

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
Wildlife Division Report 3025
March 1986

THE 1985 ELK HUNT¹

Richard J. Moran
Wildlife Research Biologist

James R. Terry
Wildlife Research Technician

Houghton Lake Wildlife Research Station
Box 158, Houghton Lake Heights, MI 48630

¹A contribution of Federal Aid to Wildlife Restoration, Michigan
Pittman-Robertson Project W-127-R.

INTRODUCTION

The fourth controlled elk hunt in Michigan was held December 10-15, 1985. The first two hunts in 1964 and 1965 were 9-day affairs, also held in December, with 300 hunter choice (any elk) permits available each year for a 577-mi² area (Moran 1973). The third hunt in 1984 was a 6-day period with 50 permits available over a 222-mi² area in the eastern one-third of the range.

In 1985 there were 52,658 applications for the 120 elk hunting permits, which included 90 antlerless (cows and calves) and 30 hunter's choice (bull, cow or calf). Successful permits were selected by lottery using the same ratio by geographic region as was found among applications—Reg. I (4), Reg. II (34), Reg. III (82).

The 295-mi² hunting area was divided into a southern Zone A of 193 mi² and a northern Zone B of 102 mi² (Fig. 1). Permits were randomly assigned with 90 (75%) in Zone A and 30 (25%) in Zone B. The 6-day hunt was held December 10-15, 1985. During the first 3 days of the hunt, hunters were required to stay within their assigned zone, but could hunt either zone during the last 3 days.

During the hunter orientation on December 9, 30 of the 120 permittees were randomly selected by drawing for hunter's choice permits, allowing these individuals the option of taking an antlered bull.

All 120 successful permittees appeared at the required half-day orientation session held in Atlanta. One hunter left the area early, resulting in an effective hunting force of 119. Maximum hunter density was 1/2.5 mi².

HUNTING SUCCESS

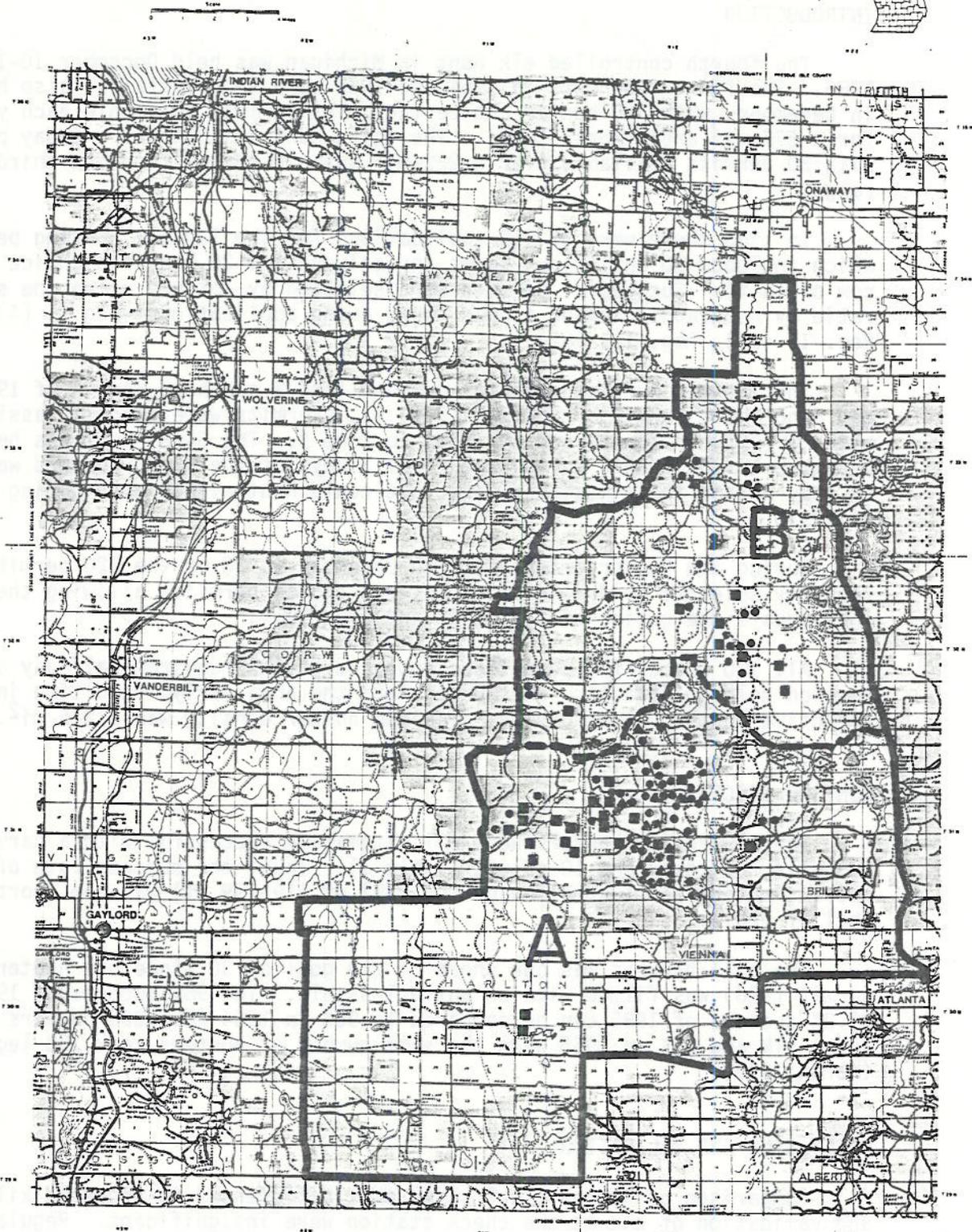
The 119 active hunters were all ultimately successful with a harvest of 29 bulls, 80 cows, and 10 calves (Table 1). Thus, the success rate of the *active* hunters was 100% although the kill of 119 (99.2%) was one short of the goal of 120.

The bull harvest was one short of the goal of 30 since one hunter's choice permit (#86) was filled with an antlerless elk. The 98% success of 1984 and 99.2% success of 1985 can be compared to 90% in 1964 when 298 hunters took 269 legal elk and 61% in 1965 when the same number of hunters took 183 legal elk (Moran 1973).

DAILY KILL AND VALIDATION

Comparison of Tables 1 & 2 shows that differences in reported kill dates and validation of elk at the check station were insignificant. Regulations stipulated that elk be presented for validation within 24 hours. About 89% of the total season's kill and validation was accomplished at the end of the third day of hunting. Most of the smaller animals (calves and yearlings) were taken early in the hunt (Table 2).

MICHIGAN ELK RANGE



■ BULL
 ● COW
 ▲ CALF

STATE OWNED LAND
 1985 ELK HUNT BOUNDARY

LEGEND
 - Contour Lines
 - Section Lines
 - Township and Range Lines
 - Water Features
 - Railroads
 - Roads
 - State Owned Land
 - 1985 Elk Hunt Boundary
 - Kill Locations: Bull (square), Cow (circle), Calve (triangle)
 - Other symbols for land use and infrastructure.

Fig. 1. Elk hunting Zones A & B with kill locations, Michigan elk season, 1985.

Table 1. Daily validation of elk and percent attained harvest, Michigan elk season, 1985.

Day	Dec.	Bulls	Cows	Calves	Tot.	Accum. Kill	% Total
1	10	11	51	8	70	70	58.8
2	11	7	13	2	22	92	77.3
3	12	7	7	0	14	106	89.1
4	13	1	3	0	4	110	92.4
5	14	3	3	0	6	116	97.5
6	15	0	3	0	3	119	100.0
Total		29	80	10	119	---	-----

Table 2. Daily legal kill of elk by sex and age class and percent harvest attained, Michigan elk season, 1985.

Day Dec.	Bulls		Antlerless		Combined			% Total Kill	
	Adult	Yrlg.	Adult	Yrlg.	Adult	Yrlg.	Calves Tot.	Bulls	Antl. Tot.
1	7	4	46	7	53	11	9	37.9	68.9
2	5	2	11	1	16	3	1	62.1	83.3
3	7	0	4	2	11	2	0	86.2	90.0
4	1	0	3	0	4	0	0	89.7	93.3
5	2	1	3	0	5	1	0	100.0	96.7
6	0	0	3	0	3	0	0	100.0	100.0
Total	22	7	70	10	92	17	10	96.7 ^b	100 ^b
									99.2 ^b

^a hunter choice permit filled w/cow

^b % harvest quota

KILL DISTRIBUTION

The distribution of land area between Zones A and B was 65:35 (Table 3). The harvest of elk by zones was very close to the initial permit allocation of 75:25 with 86 (72%) elk from Zone A and 33 (28%) from Zone B.

The random selection of the 30 "bull" permits resulted in 23 (77%) from Zone A and 7 (23%) from Zone B—much like the initial permit allocation. The harvest of bulls followed the permit allocation with 21 (72%) from Zone A and 8 (28%) from Zone B (Table 3). Thus, distribution of hunter's choice permits and the kill of *both* antlered and antlerless elk were very close to the initial license allocation ratio of 75:25 for Zones A and B.

The kill location map (Fig. 1) illustrates the relatively high concentration of kill in the north part of Zone A, particularly the Camp 30 Hills area—that part of T31N, R1E lying between the Black River on the east and Principal Meridian on the west. Only two elk, both bulls, were taken south of T31N where most complaints of agricultural damage originated. This primary kill area is a block of largely public forest lands which includes the Foch Lakes, Camp 30, Old Baldy, and Rattlesnake Hills areas. Both commercial forest cuttings and habitat development have been extensive here over the past 20 years. Harvest was high here also in 1964-65 (Moran 1973).

Public land made up 55% of the entire area open to hunting, but contributed 72% of the total kill (Table 4). In Zone A, 60% of the lands were public with 87% of the kill, while in Zone B 47% were public with only 33% of the kill.

Private land in Zone B is made up primarily by the Blue Lakes, Black River, and Canada Creek clubs. Almost two-thirds of the zone's kill came from this historically important block of elk range (Fig. 1).

The harvest by counties was Montmorency (92), Otsego (18), and Cheboygan (9) (Table 5).

HARVEST RATES

The overall kill rate for the 295-mi² hunting area was 0.4 elk/mi² (Table 6). In 1984 the removal was 0.2 elk/mi². The 1964-65 elk seasons had an average yield of 0.4 elk/mi² over a 577-mi² area—a removal density identical with that of the 1985 hunt.

Fifty sections, or 17% of those open to hunting, produced legal elk (Table 6). For these *productive* sections, the harvest averaged 2.4 elk/mi². Zone A produced about 2.8 (R=1-9) elk for each productive section, while Zone B produced 1.7 (R=1-5). The average kill rate for productive sections was similar in 1964-65 at 2.5 elk/mi² (Moran 1973).

HUNTING EFFORT

The 119 hunters expended a total of 209 hunter-days during the 6-day season for an average of 1.8 days/hunter. This is a very liberal estimate as hunting effort was calculated to the nearest full day. About 75% of the effort was

Table 3. Elk license allocation by zone compared to actual kill, Michigan elk season, 1985.

Hunting Area		Permit Allocations		Elk Harvest			
Zone	Size(mi ²)	General (%)	Hunter Choice (%)	Bulls (%)	Cows-Calves (%)	Tot. (%)	Tot. (%)
A	193	90 (75)	23 (77)	21 (72)	56 9 (72)	86 (72)	86 (72)
B	102	30 (25)	7 (23)	8 (28)	24 1 (28)	33 (28)	33 (28)
Tot.	295	120 (100)	30 (100)	29 (100)	80 10 (100)	119 (100)	119 (100)

Table 4. Representation of public and private lands in elk hunting Zones A & B with kill contribution from each, Michigan elk season, 1985.

Zone	Hunting Area		Harvest				Tot.	%
	Size(mi ²)	(%)	Bulls	Cows	Calves	(%)		
A	Public	115	(60)	15	52	8	75	(87)
	Private	78	(40)	6	4	1	11	(13)
	Tot.	193	(100)	21	56	9	86	(100)
B	Public	48	(47)	1	9	1	11	(33)
	Private	54	(53)	7	15	0	22	(67)
	Tot.	102	(100)	8	24	1	33	(100)
Comb.	Public	163	(55)	16	61	9	86	(72)
	Private	132	(45)	13	19	1	33	(28)
Gr. Tot.	295	(100)	29	80	10	119	(100)	

Table 5. Elk kill location by zone and county, Michigan elk season, 1985.

County	Zone		Total
	A	B	
Cheboygan	0	9	9
Otsego	14	4	18
Montmorency	72	20	92
Total	86	33	119

Table 6. Legal harvest of elk for total hunting area and productive sections only, Michigan elk season, 1985.

Zone	All Sections		Kill/ Mi ²	Productive Sections		Kill/ Mi ² Range		
	Mi ²	(%)		Mi ²	(%) ^a			
A	193	(65)	86	0.5	31	(16)	2.8	1-9
B	102	(35)	33	0.3	19	(19)	1.7	1-5
Tot./Avg.	295	(100)	119	0.4	50	(17)	2.4	

^a% of total

absorbed during the first 3 days of the hunt (Table 7). In 1984, the 49 hunters accumulated 1.6 days/hunter. The first 3 days accounted for 88% of the total effort. Successful elk hunters in 1964-65 averaged 2.3 days in the field during the 9-day December hunts.

ELK SEEN

Elk hunters reported seeing a total of 2,148 elk for an average of 10.3 elk/hunter day. This was about one-half the sighting rate reported in 1984 when the figure was 20.8. No doubt the snow depth and reduced access in 1985 decreased the mobility of both elk and hunters resulting in fewer hunter-elk contacts. Distribution and dispersal of elk under these conditions may have affected the rate due to differences in cover type utilization and band size.

Successful elk hunters in 1964 saw 6 elk/hunter day, while those in 1965 averaged only 3 elk/day.

SEX AND AGE COMPOSITION

The 1:3 ratio of *hunter choice* and *antlerless only* permits resulted in a kill of 75% female elk (Fig. 2). A 1:4 ratio in 1984 yielded 78% females, while hunting of *any* elk in 1964 and 1965 yielded 57 and 59% females, respectively (Moran 1973).

Fig. 2 also illustrates the relative size of the three major age-class groups (YOUNG-PRIME-OLD) among both the male and female segments. Males in 1985 showed a 50:50 split among YOUNG and PRIME compared to 25:65 in 1984. Bulls in the OLD group were absent and the 5-year age class was poorly represented in both years, but the harvest samples were relatively small, particularly in 1984.

In contrast to the males, OLD animals made up 14% of the females, while the YOUNG segment was smaller than among males at 37%. Curiously, in 1985 only one of 10 calves was a male.

Differences in age structure of the 1984 and 1985 hunting samples can be seen in Fig. 3. The PRIME group made up about half the elk examined in both years. The larger 1985 sample shows a somewhat larger YOUNG segment (39% compared to 31%) with the corresponding loss in the OLD group (11% compared to 18%). Under the *any elk* harvests of 1964 and 1965, the YOUNG segment made up 50 and 59%, respectively. Comparisons of the PRIME and OLD segments are probably not warranted, given the discrepancies between field age assignments and the present incisor cementum annuli technique (Schmitt et al. 1985). Harvest composition should be watched carefully to detect shifts in the YOUNG segment as exploitation proceeds.

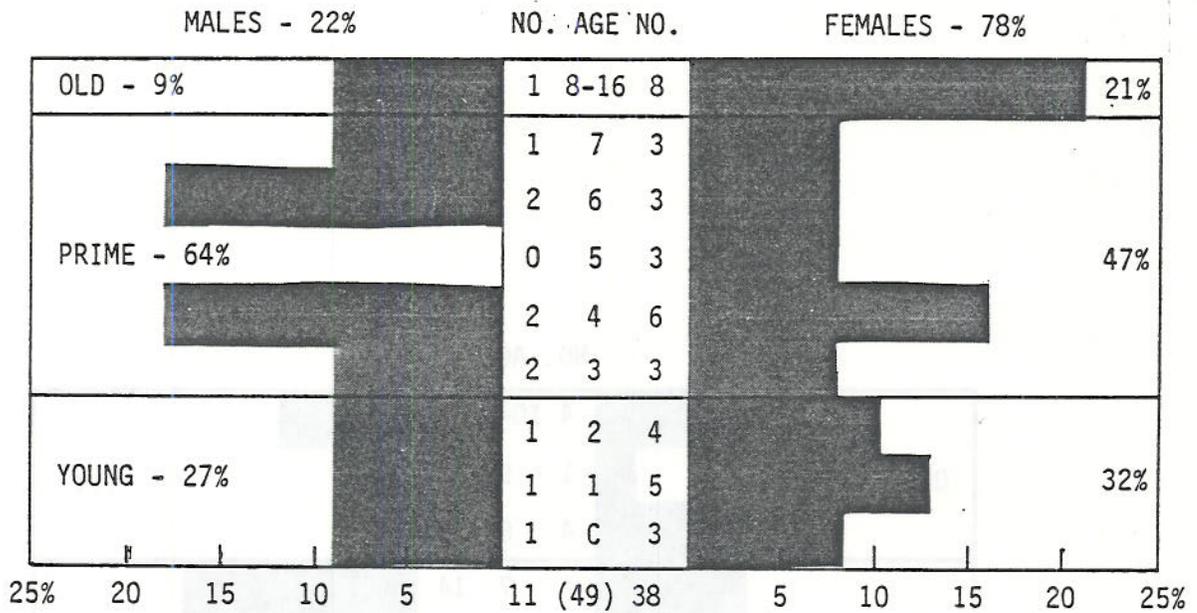
REPRODUCTIVE DATA

Field crews recovered viscera from 80 cows for reproductive studies. Seven did not contain useable reproductive tracts, while 62 of 73 contained fetuses, for an all-age pregnancy rate of 85%. Among these, the rate for adult cows (>2 years) was 94% and 22% for yearlings (Table 8). The smaller 1984 sample of 35 cows contained 74% overall, 80% for adult, and 40% for yearlings

Table 7. Distribution of hunting effort by day, Michigan elk season, 1985.

Day	1	2	3	4	5	6	Total
Day of Week	Tue	Wed	Thu	Fri	Sat	Sun	
Date	10	11	12	13	14	15	
Hunter-days	73	42	42	24	10	18	209
% of Total	35	20	20	11	5	9	(100)

1984



1985

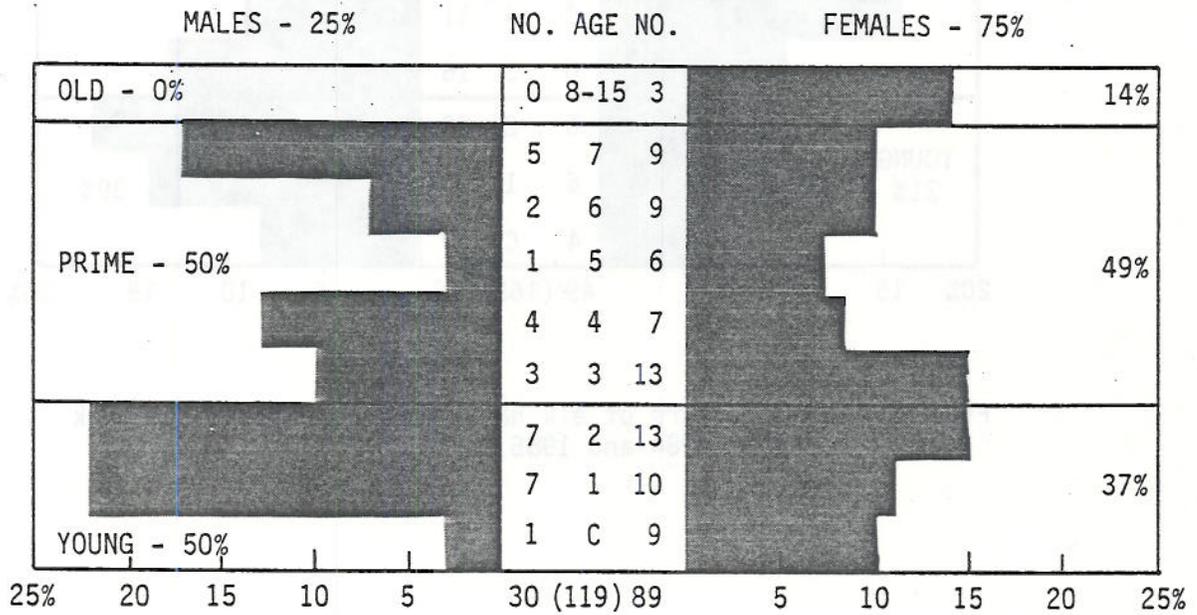


Fig. 2. Sex structure, by age groups, of elk harvested during Michigan elk seasons, 1984 and 1985.

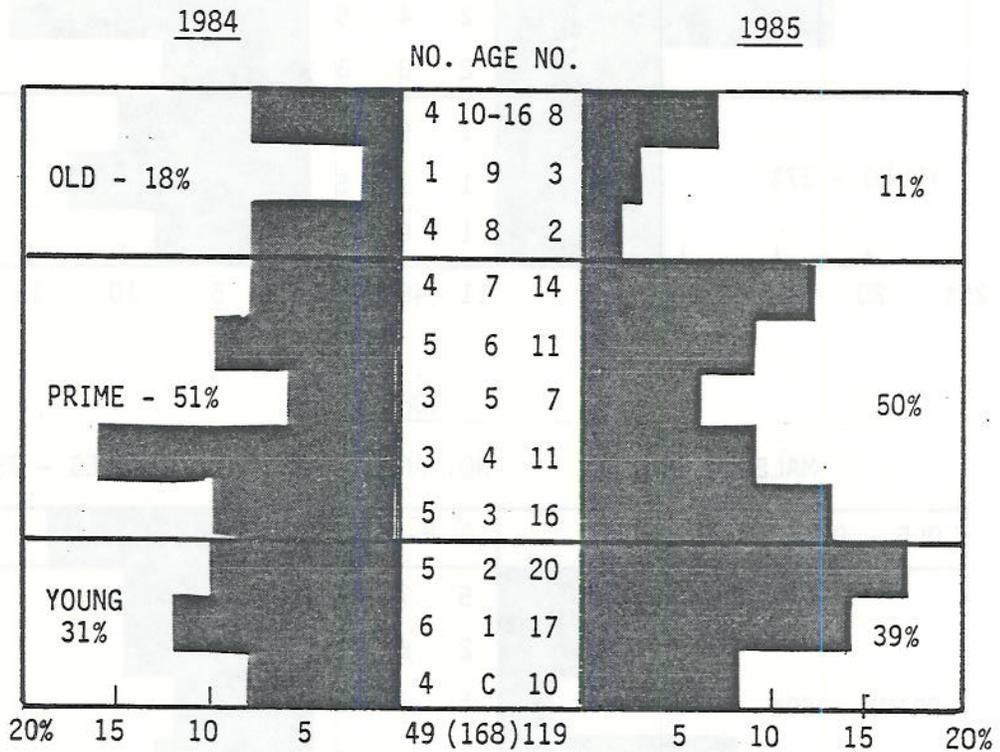


Fig. 3. Age structure of elk harvested during Michigan elk seasons, 1984 and 1985.

Table 8. Pregnancy of cow elk, by age class, and sex composition of fetuses, Michigan elk season, 1985.

Age Class	Cows		% Pregnant	Sex of Fetuses		
	N			Males	Females	Unknown
1	9		22	2	0	0
2	12		92	8	2	1
3	12		100	4	8	0
4	7		100	2	4	1
5	5		100	1	4	0
6	8		100	2	5	1
7	7		100	3	4	0
8	2		100	1	1	0
9	3		100	1	1	1
10	2		100	1	0	1
11	3		67	2	0	0
12	2		50	1	0	0
15	1		0	0	0	0
All Cows	73		85	28	29	5
Adults (>2)	64		94			
Yearlings	9		22			

(Schmitt et al. 1985). Combined data for 1964 and 1965 (192 cows) indicated an overall rate of 69%, 77% for adults, and 23% for yearlings (Moran 1973).

Weight and length measurements were obtained for 61 fetuses. Development indicated a normal September breeding season.

The sex ratio of 57 fetuses was essentially balanced (Table 8).

FIELD-DRESSED WEIGHTS

Field-dressed weight, antler measurements, and heart-girth were collected at the check station. Mean weights of 10 calves, 29 bulls and 80 cows are given in Table 9. The heaviest bull was a 7-year specimen dressing out at 664 lbs. The heaviest cow was a 10-year-old with a dressed weight of 453 lbs. The heaviest bull from the 1964-65 hunts was 656 lbs. In general, dressed weights of calves, yearling, and 2-year-olds exceeded those gathered during the 1964-65 hunts (Moran 1973).

ANTLER DEVELOPMENT

Antler measurements were collected from 28 bulls, including 7 yearlings (Table 10). Yearlings averaged 3.9 total points compared to 2.7 in 1964-65. The 2-year-olds averaged 8.5 as in the earlier hunts. Prime bulls reached the 12-point (6X6) condition at 6 years, which also matched earlier data. Detailed comparisons of physical development among older age classes are probably not warranted given the obvious differences in aging techniques (see below).

FIELD AGING VS LABORATORY

Analysis of our field-aging of elk and subsequent lab work on incisor cementum annuli presents some interesting comparisons (Table 11). In 1985 we correctly field-aged 59% of all elk compared to 43% in 1984. Field and lab ages are in excellent agreement from $\frac{1}{2}$ to 4 years. Table 11 shows that there was 100% agreement for calves and yearlings as pointed out for the 1984 data by Schmitt et al. (1985). Curiously, 2-year-olds are usually *over-aged* although we hit 90% in 1985. On the other hand, from 3 years and older, elk are consistently *under-aged* by the field technique. As with deer, the error is compounded with age of the jaw. The errors are consistent with the differences in tooth-wear patterns and the 1 year maturity lag in elk to reach the same condition.

ACKNOWLEDGMENTS

The Wildlife Disease Laboratory processed the reproductive tracts and carried out the incisor cementum annuli work. They also provided summary print-outs of biological data from the field data cards. Karen Douglas typed the manuscript and prepared final copies of figures.

Evidence of disease and parasites and a new technique for determining the reproductive status of cow elk will be covered in a later report by the Wildlife Disease Laboratory.

Table 9. Field-dressed weights, in pounds, of 119 elk examined during Michigan elk hunt, 1985.

Age Class	Males			Females		
	N	\bar{x}	Range	N	\bar{x}	Range
1	1	245	---	9	185	165-207
1	7	327	260-368	10	278	225-348
2	6	417	384-433	13	345	306-415
3	3	456	380-548	13	352	306-425
4	4	517	474-568	7	354	310-395
5	1	494	---	6	379	370-388
6	2	602	588-616	9	373	350-434
7	5	573	488-664	9	380	349-422
8				2	374	355-392
9				3	377	356-404
10				2	438	422-453
11				3	385	350-435
12				2	341	332-350
15				1	348	---
Unknown	1	400	---	0		
Total	30			89		

Table 10. Antler development of bulls examined during Michigan elk hunt, 1985.

Age	N	Total Points		Beam Circ. (in)	Beam Length (in)	Max. Spread (in)
		\bar{x}	Range			
1	7	3.9	2-7	3.8	17.7	14.0
2	6	8.5	6-10	4.4	29.3	24.8
3	3	10.0	9-11	4.9	31.6	28.4
4	4	10.3	9-12	5.2	35.0	28.1
5	1	10.0	-----	5.9	42.4	38.0
6	2	12.0	10-14	6.4	45.3	34.4
7	5	13.2	10-15	6.2	42.7	34.1

Table 11. Comparison of elk aging techniques using field tooth eruption-wear and laboratory analysis of Incisor cementum annuli, Michigan elk hunts, 1984 and 1985.

Lab Age (by incisor cementum annuli)	Field-Aging Performance					
	1984			1985		
	Agree Total Sample	% Agreement	Characteristic	Agree Total Sample	% Agreement	Characteristic
1	4/4	100	No problem	10/10	100	No problem
1	6/6	100	No problem	17/17	100	No problem
2	1/5	20	Over-aged as 3-year-olds	17/19	90	Over-aged as 3-year-olds
3	5/5	100	No problem	12/16	75	Under-aged as 2-year-olds
4	3/7	43	Under-aged as 3-year-olds	9/11	82	Under-aged as 3-year-olds
5	0/2	0	Under-aged as 4-year-olds	1/7	14	Under-aged as 3, 4-year-olds
6	1/5	20	Under-aged as 5-year-olds	2/11	18	Under and over-aged
7	0/4	0	Under-aged as 4, 5, 6-year-olds	2/14	14	Under-aged as 4, 5, 6-year-olds
8	0/4	0	Under-aged as 5, 6, 7-year-olds	0/2	0	Under-aged as 5, 6-year-olds
9	0/1	0	Under-aged as 6-year-old	0/3	0	Under-aged as 4, 5, 7-year-olds
10	---	---		0/2	0	Under-aged as 6, 8-year-olds
11	0/1	0	Under-aged as 8-year-old	0/3	0	Under-aged as 5, 6, 8-year-olds
12	0/1	0	Under-aged as 7-year-old	0/2	0	Under-aged as 8, 11-year-olds
13	0/1	0	Under-aged as 5-year-old	---	---	
15	---	---		0/1	0	Under-aged as 9-year-old
16	0/1	0	Under-aged as 10-year-old	---	0	
Total	20/47	43		70/118	59	

LITERATURE CITED

- Moran, R. J. 1973. The Rocky Mountain Elk in Michigan. Mich. Dept. Nat. Resour. Res. and Dev. Rep. 267. 93pp.
- Schmitt, S. M., T. M. Cooley, and P. D. Friedrich. 1985. 1984 elk hunt biological data. Mich. Dept. Nat. Resour. Wildl. Div. Rep. 2996. 4pp.