.10	0.50
3	116	1.93	1.55	1.43	1.08	1.00	0.50
4	370	2.11	1.86	1.88	1.66	1.15	0.50
5	226	1.89	1.66	1.69	1.50	1.09	0.50
6	362	2.02	1.33	1.81	1.58	1.20	0.50
7	232	2.30	1.86	1.77	1.64	1.17	0.50
8	170	1.98	1.67	1.84	1.45	1.15	0.50
9	505	2.28	1.88	1.87	1.53	1.15	0.50
10	127	2.19	1.64	1.52	1.13	0.97	0.50

Table 12. Deer killed per billion vehicle miles traveled and percent does in the traffic kill, 1972-84.

Year	Deer killed per billion miles driven	% change from previous year	% does in traffic kill
1972	233	--	48
1973	248	+ 6.7	50
1974	250	+ 0.5	50
1975	227	- 9.1	54
1976	225	- 0.8	54
1977	252	+11.9	56
1978	241	- 4.1	47
1979	259	+ 7.5	50
1980	335	+29.2	53
1981	365	+ 9.1	54
1982	412	+12.9	52
1983	448	+ 8.7	57
1984	500	+11.6	58

Table 13. Number of deer killed per billion vehicle miles traveled, 1977-84.

Deer survey unit	Deer killed/billion miles traveled								% change 1983 to 1984
	1977	1978	1979	1980	1981	1982	1983	1984	
1	223	258	214	414	504	456	496	567	+14
2	172	178	184	250	308	330	356	436	+22
3	236	220	224	236	225	357	341	330	- 3
4	209	172	201	218	316	403	343	442	+29
5	294	248	293	363	398	381	370	414	+12
6	606	607	600	736	658	722	827	939	+14
7	211	182	242	279	304	333	380	484	+27
8	263	259	283	378	370	435	506	523	+ 3
9	520	682	556	737	623	1005	1305	985	-25
10	252	243	249	409	435	404	501	494	- 1

Table 14. Results of the winter population estimates by deer survey unit, 1978-79 to 1984-85.

Deer survey unit	Winter population estimate							% change 1983-84 to 1984-85
	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	
1	2229	2409	2820	3378	4049	5286	5775	+ 9
2	1276	1317	1783	2277	3204	4553	4181	- 8
3	3831	3646	3917	4413	4857	6397	5923	- 7
4	3958	4292	4615	7180	7372	9570	10,085	+ 5
5	4070	4873	4980	5365	6165	7514	8856	+18
6	3275	3583	3622	3583	3741	4157	5316	+28
7	2884	3111	3296	3874	4278	5161	5896	+14
8	2301	2341	2595	2990	3453	4119	6085	+48
9	2883	3555	3455	3780	4750	6185	7150	+16
10	1542	1471	2057	3417	3888	4554	5395	+18
Total	28,249	30,598	33,140	40,257	45,757	57,496	64,662	
% Annual change	+5	+8	+8	+21	+14	+26	+12	

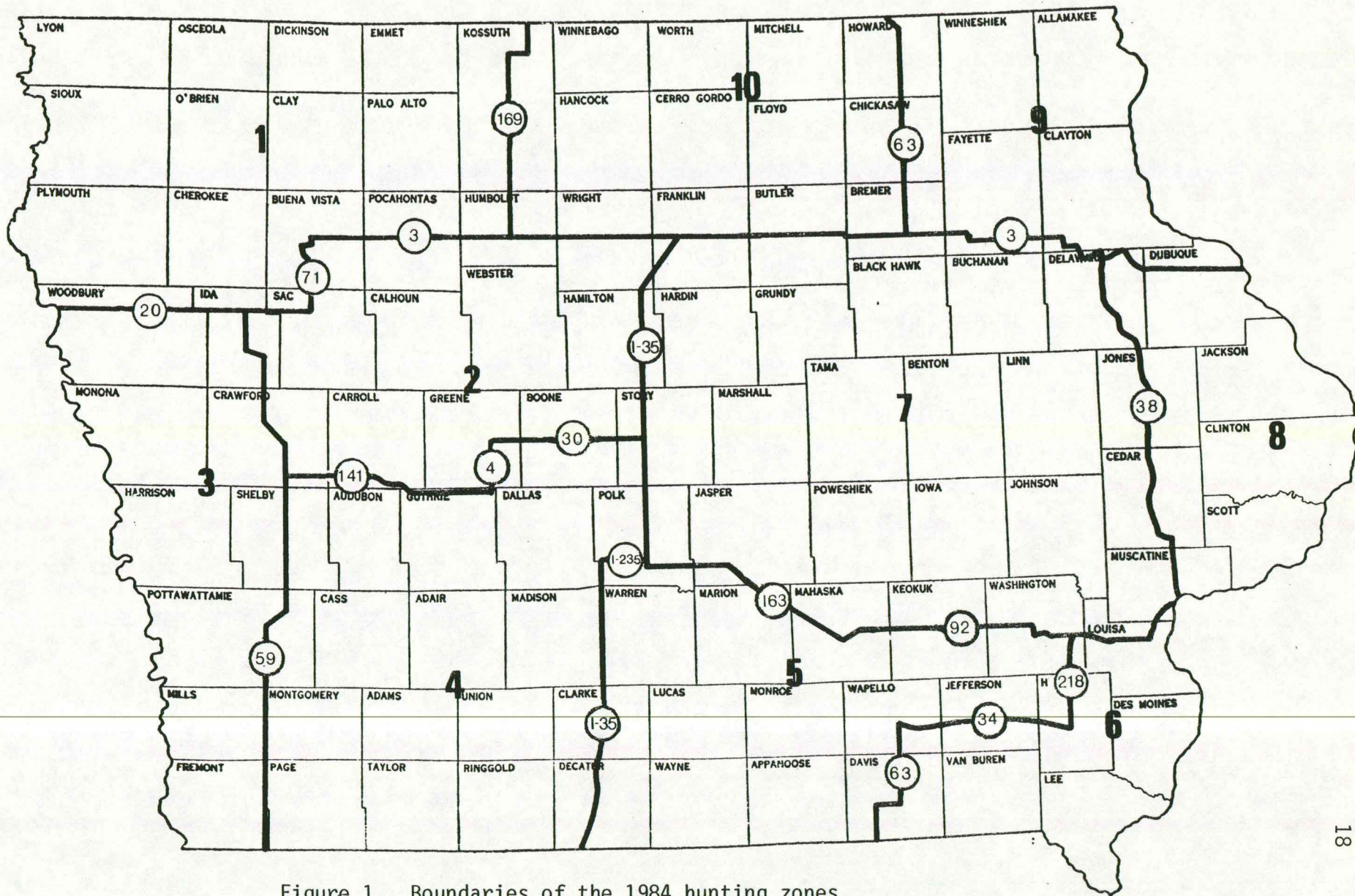


Figure 1. Boundaries of the 1984 hunting zones.

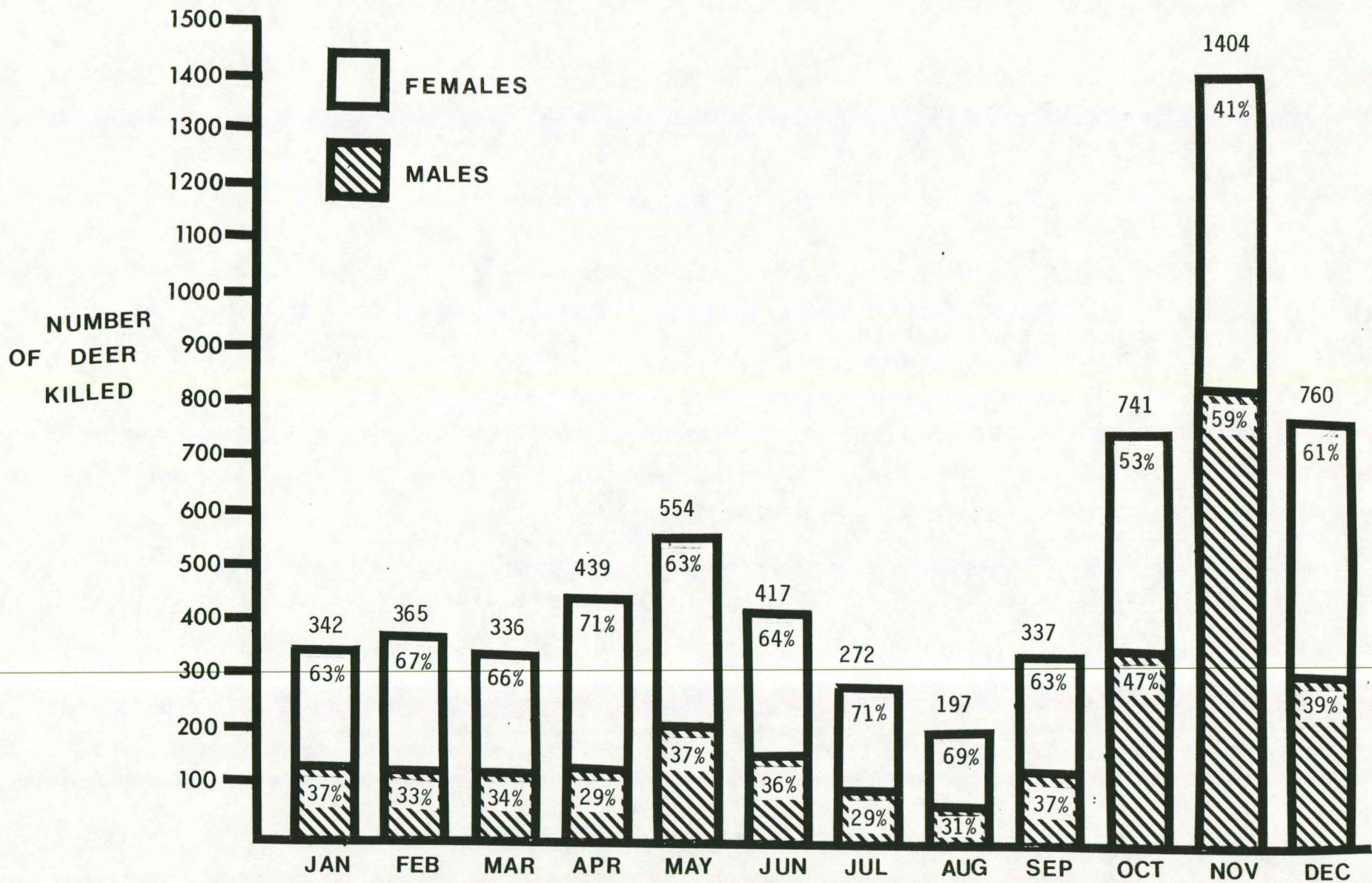


Figure 2. The 1984 traffic mortality by month and sex ratio.

APPENDIX

County	1984-85 Winter population estimate	1984 Traffic mortality	County	1984-85 Winter population estimate	1984 Traffic mortality
Adair	330	68	Jasper	287	83
Adams	665	40	Jefferson	756	52
Allamakee	3100	93	Johnson	625	303
Appanoose	445	22	Jones	925	63
Audubon	450	13	Keokuk	230	46
Benton	132	55	Kossuth	494	61
Black Hawk	335	92	Lee	1050	156
Boone	195	57	Linn	660	226
Bremer	300	32	Louisa	465	48
Buchanan	150	51	Lucas	1050	31
Buena Vista	350	40	Lyon	615	51
Butler	575	77	Madison	1000	35
Calhoun	140	41	Mahaska	270	23
Carroll	204	4	Marion	570	41
Cass	255	48	Marshall	745	65
Cedar	235	44	Mills	1000	43
Cerro Gordo	125	79	Mitchell	320	34
Cherokee	648	73	Monona	760	30
Chickasaw	300	29	Monroe	410	11
Clarke	1600	55	Montgomery	570	45
Clay	495	73	Muscatine	315	100
Clayton	2500	132	O'Brien	397	40
Clinton	495	118	Osceola	508	5
Crawford	455	52	Page	620	56
Dallas	700	57	Palo Alto	410	54
Davis	665	34	Plymouth	346	53
Decatur	1900	62	Pocahontas	483	26
Delaware	420	76	Polk	860	159
Des Moines	2015	114	Pottawattamie	1628	92
Dickinson	675	84	Poweshiek	290	21
Dubuque	925	66	Ringgold	1550	36
Emmet	342	40	Sac	442	45
Fayette	500	69	Scott	940	164
Floyd	265	31	Shelby	325	20
Franklin	465	85	Sioux	495	33
Fremont	500	51	Story	135	91
Greene	307	20	Tama	190	30
Grundy	15	17	Taylor	900	38
Guthrie	1075	54	Union	1110	67
Hamilton	275	61	Van Buren	1104	78
Hancock	500	38	Wapello	410	27
Hardin	662	77	Warren	600	57
Harrison	875	56	Washington	455	99
Henry	682	64	Wayne	450	23
Howard	350	21	Webster	660	88
Humboldt	496	33	Winnebago	1245	41
Ida	379	38	Winneshiek	1050	111
Iowa	295	171	Woodbury	380	55
Jackson	2250	88	Worth	950	70
			Wright	600	56

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