REGIONAL DIFFERENCES IN SIZE AND PRODUCTIVITY OF DEER IN WEST VIRGINIA

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REGIONAL DIFFERENCES IN SIZE AND PRODUCTIVITY OF DEER IN WEST VIRGINIA

By

John Delmont Gill

AN ABSTRACT

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

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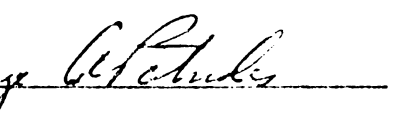
Approved 

The Conservation Commission of West Virginia established a project in 1947 to study problems connected with rapidly increasing deer populations. One objective was to compare skeletal growth, body weight, antler development and breeding potential of deer from several parts of the state.

During the hunting seasons from 1951 through 1954, information was obtained from a total sample of about 17,000 deer. The data included sex, age, hind foot length, antler beam diameter and length, number of antler points, carcass weight, and number of corpora lutea per set of ovaries. The various measurements were tabulated into frequency distributions for individual sample areas for each sex and age class. Calculated coefficients of variation indicated that hind foot length exhibited much less dispersion than the other measurements. Consequently it was selected as the primary criterion for comparing characteristics of deer in various parts of the state. Significant differences between mean hind foot lengths were used to divide the state into four regions. Within each region deer had rather constant hind foot lengths and other characteristics.

The four regions and the principal physiographical subdivisions within them are: West, Ohio-West Virginia Hills; Allegheny, Allegheny Plateau; East, Allegheny Ridges and Valleys; and South, Cumberland Mountains. Hind foot lengths and carcass weights were successively lower in West, Allegheny, South and East regions. In parts of the West

region fawns were twice the average weight, at hunting season, of fawns in parts of the East. Three of the regions, West, Allegheny and East, rank in the same order as above on the basis of antler beam diameter and ovulation rate. Antlers are smaller in the South region than in the East. The ranking of the South region in regard to ovulation rate was not accurately determined. Based on fawn/doe ratio in legal kills the four regions are ranked in the order indicated by hind foot length and carcass weight.

Causes of the differences in deer between regions are as yet unknown. Knowledge of the differences is useful in determining policy regarding harvest management.

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Conservation Commission of West Virginia, Elkins

Deer hunting in West Virginia was regulated by a buck law during the four decades prior to 1951. One of the consequences of this regulation was development of excessive populations of deer in certain parts of the state. In order to study the problems associated with rapidly increasing deer populations, an investigations project was established by the Conservation Commission in 1947. This work was undertaken with funds from the Pittman-Robertson Federal Aid in Wildlife Restoration Act.

The project has now been active continuously for eight years and investigations have been conducted in many phases of the life history and management of deer. The project phase which will be reported here has the following objective: to study deer range potentials as they may be indicated by the physical development of deer, and to compare skeletal growth, body weight, antler development and breeding potential of various herds of the state.

Before this study was established it was recognized that there were distinct differences in sizes and productivity levels of deer between various parts of West Virginia but the magnitudes of these differences were unknown. Information about physical characteristics

and productivity of deer may be useful in many ways. Some of the values of information about productivity were expressed by Morton and Cheatum (1946) as follows:

> "Knowledge of the breeding potential of a game species is essential to its proper management. Regional differences in productivity may demand differences in diagnosis and treatment. In the white-tailed deer (Odocoileus virginianus), proper management may require adjustments in laws relating to bag limits, open seasons, and legal game (buck, antlerless, and 1-deer laws). In cases of low fecundity, efforts to adjust the environment to increase the number of young produced may be feasible. These matters should be considered in the formulation of policy intended to make the best possible use of game resources."

A direct relation has been observed between adequacy of forage and the ability of female deer to produce and rear fawns. Gerstell (1938) noted low fawn production in sections of over-browsed deer range in Pennsylvania. O'Roke and Hamerstrom (1948) reported a similar relationship for the George Reserve deer herd in Michigan. Investigations conducted in New York by Morton and Cheatum (1946) and Cheatum and Severinghaus (1950) have produced evidence that fertility and fecundity of deer are directly related to range quality.

Information on anatomical characteristics of deer may also indicate range quality. Severinghaus et al. (1950) presented evidence that variations in antler development are related to forage adequacy. Differences in body weights and/or antler development were attributed to differences in range conditions by Johnson (1937), Gerstell (1938), Park (1938), Park and Day (1942) and Leopold (1943). In West Virginia,

reduction of a high deer population resulted in a significant weight increase for fawns killed in the same area the next year (Gill, 1953b).

Most of the foregoing authors cited inadequate quantity of forage during winter as the cause of reduced size and/or productivity of deer. Recently Dunkeson and Murphy (1953) reported a direct relationship in Missouri between soil fertility and the following characteristics of deer: body weight, antler development and reproductive potential. Differences in size and productivity of West Virginia deer also may well be related to differences in quality rather than quantity of forage. In this state deer population increases were controlled before extensive overbrowsed areas were developed.

Population control was secured by adoption of hunter's-choice deer seasons beginning in 1951. Deer of either sex have been legal game during the past four years (DeGarmo, 1951, 1952, 1954a and Gill, 1953b, 1954a). Increased deer harvests under the liberalized regulation have permitted collection of data on about 17,000 deer since 1951. Analysis of the data, as reported in this paper, indicates that the state can logically be divided into four regions whose deer have distinct size and reproductive characteristics.

The distribution of regions (Fig. 1) roughly resembles that for physiographical subdivisions (McKeever, 1952). The regions and subdivisions which include most of the area of each are: West, Ohio-West Virginia Hills; Allegheny, Allegheny Plateau; South, Cumberland Mountains; and East, Alleghany Ridges and Valleys.

MATERIALS AND METHODS

West Virginia hunters are required by law to present their deer for tagging at one of the official checking stations established in each county open for hunting. This checking system provides an excellent framework for sampling the legal kill. Since the deer checking law is seldom violated, deer brought to each checking station constitute a sample which is virtually unbiased as to sex and age of deer in the kill.

Certain checking stations were selected as "aging" stations and technicians were assigned to them (see Fig. 1). Selection of these aging stations was not made at random. Rather, an effort was made to secure more information from certain areas than from others.

Samples for individual aging stations were treated as random samples from the particular areas involved. This approach was used in testing for significance of differences between means for individual stations. However, the sampling design did not produce samples drawn at random from the regions. Consequently, the regional means which will be presented are not completely representative of the regions. However, they are the best estimates obtainable, and they correctly describe general differences between regions.

Technicians assigned to each aging station secured the following data from deer checked during open seasons, which occurred about December 1, each year:

1. Sex.
2. Age, according to the Severinghaus (1949) technique.
3. Hind foot length, hock to tip of longest nail; measured to the nearest 1/4 inch.
4. Antler beam diameter, one inch above the burr; measured to the nearest 1/32 inch.
5. Antler beam length, burr to tip along outside curve; measured to nearest 1/2 inch.
6. Number of antler points.
7. Weight to nearest pound, plus a record of whether whole or dressed, and, if dressed, the visceral organs remaining.

In addition to these measurements, technicians collected ovaries from adult does whenever possible.

The ovaries were subsequently sectioned and examined for evidence of ovulation (see Cheatum, 1949). The weights, as recorded on field records, were not all comparable to each other. Those for deer from which some or all of the viscera had not been removed were converted to a "hog-dressed" basis. That is, they were reduced to represent the approximate weights of carcasses which had been bled and completely eviscerated. Weight conversions were made by reference to regressions presented by Severinghaus (1949a) and Hamerstrom and Camburn (1950).

The various measurements were tabulated into frequency distributions for individual aging station sample areas for each sex and age class. Keysort punch cards were used in this process. Means and sums of squares of deviations were computed for most of the distributions.

Calculated coefficients of variation indicated that hind foot lengths exhibited much less dispersion than any of the other measurements taken. For example, the average coefficients of variation from a series of samples of yearling male deer were as follows: hind foot length, 4.3%; hog-dressed weight, 16%; antler beam diameter, 19%; antler length, 29%; and number of antler points, 34%.

Hind foot length was not only less variable than other measurements taken in this study, but it was also more easily measured than total body length or height at shoulder. Because of these factors, hind foot length was selected as the primary criterion for comparing characteristics of deer in various parts of West Virginia.

This comparison consisted of testing for differences between means. The methods of analysis of variance and the "t" test were extensively employed. By use of these devices significant differences between mean hind foot lengths for aging stations were identified. The aging stations and the probable boundaries of important differences are shown in Fig. 1.

These boundaries divide the state into four more or less homogeneous regions with regard to mean hind foot length of deer within them. There are significantly different minor areas within each region, but these areas are not contiguous. There is also some overlap between regions. For example, deer in the extreme northern part of the East Region are similar in hind foot length to those in the southernmost part of the Allegheny Region. However, the two areas are not similar ecologically. There would be no advantage in attempting to classify them together.

In Fig. 1 the boundary of the South Region is tentative since sampling from that region was of necessity limited to only five counties, and is not at all representative of the southwestern corner of the state. Deer are not numerous in that area and deer hunting has not been permitted in recent years.

REGIONAL CHARACTERISTICS OF DEER

HIND FOOT LENGTH

It can be seen that, for each of the sex-age classes included in Table 1, there is a consistent relationship between regions. The longest hind foot lengths occurred in the West. Successively shorter foot lengths were observed in the Allegheny, South and East regions. With few exceptions this ranking is repeated in all of the tables of other measurements which follow. The exceptions are in two of the characteristics for the South Region.

BODY WEIGHT, HOG-DRESSED

Average weights shown in Table 2 reveal a consistent relationship between regions which corresponds to that shown by hind foot length. This is due to the obvious correlation between skeletal size and body weight. While the two elements are closely related, weight comparisons may be more easily visualized than hind foot length relationships.

Accordingly, a digression will be made to emphasize the variation in weights of deer within West Virginia. Average values shown in the tables do not indicate the extremes, of course. At the extremes it is evident that, by December, fawns in some parts of the West Region average nearly twice as heavy as fawns in parts of the East Region. Similarly fawns from the area where West Virginia's largest deer are found are actually heavier, on the average, than yearling deer from the section where the smallest animals occur.

To express this relationship in another way, it appears that variation in fall fawn weights within West Virginia is nearly as great as variation in such weights between the states of Maine and North Carolina. Shaw and McLaughlin (1951) state that average hog-dressed weights of fawns killed during open deer seasons in Massachusetts and Maine is about 66 pounds for males and 60 pounds for females. These weights are practically identical with those typical of the West Region of West Virginia. At the other extreme, fawns from two of the middle-eastern border counties of West Virginia are similar in size to fawns in the Pisgah National Forest area of North Carolina (conversation with Frank Barick and K. J. Chiavetta).

The causes of the great diversity in sizes and weights of deer within West Virginia are not clearly understood. However, it is apparent from field observations that the differences in size cannot be satisfactorily explained by differences in quantity of forage available during winter. That explanation has been established to rationalize differences in deer size within some of the more northern states, notably Pennsylvania, New York and Michigan, where winter weather conditions are more severe than they are in West Virginia. Snow cover rarely persists in this state for longer than about one month. Conditions of continuous snow cover for much longer periods are common in New York and Michigan. As previously mentioned, there are no extensive overbrowsed areas in West Virginia.

ANTLER BEAM DIAMETER

Average antler beam diameters (Table 3) place the West, Allegheny, and East regions in the same relative order as do hind foot lengths and weights. However, the South Region does not conform since its average antler beam diameter is smaller than that for the East.

This inconsistency makes it appear that the relationship between antler development and either body weight or hind foot length is not the same in the South Region as in the other three. Apparently bucks from the South Region have antlers which are smaller in proportion to body size. As previously stated, however, the sample from the South Region is representative of a much smaller area than those for the other regions. Also a large portion of the sample for the South Region is from an area which is exceptional in that it has recently been overpopulated with deer. Furthermore, the restocking in 1932 which ultimately produced the overpopulation was made with deer from Pisgah National Forest in North Carolina. A more complicated heredity may be involved.

OVULATION

Average ovulation rates (Table 4) also exhibit a departure from the ranking of regions which was established from hind foot lengths and body weights. Averages for these body measurements place the South Region intermediate between the Allegheny and the East. The same relationship does not hold for the average number of corpora lutea for either age-class from the South Region. However, ovulation rates for the other three regions fall into the usual order.

Table 4 includes the standard error of the mean for each ovulation rate. The samples are small and are not strictly representative of the regions but the standard errors given do provide a measure of variability in ovulation rates. It can be seen that if the samples for Allegheny, South and East regions did conform to the requirement of randomness, then none of the differences between their means would be significant at the 95% level. This fact emphasizes the caution which must be used in interpreting ovulation rates and indicates that the relationship between the South Region and the other three is not necessarily as shown in Table 4.

It is much more difficult to obtain usable sets of ovaries than to secure hind foot length measurements. Since the latter measurement also has several advantages in regard to sampling error, it seemed practical to consider the possibility of a correlation between hind foot length and ovulation. This comparison was made using each deer season record which included both an ovulation count and a hind foot length for an individual doe. The data were divided into two age classes, both of which showed a highly significant correlation between number of corpora lutea and hind foot length. For yearling does only the correlation coefficient was + 0.24 (d.f. = 313). For does of age 2½ years and older r was + 0.16 (d.f. = 550).

The low degree of association between the two variables indicates that one cannot be used to estimate the other within practical limits of accuracy. However, comparison of the two types of information when

collected from the same area or the same deer may help in detecting bias or unusual sampling error.

FAWN/DOE RATIO IN THE LEGAL KILL

According to the evidence from this index of rearing success, the four regions rank in the same order as on the basis of physical measurements. Rearing success is highest in the West Region where the number of fawns in the kill actually exceeds the number of adult does (Table 5). Productivity is successively lower in the Allegheny, South and East regions. Crude fawn/doe ratios indicate that in the East Region does produce 1/3 less fawns than in the West.

AGE COMPOSITION OF THE ADULT SEGMENT OF THE LEGAL KILL

The age distribution of adult does in the kill is a potential index to productivity. Areas having relatively high productivity will have deer herds in which younger age classes are more predominant than in areas of low productivity. If mortality is more or less age-indiscriminate, then average age of adult does and slope of the kill curve (Hayne and Eberhardt, 1952) will indicate the proportion of replacement to the deer herd.

In West Virginia kill-curves of adult does from the West Region are steeper, indicating a younger average age, than exists in the East Region. Such kill-curves include considerable bias and sampling error (Gill, 1953a) and are not reliable for indicating less distinct differences in productivity.

DISCUSSION

Three of the regions shown in Fig. 1 can be ranked in a definite order on the basis of all characteristics studied. In descending order of size and productivity of deer, these regions are: West, Allegheny, and East. The South Region is intermediate between the Allegheny and East with respect to hind foot length, body weight and fawn/doe ratio. However, antler development in the portion of the South Region which was sampled was inferior to that in the East Region, and ovulation rate in the South Region was not adequately determined.

Casual comparison of regional characteristics of deer with the general distribution of various physiographical areas in West Virginia does not reveal a good fit between characteristics of deer and any of several environmental conditions. These conditions include length of growing season, precipitation, soil parent material, known mineral deficiencies, calcareous deposits, slope, agricultural land capabilities, forest types and others. Conversations with Dr. G. G. Pohlman and Dr. G. C. Anderson, respectively soils specialist and animal nutritionist with the West Virginia Agricultural Experiment Station, have led the writer to believe that the differences in deer characteristics between parts of the state probably are not attributable to any single ecological factor, but rather to a complex of factors.

The ecological variation within regions makes it impractical to attempt to identify these complexes at the regional level. Consequently,

it would be preferable to investigate limiting environmental factors in reference to smaller areas. Individual aging station areas should be studied for this purpose. Known differences in deer characteristics between aging station areas constitute a logical basis for evaluating their relative range quality.

A description of differences between aging station areas will be presented in a separate treatment. This later publication, a state bulletin, will include a discussion of local management applications of information about size and productivity of West Virginia deer.

Information about variation in deer between regions has an obvious value in management of deer harvests. Currently, the primary harvest management objective in West Virginia is to obtain better distribution of deer kill throughout the open territory. An attempt has been made to improve hunter distribution through publicity rather than by restrictive regulations (Degarmo, 1952b; Gill, 1953, 1954). Part of the publicity released in this effort has stressed the fact that the West Region can support a greater percentage removal of female deer than the rest of the state. In the East Region, where productivity is relatively low, sportsmen have been encouraged to hunt selectively for bucks in preference to does.

In general, knowledge of the variation in deer between regions has been useful in determining broad policies relating to harvest management.

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Dr. Walter D. Foster, formerly biometrician with the West Virginia Agricultural Experiment Station, generously gave advice on some statistical problems. Valuable assistance in organization and review of the manuscript was supplied by Dr. George A. Petrides, of the Departments of Zoology and Fisheries and Wildlife at Michigan State College. This paper is part of the thesis requirement for the Master of Science degree at that institution.

The author is also indebted to his associates in the Conservation Commission of West Virginia for the arduous work they performed in collecting most of the data.

SUMMARY

Size and productivity of West Virginia deer were studied under the assumption that these factors were related to range quality. Data included information about sex, age, weight, size, antler development, and ovulation. The total sample included about 17,000 deer from legal kills for the period 1951 through 1954.

The state was divided into four regions, each having populations of deer with distinct characteristics. Deer were found to be largest and most productive in the West Region. They were successively smaller and less productive in the Allegheny and East regions. Deer in the South Region were intermediate in size between those in the Allegheny and East regions, but the rank of the South Region in regard to productivity was not determined.

The causes of regional differences were not apparent. This problem requires additional study with respect to ecological differences between certain small areas in which deer characteristics are known.

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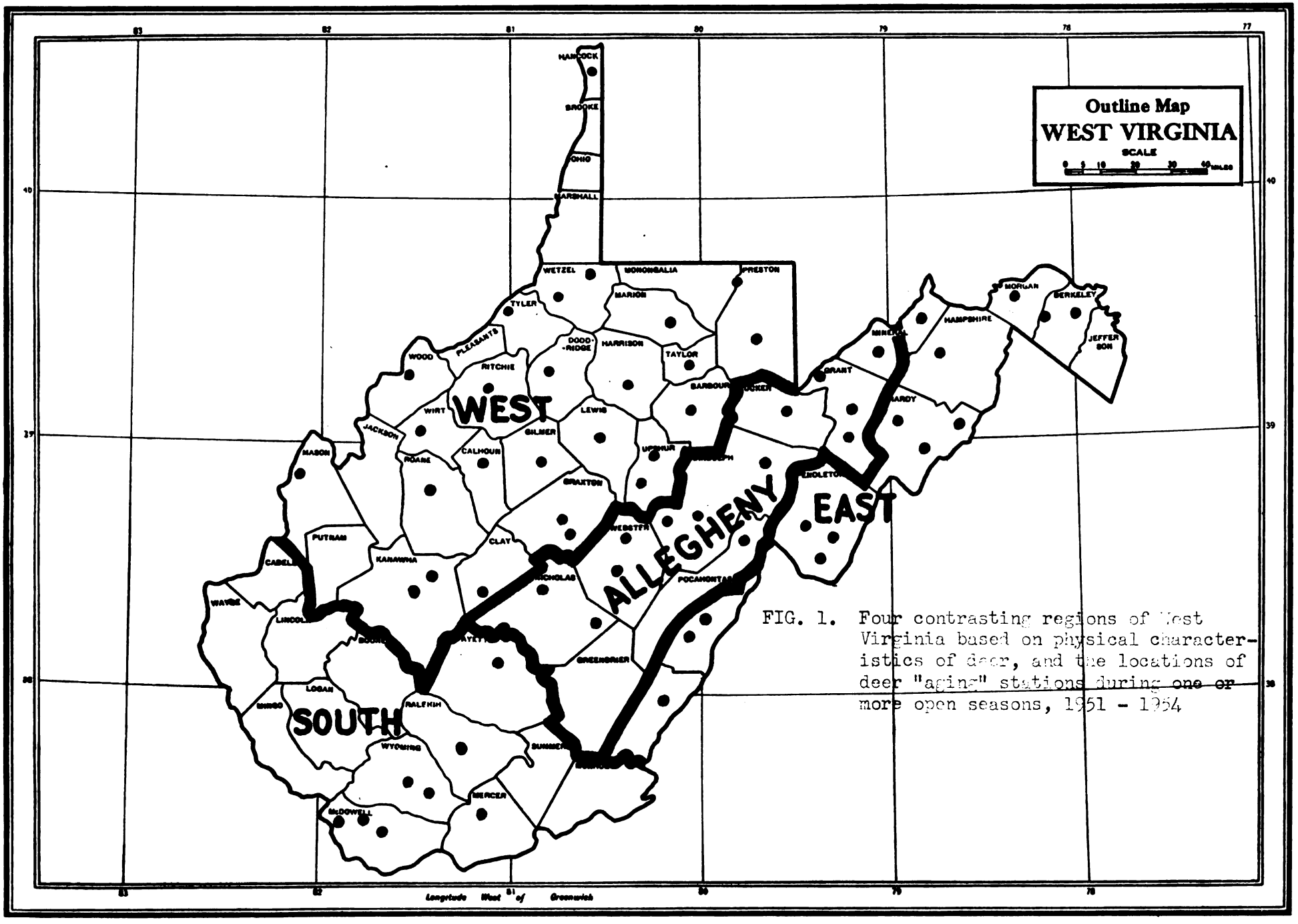

FIG. 1. Four contrasting regions of West Virginia based on physical characteristics of deer, and the locations of deer "aging" stations during one or more open seasons, 1951 - 1954

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Table 1.--HIND FOOT LENGTH OF DEER FROM FOUR REGIONS OF WEST VIRGINIA
Data from legal kills, 1951-1954

	Age 1/2 Year				Age 1 1/2 Years			
	Males		Females		Males		Females	
Region	No.	Mean	No.	Mean	No.	Mean	No.	Mean
West	650	16.91 in.	675	16.43 in.	435	19.00 in.	513	18.05
Allegheny	1180	16.20	1196	15.70	1120	18.39	1054	17.60
South	177	15.74	162	15.24	175	17.63	136	17.12
East	399	14.95	346	14.68	552	17.26	358	16.53

Table 2.--HOG-DRESSED WEIGHT OF DEER FROM FOUR REGIONS OF WEST VIRGINIA
Data from legal kills, 1951-1954

	Age 1/2 Year				Age 1 1/2 Years			
	Males		Females		Males		Females	
Region	No.	Mean	No.	Mean	No.	Mean	No.	Mean
West	560	66 lb.	568	61 lb.	436	105 lb.	417	91
Allegheny	723	57	707	53	674	97	691	87
South	158	50	136	46	150	83	116	73
East	346	44	282	43	451	79	295	72

Table 3.--ANTLER BEAM DIAMETER OF DEER FROM FOUR REGIONS OF WEST VIRGINIA
Data from legal kills, 1951-1954

Region	No.	Age 1 1/2 Years Only Mean (inches)	Mean (mm.)
West	463	0.80	20.3
Allegheny	1013	0.70	17.8
South	255	0.60	15.2
East	439	0.61	15.5

Table 4.--NUMBER OF CORPORA LUTEA IN OVARIES OF DEER FROM FOUR REGIONS OF WEST VIRGINIA
Data from legal kills, 1950-1953

Region	Age 1 1/2 Years No. Sets Ovaries	Mean No. C.L.	Age 2 1/2 Years and Older No. Sets Ovaries	Mean No. C.L.
West	84	1.77 - .06*	128	1.90 - .04*
Allegheny	154	1.34 - .05	274	1.55 - .04
South	15	1.27 - .20	45	1.53 - .10
East	85	1.29 - .07	162	1.51 - .06

* Standard error of the mean.

Table 5.--RELATIVE NUMBERS OF FAWNS AND ADULT DOES IN SAMPLES OF THE WEST VIRGINIA LEGAL KILLS, 1951-1954

Region	No. Fawns Both Sexes	No. Does Age 1 1/2 Years and Older	No. Fawns Per 100 Does
West	1615	1411	114
Allegheny	2600	3170	82
South	838	1131	78
East	851	1182	72
Total	5954	6894	86

Table 6.--HIND FOOT LENGTH (in inches) OF DEER IN WEST VIRGINIA
Data from legal kills, 1951-1954

	AGE 1/2 YEAR ONLY					
	Males			Females		
Area	No.	Mean	s.d.	No.	Mean	s.d.
West Region						
Barbour	62	16.96	.74	39	16.52	.64
Braxton	41	15.85	1.51	54	15.66	1.49
Coopers Rock	105	16.54	.82	41	16.21	.73
Clay	12	16.33	.69	17	16.22	.54
Doddridge	62	16.74	.76	60	16.04	.72
Gilmer	7	17.0	-	12	16.83	.43
Harrison	45	16.93	.70	60	16.49	.74
Kanawha	5	17.2	-	10	16.33	.97
Lewis	112	16.86	.83	103	16.24	.74
Marion	28	17.17	.71	40	16.65	.75
Mason	17	17.24	.75	13	17.14	.63
Pleasants	7	17.8	-	11	16.39	.66
Preston	44	17.03	.60	46	16.52	.67
Ritchie	10	17.0	.81	6	16.2	-
Roane	3	17.4	-	2	17.0	-
Taylor	43	17.15	.84	32	16.84	.54
Tyler	13	17.30	.64	11	16.7	.58
Upshur	44	17.20	.76	71	16.72	.87
Wetzel	40	16.90	.69	31	16.13	.75
Wirt	2	16.6	-			
Wood	4	17.2	-	5	16.9	-
Allegheny Region						
Grant, Allegheny	276	16.20	.71	305	15.63	.77
Grant, East	65	16.16	.67	66	15.49	.66
Nicholas, Muddlety	27	16.12	.70	27	15.77	.59
Poca., Thornwood	73	16.13	.73	52	15.70	.68
Randolph, Alpena	67	16.33	.93	65	15.55	.71
Rand., Huttonsville	55	16.26	.85	44	15.69	.87
Rand., Kumorabow	30	16.15	.76	42	15.94	.69
Richwood area	39	15.92	.89	57	15.55	.70
Tucker	311	16.20	.63	354	15.72	.68
Web., Hacker Valley	36	16.60	.92	33	16.15	.63
South Region						
Mercer	9	16.4	-	6	15.6	-
McDowell	84	15.07	.77	74	14.47	.65
Raleigh	5	16.3	-	7	15.3	-
Wyoming	79	15.35	.64	75	15.92	.61
East Region						
Greenbrier, Alvon	46	14.50	.64	20	14.15	.75
Hampshire	43	15.44	.94	36	14.79	1.11
Hardy	110	14.69	.85	83	14.39	.77
Min., Fort Ashby	68	15.60	.87	85	15.31	.82
Pendleton	51	15.45	.83	47	14.94	.63
Pocahontas, East	76	14.39	.83	75	14.22	.92

Table 6. (Cont'd)--HAND FOOT LENGTH (in inches) OF MEN IN WEST VIRGINIA

Area	AGE 1 1/2 YEARS ONLY					
	Males			Females		
	No.	Mean	s.d.	No.	Mean	s.d.
West Region						
Barbour	4	19.4	-	20	17.90	.60
Braxton	34	18.90	.74	30	16.89	1.11
Coopers Rock	93	18.30	.85	74	18.07	.81
Clay	13	19.00	.59	12	17.96	.41
Doddridge	56	18.43	.89	75	17.75	.52
Gilmer	6	19.0	-	9	17.67	-
Harrison	37	18.94	.86	36	17.94	.50
Kanawha	8	18.8	-	9	18.2	-
Lewis	71	18.88	.68	102	17.98	.55
Marion	16	19.16	.76	12	18.06	.65
Mason	10	19.2	-			
Pleasants	5	19.4	-	11	18.41	.69
Preston	40	19.06	.73	46	18.34	.65
Ritchie	8	19.0	-	4	18.2	-
Taylor	31	19.24	.63	26	18.43	.67
Tyler	10	19.53	.74	8	18.2	-
Upshur	55	19.42	.71	35	18.34	.72
Wetzel	25	19.09	.73	22	17.92	.83
Wirt	4	19.8	-			
Allegheny Region						
Grant, Allegheny	268	18.39	.82	222	17.56	.79
Grant, East	38	18.41	.71	42	17.39	.71
Nicholas, Muddlety	38	18.61	.86	31	17.66	.75
Poca., Thornwood	69	18.33	.80	44	17.82	.77
Randolph, Alpena	55	18.24	.88	67	17.68	.76
Rand., Huttonsville	38	18.67	.94	36	17.53	.80
Rand., Kumbrabow	8	18.0	-	40	17.42	.74
Richwood area	82	18.16	.80	70	17.24	.60
Tucker	294	18.40	.82	332	17.66	.68
Web., Hacker Valley	25	18.74	.81	27	18.03	.90
South Region						
Mercer	7	18.4	-	5	17.2	-
McDowell	91	16.79	.79	60	16.17	.59
Raleigh	9	18.9	-	11	17.80	1.23
Wyoming	63	18.63	.76	60	17.93	.71
East Region						
Greenbrier, Alvon	54	16.44	.93	34	15.78	.98
Hampshire	99	17.40	.84	32	16.69	.76
Hardy	166	17.29	.81	106	16.46	.79
Min., Fort Ashby	93	17.86	.83	72	17.12	.75
Pendleton	49	17.83	.93	40	16.88	.63
Pocahontas, East	91	16.67	.79	74	16.14	.72

Table 7.--NUMBER OF CORPORA LUTEA IN OVARIES OF DEER IN WEST VIRGINIA
Data from legal kills, 1951-1953

Area	Age 1 1/2 Years: No. Sets Ovaries	Mean No. C.L.	s.d.	2 1/2 Years and Older: No. Sets Ovaries	Mean No. C.L.	s.d.
West Region						
Barbour	7	1.86	.35	10	1.80	.75
Braxton	2	2.00	.00	6	2.16	.33
Coopers Rock	13	1.46	.49	34	1.68	.58
Clay	1	2.00	-	1	2.00	-
Doddridge	6	1.84	.33	7	2.14	.64
Gilmer	2	2.00	.00	-	-	-
Hancock	2	2.00	.00	6	1.84	.33
Harrison	2	1.50	-	-	-	-
Lewis	14	1.86	.52	18	2.00	.33
Marion	7	2.00	.54	18	2.06	.23
Preston	10	2.10	.30	9	1.78	.42
Ritchie	-	-	-	1	2.00	-
Taylor	5	1.40	.50	6	1.83	.37
Tyler	2	1.00	-	1	2.00	-
Upshur	6	2.00	.57	7	2.28	.45
Wetzel	5	1.40	.49	4	1.75	.72
Allegheny Region						
Grant, Allegheny	47	1.32	.58	93	1.42	.63
Grant, East	9	1.55	.53	17	2.00	.59
Nicholas, Muddlety	16	1.25	.56	13	1.77	.42
Poca., Thornwood	5	2.00	.00	3	2.00	.00
Randolph	20	1.25	.63	49	1.65	.63
Richwood area	11	1.36	.65	22	1.50	.72
Tucker	33	1.27	.78	47	1.38	.79
Web., Hacker Valley	10	1.30	.46	25	1.60	.57
South Region						
McDowell	3	1.33	.47	9	1.33	.47
Raleigh	4	2.00	.00	4	2.00	.71
Wyoming	8	0.89	.78	32	1.59	.71
East Region						
Berk., Morgan	6	1.50	.76	15	2.07	.44
Greenbrier, Alvon	7	0.86	.34	10	1.00	.67
Hampshire	5	1.80	.40	26	1.73	.65
Hardy	24	1.33	.55	40	1.40	.77
Min., Fort Ashby	23	1.48	.58	32	1.65	.64
Pendleton	6	1.00	.57	17	1.59	.77
Pocahontas, East	14	1.00	.54	22	1.00	.67