THE HISTORY AND DEVELOPMENT OF WILDLIFE CONSERVATION IN VIRGINIA: A CRITICAL REVIEW

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THE HISTORY AND DEVELOPMENT OF WILDLIFE CONSERVATION IN VIRGINIA: A CRITICAL REVIEW

PART I

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INTRODUCTION

For a number of years Virginia wildlife biologists have thought that a critical review of past land and game conditions in Virginia would serve as an excellent background for planning future game management activities in the state. No study such as this has been attempted in Virginia; however, other states e.g., (Vermont and New Hampshire) have compiled historical summaries of past wildlife conditions within their borders. Generally these works have been limited to the compilation of historical facts; no ideas for future management plans were proposed. No historical summary and critical review based on such a summary has been undertaken so far as is known.

In an effort to collect the most pertinent information on the history of Virginia's wildlife, the writer reviewed many of the publications of the Virginia Commission of Game and Inland Fisheries. Included among these were issues of the Game and Fish Conservationist, Virginia Wildlife, the Annual Reports of the Commission for the fiscal years 1916 - 17 through 1956 - 57, and other publications dealing with special subjects.

Old Virginia histories, old newspapers, various issues of the Virginia Code, and printed copies of early diaries have been utilized.

Several issues of the Yearbook of Agriculture and publications of the Virginia Extension Service of the Virginia Polytechnic Institute furnished additional information. Besides printed data, recollections of individuals were sometimes used to indicate

conditions and trends prevalent in the past.

This study deals primarily with the major upland game species of the state; waterfowl and furbearers are not treated in detail. Sufficient data exist within the literature for a similar historical study of fisheries; perhaps at some future date such a project will be undertaken.

The report is divided into eight major sections: Population, Forests, Agriculture, Wildlife Legislation, Histories of Wildlife Agencies in Virginia, Histories of Major Game Species in Virginia, and A Critical Review.

The writer hopes that this study will aid Virginia's wildlife biologists in planning and executing a historically and biologically sound management plan for Virginia's wildlife resources.

THE HISTORY AND DEVELOPMENT OF WILDLIFE CONSERVATION IN VIRGINIA: A CRITICAL REVIEW

PART II

HUMAN POPULATION

Precolonial Population, Prior to 1600

The tenture of man's occupancy in Virginia is conjectural, but in all probability it spans several thousand years. Although archeologists can not set the date of the first migration into this region, the discovery of folsomlid projectile points over much of the state has led to the speculation that Virginia has been peopled for at least five thousand years, and perhaps much longer.

It has been estimated that in 1600 there were some 800,000 inhabitants of the land now contained within the boundaries of the United States. About 20,000 Indians were found in Virginia (Reynolds, 1957:4). Virginia supported one of the densest Indian populations in North America; the average for the entire United States was one person per 8,000 acres, while Virginia's average was one person per 1,600 acres (Maxwell, 1910:74).

Prior to the arrival of the colonists, there were three nations of Indians in Virginia. These nations occupied definite boundaries that coincided very well with physiographic areas of the state (Fig. 1). The Coastal, or Tidewater, region was occupied by Indians of Algonoquian stock; the Piedmont region was the home of the Sioux; and the mountainous region, which in this paper includes the Blue Ridge, Great Valley and Allegheny Plateau, was held by Iroquoian peoples. It should be noted that a small portion of the southcentral Piedmont was inhabited by Indians of Iroquoian lineage. In order to better understand the dispersal of the precolonial Indians in Virginia, the status of the

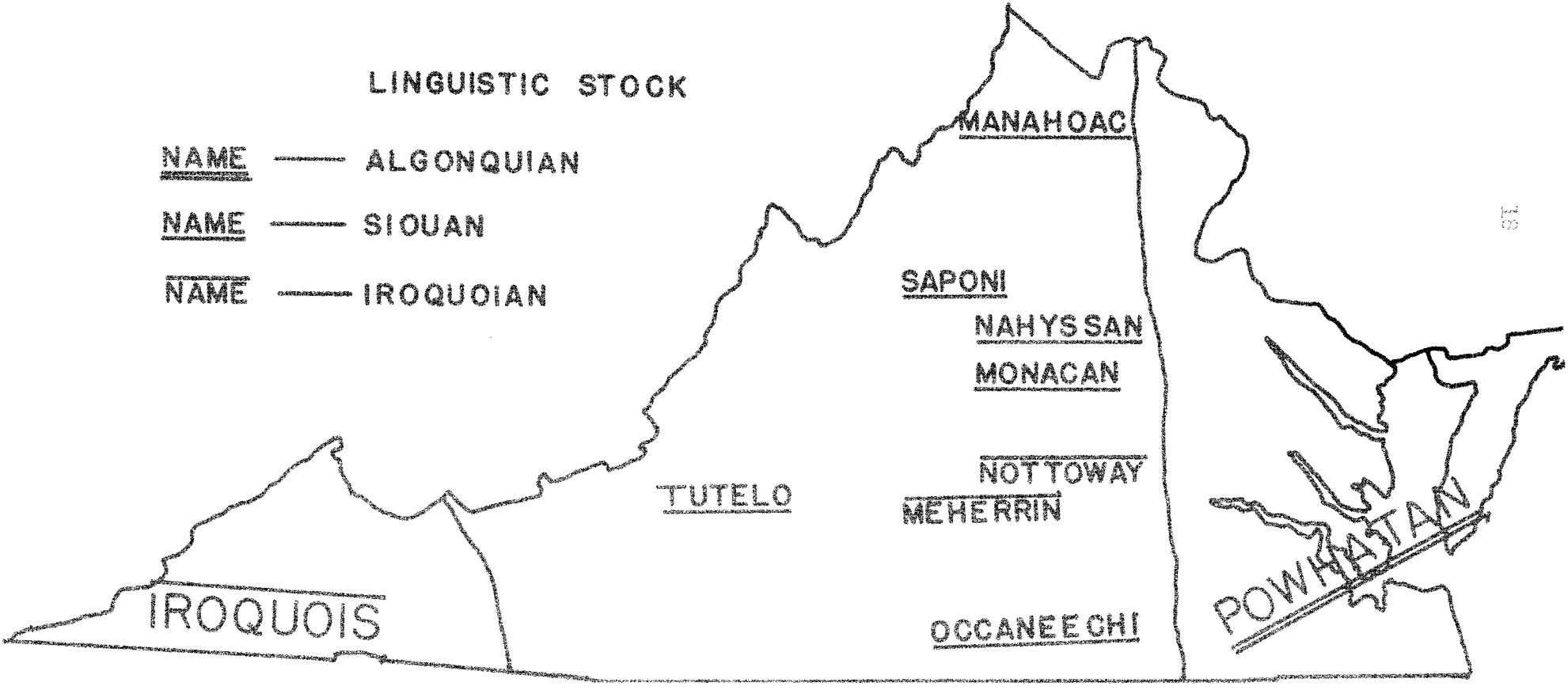


FIGURE 1. APPROXIMATE LOCATION OF INDIAN TRIBES IN VIRGINIA, 1650 (AFTER SWANTON, 1946; MAP 1).

Indian in each physiographic region of Virginia will be discussed separately.

Population Of The Coastal Region:

Of the approximately 20,000 inhabitants in the state, about 9,000 of these lived on or near the coast. This condition probably resulted from the good fishing waters and excellent agricultural sites found here (Herold and McCary, 1957:10).

The members of the Jamestown Expedition found that the coastal Indian had developed a large and efficient political system known as the Powhatan Confederation. The group was composed of more than 30 tribes, most of which had been brought together by the conquests of Powhatan, but six tribes had been previously conjoined by the efforts of his father (Swanton, 1946:18).

Swanton (1946:175) stated that about 9,000 coastal inhabitants lived in 200 villages in 1607, but that by 1669 this number had decreased to a total population of 2,000 with only 528 warriors. By 1705 ill treatment by the whites, repeated attacks by the Iroquois, and slave captures had reduced the numbers of the Powhatans to about 1285 individuals (Mooney, 1928:5).

Memorials to the once powerful Powhatans are evident in the current names of the waterways of this region of Virginia. Among these are: Chickahominy, Powhatan, Mattapony, Nansemond, Rappahannock, Potomac, and Tappahannock, and many other rivers.

Population Of The Piedmont Region:

The area of Virginia extending from the fall line of the rivers westward to the Blue Ridge Mountains was dominated by Indians of

Siouan stock. There is evidence to support the theory that these people had not long inhabited this region. Swanton (1946:30-31) says, "the Tutelo, Saponi, Monacan, and their allies were probably late comers into the Piedmont region of Virginia, which they had apparently reached from the upper Ohio." The Sioux probably were forced across the mountains into Virginia by the hostility of alien tribes from the north and south. They chose to leave their old lands rather than be crushed "between the Millstones" (Mooney, 1894:11).

Mooney (1928:6) gives the following population estimates of the Siouan Indians of mid-Virginia in 1600; Monacan confederacy 1,200; Manahoac confederacy 1,500; Occaneechi 1,200. Of the approximately 3900 Indians found in Piedmont Virginia in 1600, not a single descendent from any of these groups remained in Virginia three hundred years later.

The Nottoway and Meherrin tribes lived in the southcentral portion of the Piedmont region; in 1600 they were estimated to number 2,200 individuals. These two groups were the only Indians of Iroquoian stock residing permanently in the Piedmont region (Mooney, 1928:6).

Population Of The Mountainous Region:

The mountainous region of the state, including the Blue Ridge, Great Valley and Allegheny Plateau, was the domain of Indians of Iroquoian stock. Swanton (1946:11) observed that the Cherokee was the only truly mountainous tribe in the area. They were certainly the largest tribe in the southeastern United States, at times numbering 20,000 persons (Swanton, 1946:11). The mountains seem to

be submarginal areas occupied more by necessity than by choice. However, the region did afford a few advantages: (1) relative freedom from the thick forests of the low country, thus affording proportionately easy agricultural pursuits; (2) defensive possibilities of the mountains; (3) control of mines and stone suitable for the manufacture of pipes, and other items (Swanton, 1946:11).

The actual number of individuals in this region in precolonial times is not known, but it is thought that the population of this area fluctuated.

Colonial Population
1607 - 1776

Possibly, the white man knew of North America as early as 1000 A. D., when Nordic vessels supposedly visited the New World. Certainly, Virginia had been explored by Europeans before the English settlers, for in 1526 - 1527 Spanish Jesuits built a mission, Saint Michael at, or very near, the site of Jamestown (Anon., 1923:105). The English were the first permanent settlers, and the history of colonial population in Virginia had its beginnings with them.

The London Company was granted the rights to that portion of the New World called Virginia, and accordingly, in December 1606 their first representatives left Blackwall, London on three ships, the Sarah Constant, the Discovery, and the Goodspeed. The number and names of these first English colonists are not known with certainty and authorities vary in the estimation of the number of settlers

aboard the three ships. Koiner (1931:7) stated that there were one hundred individuals, while Bruce (1924:35) believed that there were approximately 120 colonists plus about 40 or 50 sailors who manned the ships.

This small band of colonists landed at Jamestown on May 13, 1607. Among the group were individuals not equipped with the knowledge necessary for survival in the wilderness, and had it not been for the cooperation of the Indians, the colonists would not have survived the first winter. Immigration to Virginia continued and by 1610 the population stood at 210 individuals, and this year the colony almost failed due to a severe shortage of food and the apparent inability of the inhabitants to survive in the wild (Gottmann, 1955:58-64). This situation seems peculiar since streams abounded in fish and the woods held stores of game animals. Apparently, many of the colonists came to Virginia only with the idea of getting rich quickly on the vast stores of gold that they presumed lay about in profusion. Finding no gold to be had for the picking, the colonists amost starved rather than stoop to the menial labor of growing crops.

With the passing of the years, the practice of agriculture did develop and with a sufficient amount of food available the Virginia colony attained a sound footing. Tidewater plantations were developed along the edges of main bodies of water or were placed so that they had easy access to landing piers. Though few in number, the plantation owners formed the ruling class. The vast majority of the population consisted of indentured servants and freemen who had come as indentured

servants, but since their arrival had fulfilled their obligations (Gottmann, 1955:65-66).

The year 1619 witnessed an event that exerted great influence on the future of the colony. A Dutch trading ship landed the first Negro slaves, and from this time on their numbers increased steadily throughout the rest of the seventeenth century (Gottmann, 1955:66).

The bachelor colonists made known their desires to have women transported to Virginia, and from July through November, 1621 some 111 prospective wives with good moral backgrounds were sent to the colony. Each man wishing to marry paid the sum of one hundred and twenty pounds of tobacco for passage of a prospective mate. Upon arrival, these women were housed with respectable free holders until such time as they received a proposal to their liking. None of the women were permitted to marry indentured servants (Bruce, 1924:117).

In 1620, the total population of the colonists and their servants approximated 2,400 souls (Gottmann, 1955:58). Perhaps due to the success of their agricultural efforts and the arrival of more inhabitants, the colonists became complacent and failed to recognize the Indian as a potential danger. Close association with Indians was the order of the day; colonists taught them the use of firearms and hired them to provide meat for the table. However, the Indians under Opechancanough still wished to rid themselves of the white intruders and plans were laid to attack the fort at Jamestown and outlying plantations on April 1, 1622. The attack was to be made on all points at the same time and would probably have been very successful had not a friendly Christian Indian alarmed the people at Jamestown.

There was not enough time to warn the country people, and at the end of the massacre only 893 colonists remained (Bruce, 1924:311). Following the massacre, the authorities realized that the Indians would remain a constant threat and through a series of military expeditions the Indians were forced from the area.

Up to this time, very little was known of the country to the west of the fall-line. A few trappers and frontiersmen had visited the land, but the majority of the population remained near the coast. The earliest visit to the Valley of Virginia was made by Jesuit missionaries in 1632 (Bruce, 1924:311).

Gottmann (1955:58) estimated the 1640 population at around 7,640. To many, the lands to the west held enchantment, and in 1643 Walter Ashton and his party were commissioned by colonial authorities to search out this land for large streams; just seven years later Edward Bland and his escort accidentally discovered the New River. The Piedmont and Mountain regions were still the strong-holds of the Indians. The Shenandoah Valley served all tribes as a hunting area, but, as far as is known, only two permanent villages were located there. One belonged to the Shawnees and the other to the Tuscaroras (Bruce, 1924:311).

The Virginia colonists felt that there existed a great need for some type of territorial groupings; the earliest divisions were known as congregations, plantations, hundreds or cities. In 1634 Virginia was divided into eight shires or counties: Charles City, Elizabeth City, James City, Henrico, Isle of Wight, Warwick, York, and Northampton. This division made it easier to give the communities proper representation

in the Burgesses (Koiner, 1931:83). Although the colonial settlements were somewhat scattered, Tidewater was completely occupied by 1700. The population was approaching 72,000 individuals, and during this period there was a great influx of both white and negro peoples (Gottmann, 1955:68).

Prior to the turn of the eighteenth century, the colonial capitol was moved from Jamestown to Williamsburg, and in 1691, the General Assembly of Virginia created the College of William and Mary (Gottmann, 1955:71). Jamestown never became an important town, although it did serve as a focal point from which the immigrants scattered throughout the country.

As the population of Tidewater continued to grow, the leaders realized the need to develop the western lands. At about this time, the Huguenots were being severely persecuted in France and were looking for new lands where they could live unmolested. Several colonies offered them lands, but under the leadership of Colonel William Byrd, Virginia made an offer which the French Huguenots accepted. Plans were made to develop a town west of the falls of the James River at an old Indian site, Manikin Town. For some time the Virginians had wanted to develop a silk industry, and this appeared to be the answer, since silk was an important industry in France. Too, there were other skilled craftsmen in the group and hope was high that the new settlement would be a success. The venture failed, and soon the Huguenots scattered to develop farms as did other colonists (Gottmann, 1955:71).

Even as late as 1710, there was no village west of the fall-line of the rivers, but settlement was so rapid during the next few years that by 1722 settlements were located within sight of the Blue Ridge Mountains (Bruce, 1924:314).

Large numbers of settlers migrated into the Piedmont following the expedition of Governor Spotswood and his "Knights of the Golden Horseshoe" in 1716. This company explored the Piedmont and climbed the Blue Ridge at Swift Run Gap. Upon his return, Spotswood described the country in glowing terms, and in an effort to make the country safe for settlement, he attended the meeting of the Indians at Albany in 1722. Here a treaty was signed by the Iroquois that stipulated that the Indians would remain to the west of the Blue Ridge. The Piedmont was divided into two large counties; Spottsylvania to the north and Brunswick to the south. Spottsylvania was the larger of the two and extended from the seacoast to the mountains; Brunswick lay just north of the Carolina border and did not go as far inland as the mountains (Bruce, 1924:315 and Gottmann, 1955: 78 ffd).

Gottmann (1955:79) explained that as the leading Tidewater families learned of this country, they applied for and received large tracts of land. As newly arrived immigrants reached Virginia and found the coastal areas already occupied, they pushed westward into Piedmont. For the first time in Virginia history, other nationalities than English were entering in large numbers. To the French Huguenots already here were added Swiss and the Palatine Germans. The latter had been brought at Spotswood's request to manage and work the iron mines located beyond the falls of the James and Rappahannock Rivers.

They did not remain at the mines, but left to clear additional farm land.

At this same time Brunswick County was being peopled; the colonial government passed laws stipulating that no taxes were to be collected from these people for a period of seven years, and no land patents would exceed one thousand acres. Indians of the Nottoway, Meherrin, Saponi, and Occaneechi tribes were roaming the area (Bruce, 1924:315).

Before the passage of too many years, the settlers of the Piedmont migrated over the Blue Ridge, and with the opening of the country west of the mountains, came the heavier migrations of people from Pennsylvania. The valleys and the slopes of the mountains were populated during the 1730's (Shomon, 1957:6).

During the French and Indian Wars, the Colonial Board of Trade for Virginia realized the necessity of determining how much aid they could count on from the colonies, and accordingly, in 1755 - 1756 requested data on colonial resources along with a population census. James Abercromby was appointed the agent for Virginia, and his census was based on the number of taxable people, or tithables. White men from the ages of sixteen to sixty years numbered 43,329, and the Negro men and women over sixteen years of age totaled 60,078. From calculations based on these data the 1755 census reported approximately 300,000 people in the Virginia colony. To arrive at this figure apparently one doubled the number of Negroes and quadrupled the number of whites, since the women were not considered as tithables. Although this figure is only an estimate, it does give a valuable approximation of the number of people in Virginia at this time. The census further indicated that Tidewater counties had the greatest percentage of population

and the highest concentration of Negro slaves, but as distance from the coast increased, the number of Negroes in the population decreased (Gottmann, 1955:83-85).

At the time of the Revolutionary War, Virginia's population had risen to 567,614, of which some 270,262 were slaves (Tyler, 1924:491).

As the Colonial Period ended, Tidewater was inhabited by people of English origin, those of the Piedmont were a mixture of many origins and the mountain people were predominantly Scotch-Irish and German (Gottmann, 1955:80).

While Virginia's population increased steadily throughout the Colonial period, it never reached the magnitude of some of the northern colonies. Tyler (1924:491) believed that this was due primarily to two factors; (1) emigration to the south and west, and (2) a real lack of immigration. He explained that fresher and richer farm lands in the south and west attracted more farming people. Early in Virginia's history the thin coastal soils were exhausted by the continual planting of crops on the same site year after year. As the soil wore out new lands were opened, or the owners of such lands migrated westward. Impoverished soils and heavy local tax laws, coupled with the existence of the Negro population which created a racial stratification, drove immigrants to other areas.

Postcolonial Population
1775 - 1915

The population figures recorded for the colonial period of Virginia were, for the most part, estimates of the number of people inhabiting

the state. Only two actual census were made; one in 1635 and a partial one in 1755 (North, 1910:7). The first national census was made in 1790, and since this time population figures are available for each ten year period.

Table 1 shows the results of the censuses in Virginia from 1790 until 1910. The figures included in this table were taken from the United States Census Reports, with the exceptions of the figures for 1910. The 1910 data were taken from the report by Tate and Blume (1958).

The last estimate of colonial population was made in 1775, and at this time there were 550,000 inhabitants in Virginia (North, 1909: 7). This is the best available information for this era. Since 1790 there has been a steady increase in Virginia's population, but at no time was there a large migration of people to Virginia or a jump in the numbers of inhabitants. There appears to be a decrease in population numbers in the census of 1870, but this decrease in inhabitants is accounted for by the secession of the western counties which formed the state of West Virginia in 1863.

The last census of the postcolonial period was made in 1910. At this time the population had increased to 2,061,612 people. During the period between 1790 and 1910, the number of white people in Virginia increased from 442,115 to 1,391,000, the number of Negroes increased from 306,193 to 671,000. These data show that the white people more than doubled their numbers while the Negroes failed to double their numbers by some 59,000 people.

Table 1. The postcolonial population of Virginia for the period 1790 - 1910

Year	Total	Whites		Negro			Total Population	
		Number People	Per Cent	Number Free	Number Slave	Per Cent	Per Cent Urban	Per Cent Rural
1790	748,308	442,115	59.08	12,766	293,427	40.92	-	-
1800	880,200	514,280	58.43	20,124	345,796	41.57	-	-
1810	974,622	551,534	56.59	30,570	392,518	43.41	-	-
1820	1,065,379	603,087	56.60	36,889	425,153	43.36	-	-
1830	1,211,405	694,300	57.31	47,348	459,757	42.69	-	-
1840	1,239,797	740,858	59.76	49,852	449,087	40.24	-	-
1850	1,421,661	894,800	62.94	54,333	472,528	37.06	-	-
1860 *	1,596,318	1,047,299	65.60	58,042	490,865	34.38	-	-
1870	1,225,163	712,089	58.12	512,841		41.85	-	-
1880	1,512,565	880,858	58.23	631,616		41.75	12.4	87.6
1890	1,655,980	1,020,122	61.60	635,438		38.37	17.1	82.9
1900	1,854,184	1,192,240	64.24	661,944		35.70	18.3	81.7
1910	2,061,612	1,391,000	67.00	671,000		33.00	23.1	76.9

* In 1863 West Virginia seceeded from Virginia.

The percentage of Negroes in the population increased until 1820; their highest peak was in 1810 when Negroes accounted for 43.41 per cent of the total population. From 1830 on, their percentage in the population has decreased. Perhaps this decrease was instigated by legislation prohibiting the importation of slaves. In 1806, it was illegal to bring slaves into Virginia, and by 1811 there were laws which forbade slave-trading under the British flag. The ban on importation of slaves created a slave-breeding business in the south. It was reported that Virginia led all states in this venture. One of the better years for slave-breeding was 1836; this year Virginia supposedly produced 120,000 slaves, and of these about 80,000 were taken from Virginia by their masters who were moving westward (Gottmann, 1955:100). The percentage of Negroes in the population still decreased after the Civil War. These free Negroes emigrated from the state of their own free-will. This decrease continued through the postcolonial period and to the present time.

There were considerable numbers of free Negroes in Virginia before the Civil War. In 1790 there were 12,766 non-slave Negroes and this number rose to 58,042 by 1860.

An important trend indicated by the census figures was the emigration of rural people to urban areas. In the early years of Virginia's history the people lived in farming communities or in small villages. In 1880 about 87.6 per cent of the total population still remained in the country, but the 1910 census showed that only 76.9 per cent of the population was rural. Over 288,000 more people

were living in urban areas in 1910 than in 1880.

Settlement of the country west of the Blue Ridge mountains occurred at a rapid rate. As early as 1816, it was declared that there were more white people west of the mountains than there were east of them. That year a meeting was held in Staunton, where representatives from the western country argued that the constitution of the state should be changed in order to give the western Virginians more representatives in the General Assembly. This incidence pointed to basic economic and sociological differences between the peoples of eastern and western Virginia and, later, these differences caused a split which resulted in the creation of the state of West Virginia (Gottmann, 1955:100). This split occurred in 1863.

Slaves were never very plentiful in western Virginia. They were not too suited for work in the cooler regions of the mountains, and really were not needed for the individual farms of this area were considerably smaller than those in Tidewater and Piedmont.

In summary, these major changes occurred in Virginia's postcolonial population: the total number of inhabitants increased from approximately 500,000 to 2,061,612 people; the percentage of Negroes in the population decreased steadily after 1830; there existed an emigration from rural to urban areas; settlement of the western lands occurred rapidly.

Differences in ideas and customs existed between the people of eastern and western Virginia. These differences probably stemmed from the fact that people of eastern Virginia were mainly of English origin, while there was a mixture of German, Scotch-Irish, and Swiss stock in

the mountain areas.

Modern Population
1916 - 1957

During the 41 years of the modern period great changes have taken place in the population of Virginia. The 1910 census showed a total population of 2,061,612 people and census of 1950 reported 3,318,680 inhabitants in Virginia. This increase of 1,257,068 constitutes a 61 per cent rise in the population of Virginia during this forty year period. In 1950 Virginia ranked fifteenth among the states in total population; the Old Dominion, in 1950, had an average density of 83 persons per square mile, as compared to an average density for the United States of 51 people per square mile (Gottmann, 1955:32).

Tate and Blume (1958) prepared a report titled, Some Facts About Virginia's People. This report summarizes the status and trends in the modern population of Virginia. The data presented in this section on population are taken from this source, unless otherwise noted.

It should be obvious that the concepts of conservation are closely related to the composition, background, density, education and standard of living of the human population. For this reason, a factual resume of these topics is given below. No effort will be made to indicate the obvious relationships of these topics to Virginia's natural resource conservation history; these relationships will be discussed later in this paper.

The people of Virginia stemmed from three basic origins: British, German and Negro. As was pointed out, Virginia's population exceeded

two million people in 1910; by 1950 it had surpassed three million, and it is expected to approximate four million by 1960. The average annual increase from 1910 to 1950 ranged between one and two per cent.

The rural areas of Virginia lost people, while people moved rapidly into suburban and industrial areas during the modern period. In 1950 only 53 per cent of the population was rural but only 22 per cent were farmers. The proportion of farm people in the rural population has declined steadily since 1920.

The census of 1830 marked the beginning of decline in the proportion of Negroes in the population; this decrease continued. In the 1830 census, Negroes constituted 42.69 per cent of the total population but it is expected that the census of 1980 will show that Negroes will account for only 13 per cent of the population. In 1950, Tidewater had the highest percentage of Negroes in the population while western Virginia had the lowest (4 per cent).

A very serious lack of education is evident in Virginia. In the 1950 census of persons over 24 years of age, 3 per cent of this age group did not have one year of schooling; 14 per cent of this group had some college training. The lack of high school training among rural people was alarming. Only 23 per cent had any high school training. Thirty nine per cent of this urban age group had gone to high school. About 63 per cent of the rural population had some grade school training, while only 40 per cent of the urban population had attended grade school. This lack of formal education has far reaching significance in view of the fact that modern farming,

industrial procedures and conservation require more and more knowledge.

The people of Virginia have a level-of-living index that is less than average for the United States as a whole, but somewhat better than that of the rest of the south. In 1950 most farm families existed on incomes of less than $2,000.00.

There are four large urban centers in Virginia: Washington, Hampton Roads, Richmond and Roanoke. In 1950, some 1,560,000 people were residing in over 78 cities and towns; two of these had between 25,000 and 77,000 and an additional 34 towns had from 2,500 to 5,000 inhabitants. The lowest density of people, 10 per square mile, is found in Craig and Highland Counties (Gottmann, 1955:39-43).

In 1918 there were only 4,000 miles of public roads in the state. As new areas were settled, roads were constructed into them and by 1958 there were 17,000 miles of public roads in Virginia. Today these roads reach into almost all parts of the state (Gwynn, 1958:21).

Effects Of Human Population On Wildlife

There is no evidence to indicate that the number of Indians reached a point where their activities seriously affected game animal populations within the state as a whole. However, it is possible that game species were diminished in areas near centers of high Indian population.

Colonization of Tidewater Virginia occurred rapidly. By 1620 the population of this section approximated 2,400 individuals; in 1640 the number had increased to 7,640. Tidewater was well populated

in 1700 with about 72,000 people (Gottmann, 1955:58,68). As the colonial population increased in coastal Virginia, the numbers had a definite adverse influence on game populations.

Between 1710 and 1722 Piedmont Virginia was being settled, and some of the populace of Tidewater moved into this area. Virginia's population at the beginning of the Revolutionary War was 567,614 (Tyler, 1924:491). This number of people was adequate to bring about some decrease in game populations, especially grazing species like the elk and buffalo. The postcolonial population of Virginia had increased to such numbers that most of the state was well populated (Table 1). By 1910, over three-quarters of the people lived in rural communities. Assuredly, many of these people were hunters.

Several important factors appear in a study of the modern population. Virginia possesses a relatively low level-of-living index, and persons, especially farmers and other rural dwellers, of low yearly income, often supplement their food supply with game animals. In certain cases these animals will be taken with or without a hunting license, in or out of season and with little or no regard for bag limits. A second important fact is that many hunters live in large urban areas and often create serious problems in the management of game species in the surrounding rural area. Most available hunting areas will be overharvested or at least be subjected to heavy hunting pressure. More often, a few inconsiderate hunters will take advantage of landowners and bring about a "posting" of the land. Many acres of good hunting territory are closed annually for lack of courtesy on

the part of hunters. In any event, large centers of human population create situations unfavorable for good game management.

A third important modern trend is the construction of roads. There are over four times as many miles of road in Virginia at present as there were in 1918 (Gwynn, 1958:21). These roads reach into almost every section of the Old Dominion, and allow hunting in areas that were formerly inaccessable. This, of course, may create inroads on game populations, but the bright side of the picture is that many of these roads are constructed of dirt and serve as open areas in the habitat for certain species. It may be well to note that a strip of road 8 feet wide and 5,280 feet long is equal to one acre.

The increase in the population of Virginia has been coupled with an increase in the sales of hunting licenses. In 1920 there were 3.2 hunting licenses sold for every 100 citizens of Virginia (Table 2). By 1950 hunting license sales reached a point where 11.8 licenses were sold for every 100 Virginia citizens, and by 1957 license sales were estimated to average 15 licenses per every 100 people. The estimate of the 1957 Virginia population amounted to 3,824,504 individuals, and was calculated from data included in a report by Tate and Blume (1958). The writer does not intend to imply that hunting license sales are indicative of the actual number of hunters, for the variety of types of hunting licenses make impossible the task of enumerating the number of hunters who go afield annually in the Old Dominion. A single hunter will in all probability own several types of hunting licenses. The writer has personally known of men who purchased a

Table 2. The population and estimated population of Virginia from 1920 through 1980, and the number of hunting licenses sold per 100 inhabitants of Virginia

*

Year	Number of people	Number of hunting licenses sold per 100 people
1920	2,309,187	3.2
1930	2,421,851	6.3
1940	2,677,773	6.2
1950	3,318,680	11.8
1957	3,824,504 (est)	15.0
1960	3,983,800	
1970	4,475,300	
1980	4,990,500	

Population data from Tate and Blume (1958)
Hunting license data from the Annual Reports of the Virginia Commission of Game and Inland Fisheries.

county hunting license with the idea that they would not hunt outside the limits of their "home" county, but who later during the same year found it necessary to obtain a state-wide license in order to hunt in other sections of the state. Any sportsman wishing to hunt deer on good range in the state will probably need a state hunting license, a big game hunting license, and a National Forest stamp. If he hunts in certain counties west of the Blue Ridge, he will also need a special damage stamp issued by the county. On the other hand, landowners and their families do not need a license to hunt on their own property. Thus, the task of actually counting the number of hunters would be difficult, if not impossible, to complete. The data show that as the population of Virginia increases the number of hunting licenses sold per 100 persons also increases. Although there is no data to prove it, the increase in sales of hunting licenses probably indicates an increase in the number of hunters. If the population continues to increase, as expected, it seems reasonable to assume that the number of hunters within the population will increase, and any increase in the number of hunters will create additional pressure on the game populations of Virginia.

Another important factor related to human population numbers is the number of leisure hours possessed by Virginians. In 1914 the average man worked between 53 and 55 hours a week (Wright, 1949:603). The Fair Labor Standards Act of 1938 created the 40-hour working week which was to be in effect by 1941 (Phelps, 1950:126,127). Currently, labor leaders are campaigning for a 32-hour working week. These data

point out that the average man has more hours of leisure now than in former years, and additional hours of leisure may be granted in the near future. It seems probable that many of these leisure hours will be spent in hunting. If there are more hunters with more time to hunt, the game biologists of the future will have additional problems facing them. There is just so much available public hunting lands and this number of acres will be difficult to enlarge. Possibly the creation of public and private hunting reserves will relieve some of the pressure, but the problem of supplying the hunter with a place to hunt and something to shoot at looms larger each year. These conditions may be experienced only if our human population increases as expected and if there are no serious economic slumps. In periods of economic stress, such as the depression of the 1930's, more and more people will utilize the game animals as supplements to their food supply. As pointed out earlier in this paper, in times such as these, the number of hunters may increase while the number of license sales decreases. In the event of a serious epidemic or atomic attack the conditions would also be changed but the status of the human population or the game animal population can not be ascertained at this time.

The main problem of the future seems to be finding enough space and sufficient game animals to allow the sportsmen to utilize his leisure hours. The writer suggests that a program to increase interest in archery or hunting with muzzle-loading firearms may allow for more hours of recreation without too much damage to game animal populations under high hunting pressure. Certainly in the future, the

wildlife officials will be confronted with the rapidly diminishing amounts of space per hunter, and action should be taken to purchase any available land that may serve as public hunting areas.

FORESTS

Precolonial Forests

Misconceptions regarding the status of the precolonial forest lands of Virginia are the rule rather than the exception. Day (1953: 329) quotes several outstanding misbeliefs regarding precolonial forest conditions; one of the most interesting being the statement that a squirrel could travel the length of eastern United States without ever coming down out of trees, or that indeed, he may well have traveled much of this distance without catching a glimpse of sunshine on the forest floor. On the other hand, the reports and diaries left by men who observed primeval tracts present a very different picture. One report, dated 1775, indicates that the forests of Virginia and Maryland were devoid of underbrush, and that a man could easily ride through them on horseback (Day, 1953: 334). "In many localities the mature trees alone remained, and they were frequently so thinned and depleted that the woods resembled parks rather than forests" (Maxwell, 1910:87). A 1705 history of Virginia written by Robert Beverley (1947:123-125) gives excellent descriptions of the forest conditions of early Coastal, Piedmont, and mountainous Virginia. The conditions described by Beverley probably are essentially the same as those found in precolonial forests, because by 1700 the colonists had not moved far westward from the coast.

In the following discussion much of the information concerning forest conditions in the various geographic regions of Virginia is taken from Beverley's work.

Coastal Region:

"The Land towards the Mouth of the Rivers is generally of a low, moist and fat Mould, such as the heavier sort of Grain delight in, as Rice, Hemp, Indian corn, &c. This also is varied here and there with Veins of a cold, hungry, sandy Soil, of the same Moisture, and very often lying under Water. But this also has its Advantages; for on such Land, generally grow the Huckle-berries, Cran-berries, Chincapins, Etc. These low Lands are for the most part, well stor'd with Oaks, Poplars, Pines, Cedars, Cypress, and Sweet-Gums; the Trunks of which are often Thirty, Forty, Fifty, some Sixty or Seventy foot high, without a Branch or Limb. They likewise produce great Variety of Evergreens, unknown to me by Name, besides the beauteous Holly, Sweet-Myrtle, Cedar, and the Live Oak, which for three Quarters of the Year is continually dropping its Acorns, and at the same time budding, and bearing others in their Stead" (Beverley, 1947:123-124).

Today pine occupies an important position both in abundance and in distribution in Coastal Virginia, but this was not true in the precolonial era. "At the period of discovery, pine was confined chiefly to the immediate coast, and to tracts near the mouths of large rivers--" (Maxwell, 1910:99). As a matter of fact, pine was scattered so widely as late as 1622 that the London Company was advised that the profitable manufacture of pitch and tars was

doubtful since these products could not be conveniently collected (Maxwell, 1910:99). Pines are a subclimax tree that invade land cleared of hardwood forest.

Smith (Arber, 1910:56-57) and other writers recorded that the most common trees were oak and walnut; ash and elm were also found in abundance. Large mulberry trees were often found near the Indian houses. Smith further stated that there were three types of plums. Maxwell (1910:97) deduced that such trees as hickories, walnuts and persimmons were found in such abundance as to indicate that the precolonial forests were thin and broken. "Plums were plentiful, and this fact points to open tracts and thin woods, for it is well known that the plum bears little fruit in thickets, and the trees are not plentiful" (Maxwell, 1910:97). From the above, one may surmise that precolonial forests of Coastal Virginia were composed mostly of mature hardwood trees interspersed with clearings. Smith (Arber, 1910:67) stated that the forest floor was so free of vegetation that a man could gallop a horse in any direction he wished, being halted only at rivers and creeks.

Piedmont Region:

"The Land higher up the Rivers throughout the whole Country, is generally a level Ground, with shallow Vallies, full of Streams and pleasant Springs of clear Water, having interspers'd here and there among the large Levels, some small Hills and extensive Vales: The Mould in some Places is black, fat, and thick laid; in others looser, lighter, and thin. The foundation of the Mould is also various;

sometimes Clay then Gravel, and Rocky Stones; and sometimes Marle. The Middle of the Necks or Ridges between the Rivers, is generally poor, being either a light Sand, or a white or red Clay, with a thin Mould: Yet even these Places are stored with Chestnuts, Chincapins, Acorns of the Shrub-Oak, and a Reedy Grass in Summer, very good for Cattle. The rich Lands lie next the Rivers and Branches, and are stor'd with large Oaks, Walnuts, Hickories, Ash, Beech, Popular, and many other Sorts of Timber, of surprising bigness" (Beverley, 1947: 124).

Hariot (Tarbox, 1884) wrote of the conditions around the North Carolina Colony, and the same conditions probably existed a little farther north. He states (Tarbox, 1884:198-199) "There are two kindes of Walnuts, and of the infinite ftore: In many places where very great woods for many miles together the third part of the trees are walnut-trees." It may be that Harriot confused the hickory trees with the walnut trees, and his statement may refer to the oak-hickory climax type forest, or he may have been differentiating between the black walnut (Juglans nigra) and the butternut (Juglans cinera). It is entirely possible that walnut trees were present in this abundance, because the descriptions picture a climax hardwood forest. In such a forest there would be a great deal of humus and leaf mold but little or no underbrush. These are the conditions under which the walnut grows best, thus it is conceivable that the tree would have been much more plentiful then they are at present.

Mountainous Region:

"The Heads of the Rivers afford a Mixture of Hills, Vallies, and Plains, some richer than other, whereof the Fruits and Timber-Trees are also various. In some Places lie great Plats of low and very rich Ground, well Timber'd; in others, large Spots of Meadows and Savanna's, wherein are Hundreds of Acres without any tree at all; but yield Reeds and Grass of incredible Height: And in the Swamps and sunken Grounds grow Trees, as vastly big, as I believe the World affords, and stand so close together, that the Branches or Boughs of many of them, lock into one another; but what lessens their Value is, that the greatest Bulk of them are at some Distance from Water-Carriage. The Land of these upper Parts affords greater Variety of Soil, than any other, and as great Variety in the Foundations of the Soil or Mould, of which good Judgement may be made, by the Plants and Herbs that grow upon it. The Rivers and Creeks do in many Places form very large Marshes, which are a convenient Support for their Flocks and Herds" (Beverley, 1947:124-125).

Settlers did not penetrate far beyond the Blue Ridge Mountains in the very early days of the Colony, thus little is known concerning the condition of the far western portion of the state. Most information concerning the precolonial forests of this region came from the accounts of the Indians who talked with the Englishmen, and many of these reports have been greatly distorted throughout the years.

Colonial Forests

The colonial forests served the settlers in many ways. From trees they constructed their forts, their houses and many of their agricultural tools. Wood served as fuel for heating their homes and for cooking purposes. Turkeys, deer and bear from the forest were utilized as food. Throughout the entire colonial period wood and other forest products played an important part in the development of Virginia.

Coastal Region:

Bruce (1924:16ff.) recorded the results of a study of conditions found in the colonial forests. Bruce stated that tall pines grew along the ocean coast and along the shores of Hampton Roads. These trees were so dense that they blocked the view to the interior of the land. This band of conifers was quite narrow, and it soon gave way to the greater expanse of hardwoods which covered most of the land.

The English copied many of the Indian's uses of the forests and products from the woodlands were important throughout the colonial period (Sauer, 1941:160). They adopted the Indian's method of clearing land by tree girdling, and they probably hunted with fire during the early years of the colony. Hunting, by fire or other methods, must have greatly reduced the deer population for in 1699 the General Assembly passed legislation regulating the killing of deer (Mann, 1952:12).

Jamestown was the site of the first saw-mill in America. In 1608, a sash-saw-mill was constructed. This type of mill was operated with water power and was quite effective for its day. As new

settlements appeared, a saw-mill was usually found in the immediate vicinity, but they probably did not create any real drain on the forests (Jones, 1950:391).

Piedmont Region:

Since the settlement of Piedmont Virginia did not begin until after 1710, it is probable that the forests were essentially in their precolonial form. How much acreage was cleared for agricultural fields is not known. John Lederer (1902:5-6) made several journies into the western country around 1669 and on one of his trips he had this to say, "The highlands (or Ahkontshuck) though under the same parallels, are happie notwithstanding in a more healthful air. The ground is over-grown with underwood in many places, and that so perplext and interwoven with vines that who travels here, must sometimes cut through his way." This description varies greatly from the usual accounts of the bare Piedmont forest floors. Much of what was written about early Virginia was done by men who wished to encourage emigrants to come and settle their holdings (Byrd). Lederer's description was written by a man who actually visited the land, and presumably described what he saw.

The original Piedmont forests were composed mainly of hardwoods with a few natural stands of pines scattered over the area. Oaks, chestnuts and hickories were the predominate hardwood trees (Jones, 1950:392).

Mountain Region:

Mountain forests were predominantly hardwood; this group of trees

made up approximately four-fifths of the total number of species. Perhaps the oaks were the most abundant species. The chestnut was an important mast tree and was very numerous. Yellow poplar and hickories completed the list of the major hardwoods. Small tracts of red spruce were found on top of the high mountains (Jones, 1950: 392-393). Lederer (1902:18) stated that when he visited the mountain areas, the forests were open and clear of underbrush. He attributed this condition to the industry of the aborigines, but far more likely he was describing conditions found in a climax forest. While the information provided by Lederer seems to contradict that of Beverley it should be mentioned that in certain mountainous areas few or no large trees are to be found. This is due to a combination of the elevation, geological substrate and water content of the soil.

Postcolonial Forests

During the postcolonial era great changes occurred in Virginia's forests. These changes were brought about by three principal factors; the rapid population growth, the type of agricultural pursuits and the large-scale lumbering activities during the years immediately following the Civil War.

Depleted agricultural fields were common in Tidewater and Piedmont Virginia farms. These openings had been stripped of their agricultural values due to their repeated plantings to corn and tobacco. As old fields were discarded, new ones were cut from the forest to take their place. Some depletion of the forests was created by clearing for

agriculture, but prior to 1820 most of this drain on the forests was confined to the eastern portion of the state. Travelers in the western part of the Piedmont noted that the forests were relatively undisturbed and that this area was thinly settled.

During the years 1824 - 1826, Donald MacDonald visited the country between Washington and Charlottesville. The following notes were entered in his diary on Tuesday, December 6, 1825, "The surrounding country is not much settled, and is thickly covered by the forest containing a great variety of trees, which are not of very great size" (1942:322). He noted in addition to these facts that the earth was mostly of a red soil.

Apparently the forests of the western portion of the Piedmont and mountain Virginia never contained as many large trees as the eastern forests did. Other explorers have referred to the clean floors of the western Virginia forests.

Chapin Jones, the first State Forester of Virginia, was of the opinion that from the time of Jamestown until 1850, more forest area was cleared for agricultural purposes than for all other uses. However, he did not think such land clearance constituted a serious drain on the forest resources. Although each village had its saw-mill, no real depletion of the forests by lumbering occurred until after the introduction of the steam-powered mills with circular saws (1950:391).

Agriculture was the main source of income for Virginians. The two main money crops were corn and tobacco, and both of these tended to deplete soil fertility rapidly. As land was plentiful and cheap, the virgin forest tracts gave way to open fields thus creating - "a cycle

of clearing, cultivation and abandonment" (Gruschow, 1946:8).

With the destruction of extensive forest tracts in the northern part of the United States about the middle of the nineteenth century, lumbering operations moved south. Data for the years prior to 1839 are lacking, but that year the value of lumber produced in Virginia amounted to over one-half million dollars; by 1849 the value of lumber had increased to nearly one million dollars and by 1859 it had exceeded $2,200,000 annually.

Large scale lumbering activities continued; the peak of lumber production in Virginia was reached in 1909 when 2,101,718,000 board feet of lumber were sawed. Dean (1952:16) summarized the situation as follows: "Lumber production well over the billion mark continued for several years, but saw timber of the species was becoming increasingly hard to find, and leaders in the affairs of the Commonwealth began to realize that measures must be taken to protect and develop our forest if they were to survive and continue."

Fires followed logging, thus fire damage often was inflicted on the remaining forest stands. The combination of the cutting operations and the fires that followed resulted in erosion of the topsoil, and streams that had run clear were now heavily burdened with silt and soil from the slopes (Gruschow, 1946:8; Thornton, 1955:9).

Conservationists began a fight for the protection of the forests, and public opinion began to make itself felt during the last two decades of the nineteenth century. Most of the conservation activities were carried on at the national level, but each of these advancements

for the Nation were also advancements for the forests of Virginia.

Forest Legislation:

National Level: Most of the data in this section was taken from information contained in the booklet, Highlights in the History of Forest Conservation, U. S. Department of Agriculture, Agriculture Information Bulletin No. 83, published in 1952. Data from other sources have been noted.

The American Forestry Association was organized on September 10, 1875. This group of interested men realized the need of protecting the remaining forest stands and their purpose was to make the public aware of the need for forest protection. They also attempted to promote timber culture.

In 1876, due to pressure from members of the American Association for the Advancement of Science, Congress passed legislation requiring the Commissioner of Agriculture to appoint a well-trained man to determine the amount of annual timber needs. Another purpose of this survey was to determine the amount of timber imported and exported, as well as to determine the possible future needs of timber and forest products. A study was made of forestry practices used by other countries and from these data, plans were made for the best possible methods of preservation and renewal of the forests of the United States. Congress appropriated $2,000 for the study.

In 1881, the Department of Agriculture was reorganized and its forest agency was raised to the level of Division of Forestry. The new Division had no lands under its control, but efforts were made

to collect information that would be helpful in future forestry practices.

The Biological Survey, which later became the Fish and Wildlife Service, was created as the Division of Economic Ornithology and Mammalogy in 1885. This agency was placed in the U. S. Department of Agriculture (later transferred to the Department of the Interior). This was done because the leaders in forestry realized that wildlife was an important forest crop and needed to be included in any forestry plans.

On March 3, 1891, Congress approved legislation providing the President with powers to create forest reserves of land to be withdrawn from the public domain. On March 30 of that year, President Harrison created the Yellowstone Timberland Reserve of 1,239,040 acres in Wyoming. Before the end of his term, Harrison had set aside a total of 13,000,000 acres in forest reserves. These reserves were not managed as forest tracts, and no cutting or other forest activities was carried out on them. They were merely areas in which the forests were protected.

President Grover Cleveland added an additional 20,000,000 acres to the reserve system. Foresters were not satisfied with the mere protection of forests, and pressured Congress into passing an act outlining a plan of organization and management of the public forests. This act was passed on June 4, 1897.

Before the close of the nineteenth century the public was aware of the need of forests. In an effort to assure that forested areas

would be preserved, Congress passed the necessary legislation 28 February 1899.

The authorities who managed the forests did not like the connotations of the term "forest reserves" and accordingly the name of these areas was changed to "National Forests" in 1907.

Perhaps the single greatest advancement in forestry of the present century came on March 1, 1911 with the passage of the Weeks Law. This legislation allowed the Federal government to purchase lands necessary for the protection of flow of navigable streams. It was under this law that the purchase of lands in eastern United States for National Forests was authorized. The Weeks Law, therefore, was the legal base for the organization of Virginia's two National Forests. Arrangements to set up fire control measures as a joint effort between the Federal and State governments were also contained in this law.

A federal act of August 10, 1912 decreed that 10 per cent of the forest receipts of 1912 would be spent on trails and roads in the national forests. This money was to be spent in states from which the funds came. This temporary legislation was strengthened on March 4, 1913 when this procedure was legally set up as a permanent plan. Road building was designed so that fire fighters could get to the scene of a fire in time to halt it before great damage could be inflicted. On July 11, 1916, monies amounting to $10 million in excess of the 10 per cent rule were set aside for the construction and maintenance of additional forest trails. These roads were to be constructed within or partly within the national forests.

In 1916, the National Park Service was created in the Department of Interior.

State Level: National interests in forests and forestry created interests within the individual states. The people of Virginia were among the first to realize the need for national forests. On February 15, 1901, the General Assembly passed the following legislation, "to give consent by the State of Virginia to acquisition by the United States of such lands as may be needed for the establishment of a national forest reserve in said State: to perpetuate these forests forever and preserve the headwaters of many important streams, and which will prove of great and permanent benefit to the people of the State" (Mullin, 1955:18).

The George Washington National Forest was one of the earliest national forests in the east, it was created in 1911, the same year that the Weeks Law was passed by Congress (Shomon, 1957:7).

In 1914 the General Assembly noted the need for forest protection at the State level, and that year legislation was passed creating the office of State Forester. The forester was under the control of the State Geological Commission. At this time several state laws regarding forests had been passed. Most of these laws dealt with fires, and none of them controlled trespass. In 1914 these laws were strengthened so as to insure the perpetuation of the Virginia forests. In 1915, the County fire warden system was originated for the protection of the forests (Dean, 1952:16-17; O'Byrne, 1955:3).

Fire was a grave problem of these times. For many years farmers had burned the forest lands to create pasturage for cattle and to destroy the underbrush so that there would be good crops of blue-berries. Old time residents of Rockbridge County report shipments of carloads of blue-berries from that county to metropolitan markets.

Mountain people did not change their minds quickly, and a considerable number of years were involved in teaching them that fires did more damage than good in the forests. The first forest rangers were disliked by many people, because their uniforms set them apart as a member of the "law". Little by little, the forest officials won their fight; the public realized that the forests must be protected if they were to remain. The forests were placed under sound management plans. Rigid inspection kept down the number of fires. The local inhabitants realized the value of the forest lands, and the forests in Virginia were on their way to being perpetuated.

Modern Forests

The forests of postcolonial Virginia vanished quickly as the result of lumbering activities. The large saw-mills invaded Virginia after the Civil War and increased steadily in number until after 1900. The forests of Virginia were not extensive enough to support timber cutting on an extensive and intensive level, and most of the available tracts were soon logged. In 1909, Virginia ranked sixth in the nation in lumber production; by 1923 only 770,000,000 board feet of lumber were cut and Virginia ranked sixteenth in the nation (Jones, 1925:33).

Near the end of the Civil War the trend of clearing land for agriculture began to wane. Instead, more fields were being abandoned. Through natural succession the abandoned fields have become pine forests. By 1950 about 16,000,000 acres of Virginia were in forests (Gwynn, 1958: 21). In 1930, State Forester Chapin Jones called attention to these abandoned fields, and proposed that they be planted in trees. The estimation in 1930 indicated that of the 25,767,680 acres in Virginia, 14,579,000 acres were forested, and an additional 1,200,000 acres were designated waste lands. On these "waste lands", Jones proposed a 10,000 acre management development, open to public hunting and fishing, and a 2,500 acre plot designated as a game refuge. Unfortunately, his plans never materialized (Jones, 1930:119 and Jones, 1925:33).

During the late 1920's and early 1930's the chestnut blight swept over the state. This disease was thought to have been brought in on some imported oriental chestnuts trees. The American chestnut, (Castanea dentata) was highly susceptible to the blight and in a few years the chestnut trees were dead. These trees had furnished great quantities of desirable mast for turkey, bear, grouse, squirrel and deer. With the depletion of the chestnut, mast-eating species of wildlife in portions of Virginia were deprived of this valuable food source. In addition to the production of nuts, the chestnut was desirable as a lumber tree, and chestnut wood was used as fence posts, and a source of tannic acid. They also made good den trees. Thus the U. S. Forest Service tried to find a suitable strain of Asiatic chestnut to supplant the American chestnut. The Division

of Forest Pathology planted Asiatic trees on eight experimental plots throughout the United States between 1936 and 1939 as a basic plan to determine the best possible species for use. The experiments showed that many foreign trees could not withstand the severity of American winters (Diller, 1952:11). Experimentation continued with the hope of finding a suitable tree. One of these experimental plantings of various species of chestnut was made in Amherst County. The Virginia Commission of Game and Inland Fisheries also made plantings of foreign chestnuts. Many of these trees lived, but did not spread too widely.

The shortleaf pine in Piedmont Virginia was attacked by a disease called "little leaf". This malady has been under investigation since 1940 (Anon. 1955:25). Its seriousness does not compare to that of the chestnut blight. All species of pine in Virginia are attacked by the larvae of saw-flies. The adult female slits open a leaf and deposits a single egg in each slit. After hatching, the young feed on pine needles and often completely strip a tree of its leaves. These affected trees usually do not die but remain alive to produce another set of leaves. However, the growth in diseased softwood timber species is greatly impaired by this insect.

Wood was a very necessary commodity during World War II, and great inroads were made in forest resources between 1941 and 1945. The Armed Forces used more wood by weight than steel (Anon. 1952: 14).

Around 1945 pine timber in Virginia was being cut as fast as it was being produced; the hardwoods were not cut as rapidly as

pine but they were mostly of poor quality. In 1945, officials of the Virginia Forest Service stated that the forests were greatly understocked, and that acre for acre, the forest lands were producing only about half their potential (Wright and Dean, 1945:7).

Fires have always created great damage to the Virginia forests. In the early 1900's many of the forest fires were intentionally started by nearby residents. The greatest reason for burning during the early years of this century was for the removal of underbush and litter to promote good crops of blue-berries. In 1931, it was estimated that there were 1,500 forest fires in Virginia each year. These fires burned approximately 250,000 acres of land and inflicted much damage on young trees. The monetary damages amounted to more than one-half million dollars (Pedersen, 1931:118). Between the years of 1940 and 1945 there was an annual average of 2,526 forest fires which burned about 103,980 acres. This figure amounted to only 0.82 per cent of the total area protected. During 1944, the sum of 1.9 cents per acre was spent on fire control, and forestry officials stated that good fire protection would cost in the neighborhood of 5 cents per acre of protected land (Wright and Dean, 1945:8; Gruschow, 1946:8). The number of forest fires, the amount of protected land and the number of protected acres burned are listed for specific years in Table 3.

The 1948 Forest Survey listed the total acreage of Virginia forests at 14.8 million acres (Pechanec, 1958:12). By 1955 Virginia's forests had a total combined acreage of 15,832,000 acres (Dickerman

Table 3. The number of forest fires for specified years in Virginia

Year	Number of fires	Area protected acres	Area burned acres	Size of ave. fire acres	Per Cent area burned
1925	811	9,163,471	128,281½	159.1	1.40
1930	2,554	9,579,224	333,023 3/4	131.5	3.48
1935	1,029	10,723,385	25,498	24.7	.24
1940	2,246	11,928,325	44,322 3/4	19.7	.37
1945	1,465	13,830,651	30,921 3/4	21.1	.22
1950	2,083	13,014,861	19,563	9.4	.150
1951	1,955	13,014,861	15,980¼	8.2	.123
1952	2,494	13,014,164	111,571	44.7	.86
1953	2,461	12,976,783	32,762½	13.3	.25
1954	2,318	12,976,783	16,952	7.31	.131
1955	1,506	12,976,783	15,840½	10.52	.12
1956	1,417	12,976,783	9,019	5.17	.07
1957	1,039	12,976,783	3,571	3.44	.028
1958	1,083	14,004,844	4,303	3.97	.031

(After: Improving and Expanding V.P.I.'s Role in Virginia Agricultural And Rural Life, Forestry Staff Members, 1959)

and McGuire, 1955:5), and by 1957 this figure had increased to 16.1 million acres (Pechanec, 1958:12).

Virginia's forests were very important to the economy of the state. Wood and lumber companies, along with various other manufacturers of wooden products, contributed 650 million dollars to local economy annually. These companies hired one out of five of all industrial workers in Virginia. In 1958, about 81 per cent of the forested land in Virginia was owned by 211,000 farmers (Pechanec, 1958:12). In 1948 forests covered 58 per cent of the land in Virginia (Jones, 1950: 338); by 1955, this percentage had increased to 61 per cent (Forest Survey).

While the management of Virginia's forest is primarily concerned with the growth and development of timber trees, other important resources are also considered. Many of the major cities and towns relied on forested land to serve as watershed areas; the headwaters of rivers were protected from being over-burdened with silt and top soil, and recreational areas are created for use by the public. Thus, development of the concept of "multiple forest use" in Virginia is closely allied to the establishment and history of the State Forest Service (Now the Virginia Division of Forestry).

Virginia Forest Service:

The Virginia Forest Service was created by an act of the 1914 General Assembly. The office of State Forester was placed in the organizational set-up of the State Geological Commission: Chapin Jones was appointed the first State Forester. At this time there

were few laws that dealt with the protection and preservation of state forest lands. Most of the laws were concerned with the prevention of fires and none of them controlled trespass. The Virginia public realized the need for better laws and the General Assembly passed very important legislation in 1915 including the establishment of the county forest warden system. Under the plan, each county had a warden who was to supervise the state supported forest program in his area. In 1926 legislation was passed which allowed the creation of paid teams of fire fighters. The money appropriated for this protection was insufficient and only 53 out of the 100 counties were given fire protection under this program. The dry year of 1930 presented these crews with their first real test. That year there were 2,554 fires which burned 9,579,224 acres of protected land. The precipitation that year amounted to 24.1 inches of rain or only 57.2 per cent of the normal.

The inauguration of the Civilian Conservation Corps in 1933 at Camp Roosevelt in Virginia's Massanutten Mountains greatly aided forest management and preservation. The members of the CCC cleaned out underbrush, planted trees, built fire access trails and created improvements beneficial to wildlife. The extensiveness of the CCC activities by implementing conservation practices on the land did much to focus public attention on the whole conservation field.

The seed tree law was passed in 1940. This law insured future reseeding of cut areas by requiring that four seed-trees of loblolly or shortleaf pine be left standing on each acre of pine timber cut.

The timberland Assistance Act, passed by the 1946 General

Assembly, authorized state foresters to mark timber for private owners for a nominal fee.

By 1957, the State of Virginia had acquired six State Forests. The Gallion-Prince Edward State Forest, of 588 acres, was willed to the state by Emmett G. Gallion in 1919. In 1938 a gift of 400 acres of land in Prince William County created the Conway Robinson Memorial Forest. In 1939 the State of Virginia entered into a 99 year lease with the United States government to gain control of Piedmont lands purchased under the Resettlement Administration. A total of 39,500 acres was obtained. On these lands the Cumberland, Appomattox-Buckingham and Prince Edward State Forests were created. In 1946, the Virginia Department of Conservation and Development acquired ownership of 7,600 acres of land in Chesterfield County. This land was obtained from the Federal government. Two thousand acres were set aside as a park and 5,600 acres were included in the Pocohontas State Forest. Dean (1952:16-17) presents a very good resumé of the history of State forestry activities and much of the data cited above are from this source.

The 4-Point Program of the Virginia Forest Service (now the Virginia Division of Forestry) was begun in 1945. In an effort to improve Virginia's forests the following plans were put into action: (1) adequate fire protection, (2) use of sound harvesting methods, (3) reforestation of idle lands, and (4) utilization of present wood wastes (Wright and Dean, 1945:7).

National Forests In Virginia:

There are two national forests that lie largely within Virginia. The George Washington National Forest lies in the northwestern portion of the state and the Jefferson lies in the southwestern portion of the state. They are separated by the James River in Rockbridge County.

The National forests were created by the Weeks Act passed March 1, 1911. This legislation authorized the Federal Government to buy lands to protect the headwaters of navigable streams.

The Clark-McNary Act, passed by Congress on June 7, 1924, granted the Federal Government extended rights for the purchase of lands. The Weeks Act had stipulated that only forested lands at or near the headwaters of important streams could be purchased. The Clark-McNary Act allowed the purchase of lands for timber resources. It also created provisions for better fire protection (Anon., 1952:10-11).

The Civilian Conservation Corps was established by law on April 17, 1933. The first CCC camp, Camp Roosevelt, was developed at Luray in the George Washington National Forest (Anon., 1952:11). This was the first of these camps to be set up and the last one to be evacuated.

The cooperative National Forest wildlife management program, known as the Virginia Plan, was created by an agreement between the State of Virginia and the government of the United States on June 13, 1938. Under this plan the hunters and fisherman who used the resources of the national forests paid $1.00 for a stamp annually. This money was utilized to improve habitat for fish and game, and restocking purposes. All management plans were developed cooperatively by state and federal

officials. (Shomon, 1957:7; Mead, 1948:16; Mullin, 1955:18).

Revenue from timber sales, special forest uses and sales of forest products from the Virginia area of the George Washington netted the state $23,845.76 in 1950 (Anon., 1951:13).

Another important contribution of the national forests is the value of city watershed areas. At least eight communities receive their water supply from the Virginia national forest lands. In addition, the recreational values afforded by these lands are of great importance.

Effects Of Forests On Wildlife

The precolonial forests were primarily of a climax hardwood composition. The closed canopies of such forests obliterated sunlight from the forest floors, and consequently the floors of these cathederal-like forests were bare. In such forests there would have been little or no production of browse or other deer foods. The large, over-mature, mast producing trees probably supplied an abundance of food for such forest game species as the bear, turkey, grouse and squirrel.

During the colonial period of Virginia's history, the conditions of the forests changed little. Forest cutting was done primarily for the clearing of agricultural lands and fire wood. Most of the deforestation of this type was restricted to Tidewater Virginia. Apparently little or no inroads were created in Virginia's forests at this time.

The forested acres of Virginia dwindled rapidly during the post-colonial years. Until 1820 the pattern of deforestation did not change markedly, but beginning about 1839 large scale lumbering activities

destroyed huge tracts of land in the state. Lumbering, agricultural abandonment, and fires created extensive damage in the Old Dominion. Pines, a subclimax species, invaded the cleared areas. Formerly this softwood species had been restricted to small tracts along the coast and to small stands within the Piedmont and mountainous regions. During the postcolonial years pine became abundant in Tidewater and Piedmont Virginia The lumbering activities created conditions for sprouting of hardwoods and for the return of young trees and shrubs. This growth produced excellent deer browse and cover. Squirrels were able to find food and safety in small woodlots, but grouse and bear were driven from much of their former range. Turkeys were driven from much of the territory because of food and cover scarcity in recently cut areas.

Near the close of the postcolonial period, and continuing through the modern period, the public became aware of the necessity for forest preservation and restoration.

Currently, the National Forests, industrial forests and some pirvately owned forests, are being managed on a multiple use basis. Forest managers cooperating with wildlife biologists seek to obtain conditions favorable to forest wildlife species as well as conditions favorable for good timber growth and production.

AGRICULTURE

Precolonial Agriculture

In the description of precolonial forests, mention was made of the fact that the forest floors were practically bare and that most of the forest consisted of mature trees. Once these trees were destroyed, openings were created. These openings were perpetuated by the frequent firing of the area by the Indians; fire being used either in hunting, for purposes of protection, to create food for grazing animals, or for other purposes. Other clearings were created for agricultural reasons, and still other openings were created around the villages. But by far, the greatest acreage was cleared as a direct result of fire (Maxwell, 1910:73).

The Indians had large areas of land cleared for use in agriculture, but the acreage of agricultural fields was small when compared with the size of openings resulting from fire (Maxwell, 1910:73). The Indians burned practically all land in Virginia except swamps and other lands too wet to burn (Maxwell, 1910:87); clearings in the inland portion of the State resulted from burning (Day, 1953:334). The Indians had created an extensive cleared area called "The Barrens" which extended northward from the Shenandoah Valley across Maryland and into Pennsylvania. This area was for all practical purposes devoid of trees, except small dwarfed ones. Tall grasses covered most of the area (Maxwell, 1910:94). This opening should not be confused with the mountain balds which were generally covered with grasses or members of the heath family. It is not

generally believed that the Indians created these balds, but their existence is due to a normal geological co-action. "The Barrens" was a favorite hunting area of the Indians, as well it might be, since the elk and the buffalo apparently found abundant food here. More than 1,000 square miles were included in this tract (Maxwell, 1910:94-95).

The Virginia Indians occupied villages of a permanent type, which usually resulted in sizeable clearing of the forest cover. "Establishment of a village involved clearing for home sites and foraging for a considerable radius for the plants and animals necessary to the Indian's way of life -- foods, fiber, medicines, wood and bark for utensils, weapons, canoes, and houses and particularly for fuelwood" (Day, 1953: 329).

The longer the village was in existence, the larger became the clearing surrounding it. Daily the Indian women and children searched the forests for firewood from dead trees and fallen limbs (Day, 1953: 329). Day (1953:329) stated that live trees were systematically girdled to furnish the village with the necessary wood. When the forests around the village became stripped, the entire town had to be moved to a more suitable location. Almost every permanent village also had a large area of open ground that served as a playground.

At the time of discovery, the Virginia Indians had developed their culture to such a point that it was based on hunting and fishing and on agriculture. Maxwell (1910:79) indicated that agriculture was so important to the Indian's way of life that he could not have existed long without it.

Many early writers tell of large agricultural clearings surrounding the Indian houses. One of the earliest records of such clearing is by Captain John Smith (Holland, 1952) who re-counted that, "Newport, Smith and twentie others, were sent to discover the head of the river; by divers small habitations they passed in six days they arrived at a Towne called Powhatan, consisting of some twelve houses, pleasantly seated on a hill; before it three fertile Isles, about in many cornfields, --".

Maxwell (1910:80) in commenting on the extensiveness of the Indian agriculture stated that in 1614 the Chickahominy Indians promised to give 1,000 bushels of corn annually to the colonists in return for a few iron hatchets. John Smith reported that a shipload of grain could have been loaded from supplies along the Chickahominy (Maxwell, 1910:80).

"At Kecoughtan, a town situated near the modern Hampton, there were found three thousand acres of cleared land; and the greater part of this wide area of ground was planted by the Indians in maize, interspersed, as was customary, with vegetables" (Bruce, 1924:26). "A similar field was situated at the mouth of the Appomattox which spread over one hundred acres" (Bruce, 1924:26).

After the Jamestown massacre of 1622, the Indians were driven from their holdings. The Virginians proposed to claim these open fields since the land would be all that was needed for agricultural purposes for many years without having to clear more (Maxwell, 1910:81).

Swanton (1946:256) remarked that in southeastern United States the more permanent villages were always associated with large

agricultural plots. The Indians were industrious farmers, and while the women and children did most of the planting and the field work, the men cleared the fields. Lederer (1902:16) remarked that the Indians of western Virginia usually kept a year's supply of corn in storage to prevent the starving of the tribe in case of enemy attack.

Mosby and Handley (1943:53) estimated that there were 817,000 acres or 1,200 square miles of open land in precolonial Virginia. Maxwell (1910:73) called attention to the fact that for each Indian in a tribe there were from 30 to 40 acres of open land; it is interesting to note that in 1910 there were approximately seven acres of cleared land per person. All available information indicates that a considerable amount of open land existed in Virginia prior to 1600.

Colonial Agriculture

The European colonists were accustomed to farming large areas of open land, free from stumps or other obstructions, and they were totally unprepared for the type of agriculture that the American wilderness demanded. The agricultural efforts by the "gentlemen" or craftmen settlers were dilatory during the first few years of the colony. Eventually the colonists accepted the fact that they had to produce their food by agricultural practices and adopted farming methods of the Indians; once this was done, they were able to grow enough food for themselves and their livestock. The Indian method of clearing land by girdling trees was widely practiced, and rows of crops were planted between the standing trunks of trees. An

important aboriginal farming practice was to plant seeds from several plant species in the same "hill". In this manner corn, squashes, and beans were grown together, and the land produced a greater yield than if only one type of crop was planted (Sauer, 1941:160). The colonists soon learned that by placing a fish in each "hill" the yield could be improved (Drinkard, 1950:336).

Agricultural fields, especially those in which dead trees remained standing, were burned over before planting. The firing removed leaves, twigs and sticks that had fallen to the ground. In these plots the dark forest topsoil contained large quantities of potash in the leaf-mold, and created favorable growing conditions for Indian corn. After a few seasons, the ravages of nature felled the trees; sometimes they were then hauled off for firewood, at other times they were allowed to remain and rot on the site. Roots quickly deteriorated in the moist soil (Sauer, 1941:161).

The typical colonial Virginia-type agriculture was a mixture of the European and Indian methods of farming. It has been estimated that about four-sevenths of the food plants grown by the colonists were those that had been domesticated by the Indians (Edwards, 1940:174). These included such American representatives as: corn, kidney and navy beans; squashes; pumpkins; sunflowers; Jerusalem artichokes; peanuts; tomatoes; cotton; potatoes; sweetpotatoes and tobacco (Edwards, 1940:174; Sauer, 1941:161; True, 1937:1).

The English began planting crops just a few weeks after their arrival at Jamestown. Gray (1941:15ffd.) reported that wheat was planted on June 3, 1607. Other crops planted that spring were

potatoes, pumpkins, melons, and cotton. It is said that pineapples and oranges were planted! In the planting season of 1608, fifty men were detailed to clear and plant land around Jamestown. Besides this being a poor year for crops, additional colonists arrived, and they probably would not have had enough food to go through the winter if Captain John Smith had not secured 279 bushels of corn from the Indians.

The first farmer to come to Jamestown was William Spence, who arrived in 1608 (Drinkard, 1950:336); it is obvious that the planters in 1607 were not farmers. The colonists planted fifty acres of corn during the spring of 1609. The harvest was made and the crop stored, but about half the corn was destroyed by rats. This fact greatly alarmed the colonists for besides themselves, they had 60 swine and 500 poultry animals to feed (Gray, 1941:16).

The first tobacco crops from Virginia were of such poor quality that the leaf was not acceptable on the English market. John Rolfe began to experiment with various types of tobacco plants and in 1612 developed an excellent strain or variety. This new tobacco soon proved to be the most sought after leaf from the New World (Gottmann, 1955:64). Tobacco farming had gained such prominence by 1619 that many plantations would have grown tobacco only; therefore, Sir Thomas Dale, governor of Virginia, ordered that each plantation owner must plant two acres of corn for himself and for each male servant working for him. It is probable that had this law not been effected, the colonists would not have raised enough food crops to carry them over the winters (Edwards, 1940: 184). Planters were constantly trying to develop new processes to improve the quality of their tobacco, and in 1619, a Mr. Lammert found

that tobacco dryed on a line rather than in a pile tasted much better and found a better market. That year, some 20,000 pounds were sent to England, and by 1627 this amount had increased to 500,000 pounds (Gottmann, 1955:65). Tobacco soon became the medium of exchange, and in an effort to standardize the value, the General Assembly passed a law in 1631 - 32 that no English goods could be bought with Virginia tobacco at a rate of exchange less than 6 pence per pound. Violators of this law were subject to imprisonment (Edwards, 1940 184).

English authorities made many attempts to get other money crops started in Virginia. In 1619 the colonial government passed a law stipulating that each landowner must plant 6 mulberry trees per year for seven years (Edwards, 1940:187). James I strengthened this plan with his decree that each landowner was required to plant 10 mulberry trees for each 100 acres of land. The 1623 General Assembly voted to pay the first farmer who made 100 pounds of silk in a year the sum of 5,000 pounds of tobacco (True, 1937:1). To the knowledge of the writer this prize was never won.

Near the close of the colonial period, land which had been planted repeatedly to the same crops began to lose its fertility. Virginia leaders realized that drastic measures would have to be taken if the land was to be saved. Their pleas went unheeded by the farmers. Washington was of the opinion that the farmers in Virginia did not know how to protect or improve their soil (Troubetzkoy, 1956:11). Washington, Jefferson and Madison experimented with new farming ideas and practices, but their ideas were not accepted by the common farmer (Demaree, 1941:3-4). John Clayton, a prominent Virginia botanist,

called attention to the effects that certain soils had on tobacco (True, 1937:1). Thomas Jefferson attempted to aid agriculture with the introduction of a threshing machine, but many years were to pass before this machine was accepted in Virginia (Drinkard, 1950:337).

Agriculture did not advance greatly during the colonial period. In fact, many of the practices begun in 1607 were still being employed two and one half centuries later (Sauer, 1941:160). Land was plentiful and slave labor was cheap. Manorial estates were granted to friends of the king, and each man that paid his own way to America was guaranteed fifty acres for himself and each member of his family under the "headright" plan. Eventually, each male servant owned by a landowner also brought the owner an additional fifty acres of land (Edwards, 1940: 175ffd.).

As old fields were worn out, new ones were cleared to replace them. Under the conditions where land was available, labor was cheap and only simple tools were needed; forested lands fell before the ax. A plantation of this era consisted of a large tract of virgin timber, a restricted cultivated area and one or two abandoned fields. The average plantation contained about 400 to 500 acres (Gottmann, 1955: 66ffd.). Roads were poor and farms were far from markets, thus a self-sufficient type of agriculture developed. Food for the family and livestock came from the land; wool, cotton and flax were spun into cloth. Drinkard (1950:338) summed the situation well with this statement, "When land is abundant and people are few, little thought is given to methods of land use that will conserve the greatest natural resources for generations yet unborn." This statement presents a terse

resume of the colonial attitude and use of land - and its associated forest resources. This philosophy, of course, had profound affects on the wildlife resources.

Postcolonial Agriculture

Early postcolonial agricultural practices did not differ markedly from those of late colonial period. Land in the early postcolonial years was available and cheap. Land abandonment following continuous row-cropping became a wide-spread practice and reached its peak after the Civil War.

"The social and economic structure of the United States at the close of the eighteenth century was predominantly agricultural. Each farming community was largely self-sufficient, and the methods of tillage were exploitative in the extreme. The lack of outside markets for surpluses contributed greatly to the conditions of this situation, and the abundance of what seemed to be an unlimited amount of virgin lands permitted this condition to continue through two centuries. By this time, however, the generally unprogressive nature of agriculture as an occupation began to challenge the attention of the more discerning leaders" (Demaree, 1941:3).

Shortly after 1800, farm leaders appraised Virginia agricultural lands and found them to be depleted of about three-fourths of their vegetable material (Demaree, 1941:6). This statement reflects conditions of eastern Virginia only. The land in Shenandoah Valley and in other parts of western Virginia never were destroyed as were the lands

to the east of the Blue Ridge.

Prior to 1800, the methods of plowing were primitive. Wooden plows were utilized, and these crude instruments could hardly more than scratch the surface of the earth. Not too long after the turn of the nineteenth century the iron plow share was introduced, and with this much improved tool, deeper furrows could be turned. Another very important innovation was the use of animal manure as fertilizer. With deeper plowing and the use of fertilizer, fields believed infertile were reclaimed for agricultural purposes (Gottmann, 1955:96).

During the 1780's, farmers in the Shenandoah Valley shifted from the production of tobacco to the raising of wheat. This latter crop soon became the main money crop of this section of the state. The raising of corn gained importance in Tidewater and in the northern Piedmont. By 1850, truck gardening was well established in Tidewater (Gottmann, 1955 94-104). Tobacco remained the dominant crop of the southern Piedmont. About the middle of the nineteenth century, orchards were developed along the slopes of the Blue Ridge (Gottmann, 1955:103).

Important agricultural aids developed during the postcolonial period which included the origination of the agricultural periodical, Farmer's Register in 1833. Its founder and editor, Edmund Ruffin, published articles on better agricultural practices and especially on the advantages of the uses of fertilizer. His ideas were sound but were slow in catching on (True 1937:10-11). Soil depletion in eastern Virginia caused some concern among men of prominence and wealth. Between 1800 and 1840 several agricultural societies were created. The

aim of most of these groups was to collect the best known agricultural methods and make them available to the farmers of the state. Among the list of such societies were: the Richmond Agricultural Society founded in April 1810; Virginia Society for Promoting Agriculture formed in 1811 but reorganized in 1816 as the Society of Virginia for Promoting Agriculture; the Albemarle Agricultural Society formed in 1817; and the Fredericksburg Agricultural Society formed in 1818. Although these societies did not last too long, about 1833, they did bring about some important changes in agriculture. Primarily, they were responsible for the introduction of agricultural experimentation, agricultural contests and county fairs. These agricultural innovations were in effect by 1825 and have continued to the present day; they have brought about progressive changes in the farming practices of Virginia (Kinnear, 1952:36ffd.; 59ffd.).

As an additional aid to farmers, Cyrus H. McCormick, of Rockbridge County, built his first reaper in 1831. This machine was not immediately accepted; however, in later years it was heavily utilized by Virginia farmers.

During the years between 1880 - 1910, the percentage of rural people in the population decreased. In 1880, rural people accounted for 87.6 per cent of the population, while in 1910 they amounted to only 76.9 per cent of the population.

With the cessation of slave labor at the end of the Civil War, many of the larger Tidewater and Piedmont farms were subdivided into smaller farms. As often as not the landowner did not cultivate his

land himself, but utilized the services of freed slaves. The usual arrangements agreed upon were that the landowner would furnish the land, equipment, fertilizer (or part of it), seeds or plants and a house for the tenant. In return for this, the landowner received one-half of all crops produced. The tenant in such a share-cropping venture was usually a Negro. Some white non-land owners often agreed to furnish all necessary supplies and labor with the exception of a house and the land. The landowner generally received one-fourth of all crops grown under this arrangement. In many cases the landowners resided in towns and visited the farms at infrequent intervals. Little or none of the money derived from crops went back into improvements of the land, and since the tenants did not own the land they took little care to see that the soil was properly cared for. Abandoned fields grew up in broomsedge or pines and fencerows grew over with shrubs and small trees. These conditions described above apply generally to the Piedmont. In the Valley, a somewhat different situation prevailed. Here most farms were operated by their owners and, consequently, greater care was taken of the soil, and fencerows were somewhat cleaner. Rail fences were constructed on a zig-zag pattern and it was virtually impossible to cut close to them. These fencerows grew up in briars and small shrubs. This thick vegetation offered excellent cover for rabbit and quail. Wheat and other grains were planted in the fields. These crops were harvested in mid-summer and by fall such plants as rag-weed and native legumes had invaded the areas. The seeds from these plants furnished good quail food during the fall and early winter months.

Although land abandonment had reached its peak after the Civil War, it continued throughout the postcolonial period. A story told by Professor A. B. Massey, of Virginia Polytechnic Institute, reflected the general attitude of the Virginia farmer of this day. At a meeting of farmers and soil conservationists, one farmer had heard about as much about land management as he could take. In somewhat of a huff he left the meeting; as he went out of the door he was heard to state, "This young whipper-snapper can't tell me anything about farming; I had worn out three farms before he was born."

The census of 1880 noted that there were 118,517 farms in Virginia with a combined acreage of 8,510,113 acres of improved land. The total value of farms and farming equipment was valued at $216,128,107.

Modern Agriculture

The farming practices of the modern period may be approached from two points of view. One side of the picture dealt with the total amounts of crops produced, and the other was concerned with the condition of the land on which the crops were grown.

A great deal of the damage done to Virginia's land was the result of poor farming practices. The farmers of Virginia were not quick to accept new and improved methods of farming. About 58 per cent of all land in Virginia was damaged by erosion before 1952; three million acres of land went out of agricultural production between 1900 and 1930; an additional two million acres were affected between 1948 and 1957 (Salter, 1952:9; Pechanec, 1958:12).

There has been a steady decrease in farm acreage since 1900. The data presented in Table 4 show that between 1910 and 1955, farm lands decreased 4,811,000 acres; of the 14,685,000 acres contained in Virginia farms in 1955, crops were planted on only 4,225,000 acres and 3,943,000 acres were in pastures (Table 5). Forests, streams and waste lands accounted for the remaining 6,517,000 acres of land included in farms.

In 1957 Dr. H. N. Young, director of the Virginia Agricultural Experiment Station summarized the present agricultural situation in Virginia (Young, 1957). He briefly summarized the changes in Virginia agriculture during the last century as follows:

"The change from a self-sufficing type of agriculture in which most things consumed on the farm were grown there to a system of farming in which the principal business of the farmer is to produce commodities for sale has made it possible for Virginia farmers to stay in business in the face of rigid competition from other sections of the country. This is perhaps the most important change that has taken place in Virginia agriculture within the last century. This change is the foundation upon which the progress has been built during the last 50 years. It was made possible by the development of labor saving machinery and other technological advancements. As a result, each generation of farmers has been able to produce more than their fathers did, and levels of living on the farm have risen correspondingly (Young, 1957:3).

An important change in Virginia agriculture occurred between 1880 and 1915; during this period the overall numbers of beef cattle, sheep

Table 4. Total farm acreage in Virginia, 1910 - 1955

Year	Farm Acreage	% Total Land Area in Farms
1910	19,496,000	75.6
1920	18,768,000	72.8
1930	16,729,000	64.9
1940	16,445,000	64.4
1945	16,358,000	64.1
1950	15,572,000	61.0
1955	14,685,000	57.5

(From: Improving and Expanding V.P.I.'s Role in Virginia Agricultural And Rural Life, Forestry Staff Members, V.P.I., 1959; Page 6)

Table 5. Land use in Virginia, 1955

Type of Land Use	Number of Acres	% of Total Land
Forest	15,832,000	62
Crops	4,225,000	17
Pasture	3,943,000	15
Other	1,532,000	6

(From: Improving and Expanding V.P.I.'s Role in Virginia Agricultural and Rural Life, Forestry Staff Members, 1959; Page 8)

and swine decreased. However, the numbers of the animals increased in areas where conditions for their production were favorable. There was a large upsurge in dairying and the number of dairy cattle almost doubled. This was especially true around the cities and towns. In the areas around Richmond, the Shenandoah Valley and northern Virginia, the poultry industry attained economic significance (Young, 1957:3).

Since 1900 the physical volume of crop production in Virginia increased annually; but the number of acres involved in raising crops decreased. "The physical volume of crop production averaged 38 per cent higher from 1950 to 1954 than from 1900 to 1909. The average annual acreage of harvested crops was 18 per cent less from 1950 to 1954 than during the first decade of the present century" (Young, 1957:4-5).

From 1900 to 1943 the annual average of total crop production increased slowly, but from 1935 to 1950 there was a 58 per cent increase in crop yield per acre (Young, 1957:6).

The hay crop accounted for one-fifth of the total crop production during the years from 1900 to 1910; it was responsible for one-third of all the crops raised during 1950 to 1954 (Young, 1957:12).

Total acreage involved in tobacco production increased from 1900 until 1920. From 1920 until 1932 tobacco acreage dropped sharply; the 92,600 acres of tobacco planted in 1932 represents the smallest tobacco crop on record for this century. An annual average of 130,000 acres was planted in tobacco between 1950 and 1954 (Young, 1957:14-15).

Virginia's principal fruit crops, apples and peaches, increased in production up to 1930. After this time no definite trend is evident (Young, 1957:26).

The production of livestock and livestock products increased rapidly. "The average annual output of all livestock and livestock products from 1950 to 1954 was two and one-half times as large as the 1900 to 1909 yearly average. In the case of meat animals and their products, the annual 1950 to 1954 average volume of production exceeded that of the first ten years of the present century by 36 per cent. The average yearly production of milk from 1950 to 1954 was 149 per cent larger and that of poultry, and eggs 475 per cent above the 1900 to 1909 average" (Young 1957:31).

The annual production of crops, livestock, and other farm products in Virginia increased from 1900 until 1920; this was followed by a decline until 1932. From 1932 until 1952 farm products production increased at a rate of three per cent per year. Most of the increase in farm products since 1934 have been accomplished through livestock and its associated products. Between 1910 and 1953 the number of people working on farms decreased 34 per cent while the physical output increased 76 per cent. This increase was brought about by improved scientific methods of farming and the replacement of 45 per cent of the horses and mules with tractors and trucks (Young, 1957:39-42).

Young's information concerned only the physical volume of crop production; it did not describe the conditions of the land during this period. The poor farming methods of the early 1900's destroyed the

topsoil on much of the land in the state. Heavy utilization of pastures destroyed the sod, leaving the topsoil to be washed away by rainfall. These fields were rendered infertile and the erosion exposed large outcroppings of limestone and other rocks. By 1940 a total of 380,100 acres of land in Virginia were unsuitable for farming (V. P. I. For. Staff, 1959:10). In 1952 there were 700,000 acres of unproductive land located on 175,000 Virginia farms (Bowers, 1952:16). Between 1940 and 1957 approximately 43,000 acres of marshlands were drained.

In an effort to halt the destruction of the nation's land, Congress passed legislation in 1935 which created the present-day Soil Conservation Service (which had been preceeded by the Soil Erosion Service). This agency obtained good cooperation from Virginia farmers and by 1952 nearly three million acres of land in Virginia were managed under the soil conservation farm plan. The "planned" acreage accounted for 88 per cent of the total crop land on the state, with 87 per cent of Virginia's farms cooperating (Salter, 1952:9-10).

The Soil Conservation Service program is designed to assist farmers to develop land management plans for all activities carried on in farm fields and woodlots. The SCS program seeks to accomplish the following objectives:

1. the prevention and control of soil erosion
2. achieve productive land uses for all types of soil
3. assist in solutions of land-use problems, such as fencerows
4. contribute to the prevention and control of biological damages arising out of measures established for soil and water conservation and related land-use practices.

The SCS classifies land under eight different categories. Classes I, II and III are lands capable of continued crop production; special attention, such as use of fertilizers, should be given classes II and III. Class IV lands are borderline for crop production, but they may be utilized for this purpose occasionally. Classes V, VI and VII are suitable for forest growth or grass production. Class VIII includes marshes, swamps, and other waste lands suitable for the production of wildlife.

General farming conditions in western Virginia have been summarized by Brown (1958:145), who states that, "Small farms are especially numerous in the upland areas of Kentucky, Tennessee, Virginia, and West Virginia. Nearly half the commercial farms in this area in 1954 had fewer than 20 acres of harvested croplands. Three-fourths had less than 2,500 dollars of gross value of product; this means that the net farm income was probably less than 1,200 or 1,500 dollars. Improved practices, such as legumes, fertilizer, and lime, will add 200 to 400 dollars to the net farm income on farms in this size range, but the returns will still be low compared with industry and farms in many other areas".

Summary:

Virginia's farmland decreased by 4,811,000 acres from 1900 to 1955. While the total number of acres planted declined, the actual amount of crops produced increased. There was a general decline in numbers of beef cattle, swine and sheep, but in especially favorable

areas their numbers increased. Dairies sprang up around cities and towns; the number of dairy cattle nearly doubled. By 1952, about 58 per cent of the total land in Virginia was affected by erosion; that year about 88 per cent of all cropland was under the management plans of the SCS. In certain sections of Virginia, the farmer did not receive as much income from his farm as did people working in industry and in other professions.

Effects Of Agriculture On Wildlife

Although most of precolonial Virginia was covered with a mature hardwood forest, about 0.7 per cent of the land was cleared. These openings should have created favorable food and cover conditions for quail, rabbit, elk and buffalo. To be sure, these game species would not have attained tremendous population numbers throughout the state, for open land was not that plentiful. However, it is not inconceivable that on the extensive clearings, such as "The Barrens" or the "Great Valley," the grazing species, elk and buffalo, could have created fairly large local herds.

During the colonial era large acreages were planted in corn and tobacco. Both of these crops tend to drain the soil of available nutrients and minerals rather quickly, and quite soon considerable amounts of land were abandoned. As ragweed, broomsedge, and other food and cover plants invaded these areas, favorable habitat for quail and rabbits were created. On the other hand, as agricultural activity increased, the hunting of the elk and buffalo increased and

these animals were soon eradicated.

Land abandonment continued into the postcolonial period and reached its peak during the middle of the ninteenth century. During the latter decades of the ninteenth century conditions for quail and rabbits should have been much improved, and if one believes the hunting stories and pictures from that era, they were!

Since the turn of the twentieth century the physical volume of crop production has increased while the number of acres involved have decreased. In other words, farming has become intensified. Since 1935 there has been a tremendous increase, 58 per cent, in crop yield per acre (Young, 1957:6). Agriculturists have preached the doctrine of "clean farming", and in the wake of this "learning" the over-grown fencerows have vanished; with them went the food and cover for many rabbits and quail.

Dairy farms have increased in number in the Old Dominion and unfortunately many of them have sprung up around large cities where an over-abundance of hunters are congregated. Modern pastures offer neither food nor cover for farm game species, and the hay and corn fields associated with the dairies are cut clean and offer little or no support to wildlife. Often the land surrounding large cities offers little available and suitable hunting territory. The good areas are often over-hunted. More often the city hunters have little regard for the rights and privileges of the land owner which results in the "posting" of many acres annually. These conditions create situations in which the proper harvesting of farm game species is impossible.

Certain other "advancements" in agriculture have further destroyed wildlife habitat. In particular, the writer refers to the draining of 43,000 acres of marshland in Virginia between the years of 1940 and 1957. These lands are of little or no value for agriculture or other uses, and this destruction of waterfowl habitat is inexcusable.

Most of Virginia s farm land is under the planned program supplied by the Soil Conservation Service. This agency designates the land into eight categories. The production of wildlife is mentioned only in Class VIII which includes such land as marshes, swamps and other lands suitable only for the production of wildlife. Since wildlife may be considered as an annual crop of the land, it follows that the crop will be only as good as the soil on which it is raised. Certainly the swamps and marshes will serve as good areas of production for aquatic game species, but what of the upland species of game animals? Good land has to be employed in the production of good crops - what ever that crop may be! To be sure, the farmer's main concern is the production of profitable crops and in these cases wildlife must be considered as a side-line. However, it appears that if game species are to be hunted in the future, certain areas of suitable land must be set aside for their propagation.

WILDLIFE LEGISLATION

Precolonial Wildlife Legislation

It is generally believed that the Indian had freedom of the forest, except for those areas held by enemy tribes, and that he could hunt and fish at will. This is certainly not the case, for an Indian who dared to trespass on the property of another placed himself in jeopardy of severe punishment. The trespasser was not tolerated in the Indian society, for if he killed too many animals on a neighbor's property it may well have resulted in depletion of game in that area, thereby creating a serious food and clothing shortage for the landowner and his family.

Captain John Smith illustrated Indian ownership of land by this statement, "They all knowe their severall lands, and habitations, and limits to fish, fowle, or hunt in" (Holland, 1952). Day (1955) presented additional information on this subject and pointed out that tribal lands were divided into hunting territories with definite boundaries Speck's work on the Indian ownership of land was an outstanding treatise in this field, and he said, "Before entering upon the specific material from different tribes, let me define the family hunting group as a kinship group composed of folks united by blood or marriage, having the right to hunt, trap and fish in a certain inherited district bounded by some rivers, lakes or other natural landmarks. These territories, as we shall call them, moreover, were often known by certain local names identified with the family itself. The whole territory claimed by each tribe was subdivided into tracts

owned from time immemorial by the same families and handed down from generation to generation. The almost exact bounds of these territories were known and recognized; and trespass, which, indeed, was of rare occurrence, was summarily punishable" (Speck, 1915:182-183). He stated further (1915:183) that these borders were so exact that the territories could easily have been plotted on a map.

Indians of Algonquian linguistic stock are known to have assigned each family in the tribe definite hunting territories averaging from two to four hundred square miles in the main part of the tribal lands, and acreages of two to four times this extent on the frontier of their holdings (Speck, 1915:183).

Hunting was a job necessary for existence, and the entire family took part in the expeditions. All members of the tribe seemed to have anticipated the joys of a long hunting trip. They sometimes traveled several hundred miles in order to get to their hunting lands; once there, they constructed temporary dwellings which were abandoned at the end of the hunt (Beverley, 1947:155,156). Beverley (1947:154-155) described the use by Indians of fire hunting of elk, deer and buffalo in winter, usually in October. When the herd was located, a ring of fire was drawn around them. Once the peripheral fires were blazing, the hunters, often numbering in the hundreds, started towards the center of the area lighting new fires as they went. The trapped animals feared the smoke and moved into the center of the plot where their senses were dulled by the smoke and they milled in hopeless confusion. Here they were killed in

great numbers. Swanton (1946:318) reviewed the literature on fire hunting and reached the conclusion that the white man was responsible for the wholesale killing of the larger game animals for hides; the Indians only killed when they needed the meat and hides. Whether this is the case or not, the white man did engage in a heavy trade of furs and hides and the idea that he instigated the move for killing for hides alone is quite plausible.

Most historic reports indicated that there were quantities of game animals in Coastal and Piedmont Virginia. Some reports indicated that the mountains were not so plentifully stocked with game, but there were other contradictory reports. John Lederer made three trips into the mountains of Virginia during 1670 - 1671, and he had this advice for the adventurer who cared to take such a trip: "For other provisions, you may securely trust to your gun, the woods being full of fallow, and the savanae of red-deer, besides great variety of excellent fowl, as wilde turkey, pigeons, partridges, pheasant, etc. But you must not forget to dry or barbecue some of these before you come to the mountains; for upon them you will meet with no game, except a few bears" (Lederer, 1902ed.:27).

Other early explorers reported large numbers of game animals. Governor Spotswood, Peter Salley, and Dr. Thomas Walker mentioned seeing or hearing of good buffalo hunting in the Shenandoah Valley and in the areas around Roanoke and Blacksburg (Bruce, 1924:313; Cannaday, 1950:10). Lederer, himself, had seen and described elk from western Virginia.

While these reports appear to contradict each other, the writer believes that the descriptions fit two entirely different habitats of the Great Valley and the mountains. The larger grazing species probably found excellent range in the Great Valley. There are local legends in the Shenandoah Valley area which relate that the openings were burned annually to create good forage for game animals. Fires supposedly were controlled so that the "sacred" area of the Indians around Natural Bridge was never burned. These theories are substianted by the fact that the oldest trees still extant in Virginia are found here. These trees, the arbor vitae, are estimated to be around 1,600 years old. Perhaps all was not peaceful on these ranges for an Indian burial mound, the result of a battle, on Walker's Creek near Rockbridge Baths in Rockbridge County attests to the fact that occasional trouble arose between tribes in the area.

Lederer's report on the bear might well have described conditions found in the mountains where the ecological aspects were much different from those found a few miles away in the Shenandoah Valley. In certain mountainous regions conditions were favorable only to bears.

Colonial Wildlife Legislation

Big game may not have been as abundant in the colonial era of Virginia as is presently commonly supposed; apparently the mature forest and fire-hunting methods of the Indians did not afford any large quantity of browse for deer and the colonists did not report any considerable number of buffalo in the east. However, considerable numbers

of buffalo and elk were reported in the Shenandoah Valley.

As has been pointed out previously, the Virginia Indian population approximated 20,000 individuals. Their numbers were not sufficiently large to cause inroads on existing game populations, since the lands on which they hunted were extensive and the game widely spread over the areas. The exception to this condition occurred, of course, in the immediate vicinity of relatively permanent Indian villages.

Historical records indicated that the game supply diminished rapidly after the arrival of the English. Many of the larger game animals were killed for the sake of the hides only, the meat being left in the woods to rot. Robertson (1929:50) pointed out that this became a serious menace for this meat drew the wolves and other undesirable animals from the forests to the vicinity of villages.

Game animals played a major role in the economy of the early colonists for the larger animals supplied both food and clothing. The colonial authorities realized that measures would have to be taken to avoid complete destruction of this important natural resource. During the reign of Charles I, the first wildlife laws of Virginia were enacted by the governing body. A summary of the more important colonial laws relating to wild game is presented in Table 6.

The first "hunting" law was enacted in 1632, only twenty-five years after the founding of Jamestown. Interestingly, it dealt with the protection of an exotic species, wild swine, that had been released during the early years of the colony. Hogs were released by the people at Jamestown so that their wild offspring would remain in the forests

Table 6. Colonial Virginia Wildlife Legislation

Year	Purpose of Legislation	Authority
1632	Protection of wild swine (bounty law permitted the killing of one hog for each wolf killed)	Anon., 1927 Mann, 1952
1639	First trespass law. The fine for each offense was 40 shillings	Mann, 1952
1642	Strengthening of trespass law; fine raised to 400 pounds of tobacco	Anon., 1927 Mann, 1952
1645	Firing of weapons prohibited at social gatherings; at first weddings and funerals were excepted, later only funerals were excepted.	Mann, 1952
1656	First hunting license. Indians hunting on fenced plantations must have license	Mann, 1952
1657	Farmer's property protected. Hunter must pay if horse is shot accidentally	Mann, 1952
1658	Indians allowed to hunt game with guns	Anon., 1927
1660	Firearms legal in trade with Indians	Anon., 1927
1661	Indians could hunt on lands formerly theirs if they obtained permission from two county justices	Mann, 1952
1691	Bounty on wolves. Each head worth 300 pounds of tobacco	Mann, 1952

Table 6. Colonial Virginia Wildlife Legislation (continued)

Year	Purpose of Legislation	Authority
1699	Closed season on deer: February 1 - July 31; fine 500 pounds of tobacco	Mann, 1952
1705	Closed season on deer: January 1 - July 31; the informer to receive half the fine	Mann, 1952
1705	First stream pollution law. No one was allowed to throw the body of a slave in the river	Mann, 1952
1705	Trespass law strengthened to include fishing, fowling and ranging. The third offense carried a jail sentence	Mann, 1952
1731	Bounty laws on squirrels and crows	Mann, 1952
1734	Strengthening of deer hunting laws	Robertson, 1929
1738 a.	Repeal of 1734 law on deer: Closed seasons; Bucks - December 1 - July 31 Does and fawns - January 1 - September 30 Fines; 20 shillings or 20 lashes Deer could be killed if causing damage Frontiersmen could kill deer	Robertson, 1929
b.	No search warrant needed to search for deer	
c.	All dogs must be kept in kennels or tied all year. Five shillings fine for each free-running dog	

and serve as a supplementary source of food during normal times and as an emergency food source during periods of starvation. Apparently, too many of these animals were being killed needlessly, and the 1632 law specified that no man would kill a hog in the woods "'except in his devident'" or with the permission of the governor (Anon., 1927): The governor had the right to permit any person to kill a hog if it was needed for food. The law further stated that wolves had become a menace to the colony and that if a man killed a wolf and delivered its head to his commander, the hunter was permitted to take one wild swine as his bounty. Deer, waterfowl and other wildlife were not included in this law, the thought being that the hunter seeking to kill such animals would become more proficient with a gun and would be better prepared to meet with emergencies such as an Indian attack. This law remained in effect for many years. What effect it had on the hog population is not known; however, it did not decrease the wolf population, for shortly after this time the English sought the help of Indian hunters to thin out the wolves. The agreement called for the delivery of one cow to the Indian king whenever his hunters had delivered eight wolf heads to the village commander (Anon., 1927; Mann, 1952:11).

"As early as 1639 it was found necessary to pass an act enjoining the public 'not to shoot or hunt on other men's land that is seated and bounds marked under penalty of 40 S but may pursue deer and shoot on their own land'" (Mann, 1952:11). This was the first law in Virginia that dealt with hunting trespass. Perhaps, before this time game had been plentiful and there was no need for such a restriction, or it may

have been that plantations were becoming better developed and the landowners did not want intruders on their property.

The trespass law was strengthened in 1642 and definitely forbade hunting on the property of another. According to Mann (1952:11) this act stated "'that if any planter or person shall hunt or shoot upon or within the precincts or lymitts of his neighbor --- without leave first obtained for his soe doing, and having been warned by the owner of the land to forbare hunting --- he or they soe offending shall forfeit for every such offense foure hundred pounds of tobacco, the one halfe to the owner of the land, the other halfe to publick uses --- provided also that it shall be lawful for any person having shott a deare or other game without the lymitts of any man's land to pursue the said deare into the divident of another man, and freely to carry away the same without any trepasses ---'". Since tobacco was the money crop of the day, the trespass offender was heavily taxed for his offense.

Around the middle of the seventeenth century social meetings were looked forward to, for here the colonists had the opportunity to meet and have a good time. Apparently these meetings became too riotous for in 1645 a law was passed which halted the firing of firearms at social gatherings. There was a definite need for such a law for the relationship between the colonists and the Indians had become strained and unnecessary firing of guns might have brought about an attack by Indians lurking in near-by forests or might have alarmed other colonists who were not taking part in the celebration. At first, weddings and funerals were excepted from this law, but later only

funerals were excepted (Mann, 1952:11).

The first mention of a hunting license was made in a law passed in 1656 when it became mandatory that any Indian hunting on a fenced plantation must have a license (Mann, 1952:11). This was designed primarily for the safety of the colony for by this measure the colonists would know when Indians were in the vicinity.

Early Virginia had its irresponsible or careless hunters for, much like the conditions prevalent today, not only game but often cattle and horses fell before the hunter's gun. In 1657 a law was enacted to protect the farmer against livestock loss due to hunting accidents; the hunter was responsible for all horses, cows or other animals shot, and he was forced to make restitution to the landowner (Mann, 1952:11).

The use of firearms by Indians in their hunting was one of the major points of friction between the English and the Indians. The colonists did not think it desirable for the Indian to hunt with guns, for in this way they killed too much of the game that the English considered theirs. The colonists must also have feared the use of guns by Indians on warring expeditions. An old law prevented the sale or trade of guns to the Indians and their use of firearms was strictly forbidden. This cumbersome law was impossible to enforce for bootleggers sold guns to the Indians, and the redmen used these guns in hunting and warring. In 1658 the ban on the Indian's use of firearms was lifted. The bootleggers won the right to sell guns to the Indians on April 1, 1660 (Anon., 1927). The law allowing the Indians to use firearms in hunting did ease some of the tension that had developed

between the English and the aborigines. Land had been taken away from Indians by the colonists because the English did not want Indians in the vicinity of the colonial villages. This action banished the Indians from their own hunting areas. In 1661 legislation was enacted which provided that Indians who had been driven from their lands could make application to two county justices for permission to use these lands for hunting and fishing.

Many years were to pass before the colonists showed any great interest in agriculture. Most of the early colonists had come to America to get rich off the vast stores of gold that were reported here. When they did not find this treasure, they did little but hunt, fish and explore the country. Most of their numbers were landed gentry and soldiers of fortune who knew little if anything about farming. As a result they almost starved during the first winter, and probably would have met this fate had it not been for the kindness of the Powhatan Indians. In 1731 a bounty was established on crows and squirrels (Mann, 1952). This probably resulted from increased complaints by farmers who felt that these animals were destroying their crops.

The effects of bounty laws in colonial Virginia apparently were no better than they are at present. Despite the wolf bounty law of 1632, it became apparent that the wolf population was not declining, but was in fact, increasing in number. Some type of wolf bounty had been in effect for fifty-nine years, but in 1691 it became necessary to increase the bounty per head to 300 pounds of tobacco (Mann, 1952: 12).

Deer had been hunted throughout all seasons of the year by the English since these animals furnished the settlers with food and clothing. This constant and heavy hunting pressure had caused great destruction in the deer herds. In 1699, the Grand Assembly in Virginia found it necessary to enact legislation providing protection for the remaining animals. Mann, in his study of early Virginia wildlife legislation, quoted this law (1952:12) as follows: "'Whereas the Deer of this his majesties colony and dominion is very much destroyed and dimished by the unreasonable killing them when poor and of Does bigg with young to the great detriment of the inhabitants --- without bringing any considerable benefit to those that kill them, be it enacted (etc.) that from the first day of February next ensuing no person or persons shall shoot or kill any Deer running wild --- between the first day of February and the last day of July ---'".

Violation of Virginia's first closed hunting season brought a fine of 500 pounds of tobacco to the offender. The colonists were not allowed to buy a deer or deer skin from an Indian during this period; violators of this part of the law were also fined. In case the law was broken by a slave, or other person who could not pay the fine, the punishment was 30 lashes at the whipping post.

The decrease in deer numbers continued, and in October, 1705 the closed season was lengthened. That year a closed season on all deer existed from January 1 through August 31. In an effort to bring about better enforcement of the law, the informer was given half of the fine (Mann, 1952:12).

Two other laws were passed in 1705 which related to fish and wildlife. The streams, which had remained practically free of pollution before settlement of the English were now used for many purposes including their use for the disposal of bodies of slaves. Apparently, slave owners who did not want to go to the trouble of digging graves for dead slaves found the river an easy way to get rid of them. The law of 1705 stated that no man was to throw the body of a slave or other men into the stream.

In the same year the trespass laws were also made a great deal stronger and stipulated that no man could fish, fowl or range on the property of another. The previous laws had only stipulated that no man could hunt on the property of another. Each offense was subject to a fine and the third offense carried a mandatory jail sentence (Mann, 1952:12).

Another law to protect the deer was passed in 1734, but like its predecessors, it was not strong enough to halt the slaughter. The colonial authorities realized this and during the meeting of the General Assembly, called by the authority of George II, held at Williamsburg from August 1 until November 1, 1738, stronger measures were passed. Bucks were not to be killed or otherwise captured from the first day of December until the last day of July; does and fawns were protected from the first day of January through the last day of September. This law provided a fine of twenty shillings for each offense, and if the fine was not paid within six months after conviction, the offender received twenty lashes on his bare back.

During this closed season, however, deer could legally be taken if they were causing agricultural damage. Frontiersmen were not expected to abide by this law for often deer meat was their sole food. Therefore, they were permitted to kill deer for food at any time of the year but they were not allowed to sell meat or hides; if found guilty of such a charge, they received the usual punishment (Robertson, 1929: 51).

Skins that were taken during the closed period were commonly referred to as "red skins". Undoubtedly the name came about from the fact that the authorities could easily recognize the still wet and red skins as being illegal, as the whiter skins taken during the open season would have had time to dry and bleach. It is interesting to conjecture, too, if the name "red skins" had any connection with the name applied to the Indian for it was from the Indian that the colonists obtained most of these illegal hides. Any person found in possession of a "red skin" was fined the sum of ten shillings. So intense was the effort to enforce the law, that a constable did not need a search warrant to investigate a house to look for illegal deer hides (Robertson, 1929:51).

This law of 1738 stipulated that all dogs were to be tied or kept in kennels at all times. They were allowed to roam free only when accompanied by their master or his servants in the act of hunting. The fine of five shillings was levied on each free running dog. The trespass law was strengthened, and the fine of twenty shillings per offense was equally divided between the government and the informer (Robertson, 1929:51).

The list of wildlife legislation for the colonial period of Virginia is rather impressive when one considers the scant biological knowledge of game species of that time. Game laws were hard to enforce because of public sentiment, because of the vastness of the new country, and because of the scarcity of enforcing officers. Many of the colonists were people of the lower English class and had not had the opportunity to hunt in England; finding the opportunity here, they hated to be restricted in any sense, and resented the fact that the government should attempt to regulate their hunting and fishing, thus the general public did little to assist in the enforcement of the laws. Many counties had only one constable to enforce all laws including those relating to fish and game. In some counties like Augusta, which extended westward to the Mississippi, this would have been quite an undertaking.

Despite the fact that Virginia is the oldest permanent English settlement in North America, it was one of the few states that did not extirpate such species as the deer and wild turkey.

Postcolonial Wildlife Legislation

After Virginia declared her independence in 1776, the governmental agents felt it necessary to re-write all existing legislation. The job of devising new laws was done by Thomas Jefferson. When his work was completed, 126 bills were simultaneously submitted to the General Assembly (Troubetzkoy, 1954:17).

The earliest known attempt to pass a postcolonial game law failed. On October 31, 1785, James Madison presented a bill attempting to decrease the number of deer killed. This bill would have made it unlawful to hunt or kill deer less than one year of age. It proposed separate seasons for bucks and does. It was suggested that the closed buck season extend from the first day of December until the first day of August, and that the closed season on does would begin on the first day of January and run through the last day of August. Madison believed that heavy hunting pressure, especially during snows, would eventually destroy the deer herds (Troubetzkoy, 1954:17).

A considerable number of wildlife laws were passed during the postcolonial period; the major game laws of the Virginia Code of Laws are summarized in Table 7.

Federal Legislation:

In addition to the state wildlife laws, several federal acts were enacted during the postcolonial period, 1775 - 1912. Only the most important of these laws are summarized in the following section.

Most of the important federal wildlife enactments are summarized by Shomon (1952:10). The data in this section was taken from this source.

"It was not until the middle eighties that the public began awakening to the need of protecting the group of birds known as the 'non-game 'birds'. It was during this period that the Audubon Society

Table 7. The more important hunting and fishing laws of post-colonial Virginia

Date of Legislation	Brief Summary of Law
December 4, 1792	This legislation protected the landowners against trespass. The first violation was punishable by a fine of $3.00. With conviction of the third offense, the violator could be fined up to $30.00 and could be given a jail sentence.
December 23, 1792	It was unlawful to hunt deer with fire on patented lands. A fine of $4.00 was assessed for each offense. The informed received half the money, the landowner the remaining half.
January 16, 1801	Closed season on deer to include the days from January 1 to August 1. Violators were fined $5.00; slaves received not less than ten nor more than twenty lashes on their bare backs.
February 5, 1822	Bath County was allowed to pay a bounty on wolves. Payments for old wolves ranged between $6.00 and $20.00; for young wolves less than six months of age, from $3.00 to $10.00
February 10, 1826	Bounty on crows for eastern counties. A fee of eight cents per head was levied.
January 2, 1827	Other counties added to crow bounty list.
January 5, 1828	Crow bounty made state-wide.
February 18, 1831	Counties allowed to pay bounties on red fox. Old fox worth $1.50; young fox worth $0.75.
March 3, 1831	Closed season on deer to exist from January 1 to September 1. This law applied only to those counties east of the Blue Ridge.

Table 7. The more important hunting and fishing laws of post-colonial Virginia (continued)

Date of Legislation	Brief Summary of Law
March 3, 1832	Fish and waterfowl of the Potomac River protected.
1849	All counties given the privilege of disposing of bounty payments or the right to lessen the bounty on any predatory species.
1849	Closed season on deer: East of the Blue Ridge from February 1 to September 1; West of the Blue Ridge and east of the Alleghenies, from January 1 to August 1. This was the first closed deer season west of the Blue Ridge.
1849	Fishing laws dealt with waters in mouths of rivers and other waters in eastern part of the state.
1860	If a non-resident of Virginia was caught shooting at waterfowl he was fined $100.00.
1860	Closed deer season: January 15 to July 15. Fine of $10.00; informer to get half the fine.
1860	For a gun to be legal in the hunting of waterfowl it must be capable of being fired at arm's length.
1885	Illegal to kill or offer for sale, or buy; partridges, or quail from January 1 to October 15, and grouse, pheasants and turkey from February 15 to September 15 west of the Blue Ridge, except Rockbridge; January 15 - October 1, Rockbridge and the counties of the Piedmont except Prince Edward; in Prince Edward from March 15 - October 15.

Table 7. The more important hunting and fishing laws of post-colonial Virginia (continued)

Date of Legislation	Brief Summary of Law
1887	Closed season on deer; January 1 - August 15.
1904, Va. Code, -	Unlawful to kill or capture waterfowl or turkeys at night. At no times could one employ use of traps, nets, light reflectors or guns of larger than eight bore. Muskrats will not be shot at night. Unlawful to hunt, kill, buy or sell wild turkeys, pheasants, grouse, quail, partridges, woodcocks east of the Blue Ridge between the dates of February 1 and November 1 and west of the Blue Ridge between December 31 and November 1. Only the wild turkey could be hunted in the snow.
Sect. 207b (1904)	The creation of the State Game Warden system.
Sect. 207c (1904)	Out-of-state hunters to have licenses costing $10.00.
Sect. 2071a (1904)	Mongolian and English pheasants could be bought for stocking purposes.
Sect. 2078 (1904)	Restated old law of 1849 that if hunter killed a tame deer he was responsible to the owner for the value of the animal.
Sect. 2079 (1904)	Protection for non-game birds.
Sect. 2087 (1904)	Outlawed the use of dynamite in killing fish.

Table 7. The more important hunting and fishing laws of post-colonial Virginia (continued)

Date of Legislation	Brief Summary of Law
Sect. 2108 (1904)	Closed trout season: September 15 - April 1 Closed Bass season: May 15 - July 1.
February 29, 1912	Law prohibited the killing of robins or the destruction of their nests. Fines were from $5.00 - $50.00.
February 29, 1912	Boards of supervisors given the right to shorten the hunting season in their respective counties.
February 29, 1912	The use of battery guns in waterfowl hunting outlawed.
January 20, 1912	Protection of farm game species until end of open season. This was due to extremely cold weather.

was formed, and which by a long program of education to acquaint the public with non-game birds helped in the passage of the Audubon law in all but six state legislatures. In 1885 the Bureau of Biological Survey was organized in the U. S. Department of Agriculture, resulting from the virtual extirpation of the buffalo and the passenger pigeon."

Theodore Roosevelt popularized the term "conservation". He led the fight to make the public aware of the need to save the vanishing species of wildlife.

One of the more important pieces of federal wildlife legislation was the Lacey Act, passed May 25, 1900. This act made it unlawful for any person to buy or sell game. Importation of eggs of foreign birds was controlled by this law. The federal government had complete control of interstate game.

Early in the twentieth century the Audubon Society began pressuring the federal officials for protection of migratory birds of non-game species, and in 1903 Roosevelt set aside the first areas of land especially for resting places and for protection of birds. Later presidents created additional "Federal Bird Reservations" throughout the United States.

Congressman George Shiras, III introduced a bill on December 5, 1904 in which he asked for protection of the migratory game species. The Shiras bill failed to pass, but nine years later a similar bill, the Weeks-McLean bill, was attached as a rider to the Agricultural Appropriations Act for the Fiscal Year 1914. This bill was enacted into law on March 4, 1913; the following year it was attacked but its

enemies failed to get it repealed. This was the first law which afforded federal protection to migratory game species of birds. The 1914 Congress made the first appropriations for its enforcement.

Modern Wildlife Legislation

Introduction:

The postcolonial wildlife legislation of Virginia is often referred to as the "Thou Shalt Not -" laws. Each of them began with the phrase, "It shall be unlawful -", and little attention was given to management plans that might aid the wildlife species involved. These laws were primarily set up to prolong the supply of game and few conservationists really believed that hunting was here to stay.

The modern period of wildlife management in Virginia began in 1916 with the creation of the Department of Game and Inland Fisheries. This agency found itself faced with the problem of obtaining sound wildlife laws. There were, of course, laws that dealt with closed seasons and other forms of wildlife protection, but in most cases these laws had been ignored by the populace.

G. A. Jones (1952:5-6) tersely stated the basic requirements of any law, involving wildlife regulations, when he stated "Law is only common sense in writing. So long as the law remains within the bounds of common sense it retains support. But, when the law exceeds the limit of its need - when it by-passes common sense, or when it becomes so complicated that persons cannot see where society is being benefited,

then it is ignored."

Many laws passed during the early years of the Game Department were ignored because the people had been doing for years things which were suddenly forbidden by law. Therefore, one of the main jobs of the Game Department was to sell the public on the basic ideas behind game protection and management. This was not an easy task. During its first year of operation the Commission's game wardens collected $4,223.00 in fines resulting from game law violations. As a result of better law enforcement, most sections of the state reported that game populations had increased from twenty-five to one hundred per cent (Parsons, Ann. Rep. 1917:5).

Although the Game Department did not have specific scientific data on which to base game legislation, it hoped for a state-wide uniform game season. This was never accomplished. The board of supervisors for each county had the right to shorten the hunting season on any or all species within their boundaries. This authority had been given them by a law of February 29, 1912.

An example of some of the complexities involved in the local regulations was pointed out by Lewis Tyus in 1922. At that time Virginia offered a state hunting license which allowed the bearer to hunt on any or all lands within the state; some counties had restrictions which forbade the removal of birds killed in that county; thus the hunter was not at liberty to hunt in any other county and take home his bag of birds (Tyus, 1922:166).

At a meeting of Virginia conservationists in 1927, an advisory

committee was set up to make a study of proposals for better game management. Among other recommendations, this committee suggested that the power to set the hunting season be left entirely to the Game Department. The 1928 General Assembly did take the power of changing the hunting season away from the counties and granted certain regulatory authority to the state game agency, but the General Assembly did not give them full regulatory power (Poythress, 1927:27; Robertson, Ann. Rep. 1929:3) This did not solve the problem because even today a multitude of local laws are passed by the General Assembly due to pressures from small groups. These local laws continue to hamper the activities of the overall game management plan.

As late as the hunting season of 1958 - 59, the Commission was still attempting to establish a uniform hunting season for the entire state. They did not accomplish their goal. For example, the Commission set two general seasons on squirrels; one east of the Blue Ridge and one west of these mountains. In addition to these seasons, General Assembly legislation created ten more separate squirrel seasons. Thus, during the 1958 - 59 hunting season there were twelve different squirrel seasons within the state.

The Enactment Of Wildlife Legislation:

The Virginia Commission of Game and Inland Fisheries, which replaced the Department of Game and Inland Fisheries on July 1, 1926 (Stras, 1949 6), was granted greater control over the enactment of conservation laws by the 1928 General Assembly. The Legislature

authorized the Commission to enact laws concerning the wildlife species; however, the activities of the Commission in this respect were held in check by the General Assembly (Quinn, 1955:16).

"Section 29 - 125 of the Virginia code provides that 'Having a due regard for the distribution, abundance, economic value and breeding habits of wild birds, wild animals, and fish in inland waters, the Commission is hereby vested with the necessary power to determine when, to what extent, if at all, and by what means it is desirable to restrict, extend or prohibit in any degree the provisions of the law obtaining in this state or any part thereof for the hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage or export of any wild bird, wild animal, or fish from inland waters and may upon its own motion or upon written petition of 100 licensed landowners of any county propose regulations for such purposes'" (Quinn, 1955:16).

While this legislation gave the Commission certain authority to enact wildlife regulations, there are several significant handicaps. The General Assembly retained the power to set the outside limits of the hunting seasons and to pass other game laws. The Commission's regulations could set the seasons within these outside limits, provided the Commission regulations did not conflict with specific General Assembly local game laws. A second hindrance to the Commission's regulatory authority was the fact that any 100 licensed landowners of a county could propose game legislation. Such proposals usually are local in application and seldom are well thought out; many such local laws have done more harm than good.

In an effort to guard against impractical local legislation getting into the "hopper" of the General Assembly, the House Wildlife Committee was organized in 1944. The members of the Committee consider all proposed wildlife legislation and screen the various proposals.

During the first year of its existence, the Wildlife Committee reviewed 69 bills of which 18 were designed to repeal local legislation. An additional 14 bills were pigeon-holed. The members of the House Wildlife Committee worked with individual members of the Legislature and convinced them that another 25 bills of local nature should not be introduced because of their limited value and possibility of harmful effects on the management plans of the state (Clark, 1945:3).

The regulatory authority of the Commission, therefore, is clearly defined by the General Assembly. Within the authority granted to it, the Commission has established an orderly manner of holding public hearings and making changes in game and fish regulations. For example, any proposed changes in fish legislation are heard only during the October meeting of the Commission; proposed changes in the hunting laws are heard only at the March meeting If members of the Commission find the proposals unsuitable, they are disposed of promptly. If, however, the members feel that a proposed measure has merit, a full-copy of the proposed change must be printed in the newspapers of the state ten days before the final hearing. If the change is of local application it is published in the county newspaper of the area concerned. The time and place of the hearing is noted Interested persons may visit the hearing to speak for or against the change. Final actions are taken on fish matters at the November meeting and hunting

charges are considered at the April or May meeting. The proposed changes may be rejected or accepted at these meetings.

The Commission is authorized to pass emergency legislation at any time. The closing of hunting seasons during periods of extreme fire danger is an example of the effectiveness of this provision.

When new laws are passed, the Commission sets the date when they become effective, and presents in duplicate a copy of the new law to the Division of Statutory Research and Drafting. All game laws are printed in pamphlet form and sent to the clerk of each county court where they may be obtained free for personal use (Quinn, 1955:17).

All state and federal laws regarding wildlife are enforced by the game wardens of the state, and since game laws are a part of the Virginia code of laws, state, county, and city or town police officers are responsible for apprehending violators of such laws.

Division Of Law Enforcement:

The current game warden system was created shortly after the organization of the Department of Game and Inland Fisheries in 1916; however, the first game wardens in Virginia were provided for by a law of 1904. Under the older system the wardens were appointed for a term of four years and there were no provisions for a permanent salary. The wardens collected $2.50 for each conviction. This "fee system" was not effective and the warden force did not operate effectively under this system.

The table of organization for the Commission called for the

appointment of a warden for each county and city. The respective county board of supervisors or city council prepared a list of ten names of men who were acceptable for these jobs. A warden was appointed from each list. There was no immediate rush for these jobs because salaries could not be determined until it was known how much money would be available after the operating expenses of the Commission were paid. The wardens were not hired on an annual basis, but worked only when needed (Parsons, 1917:3).

The Baker Dog Law passed the Legislature in 1918 and became effective in 1919. The game wardens were required to enforce the Virginia dog laws without additional pay, and many quit their posts as the result of this legislation (Stras, 1949:6).

In 1924 Commissioner McDonald Lee announced that a supervisory warden had been appointed for each congressional district. These supervisors were responsible for the activities of the wardens in their districts; it was hoped that the new organizational scheme would create better cooperation among wardens. Supervising wardens were paid $100.00 a month and the regular wardens were paid from $30.00 to $70.00 a month (Lee, 1924:5).

During the fiscal year ending in 1923 wardens obtained 3,098 convictions and collected $20,665 in fines. This money went to the Literary Fund. Licenses were purchased for 361,163 dogs, and 15,000 unlicensed dogs were killed. The counties of Virginia reported payments of $30,083.49 for damages caused by licensed dogs (Lee, 1924: 6,7).

The number of game wardens decreased from 145 to 120 in 1926 (Tyus, 1927:72). On October 16, 1926 the supervising wardens were given a written test in Richmond. The test covered such subjects as duties of wardens, and knowledge of dog, game and fish laws. Reports of these tests indicated that the supervising wardens were well-versed in these fields (Robertson, 1928:7).

Game wardens were placed on straight salaries in July of 1930. Before this they had been paid on the number of convictions they obtained. This action greatly improved the relationships between the law enforcement officers and the general public (Stras, 1949:5).

Virginia wardens were equipped with uniforms during the fiscal year 1938 - 1939. The Commission felt that the uniform would add prestige to the wardens (Anon., 1940:5).

In 1948 the Commission embarked on a long-range management plan including specific measures to strengthen law enforcement. I. T. Quinn, Executive Director of the Commission, outlined this plan in the Annual Report for 1948 - 1949.

"Prior to July 1, 1948 the Commission had inadequate funds for the employment of sufficiently trained personnel to properly enforce the game and fish laws and regulations of the Commonwealth. But beginning July 1, 1948 the Commission was able to allow adequate travel expenses for wardens and to inititate a program of reclassification of all field officers who merit an increase in salary.

"The Commission believes that the game warden should be adequately trained and qualified to perform the following important functions

in his county:

(1) Enforce the game, inland fish and dog laws and regulations based thereunder.

(2) To organize and assist hunters and fishermen in planning programs of activity, and to secure their cooperation in wildlife protection, restoration and development.

(3) To visit the schools and discuss the value and benefits of wildlife to the community.

(4) To work out with farmers and landowners the application of wildlife management practices.

(5) To foster organized wildlife activities among 4-H Clubs, Boy Scouts, and other clubs.

(6) To organize interested groups to assist in planting fish and game supplied by the Commission.

In order to give expert training in the foregoing, the Commission, during 1949, established a School for Wardens at the Virginia Polytechnic Institute. This School is designed to train game wardens in the technique of game management, in the work of public relations, and in the development of an active interest among all the people in the protection, restoration and development of the State's wildlife" (Quinn, Ann. Rep. 1949:4).

A previous school for wardens was held at V. P. I. in 1941 but World War II prevented its continuance on an annual basis. Beginning in 1959 this school was held at various points in Virginia in a

Supervisory District rather than on a state-wide basis.

In 1950, the Commission of Game and Inland Fisheries gave diversional status to the law enforcement branch and M. Wheeler Kesterson was chosen to head the new division. He served as division head until 1952 when Webb Midyette was appointed to this post after the retirement of Kesterson (Bausermann, 1958:17).

Around 1950 game officials realized that game laws needed to be clarified. Wardens felt that the courts were too lenient in punishment of violators. Judge William Snow and members of the Commission re-codified all existing game laws in an effort to simplify them so misinterpretations would be less likely (Wright, 1951:11).

The number of supervising wardens had been reduced from the original ten to five. A revision of the warden districts, on April 1, 1952, established six supervisory warden districts. They were: George Washington, Thomas Jefferson, Hampton Roads, Patrick Henry, Jeb Stuart and Daniel Boone Warden Districts (Anon., 1952:24).

The 1953 Annual Report of the Virginia Commission of Game and Inland Fisheries explained the organization of the Law Enforcement Division. The 138 game wardens were responsible for enforcing all state and federal game, fish and dog laws. The activities of wardens were controlled by six supervising wardens who were responsible to the division chief. The "roving wardens" or "Flying Squadron" were conservation officers who were not assigned to any one place, but went to troubled areas throughout the state where their help was needed (Midyette, 1953:20).

Virginia, Delaware, and Arkansas were the last three states in which the game wardens were compelled to enforce the dog law (Clarke, 1945:4). The 1958 General Assembly passed a law authorizing the counties to hire their own dog wardens. This law relieved the Commission of the burden of enforcement of the dog law. Up to 1958 the various county boards of supervisors paid Commission personnel up to $4,000.00 a year to enforce the dog law or paid nothing. The destruction of dogs brought much criticism on the wardens, and their release from this duty has brought about better public support for the warden force (Anon., 1958: 6). By 1960, some 60-odd counties had employed County Dog Wardens thereby releasing Game Wardens for full-time service in wildlife activities.

From 1917 to 1958 the game warden force developed from a group of underpaid individuals into an effective law enforcement agency.

Important Legislation:

The writer made no attempt to list the multitudes of wildlife laws that were passed during the years of the modern period. In 1930 the game, fish and dog laws were coded and this has been continued to the present. In this section only the major legislative advancements in game management enacted between 1917 and 1958 are discussed.

Since the early years of its existence, the Virginia Department of Game and Inland Fisheries was concerned with the problem of enforcing dog laws. On March 20, 1918 the Baker Dog Law was passed.

This law stipulated that each dog must carry a tag showing that its owner had paid the tax on the animal. Unlicensed dogs and dogs caught doing damage were destroyed by game wardens.

Virginia's first "uniform game law" was passed in 1924. The statewide open season on all species was set from November 15 to January 31; however, the counties still possessed the right to shorten the season. A seasonal limit of one buck deer was instituted; waterfowl regulations were made to coincide with federal legislation. Prior to this time, a daily bag limits had been in effect, but in 1924 a seasonal bag limits was set also. "Virginia is the first State to provide a season bag limit on all protected game. Minnesota was the first State to provide for a season bag limit on ducks. Nearly all of the States and the Federal government provide for a daily bag limit. The difficulty of enforcing daily and season bag limit laws is obvious, yet without such inhibitions the chief destroyers could not be penalized, if caught. Bag limits, daily and season, have a persuasive effect ---" (Anon., 1924:34). The laws forbidding the removal of quail from the county of kill was repealed in 1924 (Tyus, 1924:14).

In 1928 the General Assembly passed legislation which forbade the shortening of open seasons by actions of the county boards of supervisors. A new license law was passed this year; the first resident fishing license for inland waters was incorporated with a hunting and trapping license. The federal government gave permission to the Commission to establish game refuges on federal lands within the state; no gun larger than a 10-gauge was legal for hunting (Robertson, 1929:3; Anon., 1928:138).

In 1930 the game, fish and dog laws were coded; in this codification many local laws were repealed (Anon., 1930:126).

In 1936, the sale of shot rabbits was prohibited, but trapped cottontails could be sold on the market (Nolting, 1937:3).

Many attempts were made to obtain cat legislation. One such bill was introduced to the 1938 General Assembly. This bill stipulated that no person would be allowed to drop cats along roads, and that stray cats could be killed. This brought immediate and prompt protests and, like its predecessors, it failed to pass (Anon., 1938:7).

In the 1938 session of the General Assembly, four days were removed from the end of the general open season east of the Blue Ridge in an effort to decrease the kill; it became unlawful to place more than three shells in a repeating shotgun (Anon., 1938:1).

The growing interest in archery presented an excellent opportunity to allow more hours of recreational hunting. The first archery season on deer was allowed at Big Levels in 1953: the following year saw the beginning of the annual bow hunting season at Hog Island Waterfowl Refuge. Archery seasons on deer usually occurred during October and last for two weeks.

Progressive legislation of 1958 did away with the compulsory enforcement of the dog law by game wardens. Each county was given the privilege of hiring its own dog warden. This year, too, another long-fought battle came to a close. Since 1930 Commission personnel had felt that bounty payments on predatory birds were unjustified. In 1958 Virginia joined 42 other states in giving legal protection to

eagles, hawks and owls except when doing damage (Anon., 1958:21).

Quinn made the following statement about wildlife conservation legislation in the 1950's: "With an ever increasing number of hunters and fishermen, together with the ever decreasing suitable habitat for farm game especially, the Commission is confronted, more and more with the problem of providing reasonable hunting and fishing for the masses. Local laws either restrict or liberalize hunting and fishing, either of which makes the management of the State's wildlife resources more difficult. It is the sincere desire of the Commission to manage game and fish so as to render the greatest benefit to the greatest number of people" (Quinn, 1951:3).

Many of the wildlife laws of Virginia are obsolete and it is hoped that the General Assembly will modernize the present status of the Commission's law making ability so that laws can be kept up to date (Quinn, 1951:3-4).

Bounty System:

The payments of bounties had its beginning early in the history of Virginia. The first game law enacted by the colonial legislative body in Virginia in 1632 attempted to decrease the wolf population. During the postcolonial period, a law passed February 5, 1822 permitted the payment of bounties on wolves; by January 5, 1828 all Virginia counties paid bounties on crows. In 1849 the General Assembly lessened the laws concerning bounties because very little progress had been made toward the destruction of noxious animal species. The ax,

plow, and saw-mills did more to drive the wolf from Virginia than did all the bounty hunting of the colonial and postcolonial eras. At the end of the postcolonial period the crow still abounded in the state.

At the time of the organization of the Department of Game and Inland Fisheries destruction of predatory birds and mammals was the order of the day. No thought was given to the fact that bounty laws had failed earlier, and a vigorous new campaign against "vermin" was begun.

The fourth Annual Report of the Game Department stated that, "The matter of depletion of the game birds in covers of the State has given the department much concern, and your Commissioner is very strongly of the opinion that certain species of hawks, with foxes, destroy annually far more partridge and young turkeys than do the hunters which go afield with dog and gun. The Assembly of 1920 apparently realized the importance of reducing the hawk menace by passing a law placing a bounty on the Cooper's and sharpshinned hawks and certain other predatory animals and birds, with the provision that one-half of the bounties shall be paid by this department out of the game protection fund. To what extent this law will deplete the resources of the department remains, of course, to be seen. However, your Commissioner regards the killing of certain species of hawks as perhaps the first essential in any comprehensive plan for the conservation of our partridges, and will devote much of his time during the year to influence boards of supervisors to adopt the bounty act" (Bilisoly, Ann. Rep. 1920:5-6).

Counties which passed the law allowing payments of bounties furnished the other half of the money. The game officials thought that the Legislature should have made it mandatory for all counties to pay bounties (Bilisoly, Ann. Rep. 1920:6).

During the first year that this law was in effect the Game Department paid out $1,042.22 for bounties on hawks. The counties involved matched this amount.

In 1921 the Virginia Game and Fish Protective Association, with the consent of the Department, created greater interest in killing predatory birds by offering more than $1,000.00 worth of prizes to men and boys who killed the largest numbers of predators. During that year about 15,000 predatory birds were killed (Hart, 1923:42).

As early as 1922 some Virginians expressed the view that the Commission should not back this wholesale slaughter of owls and hawks and should take a stand against such actions. However, M. D. Hart executive secretary of the Commission issued a statement in which he said that Commission felt that more of these birds could be killed without seriously decreasing the population (Hart, 1923:42).

The bounty law of 1920 was amended in 1922, and the following payments were approved: sharpshinned, Cooper's and goshawks - fifty cents; crow - fifteen cents; owls - fifty cents; weasels - one dollar. Bounty on crows was paid only during the months from April through September. The cost of bounty payments was split between the game protection fund and the county of kill. The money from the county came from the funds collected in sale of dog licenses (Tyus, 1922: 131-132).

The bounty lines were drawn and ready by June, 1922. Virginia enlisted the services of Noel J. Allen, a Baptist minister, who preached against crows, hawks and owls as readily as he did Satan. He toured the State giving lectures and demonstrations in every section of the state. He travelled about equipped with suitcases of dead crows and owls to make sure that everyone knew what species of birds to kill. The Rev. Mr. Allen made it well known that he was "tooth and claw" against permitting predatory animals to remain alive on the face of the earth. Such creatures as hawks, owls, crows, cats and snakes had to go! He offered to engage in bodily contact anyone who defended any predator. One of his speeches included these remarks "There are bipeds that preach 'regulation of vermin' and the madhouse doctrine of letting pests 'maintain a balance of nature'. These balance of nature boobs ought to be given a taste of that old Roman law which sewed up in a strong bag the murderer of either parent, with an ape, a dog and a rattle snake for company to which should be added by way of scripture measure, a few peddlers of bed bugs, cooties and fleas and the merry command 'Balance All'. Not Regulation but Extermination is needed" (Allen, 1923:15).

The strange thing about Allen's stand on predators is that while he wished for the extermination of some species he bemoaned the fact that other species like the passenger pigeon had passed into oblivion (Allen, 1923:16).

Allen's "word" got results. By 1923 more than 10,000 hawks were

killed at a cost of $5,000.00. Allen believed that this money was well-spent. This year the Virginia Game Protective Association had a gold medal struck. This medal and a cash prize of $100.00 went to the man or boy who killed the most pests in the state (Allen, 1923:15-16).

Allen's contract expired December 31, 1924; he was not given a new contract because the pest control campaign was well under way (Anon., 1925:82). During this period bounty payments averaged between $15,000 and $18,000 annually.

During the heat of the campaign, McDonald Lee, Commissioner of the Department of Game and Inland Fish, issued this statement, "In 1924 our little clubs throughout the State of Virginia, mostly country boys and boy scouts, slaughtered, if you please, over 70,000 crows. Let me add that over 35,000 hawks, and nearly half that number, or 17,000 owls, and other flying pests, were killed that year" (Lee, 1925:95). Lee stated that portions of the state were teeming with bobcats who were the worst predators, if bears were excused. He had not been able to get a closed season on the black bear because of pressure from the Dismal Swamp and western part of the state.

Public sentiment against the slaughter campaign developed rapidly. An editorial in the Rockbridge County News, 1927, asked some pertinent questions of the game officials. The editor wanted to know why predators were about to extinguish game species when they had not done so in the era when game was plentiful; had not predators also been plentiful? The editorial continued with the statement that the modern gun and 2-legged vermin did away with more game than other

predators. The belief of this paper was that money spent in killing predators was worth far more than the results obtained.

Wildlife personnel were vulnerable to these attacks by the public; often they made valiant but defenseless statements in support of the pest campaign. A. Willis Robertson answered the editorial. He stated that there were more hunters in 1927 than there had been at any earlier time in Virginia's history. He believed also that game was more plentiful during earlier ages and that the ravages of vermin were not important at that time. He failed to note that if other species were more plentiful, predatory species were possibly more abundant (Robertson, 1927:108).

In 1927 the Commission spent $22,457.12 for bounty payments. Robertson explained that many clerks of courts did not know one predatory bird from another and the Commission felt it unwise to continue the bounty law (Robertson, 1928:10).

During 1927 - 28 the Commission paid out $31,991.13 for bounties on hawks, crows, owls and weasels. The game wardens were asked to help with identifying the animals and birds turned in for collection of bounty payments. The numbers of predatory species on which bounties were paid were: 67,276 hawks; 11,693 owls; 58,658 crows and 15,669 weasels. By this time the Commission was seriously considering the abandonment of the bounty payments for it appeared that the numbers of predatory animals were not disappearing rapidly (Robertson, 1929:4).

A very intensive predator campaign in Bath County was begun in September 1929. Laurence Cheney, an expert trapper from Wyoming, was imported to run the project. Trapping continued from September 1929

until February 25, 1930. On November 15, 1929, the Bath County Game Protective Association voted to pay a $3.00 bounty on bobcats and $2.00 on foxes. The Commission appropriated $100.00 for purchase of 164 number 3 steel traps.

At the close of the trapping activities, 41 bobcats and 143 foxes had been presented for bounty payments; an additional 5 cats and 30 foxes had been killed but bounties were not paid on these animals. Cheney personally accounted for 8 cats, 9 foxes, 9 raccoons, 9 o'possums, 6 skunks, 4 spotted skunks, 1 weasel, 3 ground hogs, 5 rabbits, 4 wood rats, 1 squirrel, 2 hawks, 23 buzzards and 1 blue jay. This "control" program cost the Game Commission $411.91 and $1,041.49 was spent by the Bureau of Biological Survey, who had cooperated in this effort (Silver, 1930:157).

The Commission's annual report for 1928 - 1929 showed that a total of $25,492.45 was spent on bounty payments. The following year $23,307.27 was devoted to predator control. The fiscal year ending in 1930 saw the end of wholesale squandering of money on bounty payments. In 1930 - 1931 only $285.14 was paid out for bounties by the Commission.

Carl H. Nolting, Chairman of the Virginia Commission of Game and Inland Fisheries, spoke out against state-wide bounty systems before Institute of Rural Affairs in Blacksburg in 1937.

"During the five years the state-wide bounties were in force, Virginia paid out $348,325 for bounties without appreciable benefit to her game birds. Many payments were claimed through fraud,

intentional or otherwise. For example, 9,540 bounties were paid on goshawks, yet ornithologists have but one single record of a goshawk ever having been in the state. Often the man who paid the bounties was unable to distinguish one hawk from another, or even a hawk scalp from a chicken scalp. When one considers what might have been accomplished for wildlife had this $348,325 been used for wildlife restoration and improvement of habitat rather than for bounties, he can not help but realize that our bounty laws from 1924 to 1929 were a mistake" (Anon., 1937:2).

Even after the Commission's efforts to decrease predatory animal populations had failed miserably, individual county boards of supervisors continued to make bounty payments. Thus Virginia was never free of this obsolete procedure.

Following serious rabies conditions in several sections of Virginia, the Commission entered into a cooperative agreement with the Virginia Department of Agriculture, and the United States Fish and Wildlife Service to control fox populations. The 1956 Legislature amended the Appropriations Act to establish a position of mammal control supervisor. This supervisor was to cooperate with county officials in reducing the number of foxes in the county in an effort to control epizootics of rabies. The stated reasons for controlling the fox populations were: (1) foxes carry rabies, (2) foxes create approximately $100,000 damages annually and (3) foxes create annual poultry damages of about $200,000 Counties which cooperated in this program paid bounties of $2.00 or $3.00 for each fox tail presented (Reilly, 1958:22).

In 1956, the Virginia Society of Ornithology began a fight for protective legislation for hawks and owls. The V.S.O. appointed a committee under the chairmanship of W. F. Rountrey to obtain this necessary legislation. Delegate Cross of Norfolk presented the proposed bill to the 1956 General Assembly, and the bill was killed by a tie vote in the Senate. Delegates Locker and Frost were successful in their attempt to get this legislation enacted by the 1958 General Assembly.

Summary

The Indians apparently were not without game laws. Smith and Speck pointed out that Indians actually owned definite areas of land on which they were to hunt and fish. Their property was protected from misuse by others by trespass "laws". It is interesting to note that besides the "private" land there are indications that large areas of "public" lands were also available for hunting.

As the number of colonists increased in Virginia, the hunting pressure increased, and only 25 years after the founding of Jamestown the authorities found it necessary to enact game legislation. Game laws of the colonial period dealt primarily with protection of exotic game species, trespass, restriction on use of guns by Indians, bounty payments, and closed seasons on game animals. The bounty system on wolves was begun in 1632, and wolf bounty payments were increased in 1691. Yet as the colonial period came to a close, this animal still roamed Virginia's forests. The season on deer was closed for the first

time in 1699 and underwent several modifications, the final colonial change being in 1738.

The entire Code of Laws for Virginia was re-written immediately after the Revolutionary War. This was done in an effort to completely erase any English influence which may have remained. Thomas Jefferson incorporated all the "necessary" laws into 126 bills which were presented to the General Assembly. The game laws of the postcolonial period were simply devices to halt the slaughter of the animals. The laws of the State of Virginia follow the evolution of ideas in game management as set forth by Leopold (1933:4-5) in which he stated that man's early attempts to save the vanishing species began with placing restrictions on the killing of birds and mammals. Of the animals protected, the deer was the first and most completely protected species for many years. The closed seasons on this animal were changed five times during the postcolonial era.

In the evolution of game management, protection of the species is followed by the attempted removal of predatory animals (Leopold, 1933). Virginia's first postcolonial bounty laws were passed in 1822 and by 1849 the individual counties were given the right to pay bounties or not as they saw fit. Some counties, for example Bath County, paid bounties on wolves until 1891 (Thornton, 1955:8-9).

The next step in evolution of management of game species was the development of refuges. This approach was attempted by the federal government in the setting aside of lands which served as refuges for migratory species. If the state of Virginia or private individuals

within the state employed or used refuges in the management of game species during the postcolonial period, it is not known to the writer.

Virginia's game warden system originated in 1904; but no money was appropriated for their salaries. Funds for the salaries of these early wardens were to come from the fines imposed on defendants caught by the wardens. The law stipulated that the judge would add an additional $2.50 to each fine and that this money would go to the game warden. This type of payment did not prove satisfactory. The populace complained that the wardens were making unnecessary arrests to fill their pockets. The wardens did not gain the respect and aid that would have made the system a success.

The trends of protection of species, introduction of exotics, payments of game wardens by "fee system", bounty payments and other techniques, which were begun in postcolonial days continue into the modern period; some of these practices are still extant in modern laws.

HISTORIES OF WILDLIFE AGENCIES IN VIRGINIA

The Virginia Commission of Game And Inland Fisheries

The conservation movement began to gain momentum in the South just before the turn of the present century. The Audobon Society and the Virginia Division of the League of American Sportsmen were among several proponents favoring the establishment of a state conservation agency in Virginia. Perhaps the strengthening of hunting laws in the New England States in the 1890's effected the hastening of a conservation agency in Virginia, brought about not so much by these States setting a good example for other States to follow, as from the fact that these laws drove the market hunters southward to Virginia and neighboring States (Stras, 1949:5).

As early as 1898 the Virginia Division of the League of American Sportsmen made an effort to establish a State agency for the protection of "wildlife and birdlife." Interested Virginians looked to Alabama, and seeing that this State had established a successful game protective agency, held greater hopes that Virginia could do the same (Hart, 1923:100).

The Audubon Society accepted the job of drafting a bill which, if passed by the General Assembly, would create a game protective agency. This proposed legislation was presented to the 1912 session of the Assembly and was patterned after the Alabama bill; however, the measure was not passed, nor did it pass when presented to the

1914 session. Although the bill did not pass, it did serve to create public awareness for the need of such legislation. In 1916, with the backing of the Farmer's Union led by A. B. Thornhill and the Farmer's Institute under the direction of Walter E. Hathaway, the bill was passed on March 11, 1916 and enacted into law on June 17, 1916 (Stras, 1949:5 and Hart, 1923:100). Thus Virginia won a conservation agency after an eighteen year battle.

In the First Annual Report of the Department of Game and Inland Fisheries, John S. Parsons relates (1917:3), "The act creating this department provided, 'That a State Department of Game and Inland Fisheries is hereby created and established, which shall be in charge of and presided over by the Commissioner of Fisheries, who shall ex officio be known as the Commissioner of Game and Inland Fisheries of the State of Virginia.'" Parsons, Commissioner of Fisheries, became the first Commissioner of Game and Inland Fisheries.

The act creating the Department stipulated that the operating expenses were to be derived from the sale of hunting licenses. The State had no hunting license and the Department was to be advanced funds to carry it through its first year of operations. These funds were to be repaid to the Treasury, however, as soon as money became available (Parsons, 1917:3).

The Department of Game and Inland Fisheries was furnished an office in the cloak room of the Senate Chamber; Mr. M. D. Hart was appointed chief clerk with Miss Helen Berry as assistant clerk and secretary. Commissioner Parsons was authorized to hire additional

office help as the occasion warranted (Parsons, 1917:3).

In an effort to get the Department off to a proper start, Parsons visited game departments in Pennsylvania, New Jersey and New York to study their methods, with the United States Bureau of Biological Survey and the American Game Protective and Propagating Association lending a helping hand (Parsons, 1917:3).

Funds realized from hunting license sales during the first year of operations were greater than had been anticipated. The Department received $88,421.00 from receipts and refunds of various kinds and at the end of the first fiscal year there was a balance of $20,595.65 (Anon., 1917:15).

Game wardens had to be appointed for every county and city, and in order to obtain the best available men the law required that the county boards of supervisors and city councils submit a list of ten names, one of which would be chosen for the job There was no immediate clamor for these jobs because salaries could not be determined until it was known how much money would be available. Wardens were not to be hired on an annual basis, but would work only during certain months and on critical jobs (Parsons, 1917:3). Besides the regular wardens, special wardens were appointed as needed; they were to work without pay except for fees obtained from convictions and a special fee of $3.00 per day and traveling expenses when on a special assignment for the Department (Parsons, 1917:4). The regular wardens were guaranteed a salary of $10.00 a month during the "off-season", and at this time were to keep their districts under supervision. Fines

imposed this first year of operations amounted to $4,223.00 (Parsons, 1917:5).

This new agency not only set up a warden system to protect the wildlife of the State, but also began a program of restocking depleted species. Virginia obtained 150 elk from the Yellowstone herd in an effort to reestablish this species, which had been exterminated in the early 1800's. Some of these elk died before becoming acclimated, but others lived and apparently prospered for a while. Numerous ring-necked pheasants and eggs were distributed over the State and turkeys, deer, and quail were released in Virginia (Anon., 1917:5-6).

In an effort to increase the supply of fish in Virginia streams, Commissioner Parsons (1917:11-12) planned to have a stream survey made to determine the kinds of fish present as well as the condition of the waters.

In his first annual report, Commissioner Parsons withheld making suggested changes or proposals until he met with a group of five men from each congressional district who were charged to consider current game laws and to plan future legislation. This group met for the first time in December, 1917 (Parsons, 1917:12).

There were some heartening results the first year; the game warden system was under way, protective legislation had been enacted, and it was reported that game abundance had increased 25 to 100 per cent over that of the past several years (Parsons, 1917:5).

The Department was fortunate in having, from its inception, the services of Mr. M. D. Hart, a man of tremendous foresight and enthusiastic drive. Many of the ideas and plans that stimulated the

initial growth of this organization came from him.

Parsons died in January 1918, and his unexpired term was filled by James M. Lewis. Under the Parson administration the Department had organized the warden force, released elk and pheasants and had attempted improvement of native species (Stras, 1949:6).

Lewis served as Commissioner only until the end of the fiscal year and was replaced by Walter E. Hathaway, who served only two months before illness forced his retirement. Lewis died shortly after leaving the Department.

John R. Rew was appointed to the vacancy created by the retirement of Hathaway, but he was killed in an automobile accident while on an inspection trip approximately two months after being appointed Commissioner (Stras, 1949:6).

Thus the Department was under the supervision of four different Commissioners within one year. Mr. Rew was succeeded by F. Nash Bilisoly who held office until March 1, 1922. Shortly before this time, E. Lee Trinkle was elected Governor of Virginia, and he appointed McDonald Lee as Commissioner (Stras, 1949:6).

Before leaving this phase of the Department's history, one should examine some of the more important events of the Bilisoly era. Under his directorship the game warden force underwent a gradual strengthening, including the establishment of the supervising wardens system. The State Game Farm at Windsor Shades was purchased in 1920 and development of this area began immediately. A large-mouth bass hatchery also was established on the Game Farm. Strides were made in the battle

against roving dogs when the Baker Dog Law was passed 1918 and enacted into law in 1919. This law, however, brought about difficulties because wardens were required to enforce the dog law without additional pay; many quit the force because of this (Stras, 1949:6). This dissention over the dog law may have been partially responsible for changes in the law in 1920 when it was decreed that 85 per cent of the money received for the sale of dog license monies would remain in the county of purchase and would be used to pay dog damage claims. The remaining 15 per cent was to go to the Department of Game and Inland Fisheries. If money remained in the county-controlled funds at the end of a year, they would be used for public roads, schools and as bounty payments on hawks and owls. Later, there was still another amendment to the law which allowed counties to purchase game animals for restocking from the dog license funds (Stras, 1949:6).

According to Straus (1949:6), Virginia was the first State to operate a State Game Farm, he stated, "The State Game Farm at Windsor Shades, the first quail farm designed to produce birds in quantity in the United States, showed a wonderful output of quail and total production far surpassed by any other State. Deer and wild turkey raising was also pushed on the farm."

Prior to his appointment by Governor Trinkle, Lee had served as Commissioner of Fisheries for eight years, and upon assuming responsibility for the Department of Game and Inland Fisheries, he embarked upon an active program of wildlife conservation which he described as follows (Lee, 1924:5), "Assuming office on March 1, 1922, the present

Commissioner entered with his own conceived ideas pertaining to game, fish and dogs, and immediately proceeded to put into effect methods comforting with years of experience and the study of them in other States. Knowing the spirit of the men who pay the funds supporting this department, he did not believe that an immobile administration was desired. On the contrary, he knew these men and the people of the State at large preferred a vigorous administration of affairs. There has been no hesitancy, therefore, in deciding between a non-progressive policy, in which thousands of dollars might be used with no great success, and a vigerous one which would call for advancement and greater expenditure so that the reaping might be many fold the excess in expenditures."

This agressive program set forth by Lee brought about sharp criticism by sportsmen. In the Biennial Report of the Department of Game and Inland Fisheries for 1924 - 25 is this statement by the Commissioner (Lee, 1925:5). "Financial statement of 1923 showed reduction in the 'balance' in pursuance of this policy. Statement of 1924 (with this reduced, but safe, balance, page 13) brought forth attack on 'expenditures and extravagances' by leaders of the same sportsmen's organization. Your Excellency is aware of the misinformation and furor that was launched, necessitating the department's undergoing two more audits in the same year of a prior attack, costing the department and the State much in money, more in lost time, and partial demoralization of forces. Yet, out of 50,000 items and over half a million dollars of expenditures, none could be found to be extravagant, and few to be unwise."

In the latter years of Commissioner Lee's term he gave up the idea of a progressive policy after this rather severe attack by the sportsmen of Virginia.

Even with the great controversy over the Lee administration, some very worthwhile accomplishments were realized. In an attempt to bring about better warden service in western Virginia, the Blue Ridge Division of the Department was established in Roanoke. This office was immediately under the Richmond office, but had control over matters in western Virginia; another branch office was placed in Norfolk (Lee, 1924:5).

The first educational branch was established with Lewis W. Tyus as editor of the Game and Fish Conservationist. This magazine was begun in 1921, and was considered one of the best of its kind; it was published bi-monthly and attained a circulation of 10,000. Lee also had an educational film, How Bob-whites are Raised at the Game Farm, produced for use by sportsmen's clubs and other organizations that were wildlife conscious (Stras, 1949:6).

Certainly, Commissioner Lee brought about a tremendous amount of public attention to game and fish conservation, and during his stay in office the sale of game animals was practically eliminated (Stras, 1949:6). During the 1922 session of the General Assembly a law was passed which prohibited the shipment of game birds or animals within the State.

In a letter to the American Field, reprinted in the Game and Fish Conservationist (Sept. - Oct., 1924), Jasper B. White noted that his

work with the propagation of duck foods in America put him in contact with a large number of State game agencies, and that he thought the Virginia agency was superior to all other such groups. He noted the good work of Colonel Lee and Mr. Hart and commended the State on educational work, especially the use of motion pictures. This is not the only letter which carried high praise of the Department, but only a representative selection.

In 1922, Virginia ranked twenty-first in the Nation in the number of hunters with 78,410 license holders. With this large number of hunters afield, Virginia was benefitting economically from her wildlife.

In the early days of game conservation work in Virginia there was, of course, no compulsory game kill reports. However, it was realized that information regarding game kill would be of value. Therefore, questionnaires were sent to game wardens and to outstanding hunters throughout the State to get some idea of the kill during the season ending February 1, 1923. A note accompaning the questionnaire asked that the estimate be conservative so as not to overestimate the kill. These figures were to aid in determining the economic value of wildlife in Virginia (Anon., 1923:5).

Virginia continued to lead her neighbors in the production of quail for restocking. The Game Farm was under the direction of W. B. Coleman, who attained considerable success in rearing quail and in 1925 he was honored by an award from Outdoor Life for his work in bobwhite quail propagation (Stras, 1949:24).

By 1926, the wildlife leaders in Virginia and the country began

to realize that the battle for wildlife conservation did not look as dark as it had only a few years before.

By 1926, Virginia sportsmen found that game work in Virginia had come of age, and that there was a need to separate game conservation from the Commission of Fisheries (Nolting, 1943:4). On March 24, 1926, Governor Byrd signed the bill abolishing the Department of Game and Inland Fisheries, and created a new Commission of Game and Inland Fisheries. The Commission of Game and Inland Fisheries became a reality on July 1, 1926 (Stras, 1949:6). The new Commissioners were empowered to elect one of their number as Chairman, who was to serve as a full-time executive officer of the organization.

Lee, who had been the Commissioner, resigned on March 1, 1926 and was replaced by Harry R. Houston, who was to serve only until the end of the fiscal year.

Major A. Willis Robertson was elected Chairman of the five man Commission to administer activities of the new body.

Some of the first activities of the new Commission are indicated in a statement by Robertson to Governor Byrd (Robertson, 1928:5). "In accordance with a special statue, effective July 1, 1926, the chairman presented to this Commission on July 30-31st., a department budget, accompanied by a plan of reorganization for the field service, which had been worked out under his direction. The budget, covering the remainder of the biennium ending February 29, 1928, was adopted by this Commission and subsequently approved by you. It allocated $135,338.97 for the first period (eight months), and $199,976.75 for

the second period.

"The expenditures of the department of the previous fiscal year having exceeded its revenue income during that year by approximately $10,000.00, the Commission thought it advisable to readjust matters by adopting a moderate program devoted to those phases of the work, which on the basis of available information, it deemed absolutely necessary."

The year 1927 brought a curtailment in both the office and field force. Warden supervisors took an examination to determine their knowledge of game laws and other realted information. New forms were drafted to effect better records keeping, and when it became possible to obtain the service of a trained person to set up a new system of record keeping, this was also done. The office force was given additional duties to perform, this being partially brought about by curtailment of this part of the organization. This year marked the beginning of publication of literature on a large scale and food plantings were started (Stras, 1949:22). This latter activity is of great importance, for it marks the beginning of a step upward in the evolution of game management.

Although the idea of habitat improvement had gotten a small foothold, it was more or less retarded when 5,000 Mexican quail, 150 Hungarian partridges and 2,835 bobwhite quail were released in the State, and some $32,000.00 were spent as bounty payments on hawks, one species of owl and the weasel. The Commission did question the wisdom of bounty payments. One should remember that knowledge of

game management was limited at that time. In 1927 - 28, the General Assembly appropriated $25,000.00 for a fish hatchery, and C. W. Williams was appointed Superintendent of Fish Propagation.

Prior to 1928 the county boards of supervisors had the authority to shorten hunting seasons as determined by the General Assembly laws of Commission regulations. However, in 1928 the Assembly withdrew this authority and passed legislation giving the Commission full power to set hunting and fishing regulation within "outside dates" as established by Assembly action. For the first time in her history, Virginia had nearly a uniform hunting season, with the exception of a few county restrictions. These local county laws were a great handicap to sound wildlife conservation during this earlier period as they are today.

Beverley Stras, the present Commission Chairman, points out another interesting and important development that occurred at this point in the Commission's history (1949:24). "An important measure provided for a combined hunting, trapping and fishing license for those who fish with rod and reel in the non-Tidewater section of the State. Prior to this, there was no angling license needed for residents of the State".

This measure brought in additional funds which allowed the Commission to advance its fish propagation program.

The Commission prospered from 1926 until 1930; there was a great annual increase in the number of hunters. However, the combination of the drought and depression of 1930 severly decreased the number of hunters in 1930 - 31, and as a result the Commission suffered from lack of funds (Stras, 1949:24).

In 1930, Virginia secured the service of G. W. Buller as Superintendent of Fish Propagation and C. O. Handley as Superintendent of Game propagation. Both of these men came well equipped with knowledge of their respective fields.

The only major change in the organization of the Commission between 1926 and 1942 was made in 1930 when the number of members on the Commission was changed from five to seven, and yet while no spectacular events occurred, progress in game management steadily increased (Nolting, 1943: 4).

The need for greater educational work was recognized early in the history of the Commission; it was found that greater aid and cooperation could be obtained from a well-informed public. The publication The Game And Fish Conservationist began in 1921 and attained national recognition. On April 15, 1930 Herbert K. Job accepted a position to promote the dissemination of wildlife knowledge. This phase of the work was severly hampered in 1931 when the magazine had to be discontinued due to a lack of funds.

In 1930, the game wardens were placed on a straight salary, instead of being paid in part from collection of fines. This action brought about much improved enforcement of game and fish laws (Stras, 1949:3).

Robertson had done a good job as Commissioner of Game and Inland Fisheries, and many of the improvements in conservation resulted from his efforts. He resigned from the Commission in 1933 to run for Congress. Virginia may well be proud of this man, both for his efforts with the Commission and for his part in drafting the Pittman-Robertson

Act which has so greatly aided wildlife conservation over the United States. The position vacated by Robertson was filled by Carl H. Nolting (Stras, 1949:6).

"In 1935 the Commission entered into an agreement with the U. S. Forest Service to assign to the Federal government the wildlife on approximately 30,000 acres of Federal owned forest lands in Augusta County. The President of the United States, by proclamation, made this area a wildlife sanctuary and game restoration projects were started" (Stras, 1949:6). Thus, Big Levels Refuge was established as an outdoor wildlife laboratory.

Conferences between the U. S. Bureau of Biological Survey and the American Wildlife Institute in 1935 resulted in the formation of a group of regional Cooperative Wildlife Research Units. Virginia was fortunate in being selected as the site of one such unit, and the Virginia Unit was established at the Virginia Polytechnic Institute in Blacksburg on September 8, 1935. This development presented the opportunity for research in wildlife conservation and for the training of graduate students to enter the wildlife field with professional training The history of the Virginia Cooperative Wildlife Research Unit is treated in detail later in this paper.

From 1936 - 1940 Commission funds began to return to normal after the depression; hunters and fishermen were going into the field in greater numbers and, therefore, more money was available for wildlife management. In 1936 the Front Royal Fish Hatchery was completed and was considered the most modern of its kind in the country (Stras, 1949:7).

Although the Commission was recovering from its economic slump, another obstacle stood in its path. The hunting season of 1936 - 1937 was one of the worst in several years; severe weather during the winter of 1935 - 1936 was followed by a drought beginning in April and lasting into the fall. This lack of moisture prevented food and cover growth and reduced the hatchability of quail eggs. The relatively few birds which did hatch successfully had difficulty finding water. One major result of these weather conditions was that 18,000 fewer licenses were sold this year than during the previous year (Nolting, 1938:3).

During 1937 the Virginia Wildlife magazine came into existence under the editorship of Cecil F. DeLaBarre of the Virginia Cooperative Wildlife Research Unit. This eight page publication was sponsored by the Commission from 1937 until 1940, and was adopted as the official publication of the Commission in 1940.

W. W. Bailey was employed to assist Handley as Assistant Superintendent of Game, Handley remained in Blacksburg to direct the activities of the Unit. Bailey had accomplished outstanding results in the rearing of wild turkeys for release purposes and he remained with the Commission until 1938 when he resigned to accept a position with the U. S. Fish and Wildlife Service. Chester F. Phelps replaced Bailey in 1938, and was promoted to Superintendent of Game in 1940. In addition to his other duties, Phelps was to direct the Federal Aid to Wildlife Restoration (Pittman - Robertson) program for the state.

In the early 1940's discussions concerning organizational changes

in the Commission were gaining momentum, and several sportsmen's groups voiced opinions on the number of men who should serve on the Commission and other needed changes. The Legislature, therefore, passed a new act abolishing the old Commission and creating a new one to become effective on July 1, 1942. Thus the members of the old Commission went out of office and a new nine men Commission was appointed. Commissioner's terms were staggered in such a manner that no governor had the power to appoint more than four of these men during his gubernatorial term.

Under the 1942 legislation, each congressional district in Virginia is represented by a Commissioner. Today there are ten Commissioners, one of whom is elected as chairman of the Commission. The 1942 reorganization removed the elected chairman as the executive officer but gave authority to the Commission to employ an Executive Director. Talbott E. Clarke was chosen as the first Executive Director (Clarke, 1944:3). Clarke was a man of excellent foresight and was endowed with excellent ideas for the organization. Many of the present day plans and activities of the Commission were instigated by him.

In 1941 the Commission examined their policy of stocking exotic species and came to the conclusion that the cost of this program was excessive since no new species had been established. It resolved that no more money would be spent on exotic birds, but all of the available funds would go toward effecting better supplies of the three native game birds (Nolting, 1942:5).

The Virginia Wildlife magazine was discontinued in 1942 when Henry S. Mosby, the editor, was called into the army. During the

war years activity of the Commission was greatly curtailed because most of the biologists were in the military services. About 1946 the biological work was reinstated when most of the men returned.

In August 1946 Clarke left the Commission, and was replaced by I. T. Quinn, one of the early leaders in wildlife conservation. Under Quinn's leadership the Commission prospered during the years following the war.

In 1946 the Game Farm at Windsor Shades was sold and the facilities were moved to the Cumberland State Forest in Cumberland County. Cooperation between the U. S. Forest Service and the Commission in the development of forest wildlife habitat was making good progress; deer were increasing statewide, especially in western Virginia (Quinn, 1947: 3).

The Division of Education and Information was established on January 1, 1946, and in July of that year the Virginia Wildlife magazine was again published under the direction of Clyde P. Patton (Quinn, 1947:4).

In 1948 the General Assembly passed the Crockett Act which brought about changes in the hunting and fishing licenses. This act created separate licenses for hunting and fishing. Under this new legislation revenue collected could be directed for hunting and fishing on a proportionate basis (Stras, 1949:19).

Beginning with the 1948 fiscal year the Commission adopted its first long-range wildlife restoration program designed to greatly strengthen law enforcement, to expand its game and fish propagation

and to increase its educational activities (Stras, 1949:19).

Patton left the Commission to accept a position as head of game and fish work in North Carolina. Joseph J. Shomon replaced Patton in February 1948 (Stras, 1949:19).

By 1949 - 1950 the Commission was well staffed with competent wildlife biologists and game management was progressing rapidly. The Commission was hampered only in the field of legislation where it was still possible for individual counties to secure, through their State Representatives, legislation determental to wildlife conservation to the state as a whole (Quinn, 1951:3).

The effectiveness of the game warden's school became apparent. This important program begun before the war, was discontinued during World War II, then reinstated in 1949. It was held annually at the Virginia Polytechnic Institute until 1959 and the gatherings were of significance for they allowed the wardens to discuss both about regional and personal problems in law enforcement. Lectures were given on various phases of wildlife work. Perhaps most important, it created a feeling of unity for the entire Commission with each department becoming aware of problems of another, thus bringing about the possibility of mutual assistance.

More people hunted and fished in Virginia during 1952 - 1953 than ever before; the deer population of western Virginia, which had been estimated at 500 in the 1930's had risen to 50,000 animals for this year. More than 30,000 acres of agricultural land were improved for wildlife habitat, and the new Buller Fish Hatchery was built in Smyth

County (Quinn, 1953:3-4).

The Commission, in an attempt to open larger areas of water for public fishing, built a 111-acre lake in Halifax County and a 77-acre lake in Pittsylvania County. Two privately-owned ponds with a combined acreage of 77-acres were bought in Powhatan County (Quinn, 1954:3).

Improvements were made in waterfowl and forest game habitat, and a survey was made of Bugg's Island Reservoir to determine its potential possibilities for waterfowl. Borders and food patches were planted for farm game (Phelps, 1954:5).

In 1955, the Virginia Wildlife magazine was awarded the honor of being the best publication of its type in the United States, and its 1955 circulation was expanded to 24,000 (Quinn, 1955:4). By 1958 paid circulation of this magazine reached 35,000 (Quinn, 1958:7).

The Virginia Commission of Game and Inland Fisheries continued to improve steadily under the direction of I. T. Quinn and his assistants. On June 30, 1958, Quinn retired from his post and was succeeded in office by Chester F. Phelps. The new Executive Director joined the Commission staff in 1938, and served as Chief of the Game Division since 1940. Richard H. Cross was called from the field to head up the Game Division.

Thus, if the future is reflected in the mirror of the past, Virginia has a bright future.

The Virginia Cooperative Wildlife Research Unit

During the second and third decades of the present century, it

became apparent to leaders in the wildlife field that if game conservation was to keep pace with rapidly changing conditions, scientific facts would have to be collected. Further, professionally trained men would have to be produced to put these facts into action.

Fortunately, the University of Michigan possessed men with sufficient foresight to see this need, and in 1927 they introduced wildlife conservation courses into the curriculum of the School of Forestry and Conservation (now School of Natural Resources). Training of wildlife personnel began that year under the direction of Prof. Howard M. Wight with the aid of Dr. Ned Dearborn, Dr. Earl C. O'Roke and Prof. Alvin C. Whitney. This curriculum has continued to the present, and many of the wildlife profession's leaders were trained there.

Certainly, one must mention two other outstanding accomplishments in wildlife management that occurred about this time. Herbert L. Stoddard, primarily an ornithologist, had been doing excellent field work on bobwhite quail in Georgia, and in 1931 published his data in The Bobwhite Quail. This was one of the first books in the wildlife field which clearly outlined practices useful in the management of a game species. Shortly afterward, in 1933, Aldo Leopold, a forester at the University of Wisconsin, published a book describing philosophics, theories and sound principles of wildlife conservation. His treatise, Game Management, is still widely used as a text in conservation courses, although at the time carefully collected data were at a premium and he was forced to use theoretical figures for some of his charts and graphs. It was through the efforts of these men and others

like them that the public was made aware of the need for professionally trained wildlife personnel.

With the realization of this need for acquiring and disseminating scientific facts came the necessity of training men. Most colleges found the cost of proper instruction of students too expensive, and this problem was taken under consideration in conferences between individuals representing the United States Biological Survey (now the U. S. Fish and Wildlife Service) and the American Wildlife Institute (now the Wildlife Management Institute). From these talks came the plan to develop a group of regional Cooperative Wildlife Research Units throughout the country (Handley, 1945:1).

Virginia was chosen as one of six states to have a Unit. The Virginia Commission of Game and Inland Fisheries, the Virginia Polytechnic Institute, the Bureau of Biological Survey and the American Wildlife Institute were the cooperating agencies. Under the original agreement establishing these Units, each Unit was to have a minimum operating budget of at least $18,000 annually; the budget, in cash or facilities, was to come from all agencies concerned. The Bureau was to furnish the Unit Leader, the American Wildlife Institute was to donate $3,000 to each Unit, $6,000 was to be contributed by the State wildlife agency, and $6,000 by the land grant college. The State was to furnish technical aid whenever possible.

The Virginia Cooperative Wildlife Research Unit was among the first, if not the first of the Units to get under way. The Unit was formed on September 8, 1935 at the Virginia Polytechnic Institute at Blacksburg,

Virginia. The V.P.I. furnished classrooms, office space, garages, and portions of the College Farm to be used as demonstration areas (files of the Virginia Cooperative Wildlife Research Unit).

The Unit was administered as a part of the Biology Department and was housed on the top floor of Price Hall where it remained until the fall of 1954 when it moved into its present quarters on the ground floor of that building. Charles O. Handley, the first Unit Leader, lists the following objectives of the Unit (1945:2).

"1. To investigate and correlate the production of wildlife and to study the local and regional problems involved;

2. To demonstrate the possibility in land use of practical game management in obtaining a maximum population of game and furbearing species, and of increasing the populations of other desirable species of wildlife;

3. To make readily available to game officials, landowners, and others the facts and methods found through investigation to be best suited to local and State conditions;

4. To provide comprehensive and inclusive sources of technical information for public, private, and scientific use through exchange of data with other regional laboratories coordinated through the agency of the Bureau of Biological Survey."

Staff:

Charles O. Handley, who had served as Superintendent of Game propagation for the Virginia Commission of Game and Inland Fisheries

since 1931, was sent to Blacksburg to direct the activities of the newly-formed Unit. Besides the handling of administrative duties, he supervised all graduate research and taught the wildlife management courses (Handley, 1945:3). After transferring to Blacksburg, he resigned from the Virginia Commission to become an employee of the Bureau of Biological Survey.

The services of the Assistant Unit Leader, Dr. Cecil D. DeLaBarre, were supplied by the College. He taught some of the classes and assisted with certain research problems (Handley, 1945:3).

Dr. A. B. Massey was appointed by the College as Botanist for the Unit. His main objectives were to teach botany, ecology, and plant taxonomy. Dr. Massey is one of the original staff members who remained active with the Unit until his retirement July 1, 1959. Besides the work outlined above, he has published several bulletins through the Virginia Agricultural Experiment Station, and has in general, created much interest in botany throughout the country. He joined the staff of V.P.I. in 1918, and was well acquainted with the policies and activities of the school before the founding of the Unit; his knowledge and experience have been valuable to all the Unit Leaders. Dr. Massey retired in July, 1959 with the title of Emeritus Professor of Botany and Curator of the Herbarium.

Dr. I. D. Wilson, Head of the Biology Department, served as the Administrative Consultant to the Unit staff until his retirement in 1958, when this position was filled by Dr. Fred S. Orcutt, Head of the Biology Department.

C. E. Addy, one of the early Unit graduates, served as Assistant Biologist from July 1, 1940, until June 30, 1942. He was supported by funds from the Virginia Agricultural Experiment Station, and his duties were concerned mainly with the investigation of farm pond management problems, although other projects were undertaken (Handley, 1945:3).

Other men contributed to the Unit's activities by part-time work, and notably among these were J. W. O'Byrne, Extension Forester and A. L. Dean, Extension Wildlife Specialist, who worked largely with garden clubs and 4-H groups in relation to song birds.

The first major change in the staff came in September, 1947, when Mr. Handley joined the staff of the Game Division of the West Virginia Conservation Commission, and was replaced by Dr. Henry S. Mosby. After receiving training both in forestry and wildlife management at the University of Michigan, Mosby joined the Virginia Commission as a Wildlife Biologist in 1939. During the summer of 1936 he had worked with Handley on the North River demonstration areas and was the senior author of the book, The Wild Turkey in Virginia (1943).

DeLaBarre served as Assistant Unit Leader from 1935 until the spring of 1952, when illness forced him to retire; he died in the fall of that year. It was under his editorship that the Virginia Wildlife magazine came into being at Blacksburg in 1937. He served as editor until called into military service in 1940, at which time McInteer assumed the duties of editor of Virginia Wildlife at the

Richmond office of the Virginia Commission of Game and Inland Fisheries.

Dr. DeLaBarre was succeeded as Assistant Unit Leader by Dr. Vicent Schultz, who had formerly worked with the Tennessee Game and Fish Department. Schultz served from 1952 to 1954.

On January 1, 1955, Dr. Mosby accepted the position of Professor of Wildlife Management at V.P.I., and also became a part-time staff member of the Virginia Agricultural Experiment Station. However, he remained with the Unit as Assistant Leader, this post having been vacated by Schultz.

Dr. James S. Lindzey, a Biologist for the Bureau of Indian Affairs, Department of the Interior, accepted appointment as Unit Leader, and remained in this position until May 15, 1958, when he bacame Chief Upland Ecologist at the Patuxent Wildlife Research Refuge, Laurel, Maryland.

Dr. Burd S. McGinnes, the present Unit Leader, completed a segment of a five-year rabbit investigation at the Unit in December, 1957, and had accepted a research assignment on the wild turkey investigation in Pennsylvania. He resigned from this position to return to Virginia as Leader of the Unit on May 15, 1958.

The Unit has always had a full-time secretary, but this important job has had so many changes that a listing of the people who have held it is not feasible.

Coordinating Committee:

The Coordinating Committee for the Unit is composed of a

representative from the Virginia Polytechnic Institute, the Virginia Commission of Game and Inland Fisheries, the Wildlife Management Institute and the United States Fish and Wildlife Service. This group meets once a year to review completed work, examine current projects, examine the budget and to discuss proposed investigations for the coming year. In discussing proposed plans, the Committee may delete the entire plan, or make necessary changes in it; they determine what money will be spent and how it shall be spent, and if funds are not available, they will contact various interested agencies in an effort to get the necessary aid. The Coordinating Committee is a very useful and important functioning body since it combines the best ideas of the four cooperating agencies. At present (1960) the members are:

Dr. F. S. Orcutt, Head, Department of Biology, Virginia Polytechnic Institute.

Mr. C. F. Phelps, Executive Director, Virginia Commission of Game and Inland Fisheries.

Mr. C. R. Gutermuth, Vice-President, Wildlife Management Institute.

Dr. Burd S. McGinnes, Unit Leader, U. S. Fish and Wildlife Service.

Management Areas:

Many of the research problems undertaken by Unit personnel have required large tracts of land on which investigations could be carried out. The Virginia Polytechnic Institute agreed to allow the Unit to use portions of the 2,265-acre College Farm in its work. This farm land has been utilized, especially in investigations regarding farm

game species. However, due to expanding agricultural research requirements, which made greater demands for land space, acres for wildlife research have decreased. For example, the effects of this intensive farming are reflected in quail population figures. Census figures for 1950 showed that there were 248 birds on the farm; by the fall of 1956 only 97 birds were present. It is becoming increasingly difficult to find suitable areas for farm game research on the College Farms as wildlife habitat decreased as a result of modern agricultural practices.

In the early years of the Unit, the V.P.I. leased a tract of about 2,000 acres of mountain land. This area, the John B. Laing Wildlife Demonstration Area, was administered by the Unit as a demonstration and experimental area for forest game species. Wildlife clearings were created, a deer corral was built and a cabin was constructed by Mr. C. O. Handley and the students. The lease called for a full-time caretaker who was to aid in maintaining the forest openings and to lend assistance in other ways besides caring for the property. There came a point, however, when the money spent for his salary outweighed the value gained from the studies on the area, and the property was returned to its owners in 1948.

The Camp Lee Refuge was reased by the Virginia Commission of Game and Inland Fisheries for research in propagation of quail and wild turkeys. This property was placed under the Unit's charge until its recall by the Federal government late in 1940. During the time it was assigned to the Unit, it served both as a research and demonstration area.

The 1,100 acres included in the North River Refuge in Augusta County was placed under Unit management in 1935. This area was primarily intended for use as a demonstration area for forest game, but funds for proper management were not available and work was discontinued in 1938.

Research problems involving forest game species were also undertaken on the Big Levels Game Refuge. This 40,000-acre tract of mountain land was set aside by the Federal government as a game refuge on July 6, 1935, and about 200 forest clearings were created. These clearings ranged in size from less than one acre to more than nine acres and were seeded in grass, lespedeza or other plants which would create such sods that maintenance costs would be low, but production of wildlife forage would be high.

Present Unit research plans call for work to be done on the public hunting area at Camp Pickett, located in Nottoway, Dinwiddie and Mecklenberg Counties. Current efforts are directed towards an evaluation of management techniques applied to the land and a method of testing population censusing techniques for the cottontail rabbit. The 47,000-acre area is presently under management by the Virginia Commission of Game and Inland Fisheries under a cooperative agreement with the U. S. Second Army.

The Unit, the Commission and the U. S. Forest Service recently entered into a cooperative agreement to carry out an investigation of an evaluation of forestry and wildlife management techniques on forest game populations. This research is being carried out on an 8,000-acre experimental tract in the Broad Run section of Craig County with

an additional 2,000-acre tract in the Brush Mountain region of that county serving as the control area. The species receiving major consideration, listed in order of their importance, are: deer, turkey, grouse, squirrel and rabbit.

Program of Study:

Undergraduate degrees in forestry and in wildlife were offered in the Biology Department of the Virginia Polytechnic Institute until July 1, 1959. On that date, the Forestry-Wildlife Curriculum and the Unit became parts of the Department of Forestry and Wildlife. It is not recommended that individuals holding a Bachelor's degree in wildlife management enter the field on a professional basis.

The Virginia Unit offers two graduate degrees in wildlife management: Master of Science in the Department of Forestry and Wildlife, and a Doctor of Philosophy under a cooperative program between the Department of Forestry and Wildlife and Biology. From 1935 through June 1958 there have been 56 graduates of the Unit; 50 earning M. S. degrees and 6 doctorates have been awarded. Two of the M. S. graduates remained with the Unit to earn Ph.D. degrees (Table 8).

Most graduate students entering the Unit have backgrounds in biology, although on occasion men with other training have been accepted. If a student is deficient in biology or in other natural sciences, his program of study is adjusted to meet this deficiency.

Seminars are required for all graduate students, to broaden their scope of understanding and to give them an insight into the problems

Table 8. List of game, furbearers and related investigations made by graduate students of the Virginia Cooperative Wildlife Research Unit

Master of Science candidates		Bear	Beaver	Bobcat	Deer	Elk	Fox	Muskrat	Rabbit	Raccoon	Skunk	Squirrel	Fish	Dove	Grouse	Quail	Waterfowl	Turkey	Mammals	Browse	Ecology	Wildlife Survey	Education	Pollution
Addy, C. E.	1940														x						x			
Baldwin, W. P.	1938															x								
Bailey, W. W.	1942																	x						
Blackwell, W. P.	1948		x																					
Brown, G. H.	1956																			x				
Bowman, N. P.	1953										x													
Byrd, M. A.	1951							x																
Cantner, D. E.	1955																	x			x			
Chamberlain, E. B.	1948																x				x			
Coggin, J. L.	1954																					x		
Cross, R. H.	1942											x												
Culbertson, A. B.	1948																	x						
Dale, C. K.	1949																				x	x		
Davenport, L. B.	1951	x																						
DeGarmo, W. R.	1941																				x	x		
Engle, J. W.	1956				x																			
Gehrken, G. A.	1948															x								
Gilchrist, C. P.	1950																x					x		
Giles, R. H.	1957																						x	
Givens, L. S.	1938																				x	x		
Harvey, J. C.	1953															x								
Henderson, C.	1941																							x
Hundley, L. R.	1953								x			x	x											
Kellner, W. C.	1953									x														
King, T. R.	1940															x								
Little, H. A.	1951								x			x				x								
Llewellyn, L. M.	1943								x															
McLaughlin, J. H.	1953									x														
Muncy, R. J.	1954				x																			
Nelson, F. P.	1950								x															
Newman, P. J.	1937															x								
Overton, W. S.	1950															x								

Table 8. List of game, furbearers and related investigations made by graduate students of the Virginia Cooperative Wildlife Research Unit (continued)

Master of Science candidates		Bear	Beaver	Bobcat	Deer	Elk	Fox	Muskrat	Rabbit	Raccoon	Skunk	Squirrel	Fish	Dove	Grouse	Quail	Waterfowl	Turkey	Mammals	Browse	Ecology	Wildlife Survey	Education	Pollution
Patton, C. P.	1938																		x					
Peery, C. H.	1948											x												
Phelps, C. F.	1942															x								
Progulske, D. R.	1952			x																				
Redd, J. B.	1956								x															
Richards, C. E.	1954																	x						
Rivers, D. G.	1940																	x						
Rucker, H. C.	1937															x								
Shaffer, C. H.	1948									x														
Shipley, D. D.	1941											x												
Sprunt, A.	1957													x										
Stickley, A. R.	1957	x																						
Sweet, J. C.	1950				x																			
Swink, F. N.	1952						x																	
Taylor, W. H.	1957																x							
Thornton, J. E.	1940																				x			
Wood, R. K.	1943					x																		
Woolley, D. J.	1940				x																			
Doctor of Philosophy candidates																								
Byrd, M. A.	1954																				x			
McDowell, R. D.	1954																	x						
Hundley, L. R.	1956																			x				
McGinnes, B. S.	1958								x															
Ripley, T. H.	1958															x								
Roseberry, D. A.	1950												x											

faced by other biological investigators.

Unit Graduates:

Graduates of the Unit are widely scattered in various types of wildlife work throughout the United States. Only one former student is deceased. Woodrow W. Bailey, who worked out the basic principles for the rearing of wild turkeys for restocking, was killed in action during World War II. His death cut short a career which held great promise. Prior to entering the Army, Bailey worked with the Virginia Commission and the United States Fish and Wildlife Service.

Approximately 27 per cent of the Unit graduates are currently employed by the Virginia Commission of Game and Inland Fisheries; others have served this agency, but have left for jobs in industry or with other agencies. Chester F. Phelps, Executive Director, and Richard H. Cross, Chief of the Game Division, both received their training at the Unit. Many other responsible jobs in the Game and Fish Division are held by Unit graduates.

At present, 22 per cent of the Unit graduates are hired by other states. The Executive Director of the North Carolina Wildlife Resources Commission, Clyde P. Patton, was a 1938 graduate and Russel Degarmo, 1941, is Chief of Game in Maine. It is evident that the Unit is performing an important job in training men who will serve not only in Virginia but states throughout the country, especially in the southeast.

The U. S. Fish and Wildlife Service lists 9 per cent of the

Virginia Unit's graduates on their rosters. These men serve both in administrative and research capacities. Dr. Burd S. McGinnes is now with this agency and serves as Leader of the Virginia Unit.

Private industry, private wildlife management consulting, National Park Service, U. S. Forest Service, and various other agencies have employed Unit graduates to fill jobs dealing with wildlife. Two former Unit men teach in high schools and four teach in colleges.

The Unit usually has from four to six students actively engaged in classwork and in research. Only during the war years was the Unit without students. The records indicate that by September 26, 1942, all of the men had been called to duty. The Unit staff continued work until the men returned after the conflict in 1946.

Research:

The Virginia Cooperative Wildlife Research Unit began training of wildlife personnel in the early fall of 1935, and the research efforts were also begun at this time. The location of the Unit was ideally suited for research in forest game, and the College Farm was an excellent experimental area for farm game. The original plans of research included the following projects: quail propagation; soil conservation with special emphasis on gully control; ecology and economics of native plants; farm game management; quail food and cover requirements; general conservation activities; to determine techniques of increasing wildlife and furbearers on farms; and studies on birds (Handley, 1945:21). Projects on forest game species were also undertaken. The number of game

and furbearing species of animals as well as game management problems completed by the Unit are summarized in Table 8. The complete titles of these works are listed in the Appendix.

In addition to research done by graduate students, various staff members have carried out their own research programs. For example, Dr. Massey has published eight bulletins dealing with the following subjects: farm weeds, medicinal plants, willows, Virginia ferns and their allies, poisonous plants, native grapes, legumes, and orchids. Two of these works are in their second edition while a third has been reprinted three times, showing the importance of their contents. In addition to this work, Dr. Massey has compiled what is perhaps the most representative collection of herbarium specimens for the State of Virginia, and at present is collecting information for a bulletin on the grasses of Virginia.

Mr. Handley did considerable work with forest game species and was an early cooperator in the Virginia Christmas Bird Census. In 1943, he co-authored, with H. S. Mosby, the treatise on wild turkey.

Dr. DeLaBarre was the first editor of Virginia Wildlife, and served in this capacity from the origin of this publication in 1937 until his tour of duty in the Navy. This magazine was begun as an eight-page monthly publication of the Virginia Wildlife Conservation Council, and was sponsored by the Virginia Commission. In 1940 the Commission accepted responsibility for publishing the magazine, with DeLaBarre as editor. The publication continues to serve as an excellent vehicle for the dissemination of wildlife conservation information and ideas;

it serves also as a vehicle for public education.

Dr. Mosby has undertaken long-range management studies of quail and squirrels on the College Farm. Information from this research has proved quite valuable in determining home range, contributed to life histories, overwintering potential and harvest limits. The main objective of this work is to determine what percentage of the fall population can be harvested and yet allow enough breeders to insure a huntable supply the following year. The research he did on turkeys for his Doctorate was published by the Virginia Commission of Game and Inland Fisheries as a book, The Wild Turkey in Virginia (1943).

Dr. Lindzey was greatly interested in a long-term grouse project, and had collected annual information on brood sizes and age, and sex ratios from hunting season samples. This research problem will be continued by Dr. Burd S. McGinnes. Dr. McGinnes is also interested in the study of tularemia and its effect upon humans.

Unit personnel answer many letters each year giving the best available information on wildlife and fish problems, they handle hunter check stations, investigate outbreaks of diseases and give numerous radio and club talks. One of the most important aspects is work with younger people who have noted an interest in wildlife work, and in past years the Unit has furnished quail eggs to boys' groups who wanted to raise these birds for release. This list of Unit activities could be greatly expanded, but time and space will not permit.

Much of the information collected by Unit personnel is being presently applied by game technicians in the field, and more of this

information will be used in future years after it has been tested by research.

During the 23 years from 1935 through 1958, Unit personnel published 45 popular articles, 141 technical papers, 17 bulletins and 2 complete books. Moreover, there have been 50 theses and six dissertations written by Unit graduate students.

The Virginia Plan

The cooperative agreement between the Virginia Commission of Game and Inland Fisheries and the United States Forest Service for the management of wildlife within the National Forests of Virginia was one of the most progressive steps taken in wildlife management during the modern period. This cooperative management venture is commonly known as the Virginia Plan.

Basically, the ideas for the Virginia Plan originated with Justus H. Cline, Theodore Fearnow and Talbott E. Clarke. As Fearnow (1949) described it, the game belonged to the state and the trees to the federal government, thus wildlife on the 1.4 million acres of Virginia's National Forest was like men without countries because the state managed the animals and the United States managed the trees. These men visualized a cooperative program between the State of Virginia and the government of the United States to promote better wildlife conditions within the National Forests. They wanted to increase the numbers of certain species and to insure against the destruction of all wildlife species.

Talbott E. Clarke, then Staff Assistant on the George Washington National Forest, was the federal sponsor of the plan and Justus H. Cline boosted its approval within Virginia (Mead, 1948:16).

The Virginia Plan became a reality on June 13, 1938 (Mead, 1948: 16). The Commission reported in the Annual Report for the fiscal year 1938 - 39, "The Virginia Legislature, at its last session, passed a bill allowing this Commission and the Federal Forest Service to enter into an agreement to cooperatively administer the wildlife resources on the National Forests, make a charge of one dollar for the privilege of hunting and fishing in the National Forests, all of the revenues thus derived to be used for restocking with game animals and fish and giving the necessary protection. Virginia thus will have the largest area available to the public for hunting and fishing of any State east of the Mississippi River". This report stated that 1,400,000 acres of land went under cooperative wildlife management that year.

The hunters and fishermen of Virginia and neighboring states took advantage of the opportunity offered by the national forests and during the fiscal year 1938 - 39 some 11,690 stamps were sold (Fig. 2). Sales of national forest stamps as reported in the Annual Reports of the Commission for each year since 1939 show an increase to 81,815 by 1956 - 57. This increase has been steady except for the years during World War II.

Heavy usage of these areas have not dimished the game supply. Sufficient funds for sound game management plans have definitely brought about an increase in some game species and have provided an

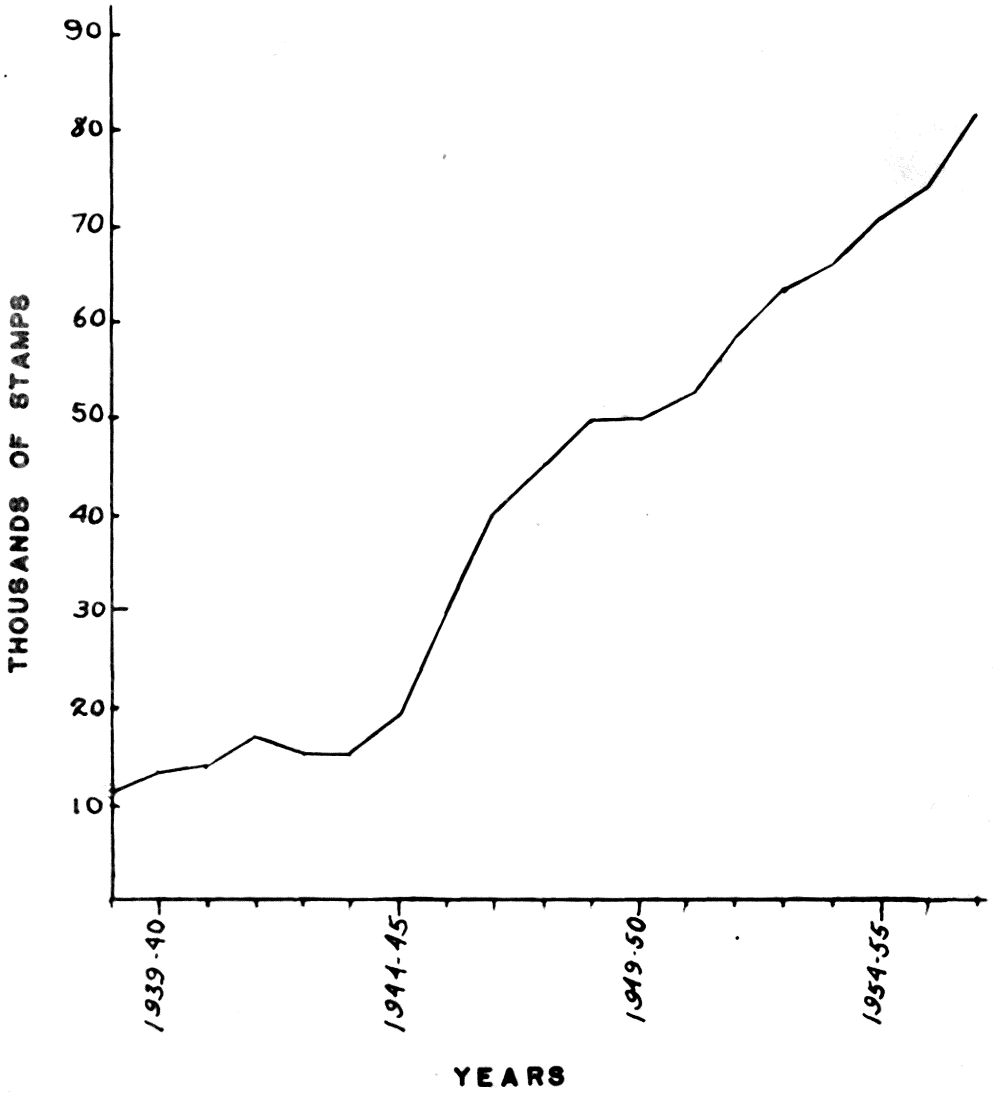


Figure 2. The annual sale of National Forest Stamps in Virginia from 1938-39 through 1956-57. (Data from the Annual Reports of the Virginia Commission of Game and Inland Fisheries.)

annual harvestable crop in many other wildlife populations.

All wildlife management activities on Virginia's two National Forests are developed jointly by officials of the United States Forest Service and the Commission. During the early years of operation of the Virginia Plan, restocking and protection of game animals were given top priority (Nolting, 1939:3). By mid-summer of 1939, game officials had released 250 deer and a number of wild turkeys (Nolting, 1940:3). In 1939 game management units were organized; these units served as habitat manipulation areas as well as sanctuaries for deer and other animals. By 1943 approximately 1,700 deer had been released on the National Forests (Phelps, 1954:15). Although restocking and protection activities continued, wildlife biologists turned their attention to habitat improvement. Commissioner Nolting (1942:4) noted that considerable habitat work had been done in depleted areas of the forests in an effort to re-establish conditions favorable for game species. Fruit trees, old home sites and logging roads offered excellent possibilities for habitat improvement.

Just prior to 1938 deer were practically extinct in the western counties except Bath and Craig. These counties had received a few brood animals in the early 1930's. Wild turkeys existed in Craig, Botetourt and the counties to the north; bear were scarce and small game populations varied with the locality (Phelps, 1953:15).

Funds collected from the sale of stamps plus additional funds from the Federal Aid source are devoted to habitat improvement; in 1956 about 33 cents were spent on each acre under management (Richards, 1956:16). In 1954 the Commission reported that 257 wildlife clearings

incorporating 230 acres of land had been established and seeded; 45 clearings were reseeded; nearly 60 miles of trails were constructed; 180 miles of existing trails were improved and 755 previously established clearings were mowed to retard the encroachment of woody vegetation (Phelps, 1954:6). The Soil Conservation Service cooperates with the Commission and the Forest Service is constructing two types of water-holes: 1) up to one-quarter acre impoundments with a maximum depth of 6 feet; 2) small pools atop high ridges, seldom possessing diameters greater than 50 feet (Thornton, 1958:21).

Presently, both the George Washington and the Jefferson National Forests are organized into game management units that vary in size from 10,000 to 80,000 acres. Each unit is supervised by a full-time game manager and there are 14 game managers on the George Washington and 10 on the Jefferson. Well-trained wildlife biologists supervise the work and activities of the game managers (Shomon, 1957:21).

The number of hunters who go afield in Virginia each year have steadily increased since 1945; this trend may be expected to continue (Fig. 4). The 1,400,000 acres of public hunting and fishing lands managed under the Virginia Plan will probably become increasingly important with the passing of the years.

MAJOR GAME SPECIES IN VIRGINIA

Introduction

The precolonial habitat of Virginia should have offered an excellent environment for the bear, turkey, squirrel, grouse, elk and buffalo. The forest species found that the overmature hardwood trees produced mast in abundance, and the animals prospered. The park-like forests interspered with savanae produced sufficient forage to feed rather large local herds of elk. It seems doubtful that many buffalo were found in Eastern Virginia, but they may have been more numerous in the western portion of the state.

It seems probable that deer herds were held in check by the lack of food provided by climax forests. Without the new succulent growth of underbrush and young trees, large numbers of these animals could not find food in any abundance. Although the Indians frequently used fire in hunting and in land clearing, the possibility remains that this burning of the forests did not produce much deer browse or cover for small game species. Considering the fact that repeated firing of forests would have reduced the amount of dead limbs, fallen leaves and other combustible material on forest floors, it seems unlikely that "ground" fires would have attained sufficient heat to "crown". The writer is aware that in forested areas where "crown" fires possibly occurred and destroyed the mature, trees, the resulting openings would have produced large quantities of browse and cover. However, the writer is of the opinion that most of Virginia was covered by a climax

hardwood forest whose closed canopy prevented or retarded growth of ground cover.

Waterfowl found conditions favorable and existed in great numbers.

The population of Virginia Indians never reached large numbers, and much of their hunting was evenly distributed over a wide area by tribal custom. There is little reason to assume that the precolonial Indians of Virginia exercised deleterious influence on game populations except perhaps locally and temporarily.

Virginia's postcolonial years were dynamic ones for wildlife. Habitat conditions for game species ranged from excellent to poor; several birds and mammals passed into oblivion, and still other creatures were pushed to the brink of extirpation (Table 9). This was a period of extravagance and wastefulness of the natural resources of the Old Dominion; large tracts of forests were destroyed; many acres of land were worn out and abandoned; rivers which had run clear were carrying heavy loads of silt and topsoil.

The ax and the plow created most of the inroads on game populations, but the gun also took its share. The flintlock musket and shotgun were the best guns available up to around the 1830's; these guns did not always fire properly or quickly but frontiersmen obtained amazing results with them. The development of the "Kentucky long rifle", the first of the American rifled pieces, presented the hunter with an excellent arm. The accurancy of the rifled barrel made the gun a favorite of the frontiersman, who killed Indians as well as

Table 9. A list of extirpated wildlife species in Virginia

Species	Approximate date of extinction	Authority
Beaver *	around 1910	Handley and Patton (1947)
Buffalo	around 1800 1815 (now W. Va.)	Handley and Patton (1947) Garretson (1938)
Elk *	1844 - 1855	Wood (1943)
Fisher	by 1900 after 1839	Shomon (1957) Handley and Patton (1947)
Mountain lion	around 1880 1911	Thornton (1955) Handley and Patton (1947)
Passenger pigeon	after 1880	Murrill (1949)
Southern Fox squirrel	by 1895	Gottmann (1955)
Timber wolf	1910	Anon., (1949) Letter from J. H. Watson

* Reintroduced

game with it. Although those guns were commonly known as "Kentucky long rifles", they were manufactured in Pennsylvania. J. Metzger was among the first of this breed of gunsmiths. His shop was located at Lancaster, Pennsylvania, where he constructed "Kentucky Rifles" as early as 1728 (Carey, 1953:143).

The second major step in firearm development was the development of the percussion cap by Joshua Shaw in 1816 (Carey, 1953:143). The percussion cap was a proved firing mechanism. It assured the marksman of quicker and more certain firing. Percussion shotguns and rifles were common about the middle to the end of the nineteenth century. The single shot cartridge rifles were replaced by multiple shot rifles around 1860, the better ones became available after 1870. Breech-loading shotguns developed quickly. Single and double barreled shotguns were widely used. Before the turn of the twentieth century, five and six shot repeating shotguns were developed. With arms of this type, the hunter could kill large quantities of game. In 1860, waterfowl were protected from guns that could not be shot at arm's length; in 1904, all guns larger than 8 gauge were outlawed. Battery guns consisted of a number of barrels mounted on a flat base. These barrels were loaded with a variety of projectiles including bolts and nuts and all barrels were fired simultaneously. They were usually employed in waterfowl hunting. This rapid development of firearms gave the "game hog" and market hunters excellent tools with which to take large quantities of wildlife; (Fig. 3).

Many of Virginia's game species, especially forest game,



Figure 3. A "scow-gun. This multiple barrel gun was used to hunt waterfowl. Its use was outlawed on February 29, 1912. (Photo by Leon Kesterloo).

diminished during the postcolonial period. Although laws protecting game species were on the statue books, no efficient game warden force existed to enforce the laws. The 1904 General Assembly enacted legislation providing for game wardens, but these officers were paid from money collected as fines, and systems operating under such financial plans seldom succeed.

With the establishment of the Virginia Game Department in 1916, and with the appointment of efficient game wardens to enforce current legislation, the wildlife species were afforded better protection. Many people thought that protection alone was sufficient to bring about larger populations of game animals; others argued that releases of birds and mammals to supplement the small numbers of already existing populations would be necessary to insure against total destruction of such species as quail and deer. Other conservation activities such as reintroduction of extirpated species and the introduction of exotic game animals were carried out by Commission personnel.

For a number of years the Game Department sent questionnaires to interested hunters throughout the state to obtain an approximation of the numbers of game animals killed. Later, game wardens made estimates of the numbers of game animals killed in their respective counties. These data supply the best indications of harvest for the period 1924 - 1946. The kill figures for bear and deer are actual numbers tagged, beginning in 1947 - 1948; turkeys were tagged following 1951 - 1952. These dates are shown in Table 10. It should

Table 10. Annual kill estimates for quail, rabbit, squirrel, bear, deer and turkeys in Virginia from 1923 to 1958

Hunting Season Ending	Quail	Rabbit	Squirrel	Bear	Deer	Turkey
1924	-	-	-	215	793	-
1925	-	-	-	127	267	-
1926	298,538	505,935	224,240	190	-	-
1927	-	-	-	-	-	-
1928	315,452	409,491	530,508	909	687	8,219
1929	242,177	350,131	164,912	139	561	6,204
1930	355,550	481,838	390,447	292	790	9,428
1931	214,741	289,389	176,788	183	1,299	5,160
1932	187,947	353,663	185,827	245	1,399	6,339
1933	350,665	373,943	321,442	161	1,151	7,574
1934	373,741	328,795	281,960	145	1,040	6,241
1935	406,966	317,822	261,299	151	1,184	6,629
1936	424,445	333,945	342,110	110	1,158	6,092
1937	288,748	258,295	195,341	121	1,475	5,583
1938	376,055	324,765	243,407	116	1,526	7,560
1939	303,696	343,466	248,330	125	1,391	6,700
1940	303,696	301,773	200,200	105	1,365	6,731
1941	181,828	208,247	224,362	164	1,691	6,398
1942	263,224	401,160	158,934	133	1,901	4,800
1943	237,988	196,202	163,470	102	1,448	4,593
1944	191,474	167,268	170,611	84	2,282	5,292

Table 10. Annual kill estimates for quail, rabbit, squirrel, bear, deer and turkeys in Virginia from 1923 to 1958 (continued

Hunting Season Ending	Quail	Rabbit	Squirrel	Bear	Deer	Turkey
1945	142,192	129,805	153,871	130	3,433	3,846
1946	155,379	150,830	199,762	149	4,545	5,414
1947	137,884	132,438	175,380	156	6,543	4,528
1948	103,784	95,139	115,445	163	3,987	4,083
1949	110,599	93,242	137,380	143	5,220	3,642
1950	149,591	94,320	117,232	147	7,021	3,655
1951	105,290	87,868	78,025	312	5,773	2,760
1952	129,269	109,582	104,700	110	7,514	2,148
1953	-	-	-	327	10,867	1,606
1954	-	-	-	358	11,807	2,531
1955	-	-	-	270	14,068	2,023
1956	-	-	-	156	14,227	2,797
1957	-	-	-	135	20,861	2,470
1958	-	-	-	213	22,474	2,060

(Kill estimates from the files of the Virginia Commission of Game and Inland Fisheries)

be pointed out that the information is based on hunter and warden approximations but the compulsory game kill records are more accurate.

The numbers of quail, rabbits and squirrels killed showed a decrease throughout the modern period. The numbers of bear killed remained more or less constant. The deer kill increased tremendously following 1952 - 53 and the turkey kill declined almost fifty per cent during the last decade.

A study of hunting license sales in Virginia revealed several interesting trends (Table 11; Fig. 4). The sales of licenses from 1916 - 1917 through 1924 - 1925 showed a general increase but the sales of one year were often below those of the previous year. In the years following the hunting season of 1924 - 1925, there was a steady increase in the sale of hunting licenses until the fiscal year 1929 - 1930; a drop in license sales between the years of 1929 - 1930 to 1932 - 1933 was followed by an increase of sales to 1939 - 1940. In 1939 - 1940 the number sold approximated the sales of 1929 - 1930. The decline in sales following 1929 - 1930 were probably reflections of the depression The effects of World War II was felt between 1940 - 1941 and 1944 - 1945 when license sales decreased.

Following World War II license sales soared. The number of licenses sold in 1944 - 1945 was 165,773 and this number increased to 490,854 by 1956 - 1957.

Special licenses for big game hunting were required in 1936 - 1937, and the sales of this type of license increased steadily, with the exception of 1942 - 1943. A large number of non-resident hunting

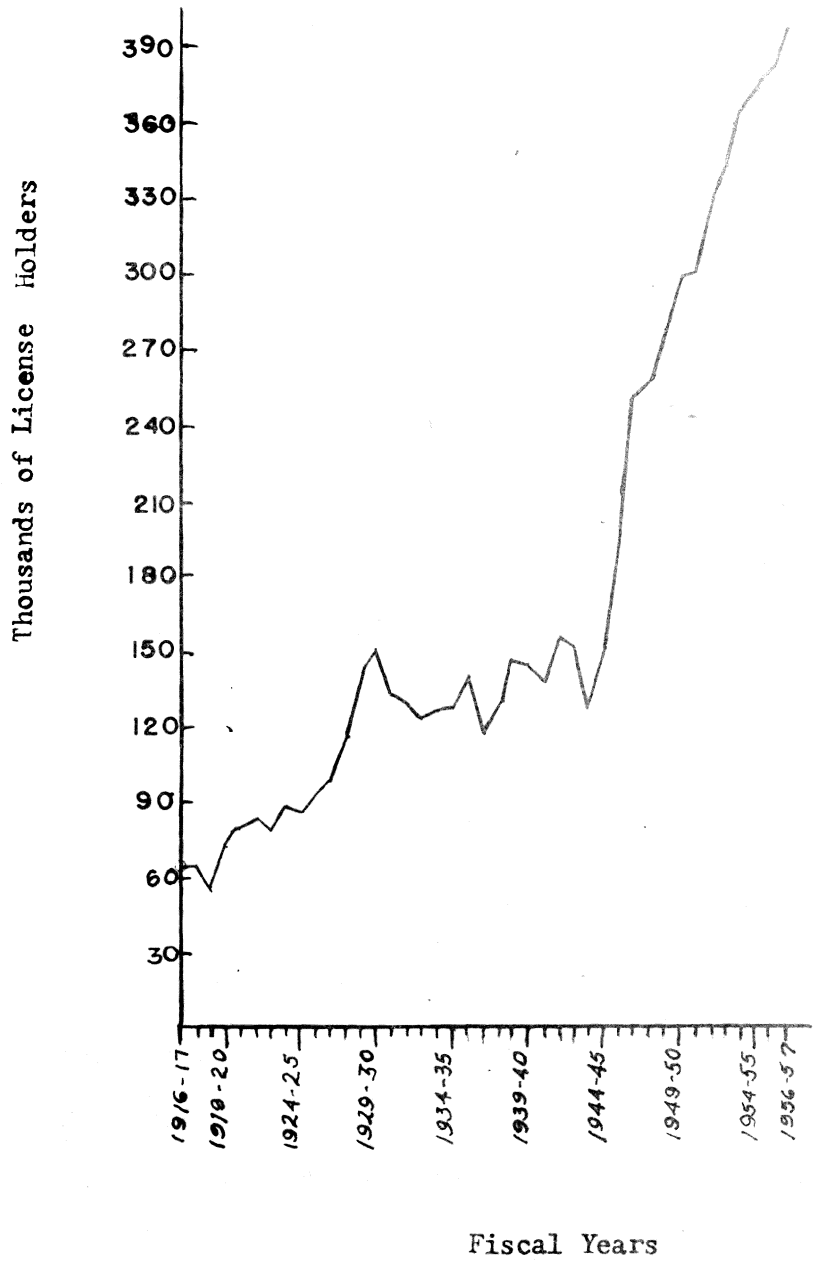


Figure 4. The number of hunting license holders in Virginia from 1916-17 to 1956-57. (Data from the Annual Reports of the Virginia Commission of Game and Inland Fisheries.)

Table 11. The numbers of various types of hunting licenses sold in Virginia between 1916-1917 and 1956-1957

Year	County	State	State Mixed	Mixed Non.Res.	Non.Res.	State Big Game	Non.Res. Big Game	Nat.For.	Other	Total
1916-1917	54,077	9,893			799					64,769
1917-1918	57,129	9,888			723					67,740
1918-1919	45,239	9,331			558					55,128
1919-1920	59,532	12,636			789					72,957
1920-1921	61,802	15,416			1,095					78,313
1921-1922	66,697	16,311			1,203					84,211
1922-1923	61,542	16,774			1,435					79,751
1923-1924	68,371	19,363			1,762					89,496
1924-1925	66,257	19,773			1,872					87,902
1925-1926	70,293	21,190			2,005					93,488
1926-1927	72,397	22,657			2,194					97,248
1927-1928	90,362	25,771			2,565					118,698
1928-1929	108,647		31,960	2,687						143,294
1929-1930	113,531		35,259	2,693						151,483
1930-1931	102,153		35,159	2,074						139,386

Table 11. The numbers of various types of hunting licenses sold in Virginia between 1916-1917 and 1956-1957 (continued)

Year	County	State	State Mixed	Mixed Non.Res.	Non.Res.	State Big Game	Non.Res. Big Game	Nat.For.	Other	Total
1931-1932	95,178	32,883	1,519							129,580
1932-1933	90,969		30,187	1,250						122,406
1933-1934	93,984		31,043	1,089						126,116
1934-1935	92,740		33,094	1,136		126				127,096
1935-1936	102,119		36,827	1,101		209				140,256
1936-1937	71,075	15,453	29,694	1,020	565	4,837	193		*101	122,938
1937-1938	78,304	18,815	31,294	1,051	773	5,433	217		#107	135,994
1938-1939	89,121	20,317	34,763	1,190	936	5,870	221	11,690		164,115
1939-1940	85,761	20,889	35,948	1,254	976	6,093	205	13,569		164,695
1940-1941	77,856	20,080	36,534	1,213	902	6,484	217	14,103	#448; @16	157,853
1941-1942	85,696	22,020	44,003	1,190	920	8,434	254	16,803	#295; @4	179,619
1942-1943	87,112	21,066	42,412	975	785	7,850	231	15,460	#357; @6	176,254
1943-1944	66,064	18,437	39,572	1,186	904	9,311	304	15,237	#1180; @67	152,262

Table 11. The numbers of various types of hunting licenses sold in Virginia between 1916-1917 and 1956-1957 (continued)

Year	County	State	State Mixed	Mixed Non.Res.	Non.Res.	State Big Game	Non.Res. Big Game	Nat.For.	Other	Total
1944-1945	76,154	22,578	50,456	1,574	1,052	12,739	486	19,049	#682; @52	184,822
1945-1946	93,843	29,108	68,094	2,020	1,210	19,593	781	29,941	#503 @21	245,114
1946-1947	113,458	36,400	97,649	3,025	1,927	32,921	1,500	40,284	#14	327,178
1947-1948	111,169	36,344	105,604	3,479	1,970	39,982	1,948	45,451		345,947
1948-1949	163,773	110,542			4,055	43,081	1,964	49,475		372,890
1949-1950	185,328	109,331			3,873	40,943	1,765	49,835		391,075
1950-1951	187,012	108,075			3,937	44,135	1,951	52,520		397,630
1951-1952	198,535	123,275			4,865	52,233	2,660	58,028		439,596
1952-1953	204,472	133,058			5,582	61,894	3,210	63,712		471,928
1953-1954	216,459	141,945			5,909	66,969	3,453	65,755		500,490
1954-1955	222,116	147,978			6,501	75,183	4,032	71,042	a 367	527,219
1955-1956	218,984	154,775			7,386	79,139	4,778	74,395	a 418	539,875
1956-1957	227,032	162,252			8,494	87,028	5,672	81,815	a 376	572,569

(Data from the Annual Reports of the Commission of Game and Inland Fisheries)

Table 11. The numbers of various types of hunting licenses sold in Virginia between 1916-1917 and 1956-1957 (continued)

Symbols:

* 2-day non-resident license to hunt

\# Resident license to hunt elk

@ Non-resident license to hunt elk

a City licenses to hunt in the county where city is located; in 1956-1957 only Hampton and Warwick are included.

licenses are purchased annually; in 1956 - 1957, some 5,672 hunters from other states enjoyed hunting in Virginia.

Presently, the greatest problem confronting Commission personnel is that of producing a sufficient crop of game animals for the ever-increasing army of hunters. This problem is aggravated by the fact that suitable and available hunting lands are decreasing annually.

Deer

The white-tailed deer, Odocoileus virginianus (Zimmerman) was the single most important animal to the precolonial Virginian. Venison probably was the greatest single source of meat of these people. The hides served as clothing, bedding and shelter. The antler tines were used as arrow points, and also used as flaking tools in the manufacture of stone implements; a glue was made by boiling the antlers and hooves. These few products were by no means the only commodities that came from the deer; a complete list of all uses made of the deer by Indians would be quite lengthy.

Several methods of hunting deer have been described in early accounts. The most popular type was that of surround-by-fire, as previously discussed. This method of hunting required the cooperation of many people, but of course, the Indian often hunted as an individual. Beverly (1947ed.:155-156) stated that "The Indians have many pretty inventions, to discover and come up to the Deer, Turkey and other Game undiscern'd: but that being an Art, known to very few English there, I will not be so accessory to the Destruction of their

Game, as to make it publik." Captain John Smith (Swanton, 1946:31) somewhat less secretive than Beverley, described the hunting methods in detail, recounting that, "One Savage hunting alone, useth the skinne of a Deare slit on the one side, and so he put on his arms, through the neck, so that his hand comes to the head which is stuffed, and the hornes, head, eies, eares, and every part as artifically counterfeited as they can devise. Thus shrouding his body in the skinne, by stalking he approacheth the Deare, creeping on the ground from one tree to another. If the Deare chance to find fault, or stande at gaze, hee turneth the head with his hand to his best advantage to seem like a Deare, also gazing and licking himself. So watching his best advantage to approach, having shot him, he chaseth him by his blood and straine til he get him." Swanton (1946:314) recorded that the shiny seeds of the scarlet flowering horsechestnut were used as eyes in the stuffed head, and that the Indian became so clever in mimicking the deer that sometimes one hunter shot another, the unfortunate man being mistaken for a deer. This type of camouflage hunting was strictly forbidden in certain heavily populated areas. During the spring hunts the Indian used a call that imitated the cry of a fawn. As the doe was drawn into range, she was killed by the hunter (Swanton, 1946:317).

It was mandatory that the Indian get close to his quarry for his weapons were not effective at long range. In the early stages of his culture, the Indian hunter was most probably armed only with the hand-held spear and later, the spear-thrower (Fig 5). The spear-thrower made it possible for the Indian to hurl a short spear

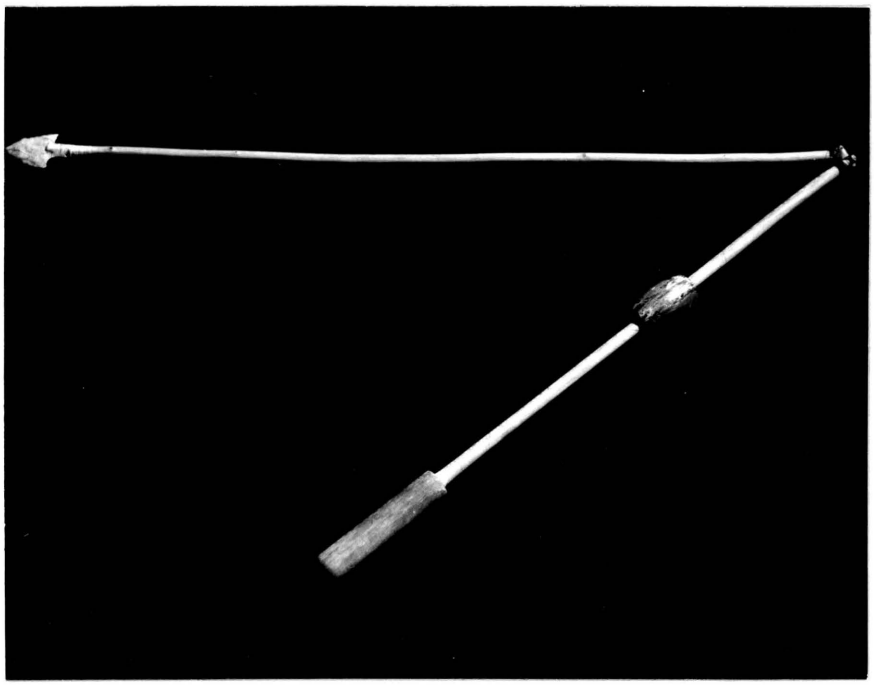


Figure 5. The spearthrower made it possible for the Indian to hurl a short spear at a high rate of speed.

at a high rate of speed over a short distance. Later the introduction of the bow and arrow gave the hunter a projectile with an even longer range and more accuracy.

Strachey (Swanton, 1946:313) stated that the people on Jamestown Island saw herds containing from fifty to two hundred deer; he remarked that there were more deer near the heads of rivers, but that there were fewer animals "amongst the rivers". Lederer (1902:6) related that the valleys of Piedmont Virginia fed numerous herds of deer. Hariot, the writer of the North Carolina Colony at Roanoke Island, had this to say about the supply of deer: "In some places there are great store (of deer): neere vnto the sea coast they are of the ordinarie bignes as ours in England, & some lesse: but further up into the country where there is better seed they are greater: they differ from ours onely in this, their tailes are longer and the snags of their hornes looke backward" (Hariot, 1893:89 quoted in Swanton, 1946:312).

These reports indicated that deer were more plentiful in the interior of the state than they were on the coast. There may have been an ecological reason for this; Hariot indicated a better food supply in the inland regions.

A determination of the age of 19 deer jaws recovered from Indian village sites in Piedmont and Mountainous Virginia revealed that over 35 per cent of this sample was in the age group of five years or older (McGinnes and Reeves, 1957). This would indicate to modern-day game biologists that the herd was not producing as vigorously as possible because when a herd is increasing, probably not more than 15 - 20

per cent of the sample would be in this 5-year and older age class. This bit of evidence substantiates other available information, indicating that the precolonial deer herd was relatively static and less abundant than it is today. It is of interest to note that the Indians in some regions thought it necessary to burn bones of deer they killed in the belief that, if this was not done, other deer would leave for other parts of the country (Swanton, 1946:314).

Not many years after the founding of the colony at Jamestown, the seemingly inexhaustible supply of deer began to wane. Leaders of the colony became alarmed at these conditions for they knew the value of the deer. Constant hunting at all times of the year was singled out as being the main cause of this difficulty. In 1699 the General Assembly of Virginia passed legislation creating a closed season on deer to extend from the first day of February through the last day of July (Mann, 1952:12). This law did not have the desired effect and in October 1705 the closed season on deer was lengthened to include the dates between the first day of January and the last day of August (Mann, 1952:12). Additional legislation was passed in 1734, but deer numbers still decreased.

The deer conditions depicted above described the status of the deer in Coastal Virginia. Apparently, no serious inroads on deer in Piedmont and Mountainous Virginia occurred during the colonial period. Lederer (1902:6;11) recorded the presence of large herds in the Piedmont; James Burke, Dr. Thomas Walker and Captain William Preston are a few among many who described quantities of deer in the mountains (Johnston, 1905:23ffd.)

Early colonial legislation recognized that the frontiersman needed the meat for food and the hides for clothing and other necessities. This feeling was carried over into the postcolonial years, and it was not until 1849 that counties west of the Blue Ridge had a closed season. This law did not cover those counties west of the Allegheny range.

By 1900 the deer herds in Virginia's mountains were depleted. Old hunters who remembered the years around the turn of the century, stated that deer were scarce or absent and that only bear was hunted as big game. In conservation with Colonel Robert P. Carroll, the writer was told that Jake Hostetter and Buzz Reynolds stated that one of the last deer in Rockbridge County was killed in 1885. Dr. Lyle Kinnear related that his father had killed a deer in the North Mountain section of Rockbridge County sometime after the turn of the present century. The antlers of this specimen are at his family home in the Timber Ridge neighborhood in that county. For some years after this his father was affiliated with a club which hunted in the Deerfield area of Bath County. Although the deer in this area may never have been completely eradicated, their numbers were scarce after 1900. Thornton (1955:9) in an informative article about game conditions at the turn of the century, reported that James Todd of Rockingham County supposedly killed over 2,700 deer prior to 1860. Most of these animals were killed for the market and the current price for venison averaged 10 cents a pound. The last deer in Augusta County was killed in 1911.

The deer herds were never completely eradicated from the eastern counties. In some places their numbers were critically low, but deer remained in Tidewater and Piedmont Virginia. Reports of large numbers

of deer being killed were not prevalent in this region. In 1942 John A. Carter, a Confederate veteran, of Buckingham County, told that his best deer hunts occurred around 1900 when he killed 25 deer in 27 days (Boatwright, 1942:89). Quite a record, but not equal to the thousands killed in the mountains.

Large game species such as deer could not withstand the hunting pressures to which they were subjected, and they vanished from areas where they were not protected.

Of all large game species in Virginia, the native White-tailed Deer, Odocoileus v. virginianus (Bodeaert), is probably the most important animal. Deer numbers began to wane shortly after the arrival of the colonists at Jamestown, and by 1699, colonial authorities found it necessary to enact legislation closing the season on deer. As agriculture developed, the deer population decreased. Davey (1955) stated, "The lowest ebb of the deer population possibly coincided with the peak of agricultural expansion which came about 50 years ago". Apparently, three main factors were responsible for the decline of deer abundance: (1) continued over-harvesting; (2) expansion of agriculture, and (3) the destruction of forests by fire and ax.

The deer were never completely annihilated from Virginia. Davey (1955) reported that deer remained in the eastern counties of Norfolk, Nansemond and Surry, and in the western counties of Highland, Bath and Alleghany. It is possible that other sections of the state, especially the Piedmont, had populations of native deer. In the 1930's the deer population in the 31 counties west of the Blue Ridge was estimated at

around 500 animals (Quinn, 1953:3); however, in the late 1930's, wildlife personnel conducted brief surveys to determine the location of good deer range and to get some idea of the existing deer population. Vernon Bailey (1929:3) made this report, "The object of this trip was to make a brief reconnoissance of the best deer range in Virginia, lying in Bath and Highland counties, as a preliminary to a detailed study of the deer problems in Virginia. In the few days available we were able to gather a general idea of the abundance and distribution of deer, the suitable food supply, and other important factors bearing on their rate of increase and general welfare." Bailey (1929:3) found that 80 per cent of the area was covered with suitable food and cover and was suitable as deer range. William A. Hite, Bath County game warden estimated approximately 1,500 deer; he made his estimate from the number of tracks and the amount of browsing signs. Bailey thought that this figure was conservative. Highland County had an estimated herd of 1,000 deer. Bath County had an approximated bobcat population of from 100 to 200 animals; each cat supposedly killed an average of ten deer annually. It was thought that the cats killed more deer than did the hunters. It was proposed that hunting in this region be curtailed to allow for a deer increase, it was also proposed that only bucks be killed for two years. As a result of the survey of Bath and Highland counties, the investigator did not consider it necessary or wise to introduce more deer into this area (Bailey, 1929:3-5). In 1929 Paul G. Redington, Chief of the Bureau of Biological Survey, noted that deer herds in Bath County were still below the available food

supply; he considered it advisable to allow hunting in an effort to diminish poaching. He also suggested that a trained biologist be on hand during the gunning season to keep a record on the kill and to collect scientific data. The Bureau offered to send a man to collect this material if none were available from the Commission (Redington, 1929:3).

From the time of the formation of the Game Department in 1916, wildlife officials devoted much of their time and efforts to restoring the deer in Virginia. In 1917 Commissioner Parsons (1917:6-7) called attention to the fact that deer should be given more protection under law. He proposed shorter hunting seasons and a buck season as management measures.

Prior to 1919 the deer season began September 1 and continued to December 1; in 1919, the season extended from October 1 until February 1 (Bilisoly, 1921:21). In 1921 Commissioner Bilisoly recommended to the General Assembly that the season be reduced to those days falling between November 1 and January 1; he deemed it necessary to further protect the deer by providing for a seasonal bag limit (1921:12). The 1922 General Assembly did nothing to shorten the deer season, but Chapter 46-4 of the Virginia code did make it illegal to sell deer (Anon., 1922:133). In 1924 the General Assembly shortened the deer season to 45 days between November 15th. and December 31st. This law also stipulated that a hunter could kill only one deer a day and two deer per season and furthermore, only bucks with antlers visible above the hair were legal. In an effort to collect information on persons selling deer, it was declared illegal to sell deer meat but not to buy it

(Tyus, 1924:14) In 1928 the deer in Frederick County were protected by closing the season for three years beginning November 1 (Anon., 1928: 4).

With improved game warden protection and sound legislation, the stage was set for the deer restocking venture which began in 1928 and which has continued up the present day to some little extent. However, the greatest deer restocking activity was between 1928 and 1950. Since that time no out-of-state animals have been imported and restocking efforts have been confined to trapping over-populated areas and moving the deer to under-populated regions. The releases of deer in Virginia are shown in Table 12, and Figure 6. The exact release points of these animals are not known, but generally they were distributed in counties lying west of the Blue Ridge.

The results of deer restocking were promising. In 1929, thirty-one deer trapped at the Game Farm were shipped to southwestern Virginia (Robertson, 1930:6). The 85 deer released in 1933 were brought into Virginia from the Pisgah National Forest and from a private reserve in Pennsylvania (Handley, 1933:10). Justus H. Cline made an attempt to buy eight deer on the cooperative plan from Pisgah National Forest for release on the Big Levels Refuge; apparently he was able to obtain only five deer. The Shenandoah County Game and Fish Protective Association purchased 25 deer from a private breeder in Pennsylvania; these were released in the Massanutten Mountains (Handley, 1933:24). In 1934 ten deer were bought with funds half of which came from the Commission and half from interested sportsmen. The Shenandoah Game and Fish Protective Association released two of these on the North River Refuge in Augusta County.

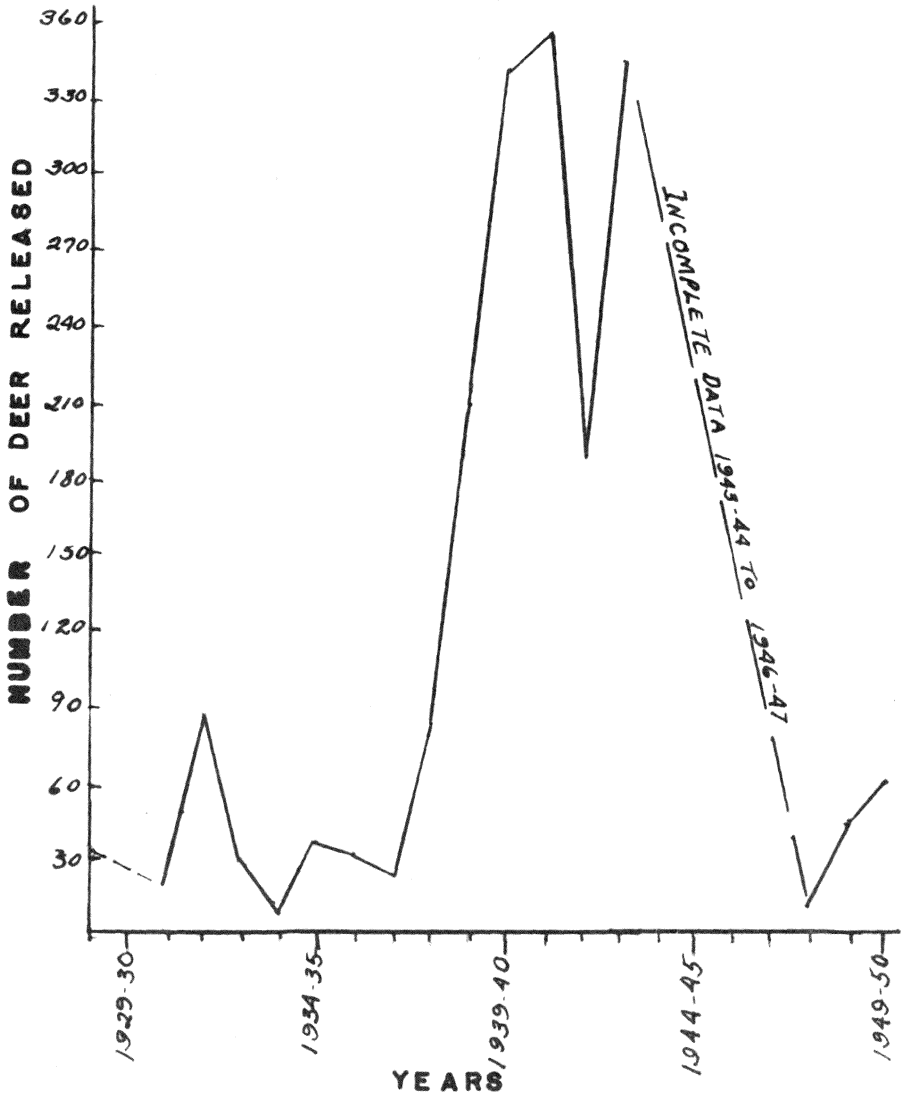


Figure 6. The annual numbers of deer released in Virginia from 1929-30 through 1949-50. (Data from the Annual Reports of the Virginia Commission of Game and Inland Fisheries.)

Table 12. The number of deer released in Virginia between 1928-29 and 1949-50

Year	Number Released	Year	Number Released
1928-29	31	1938-39	211
1929-30	0	1939-40	343
1930-31	21	1940-41	356
1931-32	85	1941-42	188
1932-33	30	1942-43	345
1933-34	10	Insufficient data	
1934-35	38	1946-47	1
1935-36	34	1947-48	12
1936-37	25	1948-49	46
1937-38	86	1949-50	60
		Total	1,922

Data from the annual reports of the Commission of Game and Inland Fisheries.

Eight were purchased by the F.F.A. Club of Giles County who planned to hold them as breeding stock with plans to liberate the annual increase (Handley, 1935:19).

Handley (1935:30) reported the purchase of 38 deer with money from the cooperative fund. Twelve came from Pisgah and 26 from Pennsylvania; these animals were distributed as follows: 12 on the North River Refuge; 18 on the Powell's Fort Game Refuge in Shenandoah County; 8 at Max Mountains in Pulaski County. In 1936, ten deer were released in Shenandoah County and 24 were liberated in Augusta County; these animals were imported from Pennsylvania (Anon., 1937:24). In the succeeding years, deer were freed in Montgomery, Giles, Loudoun and Rockingham counties (Anon., 1938:32).

Funds from the newly enacted Pittman-Robertson Act gave Virginia $6,234.77. The Pittman-Robertson Act levied a 10 per cent tax on sporting arms and ammunition. The money derived from this legislation was distributed among the states with respect to the numbers of licenses sold and amount of public hunting acreage available within a state. The states put up one-fourth of the money for activities carried out with these funds. Eighty per cent of Virginia's portion was spent for restocking areas that had been depleted of game species. Michigan allowed Virginia to trap and bring to Virginia some 133 deer from their overpopulated areas. Virginia got other deer from Wisconsin, Georgia and Pennsylvania. These deer could not be liberated in a county until that county enacted laws regulating the control of dogs (Nolting, 1940:3).

P-R funds also made it possible for Virginia to hire five wildlife biologists to work with the major game species (Nolting, 1941:4).

Sound game management plans were soon applied to the deer herds. The 1934 General Assembly passed legislation closing the deer season in 18 counties west of the Blue Ridge (Clarke, 1944:3). Game wardens were instructed to enforce the dog law to diminish damage to deer by free-running dogs. The creation of the Virginia Plan in 1938 aided the rapid growth of deer herds by creating favorable habitat and good supplies of food. Commissioner Nolting (1941:3) noted that if deer populations increase continued, much of the area in the federal forest lands would be open to hunting by 1942; new hunting areas were already open in western Virginia in 1940.

In 1941 Nolting (1942:6) noted that some western districts had deer where none had existed for 50 years. Talbott E. Clarke, (1944: 3) Executive Director of the Commission, reported on the deer situation in 1943, and he credited game warden protection for much of the deer increase, especially in eastern Virginia. Western herds were ready for harvesting; he predicted that some 700,000 acres of public shooting range would be open to hunting by 1944. The first legal deer season in Augusta County in 40 years took place in 1944. This meant that 350,000 acres of public hunting lands were opened (Clarke, 1945:4).

DeLaBarre (1938:1) described the prevailing conditions of the deer harvest in Alleghany and Bath counties in 1938 "Hunters spent $306 for each legal deer bagged this past season on the George Washington National Forest in Bath and Alleghany counties, the only National Forest counties in which there was an open season. An

estimated 2500 hunters spent a total of $65,000 during the five-day season, an average expenditure of $26.00 per man. They bagged 212 legal bucks, one hunter in twelve being successful in getting his deer".

As the herds continued to increase, more and more counties opened seasons on deer. The numbers of deer harvested between 1927 - 28 and 1957 - 58 are shown in Figure 7. The numbers of deer harvested in individual counties west of the Blue Ridge since 1948 - 49 are shown in Table 13. When the Cooperative program between the state and federal government on the National Forests got under way in 1938, only two counties (Alleghany and Bath) west of the Blue Ridge had open season on deer. By 1948, 21 counties in this section allowed deer hunting. During the 1946 deer season 1,357 deer were legally taken from these counties (Mead, 1948:16).

During the hunting season of 1949 - 50 eight counties opened the season on antlerless deer; this year 1,264 antlerless deer were harvested. Only one county had a antlerless season during 1950 - 51 and 128 antlerless deer were killed at that time. In 1951 - 52 antlerless deer were legal in Halifax and Sussex counties; their combined harvest was 404 (Phelps, 1958:18). As long ago as 1931, game officials realized that the time would arrive when does would have to be harvested in order to properly manage the deer herds. James T. Robertson (1931:75) recounted that does had been protected since 1923 - 24 but that if Virginia's herd continued to increase, the harvesting of any deer in the future would be necessary for good deer management.

At the time when doe protection was necessary, the Virginia game

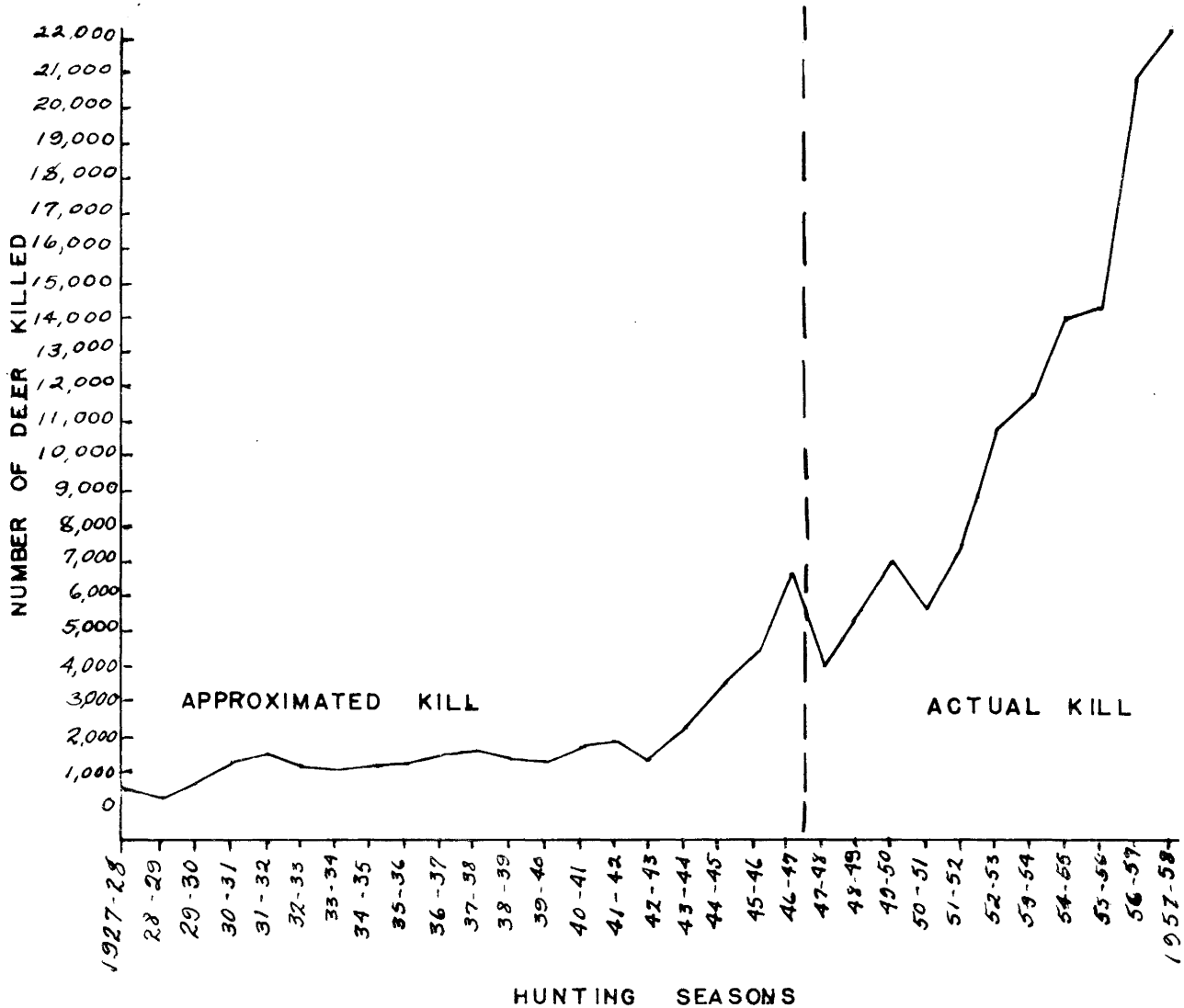


Figure 7 . The annual deer kill in Virginia from 1927-28 through 1957-58. Data prior to 1947-48 represent game warden estimates of deer kill. (Data from the files of the Virginia Commission of Game and Inland Fisheries.)

Table 13. Deer kill in counties west of the Blue Ridge, between 1948-49 and 1957-58

County	48-49	49-50	50-51	51-52	52-53	53-54	54-55	55-56	56-57	57-58
Alleghany	41	46	64	90	87	132	162	221	288	360
Augusta	240	274	310	541	1131	635	1103	662	1028	1187
Bath	444	460	375	465	917	689	1185	928	1528	1351
Bland	18	11	15	16	23	44	46	35	32	57
Botetourt	17	26	38	63	74	113	113	156	232	301
Buchanan	-	-	-	-	-	-	-	-	-	-
Carroll	-	-	-	-	-	1	3	10	10	9
Clarke	-	-	-	-	-	-	13	23	35	62
Craig	30	37	71	113	112	236	216	282	402	447
Dickenson	-	-	-	-	-	-	-	-	-	-
Floyd	-	-	-	-	-	-	-	-	-	-
Frederick	122	130	146	237	432	389	590	567	1068	833
Giles	36	38	66	112	147	205	236	223	365	385
Grayson	80	60	84	138	145	169	201	242	373	273
Highland	75	106	67	107	119	149	208	213	427	366
Lee	-	9	3	9	10	14	14	21	18	19
Montgomery	-	-	-	-	-	-	-	-	-	-
Page	20	22	34	65	64	132	198	131	334	408
Pulaski	-	-	-	-	-	-	2	2	2	4
Roanoke	3	4	6	14	9	13	13	12	18	21
Rockbridge	-	37	32	65	60	107	126	153	228	292
Rockingham	75	101	150	198	256	370	462	469	896	822
Russell	-	-	-	-	1	8	7	7	5	5
Scott	61	67	64	142	100	161	183	106	96	216
Shenandoah	171	221	298	512	1196	743	1381	1052	2817	2175
Smyth	104	96	156	225	235	299	357	692	505	345
Tazewell	19	8	33	21	30	51	49	42	22	45
Warren	13	17	31	73	121	122	195	158	385	400
Washington	61	64	90	72	96	139	91	97	156	135
Wise	75	85	83	109	104	140	141	98	65	248
Wythe	18	34	39	48	64	80	78	87	117	99

(Data from the Virginia Wildlife magazines)

officials did such a thorough job of selling the idea of protection of the female that when the harvesting of does became mandatory for good management of the species, the public was reluctant to accept an open season on these animals. It is quite likely that no serious objections will come from the public once they are shown that no damage is inflicted by harvesting does.

Virginia's deer herd is a prime example of what can be done with a species when sound management plans are prepared and followed. The 1957-58 deer kill is about 40 times greater than the harvest of 1929 - 30. Possibly, the large acreage of federal lands, which served as a mammoth laboratory, was of prime importance, for on these lands various types of management techniques were tested. More than this, however, the combined efforts of the federal foresters, state biologists, game managers and game wardens were the forces which brought about the present success.

In 1952 the Commission initiated a statewide deer investigation with the purpose of collecting all available data which would help to set future bag limits and season length (Phelps, 1954:10). In 1954 a full-time deer biologist was employed to make more detailed study of Virginia's deer problems. That year the herd was estimated at approximately 150,000 deer and it was thought that current range conditions could support 200,000 animals. Virginia had 16,000 square miles of deer range in 1954; one-third of this land lay west of the Blue Ridge Mountains. Carrying capacity ranged from a low of 15 deer per square mile in the west to a high of 100 deer per square mile in the east (Phelps, 1955:5-6).

Phelps (1956:12-13) acknowledged that the problem was not to increase the present herd, but to make a proper harvest of the existing deer herd. Of the 16,000 to 18,000 square miles of deer range in the state, over half the area had maximum desired populations. Phelps continued "An annual harvest of between one-half and one and one-half adult bucks per square miles of an average deer range is apparently all that most ranges will produce on a sustained basis" (Phelps, 1956:12). He noted, too, that in order to maintain the deer population, and at the same time to get the greatest harvest, equal numbers of both sexes should be taken. Under proper management, the annual harvest could possibly reach 35,000 deer (Phelps, 1956:13).

By 1956 thirteen localities were classified as being over-populated. A locality is regarded as being over-populated when browsing deer inflict damage on forest vegetation or when the deer cause substantial damage to agricultural crops (Anon., 1950:23). Investigations carried out in 1956 by Commission biologists revealed that many western counties had reached their carrying capacity for deer; only Alleghany, Craig, Botetourt and Rockbridge counties afforded habitat for greater numbers of deer.

Davey (1957:19) estimated that the maximum deer harvest that could be expected for the western counties should approach 15,000, with bucks accounting for 6,000 to 8,000 of this number. On a state-wide basis, current deer harvests fall about 10,000 less than the desired number, although much of Virginia's deer range is at carrying capacity (Davey, 1958:16).

In the summer of 1957 wildlife agencies in eleven southern states, including Virginia, united to form the Cooperative Deer Disease Study. Headquarters of this organization are located at the University of Georgia. Plans include investigations of two diseases of unborn fawns, collection of blood samples for analysis, nutritional studies, parasites and toxicology (Anon., 1958:24).

The state's deer herds were estimated at 150,000 animals in the fall of 1954 (Phelps, 1955:13), and by 1958, Commission personnel stated that there was a minimum of 100,000 deer in the areas of the National Forests (Quinn, 1958:6).

Deer are an important natural resource in Virginia. Annually deer hunters spend large sums of money in Virginia. In 1958 the total money spent by deer hunters for transportation, food, equipment and other necessary commodities amounted to more than one-half million dollars; the result was 550 tons of dressed meat. The "zeroing-in" of rifles alone cost $30,000.00 (Gwynn, 1958:10). In the esthetic sense, many hours of pleasure are the direct result of hunting deer with camera, bow or gun. In 1957 - 58 bowhunters accounted for 208 of the 22,473 deer killed (Phelps, 1958:20). With continued sound management, the deer will continue to provide pleasure for Virginians yet unborn.

Black Bear

The black bear, Euarctos americanus americanus Pallas (Fig. 8) was of great importance to the Indians of southeastern United States. Swanton (1946:249) listed them as the second most useful game animal



Figure 8. The black bear. One of the major game animals in the precolonial period of Virginia. (Photo by Dr. Henry S. Mosby).

in this region.

No great amount of information has been collected concerning the Indian's technique of hunting bear, but the account by Hariot, describing conditions along the North Carolina Coast, gives us the best picture that is available for this section of the country. He states, "Bears, which are of blacke colour. The beares of this countrey are good meat. The inhabitants in time of Winter do vse to take & eate many: so also sometime did we. They are taken commonlie in this sort. In some ifands or places where they are, being hunted for af foon as they haue spiall of a man, they prefently run away, and then being chafed, they clime and get vp the next tree they can: from whence with arrous they are fhot downe ftarke dead, or with thofe wounds that they may after eafily be killed we sometime shotte them downe with our calieuers" (Tarbox, 1884:217).

Skins of bear were transformed into heavy winter robes, moccasins, and bed covering. Excellent bowstrings were fashioned from twisted bear gut; teeth and claws served as ornaments. The bear was an important source of meat, but perhaps it was more important as a source of fat. This fat was used as butter, and as body and hair oil. Most of the paint pigments that decorated the Indian's body were mixed with bear's grease (Swanton, 1946:249). The writer uncovered two ornaments made from the canine tusks of bear from an excavation of an Indian village site located in Giles County, apparently the bear was used to some extent by the peoples of western Virginia.

Information regarding the distribution and abundance of black

bear in precolonial Virginia is scanty because only a few references mention the bear condition. John Lederer indicated that in the Appalachian mountains bear was the only game animal in abundance, and he related "The Apalatean mountains called in Indian Poemotinck, (or the origine of the Indians) are barren rocks, and therefore deserted by all living creatures but bears, who live in hollow cliffs" (Lederer, 1902: 6). In another passage, previously stated, he reminded the adventurer that if he planned a mountain trip he should carry provisions with him for bears would be the only animals that he would meet within the mountains. Bruce (1924:22) said that aboriginal bears of Virginia were small, and that their principal range was in the Dismal Swamp. He also referred to a herd of bears near the falls of the Powhatan River. This may have been the bears discussed by Lederer (1902:11) when he described conditions around the south branch of the Rappahannock River. He there saw bears on the hill-sides feeding on the mast.

The lack of information regarding the bear is regrettable for it must have been a useful animal in the daily life of the Indian.

The earliest recorded description of the bear in southeastern United States was written in the 1580's by Thomas Hariot (1903:D3), of the Roanoke Island Colony in North Carolina. He noted that the black bear supplied the hunter with meat of excellent quality. When pursued, the bear would climb a tree and in this situation he could be easily killed. Considerable numbers of bear were reported around Jamestown. In a 1670 treatise of Dismal Swamp, Augustine Herman wrote that bears were commonly found in this area (Gottmann, 1955:30). Lederer (1902:27) mentioned that bears were common in Piedmont

Virginia, and that in the mountains they were sometimes the only animals encountered. On their way to Swift Run Gap in 1716, the "Knights of the Golden Horseshoe" killed bears daily to supplement the food supply (Bruce, 1924:313). The bear was important to settlers of western Virginia and many of the written reports from this region mentioned the taking of bears for food or skins. George Washington detailed Major Andrew Lewis and his men to attack Indian towns along the Ohio River; they left a site near the present town of Salem and in the vicinity of Tazewell County they killed three or four bears. This was in February of 1756 (Johnston, 1905:23ffd.). A settler named James Burke moved with his family into what is now Burke's Garden, Tazewell County, in 1754. During the next year he reportedly killed a large number of bears and brought the skins back with him. Thus it appears that during the colonial period, bears were generally plentiful and were found in all regions of the state (Fig. 9).

A frontiersman, Wilburn Waters, spent the fall of 1832 in the vicinity of White Top Mountain. He reported that the mast crop that year was very poor and that game animals which utilized these nuts as food were scarce in that section. However, he did kill a bear weighing around 400 pounds; it produced 18 gallons of oil (Coale, 1878:53-57). W. B. Ninnick, a Rockingham County hunter, killed 13 bear during 1890. Bear were listed among the animals shipped to markets from the railyards at Staunton (Thornton, 1955:9). The frontiersmen considered bear's meat to be the best available; 'coon ran a close second (Coale, 1878:55). At the end of the postcolonial period the bear was plentiful

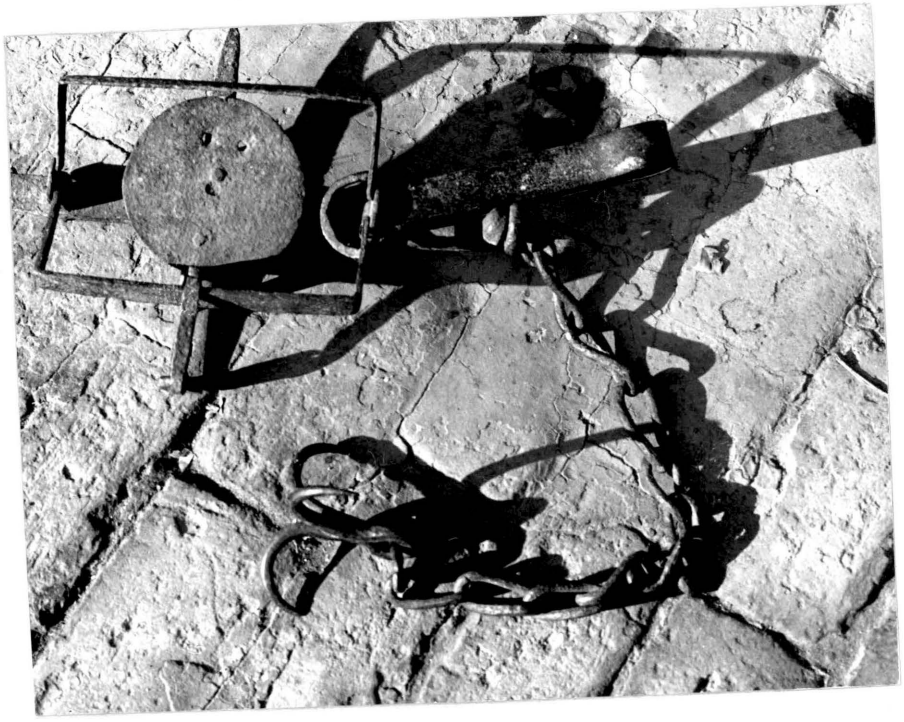


Figure 9. A home-made bear trap. This trap was found deep in a northwestern Virginia swamp.

in the mountains and in Dismal Swamp but his numbers had been severly reduced in most of Tidewater and Piedmont Virginia.

The black bear originally ranged throughout the state. During recent years this species has been restricted to 180 square miles of land lying within the Dismal Swamp and 4116 square miles of mountainous land in the western counties; combined, these areas amount to 4,296 square miles of bear range within Virginia (Stickley, 1957:12). Stickley (1957:24) estimated a bear population of 1,102 animals in 1957; this indicated an average density of one bear per 3.9 square miles of bear range.

Farmers within bear range waged constant war against the species. An anonymous report in the Game and Fish Conservationist (1929:119) noted that Virginia was one of 17 states that recognized the black bear as a game species. Bailey (1929:6) acknowledged that bears were often killed needlessly, and he believed that they should be protected. He proposed that young bear, or old bear accompanied by young, be protected by law. The bear was listed as a game animal under the 1930 - 31 Game Code (Anon., 1930:129). That year, 1930 - 31, the open season existed from November 15 to January 31. No daily or seasonal limit was set. In exception to this law, bear could be killed at any time if they were apprehended causing damage; in these cases the kill was to be reported to the game warden immediately.

Although limited management plans were prescribed for the bear, its numbers remained about constant. Executive Director Clarke (1944: 4) noted that the bear was holding its own in the extreme eastern portions of the state and was increasing in the western counties of

Rockingham, Highland, and Augusta; counties south of Rockbridge offered little or no hunting possibilities. With regard to the situation of the species during the years immediately following World War II, Clarke gave this report, "The bear population remains about the same and, due to their destructiveness to livestock, should not be allowed to increase beyond their present number, particularly in the grazing counties of the western part of the State" (Ann. Rep. 1945:3).

In 1951 L. B. Davenport (1951:75-77) concluded the first statewide study of the black bear. His research centered around the economic importance of the bear in Virginia, and as a result of the data collected, the following management plans were proposed: 1) protection of young bear by forbidding the killing of any animal weighing less than fifty pounds; 2) separating the bear and deer seasons in order to halt the killing of bear by deer hunters. Davenport spoke out against longer bear seasons in spite of pressure from sheep raisers because he believed that an extended season might seriously reduce bear numbers. Davenport (1951:74) noted that few facts were known about the bear since these animals frequently lived in forests away from habitations.

The most recent work on the bear was accomplished by A. R. Stickley in 1957. This research was concerned with the status and characteristics of the bear in Virginia. This investigation (1957) reported that there were approximately 4,296 square miles of bear range and that an additional 750 square miles appeared to be potential range. Hunting pressure, precipitation and mast supply apparently affect the bear harvest; of these factors, mast supply appears most important. He associated the decline of the legal bear kill with a general decline in bear

numbers. Placental scar counts indicate an average of 2.27 cubs per litter. Testes collected during November-December hunting season showed no spermatic activity, although a testis collected in June showed definite spermatic activity. Limited data pointed out the possibility that females may breed at 2½ years rather than 3½ years of age as indicated in most literature.

Stickley (1957) proposed that no bear weighing less than 75 pounds be killed.

From the hunting season of 1923 - 24 through the season of 1946 - 47, game wardens estimated the annual bear kill (Figure 10 and Table 14). The writer assumes that the 909 bears reportedly killed in 1927 - 28 is an error for no other year's kill approaches such magnitude. When these figures are plotted (Figure 10) it is noticed that two peaks of bear kill are evident. The first occurred during the 1929 - 30 hunting season when 292 bears were harvested and the second during the 1954 - 55 hunting season when 358 bears were killed. The average annual kill for the years between 1930 - 31 and 1949 - 50 was 141 bears. Apparently little fluctuations occur in the bear kill over an extended number of years.

The Commission has taken some positive steps in bear management. In 1957 - 58 the cub law was enacted which forbade the killing of bears weighing less than 75 pounds; the bear and deer seasons west of the Blue Ridge were separated. In 1957, A. R. Stickley was employed as a full-time bear research biologist. His major objectives include plans for collecting date on range, food, young-adult ratios, and other factors influencing bear abundance.

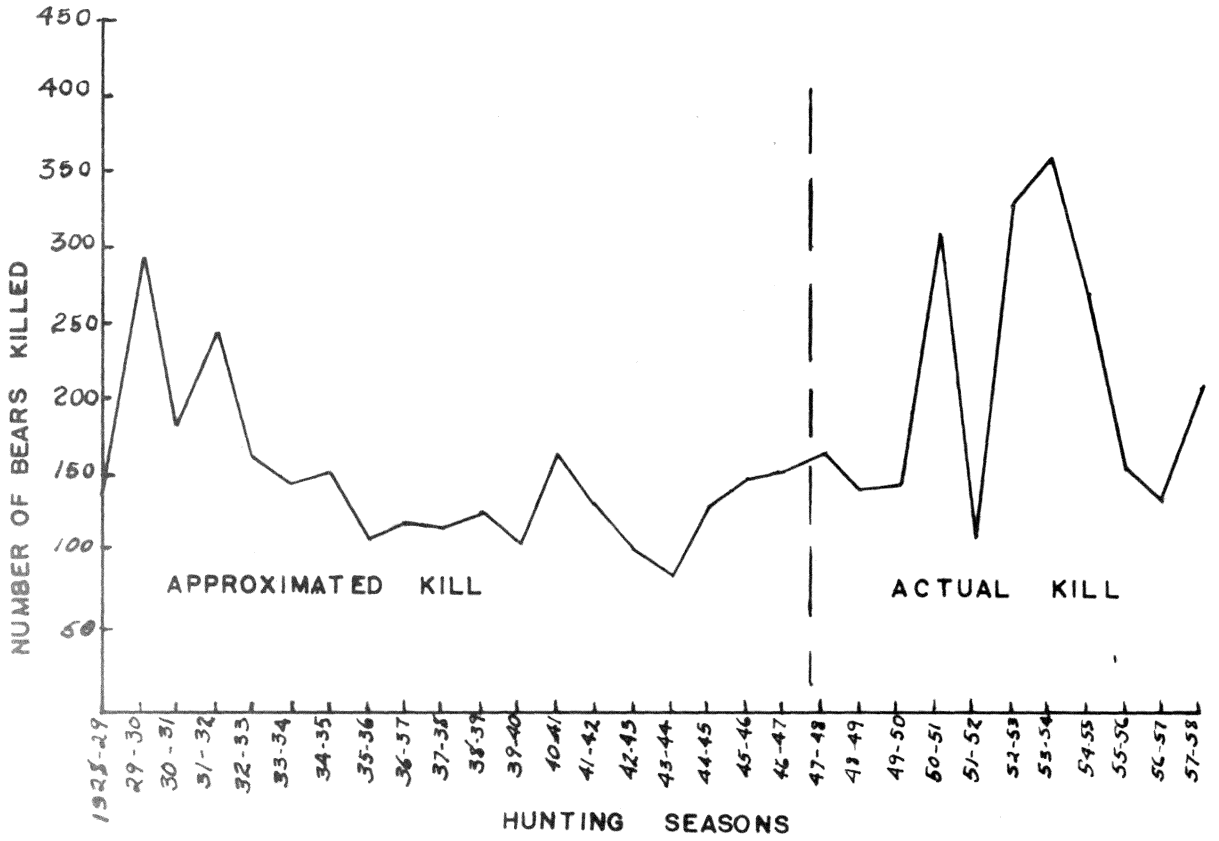


Figure 10. The annual bear kill in Virginia from 1928-29 through 1957-58. Prior to 1947-48 the kill figures are game warden estimates of bear kill. (Data from the files of the Virginia Commission of Game and Inland Fisheries.)

Table 14. Bear kill in Virginia from 1923-24 through 1957-58

Year	Number Killed	Year	Number Killed
1923-24	215	1941-42	133
1924-25	127	1942-43	102
1925-26	190	1943-44	84
1926-27	---	1944-45	130
1927-28	909	1945-46	149
1928-29	139	1946-47	156
		----------*	
1929-30	292	1947-48	163
1930-31	183	1948-49	143
1931-32	245	1949-50	147
1932-33	161	1950-51	312
1933-34	145	1951-52	110
1934-35	151	1952-53	327
1935-36	110	1953-54	358
1936-37	121	1954-55	270
1937-38	116	1955-56	156
1938-39	125	1956-57	135
1939-40	105	1957-58	213
1940-41	164		

Data from files of Commission of Game and Inland Fisheries.

* After 1947-48 the figures represent tagged legally killed bears.

Elk

In precolonial Virginia, the elk or wapiti, Cervus canadensis L. occupied all of the land now within the borders of Virginia; however, they were more abundant in the lands adjacent to the Blue Ridge and Allegheny Mountains (Wood, 1943:9). This animal was quite abundant prior to 1600, but it decreased in numbers as the settlers moved westward. The elk is a grazing animal, and its diet put it in direct competition with the farmer's cattle; elk also destroyed grass crops and other agricultural plantings. It was probably the westward movement of agriculture and the general increase in population that caused the elk to vanish from Virginia about 1855.

The savannas and open forest areas presented the elk with excellent food. Several early accounts described large herds of "red deer" that lived on the grassy plains of the upper Piedmont, or more probably in the great Shenandoah Valley. These red deer were probably elk. John Lederer was disturbed over the misnaming of the animal and expressed his views in this way,"---and in various branches interlace the flowry meads, whose luxurious herbage invites numerous herds of red deer (for their unusual largeness improperly termed elks by ignorant people) to feed. The right elk (probably the moose) though very common in New Scotland, Canada, and those northern parts, is never seen on this side of the continent: for that which the Virginians call elks, does not at all differ from the red deer of Europe, but in his dimensions, which are far greater: but yet the elk in bigness does as far exceed them: their heads or horns, are not very different; but the neck of the elk is so short, that it hardly separates the head

from the shoulders; which is the reason that they cannot feed upon level ground but by falling on their knees, though their heads be a yard long: therefore they commonly either browse upon trees, or standing up to the belly in ponds or rivers feed upon the banks: their cingles or tails are hardly three inches long" (Lederer, 1902: 24). Since the elk is closely related both taxonomically and morphologically to the red deer, Cervus elaphus, it was understandable that the early explorers confused the elk or wapiti, with the red stag. Cahalane (1939:485) shed more light on this matter, "Many years ago, when the English colonists first penetrated the forest in America, they found a new deer, a magnificient animal larger than their own 'Stag' or red deer, but closely resembling it. The Shawnee Indians called it the wapiti, but, disregarding the fact that a hump-shouldered, broad antlered animal of northern Europe already bore the name, the English called it the 'elk', and the name has stuck."

The elk was not protected under colonial wildlife legislation, and this may have been indicative of the fact that the colonists considered them very destructive around their farms. They were found in Gloucester County as late as 1739 (Wood, 1943:11), but it is doubtful that they remained in Coastal Virginia long after this date. The elk remained in the Piedmont regions for many years after their annihilation from the Tidewater area, and they were still extant in the mountains at the close of the colonial period (Lederer, 1902:6).

The elk vanished from Virginia during the postcolonial period. The few elk that remained during this era were found in the mountains and their associated valleys. Wood (1943:11) pointed out that various

dates have been given for the extirpation of the elk. Some authorities believed that the last elk had been killed by 1844, while others list 1855 as the year of extinction. The last elk in Virginia was reported to have been killed in Clarke County (Wood, 1943:11). Other earlier known kills of elk in Virginia occurred in 1754 in Tazewell County and in 1829 in Bath and Highland Counties (Wood, 1943:11).

In 1917, the newly created Virginia Department of Game and Inland Fisheries thought that the restoration of elk in Virginia was desirable. Federal officials allowed Virginia to obtain 150 elk from the Yellowstone herd; about 10 of these died in transit (Wood, 1943). The elk were released in the counties of Russel, Washington, Bland, Giles, Montgomery, Pulaski, Botetourt, Warren, Princess Anne and Cumberland.

Little data concerning food and cover requirements were available, and as a consequence most of the restocking attempts failed (Wood, 1943). The re-introduction of elk did create two herds; the Giles-Bland and the Botetourt herds. The 17 elk released in the sand dune area of Cape Henry, Princess Anne County, caused depredations in the truck garden region and these animals were destroyed. The second annual report of the Department stated that future plantings of elk in agricultural regions were unwise (Wood, 1943:13-14). Commissioner Bilisoly (1918:5) noted that reports of agricultural damage were frequent, and that the Department was not authorized to pay claims. It was evident that elk herds would have to remain small in order to minimize the menace to agriculture.

On December 15, 1922 a two-week elk season was opened on bulls only; no hunting was allowed on the forest preserves. Field workers

reported a population of approximately 500 elk in Virginia distributed as follows: Bland, 50; Botetourt, 70; Craig, 30; Giles, 70; Roanoke, 50; Russell, 30; Washington, 50; Warren, 30; a few remained in Princess Anne, Montgomery and Pulaski (Anon., 1922:171). In 1922 an additional 43 animals were imported from Yellowstone - 6 were released in Botetourt County and the rest were liberated in the Giles-Bland range. This release came as the result of a cooperative arrangement between the Department of Game and Inland Fisheries and the board of supervisors and sportsmen in Giles County (Wood, 1943:15).

The two-week season was reduced to three days. By 1926, the herd which numbered 500 in 1922, was reduced to 75 elk. All populations except the ones in Botetourt and Giles-Bland were depleted. What caused the depletion of numbers was not determined (Wood, 1943:14).

"---In 1935, in view of interest being shown in elk hunting in the State, it was thought advisable to introduce some new blood to revive the herds originally established in the State from the herd that was introduced in 1917. One express carload, consisting of 56 head of both bulls and cows, was obtained from the Yellowstone National Park in February, 1935. Five of the animals died in transit and 45 were liberated in the Sugar Hollow Section of Giles County and six were liberated in the Natural Bridge end of the forest in Botetourt County" (Stras, 1949:7).

Research on the elk began shortly after the release of the animals in 1935. C. F. DeLaBarre, of the Wildlife Unit, was the project leader. During the fall and winter of 1939 - 40, DeLaBarre carried out a general study of conditions on the Giles-Bland Range.

More detailed information was collected during the period from June 1, 1940 to May 1, 1941. The objectives of the study were to determine: (1) the elk population of the Giles-Bland Range; (2) a practical censusing technique; (3) factors influencing movements and population increase; (4) seasonal food habits; (5) necessary range requirements; and (6) methods of preventing or decreasing agricultural damage (Wood, 1943).

The Giles-Bland herd utilizes an area including some 39,000 acres. The range exhibits altitude variations of from 1,500 to 4,000 feet, and includes one of the most extensive wilderness areas within the state. An extensive hardwood forest, broken here and there by small stands of conifers and openings of abandoned farm lands cover the area (Wood, 1943).

Wood (1943) found that elk in the Giles-Bland herd were not increasing, but appeared to be holding their own. He explained this lack of increase to the following factors: (1) hunting pressures; (2) shooting of "spike" bulls; (3) emigration from "homerange"; (4) improper range conditions; and (5) a shortage of actual range. Wood contended that if the herd was to be maintained the range must be improved and the animals must be given better protection. He estimated that the range could not support more than 75 elk.

In 1943 the following regulations applied to the elk: (1) a three day open season; (2) the bag limit of one bull elk with antlers visible above the hairline; (3) illegal to hunt elk with dogs or when snow is on the ground; (4) Bland, Botetourt and Giles

counties sold a special stamp to hunt elk; (5) monies from sale of stamps are used to pay off agricultural claims; and (6) for killing an elk illegally one was fined from $25 to $50, with a $75 replacement fee (Wood, 1943:8).

At the close of the elk investigation Wood (1943:10) proposed that as soon as funds from the sale of stamps were sufficient to pay agricultural damages, the season on elk be closed to allow the herd to build up; he also thought that the killing of elk should be restricted to those bulls having at least 4 tines on the antlers. Other proposals included: (1) cows and calves should not be hunted nor molested; (2) only rifle larger than 25-30 calibre should be allowed on elk range during hunting; (3) all hunters should report their kill, and (4) the plan of controlled shooting or restocking should not be allowed (Wood, 1943:10). Wood proposed that the Commission create an elk refuge and close the season for one to three years.

In 1943, Clarke (1944:4) reported that the elk herds in both ranges were increasing and that the agricultural claims that arose from their depredations would probably bring about seasonal and bag limit changes. He also foresaw the need to shoot some cows if necessary, to hold the herds to their safe population level.

Elk were hunted during each open season from 1922 through 1943. Although the kill figures are incomplete for these seasons, Commission personnel believe that about 87 elk were harvested. Agricultural damage complaints had increased in such numbers that a three-day open season on both sexes was declared in 1944 and during this

short time about 70 elk were killed (Cross, 1950:10).

One of the dangers of over harvesting the elk is the fact that the females give birth to only one fawn per year with twins occurring rather infrequently (Cross, 1950:11). This fact coupled with a lack of good available range could be disastrous to small herds such as the two in Virginia.

The two herds - Botetourt and Giles-Bland - remain in Virginia today. The elk are apparently getting along fairly well. Some poaching exists but their numbers were sufficiently high to allow a short hunting season of three days during the 1958 - 59 hunting season. Perhaps as long as the elk remains in Virginia there will always be mixed emotions between the farmers in elk range and hunters who like to stalk this animal.

Buffalo

The black buffalo, Bison bison pennsylvanicus (Shoemaker), often confused with the bison, was ranked as an important game animal in precolonial southeastern United States, (Swanton, 1946:249). It was not of such great importance to the Virginia Indians, due to its scarcity in this region. The animal was hunted by the surround-by-fire method as was the elk and the deer (Beverley, 1947:154-155).

The black buffalo reportedly had a range that included the land between the Great Lakes and the valleys of the states from southern Pennsylvania to Georgia (Allen, 1942:338). Bruce (1924:22) said, "Buffalo and elk wandered about in the remote regions towards the

mountains, disturbed only by wolves and Indians." William Byrd provided a good "sight-and-kill" record of the eastern bison. The November 11, 1728 entry in his diary noted, "We took up our Quarters upon Sugar Tree Creek, in the same camp we had lain in when we came up, and happen'd to be entertained at Supper with a Rarity we never had the fortune to meet with before, during the whole Expedition. A little wide of this creek, one of the men had the Luck to meet with a Young Buffalo or two Years Old---" (Byrd, 1901:224-225). The spot is probably in Halifax County, Virginia, but it may possibly have been in Person County, North Carolina. However, it does indicate that even in early days the buffalo were few in number in eastern Virginia, for these men had been on a long trek surveying the boundry line between Virginia and North Carolina; they were on their return before they saw their first bison.

Indians considered the meat of the buffalo to be quite a delicacy; the hides were made into clothes, bed coverings and shields. Horns were utilized in the manufacture of ornaments; the hair was woven into strong cords, and the shoulder blades made excellent agricultural hoes (Swanton, 1946:249). Byrd (1901:225) related that the Indians believed that if poisoned food was placed in a spoon made of buffalo horn the spoon would fall apart before the food could be eaten.

The buffalo passed from the scene in Virginia about 1800, and the controversy over the proper name of this animal was never settled. Allen (1942:337-338) pointed out that Shoemaker was not on solid ground when he named this race the black buffalo, and that his descriptions were based on heresay. Schroger (1944:314) continued, "Definitive descriptions of the bison found within the range of pennsylvanicus

are few but those available do not indicate that there was any difference between animals east and west of the Mississippi." Seton (1929:643) followed Shoemaker's description and said that many old bulls were coal-black with grizzly white hairs around the nose and ears. The main difference between the black buffalo and the bison was the fact that the eastern animal lacked the hump so characteristic of the western bison. At this late date only the field of archeology offered any hope for a solution to the problem, and if field excavations bring enough of the skeletal material of the eastern buffalo to light, some definite answers may be revealed.

Descriptions and reports of buffalo at or near Jamestown are lacking. It is possible that these animals had been driven farther inland by the high concentration of Indians along the coast. The first recorded report of the buffalo came from Sir Samuel Argoll in 1612. He first saw this animal as he explored the country along the banks of the Potomac River (Garretson, 1938:16). A few other reports told of buffalo in eastern Virginia (Byrd, 1901:224-225). However, buffalo were more prevalent in western Virginia. Governor Spotswood reported seeing large herds of them grazing in the Shenandoah Valley in 1716 (Bruce, 1924:313). Peter Salley, a frontiersman from Balcony Falls, reported excellent buffalo hunting in the area around Blacksburg and on the New River around Radford. During a hunt in 1742, he and his party killed five buffalo. They fashioned a boat from the hides of these animals and with it they sailed on the New River (Cannaday, 1950: 10). Dr. Thomas Walker, of Albemarle County described the western country in his diary of 1750. He mentioned that the area around Roanoke

had once been good hunting grounds for buffalo, but that these animal were depleted since the settlers shot at them for diversion (Cannaday, 1950:10). The natural salt lick at Roanoke was the origin of the first name for this city, Big Lick. Another famous buffalo lick was located sixteen miles northeast of Abingdon (Coale, 1878:130-131). "Boone's Trace" the westward trail blazed by Daniel Boone followed the old paths of the elk and buffalo. This trail later became the main road of east-west travel through Abingdon (Coale, 1878:111).

The buffalo had been extirpated from Piedmont Virginia before the close of the colonial era and became extinct in Virginia long before the close of the postcolonial period. Garretson (1938:80) believed that the exchange of the bow for the gun brought about the demise of the buffalo. He reported that the last buffalo was killed in 1815 on Little Sandy Creek, 12 miles from Charleston (then in Virginia). Handley and Patton (1947:84) thought that the buffalo were evadicated from the present boundaries of Virginia somewhere around 1800. In the late 1700's, the Trimble family at Swoope, near Waynesboro, had all their hay eaten by buffalo. The last of this species in the Old Dominion may have been killed on the New River in 1797 (Thornton, 1955:9). Much of western Virginia was too steep, rough and heavily timbered for many buffalo to have ever lived there, but the great valley of Virginia, and bottom lands of rivers were suitable for this game species.

Rabbit

Small game animals, like the rabbit, Sylvilagus floridanus

mallurus (Thomas), probably furnished a fairly large portion of the total amount of food and clothing of the Indian. While few references were made to the cottontail, quantities of rabbit bones are available from excavated Indian kitchen middens.

The Indians enjoyed hunting the rabbits, and Beverley (1947:309) told of their hunts. They used "Mungrils or swift Dogs" to chase the rabbits. The rabbits usually found refuge in a hollow tree, and the hunters built fires at the opening into the hollow to run them out. As they succumbed because of the smoke they lost their footing and fell. The Indians did not kill these rabbits but turned them loose so that they could be chased at a later date.

Captain John Smith noted the lack of abundance of the cottontail at Jamestown, "Their Hares (are) no bigger than our Conies, and few of them to be found" (Holland, 1952). In precolonial Virginia the lack of desirable habitat probably kept the rabit numbers to a minimum, but the rabbits began to increase in number as agriculture began to spread because crops and field borders furnished much more desirable rabbit food and cover than did extensive forests. The agricultural practice of land abandonment also furnished additional habitat.

This farm game species prospered under the postcolonial type of farming. Rabbits were plentiful in the grown up fence rows and abandoned fields. Food was abundant in the hay fields. Many rabbits were taken for the market, but perhaps most of them were killed for individual family use. The American institution of trapping rabbits by farm boys came into prominence. The number of these animals was so great that little thought was given to the need of conservation of

the species. Often the point of the rabbit hunt was to see who could kill the most. The writer's father told of one ingenious device used by the rabbit hunters of Halifax County. There was developed a rabbit-jumping-wire. This weird instrument consisted of a long wire with wooden handles on each end. Two men dragged the wire across abandoned broomsedge fields while other hunters shot the rabbits as they were flushed from their beds by the dragging wire. The shooters walked behind the advancing wire to lift it over small pine trees and other obstacles. With this device an entire field could be covered without missing a single rabbit. At this time little legal protection was afforded the cottontail in Virginia.

In 1924 it was legal to sell rabbits trapped or shot during the open gunning season (Tyus, 1924:15). In 1928 it was permissable, under law, for residents to kill or have killed any rabbit on his land at anytime (Anon., 1928:138). Under a proposed 1930 game law, the rabbit season would extend from November 15 through December 31 with a daily bag of ten and a seasonal bag of 150 rabbits (Anon., 1930:129).

By 1933 rabbits were scarce in most sections of Virginia; game officials reported that tulermia was responsible for the tremendous decline in rabbit abundance. In an effort to help them make a comeback, the Commission wished to place the rabbits under a law prohibiting their sale on markets (Nolting, 1934:3).

This game species suffered during the severe winter of 1935 - 1936; however, they were given some legal protection that year when legislation banned the sale of rabbits which had been shot (Nolting, 1937:3).

The Commission reported in 1937 that rabbits were increasing in abundance and that tularemia was apparently on the wane (Nolting, 1938: 3).

In 1941 the Commission was instrumental in making it unlawful to buy, or offer for sale, any rabbit (Virginia Game and Inland Fish and Dog Laws, 1948:21).

Under the game program outlined by the Commission in the annual report for 1949 was the stipulation that rabbits would be stocked wherever they were needed for brood stock (Quinn, 1950:4). In 1948 with funds from Federal Aid, the Commission began a program of farm game habitat improvement. Through this program a cooperating landowner was provided with free planting material (seed and plants) and technical advice. Between 1949 - 1950 and 1952 - 1953 there were 14,606 cooperators; 5,541,000 shrub-lespedeza plants; various amounts of seeds of milo maize, Sericea lespedeza and other annual seeds were distributed. Food and cover improvements were made in almost all counties (Phelps, 1954:6-7).

McGinnes (1958:111-113) concluded that the placing of brush piles on unoccupied rabbit areas would induce rabbits to utilize the area. Location of the cover is an important factor in the usage of an area by rabbits. He also found that overstocking an area often resulted in a depression of the existing population. Predation was not found to affect rabbit abundance too greatly.

The rabbit kill in Virginia has shown a general decline in numbers through the years, (Figure 11). As additional research is undertaken on the rabbit it is hoped that more definite information

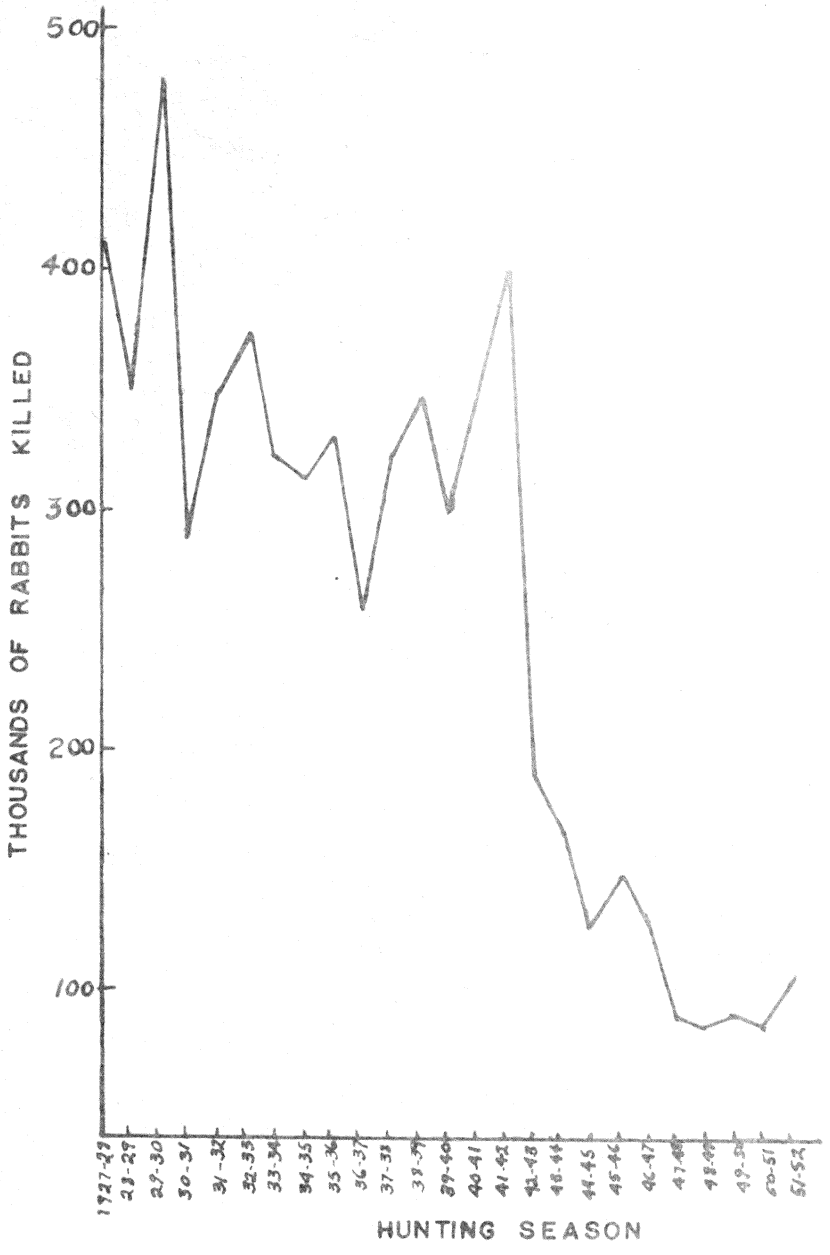


Figure 11. Game warden estimates of the annual rabbit kill in Virginia from 1927-28 through 1951-52. (Data from the files of the Virginia Commission of Game and Inland Fisheries.)

regarding their food, cover and range requirements will be added to the existing knowledge and that a sound program of rabbit management will be developed for Virginia.

Squirrel

Bruce (1924:22) reported that the Virginia woods were full of Gray Squirrels, Sciurus Carolinenis carolinenis melin, (Fig. 12). The Virginia Indians were fond of squirrel meat; the claws of the animal were used as ear ornaments, skins were made into clothing, and a good bowstring could be made from twisted skins (Swanton, 1946:250).

Small animals such as squirrels and rabbits were undoubtedly trapped and snared for table use, but Captain John Smith related that the Powhatan Indians also made arrows from slender "sprigs" which they headed with points of bone. These bone arrow points ranged from two to three inches in length. He noted that these arrows were shot at squirrels in trees (Holland, 1952).

Smith's description of the squirrel is as follows, "Their squirrels some as neare as greate as our smallest sort of wilde rabbits; some blackish, or black and white, but the most are gray" (Holland, 1952). It is probable that the "black and white" squirrels referred to by Smith may have been the Southern Fox Squirrel.

Like the rabbit, the squirrel does not appear too frequently in the early literature of Virginia, but the numbers of squirrel bones found in the prehistoric middens is mute evidence of its importance in the diet of the Indian.



Figure 12. Indian beads fashioned from the scapulae of squirrels.

Colonial forests offered superb conditions for the gray squirrels. Flying squirrels were also found in the colonial forests. They were called "Assapanick" and were said to be capable of sailing for 30 to 40 yards (Holland, 1952). After the colonists began growing corn and other grain crops, the squirrels became a nuisance; finally their numbers reached a point where control measures became necessary. In 1731, a bounty law was passed which declared the squirrel and the crow to be undesirable species.

Squirrel abundance continued throughout the postcolonial period. They were found in the farm woodlots and in larger forested areas. Although their meat and size did not make them especially desired for the market, they were heavily utilized by farm families. Each recipe for Brunswick stew called for a goody proportion of squirrel meat. Their main contribution to hunting was that they offered an excellent training species for the young hunter. The fathers of many boys have taught their sons the proper use of firearms while hunting the squirrel.

The writer was unable to discover any legislation protecting the squirrel prior to their being placed on the protected list during the winter of 1913.

According to some men who hunted in Virginia during the latter days of the chestnut's fight for existence the squirrels left the more extensive forests and took up their abode in smaller woodlots. The curtailment of food had brought about this change. Presumably the woodlots placed the squirrels nearer cornfields and other sources of food. In this concentrated condition literally hundreds of squirrels were slaughtered. One hunter boasted that he killed 75 squirrels in one day.

The squirrel like the rabbit has never been the object of intensive management. A program of research was completed on the squirrel by R. H. Cross in 1942. This research was carried on under the supervision of the Wildlife Unit personnel, and from it the following conclusions were drawn: (1) squirrels in southwestern Virginia exhibit two breeding seasons, one in midwinter and one in midsummer; (2) principal foods are the acorns of the white oaks, hickory nuts and black walnuts; (3) use of artificial dens or "nest boxes" are suitable only in small woodlots or in demonstration areas; (4) gray squirrels produce two litters annually; (5) females having a litter in the fall usually have another early the following spring; (6) no evidence revealed population shifts from one woodlot to another; (7) squirrels do not generally cause a great amount of agricultural damage; and (8) decimating factors are habitat changes and overharvesting (Cross, 1942: 35-39).

Cross (1942:38-39) deemed it wise to abandon the early September squirrel season. He suggested outside dates for squirrels between October 15 and December 15. Data show that approximately 2.5 young squirrels are destroyed for each female killed in September. Cross indicated that the fall broods increase squirrel abundance by 98.3 per cent, thus if the season were opened later than October 15 there would be nearly twice as many squirrels to hunt. He also pointed out that the variation of early seasons among counties often resulted in the concentration of a large number of hunters which decimated squirrel populations in local areas. Game warden estimates for Virginia's annual squirrel kill from 1927 - 28 through 1951 - 52 are shown in

(Figure 13).

Wild Turkey

The eastern wild turkey, Meleagris gallopavo silvestris (Vieillot), was undoubtedly the most important bird in precolonial Virginia (Fig. 14). This bird was hunted by the Indians wherever it could be found (Swanton, 1946:5). According to Mosby and Handley (1943:5), "The Indians of Eastern North America who lived within the range of the Eastern wild turkey (Meleagris gallopavo silvestris) apparently made little or no attempt to domesticate the wild turkey." They further related that the Indian, primarily a hunter, could go into the forest and kill one whenever the need occurred, and therefore found no need to domesticate the turkey as was done by the Mexican Indians.

Mantles or cloaks were made from turkey feathers; spurs served as arrowpoints; the feathers were preferred for fletching arrows and fans were constructed from the tail feathers. Many Indian tribes had a list of foods that were considered taboo to eat; the turkey was on some of these tribal lists, but apparently it was eaten by all Virginia tribes (Mosby and Handley, 1943:9).

The Indians hunted turkeys with a decoy; they concealed themselves and mimicked the call of the bird, and as one came close enough to the calling Indian, it was killed. In some sections, experienced hunters left the turkeys to the less skilled hunters (Mosby and Handley, 1943: 9-10).

John Lederer, John Smith and other early writers discussed the

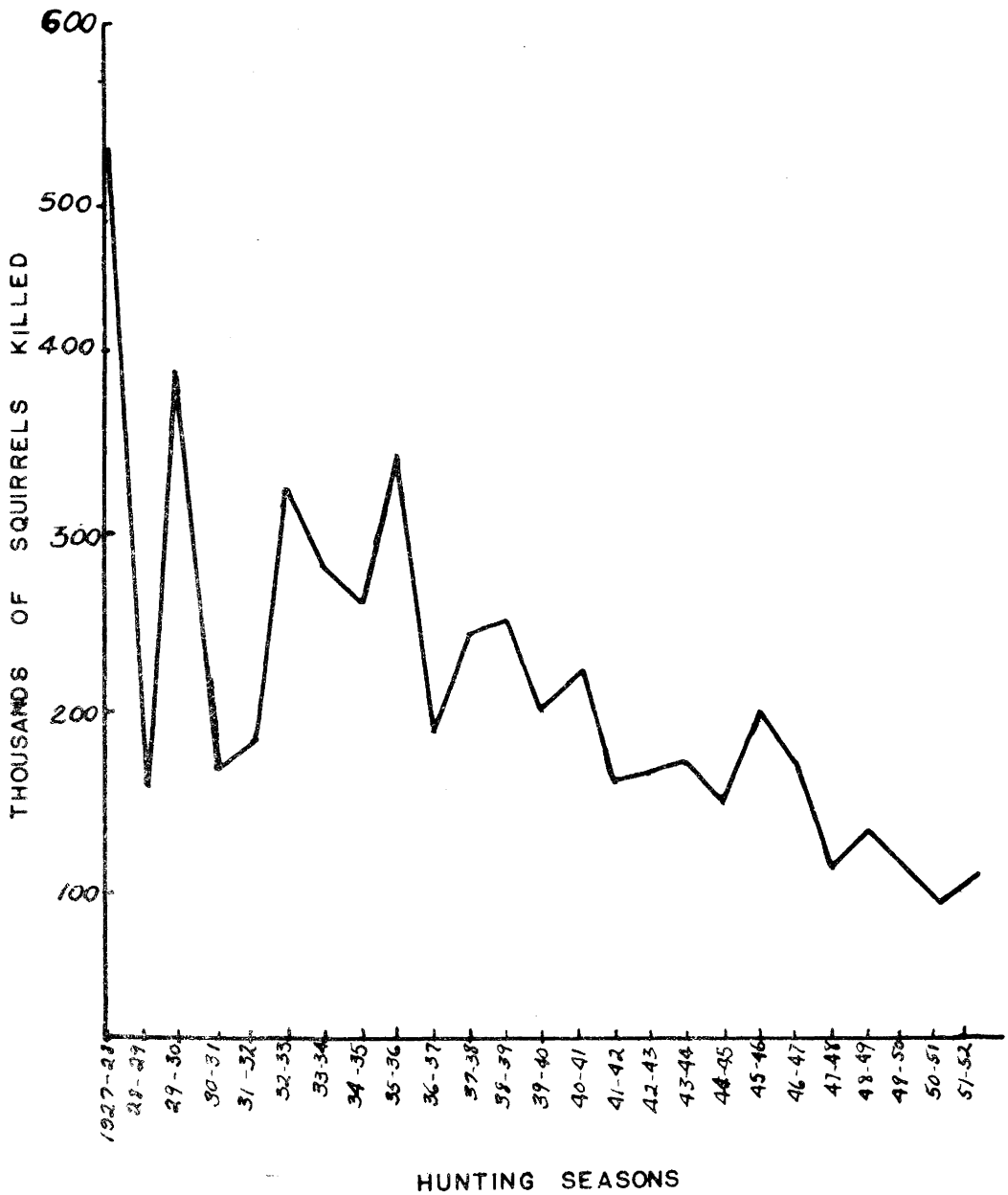


Figure 13 Game warden estimates of the annual squirrel kill in Virginia from 1927-28 through 1951-52. (Data from the files of the Virginia Commission of Game and Inland Fisheries.)

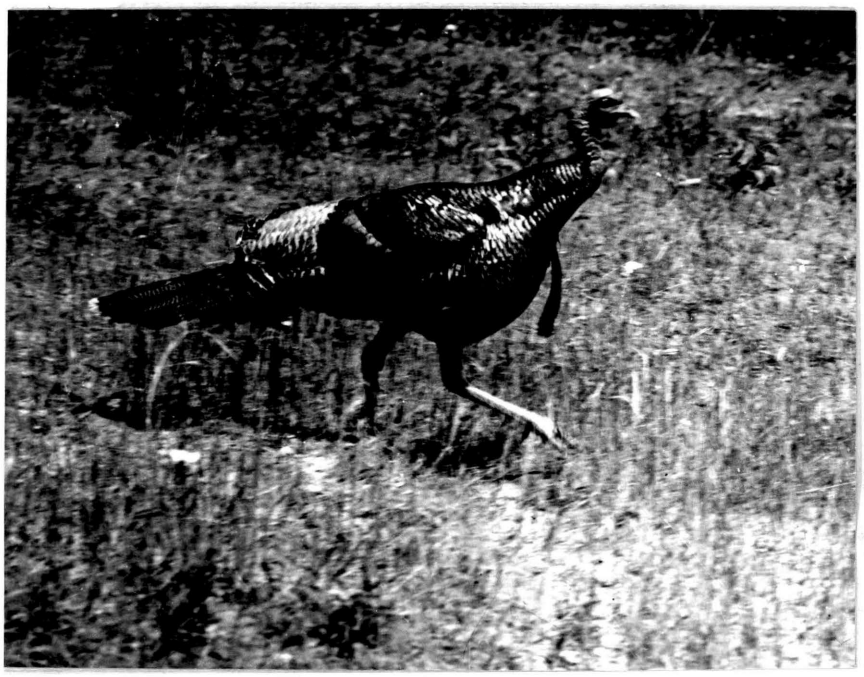


Figure 14. The eastern wild turkey was the most important game bird in early Virginia. (Photo by Dr. Henry S. Mosby).

turkey in their reports, and Beverley (1947:310) indicated the bird was very abundant in early Virginia.

The early settlers were greatly impressed with the size and the taste of the turkey. This bird was especially important as food for the colonists during the years before agriculture was well developed. This species was under constant hunting pressure the year round. Beverley (1947:310) was somewhat disturbed about the slaughter of turkeys in Colonial Virginia, and in his 1705 history of the colony stated that they were being caught in tremendous numbers. He reported that some trappers had devised turkey traps that were capable of taking entire flocks at once. One such trapper was very disgusted that he could not fix his traps so as to catch more than one flock at a time. This same trapper was known to have caught as many as seventeen birds during one night. Even with this hunting and trapping pressure, the turkey continued to inhabit the Colonial forests where it found good food conditions and sufficient cover.

The turkey suffered greatly during the postcolonial period. The birds were hunted year-round, they were sold in large numbers on the markets, and large tracts of their range were destroyed during large scale lumbering in the late nineteenth century and the first decade of the twentieth century.

Small local cuttings of the forest for immediate needs did not damage the turkey habitat, in fact it may have improved the range by creating openings usable for dusting and gravel-procuring areas. The great damage to turkey range came when large sections of the

forest were cut over. In many sections of Virginia so many forested acres were cleared that the turkey vanished. Wholesale destruction of turkey range began about 1860 and continued until after 1910.

Turkeys were favorite game for many hunters. The wariness of the bird was well-known and hunters tested their skill with the various types of turkey callers. The turkey hunter was a secretive person; he told few people of his favorite hunting methods or of his best hunting territory. The turkey did not suffer greatly at the hands of the sportsman, but a great many were slaughtered for the markets.

One Highland County man reportedly killed 207 turkeys during his life (Thornton, 1955:9). A Piedmont hunter declared his most productive hunt occurred around 1900 when he and a friend killed thirteen turkeys in a single day. Thornton (1955:10) reported that turkey sold on the market for one dollar apiece. Under pressure such as this plus the fact that much of its range was destroyed, the turkey became scarce in Virginia about the turn of the twentieth century.

Members of the General Assembly were moved to action in 1885. That year a law was passed which created a closed season east of the Blue Ridge, from January 15 until October 1, and west of the Blue Ridge from February 15 to September 15. This legislation banned buying and selling birds during the closed season. In 1904, this law was revised. It became unlawful to shoot turkeys at night or to capture them in traps or nets. East of the Blue Ridge the closed season extended from February 1 until November 1, and west of the Blue Ridge between the dates of December 31 and November 1.

Turkeys vanished from many of the western counties around 1900, but most eastern counties retained reduced flocks throughout the post-colonial period.

The wild turkey once exhibited large populations over the entire state. The early law makers saw no need to give these birds protection for their large numbers did not indicate that their population would ever be greatly reduced. Wagon loads of turkeys were shipped to markets in Richmond and other large cities. The legislation of 1912, commonly referred to as the "Robin Bill" made it illegal to offer the turkey and other birds for sale (Mosby, 1940:11).

By 1917 the turkey had been extirpated from much of its range. In the first annual report of the Department of Game and Inland Fisheries in 1916 - 1917, Commissioner Parsons noted the scarcity of turkeys in Virginia. The outline of management plans for 1918 included the breeding and rearing of birds on a tract of land donated by the Norfolk and Western Railroad Company near Ford, Virginia (Parsons, 1917:6). The final outcome of this plan is not known for nothing else regarding this particular land is recorded in the Commission's reports.

In 1921 Paul C. Edmunds attempted to increase the turkey population on the Falkland Estate in Halifax County by releasing seven pure-bred bronze turkey hens. This method proved successful to a certain extent as the hens mated with wild gobblers, and with the onset of winter the hens and their young joined the wild flock. The cross produced larger birds than the original wild turkeys and Edmunds reported that the young flew well, but were not as "handsome"

as the true wild turkey (Edmunds, 1922:163).

The 1922 General Assembly enacted legislation which prohibited the baiting of turkeys for the purpose of killing or capturing. A permit could be obtained from the Commissioner to trap birds for re-stocking purposes. A violation of this law carried a maximum penalty of $100.00 and 30 days in jail (Tyus, 1922:132-133).

Early in the history of the Department of Game and Inland Fisheries the idea that many turkeys were killed during the early squirrel season came into existence (Cockes, 1922:126). This idea persisted for many years, and is still occasionally used in the fight against early squirrel seasons.

Members of the Commission noted in 1928 that turkeys suitable for release purposes could not be raised under existing techniques, and since this was the case the birds were given special protection during the nesting season (Stras, 1928:124).

In 1929 the Commission's program of turkey restocking was started (Fig. 15 and Table 15). That year 150 wild turkeys were bought at a price of $20.00 each. These birds were released in areas of the state where turkeys were practically extinct. Reports from these releases were promising; plans were made for additional releases the following year. Suggested management plans called for the purchase of half wild turkeys at market prices. These birds plus ones raised at the Windsor Shades Game Farm would be released in an effort to collect data on the turkey, each released bird carried an aluminum tag with the note to notify the Game Department when the bird was killed (Robertson, 1931:4).

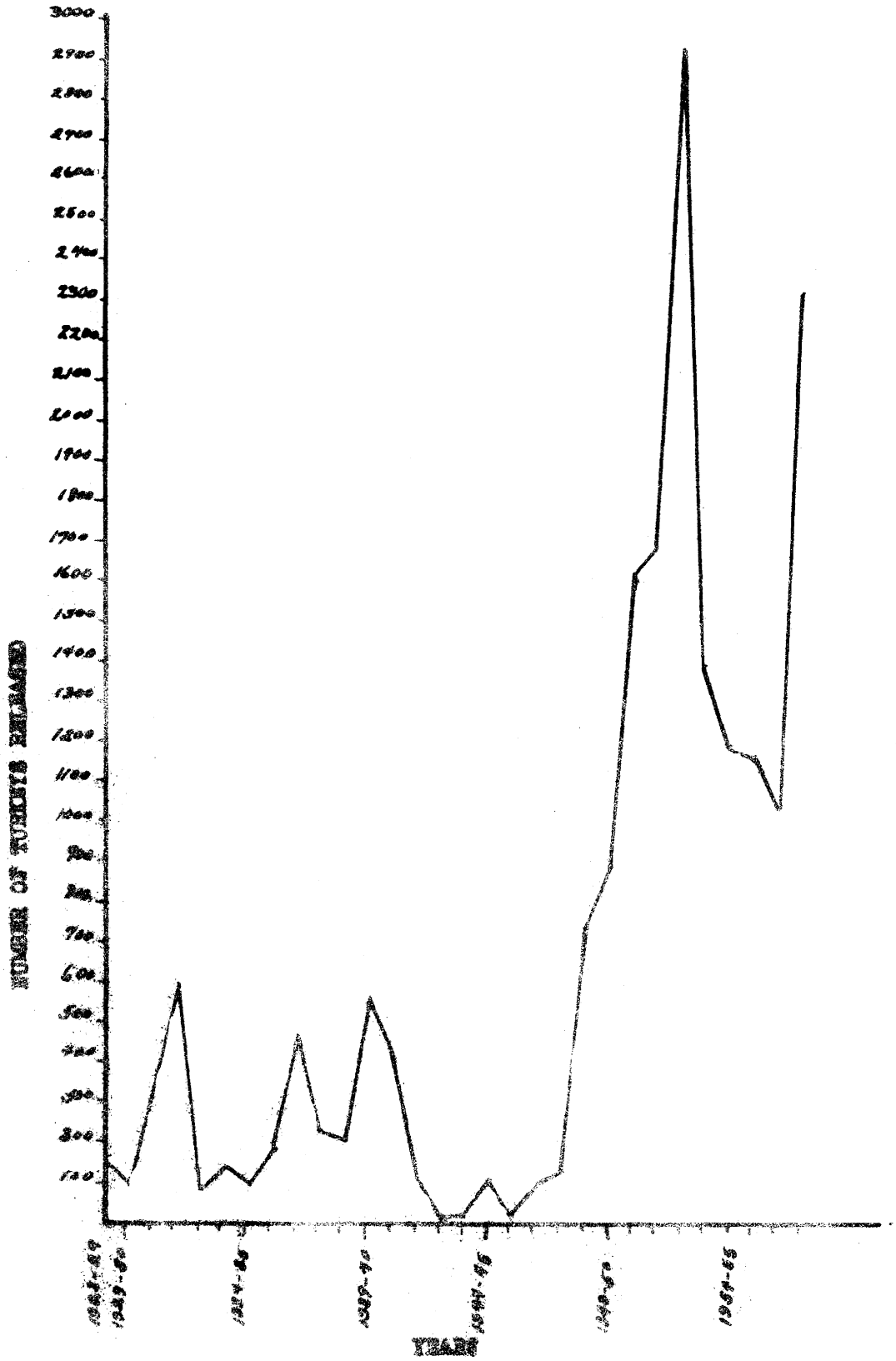


Figure 15. The number of turkeys released annually in Virginia from 1929-30 through 1957-58. (Data from the files of the Virginia Commission of Game and Inland Fisheries).

Table 15. The number of turkeys released in Virginia since 1928-29

Year	Number Released	Year	Number Released
1928-29	150	1943-44	14
1929-30	87	1944-45	107
1930-31	331	1945-46	12
1931-32	597	1946-47	97
1932-33	73	1947-48	129
1933-34	142	1948-49	730
1934-35	92	1949-50	888
1935-36	181	1950-51	1,630
1936-37	460	1951-52	1,676
1937-38	224	1952-53	2,932
1938-39	199	1953-54	1,373
1939-40	564	1954-55	1,184
1940-41	407	1955-56	1,162
1941-42	104	1956-57	1,038
1942-43	11	1957-58	2,326
		Total	18,920

Data from the annual reports and files of the Commission of Game and Inland Fisheries.

Prior to the fiscal year 1931 - 1932 the practice of releasing turkeys was so designed as to release sufficient numbers in a locality so that an open season could be declared before local interest in the birds waned. This practice was abandoned. Several important factors were involved in this change of policy: (1) cost of rearing was too great; (2) captivity-reared birds would not join the wild flocks if too many birds were released at the same place, while the released birds would join the flock if only a few were released (Handley, 1933: 10). The annual report for 1932 indicated that turkeys would be released on areas where hunting would not be allowed for one year following the planting (Robertson, 1933:4).

Commissioner Nolting (1935:3) reported that turkeys were increasing in certain isolated areas in 1933 - 1934, but that state-wide there was no increase. He also noted that additional wardens were hired during the early squirrel season to cut down on the illegal turkey kill.

Up to this time efforts to produce turkeys satisfactory for release purposes had failed. W. W. Bailey, graduate student at the Wildlife Unit, began a study leading to the development of good restocking strains of turkeys. He discovered that, if selected brood hens were mated with wild gobblers, excellent poults were produced. The young turkeys were kept in holding pens removed as far as possible from human contact, and were released at about four months of age. Releases were made in the ratio of six hens and four gobblers (Mosby, 1940:13-14). The annual report for 1938 noted that birds raised under the new method were much wilder than the turkeys previously

released (Nolting, 1939:3).

In 1938 the Virginia Cooperative Wildlife Research Unit drew up plans to make a study of the distribution, food habits, and range requirements of the turkey. Henry S. Mosby was chosen as the investigator. In January 1939 the Commission accepted the responsibility for this research and placed it under the P-R program (Mosby, 1940:11). Data collected showed that 69 counties retained native flocks; the 31 counties without turkeys lay in the southern and northern parts of the Blue Ridge and in southwestern Virginia. The Piedmont exhibited the greatest abundance of turkeys (Mosby, 1940:11-12). Mosby (1940: 11) indicated that approximately 30 per cent of the total turkey population was harvested annually. He determined that released young turkeys had greatest chances for survival when liberated in the fall and in the ratio of 2 hens to one gobbler (Mosby and Handley, 1943: 194-195).

The turkey, a wide ranging bird, needs a large tract of land - the minimum size of such a tract should approximate 15,000 acres. Forests should cover from 50 to 90 per cent of the area with an even interspersion of small openings. Surface water should be readily available, especially near the feeding and nesting sites (Mosby and Handley, 1943:206).

The following turkey management proposals resulted from the study by Mosby and Handley (1943:21): "(1) drafting and enforcing sound wildlife legislation; (2) restocking depleted coverts where biologically, ecologically, and economically possible; (3) determining and demonstrating practical wildlife management techniques by means of a

well-rounded land use research program; and (4) educating the public to the need, objectives, and application of a sound wildlife management program".

Approximately 90 per cent of the annual turkey kill occurs during the first 36 days of the season, thus in order to decrease the annual kill the season would necessarily be greatly reduced (Mosby and Handley, 1943:242).

Commissioner Nolting (1942-4-5) explained that the average fall population of turkeys in the early 1940's was 25,000 turkeys. The Commission had undertaken to preserve the existing stock by an extensive management program on public-owned lands. Cooperation was received from both the National Forests and the Virginia Forest Service. Food patches were constructed and new birds were released to build up the breeding stock.

During the hunting season of 1951 - 52 the Commission was instrumental in obtaining legislation requiring each hunter to report his turkey kill (McDowell, 1956:5). Prior to this time the annual turkey kill had been estimated by game wardens (Figure 16). Even with substantial management efforts by the Commission personnel, the turkey kill in Virginia decreased. This decrease alarmed the wildlife officials and additional research on the turkey was undertaken by members of the Wildlife Unit.

McDowell (1956:42-43) found that the highest turkey kills in Virginia were in counties in the northwestern region of the state. This investigator proposed the abolition of regional seasons and bag limits and the introduction of county seasons and limits based on the

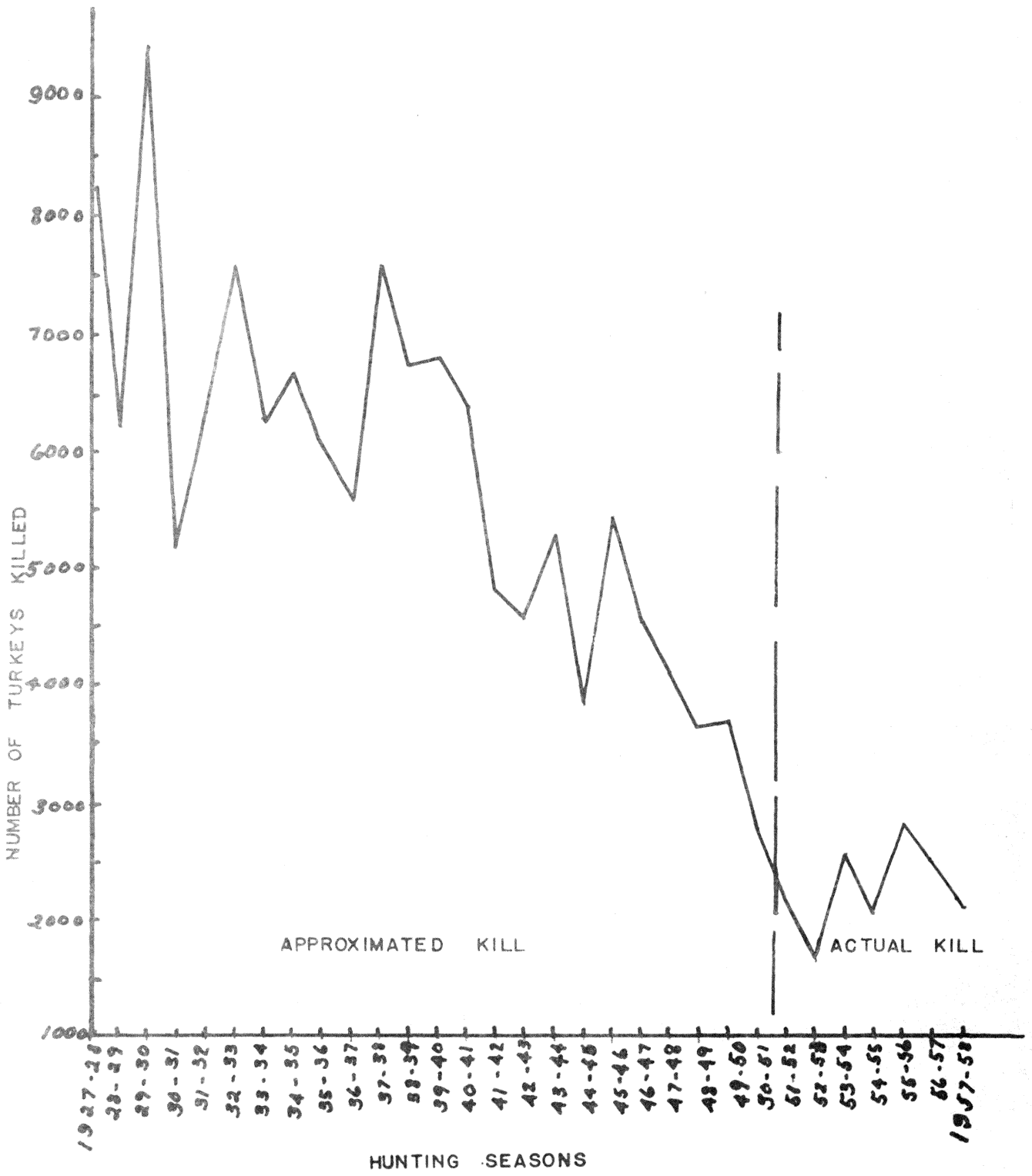


Figure 16. The turkey kill in Virginia from 1927-28 through 1957-58. (Data from the files of the Virginia Commission of Game and Inland Fisheries.)

local productivity of the turkey.

The wild turkey restoration project which began in 1938 showed good results. Birds released on suitable but unoccupied range in Dickenson, Wise, Prince George and Russell counties resulted in established populations; turkeys may have gained a foot-hold in Tazewell, Bland, Washington, Smyth and Pulaski counties (Phelps, 1954:12-13).

The southwestern portion of Virginia has been the site of most of the restocking efforts. In this part of the state no open hunting season on turkeys exists and the birds are afforded every chance for survival (Phelps, 1955:6). During the winter of 1953 - 1954 winter feeding of turkeys was begun. Released birds ate from basket feeders and the wild stock ate from the ground. Phelps (1955:6) believed this helped the turkeys to over-winter more successfully.

Currently, wild turkey research is being done by Jack Gwynn, Commission biologist, who believes the following items are necessary for good turkey range: (1) mature forest cover; (2) diversity of forest types; (3) vast contiguous forested areas; and (4) protection from man (Gwynn, 1958:20).

McDowell (1954:10) was not of the opinion that clearings planted in corn or the artificial winter feeding of corn was necessary for successful overwintering of turkeys; he spoke out against the "slaughter" of turkeys by deer hunters. He proposed that the hunting season on non-migratory game open two weeks before the deer and bear season, and in counties where the turkey population was known to be low to close turkey season during deer season (McDowell, 1954:12-13).

The turkey continues to decrease in Virginia; perhaps with additional knowledge a successful management plan may be evolved.

Grouse

Game birds were hunted by the aborigines, but little definite information was recorded about them. Most of the early writers spoke of birds under the names of quailes, partridges and pheasants, but it was difficult to determine to which species reference was being made. These American birds were unknown in Europe, and as Beverley (1947:153) described the birdlife of Coastal Virginia in 1705 he mentioned that a great many of the good eating birds were unnamed. However, when John Smith (1884:60) spoke of "Partridges---little bigger than our Quailes", he was probably referring to the grouse, Bonasa umbrellus (Linnaeus).

Grouse, typically a bird of the forest, orginally inhabited the entire state. Mast from the mature oaks, green foliage from the forest edges and grapes, to mention only a few items, furnished the grouse with a good food supply, and they found good cover within the forest. As the forested acres decreased before the ax and the plow, the range of the grouse decreased, and its numbers diminished in the eastern part of the state.

Grouse were hunted for markets. Opie (1924:6) stated that once at the Monterey railroad station there were ten barrels of "pheasants" awaiting shipment to the city. These barrels contained a total of 2,500 birds. Thornton (1955:9) reported that the average price for

grouse on the market was fifty cents apiece. The 1885 law described above also included grouse on the protected list. Three different seasons were established: Counties east of the Blue Ridge (except Prince Edward) and Rockbridge County, had a closed season from January 15 to October 1; Prince Edward had a closed season from March 15 to October 15; west of the Blue Ridge (except Rockbridge) the closed season extended from February 15 to September 15.

The destruction of a mast-producting hardwoods by large scale lumbering operations around the turn of the twentieth century destroyed much of the available grouse habitat. The bird once enjoyed state-wide distribution, but by the end of the postcolonial period they were restricted chiefly to the mountainous regions where favorable conditions could be found.

In 1928 the Commission admitted that no satisfactory methods of artificially raising grouse were known and that the best management program was one of exceptional protection of the grouse during the breeding season (Stras, 1928:124).

W. B. Coleman had pioneered in raising bobwhite quail in captivity, and although he was aware of the difficulties involved in rearing grouse in captivity, he wished to try his hand in the matter. In the spring of 1930 all wardens in grouse territory were alerted to be on the watch for grouse nests. Thirteen eggs were secured from a nest in Rockingham County, and from these, 5 adult grouse were raised (Handley, 1931:3-5). Three of these birds were hens which laid 39 eggs in 1931. Twenty-one chicks were hatched from the eggs, and at the time of the report, 9 were living. Coleman determined that the

proper temperature for incubation was between 102° and 103° F. and that the period of incubation was 25 days. Captivity reared grouse could be raised to produce viable eggs. The birds exhibited polygamous tendencies in captivity (Handley, 1931:81).

Grouse suffered a severe decline in numbers in 1935 and in 1943 they still had not fully recovered. T. E. Clarke, in contradiction to Handley, noted that the grouse could not be successfully raised in captivity and as a result the management for this species included habitat improvement and intensive protection until its numbers returned to something approximating normal (Clarke, 1944:4). Clarke (1945:4) reported that the grouse population for 1944 showed a decline of 20 per cent.

The ruffed grouse is listed as the third most important game bird in Virginia, and the management plan carried out for the turkey proved quite satisfactory for the grouse (Nolting, 1942:5).

The Virginia Cooperative Wildlife Research Unit carried out preliminary research studies on the grouse in 1939 which indicated that the major predators were man, fox, and skunk. Perhaps only man exerts any influence on its distribution. At the time of the study the largest concentrations of grouse were found in the western counties in the Allegheny Mountains, especially in Bland County (Addy, 1940:9).

Presently, research on the grouse is being conducted at the Wildlife Unit. This work was begun by J. S. Lindzey and is now under the supervision of B. S. McGinnes. Tails and wings are collected from as many hunters as possible. From this material, data regarding sex ratios, age determination, and relative abundance may be collected.

As yet, not enough material has been studied to present any definite conclusions.

The annual estimated grouse kill in Virginia is shown in (Figure 17).

Quail

In precolonial forests and field, bobwhite quail Colinus virginianus virginianus (Linnaeus) would not have had good range, but as colonial agricultural fields were abandoned and left to grow up in weeds additional food and cover was developed and probably the numbers of quail increased. The production of small grain crops added to the existing food supply for this game species.

Quail were not seriously affected under the market system of hunting because the type of farming of that day gave them sufficient food and cover (Thornton, 1955:9). Quail were so plentiful that Virginia's lawmakers did not see the need of protecting them before 1885. That year legislation was passed which made it illegal to hunt, kill, sell, or buy quail from January 1 to October 15. This law applied to Piedmont counties. Quail underwent a serious decline just prior to the turn of the century according to Hart (1924:67). He described this situation clearly as follows:

"In February 1899, a severe snow storm swept Virginia. The snow fell to an average depth of three and one-half feet on the level, and for three weeks the thermometer was often below zero, and never much above. In 'Partridge' history, this was the 'Great Plague'. It

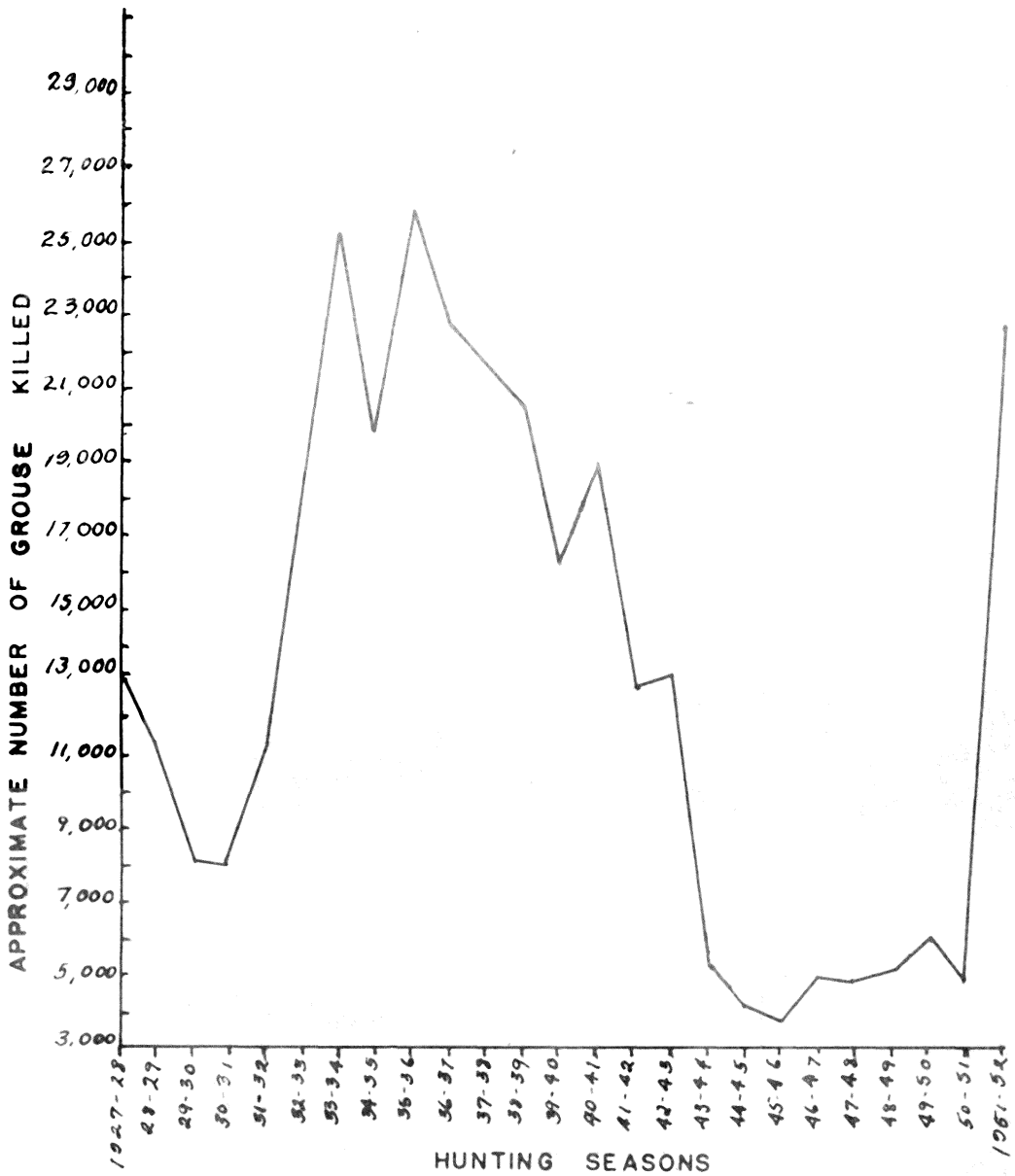


Figure 17. Game warden estimates of the annual grouse kill in Virginia from 1927–28 through 1951–52. (Data from the files of the Virginia Commission of Game and Inland Fisheries.)

almost killed out the whole species, so few surviving that had hunters not imported breeding stock here, it would have been many years before the quail in the Carolinas could have gradually worked their way up into Virginia".

The bobwhite quail probably reached its highest population peak following the Civil War. During these years a great deal of crop land was being abandoned and most farms had a good share of grown-up fence rows. These conditions furnished the bobwhite with ideal food and cover.

Commissioner Parsons (1917:6) reported that quail populations in Virginia were low in 1917. He thought that, if the quail were afforded protection, they would make a successful come back. Parsons stated that some breeders were rearing quail in captivity, but that the results were not too good. The expense involved in rearing quail was too great for Virginia to become involved.

The game officials in Virginia believed that some definite action would have to be taken if the quail were to be saved. An order was placed for 4,000 Texas quail but it was placed too late in 1918, and no birds were available that year (Bilisoly, 1919:6).

Virginia was fortunate to obtain the services of W. B. Coleman, a pioneer in quail breeding, who reported for work in the fall of 1917 (Bilisoly, Ann. Rep. 1919:6). Quail breeding at the Game Farm steadily improved; by 1923 Virginia led all other states in quail production (Anon., 1923:8).

Large quantities of quail were released in Virginia (Figure 18 and Table 16) At the beginning of the restocking period a great many of the birds were of Texas and Mexican origin. In 1923 the

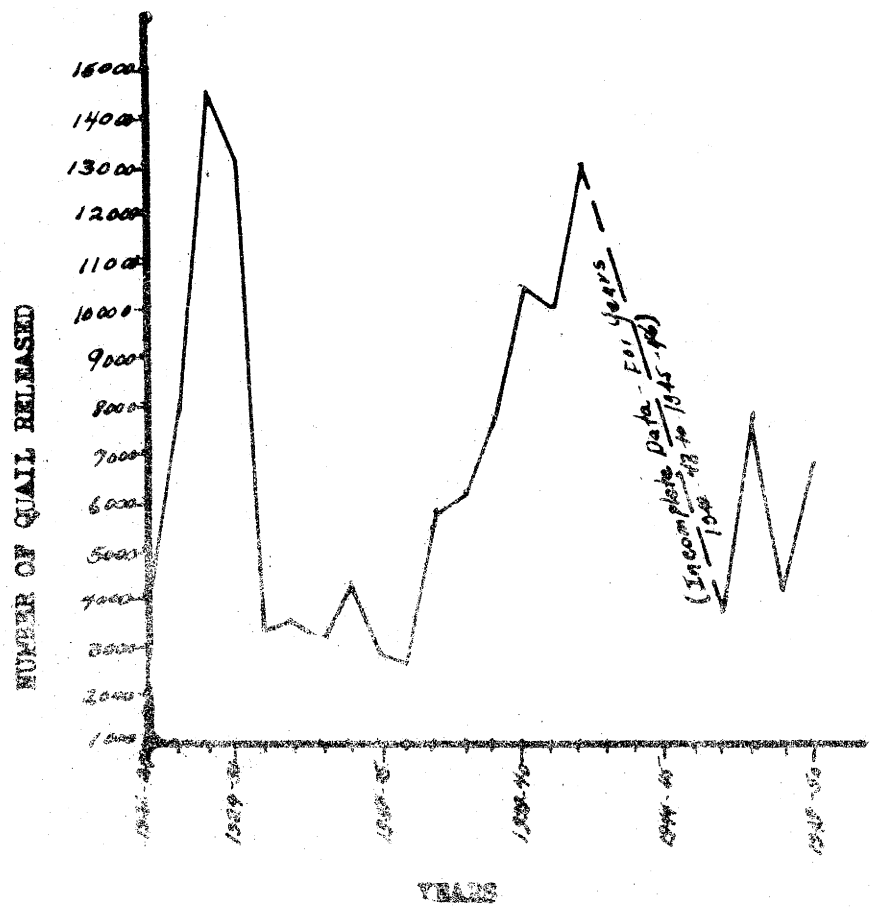


Figure 18. The number of quail released annually in Virginia from 1926-27 through 1949-50. (Data from the Annual Reports of the Virginia Commission of Game and Inland Fisheries).

Table 16. The number of quail released in Virginia from 1927-28 through 1949-50

Year	Number Released	Year	Number Released
1926-27	3,650	1937-38	6,217
1927-28	7,875 *	1938-39	7,658
1928-29	14,489 *	1939-40	10,454
1929-30	13,021 *	1940-41	10,000 (approximate)
1930-31	3,349	1941-42	13,000
1931-32	3,520	Insufficient data	
1932-33	3,099	1946-47	3,677
1933-34	4,227	1947-48	7,727
1934-35	2,873	1948-49	4,201
1935-36	2,607	1949-50	6,799
1936-37	5,770		
		Total	134,213

Data from the annual reports of the Commission of Game and Inland Fisheries.

* Totals include Mexican quail plus native bobwhite quail

Department of Game and Inland Fisheries temporarily abandoned the practice of releasing imported birds because the imports did not overwinter well and were generally considered inferior to native birds (Anon., 1923:8).

Up to 1923 there was no set method for quail rearing. Coleman experimented with various foods and found that clabber was a more effective and more economical food than was the boiled yolk of eggs then being fed the young birds (Anon., 1923:101).

Virginia attained a record in captivity-reared quail in 1922 when 1,200 bobwhites were raised at the Game Farm (Machen, 1923:31). These and other birds were released on sanctuaries throughout the state. These privately-owned sanctuaries were rented for a minimum of three years and in 1922 over 100,000 acres were included in such areas (Machen, 1923:31 and Anon., 1923:101). In 1927 the Game Department reversed their decision of 1923 and released 1,260 Texas quail in Virginia (Hart, 1928:129). The following year 6,200 Mexican quail were released (Anon., 1928:8); about 10,000 Mexican quail were released in 1929 (Robertson, 1929:145). Robertson (1929:145) realized that the importation of birds was not the answer to quail abundance. He recounted that the cost of stocking was too great, and that if money was available, not enough birds could be imported to make any significant change in quail population. Mexican quail cost $2.00 each as compared to a cost of $3.00 - $5.00 for game farm birds. As a result of an effort to increase production at the Game Farm, some 6,000 young birds were killed due to over-crowding and disease. Robertson mentioned that an attempt, began in 1927, to raise birds

in their natural state at Camp Lee cost approximately $4.63 a bird. The members of the Commission felt that, if quail propagation was to be successful, most of the activities would come on the county level where birds could be propagated in natural conditions. In this regard, Charles O. Handley was hired to work out plans for this type of quail propagation.

Following the release of the 10,000 Mexican quail in 1927, game wardens and sportsmen's clubs throughout Virginia were asked to co-operate in making a survey to determine the success of the venture (Anon., 1929:59).

The game warden estimates of quail kill in Virginia from 1927 - 28 through 1951 - 52 are shown in (Figure 19).

Robertson (1931:5) stated that the Commission's policy on stocking quail was to release them on areas on which the hunting season was closed for one year after stocking in order to allow one season of breeding before they were hunted. Handley (1931:46) believed that quail abundance could be improved with the planting of field borders with Korean lespedeza. This plant had such value as quail food that as plantings increased, quail would also increase. Approximately 5,000 farmers received seed from the Game Commission in 1931. Private individuals entered the scene to fight for quail; G. B. Collins, Newport News, offered $1.00 for each quail nest saved in a harvest field. Game wardens were to investigate to determine if eggs hatched. About 260 claims were paid by Collins (Handley, 1931:43). Much of this activity was probably instituted as the result of the drought of 1930 when quail suffered heavily. Rainfall for the entire state

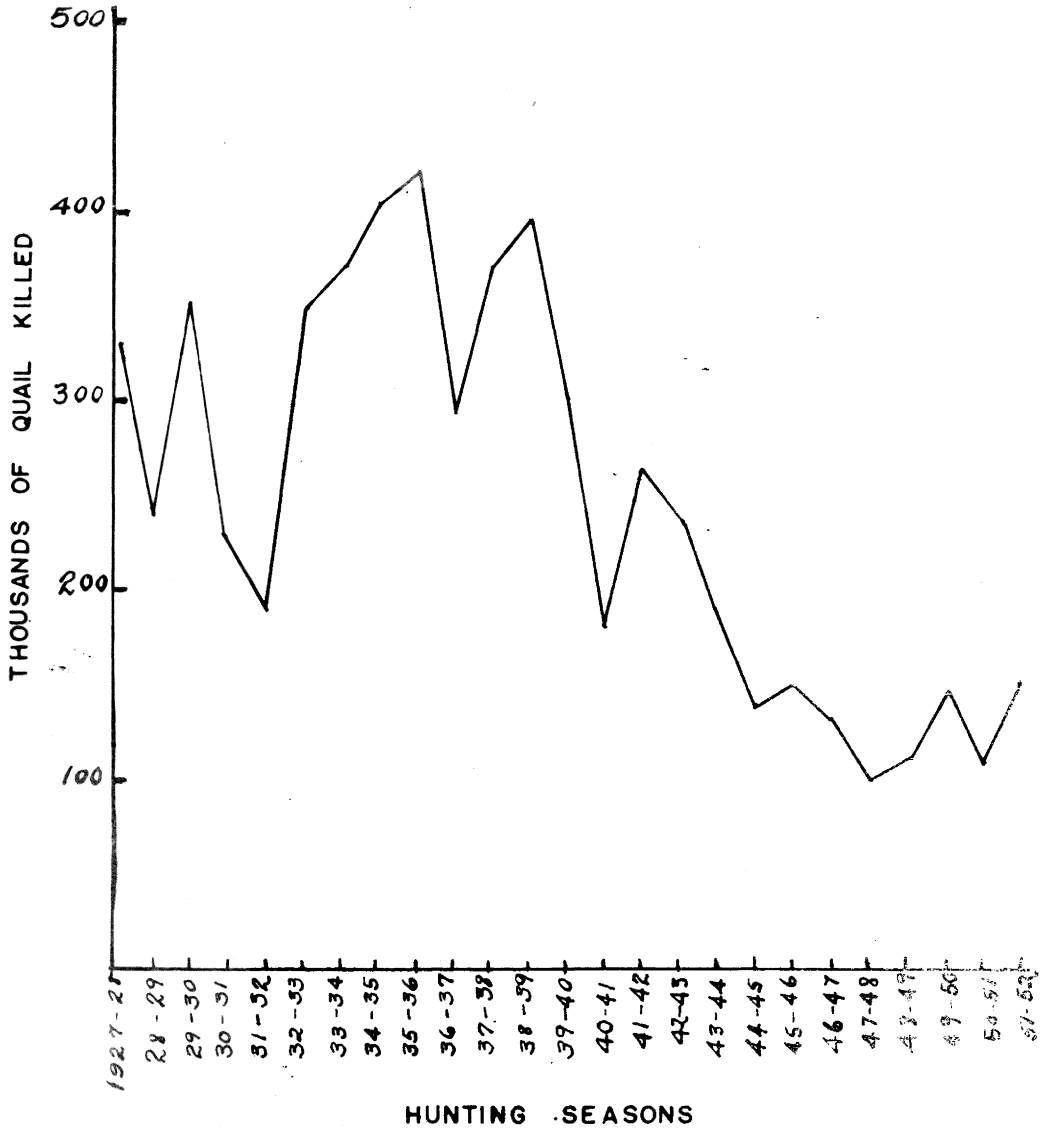


Figure 19. Game warden estimates of the annual quail kill in Virginia from 1927-28 through 1951-52. (Data from the files of the Virginia Commission of Game and Inland Fisheries.)

was about half of the normal and certain sections had only a small fraction of the usual amount of precipitation (Handley, 1931:43). Quail populations did not increase in Virginia; the Commission instituted a plan whereby more quail could be liberated in the State. Under this plan interested persons were given a few pairs of captivity reared quail as brood stock, with the stipulation that all birds raised would be liberated in the fields. If the person became interested in quail raising and wanted to begin a commercial business, he could buy part or all of the quail at one-half market price. About 184 adult birds and 28 settings of eggs were distributed under this plan (Handley, 1933:11).

The Commission distributed in 1932, approximately 15,000 pounds of Korean lespedeza seed to wardens who in turn distributed it to interested persons. No person was allowed more than ten pounds of seed and few received this much. Its value as quail food was reported to be supposedly very good. The Commission believed that people now realized the value of lespedeza and there was no need for the Commission to further push its planting (Robertson, 1933:11-12).

Banding experiments at Camp Lee were designed to determine the effectiveness of releasing captivity-reared quail. Considerable difficulty was encountered in trapping the birds; however, 40 per cent of one small group released in July 1931 were trapped the following spring. The results were encouraging but the data was insufficient to draw definite conclusions (Robertson, 1933:15).

DeLaBarre (1938:5) noted that the Commission released 2,500 quail in the spring of 1937 on areas where acute shortages were reported.

These birds, released late in March and early in April, adjusted satisfactorily and brought off broods.

The severe winter of 1939 - 1940 followed by the wet spring of 1940 greatly affected the quail population; to aid the remaining coveys the hunting season of 1940 - 1941 was shortened. An additional 887 refuges were created to protect the quail (Nolting, 1942:4).

Excellent research on over-winter survival of native quail was conducted by C. F. Phelps, then a graduate student of the Wildlife Unit. He reported that 43 per cent of the quail were lost each winter to natural causes; each covey had definite ranges, but some "shuffling" occurred between coveys, and occassionally two smaller coveys banded together to form a larger covey. Phelps felt that the greatest decimating factor was the lack of cover. His study showed clearly that coveys with the better food and cover suffered considerably smaller losses than coveys with poor food and cover (Phelps, 1942:18-21).

Early in 1941 the Commission requested its P-R personnel to devise a method for obtaining an annual estimate of quail populations in Virginia. This was a mammoth task because the area involved contained some 25,535,360 acres. The investigators realized that the use of a sampling technique was mandatory. Three sampling procedures were available: (1) use of bird dogs; (2) use of questionnaires sent to landowners; and (3) personal interviews of landowners by game wardens. Use of the first two methods was abandoned due to factors that could not be controlled. At the Game Warden's School in Blacksburg during July 1941 the wardens were briefed on the subject. The state was divided into four areas with a P-R biologist in charge of each area.

He was to collect and assemble the data for his section. Each game warden was to contact at least 25 farmers in his county. They were asked to pick only reliable farmers who would have some interest in the work; they were not to collect any questionable data. The farms selected were to be of average size and well dispersed throughout the county. In order to get a basis for comparison, an attempt was made to collect information on the season just passed, 1940, but it was realized that the information would be inaccurate as it was based on the farmer's memory of quail abundance. During September 1941, 14 counties were surveyed and it was found that it was too early in the year to obtain information. Data sheets for each county were to show: (1) total acres of open and forested land covered by the inventory; (2) number of coveys reported in the area; and (3) number of quail on the acreage. Estimates for the state were confined to agricultural land because quail populations vary with the intensity of agriculture. The total number of quail per county was obtained by multiplying the estimated number of coveys by the estimated number of birds per covey. The conversion factor to account for the number of coveys per county was calculated from the knowledge of the amount of open land in that county from the 1940 Census of Agriculture in Virginia. Only Arlington County was excluded from this study; this was done because of the high human population of the area. The research estimate showed a total of 325,467 coveys and 4,069,513 birds in 1941. Members of the Virginia Cooperative Wildlife Research Unit checked data on one area and found that the warden had made a thorough survey (Phelps, 1942:81-85).

In the early 1940's Virginia's game officials began to entertain serious doubts about the value of stocking pen-reared quail to increase quail abundance. In the fall of 1941 research was undertaken to determine what results could be expected from such releases. Experimental areas were carefully selected; some areas chosen had existing quail populations, others had no quail present. All existing quail were removed from the areas and were replaced with the same number of pen-reared birds. The results of this work showed: (1) factors influencing results could not be controlled; (2) it was useless to attempt to build up a population of quail on a given area by stocking pen-reared birds; (3) there was no evidence to indicate that the stocking of an unoccupied area would result in the successful establishment of a quail population; (4) it was unnecessary to stock birds on areas where sufficient food and cover exist because birds from surrounding areas will infiltrate the cover; and (5) the carrying capacity of the land was the principal limiting factor of species having the high reproductive rate of quail (Phelps, 1948:16-17).

The annual estimated quail kill in Virginia showed a decline in the years following World War II. As studies by Phelps (1948), Mosby (1950) and Overton (1950) have shown, quail abundance is governed by the availability of food and cover. Mosby (1950:353) presented data obtained from a six year study which indicated that 40 per cent of a quail population could be harvested without detrimental effects to the abundance of the species. He was of the opinion that hunting removes only a portion of the quail population that would be otherwise lost to natural over-wintering causes. Apparently, the reduction in

quail abundance is affected by land-use practices. In more recent years cattle-raising has gained in importance in Virginia, thus a large portion of the land in the state has gone into pasturage. Presently, the farmers are practicing a type of farming that calls for clean fence rows, which once were overgrown with shrubs and bushes and offered good food and cover to quail.

Waterfowl

Beverley's description of the waterfowl painted a glorious picture of these species in the early days of Virginia's history. Geese and ducks of all kinds were found in abundance. Cranes, curlews, herons and other water birds lined the shores and marshes of Virginia. He described the Indian's method of hunting waterfowl as follows, "The Indians had no other Way of taking their Water or Land-Fowl, but by the Help of Bows and Arrows: yet so great was their plenty that with this Weapon only, they kill'd what numbers they pleased. And when the Water-Fowl kept far from Shore, (as in warmer Weather they sometimes did) they took their Canoes, and paddl'd after them (Beverley, 1947: 154).

Habitat conditions for waterfowl in the colonial period differed little, if at all, from those of the precolonial era. One record on their abundance around 1705 was noted by Beverley (1947:153, "There are such a multitude of Swans, Geese, Brants, Sheldrakes, Ducks of several Sorts, Mallards, Teal, Blewings, and many other Kinds of Water-Fowl, that the Plenty of them is incredible. I am but a small

Sports-man, yet with a fowling-Piece, have kill'd above twenty of them at a Shot.

"The Shores, Marshy Grounds, Swamps, and Savanna's, are all stor'd with the like Plenty of Game, of all Sorts, as Cranes, Curlews, Herons, Snipes, Woodcocks, Sauerers, Ox-eyes, Plovers, Larks, and many other good Birds for the Table that they have not yet found a Name for."

Of all wildlife species, the waterfowl suffered greatest under the market system of hunting so widely practiced during the post-colonial era. The large flocks of migrating waterfowl concentrated along the coast and in Tidewater Virginia. The hunters devised various methods of capturing and killing the birds. They were hunted at night with the use of light reflectors; hunters either walked along the shore or approached the flocks in sneak boats. Once the flocks were located they were bombarded with various types of armaments. If single-barreled guns were utilized the bore was often sufficiently large enough to accept a coin the size of a quarter. Into these muzzles went shot, scrap iron, bolts, nuts and other material. More often multiple-barreled guns were utilized. These were the socalled "scow-guns". Iron pipes often served as barrels; these were plugged at the "breech" and attached to a heavy wooden base. It was not unusual for such a gun to have from six to ten barrels (see Fig. 3). These barrels were muzzle-loaded and fired simultaneously. The platform was attached to the bow of the "sneak-boat" A blast from a gun of this type could destroy hundreds of geese and ducks. Nets and traps were other tools of the market hunters.

By March 3, 1832, legislation was passed which protected the waterfowl of the Potomac River. Controversies concerning the shooting of waterfowl arose between Virginians and their neighbors, and in 1860, it became unlawful for any person not a resident of Virginia to shoot, kill or capture waterfowl. Each offense carried a fine of $100.00. This same year restructions were placed on guns used in waterfowling. If anyone was caught hunting with a gun so large that it could not be fired at arm's length, the gun was confiscated and destroyed. The General Assembly of 1904 passed an Act making it illegal to kill waterfowl at night, or to capture or kill them with the aid of traps, nets or light reflectors or with a gun larger than an eight bore. It was unlawful to sell or buy waterfowl during the closed season, which included the days between February 1 and November 1. On February 29, 1912, battery-guns or scow guns were outlawed.

Passenger Pigeon

Early reports told of unbelievable numbers of passenger pigeons Ectopistes migratorius (Linnaeus). Ralph Hamor described a flight that occurred in 1615. He reported that the birds numbers obscured the sun for three or four hours (Murrill, 1949:10). There were still large flocks of these birds present long after the close of the colonial period.

The massive flights of passenger pigeon had vanished from Virginia before 1910. Literally thousands of these birds had been killed for food. Douglas Mankin of Herndon, Virginia related to the writer that

his father often told of the tremendous numbers of these birds before 1900. These birds often roosted in oak stands and fed on acorns and other nuts of forest trees. Sometimes so many birds would light on a tree that their combined weight would break off sizeable limbs. Murrill (1949:10), discussing the extinction of this species, related that he killed several birds from a small flock several miles east of Roanoke during the autumn of 1880. This was the last flock he saw in the state. He was interested in conditions which were instrumental in causing their extinction and presented the idea that they possibly succumbed to some highly infectious disease. As evidence for the support of this theory he described roosts in Alabama, undisturbed by man, where dead birds covered the ground to a depth of one foot.

Exotic Game Species

The stocking of exotic game species seems always to have stirred the imagination of all men who are interested in the world about them. Not long after the English colonists became settled at Jamestown, they felt that it was necessary to introduce swine into the countryside. As described in the section on colonial wildlife legislation, this animal was released in hopes that its numbers would increase to such an abundance that it would serve as a source of food for the colonists. The fate of the released swine is unknown, however, the colonial law-makers saw fit to offer protection to this species in 1632 (Mann, 1952: 11).

Around 1750 a second exotic game species was introduced into

Virginia. The English foxhunters were displeased with the performance of the native Eastern Gray Fox (Urocyon c. cineroargenteum Schreber); they believed that the gray fox lacked the stamina necessary in a good sporting animal and therefore the English red fox was imported in considerable numbers (Johnson, 1938:2). This species differed from the first exotic species released in that it was successful in establishing populations which are extant today.

Exotic game species offered interesting possibilities to the post-colonial sportsman. The fields and forests produced wildlife in abundance, but the desire to have more game on hand was prevalent. Many of the hunters were wealthy land owners who had both the time and the money to experiment with new animals. Men like George Washington and Thomas Jefferson were more than mildly interested in natural history, and both of these distinguished Virginians introduced foreign species.

In 1728, Lafayette sent Hungarian partridges to George Washington (Bump, 1958:4). Washington also imported Chinese pheasants, Chinese geese and English fallow deer (Troubetskoy, 1956:12;22). These species were not introduced in an effort to create new game populations, but were released on Washington's farms for show purposes.

In 1904 the General Assembly permitted the purchase of Mongolian and English pheasants for restocking. The sale of other birds, either foreign or domestic, was banned by law.

The extent of quail restocking that followed the severe winter of 1899 is unknown. M. F. Hart (1924:67) reported that interested hunters imported birds for restocking. He did not give the type or number of quail introduced or the numbers released.

The colonial and postcolonial game enthauists were not the only Virginians that have attempted to introduce new game species into the state. The release of exotic game species reached its peak after the creation of the Department of Game and Inland Fisheries, and at a time when restocking depleted game species and the introduction of new species to increase game abundance was highly popular.

The entire list of game birds and mammals that have been brought into Virginia would be quite lengthy, and accordingly, the writer will discuss only the most important imports.

The ringnecked pheasant was the first exotic bird which gained favor with the young Department. In 1917 Commissioner Parsons made the following statement in the first annual report of this organization: "Experts in breeding ringnecked pheasants believe the climate and 'cover' of eastern, southern and valley portions of Virginia to be ideal for this bird. While it is doing well in New York, New Jersey, Pennsylvania and some of the Middle Western States, it is believed that it will thrive even better in the milder climate of Virginia. The Department is making an effort to introduce this bird into the State, and has distributed 4,000 eggs with lovers of wildlife who would agree to hatch the eggs under hens and protect the birds after they had been liberated" (Parsons, 1917:6). In addition to these eggs, 2,200 young pheasants were distributed over the state and 200 adult breeders were obtained for propagation purposes at the State Game Farm (Parsons, 1917:6). The following year, 1918, Commissioner Bilisoly (1918:5) bemoaned the fate of the 4,000 eggs which had been distributed over the state. He reported that the hatch amounted to approximately 10 per cent and that

those birds which did hatch were not properly cared for; many of those released fell the prey of cats and other predators. Those birds which had been released in the field suffered greatly during the winter snows as they were often killed by hawks. Reports in the spring of 1918 were very discouraging and very few broods were seen. The Commissioner noted that the successful introduction of ringnecked pheasants in Virginia would take many years, and he wondered if the expense of the venture would be worth the results.

Paul C. Edmunds, Halifax County sportsman, liberated over 100 pheasants, chiefly ringnecked and Chinese; these birds did nest successfully and the adults were found to travel long distances and scatter widely. According to Edmunds apparently pheasants preferred the swamplands to wooded hills (Edmunds, 1922:163). The Department and interested individuals continued to introduce the species and during the hunting season of 1922 - 1923 it was estimated that 5,175 pheasants were harvested (Anon., 1923:185). In 1923 over 1,000 pheasants raised at the Game Farm were released in the state (Anon., 1923:101).

About 1930, the Virginia hunters began to have doubts about the release of ringnecks on bobwhite quail range. Handley (1930:38) reported on this situation and noted that Willie Craig, Louisa County, had noticed cases of depredation on the quail by the pheasants; from C. F. Pretler, Bureau of Biological Survey, came evidence of depredations of this sort.

In 1931, two adults, and 65 young ringnecked pheasants were released by the Commission; 58 eggs were distributed for hatching and the eventual release of young (Handley, 1931:43). About 1932 an

experimental area was set aside in Northampton County in an effort to determine if the bird could be successfully stocked in Virginia. The hunting season on pheasants was closed in this county. Of the 61 young and 35 adult pheasants released in 1932, most went to this area (Handley, 1933:10). In 1933, one adult and 200 eggs were sent to Northampton (Handley, 1934:24-25). In the annual report for 1934, Handley (1935: 19) noted that the ringnecked pheasant was not doing well in Northampton County.

M. D. Hart (1942:52) reviewed the ringnecked pheasant stocking venture in 1942. He reported that about 2,500 pheasants were released in the State during the experiment, and in addition a large number of eggs were sent to interested sportsmen. Finally the Commission reached the decision that Virginia's ecological conditions were not suitable for this exotic species.

In the annual report for 1941, Commissioner Nolting (1942:5) made this statement: "Experience of the past shows definitely the ringnecked pheasants and Chukar and other exotic partridges do not thrive in this State. Since we already have an abundance of quail, turkey and grouse, three of the finest game birds in the world, we no longer try to introduce exotic species and are concentrating our efforts on the protection and management of our fine native game."

An attempt was made to introduce the Texas and Mexican quail in Virginia. The details of this stocking are covered in the section on quail. Needless to say, little definite information concerning the effectiveness of this bird in bolstering the existing population of bobwhite quail is available. The opinion among many sportsmen was

that the imported quail caused a great deal of trouble by lighting in trees after they were flushed and did not afford good "singles" hunting.

An anonymous report (1923:8) noted that a small number of Hungarian partridges had been imported from Hungary. These birds were to be reared and contained at the State Game Farm with the hopes that they could be established in the state.

The Hungarian partridge also was considered suitable for release in Virginia. Stras wrote an article in favor of stocking this species in which he stated: "After adequate provision had been made for the protection and propagation of our native species, it was but natural that the members of the Commission should consider the matter of introducing some foreign game birds that are hardy, prolific, and readily adaptable to comparative open country where conditions are unfavorable for our native birds, and with such sporting qualities as to render them attractive to hunters. All of these qualities are apparently possessed by the Hungarian partridge or gray-leg partridge as he is known in England" (Stras, 1928:127). Late in 1926 the Commission ordered 100 of these birds which were released in Tazewell County. The weather at the time of release as quite satisfactory for the birds. One bird was dead on arrival, and it was determined that the remaining birds would be broken into two groups of 40 birds each and a third group containing 19 birds. All were to be released on sanctuaries. Sixty of them were released at Burke's Garden. This site was located at an elevation of 3,200 feet for it was thought that this area would afford a good test of the bird's ability to overwinter. The 1928 estimate of this population was set at 400 birds. The Commission also

authorized the release of 75 pair of Hungarian partridges elsewhere in the state (Stras, 1928:124). The 1927 cost of stocking Hungarians increased from an expected $500.00 to $600.00 when there was a sharp increase in the cost of individual birds (Tyus, 1927:79). A. Willis Robertson (1929:9) reported that the Commission liberated 50 pair of Hungarian partridges in Burke's Garden in 1928. In cooperation with the Commission, Tazewell County closed the season on these birds for a period of five years.

M. D. Hart (1942:52) recounted that 600 Hungarian partridges were released in Virginia but that these birds did not find conditions suitable for their successful establishment.

Following the unsuccessful attempt to introduce the ringnecked pheasant in Virginia, the game officials held more hope for the melanistic mutant pheasant. Twelve of these birds were held at the Game Farm with the idea that as, soon as enough young could be produced, they would be released on a large sancturary in Northampton County where their progress could be studied (Handley, 1935:19). Northampton County closed the season on pheasants for an indefinite period to await the outcome of the melanistic mutant pheasant (Handley, 1935: 30). This species of pheasant vanished from the scene as did the ringneck.

Around 1936, the Commission decided to try the Chukar partridge in Virginia. One hundred of these birds were released in Virginia: 10 on the Northampton refuge; 10 at Camp Lee; 20 at the Sussex Game Refuge; 40 at the Haven's Refuge near Roanoke; and 20 at the John B. Laing Experimental Refuge in Giles County. Reports in the summer of

1937 indicated that at least one brood was raised on the John B. Laing Experimental Refuge, but the birds eventually disappeared from the state (Anon., 1937:2).

During the first cycle of exotic game species stocking many species were planted in Virginia, among them were the following species: Golden and Silver pheasants, African gander, Attwater or Lesser prarie chickens, and California Valley Quail (Handley, 1934:24-25; Anon., 1939:8; Cline, 1938:2; Edmunds, 1922:163). From time to time an interested individual turned loose whatever struck his fancy.

In 1958, the appearance of wild hogs in the National Forests brought about a news release by the Commission that these animals were potentially dangerous to wildlife in that their activities could destroy turkey and grouse nests, create agricultural damage in adjacent farm lands and destroy available food eaten by other wildlife species. An attempt was made to determine who released the animals, and it was thought that they were released with the hope that a population of wild swine would be created. At the last report, the guilty party had not been apprehended (Anon., 1958:24).

In 1958 the Commission entered into an agreement with the United States Fish and Wildlife Service in an effort to find birds suitable for stocking in habitats not now occupied by a native species. Before any given species is considered, a careful study is made of climatic and edaphic conditions required by the proposed species and the proper part of the state is chosen for the releases. The Iranian blackneck pheasant is the current choice. The Commission got 11 hens and 15 cocks in 1958. Pure strains and crosses between the blackneck and

ringneck pheasants from California have been accomplished. As yet little is known of their ability to survive in the wild (Anon., 1958:13). Of the fifteen cocks, 4 are of the species, Phasianus colchicus talischensis, and this particular species is thought to be suited to the ecological factors prevalent in eastern Virginia; 11 are of the species, Phasianus colchicus persicus, and this breed is more likely to become established in western Virginia. Both species of birds are of about the same size as ringnecks and their diet is similar in most respects. Two release points have been chosen in eastern Virginia; Halifax County and Charles City County. From 300 to 500 birds will be released annually on each site for the next three to five years. The season on pheasants will be closed for the next five years, but in all probability it will take at least ten years to determine the effectiveness of the plantings (Tuttle, 1958:4).

From a news release in the February 3, 1959 South Boston News came the following information regarding the birds after their release: (1) the 250 Iranian blackneck pheasants released in the northern part of Halifax County seemed to winter well; (2) the birds seem to have become quite wild since their release; and (3) Commission biologists hope that the birds will mate, nest and successfully bring off young. Herman Tuttle, the Commission biologist in the area where the pheasants were released warned the local sportsmen to hold down their enthuasiasm until more definite information on their welfare is ascertained. Tuttle also stated that the Commission has placed an order for Reeves pheasants and red jungle fowl which will be released in some areas of Virginia.

Another bird receiving some interest currently is the button quail,

Coturnix coturnix japonica. Their rapid reproductive rate is a strong point in their favor. During the summer of 1956 some 2,800 young were raised from 35 pair. The female lays from 150 to 250 eggs a year, and as a rule there are two broods per year. Early in 1957 about 2,500 button quail were released in 22 counties at 54 different sites; during the summer of 1957 at least 20 of this species were released in every county in Virginia. The major deficiency of this bird is that they are migratory. This bird occupies the same cover type as does the bobwhite quail and has been found in the same covey, yet they are not known to cross breed. From releases in Louisa County they are known to winter well. They appear as an ideal bird for controlled shooting preserves (Phelps, 1958:21-24). However, due to the migratory habits, the results of the release of the button quail have shown no promise of their successful introduction into Virginia.

It is interesting to note that the rearing of the Eastern Wild Turkey was discontinued at the Cumberland State Game Farm in the spring of 1960. The project activities of the Game Farm will be directed toward experimental work with exotic game species.

Predatory Species

Early in the history of Virginia, wolves became a menace to the populace and their livestock. Wolves were drawn to the vicinity of villages by the smell of table garbage and by the practice of leaving the bodies of animals killed for skins in the forests as carrion. Many folk stories developed around the activities of the wolves;

they were feared for their cunning and boldness. One early report stated that, "The wolves in these parts are so ravenous, that I when in the night feared my horse would be devoured by them, they would gather up and howl so close round about him, though tethr'd to the same tree at whose foot I my self and the Indians lay: but the fires which we made, I suppose, scared them from worrying us all" (Lederer, 1902:11).

Wolves ranged over the entire State; a later report recalled the fact that Abington had originally been called "Wolf Hills" because a cave which served as headquarters for the local pack was located there (Coale, 1878:100-101).

Wolves became so numerous in Tidewater that the first game law in Virginia, enacted in 1632, was partially designed to control their numbers. Any settler killing a wolf obtained permission to take a hog from the community herd. This plan was not sufficient to check the numbers of wolves and authorities then enlisted the aid of Indians to help cut down the wolf population. County laws did little to dimish the wolf population, and this animal existed in Virginia long after the close of the colonial era. On February 5, 1822, Bath County was given permission by the General Assembly to pay bounties on wolves. Payments on this predator varied from $3.00 to $20.00. Apparently wolves were very plentiful in the mountains. An anonymous report from the town of Graham, in 1804, related that wolves were so numerous that a bounty of $2.00 per wolf was levied and a total of 38 animals were collected (Anon., 1923:186). Wolves vanished from Virginia about 1909 or 1910 (Handley and Patton, 1947:877. They were reported from Augusta County

as late as 1870. The last wolf killed in Bath County was taken in the vicinity of Falling Springs in 1880, but the Bath County wolf bounty law remained in effect until 1891 (Thornton, 1955:8-9). The latest reports of wolves killed in Virginia are incorporated in a letter written by J. H. Watson in 1912. He stated that two wolves were killed near Clinch Mountain, Tazewell County during the winter of 1909 - 1910 (Anon., 1949:26).

The gray fox is reported to have existed in great numbers in colonial Virginia (Lederer, 1902; Johnson, 1938; Smith; Holland, G. C. (ed.) 1952). The fox was not considered a serious threat to poultry or livestock and no mention is made of foxes in early colonial wildlife legislation.

No colonial bounty laws for foxes existed, but on February 18, 1831 bounties were placed on red foxes; this legislation made no mention of the native gray foxes. In order to collect the bounty, the scalp with the ears still attached was presented. The ears were removed when the bounty was paid to prevent the scalp from being offered for bounty more than once.

Crows and squirrels were declared nuisance animals by a law of 1731 (Mann, 1952). During the postcolonial period only the crow was considered a pest. The first crow law was passed on February 10, 1826, and it was confined to eastern Virginia counties; in 1827 additional counties were added to the list of those which paid crow bounties. On January 5, 1828 a law was enacted that allowed crow bounties to be paid by all Virginia counties.

In 1849 the General Assembly voted in favor of a law placing the authority for making bounty payments in the hands of each county. This law made it possible for a county to pay bounties if they so desired; the county could also set the price of the bounty.

A CRITICAL REVIEW

A great deal of praise goes to the Virginia Commission of Game and Inland Fisheries whose personnel have kept the wildlife species extant in face of ever increasing hunting pressure and changing land usage. The time may yet come when further restrictions on hunting will have to be made in order to protect the species of game animals, but every effort is being made to provide the Virginia hunter with an abundance of game and land on which to hunt.

The Virginia Cooperative Wildlife Research Unit has supervised fifty-six wildlife research programs which have added information to that already gathered by other researchers. The Unit may well be considered as the research arm of the Commission, and the scientific data collected here are applicable to field problems encountered by biologists. In addition to the work mentioned above, the staff of the Unit have accomplished outstanding research in the wildlife field, and have trained a large number of wildlife biologists who have taken their place in the conservation agencies both at the state and federal level. The combination of research done by the Unit and that done by Commission personnel will undoubtedly solve many of the present day problems.

In this review, each of the major game species is discussed in order that its present status and possible future may be appraised.

Black Bear

The early writers noted an abundance of bear in all sections of

the Old Dominion, but the scarcity of published material from Piedmont Virginia during the postcolonial years, 1776 - 1915, may indicate that the bear abundance was diminishing in that region (Lederer, 1902:27; Bruce, 1924:313; Johnston, 1905:23 ffd.). During the years of the modern period, 1916 - 1958, the black bear has been found in two widely separated areas; 180 square miles of bear range exist in the Dismal Swamp and 4,116 square miles of bear range lie in the western counties (Stickley, 1952:12). In 1957 Stickley (1957:24) estimated the Virginia bear population to be 1,102 animals.

The bear is apparently holding its own over much of its range, and slight increases in the population may be expected in certain areas in the future. The present trend in Virginia is towards an increase in the amount of forested acres (Pechanec, 1958:12; Dickerman and McGuire, 1955:5). As more acres of forested land are produced it seems reasonable to assume that the number of acres of bear range will also increase. Stickley (1957) noted that an additional 750 square miles of Virginia appeared to be potential bear range; perhaps with management practices, especially habitat improvement, these lands will enhance the bear population.

The bear is a controversial animal; it is despised by farmers but lauded by bear hunters. This animal has been, and will almost certainly continue to be attacked by farmers as a predatory species. It is possible that the bear has been unjustly accused by farmers (Bailey, 1929:6), and there is opposition to any lengthening of the open season as a result of pressure springing from the agricultural group (Davenport, 1951:75-77). Presently, there is a large group

of sportsmen who specialize in the hunting of bear with dogs; their numbers will probably continue to increase The influence of the bear hunters is seen in the legislation which separated the deer and bear seasons west of the Blue Ridge in 1957 - 58. The purpose of this law was to prevent the killing of bear during the deer season at a time when neither bear nor deer could legally be hunted with dogs.

There is apparently no cause for alarm if the harvest of bears is drastically reduced for a year or two. Kill figures collected from the field since 1947 - 48 through 1957 - 58 show an average annual harvest of 212 bears. The most drastic reduction in bear kill during this time occurred in 1951 - 52 when only 110 bears were reported; some 312 bears had been killed during 1950 - 51. The harvest for 1952 - 53 rose to 327 bears. Another decrease was noted in the bear kill for 1955 - 56 and 1956 - 57, but the 1957 - 58 kill again surpassed the 200 mark. It appears that the average annual kill will be maintained at its present level or may be expected to increase slightly.

Game biologists need additional information on the bear if they are to prepare and execute future management plans. More information is currently being sought by the Commission. It appears that bear abundance in Virginia can increase only when additional suitable habitat becomes available.

Deer

The Commission of Game and Inland Fisheries has an enviable

record in the case of deer restoration in western Virginia and to some extent in the eastern portion of the state. Estimates of deer numbers in western Virginia during the 1920's and 1930's vary as greatly as 500 animals in all western counties (Quinn, 1954:3) to 2,500 deer in Bath and Highland counties (Bailey, 1929:3). In either case, deer numbers were small; to this existing native population were added a total of 1,922 deer between the years of 1928 - 29 and 1949 - 50. From this small nucleus has come a population numbering more than 150,000 animals (Phelps, 1955:13). Apparently the proper conditions for deer success were present, however, one should not overlook the fact that a great deal of habitat improvement has been carried out by Commission personnel.

It is believed that this success is due largely to; (1) the restocking of suitable habitat, (2) efforts of game wardens who supplied good protection at a time when it was greatly needed, and (3) foresight of game biologists and game managers who improved available food and cover (Clarke, 1944:3; Phelps, 1954:6).

Currently the game officials are faced with the problem of obtaining a satisfactory annual harvest of deer in order to maintain a balance between the animals and their range. Phelps (1956:13) has noted that about equal numbers of both sexes of deer must be harvested if the present high deer population is to be maintained, and if the greatest possible harvest is to be realized. Sportsmen are dubious about doe seasons, and many hunters feel that if does are harvested, the deer herds will decrease. The Commission is beginning a campaign to prove that this is not the case, and in

fact, if does are not harvested, the herd may well overpopulate an area and the damage caused by overbrowsing will take years to repair.

As the deer are increasing, the available food and cover are decreasing. The young forests that created such good habitat in the years at the beginning of the deer restoration program have now grown into more mature stands. If the deer are expected to remain at their present level more food will have to be created. There are relatively few methods of producing food that will carry the animals over the "bottle-neck" in late winter and in very early spring. One of the most efficient methods is cutting the mature timber and the regrowth of new shrubby vegetation. Planned harvesting of timber on the public hunting areas is one way in which new food could be attained.

There are at present, a few areas in the state that are overstocked; also there are areas where additional deer are needed (Anon., 1956:23). After studies are made to insure that the uninhabited areas have sufficient food and cover to support a deer population, deer may be trapped on the overpopulated areas and released on the desirable but uninhabited regions. This would help to alleviate conditions on both areas.

Virginia plans to join with 11 other southern states to form the Cooperative Deer Disease Study (Anon., 1958:24). When biologists from each of the states working together can solve some of the problems of deer disease, this backlog of knowledge should be helpful in solving emergency problems that might arise.

Elk

In all probability the elk was exterminated in Virginia because of its grazing habit and its large size. Yet these facts were not considered when the animals were re-introduced into the state. It should have been fairly obvious that elk would certainly require large tracts of land, relatively well isolated from farming communities, if they were expected to create successful populations. Elk were distributed widely over the Old Dominion, but most of them were soon destroyed by farmers who did not condone the damage done to crops by this game species. From these releases two herds, the Giles-Bland and the Botetourt, were developed (Bilisoly, 1918:5; Wood, 1943).

By 1918 the Commission questioned the wisdom of restocking the elk in Virginia since it caused many complaints from farmers (Ann. Report, 1918:5). In 1944, a three day open season was declared on the elk of the Giles-Bland herd with the intention of reducing the numbers of elk in hopes of reducing agricultural depredations (Cross, 1950:10).

The elk of the Botetourt herd range primarily on lands under the control of the National Park Service, and their numbers remain fairly static and within the carrying capacity of the area. Yearly increments are approximated by yearly losses; if these conditions continue to exist, this herd may remain, to be enjoyed by visitors to the vicinity of the Peaks of Otter, but it is unlikely that these animals will furnish many hours of hunting recreation. The Giles-Bland herd will

probably continue to over-populate its range and hunting seasons, of limited time, will be necessary to keep numbers within the herd small (Cross, 1950:10-11). Since Virginia is an agricultural state, it is most unlikely that large numbers of elk can ever be supported here.

Ruffed Grouse

The ruffed grouse has been extirpated from most of its original range, and currently occupies areas located in the western counties of Virginia. Addy (1940) found the highest concentrations of this bird in the counties lying within the Allegheny Mountains, and especially high concentrations were found in Bland County.

The grouse is generally regarded as a cyclic species over much of its range, and if any credence can be afforded the game warden estimates of annual kill in Virginia, this condition possibly exists in the Old Dominion (Allen, 1954:101-102). The annual estimated kill varies from highs of approximately 25,000 birds to lows of less than 5,000 birds. The data collected on kills in Virginia are not sufficient to definitely prove that the grouse populations are cyclic but there is a trend in that general direction.

Research at the Virginia Cooperative Wildlife Research Unit showed that grouse suffer most from the effects of man and skunks, and that man was probably the only factor that exerted any influence on its distribution (Addy, 1940:9).

Grouse benefit from management practices aimed towards turkey and other forest game species (Nolting, 1942:5). Perhaps the

improvements carried out under the Virginia Plan will be suitable to maintain a good grouse population within the state. Grouse hunting in Virginia may be expected to improve in future years as more and more acres of forest land reach maturity and provide additional food for these birds.

Quail

During the early years of quail management in Virginia great stress was laid on the production of pen-reared birds for restocking purposes (Anon., 1923:8). Through the years wildlife officials noted that the release of pen-reared quail and imported quail did little to improve quail abundance. Eventually scientific research showed the uselessness of restocking quail to improve the population, and this form of management was largely abandoned (Phelps, 1948). The work of many researchers indicates that food and cover, or carrying capacity, actually controls quail abundance (Phelps, 1942:18-21, 81-85; Mosby, 1950; Overton, 1950). If these findings are correct, then the best form of quail management would be to improve the habitat for farm game species. This presents a problem, for the farmer is more interested in obtaining money for his efforts than he is in obtaining more quail. Through educational efforts, the farmer can be shown that abandoned fields planted in quail foods with sufficient cover near by will increase quail production. It is highly doubtful that much habitat improvement work of this sort would be done by the landowner unless he was personally interested in the birds. The demonstration of proper quail management on public-owned

lands would point the way to better quail habitat and eventually more quail abundance. Since quail can be raised on small areas, it may be possible to increase their abundance throughout the state by improving habitat conditions on a large number of areas evenly distributed over the Old Dominion.

Wild Turkey

The harvest of wild turkeys continues to decrease annually, even though active management of the species is employed.

This condition seems unusual for several reasons. The original vast hardwood forests of Virginia were virtually destroyed in the years following the Civil War, and since the early years of the present century, much land formerly utilized for agricultural purposes has reverted to forests. The greatest peak of lumber production in Virginia occurred around 1909 and in the years that immediately followed (Dean, 1952:16). These lands which reverted to forests should presently, or very soon, be mature stands. Certainly the 1,500,000 acres included in the National Forests furnish good turkey range.

Most of the decline of the turkey is occurring in the eastern part of the state, while new populations are actually being successfully created in western counties. At the present time new flocks are appearing in the extreme southwestern counties of Dickenson, Wise and Russell (Phelps, 1954:12).

Throughout the years of wild turkey management in Virginia a great many different techniques have been employed in an effort to produce a captivity-reared bird that would bring about successful populations in the wild (Edmunds, 1922:163; Robertson, 1930:6; Mosby, 1940:13-14). So far no such bird has been bred. It seems plausible to trap wild turkeys in areas where they are abundant and release them on suitable but unoccupied range. In cases where this method has been attempted wild flocks have become established. If such a program were employed on a large scale it is highly probable that wild turkey flocks could be established on all suitable range in Virginia.

Rabbit

Rabbits were abundant in Virginia until around 1933, but beginning that year an outbreak of tuleremia brought about a sharp decline in the numbers of this species (Nolting, 1934:3). The rabbit is found in all sections of the state, and there are indications that its abundance is governed by the amount of available cover. McGinnes (1958:111-113) discovered that the placement of cover was an important factor in the usage of an area by rabbits.

The rabbit, like the quail, has suffered as a result of "clean farming". Although the Commission has no program that is specifically designed to promote rabbit abundance, it is believed that the farm game habitat improvement program currently being carried out by the Commission is the best way to improve the numbers of this species (Phelps, 1954:6). If sufficient numbers of individual landowners can

be convinced that wildlife borders are necessary to improve conditions favorable for quail and rabbits, one might well expect their numbers in Virginia to increase, but there is little hope of additional rabbits without the help of the landowners.

Squirrel

The writer was unable to discover any management plan designed to promote the numbers of squirrels in the Old Dominion. In the recorded history of Virginia, perhaps the worst tragedy suffered by squirrels was the loss of the chestnut trees. Currently, hunters in Virginia have little difficulty in finding squirrels in over-mature woodlots and along the edges of the mature hardwood forests. Their numbers may be expected to increase as the forested acres in Virginia increase.

There is, however, one point where the squirrels may be helped. Cross (1942 38-39) considered it unwise to allow early squirrel seasons. His data showed that an average of 2.5 young squirrels died in the nest whenever a female was killed during a September season. He felt that the outside dates for squirrel seasons should fall between October 15 and December 15. With knowledge such as this available, the Commission sets the general open season, then local influences in the General Assembly create exceptions to this season. During 1958 - 59, there were ten exceptions to the general open seasons set for the areas to the east and west of the Blue Ridge. If it were possible to fix, by law, a standard open season on squirrels this situation may be improved.

Exotic Game Species

Virginia has attempted to introduce various exotic species of game birds. Some species attempted were: Ring-necked pheasant (Parsons, 1917:6); Chinese pheasants (Edmunds, 1922:163); Hungarian partridges (Anon., 1923:8); melanistic mutant pheasant (Handley, 1935:30); and Chukar partridge (Anon., 1937:2). Other smaller stockings of Golden and Silver pheasants, Attwater or Lesser prarie chickens, and California Valley quail were attempted (Handley, 1934:24-25; Anon., 1939:8; Cline, 1938:2; Edmunds, 1922:163). None of these introductions created successful populations within the Old Dominion. In 1941, Commissioner Nolting (1942:5) noted that past activity in stocking exotic game species was unsatisfactory, and the Commission had decided not to try other birds.

Currently, the Commission is attempting to introduce the Iranian blackneck pheasant and the coturnix quail in Virginia (Tuttle, 1958: 4; Phelps, 1958:21-24). These later attempts have not been carried on long enough for biologists to determine their chances for success. With more knowledge of range and habitat requirements for the particular species in question, better management activities may be practiced and it is possible that new species of game animals could be successfully introduced into Virginia.

The biologists in charge of this form of game management are aware of the tremendous costs of such a venture. As Bump (1958:5) pointed out, only one bird out of four or five introduced will succeed in creating a new population. At a cost of $25,000 to $50,000 a trial,

this would mean that the minimum cost expected to establish a huntable population approaches $100,000 and could reach such astronomical heights as $250,000. The main hopes of establishing an exotic population is to completely understand the species in question. In view of past experiences, the writer is of the opinion that the money used in an attempt to introduce a new game species could be spent more profitably in acquiring additional public hunting lands or in increasing native game animal populations.

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APPENDIX

Appendix Table 1. A list of theses and dissertations completed by graduate students at the Virginia Cooperative Wildlife Research Unit

Addy, C. E. 1940. The Ecological Factors Affecting the Distribution and Abundance of the Ruffed Grouse in Virginia. 172 pp.; 7 tab.; 15 fig.

Baldwin, W. P., Jr. 1938. The Winter Food Habits of the Bobwhite Quail in Virginia. 79 pp.; 6 tab. and maps.

Bailey, W. W. 1942. A Method for the Production of Genuine Wild Turkeys for Restocking Purposes. 58 pp.; 15 fig.

Blackwell, W. P. 1948. The Status of Beaver in Virginia. 78 pp.; 28 fig.; 4 tab.; 1 map; (Dup.).

Brown, G. H. 1956. An Evaluation of the Aldous Browse Measurement System and Its Application to the Mountainous Areas of Virginia. 92 pp.; 5 fig.; 19 tab.; 3 app. fig.

Bowman, N. R. 1953. The Relation of the Skunk to Game and Burrow-using Animals in Virginia. 41 pp.; 6 tab.; 15 fig. (Dup.).

Byrd, M. A. 1951. The Economic Importance of the Muskrat in Virginia. 224 pp.; 26 fig.; 44 tab.; 1 app. fig.; 15 app. tab. (Dup.).

Cantner, D. E. 1955. An Evaluation of the Techniques Used to Restock Unoccupied Wild Turkey Habitat in Virginia. 92 pp.; 7 tab.; 8 fig.; 2 app. tab.

Chamberlain, E. B., Jr. 1948. An Investigation of Certain Waterfowl Food Plants and a Botanical Survey of Back Bay National Wildlife Refuge, Princess Anne County, Virginia. 147 pp.; 13 fig.; 9 tab.; (Dup.).

Coggin, J. L. 1954. A wildlife Survey of Patrick County, Virginia. 162 pp.; 41 tab.; 1 fig.

Cross, R. H., Jr. 1942. A study of the Habits and Management of the Gray Squirrel in Virginia. 40 pp.; 17 fig.; 11 charts and maps.

Culbertson, A. B. 1948. Annual Variation in the Early Winter Foods of the Wild Turkey and their Management Implications. 118 pp.; 23 fig.; 16 tab.; (Dup.).

Dale, C. K. 1949. Ecology and Wildlife Potentialities of the Rock Knob Area in Floyd and Patrick Counties, Virginia. 125 pp.; 9 fig.

Davenport, L. B., Jr. 1951. The Economic Importance of the Black Bear in Virginia. 104 pp.; 21 fig.; 13 tab.; (Dup.).

DeGarmo, W. R. 1941. A Study in Forest Wildlife Relationships. 160 pp.; 10 app. tab.; 6 tab.

Engle, J. W., Jr. 1956. An Investigation of Conditions Influencing the Pattern of Overpopulated Deer Areas in Virginia During 1949. 113 pp.; 19 fig.; 16 tab.; 7 app. fig.; 6 app. tab.; (Dup.).

Gehrken, G. A. 1948. Factors Influencing the Winter Survival of the Bobwhite on the V.P.I. Farms, Montgomery County, Virginia. 95 pp.; 25 fig.; 15 tab.; 7 maps; (Dup.).

Gilchrist, C. P., Jr. 1950. A Survey of the Potential Waterfowl Management Areas of Eastern Virginia, 1949. 65 pp.; 18 fig.; 4 tab.; (Dup.).

Giles, R. H., Jr. 1957. Conservation Knowledge of Virginia School Pupils. 239 pp.; 27 tab.; 10 fig.

Givens, L. S. 1938. A Preliminary Ecological Survey to Determine the Potentialities of the Mountain Lake Region for Wildlife Production. 90 pp.; 6 tab.; 1 map.

Harvey, J. C., Jr. 1953. Methods of Predicting Quail Population Changes. 88 pp.; 10 fig.; 15 tab.; 3 app. fig.

Henderson, C. 1941. Biological Aspects of Stream Pollution in the Roanoke River, Virginia. 116 pp.; 8 tab.; 12 graphs.

Hundley, L. R. 1953. The Estimation of Population of Some Farm Game Species. 47 pp.; 8 fig.; 11 tab.; 8 app. tab.; (Dup.).

Kellner, W. C. 1953. Factors Influencing the Raccoon and its Management in Southwestern Virginia. 81 pp.; 18 tab.; 9 fig.

King, T. R. 1940. The Relative Nutritional Value of Certain Bobwhite Quail Foods. 81 pp.; 4 tab.; 1 fig.

Little, H. A. 1951. An Evaluation of Virginia's Farm Game Program. 98 pp.; 16 tab.; 13 fig.; (Dup.).

Llewellyn, L. M. 1943. A Determination of the Species and Subspecies of the Rabbits of the Genus Sylvilagus and their Distribution in Virginia. 47 pp.; 15 fig.; 7 tab.

McLaughlin, J. H. 1953. Factors Influencing the Raccoon and its Management in Southwestern Virginia. 56 pp.; 9 tab.

Muncy, R. J. 1954. The Status of the White-tailed Deer in Bath County, Virginia. 104 pp.; 22 tab.; 14 fig. and tab.

Nelson, F. P. 1950. Factors Limiting Cottontail Rabbits on Representatives Areas of Virginia. 75 pp.; 22 fig.; 6 tab.; (Dup.).

Newman, P. J. 1937. A Study of the Winter Survival of Bobwhite Quail Under Natural Conditions. 47 pp.

Overton, Walter S. 1950. Factors Influencing the Bobwhite Quail Population on the V.P.I. Farms, Montgomery County, Virginia. 100 pp.; 33 tab.; 37 fig.; (Dup.).

Patton, C. P. 1938. Distributional List of the Mammals of Virginia. 114 pp.; 1 fig.

Peery, C. H., III. 1948. Breeding Potentialities of the Gray Squirrel at Blacksburg, Virginia. 117 pp.; 57 fig.; 2 tab.; (Dup.).

Phelps, C. F. 1942. Winter Survival of the Bobwhite Quail on its Intermediate Range. 85 pp.; 21 fig.

Progulske, D. R. 1952. The Bobcat and its Relation to Prey Species in Virginia. 135 pp.; 13 fig.; 16 tab.; 11 app. tab.; (Dup.).

Redd, J. B., Jr. 1956. Abundance and Distribution of the Cottontail Rabbit as Affected by Land Use. 116 pp.; 16 fig.; 22 tab.; 25 app. tab.

Richards, C. E. 1954. An Evaluation of the Wild Turkey Restoration Program in Western Virginia. 74 pp.; 2 fig.; 15 tab.

Rivers, D. G. 1940. A Study of the Food Habits of the Wild Turkey of Virginia. 104 pp.; 6 tab.; 2 maps; 3 photos.

Rucker, H. C. 1937. Quail as an Additional Farm Crop on the Average Farm in Montgomery County. 108 pp.; 33 fig.

Shaffer, C. H. 1948. A Study of Raccoons in Princess Anne County, Virginia. 89 pp.; 23 fig.; 4 tab.; (Dup.).

Shipley, D. D. 1941. A Study of the Habits and Management of the Gray Squirrel in Southwest Virginia. 166 pp.; 5 tab.; 41 fig.; 6 maps.

Sprunt, A., IV. 1957. The Seasonal Population and Nesting Success of the Mourning Dove in Virginia. 72 pp.; 18 fig.; 11 tab.

Stickley, A. R., Jr. 1957. The Status and Characteristics of the Black Bear in Virginia. 142 pp.; 32 fig.; 25 tab.; 5 app. tab.

Sweet, J. C., Jr. 1950. An Evaluation of the Deer and Grouse Management Practices on the Jefferson National Forest, Virginia. 118 pp.; 35 fig.; 13 tab.; (Dup.).

Swink, F. N., Jr. 1952. The Effects of Red Fox Populations on Other Game Species. 147 pp.; 20 fig.; 23 tab.; (Dup.).

Taylor, W. H. 1957. Utilization, Preference and Nutritional Value of Winter-Green Agricultural Crops for Goose Food. 125 pp.; 24 fig.; 22 tab.; 15 app. tab.

Thornton, J. E. 1940. An Ecological Study of Forest Clearings on the Big Levels Game Refuge. 125 pp.; 21 maps.

Wood, R. K. 1943. The Elk in Virginia. 271 pp.; 23 fig.; 7 maps.

Woolley, D. J. 1940. The Survival of Restocked Deer in Virginia. 176 pp.; 2 fig.

Byrd, M. A. 1954. Ecological Succession on Abandoned Farmland and its Relation to Wildlife Production in Cumberland County, Virginia. 146 pp.; 14 fig.; 78 tab.; 2 app. tab.; (Dup.).

McDowell, R. D. 1954. Productivity of Wild Turkey in Virginia. 107 pp.; 1 fig.; 36 tab.

Hundley, L. R. 1956. The Available Nutrients in Selected Deer Browse Species Growing on Different Soils. 102 pp.; 15 fig.; 39 tab.

McGinnes, B. S. 1957. Some Factors Influencing the Cottontail Rabbit in Southwestern Virginia. 189 pp.; 20 fig.; 20 tab.; 4 app. tab.

Ripley, T. H. 1958. Ecology, Population Dynamics and Management of The Bobwhite Quail, Colinus virginianus marilandicus (L.), in Massachusetts. 148 pp.; 14 tab.; 25 fig.

Roseberry, D. A. 1950. Game Fisheries Investigation of Claytor Lake. 268 pp.; 80 tab.; 56 fig.; (Dup.).

*In 1947 the Commission of Game and Inland Fisheries published Patton's thesis, Wild Mammals of Virginia. This work had been revised by C. O. Handley, Jr., and Patton.

ABSTRACT

of

THE HISTORY AND DEVELOPMENT OF WILDLIFE CONSERVATION

IN VIRGINIA: A CRITICAL REVIEW

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Thesis submitted to the Graduate Faculty of the

Virginia Polytechnic Institute

in candidacy for the degree of

DOCTOR OF PHILOSOPHY

in

BIOLOGY

This study of the history and development of Virginia's wildlife resources is concerned with the factors that exerted influence on forest and field conditions and wildlife abundance in Virginia. The study began with a discussion of environmental conditions of pre-colonial Virginia and succeeding sections dealt with the conditions of the years between 1607 and 1958. A critical review of Virginia's game species and management plans for these species was included in the final section.

Precolonial conditions were suitable for elk, bear, turkey, grouse, squirrel and buffalo; habitat conditions were poorer for rabbits, deer, and quail. The number of Indians was not sufficient to cause a drain on wildlife species.

With the introduction of agriculture in the colonial era, habitat for quail and rabbits improved. Deer numbers became so reduced that colonial authorities enacted legislation to protect this species. Elk were driven westward as agriculture developed. Turkey, squirrel and grouse were abundant.

Virginia's postcolonial period 1778 - 1915, was one of extravagance. The buffalo and elk were extirpated from the state as a result of agricultural expansion. Extensive lumbering activities following the Civil War destroyed much of Virginia's forests and decreased the available habitat for turkey, grouse, deer and bear. Market hunting further depleted game populations. Deer were estirpated from portions of the state. Rabbits, squirrels and quail remained in considerable numbers. Towards the end of the postcolonial period, enlightened people attempted

to aid wildlife species. Refuges for wildlife and timber reserves were developed. Legislation was enacted to protect game species; there was little hope that the game animals could be perpetuated and the laws intended only to prolong their existence.

During the modern period, 1916 - 1958, wildlife management practices improved greatly. With the development of the Department of Game and Inland Fisheries came increased and improved game management activities. Elk were re-introduced in the state; deer populations were boosted; and considerable attention was given the wild turkey. An outbreak of tuleremia decimated the rabbit population. Bear remained in the Dismal Swamp and in the mountainous region. Squirrel, quail and grouse were found wherever food and cover were available. Modern agriculture has destroyed much of the habitat for farm game species.

Modern management plans for deer, bear, grouse, quail, rabbit and squirrel appear to be satisfactory; only the turkey seems to be decreasing. Some flocks have been established in the state, but the annual kill, according to official records, continues to decrease.