DEER POPULATION MANAGEMENT REPORT

1984 - 1994

by

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FOREST DESCRIPTION

The Black Rock Forest, a privately owned tract of land, is approximately 3800 acres. The forest is situated on the northwest side of the Hudson Highlands, a few miles west of the Hudson River, in the towns of Cornwall and Highlands, Orange County, New York. (Figure 1)

The ancient mountainous terrain is composed mainly of gneiss bedrock with a mantle of glacial till, granite. The forest's lowest elevation just below Peck's Pond (450') and its highest elevation at Spy Rock (1461') are two miles apart. Seventy percent (70%) of Black Rock Forest is above 1100' in elevation.

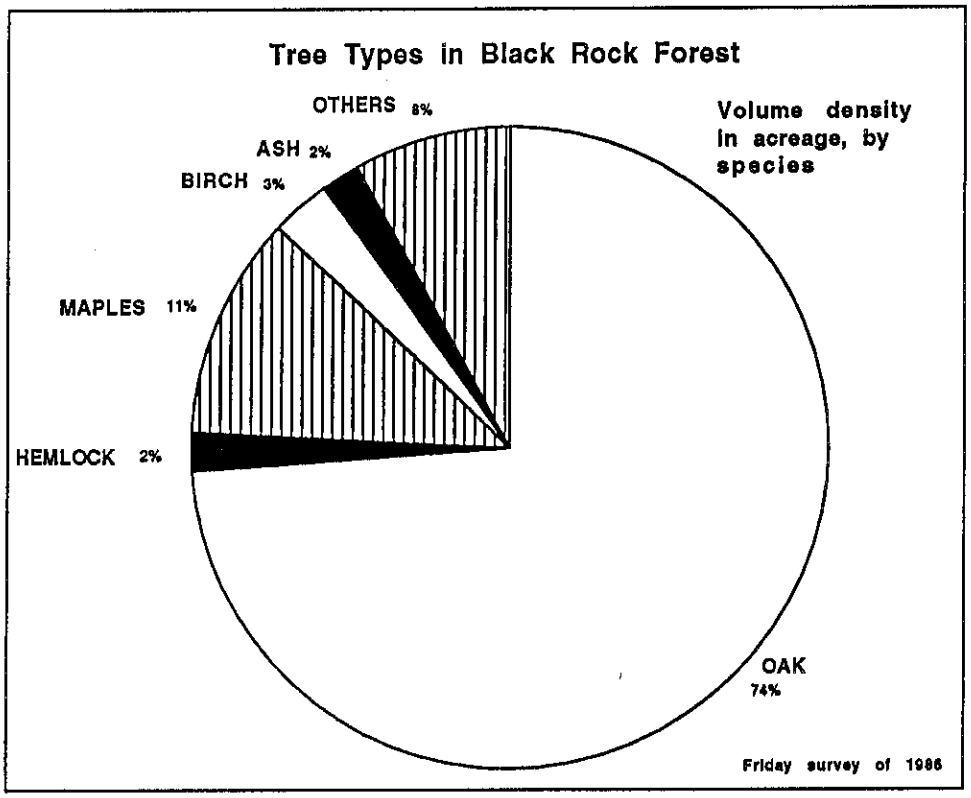
The forest is predominately oak and associated hardwoods. Virtually every forest type located in Black Rock Forest is associated with some species of oak. Due to human exploitation of the accessible areas, by means of burning and cutting, 60% of the forest is relatively equal in its apparent stage of succession. These forest types are 70 - 100 years of age with dominant trees of 12"-16" average in diameter. Many of these areas have experienced intense silvicultural treatment over the past 60-70 years. Optimum growth and regeneration have been sought and the results demonstrate man's reclamation of the forest.

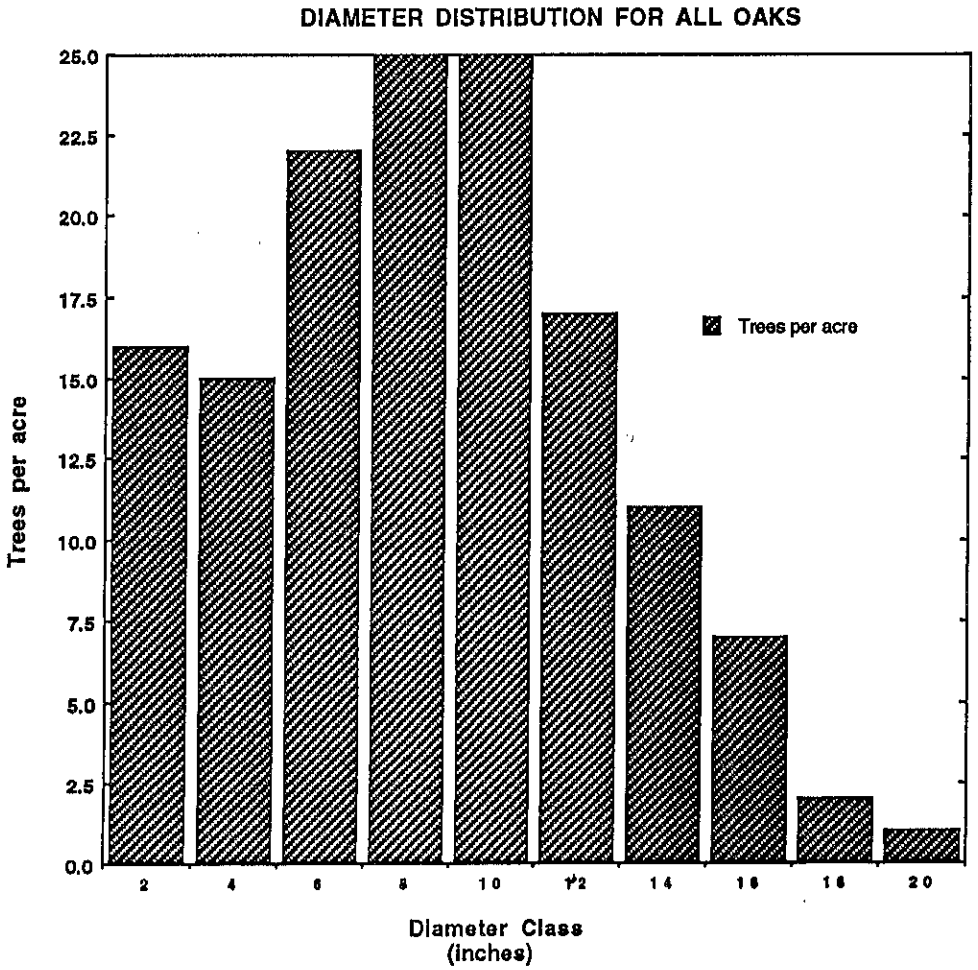
The forest also exhibits two other prominent forest types, the ridge-top and northern ravine habitats. Ridge-tops above 1300' are characterized by shallow soils and dwarfed plant growth resulting from extreme environmental conditions. The northern ravine forest type is of a conifer nature, predominately hemlock. These drainage areas comprise a small percent of the landscape, up to an elevation of 1200' along the Canterbury, Black Rock and Mineral Springs Brooks.

Sizeable wetlands up to 20 acres or more are confined to five areas: Sutherland Pond Swamp, Glycerine Hollow, Beaver Swamp, Eagle Cliff Swamp, and the Mineral Spring Wetlands. The remainder of the forest is dotted with small pothole vernal pools, sporadically encountered at all elevations.

Black Rock Forest also contains seven ponds totalling approximately 100 acres, including the ten acre Sutherland Pond, the only natural pond.

The forest is accessible by a network of dirt roads totalling 15 miles and a trail system of 25 miles.


Tree Types in Black Rock Forest
OTHERS 8%
ASH 2%
BIRCH 3%
MAPLES 11%
HEMLOCK 2%
OAK 74%
Volume density in acreage, by species
Friday survey of 1986


DIAMETER DISTRIBUTION FOR ALL OAKS
Trees per acre
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
2
4
6
8
10
12
14
16
18
20
Diameter Class (inches)

MAMMALS OF BLACK ROCK FOREST
1995

Order/Species	Common Name	Occurrence
Marsupialia		
Didelphis virginana	Opossum	Common
Insectivora		
Talpidae (Family)	Moles, mice	Common
Chiroptera		
Myotis lucifugus	Little Brown Bat	Common
Epteskus fuscus	Big Brown Bat	Common-Uncommon
Myotis sodalis	Indiana Bat	Uncommon
Lagomorpha		
Sylvilagus floridanus	Eastern Cottontail	Uncommon
Rodentia		
Marmota monax	Woodchuck	Uncommon
Tamiasciurus hudsonicus	Red Squirrel	Common
Sciurus carolinensis	Grey Squirrel	Common
Glaucomys sabrinus	Flying Squirrel	Common
Tamias striatus	Eastern Chipmunk	Common
Castor canadensis	Beaver	Common-Uncommon
Ondatra zibethicus	Muskrat	Uncommon
Microtus	Voles	Common
Erethizon dorsatum	Porcupine	Uncommon
Carnivora		
Canis latrans	Eastern Coyote	Common
Vulpes vulpes	Red Fox	Common
Urocyon cinereoargenteus	Gray Fox	Common
Ursus americanus	Black Bear	Uncommon
Procyon lotor	Raccoon	Common
Martes pennanti	Fisher	Rare
Mustela frenata	Long-tailed Weasel	Common
Mustela vison	Mink	Common-Uncommon
Mephitis mephitis	Striped Skunk	Common
Lutra canadensis	River Otter	Common
Felix rufus	Bobcat	Uncommon
Artiodactylau		
Ododcoileus virginianus	White-tailed Deer	Common

COMMON - Mammal has established functional breeding population.
UNCOMMON - Mammal occasional presence, periodically establishing a breeding population.
RARE - Mammal seldom seen, no evidence of breeding population.

MANAGEMENT HISTORY

Since the appearance of mankind, habitats have been manipulated, plants and animals harvested. Survival of the human species has been the obvious goal of any land treatment. In the United States, early land exploitation in the 1800's caused major impacts on wildlife, as habitats were dramatically altered. In reaction to diminishing populations of wild game, regulations were imposed in an attempt to recover a much needed commodity.

From the early 1900's to 1960's, the Black Rock Forest was introduced to early attempts at imposed conservation management. These techniques focused on management of a resource beneficial to man (lumber and fuelwood), with habitat management as a resulting consequence to wildlife.

With the birth of the modern "Multiple-use Management" in the 1970's further regulations and record keeping of wildlife conservation efforts were introduced. Tallying of deer harvests and hunter visits were recorded in 1970. The first study of deer impact on plant reproduction, deer exclosure was established in 1971. Deer biological data was first recorded in 1984, thus beginning the age of White-tail population monitoring and management at Black Rock Forest.

With the purchase of Black Rock Forest by the Golden Family Foundation in 1989, forest management and use was re-evaluated. It was determined that the only wild population in Black Rock Forest that required active, annual management was the White-tail deer herd. The habitat altering and sometimes destructive tendencies of deer are primarily a result of post human activities. Eradicating predators and creating prime habitats for deer by tree cutting have resulted in a unnatural situation leading to overpopulation and habitat destruction. Consequently, hunting of white-tails has become an important habitat management tool.

In approaching the modern goal of integrated, whole ecosystem management, deer population trends are now assessed, habitat carrying capacities are determined, and harvest quotas are implemented.

Continuing study of environmental indicators, forest regeneration, and ecosystem-level understanding are crucial in today's world. The study and management of the White-tail deer populations are viewed as one important ingredient in maintaining and increasing the integrity of the forest ecosystem.

BLACK ROCK FOREST WILDLIFE MANAGEMENT OBJECTIVE

To observe, manage, and maintain healthy wild populations of native animals. To ensure the biological integrity of the forest community through proven methods of wildlife and habitat management.

To continually seek improvements in wildlife management by use of scientific methods, to benefit wild populations, the ecosystem and man.

For thousand of years, from the fires set by Native Americans through the exploitative cutting of settlers, humanity has been a major player in the formation and development of the Black Rock Forest. Right or wrong, man's past and present involvement must be considered in all management plans.

CURRENT MANAGEMENT PLAN

From 1984 to 1989, extensive biological and hunting pressure data were accumulated during each fall deer harvest. Data analysis revealed the health of the herd and its relationship to hunting pressure. By 1989 these measurements lead to the implementation of a forest zoning management plan (see page 33). Harvest data led to the formation of population reconstruction tables, and a better understanding of age and sex composition of the herd. Mean Antler Beam Diameter and weight, applied to age classes, were adopted as the primary indicators of herd health and reproduction potential on an annual basis. By 1989 a concise management objective had been formed (see page 5). In order to fulfill the management objective, an overwintering deer density goal of 22-25 deer per square mile was established to maintain and insure habitat and herd health.

A need for additional forms of information to achieve this goal has been evident. In addition, the "hindsight" management scheme of 1984-1989 needed further development to become a more effective means of predicting population trends and response to environmental fluctuation and management decisions. Subsequently, additional management techniques have been implemented. Winter severity and overwintering populations have been increasingly monitored (see page 41). Investigation of deer diets and determination of forest carrying capacity have begun to be pursued (see Acorns page 47).

The overall management plan has progressed steadily but cautiously, taking heed to information provided by the numerical data, but recognizing the natural fluctuations in any ecological system.

BLACK ROCK FOREST AS DEER HABITAT

Changes in the forest in the past century have directly affected the White-tailed deer population.

Young woodlands during the period 1920-40 resulted from previous extensive cuttings. Browse became plentiful as trees and shrubs regenerated. Abundant berry crops were also readily available in these early successional stands. Stands of hemlock, mainly in the northern ravines, survived the early cuttings. These created winter shelter, along with the pine and spruce plantations near the center of the forest. Silvicultural treatments continued from the 1930's through the 1950's, sustaining deer browse and other foods by creating forest openings. Forest carrying capacity for deer remained higher through this period. High deer populations resulted from the late 1960's through the 1970's as diets were supplemented by increased acorn crops from the maturing oak trees.

Presently, deer diets are highly dependent upon acorn crops. Black Rock Forest is composed of 74% oaks, and 60% of these are in the 6"-12" diameter class. These trees are mostly between 70-100 years of age, and are very capable of yielding substantial acorn crops. The maturation of the forest and the lack of silvicultural treatments since 1987 has led to decreasing light penetration to the forest floor. This situation, coupled with an abundant deer population, can lead to decreasing forest diversity. Deer food availability can become restrictive, and what little tree regeneration occurs may be eaten by deer. This affects not only deer but other wild populations as well, by eliminating food and cover.

Forest records suggest deer population as high as 40 per square mile during the 1960-1970's. Presently, deer diets and populations trends rely heavily upon unpredictable and variable acorn crops. This has lowered the carrying capacity of the forest to perhaps 28-30 overwintering deer per square mile.

DEER OF BLACK ROCK FOREST

The White-tailed deer may be seen during any season of the year.

Fawns are born in late May - early June, weighing four to eight pounds, standing approximately 18" high at the shoulder and measuring roughly 30" from nose to tail. To insure protection from predators, a fawn's reddish-brown coat is spotted in white to camouflage the animal in patterns of sun and shade. Within four months the spotted coat is replaced by a deeper, thicker brownish-gray winter coat. By fall, a fawn weighs an average of 60 lbs. (live weight)

Yearlings are deer who have survived their first winter. A deer's winter coat is shed between April and June and is replaced by a reddish-brown summer coat. Yearling weight during its second autumn of life averages 109 lbs. (live weight) for bucks and 102 lbs for does.

Adults are White-tails that have survived at least two winters and whose skeleton structure is near or at completion (full skeletal size is reached at 4 1/2 to 5 1/2 years). These deer stand an average three feet at the shoulder and are four feet long from nose to tail. After the annual shedding of their summer coat to their winter pelage in August-September, White-tails enters their third autumn weighing an average of 135 lbs (live weight) for males and 107 lbs for females.

The slang terms for White-tailed deer are buck for a male and doe for female. Bucks are distinguished from does by the presence of antlers from May through January. Bucks become progressively heavier than does through life. Their life expectancy is far less than that of a doe. The buck's reckless behavior during the fall rut (breeding season) exposes them to many more fatal situations, including moving vehicles and hunters. Only one known buck has lived 4 1/2 years in the Black Rock Forest Population during the period 1984-1994. Does, on the other hand, have benefitted from their cautious life style and low hunting pressure to easily live twice as long as bucks. Six does have been recorded over 10 1/2 years of age during the same time period (1984-1994).

Antlers characterize bucks, but on very rare occasion a doe may develop antlers. Antler development begins in early April as a result of photoperiodism, and ends mid-August. Antlers are true bone, made of solid calcium and phosphorus, and lacking bone marrow. Antler growth is one of the fastest known forms of bone growth, as much as 1/2 inch

in length per day. The function of antlers are socially related, revealing their greatest importance during the rut. Bucks display dominant status by the use of large antlers and aggressive behavior insures natural deer behavior, maintaining the underlying genetic traits in the gene pool.

Antler growth and potential is directly related to available nutrients, age, and heredity. Average antler size is affected by herd age structure and sex composition and this represents a good indicator of herd health and food supply.

Antlers are measured in the form of antler beam diameter (ABD) in millimeters. Antler beam diameter is measured one inch above the burr of the antler, which is located at the base of the antler, where it protrudes from the skull. The recorded measurement is an average of the left and right antler beam diameter. Averaging beam diameter according to age classes is an accurate method of determining herd health and reproduction potential the following spring. The yearling age class provides the most reliable antler beam diameter calculation (YABD). Since yearlings compose roughly 60%-70% of the buck take, the most accurate sample of the health of the deer herd, over the past year and one half is provided by the YABD.

Deer aging - The age of deer is determined by the tooth wear and replacement method (Severinghaus 1949b). In small populations of deer such as at Black Rock Forest, effects on corresponding accurate aging is critical for determination of average measurements (beam diameter, weight, age composition) by age class. Aging of does leads to determination of doe population age structure, important in determining reproduction potential. The average number of fetus' per doe is strongly affected by age. Under good range conditions, adult does may give birth to twins or triplets, yearlings to single or possibly twin fawns, and even fawns occasionally may give birth (10%).

IMPORTANT DATES

November 10-12 - Peak of rut (breeding) also highest incidents of vehicle collisions with deer

December 5 - Second rut, unbred does enter 2nd estrus cycle

May 20th - Fawn day - deer bred during the first rut give birth on or around this day

INFORMATION LEAFLET
N. Y. STATE CONSERVATION DEPT.
DIVISION OF CONSERVATION EDUCATION

This material from the
Department's official magazine —
THE N. Y. STATE CONSERVATIONIST

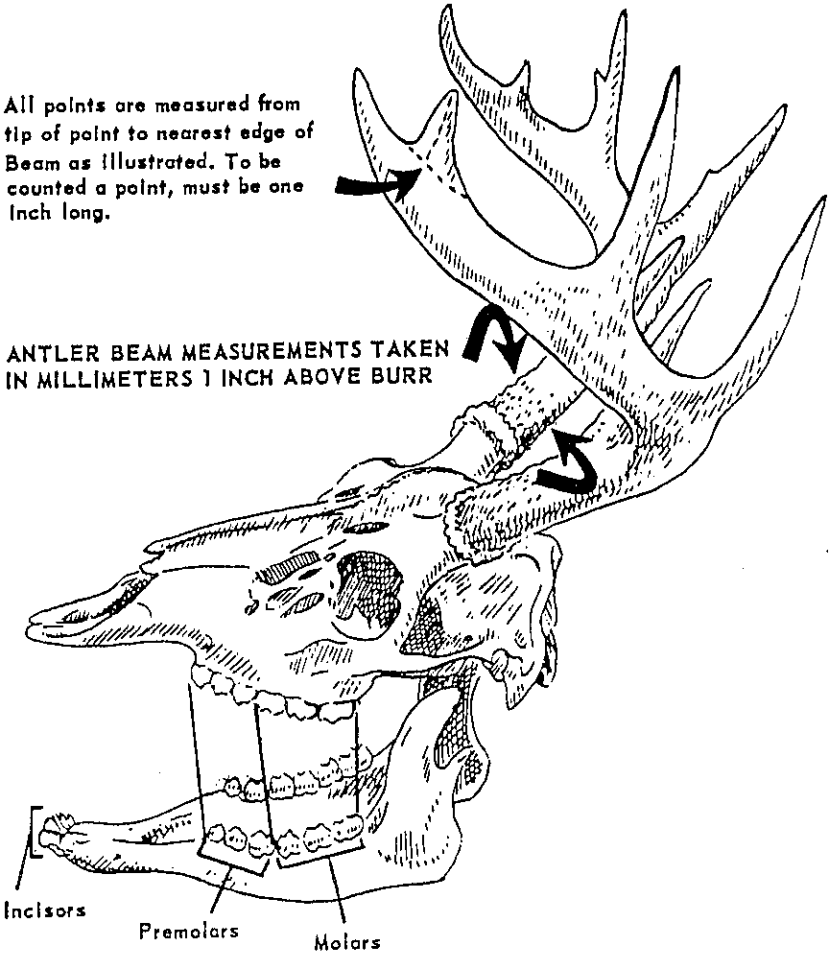
Aging A Deer

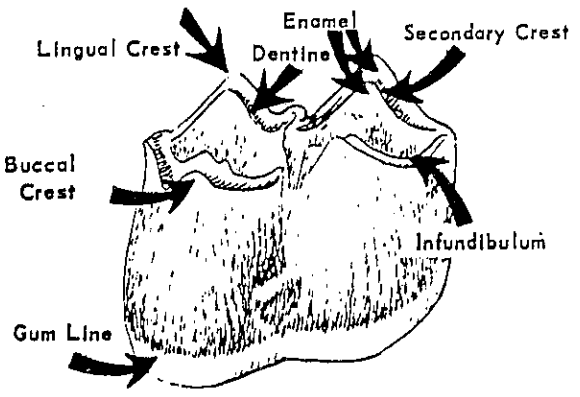
Not only is the means of accurately judging the age of a deer of interest to the hunter, but it is also a valuable tool for the Game Manager. By use of such a tool, data may be obtained which shows the age composition of the deer population. Such data — most of it now being obtained through hunter cooperation at checking stations, will indicate the degree of annual replenishment of young stock, as well as the average life span and the rate of decline of various age groups over a period of years. Such information is essential to good deer management.

For decades man has known how to judge the age of domestic livestock by the replacement and wear of their teeth. Why shouldn't the same principle hold for deer? It does -- as a study carried out by the Department's Bureau of Fish and Wildlife Investigations has now shown.

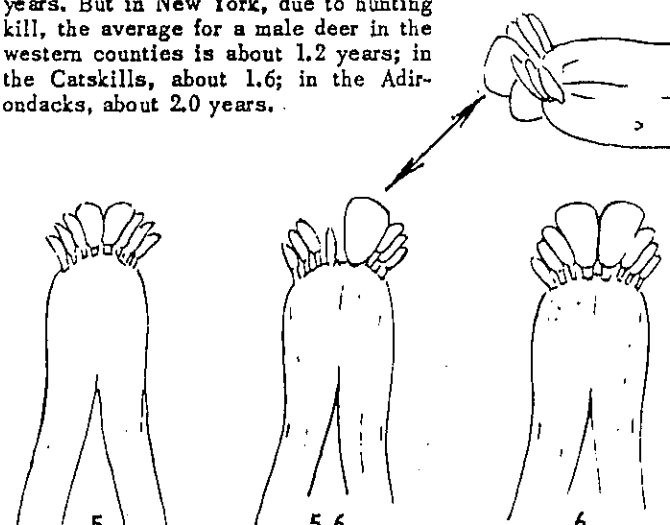
In general, the study indicated that, for the purpose of judging age, deer may be divided into two major groups: those under two years of age, and those above that age. The decisive factor here is the presence or absence of the deciduous teeth (similar to "baby" teeth in humans), and the degree to which these teeth have been replaced by permanent ones. Age determination of older deer is more complicated, and is explained in detail below.

It has been estimated that the average life expectancy of a deer unmolested by hunters is between eight and nine years. But in New York, due to hunting kill, the average for a male deer in the western counties is about 1.2 years; in the Catskills, about 1.6; in the Adirondacks, about 2.0 years.





Lateral View of Lower Molar



FAWNS

5 Months. *All incisors are milk teeth.*

5 to 6 Months. *Milk pincers (two middle teeth) are lost during fifth month and are replaced by permanent pincers.*

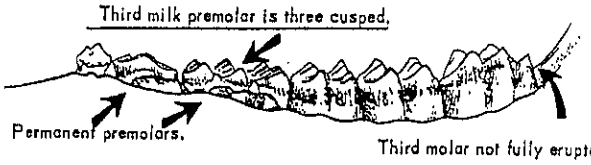
6 Months. *Permanent pincers fully erupted. Lateral and corner incisors are still milk teeth and are replaced during 10th and 11th month.*

B-24

mm SCALE

YEARLINGS: 1 Yr. 4-5 Mos.

Milk premolars moderate to heavily worn.

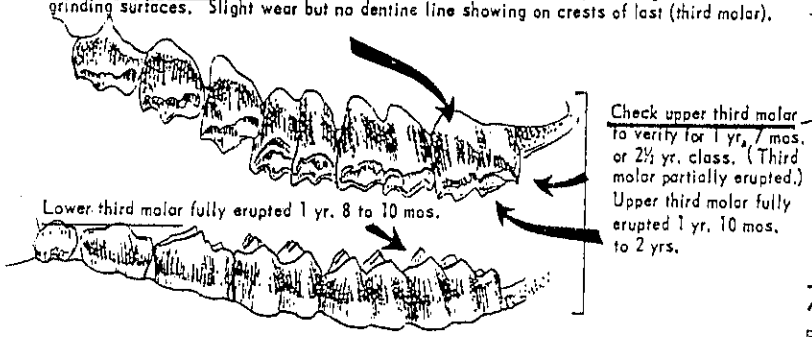


YEARLINGS: 1 Yr. 6 Mos.

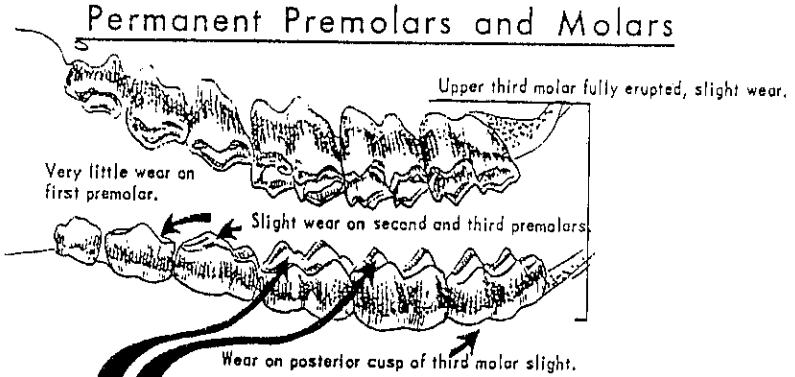
Loss of milk premolars and partially erupted permanent premolars.

YEARLINGS: 1 Yr. 7 Mos.

Permanent premolars usually fully erupted slight wear occasionally showing on grinding surfaces. Slight wear but no dentine line showing on crests of last (third molar).



2 1/2 YEARS: Permanent Premolars and Molars

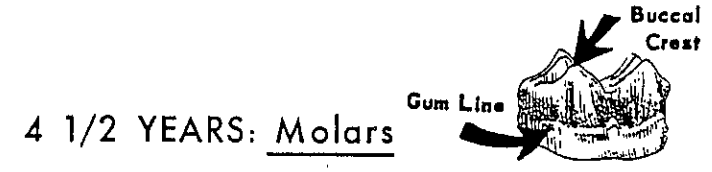


Lingual crests of first and second molar sharp, enamel well above narrow dentine of the crest.

3 1/2 YEARS: Molars

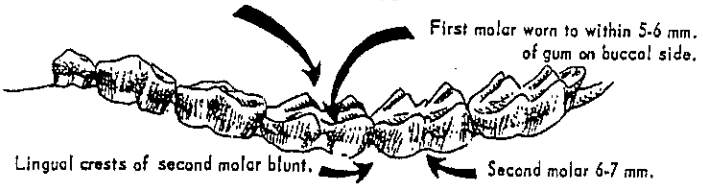
Lingual crests of first molar blunt, secondary crests prominent and blunt.

First molar worn to within 6-7 mm. of gum on buccal side.



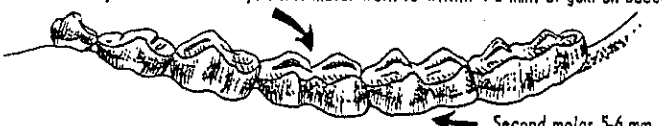
4 1/2 YEARS: Molars

Lingual crests on first molar almost worn away. Secondary crests visible.



5 1/2 YEARS: Molars

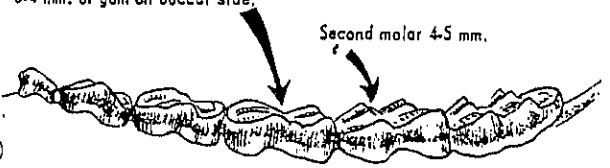
Original lingual crests of first molar worn away, simulated lingual crests appear. Secondary crests worn away. First molar worn to within 4-5 mm. of gum on buccal side.



Dentine crests on all molars much broader than enamel.

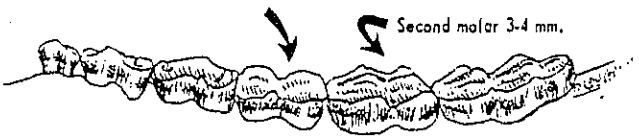
6 1/2 YEARS: Molars

No lingual crests on first molar and worn to within 3-4 mm. of gum on buccal side.



7 1/2 YEARS: Molars

First molar worn to within 2-3 mm. on buccal side.

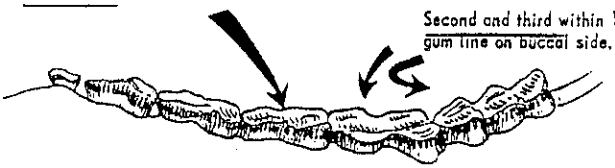


8½ - 9½ YEARS: Molars

All molars worn to within 2-3 mm. of gum on buccal side.

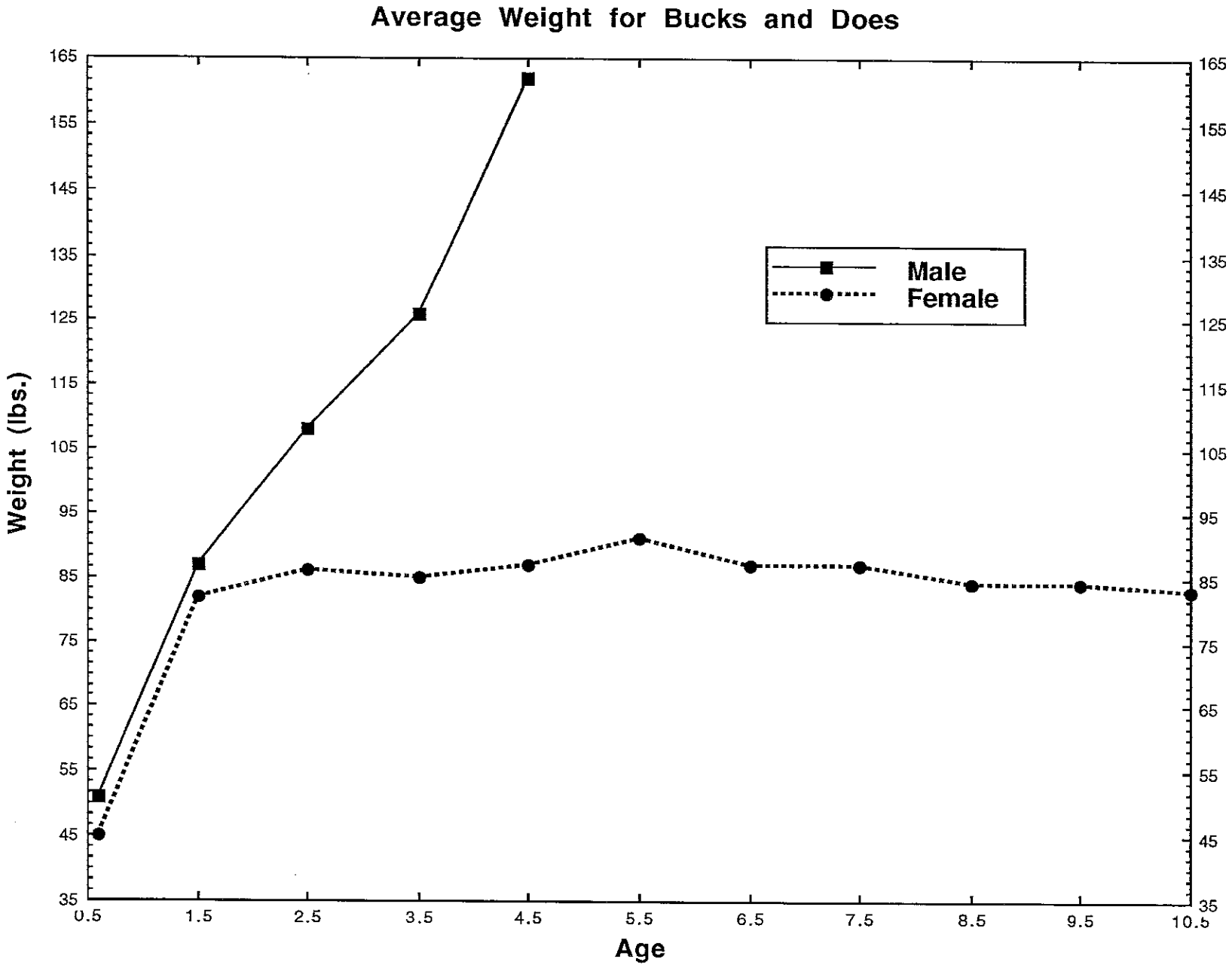
10 1/2 YEARS AND OLDER: Molars

First molar at or below gum line.



AVERAGE WEIGHT BY SEX AND AGE CLASS
HARVEST DATA 1984 - 1994

		SAMPLE	AVERAGE WEIGHT		LOW RANGE		HIGH RANGE	
	YEARS	SIZE	*FIELD DRESSED	LIVE WEIGHT	*FIELD DRESSED	LIVE WEIGHT	*FIELD DRESSED	LIVE WEIGHT
			(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
FAWN								
MALE		37	51	64	33	41	76	95
FEMALE		26	45	56	22	27	56	70
YEARLING								
MALE		29	87	109	62	77	117	146
FEMALE		33	82	102	62	77	110	137
ADULT								
MALE	2.5	83	108	135	72	90	147	184
FEMALE	2.5	46	86	107	70	87	114	142
MALE	3.5	28	126	158	94	118	157	196
FEMALE	3.5	33	85	106	65	81	112	140
MALE	4.5	1	162	203				
FEMALE	4.5	20	87	109	71	89	108	135
FEMALE	5.5	12	91	114	65	81	115	144
	6.5	10	87	109	75	94	108	135
	7.5	12	87	109	70	87	115	144
	8.5-9.5	6	84	105	64	80	105	131
	10 1/2 +	3	83	104	58	72	87	121


Average Weight for Bucks and Does
Weight (lbs.)
Age
Male
Female
165
155
145
135
125
115
105
95
85
75
65
55
45
35
0.5
1.5
2.5
3.5
4.5
5.5
6.5
7.5
8.5
9.5
10.5

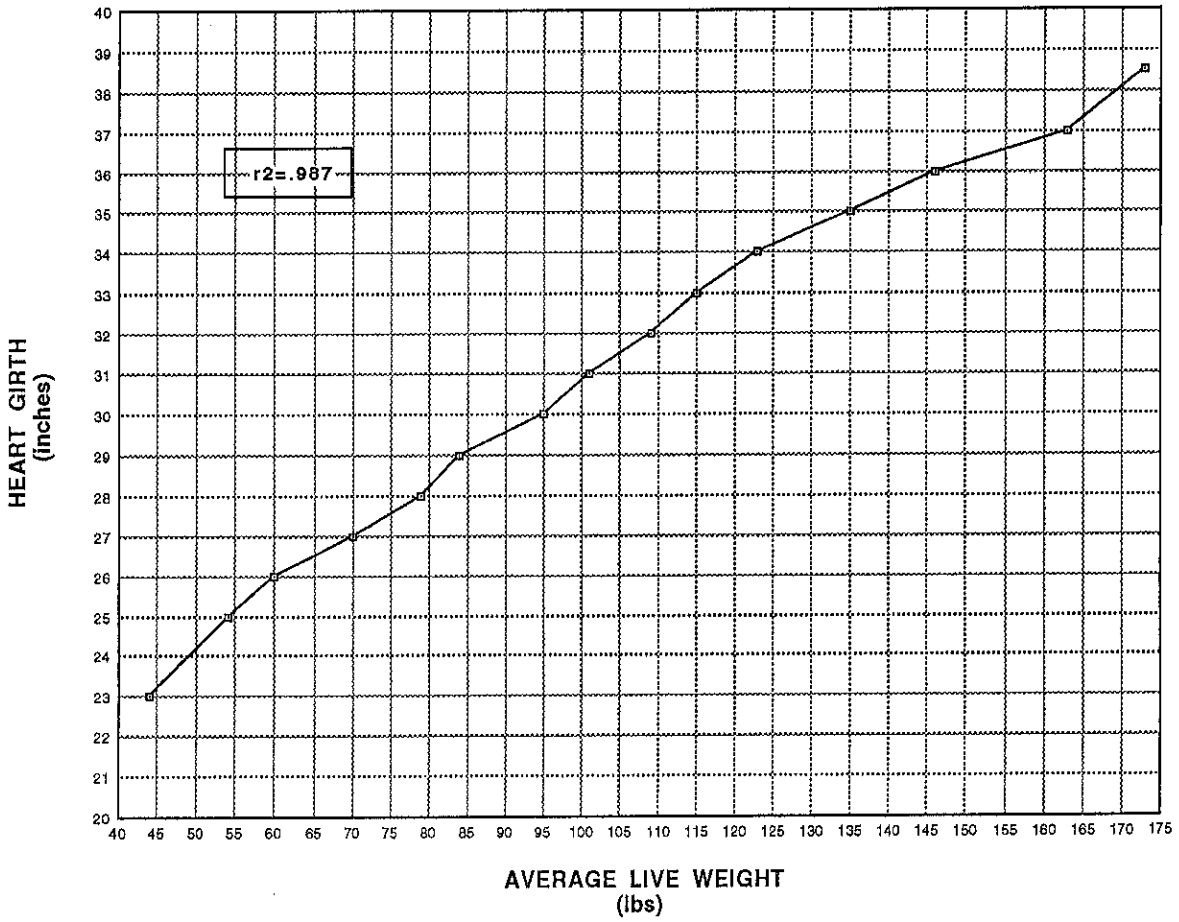
HEART GIRTH (inches) vs WEIGHT (lbs)

1988 - 1994
(n = 548)

HEART GIRTH*	NO. OF DEER	AVG WT. **	LIVE WT (x 1.25)	EDIBLE WT. (x.75)
20-24	10	35	44	26
25	5	43	54	32
26	6	48	60	36
27	20	56	70	42
28	19	63	79	47
29	18	67	84	50
30	44	76	95	57
31	82	81	101	61
32	101	87	109	65
33	82	92	115	69
34	75	98	123	74
35	42	108	135	81
36	25	117	146	88
37	10	130	163	96
38-39	9	138	173	104

*Circumference of chest cavity at greatest diameter

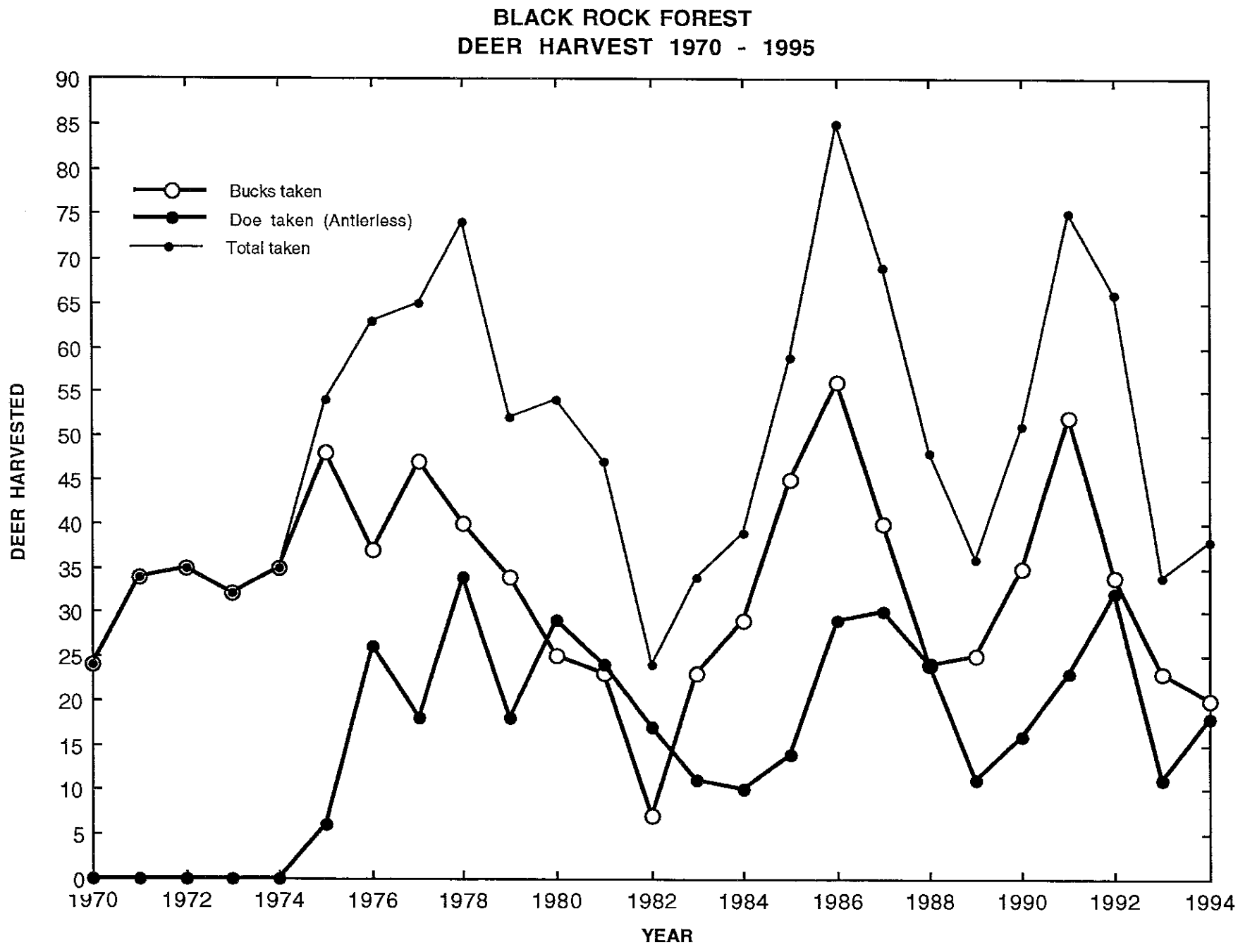
** All internal organs removed



DEER HARVEST
1970-1994

DATE	BUCK	DOES	TOTAL HARVEST
1970	24	0	24
1971	34	0	34
1972	35	0	35
1973	32	0	32
1974	35	0	35
1975	48	6	54
*1976	38	25	63
1977	50	24	74
1978	40	34	74
1979	33	20	53
1980	25	28	53
1981	23	24	47
1982	7	17	24
1983	23	10	33
1984	29	10	39
1985	45	14	59
1986	56	29	85
1987	40	29	69
1988	24	24	48
1989	25	11	36
1990	35	16	51
1991	52	23	75
1992	34	32	66
1993	23	11	34
1994	20	18	38
Average Harvest			
1970-1994	33		49
1976-1994	33	21	54

*1976 - Creation of deer management unit #54 (D.M.U. #54) by New York State Department of Environmental Conservation. Antlerless deer (does) are now harvested as a means of population management.


BLACK ROCK FOREST
DEER HARVEST 1970 - 1995
Bucks taken
Doe taken (Antlerless)
Total taken
DEER HARVESTED
YEAR
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994

HARVEST DATA 1970-1994: ANTLER POINT CLASS
(All Age Bucks)

YEAR	TOTAL LEGAL BUCKS*	SPIKE	3 PTS	4 PTS	5 PTS	6 PTS	7 PTS	8 PTS	
1970	24	15	2	5	1		1		
1971	34	20	3	5	3	2		1	
1972	35	26	4	4		1			
1973	32	24	3	2		1	2		
1974	35	15	3	10	2	2		3	
1975	48	24	3	7	2	8	1	3	
1976	38	24	5	2	3	3		1	
1977	47	21	3	6	2	11	1	3	
1978	40	25	1	6	1	2	2	3	
1979	33	21	1	8	1	1		1	
1980	25	12		7	3	1	1	1	
1981	23	12	3	7			1		
1982	7								
1983	23								
1984	30	17	2	3	1	2	3	2	
1985	36	12	4	8	4	3	1	3	10 PT
1986	48	17	6	9	6	5		4	10 PT
1987	29	15	3	6	1			4	
1988	21	9	3	2	3	2	2		
1989	18	8	2	3	1	2	1	1	
1990	31	5	6	5	4	6	1	4	
1991	49	14	3	13	2	8	3	5	10 PT
1992	31	5	3	7	6	4	2	4	
1993	22	12	3	2		3	1	1	
1994	16	3	2	3	3	2		3	

	1970-1988	1989-1994
% 2 PTS (SPIKES)	54%	28%
% 3-5 PTS	31%	41%
% 6 PTS +(Racks)	15%	31%

*LEGAL BUCK: Male deer displaying a minimum of one antler 3" long, above the burr or base of the antler growth.

1984-1994 WHITE-TAILED DEER HARVEST: STATISTICS BY SEX AND AGE CLASS

YEARLING MALES

YEAR	TOTAL MALES	SPK	ANTLER POINT CLASS 3	4	5	6	7	8	9	10	SUB(1) LEGAL	AVG PTS. (2)	AVG BEAM DIA. (mm)(3)	AVERAGE WT. (LBS)	FREQ. %
1984	22	14	2	2	0	1	0	0	0	0	3	2.6	17	89	76
1985	29	12	3	8	3	2	1	0	0	0	0	3.4	17.8	85	82
1986	37	17	6	7	4	3	0	0	0	0	0	3.2	16.1	84	77
1987	22	14	1	2	0	0	0	1	0	0	4	2.6	15	82	66
1988	14	7	3	0	1	2	0	0	0	0	1	3.1	15	84	64
1989	15	8	2	0	0	1	0	0	0	0	4	2.5	14.7	80	68
1990	17	5	5	3	2	2	0	0	0	0	0	3.5	16.3	88	56
1991	31	14	3	11	1	1	1	0	0	0	0	3.2	16.6	94	63
1992	20	6	3	7	1	3	0	0	0	0	0	3.7	16.7	86	61
1993	15	9	2	1	0	1	0	0	0	0	2	2.6	14.7	89	68
1994	7	3	2	1	1	0	0	0	0	0	0	3	15	91	44

2 1/2 YEAR OLD MALES

YEAR	TOTAL MALES	SPK	ANTLER POINT CLASS 3	4	5	6	7	8	9	10	SUB LEGAL	AVG. PTS.	AVG BEAM DIA. (MM)	AVERAGE WT. (LBS)	FREQ. %
1984	5	1	0	0	0	1	1	2	0	0	0	6.2	23.8	115	17
1985	3	0	0	1	0	0	0	0	1	1	0	7	23	114	8
1986	9	0	0	2	2	2	0	3	0	0	0	6	23.5	113	19
1987	10	1	2	4	1	0	0	2	0	0	0	4.5	19.4	101	30
1988	8	2	0	2	2	0	2	0	0	0	0	4.3	18.8	96	36
1989	7	0	0	3	1	1	1	1	0	0	0	5.4	20	95	32
1990	13	0	1	2	1	4	1	4	0	0	0	6.1	21.6	105	40
1991	14	0	0	2	1	6	1	4	0	0	0	6.3	21.8	112	28
1992	7	0	0	1	4	0	1	1	0	0	0	5.6	20.9	110	21
1993	5	1	1	1	0	2	0	0	0	0	0	4.2	18.4	103	23
1994	2	0	0	1	1	0	0	0	0	0	0	4.5	20	122	12

(1) Sub-legal: antler growth <3" from base (burr)
(2) Antler points: protrusions from the main beam of the antler, measuring a minimum length of one inch.
(3) Average beam diameter: measured in mm 1" above the burr

1984 -1994 WHITE-TAILED DEER HARVEST REPORT

3.5 - 4.5 YEAR OLD MALES

Year	Total Males	Antler Point Class									Sub Legal	Average Points	Avg. Beam Dia. (mm)	Average Wt. (lbs.)	Freq. %
		Spike	3	4	5	6	7	8	9	10					
1984	2	0	0	0	0	0	2	0	0	0	0	7	27	120	7
1985	4	0	0	0	1	1	0	2	0	0	0	6.8	26.8	119	10
1986	2	0	0	0	0	0	0	1	0	1	0	9	30.5	145	4
1987	1	0	0	0	0	0	0	1	0	0	0	8	35	152	3
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	1	0	0	0	1	0	0	0	0	0	0	5	22	94	3
1991	4	0	0	0	0	1	1	1	0	1	0	7.8	24.3	117	8
1992	6	0	0	0	1	1	1	3	0	0	0	7	26.3	140	18
1993	2	0	0	0	0	0	1	1	0	0	0	7.5	23.5	126	9
1994	7	0	0	1	1	2	0	3	0	0	0	6.4	23.1	124	44

FEMALE AGE CLASS IN YEARS

Year	Fawn	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5-9.5	10.5+	TOTAL	% 3 1/2 yrs. +
1984	1	5	1	0	1	0	0	1	1	0	10	30
1985	3	2	5	3	1	0	0	0	0	0	14	28
1986	4	5	7	4	1	3	2	2	0	1	29	45
1987	4	1	8	6	5	1	2	2	0	0	29	55
1988	3	3	6	4	5	0	2	1	0	0	24	50
1989	0	1	1	4	3	1	0	0	1	0	11	82
1990	2	1	4	6	1	0	0	2	0	0	16	56
1991	1	7	6	3	1	3	0	1	0	1	23	39
1992	2	6	5	3	2	5	3	2	3	1	32	59
1993	1	2	3	1	2	1	1	0	0	0	11	45
1994	5	1	3	3	1	1	1	2	1	0	18	50

1984 - 1994 HARVEST DATA: FAWNS

YEAR	TOTAL FAWN HARVESTED	TOTAL ANTLERLESS TAKE	FAWNS AS % OF ANTLERLESS HARVEST	MALE		FEMALE	
				TOTAL HARVESTED	AVG DRESSED* WEIGHT (LBS)	TOTAL HARVESTED	AVG DRESSED WEIGHT (LBS)
1984	1	10	10%	0	NA	1	50
1985	9	20	45%	6	56	3	48
1986	12	37	32%	8	45	4	33
1987	11	36	29%	7	38	4	44
1988	4	25	16%	1	44	3	49
1989	3	14	21%	3	55	0	0
1990	5	19	26%	3	56	2	48
1991	4	26	15%	3	59	1	52
1992	3	33	9%	1	48	2	40
1993	2	12	16%	1	46	1	48
1994	9	22	40%	4	65	5	53
TOTALS	63	254		37		26	
AVERAGE			25%		51		45

* DRESSED WEIGHT - Weight of animal with all internal body organs removed.
(Live weight calculaton = dressed weight x 1.25)

YEARLING MALE-AGE CLASSES
1984 - 1994

Year	1 Year 5 Months			1 Year 6 Months		1 Year 7 Months	
	Total Yearling Harvest	# per	% of Yearling Harvest	# per	% of Yearling Harvest	# per	% of Yearling Harvest
1984	22	7	32%	4	18%	11	50%
1985	29	7	24%	13	45%	9	31%
1986	37	11	29%	18	49%	8	22%
1987	21	9	43%	9	43%	3	14%
1988	13	6	46%	2	15%	5	39%
1989	14	8	57%	5	36%	1	7%
1990	18	6	33%	9	50%	3	17%
1991	31	14	45%	9	29%	8	26%
1992	20	9	45%	5	25%	6	30%
1993	15	3	20%	7	47%	5	33%
1994	7	3	43%	3	43%	1	14%
1984-1994	227	83	37%	84	37%	60	26%

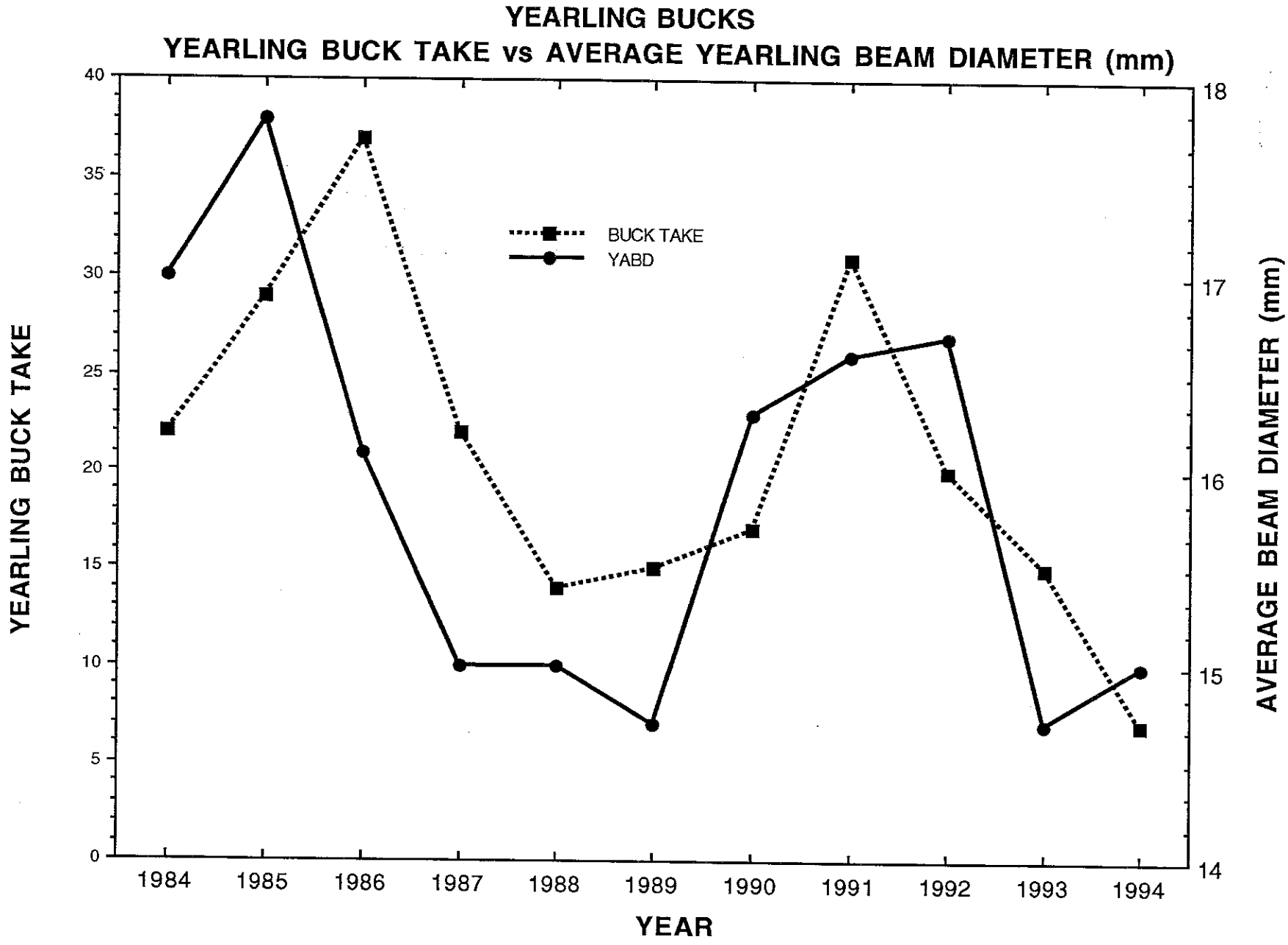
	Avg Wt	ABD*	Avg Wt	ABD	Avg Wt	ABD
1984-1994	84	15.5	87.5	16	91	17.2

*Antler Beam Diameter

** Data recorded from annual harvest during hunting Season

Distinguishing three sub classes of yearlings are made by the presence of a 3 cuspid 3rd premolar at 1 yr 5 mos, the loss of the milk tooth by an emerging 2 cuspid permanent tooth at 1 yr 6 mos and the full emergence of the 2 cuspid 3rd premolar at 1 yr 7 mos. The percentage of each sub-class in the yearling harvest may give insight to early and late fawn birthings. Increase frequency in 1 yr 5 mos. and deceases in 1 yr 7 mos may indicate late conception dates (mid-late December) caused by inadequate sex ratios.

Averaged data indicates the progressive increase in average weight, Antler Beam Diameter and antler points within the sub-classes. Displaying optimum biological health within the yearling age class, at 1 yr 7 mos, this creates a goal of management to create conditions for optimum herd health by maintaining early birth frequency, through adjusting sex ratios by altering doe (antlerless) quotas annually.


YEARLING BUCKS
YEARLING BUCK TAKE vs AVERAGE YEARLING BEAM DIAMETER (mm)
YEARLING BUCK TAKE
AVERAGE BEAM DIAMETER (mm)
YEAR
BUCK TAKE
YABD
0
5
10
15
20
25
30
35
40
14
15
16
17
18
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994

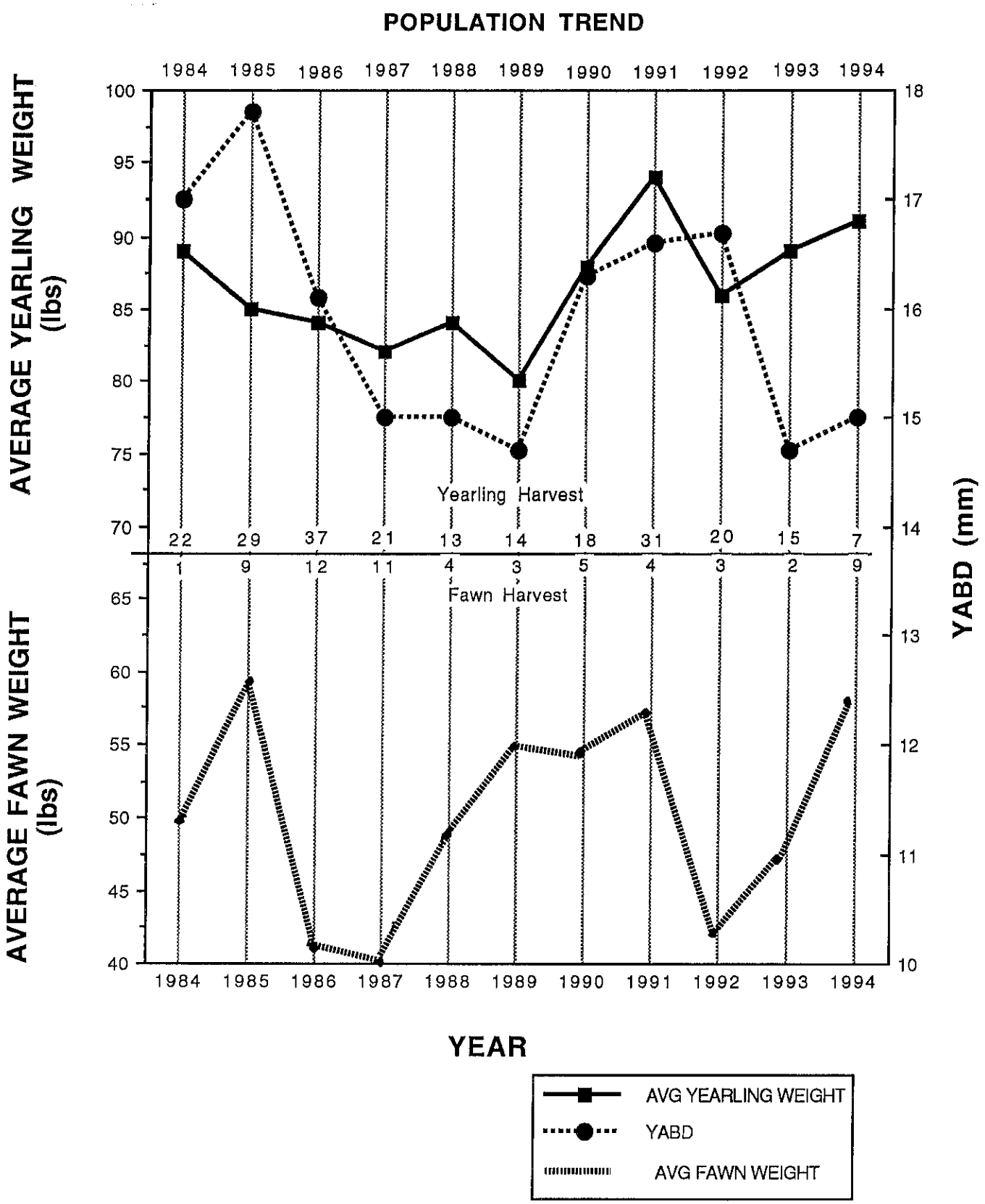
BLACK ROCK FOREST
BIG BUCKS

YEAR	HUNTERS NAME	POINTS	AGE/yrs	WEIGHT(lbs)	BEAM DIAMETER (mm)
1984	GREG LUDATO	8	2 1/2	126	29
	LARRY KIRWAN	7	3 1/2	120	29
1985	RAY KENNY	10	2 1/2	130	27
	AL PALUMBO	8	3 1/2	123	36
	JOEL TRUNCALI	8	3 1/2	130	24
1986	FURMAN CONKLIN	10	3 1/2	157	31
	TOM STEED	8	3 1/2	132	30
	JIM BOTHWELL	8	2 1/2	121	28
	PETE VETERE	8	2 1/2	125	27
1987	GENE CONKLIN	8	3 1/2	152	35
	CHARLES CHATFIELD	8	2 1/2	135	28
1988	BOB SMITH SR.	7	2 1/2	138	25
1989	JEFF PAVIA	8	2 1/2	147	26
1990	DAVE RICE	8	2 1/2	138	27
1991	STEVE OTLOWSKI	10	3 1/2	124	27
	JOHN O'ROURKE	8	3 1/2	138	25
	JOE SWANSON	7	3 1/2	140	21
	JEFF PAVIA	8	2 1/2	120	28
	BOB BATES	6	2 1/2	122	26
	DAVE BARKI	8	2 1/2	114	26
1992	FURMAN CONKLIN	5	4 1/2	162	31
	RALPH DEPEW	7	3 1/2	154	28
	DOUG SPAULDING	8	3 1/2	150	23
	BOB SHERMAN JR	8	3 1/2	120	27
	LOU GIZZARELLI	6	3 1/2	132	25
	TONY TALLARICO	8	3 1/2	122	24
	JEFF PAVIA	8	2 1/2	116	25
1993	HENRY MESEROLE	8	3 1/2	134	25
	AL CRUDELE	7	3 1/2	118	22
1994	AL CRUDELE (BOW)	8	3 1/2	130	26
	AL CRUDELE	6	3 1/2	142	27
	PAT PURCELL	8	3 1/2	130	23
	JOHN VITEK	8	3 1/2	110	23

POPULATION TRENDS

The most revealing data collected during the past ten years concerning the population trends of the Whitetail herd are: Average fawn weight (AFW), average yearling weight (AYW), and yearling antler beam diameter (YABD). These three yearly averages are graphed together along with the listing of the yearling harvests. (Page 25)

Notice in 1986 when 37 yearlings were harvested, herd health indicators (AFW and YABD) were much lower than they had been the previous year. The result was reduced yearling take of 21 in 1987. A continuation of falling AFW and YABD in 1987 produced a further reduction in the yearling take of 1988. As fawn weights increased 1987 to 1989, YABD and yearling weights followed in 1989-1991. The harvest responded with the harvest of yearlings peaking out at 31 in 1991.


POPULATION TREND
AVERAGE YEARLING WEIGHT (lbs)
AVERAGE FAWN WEIGHT (lbs)
YABD (mm)
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994
Yearling Harvest
22 29 37 21 13 14 18 31 20 15 7
Fawn Harvest
1 9 12 11 4 3 5 4 3 2 9
YEAR
AVG YEARLING WEIGHT
YABD
AVG FAWN WEIGHT

MINIMAL POPULATION SIZE AND COMPOSITION

From the records of deer killed or found dead (hunted, vehicle collision, starvation, predator kill, and unknown) a minimal population estimate can be determined. By aging deer carcasses, the year of birth can be determined. Tabulation of this data can re-construct the known minimum deer population for any given year. This provides insight on the age composition of does in the population, critical to reproduction potential.

Reading the chart horizontally, below each year a column is divided into male and female. The numbers in these columns indicate the number of male and female born in the year indicated in the left hand column. The total at the bottom of the column indicates the known dead deer from that year. Continuation of this data reconstructs the minimum population of deer for a given year, recorded to the far right under minimum population known.

EXAMPLE: In 1986, 56 bucks and 26 does were known to have been killed and aged. Notice 37 bucks of that year were born in 1985 (making them yearlings in 1986). Following that column horizontally to the minimum population known column it can be realized a minimum of 56 bucks were born in 1985, along with 28 does totaling a minimum known population of 84 deer.

After applying natural and unnatural mortality factors (starvation, predator kill, car collision) the survival rate of does can be estimated throughout the coming years. Age structure of residual or breeding population can be determined as data collection continues. Investigation of sex ratio at birth reveals a slight favoring of bucks, 106.2 males: 100 females as reported by Severinghaus and Cheatum -1956, sex frequency at birth are affected by doe age and condition.

MINIMAL POPULATION SIZE AND COMPOSITION

POPULATION COMPOSITION BY YEAR CLASS FOR DEER KNOWN TO HAVE BEEN REMOVED*

BIRTH	YEAR OF DEATH																						KNOWN MORT		MIN POP			AGE AS OF
YEAR	1984		1985		1986		1987		1988		1989		1990		1991		1992		1993		1994		** MISC.		KNOWN		TOTAL	FALL 1995
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		M	F	M	F		(yrs)
1983	22	5	3	5	2	4	0	5					0	2			0	1						0	0	27	22	49	
1984	0	1	32	2	9	7	1	6	0	5	0	1	0	0	0	1	0	3						0	1	42	27	69	
1985			6	3	37	5	10	8	0	4	0	3	0	0	0	0	0	2			0	1		3	3	56	28	84	10.5
1986					8	4	22	1	8	6	0	4	0	1	0	3	0	3			0	0		3	6	41	28	69	9.5
1987							7	4	13	3	7	1	1	6	0	1	0	5	0	1	0	2		1	2	29	25	54	8.5
1988									2	3	15	1	13	4	4	3	1	2	0	1	0	1		1	0	36	16	52	7.5
1989											3	0	18	1	14	6	5	3	0	2	0	1		2	2	42	15	57	6.5
1990													3	2	31	7	7	5	2	1	0	1		1	1	44	17	61	5.5
1991															3	1	20	6	5	3	7	3		1	2	36	15	51	4.5
1992																	1	2	15	2	2	3		3	10	21	17	38	3.5
1993																			1	1	7	1		0	1	8	3	11	2.5
1994																					4	5		0	0	4	5	9	1.5
TOTAL	29	8	45	14	56	26	40	29	23	24	25	11	35	16	52	23	34	32	23	11	20	18		15	30	397	242	639	

*The data represents the population compositon each year at the time fawns were born.

**Known mortality Misc. - These are deer known to have died by other means than hunter kill. (Vehicle collision, starvation, predator kill, unknown)

BLACK ROCK FISH AND GAME CLUB (membership 1400)

The club, established in 1923, has had exclusive hunting rights at Black Rock Forest for over 60 years. Previous to 1989, all New York State Hunting Seasons were recognized. Since 1989 only deer hunting has been permitted at the forest. The club supports the forest through an annual donation of $5,000 and contribution of $500 annually to the Jack Karing Educational Fund. Also available to members are year round fishing rights in Sutherland Pond and access to a forest gate key for vehicle access. The forest is secured by the club patrol, assisting hikers and enforcing forest rules and regulations.

IMPORTANT DATES

	Opening Day	Final Day
Archery	October 15	Day before regular gun
Regular-gun	lst Monday after 15th of November	2nd Tues of December
Muzzel loading	2nd Wednesday of December	3rd Tuesday of December
Late Archery	2nd Wednesday of December	3rd Sunday of December

Second Monday of November - Deer hunters' meeting at Fish and Game Club

BLACK ROCK FOREST DEER HUNTING SEASON

RULES AND REGULATIONS

1) BLACK ROCK FOREST ABIDES BY ALL N.Y. D.E.C. RULES AND REGULATIONS.

2) ALL MEMBERS ARE TO CLEARLY DISPLAY THEIR BLACK ROCK FISH & GAME MEMBERSHIP BUTTON.

3) ALL MEMBERS AND IMMEDIATE FAMILY (SPOUSE AND CHILDREN UNDER 25 YEARS) MUST REGISTER WITH GATE KEEPER UPON ARRIVAL AND DEPARTURE (EVEN IF HUNTING THE PERIMETER).

4) FOREST GATE PASSES ARE TO BE CLEARLY DISPLAYED ON VEHICLE DASHBOARD.

5) GATE OPENS AT **5:30 A.M.**, ALL HUNTERS MUST CHECK OUT WITH GATE KEEPER BY **5:30 P.M.**.

6) HUNTING ZONES, SANCTUARY AND HUNTER ZONE CAPACITIES RULES MUST BE OBEYED.

7) DO NOT BLOCK GATES OR ROADS, FOREST SPEED LIMIT IS 10 MPH.

8) ROAD HUNTING IS ILLEGAL.

9) ALL ANIMALS HARVESTED MUST BE REGISTERED AND INSPECTED BY FOREST MANAGER AT DEER STATION (GATE).

10) OPENING DAY - BUCK ONLY- ANTLERLESS DEER MAY BE TAKEN FOR THE REMAINDER OF SEASON (AS QUOTA ALLOWS) DEER MANAGEMENT UNIT #54 PERMIT REQUIRED.

11) NO BEAR HUNTING.

12) NO PERMANENT TREE STANDS.

13) REPORT TRESPASSERS AND OR ILLEGAL ACTIONS TO GATEKEEPER, C.B. CHANNEL 3.

14) BOWHUNTING IS PERMITTED TILL 11 A.M. DURING N.Y.S. ARCHERY SEASON DATES. HUNTER REPORT STATION LOCATED AT THE STONE HOUSE GARAGE. (WILDLIFE SIGHTINGS AND INCIDENT REPORTS)

MINERAL SPRINGS

A 122 acre forested parcel was donated to Black Rock Forest by the Nature Conservancy in 1993.

Private land owners, neighboring the property, have show great concern about hunting. This parcel, contiguous with Black Rock, had a history of hunting trespass and required a more stringent hunting program than the mother forest at Black Rock.

Any hunter interest in hunting this property must take a tour with the Forest Director or Manager to become aware of boundaries, dwellings and regulations. Communication between hunters, forest staff and neighboring land owners is critical. This method of management has been chosen to best obtain the forest objectives, to maintain a healthy deer herd in a safe manner, and to restrict hunting trespass by installing our own educated and concerned hunters as property stewards.

MINERAL SPRINGS
HUNTING RULES AND REGULATIONS

1. NO HUNTING NORTH OF MINERAL SPRING BROOK.

2. HUNTERS MUST PHONE IN TO FOREST HEADQUARTERS (534-4517) PRIOR TO HUNTING VISITS, INFORMING FOREST OF TIME OF ARRIVAL AND DEPARTURE.

3. ALL HUNTERS MUST POSSESS AND DISPLAY UPON REQUEST, WRITTEN PERMISSION FROM BLACK ROCK FOREST DIRECTOR OR FOREST MANAGER.

4. HUNTERS MUST BE A MEMBER, OF GOOD STANDING, WITH THE BLACK ROCK FISH AND GAME CLUB.

5. PARKING PERMITS ARE TO BE DISPLAYED ON VEHICLE DASHBOARD.

6. BLACK ROCK FOREST ABIDES BY ALL NEW YORK D.E.C. RULES AND REGULATIONS.

7. ALL DEER HARVESTED MUST BE INSPECTED BY FOREST MANAGER.

8. ANY ILLEGAL HUNTERS OR ACTIVITIES ARE TO BE REPORTED TO THE FOREST DIRECTOR OR FOREST MANAGER. IF POSSIBLE COLLECT NAMES, BACK TAG NUMBERS, VEHICLE PLATE NUMBERS AND DESCRIPTIONS. **REPORT IMMEDIATELY.**

9. NO DRIVING OR PARKING ON MERRILL ROAD.

10. LIMIT OF SIX (6) HUNTERS ON PROPERTY AT ANY ONE TIME.

DEER CHECK STATION

The Black Rock Forest Deer Check Station is located, each fall during hunting season, near the information board at the Upper Reservoir (Map p. 2). The station operates as a New York Department of Conservation Deer Check Station (#81) located in Deer Management Unit #54 (Map p.32), abiding by all New York State Hunting Rules and Regulations.

All hunters are required to display proof of membership to Black Rock Fish and Game Club during sign-in with gatekeeper. Passes consist of two copies. A yellow copy for display on the vehicle's dashboard and a white copy retained by the gatekeeper. Permits (passes) are to be returned to gatekeeper upon departure from forest.

Deer station is equipped with CB (Channel 3) and Cellular phone in case of emergency. Posted at the station are the rules and regulations, forest zone maps, anterless deer quota and hunter take, along with educational material relating to deer and deer hunting.

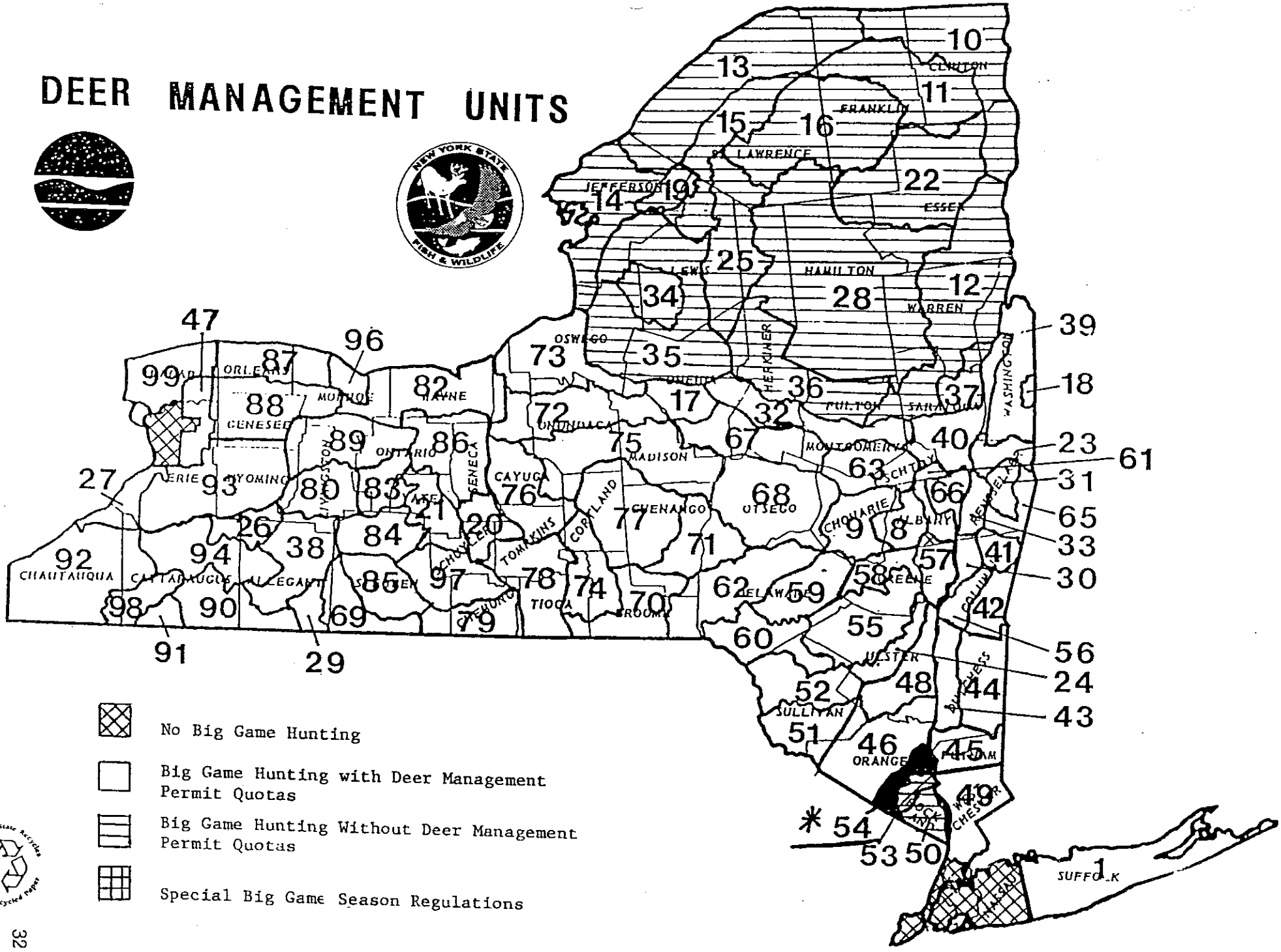
The station is also equipped with weight scale, calipers, measuring tape, jaw board, jaw breaker, flashlight, knife, string, saw dust, hacksaw, ladder, table, surgical gloves, first aid kit, rags and field sheets.

Deer station opens at 5:30 am and closes 5:30 pm everyday for the entire Big Game-rifle Season.

This is a 23 day season beginning the second Monday after the 10th of November until the second Tuesday in December.

The Black Rock Forest is closed to all other activities (hiking, biking, etc) during this period.

DEER MANAGEMENT UNITS



No Big Game Hunting

Big Game Hunting with Deer Management Permit Quotas

Big Game Hunting Without Deer Management Permit Quotas

Special Big Game Season Regulations

FOREST ZONING
(Est 1989)

In 1989, examination of previous seasonal hunting reports from Black Rock Forest indicated that, from a safety and management standpoint, hunter density needed to be more carefully regulated.

Thus starting in that season, the Black Rock Forest was compartmentalized into ten zones. These zones are distinguishable by forest roads, trails, natural features and forest boundaries.

Hunter capacity in each zone is determined by acreage and terrain. Maximum hunter density of one hunter per 35 acres was determined after investigation and observance of hunting areas with similar conditions (i.e. West Point, Stewart Co-op).

This distribution of hunting pressure has been well received by hunters. The breakdown of harvest per zone has provided useful data that is popular with hunters. Deer densities have also been monitored with greater spartial accuracy. Areas may be further managed in accordance with localized conditions.

ZONE	ACREAGE	HUNTER CAPACITY
I	450	12
II	520	15
III	450	13
IV	460	16
V	400	11
VI	500	16
VII	150	7
VIII	330	11
IX (Sanctuary)	220	0
X Mineral Springs	120	6
Totals	3600	106

The ***Sanctuary*** , installed in 1989.

Yearling male frequency, 1984-1987, was 76%, an indication of intense hunting pressure. Older mature bucks were therefore not well represented in the age composition of the deer herd. Social behavior, resulting from a natural age composition, is critical to White-tailed deer reproductive strategies and survival. Absence of older mature bucks may cause stress

(Forest Zoning continued)

in younger age classes. Mature Does entering their intial estrus of the season may not be serviced, since younger bucks (yearling and fawn) are not available (physical requirements of body growth must be met first before the physical demands of reproduction). Thus unbred, the dams may be serviced in their 2nd or 3rd estrus, by younger bucks now possibly capable of their first inexperienced rut. This results in later fawn births and corresponding survival difficulties.

The continuance of this condition will compound social and physical deficiencies.

Zone IX was thus declared and posted as a sanctuary from 1989-1994, with no hunting or trespassing allowed on 220 acres.The reasoning was that this area would allow some bucks to live longer and correct herd age structure.

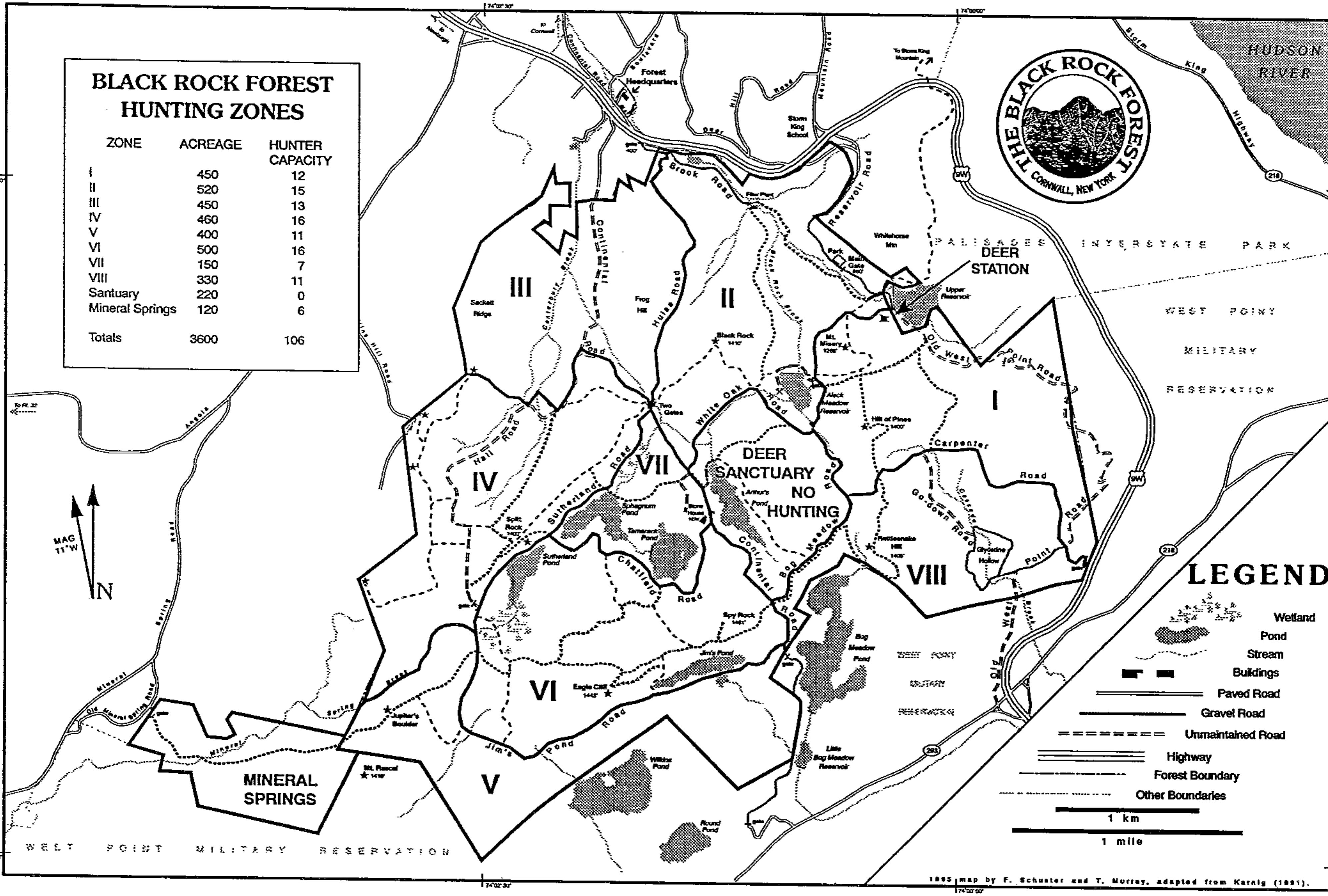
Results were immediate, in conjunction with the zoning system. Yearling male frequency decreased as adult male frequency increased in subsequent years.

YEARLING MALE FREQUENCY* (YMF)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Yearling Male Freq. 1 1/2 years	76	81	77	67 73%	64	68	55	63	61 59%	68	44
Adult Male Freq. 2 1/2 years	24	18	23	34	36	32	44	37	39	32	56

*Yearling Male Frequency (YMF) - the occurence of yearling males in the total buck take, expressed as a percent. $\frac{\text{Yearling Buck Kill}}{\text{Total Buck Kill}} = \text{YMF}$

This percentage is useful in determing hunting pressure, age structures and reproduction rates.



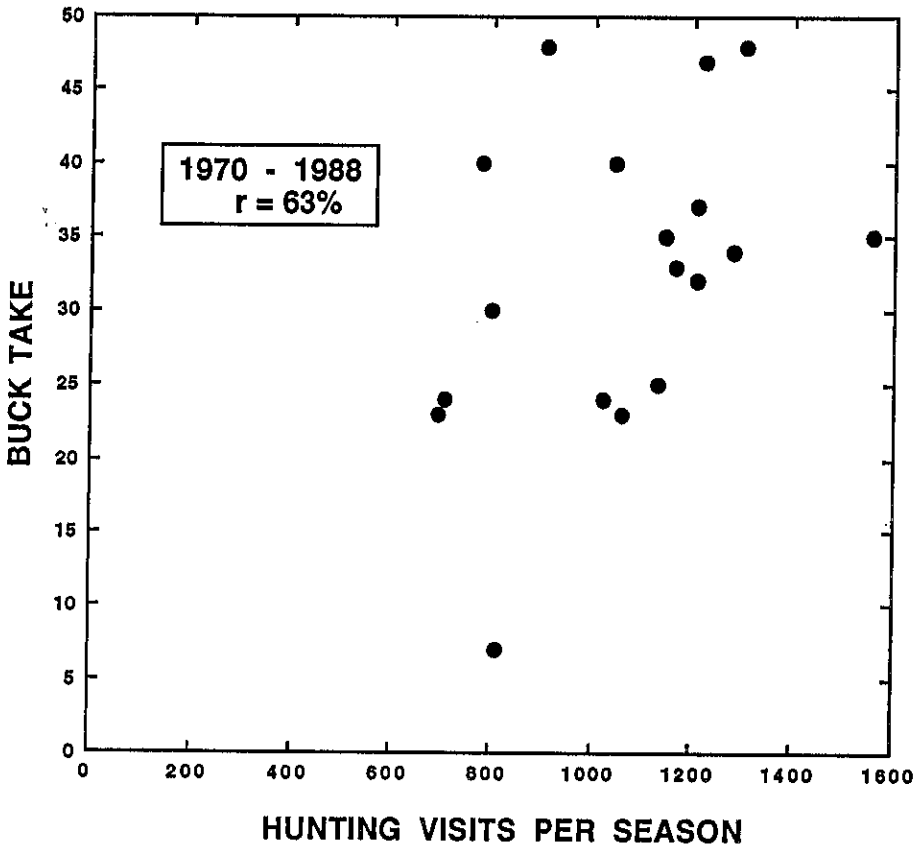
BLACK ROCK FOREST HUNTING ZONES

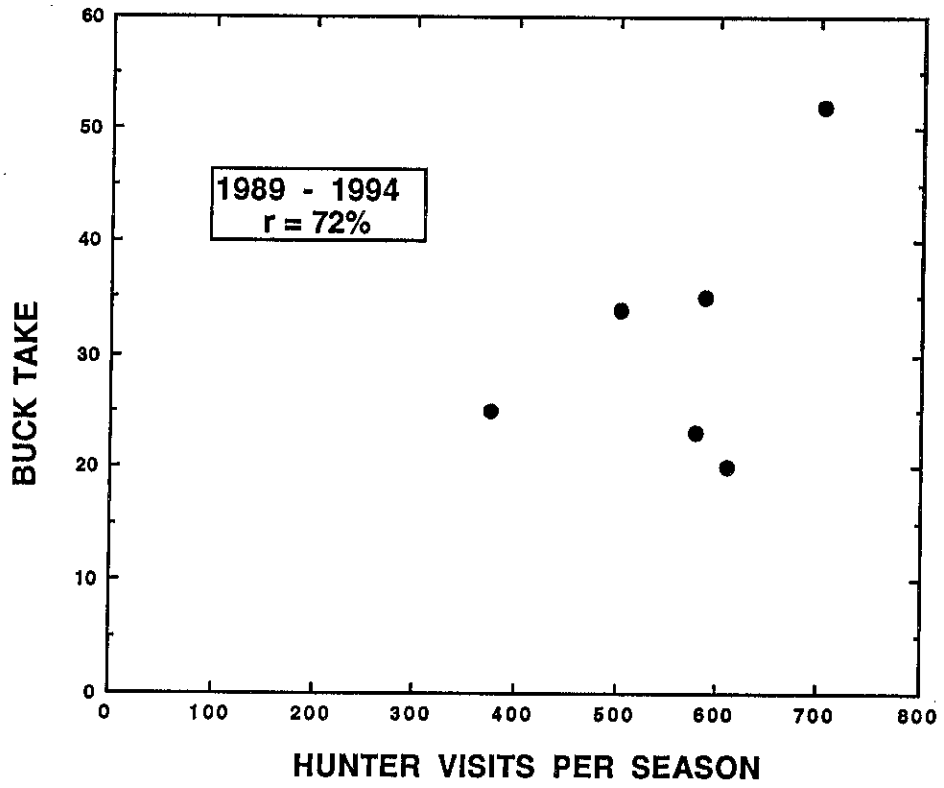
ZONE	ACREAGE	HUNTER CAPACITY
I	450	12
II	520	15
III	450	13
IV	460	16
V	400	11
VI	500	16
VII	150	7
VIII	330	11
Santuary	220	0
Mineral Springs	120	6
Totals	3600	106

HUNTING PRESSURE
BUCKS ONLY

	HUNTER VISITS		BUCK TAKE	
YEAR	OPENING DAY	SEASON (23 DAYS)	OPENING DAY	SEASON (23 DAYS)
1970	158	1022	13	24
1971	220	1281	11	34
1972	163	1147	11	35
1973	195	1210	20	32
1974	201	**1556**	14	35
1975	186	1301	19	48
1976	199	1211	18	37
1977	184	1222	23	47
1978	178	1043	10	40
1979	**224**	1168	25	33
1980	184	1134	14	25
1981	151	1060	7	23
1982	138	810	3	7
1983	129	691	NA	23
1984	NA	797	18	30
1985	NA	NA	NA	34
1986	182	905	27	48
1987	171	777	21	40
1988	139	704	17	24
AVERAGE	**177**	**1058**	**16**	**32**
1989	78	375	12	25
1990	88	588	17	35
1991	103	703	32	52
1992	109	503	18	34
1993	97	578	13	23
1994	109	611	10	20
AVERAGE	**97**	**560**	**17**	**32**

HUNTING PRESSURE vs BUCK TAKE





HUNTING PRESSURE
BUCKS AND DOES
HUNTER VISITS

	# HUNTER VISITS		# HUNTER VISITS ENTIRE	
YEAR	OPENING DAY		SEASON (23 DAYS)	
1970	158		1022	
1971	220		1281	
1972	163		1147	
1973	195		1210	
1974	201		1556	HIGH
1975	186		1301	
1976	199		1211	
1977	193		1302	
1978	185		1171	
1979	239	HIGH	1305	
1980	198		1230	
1981	162		1197	
1982	164		908	
1983	148		720	
1984	139	LOW	797	
1985	NA		NA	
1986	210		905	
1987	171		777	
1988	139		704	LOW
AVERAGE	**182**		**1097**	
1989	78		375	
1990	88		588	
1991	103		703	HIGH
1992	109	HIGH	503	
1993	97		578	
1994	109	HIGH	611	
AVERAGE	**97**		**560**	

SUCCESS RATE

During the 19 year time period of 1970 through 1988, an average of 177 hunters participated on the Opening Day hunt. They harvested an average of 16 bucks, a success rate of 9%. During the six year time period of 1989 through 1994, an average of 97 hunters harvested an average of 17 bucks per opening day, a success rate of 18%. These statistics reflect a saturation point that can be obtained when an optimum number of bucks are harvested by the least number of hunters, producing safe hunts and efficient success rates.

On average, 50% of the total seasonal harvest of bucks are taken by hunters on opening day. The first weekend of the season accounts for 20-25% more of the total seasonal harvest. These percentages are subject to fluctuation due to weather conditions.

Prior to 1991 the number of hunters were counted opening day. Only hunter visits were then tallied for the remainder of the season. Total number of individual hunters for the season is not available.

Since 1991, all hunters are counted throughout the season by using Fish & Game Club ID Button numbers. Hunter visits are tallied per button number. Actual seasonal hunting pressure can then be calculated.

SEASON HUNTING PRESSURE AND SUCCESS RATE

	(1)	(2)	(3)			(4)		
			DMU#54		VISITS	SUCCESS RATE		
YEAR	PERMITS	HUNTERS	PERMITS	VISITS	PER HUNTER	BUCKS	DMU	TOTAL
1991	703	208				24%		36%
1992	503	227		759	3.4	15%		29%
1993	395	186	90	577	3.1	12%	13%	18%
1994	434	198	110	619	3.1	08%	20%	19%

1. Permits - Written pass for each vehicle entering the forest (Permits=Vehicles)

2. Hunters - Number possessing a N.Y.S. Big Game license. Entitling possessor one antlered White-tailed deer. This number also includes DMU Permits Holders. DMU permit holders are required to possess big game license.

3. DMU Permits - Deer Management unit, special permit, supplied by NYS Department Environmental Conservation, entitling hunter to harvest one antlerless deer, only. (Black Rock Forest is located in DMU #54)

4. Success Rate - Percentage of hunters filling a hunting permit by harvesting a deer.

SUCCESS RATE

YEAR	OPENING DAY			% OF TOTAL BUCK KILL
1970	8%			54%
1971	5%			32%
1972	7%			31%
1973	10%			63%
1974	7%			40%
1975	10%			40%
1976	9%			49%
1977	13%			49%
1978	6%			25%
1979	11%			76%
1980	8%			56%
1981	5%			30%
1982	2%			43%
1983	NA			NA
1984	NA			60%
1985	NA			NA
1986	15%			56%
1987	12%			53%
1988	12%			71%
AVG SUCCESS RATE '70-'88		**9%**	**50%**	
1989	15%			48%
1990	20%			49%
1991	31%			61%
1992	17%			53%
1993	13%			56%
1994	11%			50%
AVG SUCCESS RATE '89-'94		**18%**	**53%**	

DEER TRACKING CENSUS (DTC)

The DTC was employed in 1988 to produce an index of over-wintering deer in Black Rock Forest. This method of determining population trends requires freshly fallen snow. Distances of five to ten miles are traveled on pre-determined routes to count freshly made tracks. Tracking time intervals after snowfalls become critical. Deer activity periods after snow events are influenced by snow accumulation and post event weather. Further investigation has been undertaken by tracking at 12 and 24 hour time intervals to better assess deer activity periods after snow events.

Double or repeated counts of deer tracks must constantly be considered. Knowledge of terrain, deer group size and direction of tracks must be noted by tracker.

Pre-determined tracking routes generally favor roadways. Deer travel in winter groups, usually traveling single file on developed deer trails through wooded areas. Upon reaching open areas such as roadways, deer commonly break ranks, therefore creating on opportunity to count the number of individuals in the group.

The average size of these over-wintering deer groups has proven to be helpful in indicating the trend of the post hunt population, appears closely related to deer harvest of the following hunting season.

$$\frac{\text{Total number of deer tracks}}{\text{Total number of groups}} = \text{Average deer per group}$$

Other benefits of tracking include observation of other wildlife, and has led to a better understanding of the behavior and habits of animals such as coyote, fox, otter, mink, squirrel, grouse, turkey and humans.

An example of studying animal behavior, through tracking, is shown in the field notes of January 30, 1990. This investigation lends curious information concerning winter deer range and movements.

TRACKING INDEX

YEAR	Snowfall (inches)	Distance (miles)	# of Deer	Deer/Mile	of Groups	Deer/Group
1988	55	29	188	6.5	85	2.2
1989	6	20	139	7	51	2.7
1990	27	54.5	377	7	121	3.1
1991	22	48.5	384	7.9	86	4
1992	17	44.7	292	6.5	88	3.3
1993*	44	42.4	345	8.1	120	2.6
1994	80	33.4	260	7.7	89	2.9

% OF TOTAL

GROUP	1988	1989	1990	1991	1992	1993	1994
1 DEER	28	**31**	15	5	15	14	19
2 DEER	**36**	**31**	25	15	**25**	**38**	21
3 DEER	25	16	**29**	**29**	18	21	**26**
4 DEER	9	12	21	19	23	14	15
5 DEER	1	2	4	13	8	7	13
6 DEER	1	2	4	8	6	2	1
7 DEER		2	1	6	2	2	4
8 DEER		2	1	1	1	1	1
9 DEER		\		2	0		
10 DEER		2		1	2		
DEER PER MILE	6.5	7	7	7.9	6.5	8.1	7.7
AVG. DEER/GROUP	2.2	2.7	3.1	4	3.3	2.6	2.9
BUCK TAKE	23	25	35	52	34	23	20
TOTAL TAKE	47	36	51	75	66	34	38

*SEE "BLIZZARD OF 1993"

TRACKING DEER GROUPS I - JANUARY 30, 1990

Four inches (4") of snowfall, stopped at 9 am January 29th continued to rain from 2 pm on the 29th to pre-dawn January 30th, leaving 1" of slushy snow with soft crust, partly cloudy, brisk wind, 35o - 40o

Time in: 10 am Time out: 2 pm

Located three relatively fresh deer tracks on the Old West Point Road just south of the upper reservoir tracking east to west. Expecting to see the same tracks on the Swamp Trail I continue on. On the Swamp Trail behind Mt. Misery I did come upon three (3) deer track traveling in the presumed direction, north to south. Here I began to follow the tracks in the direction they were traveling. After intersecting with another (3) three deer tracks the tracks began to quicken, as they must have felt my presence. I lost their tracks shortly after they crossed the outlet of Alec Meadow, which was quite swollen. Here in the hemlocks, shortage of snow made tracking difficult. Upon leaving the Alec Meadow Dam I picked up the three tracks, pursuing I came upon the previous track at previous intersection.

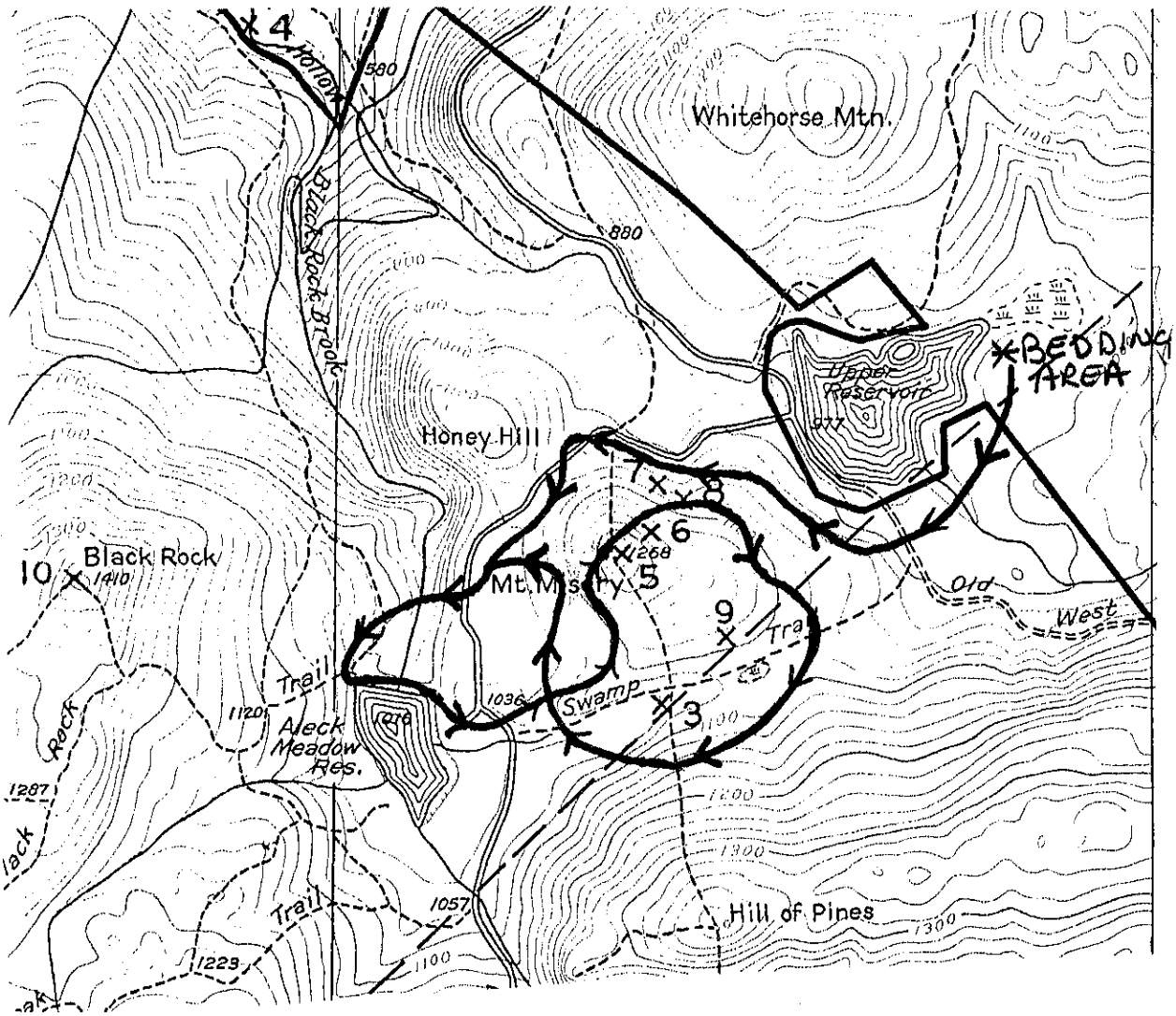
Returning to my starting point on the Swamp Trail I now back tracked the deer. Figuring to hook up with the tracks from the Old West Point Road. I did not. The tracks meander through some small hemlock stand on the east side of Mt. Misery, headed north, straight down Mt. Misery heading west and hooked up with my previous tracking in the swampy hemlock stand at the base of Mt. Misery, east of the White Oak Road. This had been the intersection described earlier. This route formed a figure eight (8). Since there was no starting point (bedding area) I went back to the original tracks behind the Upper Reservoir following the direction of the tracks took me along the old rifle range up between Mt. Misery and Honey Hill right into the previously mentioned hemlock stand below Alec Meadow. Upon back tracking from the Old West Point Road behind the Upper Reservoir I discovered a bedding area just south of the swamp behind the Upper Reservoir which they had been accompanied by six (6) other deer who headed south.

SUMMARIZING

Upon rising and departing from a group of nine (9) deer, three (3) deer headed east, digging for acorns as they traveled. Upon crossing the Old West Point Road feeding by digging had stopped. The three deer travel west along the old range and continued between Mt. Misery and Honey Hill. Walking along the swamp-hemlock area then proceed to cross White

Oak Road and descend into the hemlock stand surrounding the outlet stream from Alec Meadow. Circling back along the feeder stream into Alec Meadow by the swamp trail the deer than cut sharply north and than sharply east. Straight up Mt. Misery, quite a task. Then circling around Mt. Misery to a small hemlock stand up behind the old range, within 300' of their entering rout. The three deer proceeded south around Mt. Misery to the Swamp Trail, where I began my tracking. They walked through laurel along the contour of the northern slop of Hill of Pines and then north the swampy hemlock sight were I caught up to them and lost them in the hemlock stand.

Travel time of deer: 4 - 6 hours
Mileage of deer : 2 1/2 miles, 3/4 miles - furthest points
Acreage of area: approximate 100-125 acres



SPOTLIGHT CENSUS

The deer spotlight census is a method used to inventory whitetailed deer. Census data may be used to determine population trends, herd composition and reproductive rates.

This method was employed at Black Rock Forest in August of 1986. Using a pickup truck, driver and two spotters, a pre-determined route of 8 to 10 miles was traveled on the forest's dirt road system. Equipped with two 200,000 candle power spotlights, searching for deer up to 500' from the road was possible, although 200'-300' was the average. Upon sighting, presence or lack of antlers; as well as spotted fawns was recorded. The census was carried out Mid to Late August. During this time period buck antlers are well developed and does, still accompanied by the spotted fawn(s), are easily identified. The course is run on 10 consecutive nights, starting at dusk and ending near midnight.

Data on the total mileage covered, weather, time, number of antlerless, bucks, fawns and unknown were compiled nightly. The highest number of deer seen on a given night throughout the spotlighting period of ten (10) days were used in sex and reproduction ratios.

$$\text{Average deer per mile} = \frac{\text{Total Deer}}{\text{Total Mileage}}$$

$$\text{Average deer per night} = \frac{\text{Total Deer}}{\text{Total number of nights}}$$

Buck:Does
Highest # of Bucks : Highest # of Does
Highest # of Fawns : Highest # of Does
Fawn:Doe

Results: During this time of year in this heavily deciduous wooded forest, visibility is limited by foliage and mountainous terrain. Deer groups seen by spotters are fragmented by the poor visibility.

Data interpretation became unreliable and undesirable. Population trends indicated by harvest data did not coincide with spotlighting data. Spotlighting for fawn to Doe ratios were virtually unchanged from year to year, leaving little indication of changing birth rates.

The deer spotlight census was discontinued in 1991.

SPOTLIGHT CENSUS

YEAR	TOTAL DEER SIGHTED	NUMBER OF NIGHTS	AVERAGE PER NIGHT	TOTAL MILES	DEER PER MILE
1986	220	10	22	104	2.1
1987	195	8	24	62	3.1
1988	125	10	12.5	90.9	1.4
1989	141	9	15.7	75.5	1.9
1990	124	10	12.4	80.8	1.5

NIGHTLY HIGHS

YEAR	ANTLERLESS	FAWNS	BUCKS	TOTAL	DOE TO FAWN RATIO	BUCK HARVEST
1986	18	9	6	34	1 : .5	56
1987	19	11	3	39	1 : .6	40
1988	12	5	3	20	1 : .4	24
1989	22	5	2	29	1: .2	25
1990	13	5	2	18	1 : .4	35

ACORNS

The Black Rock Forest is dominated by intermediate and mature oaks. The fruits produced by these trees, acorns, are extremely valuable to wild populations of mammals, birds and insects. This seed source is also critical in the perpetuation of the forest ecosystem. It is uncertain to what degree oaks also dominanted pre-settlement forests. However, careful analysis of fossil pollen assemblages from sediments in Sutherland Pond demonstrate oak trees have been abundant for the past 10,000 years. (Maenza-Gmelch, 1995) Indications from oak regeneration, or the scarcity there of, are that oak forests are changing. Studies at Penn State University revealed: "Only 0.6 percent of original acorn production resulted in live seedlings 18 months later. In other words, both acorn survival and seedling survival in this study were too low to achieve natural regeneration of Northern Red oak stands from seed." (Zaczek 1995) These six acorns out of 1,000 reaching a seedling stage at 18 months are further reduced by the browsing of deer until sapling stages. Thus, the chances of an acorn becoming a tree under natural conditions in the forest of today are slim. In this century oak regeneration has relied on stump sprouts to maintain its present existence.

There are seven species of oaks found in Black Rock Forest, listed in order of abundance below:

Northern Red Oak - Quercus rubra
Chestnut Oak - Quercus montana
White Oak - Quercus alba
Black Oak - Quercus velutina
Scarlet Oak - Quercus coccinea
Scrub Oak - Quercus ilicifolia
Swamp White Oak - Quercus bicolor

Acorns are sources of protein, calcium, crude fiber and are high in fat content. Mast crops of acorns thus comprise a critical overwintering food source. This food source is shared and competed for by deer, turkey, bear, squirrels, grouse, raccoon, mice and insects.

The importance of mast crops to deer over the past decade has been evident. The abundance of acorns is likely a major determinate of herd health and reproduction. However, accurate measurement and classification of mast crops would be required to properly determine the effects of acorn abundance on whitetail deer. Previous forms of measurement of mast crops consisted of observation of species

producing seed and visual estimates of abundance (ex. poor, good, bumper). This proved inadequate, and a more uniform numerical censusing method was needed.

A time and cost effective means of sampling was established in the fall of 1995. This random sampling method utilizes a hoop 34" in diameter, a vehicle, and 1 1/2 days field work over a three (3) week period.

PROCEDURE: One survey at weekly intervals over the period of acorn drop (late September - early October). A transect containing 15 sites bisecting the forest was traveled by vehicle. At each site the hoop was thrown randomly 10 times, interpreted as 10 plots. Each plot would then be investigated for viable acorns and/or fresh acorn caps. Parent tree species and amount of acorns are recorded per plot. Accumulation of the data produced from 450 plots over a three (3) week period appeared adequate to determine acorn crop size.

RESULTS: Weekly interpretation of data revealed the peak of acorn drop by species. Computation of peak crops numbers disclosed the number of acorns per acre, by species.

APPLIED DATA: Acorns per acre will be classified as: (Auchmoody,eta, 1993)

	Acorns/acre
Bumper	>250,000
Good	125-250,000
Fair	65-125,000
Poor	20 - 65,000
Trace	<20,000

Continuation of investigation will develop a rating chart specific to Black Rock Forest. Data should lead to a greater understanding of this important food source, and provide a foundation for future forest stand stocking.

ACORNS PRODUCTION 1995

		9/23/95		9/29/95		10/6/95		Peak Crop		Acorns Per Acre			
		Northern	Black &	Northern	Black &	Northern	Black &	Northern	Black &	Northern	Black &	Chestnut	White
		Red Oak	Scarlet Oak	Red Oak	Scarlet Oak	Red Oak	Scarlet Oak	Red Oak	Scarlet Oak	Red Oak	Scarlet Oak	Oak	Oak
ELEV (ft)	SITE												
880	Twin Culvert (G.W.)	1	5	4	1	16	8	16	8	11,059	5,529	0	0
900	Dagger Turn	9	13	6	9	14	6	14	13	9,677	8,986	0	0
1040	Mt Misery - Honey Hill	9	12	7	10	13	8	13	12	8,986	8,294	0	0
1120	Turtle Crossing	6	1	3	3	9	2	9	3	6,221	2,074	0	0
1150	Frog Rock	18	6	4	8	17	2	18	8	12,442	5,529	0	0
1150	Go-Down Road	15	11			15	7	15	11	10,368	7,603	0	0
1200	Goat Hill	6	4									0	0
1200	Horse Bones			6	9	21	1	21	9	14,505	6,221	0	0
1200	Jeep Road (J.P.Rd)	11	8									0	0
1200	Coyote Bend (J.P.Rd)			9	8	11	7	11	8	7,603	5,529	0	0
1200	Glycerine Hollow Overlook	4	3			5	2					0	0
1200	Snake Den			0	5			5	5	3,456	3,456	0	0
1220	Beaver Culver (W.O. Rd)	13	11									0	0
1220	Two Gates			7	4							0	0
1180	Knee Cut (W.O.Rd)					20	10	20	11	13,824	7,603	0	0
1250	Jim Pond South	8	3	10	9	18	8	18	9	12,442	6,221	0	0
1250	Odell's Field	13	17	4	0	14	9	14	17	9,677	11,750	0	0
1250	Otter Crossing (B.M.Rd)	19	8	13	5	10	10	19	10	13,133	6,912	0	0
1280	Bulson's Blunder	16	45	12	5			16	45	11,059	31,104	0	0
1260	Babcock Spring (Continental Rd)			2	6							0	0
1300	Otter Slide (Chatfield Rd)	13	7									0	0
1320	Pond Ecology Project					34	9	34	9	23,501	6,221	0	0
	Total Acorns	161	164	90	82	235	98	243	178			0	0
	Acorns/Plot	1.07	1.02	0.6	0.54	1.56	0.65	1.6	1.18			0	0
	Acorns/Acre	7,396	7,050	4,147	3,732	10,783	4,493	11,059	8,156			0	0
	9/23/95		14,446										
	9/29/95				7,879								
	10/6/95						15,276						
	TOTAL ACORNS PER ACRE								**19,215**				
	RADIUS OF PLOT = 17"												
	AREA OF PLOT 6.302 SQUARE FEET												
	10 PLOTS PER SITE, 15 SITES PER DAY, 3 DAYS												
	AVG NUMBER OF ACORNS PER PLOT X 6912.09 = ACORNS PER ACRE												

ROAD KILLS

Mortality of deer as a result of vehicle collision on Route 9W has been attended to when possible. Recorded information (sex-age) has been incorporated into the minimal population composition graph (page 27). Periodically, carcasses have been weighed to determine live weights.

Presently, in joint interest with D.E.C. (Department of Environmental Conservation) and West Point, investigation of reproduction rates and conception dates from road kills has begun. Carcasses found on the roads of D.M.U. 54, with the help of local police and highway departments, will be inspected from January 15 to April 15. Information pursued will be deer sex and age coupled with fat content found in the bone marrow of the femur bone. The percentage of fat found in the bone marrow is used as an index of malnutrition in deer. Fetuses found in female deer will be removed, sexed and aged to determine the date of conception. This information will be helpful in determining sex ratios. Sex ratios favoring females result from high adult buck removal and low adult female harvest. This condition could result in increased females not bred during their first estrus. This causes problems of late fawn births leading to higher winter mortality of fawns.

EDUCATIONAL LEAFLET

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF EDUCATIONAL SERVICES

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THE CONSERVATIONIST

BONE MARROW

AS AN INDEX OF MALNUTRITION IN DEER

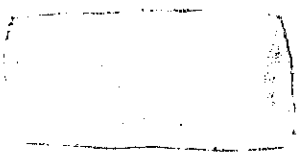
DURING spring surveys of winter mortality of deer in the northern and northeastern states, many carcasses are found which have been denuded through decay and scavenging. One of the objects of these surveys is to determine the extent of mortality from malnutrition caused by severe wintering conditions. Since the surveys are often conducted at a considerable interval (two or more months) following the first deaths, there is the problem of determining from skeletal remains alone whether the animals died a lingering death accompanied by emaciation or a sudden death in which little weight loss occurred.

It has been noted in deer that the marrow core of the femur (leg bone joining the pelvis) is almost solid white fat when the animal is in top condition. When it reaches a state of starvation, this femur marrow is red or yellowish and of a gelatin-like consistency and appearance. This fact was known and was being used to advantage by C. W. Severinghaus (leader of the New York Deer Research Project) in the course of surveys on winter mortality of deer in the State. He discussed the use of this knowledge with leaders of other northeastern state deer projects. It became evident to this group that there was need for a simple field method for estimating the fat content of bone marrow from deer found dead. This need was brought to my attention and a job was set up to investigate the possibilities and, if feasible, to provide an acceptable technique.

A single bone was chosen for comparative study because of the known variability of different skeletal members in the function of their marrows as blood-forming and fat-storing centers. The femur bone was used in the present study for several reasons. It is furnished with a large marrow core, the behavior of which in relation to starvation had already been observed. It lies deeply within muscle tissue and is furnished with an abundant blood supply, facts of considerable importance to the problem since as a consequence the femur marrow should be more responsive than other bones to nutritional changes

EXPLANTION OF FIGURES

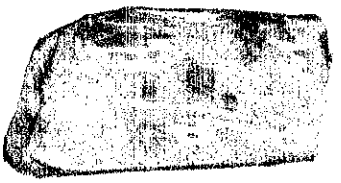
How bone marrow can indicate the condition of a deer: Appearance of marrow (natural size) in mid-femur (thigh bone) sections from white-tailed deer in various stages of fat depletion. Percentages in parenthesis ( ) represent fat content by fresh weight of marrow samples. Figures 9 to 12 represent dehydrated specimens which correspond to figures 5 to 8 respectively.



1. White solid (90%)

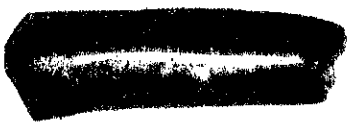
2. Spotted pink solid (85%)

3. Dark pink solid (70%)



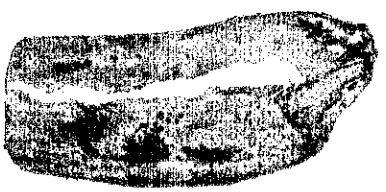
4. Yellow solid (55%)

5. Red solid (50%)



6. Red gelatinous (1.5%)

7. Yellow gelatinous (1.5%)



8. Yellow approaching gelatinous (10%)

9. No. 5, dried

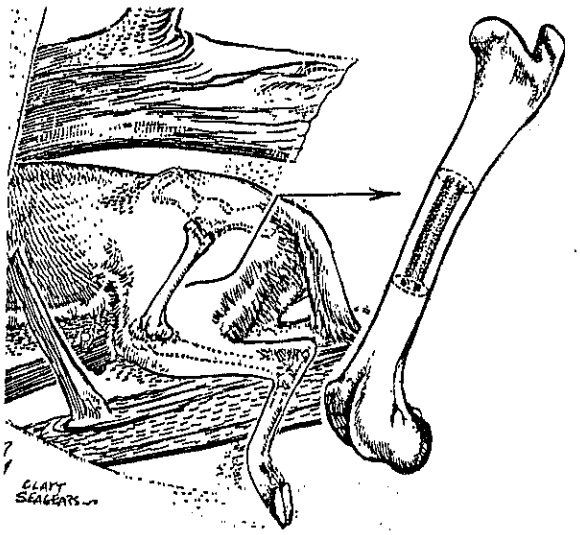
10. No. 6, dried

11. No. 7, dried

12. No. 8, dried

RESEARCH SOLVES DEER DEATH CAUSE

Deer which die during the winter, particularly in the Adirondacks, usually aren't found until the spring--too late to determine readily the cause of death. But knowledge of what caused death is essential to proper management of the deer herd. Analysis of the marrow of the femur bone (location of bone shown at right, with marrow sections on front page provides this information.



and alterations in certain blood element requirements. A further restriction of marrow sampling within the femur was required because of the progressive alteration of the marrow proceeding outward from the femur head. Because of this, the middle third of the marrow core was chosen as the standard sample for comparison.

Following a brief preliminary investigation which consisted in comparing the femur marrows of deer in several stages of physical condition--ranging from fat specimens taken in the fall to those dying from malnutrition in late winter--it became evident that a set of visual criteria for estimating fat content of marrow could be devised. In order to learn the actual fat content of the marrows, 123 samples from 104 deer were subjected to alcohol-ether extraction and the amount of fat calculated in percentages of both fresh and dry marrow weights. A correlation was found between progressive reddening of the marrow core and diminished fat content. Furthermore, fat reduction in the marrow bore a relation to its diminishment in the fat depots of the skin and body cavity, and to the degree of weight loss of the animal.

While a reduced fat content was usually associated with an increased reddening of the marrow core, in some cases it was yellowish (Figure 4), a condition probably indicative of a low state of red blood cell formation. The gelatinous stage of femur marrow was never observed without general emaciation being evident.

The accompanying color plate presents water-color sketches of bone marrow segments taken from the middle third of femur shafts. Figures 1 to 8 were drawn from fresh specimens, while Figures 9 to 12 were drawn from dehydrated ones, corresponding in fat content to Figures 5, 6, 7 and 8, respectively. The percentage-fat by fresh weight of these samples is given in the legend for each figure.

For the fresh specimens, Figures 1, 2, 3, 5 and 6 illustrate the progressive reddening of the marrow as its fat content declines. Figures 4, 7 and 8 are yellow type marrows which may be associated with anemia. Although they appear out of line with the color progression noted above, they nevertheless represent conditions of low fat content. The cause of this yellow marrow has not been definitely established, but in two instances (Figures 4 and 8) purrulent (pus forming) infections of grave extent were present in the deer. These infections may have interfered with normal, blood-forming functions and resulted in anemia which was manifest by the pale, yellowish appearance of the femur marrow. Cases of nutritional anemia may result similarly.

Figures 9 to 12 illustrate the type of specimens which may be encountered by the field man in femur bones which have weathered over an extended period. The water content has disappeared by evaporation through the porous bone shaft. Femur marrows with high fat and low water content which have weathered for at least one year displayed little alteration in bulk from the fresh state.

In using the color plate as a basis for estimating femur marrow fat content, it must, of course, be recognized that the figures on the plate only depict arbitrary stages in fat withdrawal. There are innumerable gradations between each figure, and there is also considerable variation in color, quality and pattern in any one stage. It must also be emphasized that the marrows pictured apply only to the middle third of the femur shaft, and do not apply to marrow from any other bone. As a general rule, the farther marrow bone is located from the body proper, the more fatty the marrow. Thus, bone marrow from the lower leg (canon bone) may exhibit a white, solid stage (Figure 1) whereas the femur marrow from the same leg may be dark pink (Figure 3). This fact appears to be related to a cooler temperature of the extremities and the resultant diminution of the blood-forming function of marrow found there. It may also be that as the animal starves, there is a progressive utilization of marrow fat outward to bones of the extremities, and death may result when over 90 per cent of the fat in the femur bones has been consumed but a relatively large amount still remains in the lower leg bones.

In addition to changes in the color of femur marrow as the deer draws on its stored fat, there are changes in its consistency. The observer will readily become acquainted with the feel of marrows from deer in different stages of nutrition. The fatty marrow has the solid, waxy feel of the tallow one finds in the fatty depots of the deer's body cavity (e.g., along the back straps and around the kidneys). It approximates the condition of marrow in the femur bone of a fat leg of lamb. In the "red solid" stage (Figure 5) a slight fatty quality to the touch is still present but the consistency is more liver-like due to the greater amount of water present and the more fibrous structure. Between the red solid and gelatinous stages, the marrow resembles brain tissue in consistency and may often have a glistening, but opaque, grayish-pink appearance. In the gelatinous stage (Figures 4, 7 and 8), the marrow is translucent, glistening, wet to the touch and with no fatty quality present. If crushed between the fingers it will be found to consist mostly of water.

Adult deer attain their greatest quantity of stored fat in the fall and early winter. As a general rule, the femur marrows exhibit the white solid stage during this period. As winter progresses, and especially when deep snow hinders access to adequate food, the animals begin to burn their stored fat. It seems that extensive withdrawal (reduction of over 50 per cent) from the marrow fat of the femur does not occur until the fat depots under the skin, around the viscera, and other surfaces within the body cavity are exhausted. Although previous to this stage some femur fat is lost, the serious depletion of this fat source appears to begin coincident with the process of emaciation wherein other tissues (e.g., proteins of muscle) are drawn upon as a source of fuel. When less than 25 per cent by fresh weight of the femur marrow is composed of fat, it is evident that a serious stage of malnutrition has arrived. Deer have been collected while still able to move around on their feet and with the femur marrow reduced to 1.5 per cent fat. These animals would probably not have recuperated even had they been treated with the best of shelter and food. A few deer have been found dead in locations with poor shelter with from 20 to 25 per cent fat in their femur marrows. Differences in the degree of shelter from the chilling effects of wind and low temperatures may be important factors in determining the ability of some animals to survive long enough to deplete the marrow fat to values lower than 15 or 20 per cent.

The femur marrow of fawns is normally of the red solid variety (Figure 5) until they begin putting on their winter supply of fat when four to six months of age. If good growth has been attained before the rigors of winter arrive, their marrows will usually contain a high percentage of fat. Changes in marrow appearance with fat depletion closely resemble those observed in adult femur marrows. Casualties from the hunting season among late born fawns are likely to show red solid marrows, normal for deer in their first three or four months of life. Their size and tooth development will reveal their age, however, and appropriate allowance can be made in interpretation of their marrow conditions in relation to possible malnutrition.

Dr. E. L. Cheatum

COYOTE - *Canis latrans*

The coyote reappeared in the Hudson Highlands with sporadic sightings in the late 1970's. Their interaction with feral dogs resulted in a sub species mix called a coydog. During the mid-late 80's the coyote population had become well established. Breeding with feral dogs was terminated, as breeding preference to their own species prevailed. By the 1990's the coyote population was well established. Animals weighing 30-45 lbs and 48-60 inches in length now roam the forest in family groups of up to five.

The coyote's return has filled a niche which had been feebly filled by an variety of other animals. However, their diet consists of a variety of foods. Preferring to prey on small rodents, they also exist on deer, turkey, grouse, insects and plant materials. (Determination of diet has been revealed by scat analysis.)

In general, coyotes do not appear a limiting factor to deer populations in this region. But under harsh winter conditions, such as 1993 and 1994, coyotes are a factor to be considered in deer winter mortality.

Studies in the state of Maine reveal coyotes are responsible for up 40% of winter mortality. Only 5% of the deer consumed by coyote had died of starvation. This condition is extreme, but displays the possible impacts of coyotes on deer populations.

Examination of winter mortality at Black Rock Forest has not been able to completely determine if coyotes have been solely responsible for the death of deer. Conditions such as deep snow, weakness due to malnutrition, physical injury, and unknown causes have always coincided with the examination of carcasses.

There is possible concern as to the effect of coyotes on fawns. These young represent easy prey to coyotes and are available when the whelping of young pups occurs (May).

The number of coyotes that use Black Rock Forest is quite variable. Coyotes living in packs have a winter home range of 5-6 square miles, pairs or lone coyotes have a home range of 10-13 square miles. Black Rock Forest consists of 6 square miles. Black Rock is therefore, only a portion of any coyote's home range. Upon interpretation of the Winter Tracking Index, up to 8-10 coyotes will be present on the forest during a

(Coyote continued)

24 hour period. The forest offers excellent denning sites in remote areas at high elevation.

First coyote taken by hunting was in 1986. Since then eight (8) carcasses have been examined.

Date	Sex	Live Weight(lbs)
11/90	F	32
11/91	M	36
5/92	M(pup)	-
10/93	M	42
11/93	M	38
1/94	F	36
2/94	F	32
12/94	F	28

NOTE: I have observed the displacement and/or reduction of Grey Fox since the re-establishment of the Eastern Coyote.

Feral Dogs:

Wild dogs were prevalent at the forest in the 1970's and early 1980's. Usually traveling in packs, these formerly domestic canines wantonly killed deer. A fairly common occurrence was to observe the remains of deer run out on the ice of the ponds in the forest. The tracks in the snow told of the gruesome and inefficient method of kill. The carcass was usually discarded and scantily utilized as food.

Feral dog packs usually numbered two per winter with up to five members. Their effect on the deer herd was never directly studied.

Wild dogs at Black Rock Forest were extirpated by the emergence and establishment of the coyote population.

BLIZZARD OF 1993

March 13-14, 1993:This day mother nature evoked her wrath on the whitetailed population. The effects of this one day would be felt for years to come and alter management plans.

The stage was set in the 1992 deer hunting season (November 16-December 8). Biological data such as yearling antler beam diameter (YABD) was 16.7 mm, indicating a healthy herd with good reproductive potential for 1993. Thirty four (34) bucks and thirty two (32) does were harvested, above the Black Rock Forest average. The good news ended there. The first indication of trouble became evident with the dramatic drop in average fawn weight (51 lbs in 1991 - 42 lbs in 1992). Coupled with a total lack of a mast crop in the fall of '92, the fawns born in the spring of '92 were approaching their first winter, underweight and their most important winter food supply (acorns) absent. The mild winters of 1989, 1990 and 1991, and adequate acorn crops provided a high winter survival rate, swelling deer numbers. Throughout the months of January, February and early March 1993 deer tracking census indicated a reduction in average deer group size (4 deer per group in 1991 - 3.3 deer per group in 1992- 2.6 deer per group in 1993, Deer were slowly starving). On March 13-14, the twelfth (12th) snow event of the winter of 1993 was to dump 20" of snow at forest headquarters, drifting in the woods accumulated to over four feet (4'). The forest was now snow covered for the past eleven weeks.

Deer mortality was immediate, animals seeking relief from the deep snow ventured on to roadways (9W). Snowplows and vehicles recorded the first victims of the storm. The deer track census normally following a snow event turned into a deer carcass search. Twelve dead deer were found and examined the three days after the storm.

After the snow began to recede, evidence (body parts) was commonly scene. Coyotes had dismember carcasses, leaving the forest sporadically littered with deer bones and a coyote and fox population that was well feed. Fawns were the first to perish, then the older females. This blizzard may have also triggered the re-absorption of fetuses by does to meet the nutritional demands of late winter.

The impact of this disaster was not fully realized until the fall hunting seasons of 1993 and 1994. The deer take dropped dramatically, physical condition suffered, YABD dropped from 16.7 mm in 1992 to 14.7 mm in 1993. In the fall of 1994, at which time the deer born the spring of 1993 would be yearlings, were very poorly represented in the deer harvest. Normally an average 22 yearlings are taken per year, only seven (7) were taken in 1994. The poor representation of this age class will be evident in the 1995 season as these deer would be 2 1/2 years old.

In contrast, the winter of 1994 which was severe by many standards, included 80" of snow. But the low deer population, excellent acorn crop, and lack of fawns from the previous spring (1993). Winter survival was high.

ANNUAL TIME EXPENDITURE (ESTIMATES)

The management of the Whitetail deer population has presently developed into a 40 day per year expenditure of time, which translates into 15% of the forest managers annual responsibilities.

	Days
Deer Station and Hunting Season	13
Tracking Census	6
Road Kill	2
Deer Aging Certification	1
Annual Report	2
Meetings - Conferences	4
Acorn Production Estimates	2
Data Interpretation - Office	10
	40

FUTURE

The management of the Whitetailed Deer population must be continued to ensure the integrity of the forest biological community.

The continuance of the evolving management goal of managing and maintaining a density of deer within carrying capacity of the Black Rock Forest.

Continued investigation into effects on Whitetail populations, their role and impact on the forest. Further study of food sources, such as acorns, need to be quantitatively measured. Also, construction of deer exclosures, to determine the effects of browsing by deer in our changing forest, must be continued. The effects of coyote predation must be consider and investigated.

Forest management decisions will dictate population densities in the future. Both forest and wildlife management decisions must be carefully and intelligently integrated to ensure the biological diversity of Black Rock Forest.

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BIBLIOGRAPHY

Auchmoody, L. R. and Smith, H. Clay and Walters, Russell S. 1993. Acorn production in Northern Red Oak Stands in Northwest Pennsylvania, Northeast Forest Experiment Station, Research Paper NE-680.

Chapman, Joseph A. and Feldhamer, George A. 1987. Wild Mammals of North America, Biology, Management and Economics; the John Hopkins University Press.

Dickinson, Nathaniel R. 1982. Basis for Using Selected Sex Ratios in the Harvest for Deriving Quotas for Harvesting Antlerless Deer. New York Fish and Game Journal, Vol 29, No. 1.

Friday, Kathleen Stearns and James Boyd. 1985. Black Rock Forest Inventory.

Halls, Lowell H. 1984. White-tailed Deer, Ecology and Management, Stackpole Books.

Hesselton, William T. and Severinghaus, C. W. and Tanck, John E. 1965. Population Dynamics of Deer at the Seneca Army Depot. New York Fish and Game Journal Vol. 12, No. 1.

Maenza-Gmelch, Terryanne E., 1995. Late-glacial Early Holocene Vegetation, Climate, And Fire at Sutherland Pond, Hudson Highlands, Southern New York, USA.

Raup, Hugh H. 1938. Botanical Studies in the Black Rock Forest, Bulletin No. 7

Rue, Leonard Lee. 1984. The Deer of North America, Outdoor Life Books.

Severinghaus, C. W. and Moen, Aaron N. 1983. Prediction of weight and reproductive rates of a White-tailed Deer Population From Records of Antler Beam Diameter Among Yearling Males. New York Fish and Game Journal, Vol. 30, No. 1.

Severinghaus, C. W. 1969. Minimum Deer Populations on the Moose River Recreation Area. New York Fish and Game Journal, Vol 16, No. 1.

Severinghaus, C. W. 1949. Tooth Development and Wear as Criteria of Age in White-tailed Deer. Journal of Wildlife Management 13(2); 195-216.

Tryon, Henry H. 1930. The Black Rock Forest, Bulletin No. 1.

Zaczek, James J. 1985. Understanding Oak Regeneration - A Research Summary. Annual Report - Pennsylvania State University.