

# THE EFFECTS OF LAND USE TRENDS ON STATEWIDE GAME MANAGEMENT PLANNING

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Proc. Annu. Conf. Southeast. Assoc. Game & Fish Comm. 7:41-55

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Long range game management planning on a Statewide or unit basis is desirable for several reasons. Briefly, sound management plans are:

1. The basis for the wise use of management funds.
2. Assurance that knowledge and work accomplished will not be lost but utilized in a continuous program designed for the achievement of ultimate management goals.
3. Extremely helpful in the guidance of new personnel.
4. A tool to be used in combatting various questionable ideas advanced by self-appointed authorities on game management.

In order that plans might adequately serve the aforementioned purposes it is necessary that they possess a firm basis. Theoretically, the intelligent conservation of any game species depends primarily upon our knowledge of two things: Life history and species requirement. A study of the life history reveals correct hunting dates and bag limits and a knowledge of requirements can be utilized in providing the well-rounded habitat. Limiting factors such as predators, weather, disease and accidents are of secondary importance, since they usually occur in specific localities under specific conditions.

While information regarding the life of game species is extremely important it remains a management factor which can be handled with little difficulty. Careful consideration of breeding habits reveals correct hunting season dates and bag limits. Thus, it is simply a matter of obtaining game laws which coincide with life histories of the species.

The requirement factors is more complex and herein lie the game technician's problems. Each species is dependent upon certain food and cover plants, the combination of which contributes to the formation of a distinct type of habitat. Also, these plants are dependent upon specific types of soils for nutrients necessary for their growth. Thus, it might be concluded that wildlife is a natural resource directly and indirectly dependent upon the soil and soil uses.

In planning the management of the principal game species it becomes necessary to inventory the interrelated resources, which are the primary factors limiting distribution and abundance of birds and animals dependent upon them. Suitable turkey habitat is restricted to certain forest types with reflect soil characteristics. The turkey may be further limited by man's utilization of these resources. Therefore, it is necessary to recognize all potential wildlife habitat according to geological and morphological characteristics and then actual populations within these areas will be determined by the extent to which man is competing with wildlife by altering the habitat through his utilization.

Agricultural economists have divided Virginia into twelve geological sections known as Resource Areas (Fig. 1). The soils, terrain and climate of these areas have influenced the distribution of industry and human populations, land use



Fig. 1. Resource areas of Virginia.

patterns, and thus, indirectly affected the distribution and relative abundance of the principal game species.

A study of the geologic-morphologic characteristics of these individual sections reveals the basic game management potentialities. Further analysis of resource use within the sections presents a clear picture of past, present and future land use trends, a thorough knowledge of which is necessary in the formulation of sound long-range game management plans.

The following includes brief descriptions of the Resource Areas with emphasis on land use and land use trends. The Southwest Virginia Resource Area has been treated in detail for illustrative purposes.

## CUMBERLAND MOUNTAINS

This part of the Cumberland Mountains is a highly dissected plateau. Creeks and streams have cut their courses several hundred feet deep into the original surface level and produced a maze of ridges with occasional summit flats left as remnants of the former plateau surface. Aside from these narrow and less steeply sloping ridgetop areas, there is little land suitable for cultivation. The profile of the valleys is V-shaped, with the bottoms rarely wide enough for arable use. In general, soil productivity is low and most of the land is suited only for forests.

The area is densely settled, since coal mining is the principal industry. Crop and grazing acreages per farm are small and agriculture is largely of a subsistence nature.

## SOUTHWEST VIRGINIA

Southwest Virginia constitutes a part of the Appalachian Great Valley, which forms a belt between the Blue Ridge on the east and the Appalachian Plateaus on the west. The stratified limestone, shale, and sandstone formations are strongly folded, with their folding axes and fault lines roughly parallel to the main direction of the Great Valley. Weathering, erosion and solution have reduced the elevation and produced a succession of long and narrow ridges with more or less connected intervening valleys. In the process, the harder, and more decay-resisting sandstone, and, to some extent, shales, have formed the ridges; whereas the more soluble limestones or dolomites wear down more rapidly and are usually found in the valleys.

The general elevation of Southwest Virginia is lower than that of the Blue Ridge on one side but is higher than that of the Cumberland Mountains on the other. The area occupies the summit in the arch of the Appalachian Great Valley itself. Direction of drainage and climatic distinctiveness are corollaries of this arrangement. Drainage of the southern portion is directed toward the southwest. In the northern portion, the New River which had its headwaters in the Blue Ridge, crosses the Great Valley and carries the water through a canyon to the western side of the Appalachian Plateaus. But the direction of the tributaries of the New River within the Great Valley is oriented by the ridges. By far the largest proportion of Southwest Virginia is more than 2,000 feet above sea level and on that account has a somewhat colder climate and shorter growing season than the lower Valley of Virginia to the north, a situation reflected in the types of farming within these areas.

The distribution of soil characteristics in general coincides with that of the geologic-morphologic features. The more productive limestone soils are found in the broader valleys, while the soils derived from shale and sandstone are generally associated with the foothills and mountains.

The proportion of land in farms is largest in the counties along the Tennessee Boundary, and in Russell County where farms represent more than 75 percent of the total land area. For the area as a whole, however, about 60 percent is in farms. Most of the land is too steep, rough, and stony to be suitable for cultivated crops and is adapted only to forest and pasture use. About half of the total land area is included in the purchase area of Jefferson National Forest. The average amount of cropland per farm is about 15 to 20 acres. This average, however, does not reflect adequately the presence of an important number of large livestock enterprises in the area. The farm economy is largely based on animal husbandry in which dairying, beef cattle and sheep are important. Corn and small grains, mainly wheat and oats, and burley tobacco and cabbage are the principal farms crops. There are also a few orchards.

Distribution of the population follows largely the natural setting to which agriculture and industry are adjusted. Agriculture is more concentrated in the broader valleys of the Holston and Clinch Rivers in the south. Other concentrations of population are on the New River and in the environs of Roanoke, where the Roanoke River taps the area through the Roanoke Gap. Manufacturing has also developed in the area, and the woodworking and chemical industries being most significant. Urbanization and industrialization are more pronounced along the main line of communication between Bristol and Roanoke. Mining of manganese and anthracite coal is only of local significance.

Southwest Virginia provides an illustration that economic unity is not determined by State and county boundaries. The city of Bristol, which straddles the Tennessee-Virginia boundary, is an indication of this fact. That agriculture in this part of the area is more influenced by the industrial development in the Bristol-Kingsport-Johnson City area than the rest of southwest Virginia is indicated by the recent great increase in milk production in Washington County.

## Deer

Prior to 1930 the white-tail was a rare animal in Southwest Virginia. Remnants of former herds were found in Craig County but reduced to such an extent that hunting was finally prohibited. In other sections the species had been non-existent for as long as thirty years.

A few animals were released in Bland (22), Roanoke (19), Pulaski (8) and Scott (25) between 1930 and 1936 but, the majority of the restocking was accomplished after the latter date. Between 1936 and 1944 a total of 659 deer were released in Craig (76), Giles (49), Grayson (16), Montgomery (10), Pulaski (49), Russell (14), Smyth (119), Tazewell (37), Washington (28), and Wythe (261).

The program was very successful and at the present time deer are found in every county in the Resource Area. In most instances, releases were made on National Forest Closed Wildlife Areas, manned by Resident Game Managers. Here the animals received maximum protection and were further benefited by an intensive habitat improvement program. It was found that roving dogs constituted the most serious limiting factor and dogs continue to be a menace in most

sections. The poaching problem is growing with the herds and night shooting with spotlights is not uncommon.

Deer hunting is now a legal sport in 12 of the 14 counties in Southwest Virginia with Montgomery and Pulaski remaining closed to hunting. Restoration work is underway in these areas with a total of 50 animals scheduled for the Peak Creek section of Pulaski and 30 deer will be released on Brushy Mountain in Montgomery. Brood stock is being trapped in Craig, Smyth and Wythe.

Deer are increasing in every area, as evidenced by annual kill figures obtained since the first legal hunting in 1945:

Year	1945	1946	1947	1948	1949	1950	1951	1952
Kill	117	284	328	430	427	637	924	984

With the exception of the two counties already mentioned, the Resource Area contains sufficient brood stock and the annual increase is gratifying. However, personnel engaged in big game management in this section are aware of the fact that the numbers of deer will eventually exceed the carrying capacity of the range unless control measures are initiated at the proper time. The dissemination of this information is an important part of the overall program, in order that wildlife administrators may experience little opposition when the time for the removal of does arrives. In this connection, a full-time deer research position was set up in 1953.

Elk

While the elk is not considered a principal game species, the State contains two small herds. Brood stock was obtained from the Yellowstone National Park with the last animal being released in Giles (45) and Botetourt (6) in 1935.

The Botetourt herd is found in the North Creek-Apple Orchard section with the range extending across the Blue Ridge Parkway for a short distance into Bedford County. The population appears to remain constant and latest estimates indicate the presence of 25 - 50 animals. There is some known poaching, and this, plus the usual loss from accidents is responsible for the lack of any appreciable increase in numbers.

The Giles-Bland herd is located on the Conley Tract section of the Jefferson National Forest. After 1935, a normal increase was accompanied by numerous crop damage complaints from adjacent landowners and hunting was permitted in order that numbers might be controlled. The shooting of bulls, three days each year, continued until 1944 when the taking of either sex was declared legal. This measure resulted from a steadily increasing number of crop damage complaints and during the 1944, and final, shooting season approximately 70 animals were taken by hunters. Before this time the average annual kill had been about eight bulls. The antlerless season considerably reduced the herd which was never estimated to be more than 100 - 150 elk.

At the present time there is some question as to whether or not the preservation of elk in Virginia is desirable from a management viewpoint. Big game hunting pressure is increasing annually and the range now occupied by the elk is capable of carrying a much greater number of deer, thus furnishing sport for a correspondingly larger number of hunters.

The area was stocked with 46 deer in 1949 - 51 and as soon as the herd has increased sufficiently it is proposed to permit hunting for both deer and elk in the area.

## Bear

An occasional bear is taken in Bland, Craig, Giles or Grayson Counties and the animals are reported in Washington, Smyth, Tazewell and Wythe. In the latter areas the report of a bear is usually accompanied by a stock damage complaint which supposedly justifies an all-out invasion of the mountains by numerous men with guns and dogs, regardless of the season.

The black bear appears to be increasing and this can probably be expected with the return of the deer herds. It is indeed encouraging since the bear rates high on the trophy list of the Southwest Virginia sportsman.

It has been found that the majority of the stock losses, attributed to the bear, are sometimes questionable. Furthermore, trapping is a more efficient method of removing a nuisance animal.

## Turkey

The wild turkey, like the deer, was literally exterminated in Southwest Virginia. The only native birds known to have survived are now located in Botetourt, Craig and Roanoke Counties.

The restoration of the turkey in this resource area has been an important part of the Cooperative Game Management Program but, to date the project has met with little success. Some of the larger releases have been made in Giles, Smyth, Tazewell, Washington and Wythe Counties on National Forest lands. Vast areas under government ownership are already providing some excellent turkey range and, as the forest matures, the situation will greatly improve. The most serious problem has been that of obtaining a sufficiently wild turkey for restocking. All previous releases have consisted of pen-reared birds and losses, due to weather and predators, have been exceptionally high. Also, about ten percent of the turkeys can be expected to come in to farm houses where they are usually attracted by the presence of tame flocks. It might be mentioned that restoration efforts are being confined to those areas containing no brood stock.

During the past year efforts have been made to re-establish the wild turkey to former ranges by use of the Pennsylvania-type propagation pens and the operation is meeting with some success.

## Grouse

West of the Blue Ridge Mountains the popularity of the grouse as a sporting bird is similar to that of the quail throughout the remainder of Virginia. The species is found in every sizeable tract of woodland although population density varies with local conditions.

Due to the scarcity of suitable quail habitat in the Southwest Virginia resource area increasing numbers of sportsmen are turning to grouse hunting and the management of this bird is becoming one of our most important duties. Again, the Jefferson National Forest furnishes the majority of the grouse coverts and it is on

this area that the most effective work can be accomplished. The Cooperative Game Management Program includes an intensive grouse management project which will no doubt be expanded during the coming years.

The lack of suitable habitat must be considered the principal factor limiting grouse populations. At the present time the ideal environment is thought to contain second growth hardwoods, conifers, brush and a portion of open land, all within the cruising radius of the bird. Therefore, management on the Jefferson Forest consists of a systematic survey to determine which of the aforementioned components are absent and the utilization of this information in the preparation of actual work plans. The survey is the duty of the District Game Technician, while the Resident Wildlife Manager performs the work on the ground.

Many of the grouse management practices are admittedly experimental and every effort is being made to evaluate them properly.

## Raccoon

In recent years raccoon hunting has become extremely popular in Southwest Virginia. It might be possible that normal population increases have been responsible for the trend. However, it is felt that present demand still exceeds the supply, in spite of the fact that the animals are present in every section and appear to be continuing on the increase.

Sportsmen's clubs have been releasing raccoons in this area for a number of years and in 1940 the Commission of Game and Inland Fisheries began a rather intensive restocking program. In the beginning, animals purchased in Florida and South Carolina proved inferior and it was found in several cases that they were unable to withstand the comparatively severe winters in Southwest Virginia. At the present time raccoons for restocking are being trapped in the eastern section of the State where they are considered a nuisance by the average landowner.

The majority of the better raccoon range lies within the Jefferson National Forest purchase unit where habitat conditions can be expected to improve throughout the coming years.

The most serious raccoon problem involves legislation. At the present time the hunting season on private lands opens on October 15 and it is illegal to take raccoons on the National Forest until November 20. This condition presents a difficult problem for the law enforcement officer as well as the sportsman. National forest boundaries are seldom marked clearly and it is often necessary for forest officials to actually survey questionable lines in order to determine correct ownership. Therefore, it is sometimes impossible for the night hunter to determine his position with reference to these boundaries. A uniform hunting season would eliminate this confusion.

It is desirable to have the uniform raccoon hunting season open not earlier than November 1. It has been found that the young brood is still accompanying one of the parent animals as late as October and it is not uncommon for a hunter to capture such family groups in the same tree. By November the group has separated and therefore, furnishes a proportionately greater amount of sport. This is an important factor in an area where raccoons are in great demand.

## Squirrel

The red, fox, and gray squirrels are all common to Southwest Virginia but the latter is the most abundant. The gray squirrel probably furnishes more sport than any other game species in this area.

Gray squirrels are found in practically every woodlot and throughout the Jefferson National Forest where sound timber management is providing an ever increasing amount of suitable habitat. Undoubtedly, the most important limiting factor is the early shooting season which conflicts with the second breeding period. A life history study, performed by graduate students of the Virginia Cooperative Wildlife Station in 1940 - 41, revealed two main breeding seasons. The first brood of squirrels makes its appearance in mid-February and the second brood comes in mid-August. Since the young squirrels are dependent upon the parent animals for approximately six weeks it is inadvisable to schedule a shooting season before October 15. The September hunting season has caused a tremendous loss of young squirrels due to starvation when the mother of the brood is shot.

Red squirrel range is usually confined to the higher mountains and they have been definitely reported on White Top, Mt. Rogers, and Pine Mountain. The animals are normally found in more or less isolated colonies.

The fox squirrel is thinly scattered over the entire area and is most often found in the more open woodlots on private lands.

Since the squirrels are dependent upon mature woodland for suitable habitat there is little practical management work which can be accomplished. On private lands the grazing of woodlots presents a rather serious limiting factor and in some instances there might be an insufficient number of den trees. However, the establishment of hunting dates which are biologically sound still remains the most important job to be accomplished by the wildlife administrator.

## Quail

This game bird is found in all of the counties in Southwest Virginia. However, land-use trends are largely responsible for a definite scarcity of suitable quail habitat.

As stated previously, farming throughout the central part of this resource area consists chiefly of cattle production. Farms are characterized by extremely large fields and pastures with little interspersed woodland or fencerows. Many woodlots are grazed and this eliminated the protective edge growth as well as cover within the wooded areas. Such conditions plus rather severe winters make it exceedingly difficult for quail to survive the critical period.

The best quail range is located in the southwestern end of the region in Washington and Scott Counties which are predominantly agricultural. Here a number of small landowners have found cattle raising impractical and are forced to depend upon a more diversified land-use program. In recent years, however, the establishment of two milk condensaries in the Bristol area have made it possible for the small landowner to include raw milk as another cash crop and there has been a great increase in milk production in Washington County. This means that more agricultural land is being used for pasture and quail habitat may be expected to decrease accordingly.



Farming in the northern end of the region, around Roanoke, is slightly more diversified than in the central section and quail habitat is correspondingly more plentiful. This situation will undoubtedly continue since there is a market for numerous farm products in the city of Roanoke.

For a number of years the trend in Southwest Virginia has been toward increased milk and beef cattle production. The rolling land in the valleys is best suited for pasture and hay and for this reason the present type of land-use is expected to remain constant. Therefore, the possibilities of increasing small game populations are limited.

### Cottontail Rabbit

Due to the similarity of habitat requirements the status of the rabbit in Southwest Virginia is essentially the same as that of the bobwhite quail. The animals are quite common in areas where food and cover are sufficient; a condition which might be termed an exception rather than the rule. A notable example is the college farm at Blacksburg where the rabbit population is exceptionally high.

This resource area contains two species of cottontails and one sub-species. *Sylvilagus floridanus mallurus* is the most widely distributed and is found in all except a part of Russell, Scott and Lee Counties. In this section *Sylvilagus floridanus mearnsi* occurs. *Sylvilagus transitionalis* is scattered throughout the resource area but found only at higher elevations. It is possible that this animal might occur at all altitudes above 3000 feet.

Clean farming and grazing have been responsible for the small cottontail populations in the southwest and land-use trends do not appear encouraging. Any quail management will prove equally beneficial to this species.

### Red and Gray Foxes

These popular, and more often unpopular, game animals are found throughout the area and furnish sport for a considerably large number of hunters. As a general rule the gray fox inhabits the densely wooded and brushy sections while the red prefers the more open farm and grazing areas. Red foxes are seldom taken by National Forest Wildlife Managers performing predator control work but, the gray fox is probably the species most often trapped.

In recent years Southwest Virginia, as well as other sections, has experienced a considerable increase in fox populations. Small game hunters were the first to complain of their depredations and some fox hunters admitted that the animals had become too numerous.

In most sections the foxes have already reached their population peak and started on the decline. This trend is evidenced by the fact that numerous dead animals have been found in Scott, Roanoke and possibly other counties. Unfortunately, it has not been possible to collect a specimen for autopsy.

Due to local legislation, regulations regarding the taking of foxes are indeed numerous. It is desirable to establish a uniform fox hunting and trapping season.

## Beaver

This furbearer is found in eight of the counties in the Southwest Virginia resource area, including: Craig, Giles, Pulaski, Smyth, Washington, Tazewell, Bland and Grayson Counties.

Original releases were made in Craig and Giles Counties and some animals have been trapped and transplanted in Tazewell, Smyth and Washington. The remaining colonies have come from these sources.

Due to its habits the beaver might be considered an undesirable species in Southwest Virginia. It is of necessity that the animals usually seek the slower moving streams in the lowlands where dam construction is comparatively easy. This practice often results in the flooding of cultivated land and unfortunately, nearby corn crops are utilized as a source of early fall food. The beaver cut the corn stalks about three inches above the ground and the entire stalk is taken into the water where the ears are removed and consumed. In some instances, this form of crop damage has become a serious matter. The removal of nuisance animals by trapping is now an annual job which requires 30 - 60 days.

In view of the aforementioned facts it is undesirable to establish additional beaver colonies in Southwest Virginia. Legal trapping was permitted in Craig County in 1953 but only 19 animals were taken.

## Muskrat

The muskrat occurs in all of the waters within this resource area. However, it is not found in such concentrations as are common to the eastern Virginia marshes and therefore, cannot be considered an important furbearer.

## Wildcat

The species is common to the more isolated mountain ranges and its numbers will undoubtedly increase with the growing deer herds.

While the wildcat is classified as a predator, the extent of the damage caused by this animal is questionable. The majority of the wildcats are taken by trapping and are seldom hunted as a sport.

## Otter

There are no records on the occurrence of the otter in Southwest Virginia.

## Varying Hare

Few sportsmen are aware of the fact that this animal inhabits some of the higher mountains of the area. However, due to exceptionally small populations, the snowshoe rabbit is not an important game animal.

## SUMMARY

All of the principal non-migratory game species common to the State are found in the Southwest Virginia Resource Area. However, due to geological characteristics

and resulting land-use practices, forest game and big game must be considered the two most important types. The Jefferson National Forest purchase unit, covering approximately one-half of the area, includes the rougher mountainous sections which furnish suitable habitat for these species. Deer, grouse, raccoons, and squirrels are common to all counties. The black bear is found in Craig, Bland, Smyth, and Wythe and is occasionally observed in adjacent sections. One of Virginia's two elk herds is located in Giles-Bland and native wild turkeys have survived in Craig County.

While the other half of the Resource Area is open, the principal industry is animal husbandry and this type of land use presents a serious limiting factor to farm game populations. Cultivated land is usually surrounded by pasture or grazed woodlots, leaving little protective cover for quail and rabbits. Winters are somewhat severe and such habitat conditions make it rather difficult for the farm game species to survive the annual critical period.

## MANAGEMENT RECOMMENDATIONS

1. Big game and forest game are the two most important types occurring in this area and their management should receive top priority. This can best be accomplished through the Cooperative Game Management Program between the Game Commission and the U. S. Forest Service and the project might be expanded.
2. It is felt that every effort should be made to restore the wild turkey to its former range.
3. Deer research is needed in order to stay ahead of increasing populations.
4. Intensive farm game management should be limited to suitable areas, chosen by the Game Biologist.
5. There is need for research to determine ways and means of maintaining farm game populations on lands used primarily for animal husbandry.
6. Use traps, instead of guns and dogs, to control nuisance bears.
7. Discontinue beaver restoration in the area. It might even be desirable to eliminate the species.

## MOUNT MITCHELL

Owing to the high elevation (above 2000 ft.) the climate is cooler and the summers are shorter than in the Piedmont to the east. Severe winters are not uncommon.

With much of the land too steep for cultivation, about half of the land in farms is used for grazing. Agricultural production is largely centered on livestock and animal products. Dairying, beef cattle, sheep and poultry, with some cash crops are the important sources of farm income.

## CAROLINA-VIRGINIA PIEDMONT

Land in farms comprises about three-fourths of the total area, but more than half of all the land is in forests, something like 15 to 20 percent in pasture. Distribution of the principal crops is affected by the physical setting within the area. Tobacco, corn, wheat, sweet potatoes and cowpeas are prominent in the

central counties; cotton is more concentrated in the two southeastern counties and orchards, small grains and hay more significant in the western counties. Next to crops as sources of income are poultry and dairy products. Milk production is increasing over nearly the entire area.

#### CAROLINA-VIRGINIA COASTAL PLAIN

Land use in the Surry Coastal Plain is intensive in some parts and extensive in others. Of the total land area, land in forest varies from 30 to 50 percent, of which a good share is in farm woodland. The forest consists mainly of loblolly pine and hardwoods. Agriculture is largely based on cash crops, with peanuts being the outstanding crop of the area. Other important crops are corn, soybeans, hay and sorghums, and cotton along the southern boundary. Livestock and livestock products, mainly swine, poultry and dairy, are important supplements to the cash crop income of the farms.

#### EASTERN SHORE

The Eastern Shore has the most intensive agriculture and produces the highest average value of farm products per acre of any resource in Virginia. Many farms grow in one year on the same land, up to three crops in rotation. Most of the farm income is obtained from truck crops of which Irish potatoes, sweet potatoes, strawberries, onions and cabbage are the more important. Corn, small grains and hay are other important crops but used mainly on the farms. Livestock and livestock products, especially poultry, have in recent years replaced to some extent truck crops as a source of farm income.

#### NORTHEASTERN VIRGINIA

Crop production and type of farming are very irregularly distributed as result of adjustment to natural conditions as well as proximity of population concentrations. The proportion of land area in farms varies considerably; it is lowest in the counties along the Chesapeake Bay and the highest in the counties along the fall line. Land in forest as a complement varies inversely in distribution from about 20 percent inland to about 60 percent in the shore counties. In contrast to the proportional distributional arrangement of land in farms and forest, the agriculture in the shore counties is much more intensive with an average value of farm products per square acre several times of what is obtained land. Irish and sweet potatoes, other vegetables, corn, peanuts, soybeans and hay are either restricted or more concentrated in the shore counties, while small grains and cowpeas are more prevalent in the interior. Livestock has a similar distribution pattern. Poultry is important in the shore counties, whereas cattle and swine are more important in the interior as income producing animals. By and large, agriculture has declined in recent years nearly everywhere except in some of the southern counties.

#### MIDDLE VIRGINIA PIEDMONT

Agriculture in the Middle Virginia Piedmont is largely on the subsistence level. The number of farms has decreased in recent years in practically all counties. This

in itself is an indication of the prevailing low income of many farmers. Of the total land area, 60 to 70 percent is in farms, but only 10 to 15 percent is used for crops with the remainder in woods and forest. The rougher parts are included in the Shenandoah National Park or in the National Forest purchase unit.

The type of farming practiced in this area is far from uniform. On the plateau side, general farming predominates in which crop and animal specialties supply an important part of the farm income. In the southern part of this section it is primarily fire and flue-cured tobacco, while in the eastern, due to the proximity of Richmond, poultry and vegetables are more significant. In the highland belt farming is more diversified. Fruit, mainly apples, are here a specialty with vegetables and livestock following as close seconds.

This area, although located in the heart of Virginia, has not kept pace in economic development with the rest of the State. During the long time cultivation of the land for corn and tobacco crops, accelerated erosion has taken a heavy toll in soil resources, and depleted the fertility of the land. As a problem area, Middle Virginia commands attention as far as human and natural resources are concerned. There is no definite information on hand as to what extent the land is susceptible to restoring some of the old productiveness. However, the indications are that with effective soil management and proper adjustment of the major land uses to the characteristics and capabilities of the land itself, paired with greater emphasis on animal husbandry either in the form of meat or dairy livestock, much can be done to improve the situation.

## VALLEY OF VIRGINIA

Economically, the Valley of Virginia is one of the most advanced sections of the State. Farming as the principal activity is diversified. Land use is fairly well adjusted to the natural characteristics of the land itself. In the main, crops are confined to the better land, the more hilly portions are in pasture and the rough mountainous land in forest. Of the total area, land in farms comprises 50 to 80 percent in different parts of the Valley and land in forest varies from 30 to 40 percent of the total. The largest proportion of the land is, therefore, in crop and pasture use. Of economic-social significance is the relationship between land value and size of farms. The larger farms are located on the better and higher priced land, while the smaller farms are located on the lower priced lands. General farming is the prevailing type, though in a number of places specialization in one or the other direction is noticeable. Crops are usually grown in a well established rotation. Corn, wheat and other small grains, in addition to hay are the principal crops, but fruit, mainly apples, and vegetables are important near the cities. A certain amount of specialization is also found in stock raising, dairying and poultry farming.

## ALLEGHANY RIDGES AND VALLEYS

Owing to the mountainous nature of the country the climate of the area is cooler than in any other Resource Area of Virginia and winters are comparatively more severe. The frost-free season is also shorter, lasting about 160 days.

Agricultural production is severely handicapped in this area. Less than 40 percent of the total area is in farms and only 5 to 6 percent is used for crops.

Pasture acreage is somewhat larger than crop acreage but most of the land is in forest. Farming revolves largely around animal husbandry, mainly cattle and sheep, which provide the major source of farm income. The staple crops grown are largely used on the farm. About three-fourths of the total land area is included in the George Washington National Forest Purchase Unit Boundary.

## NORTH VIRGINIA PIEDMONT

Farming in the North Virginia Piedmont is not entirely uniform in type nor distribution, but reflects the adjustment to natural background and proximity of the city of Washington. The proportion of total land area in farms varies considerably. In the counties along the eastern boundary, traversed by the more dissected border of the Piedmont, it is lowest, about 55 percent, whereas in the northcentral counties the proportion rises to over 80 percent. Also, a large proportion of the land is suited for crop production, the actual amount used for this purpose is relatively small. For the most part the proportion ranges from 11 percent in the eastern counties to about 20 percent in the central and western counties. A similar distribution arrangement prevails with reference to pasture. Crop and pasture acreage is nearly equal in the border counties but pasture exceeds crop acreage considerably in the west. Forests, as a complement, are distributed in the inverse order, the eastern counties have the higher and the central and western counties the lower proportion of land in forest, which ranges from about 10 to 40 percent. Of the crops harvested, corn, wheat, oats, rye, barley and hay are the most important. Crops are, however, of only secondary importance as a source of cash income. Farming in the main is centered on animal husbandry with beef and dairy cattle, horses, poultry and to a lesser extent, swine and sheep dominating the farm economy. Dairying is important. The population increase of greater Washington has not only advanced the suburban development into Arlington and Fairfax Counties, with corresponding advances in farm land values, but increased the demand for farm products. As a result, the Washington milkshed, of which this area is a major portion, is expanding and milk production is increasing throughout the area but is more concentrated in the northern counties. A large number of the northern farms are pretentious country estates, belonging to Washington society people.

## CAROLINA-VIRGINIA TIDEWATER

For the largest part of the area inadequate drainage has been the principal drawback to agricultural development. Originally the Dismal Swamp covered a much larger portion of the area than it does today. Drainage improvements were started in colonial time. George Washington with others surveyed the Swamp in 1763 for the Great Dismal Swamp Land Company, having as objective the reclamation of the land for settlement and providing means of transport to the North Carolina counties. The Dismal Swamp Canal was dug with slave labor for the dual purpose. For years the canal served as the principal means of transport between the Hampton Roads area and the Albemarle Sound and now, as then, holds back the waters of the Swamp and prevents the overflow of a large part of the land to the East. More recently, two additional drainage enterprises have been organized and other canals have been dug, but much remains to be done to make

the even partly drained land suitable for cultivation. The Dismal Swamp proper remains an untamed wilderness overgrown by forests of cypress, gum, juniper and pine, interspersed by bush and canebrakes.

Agricultural production is diversified, but on the whole is of the intensive type with a high productive value per acre. Of the total land area, less than half is in farms and only about 25 percent in crops. Pasture acreage is comparatively small. Nearby markets, fertile land and long growing seasons form a combination conducive to intensive crop production. Truck crops, corn, Irish and sweet potatoes are the principal crops grown in the northern section with hay, soybeans, cowpeas, some small grains, peanuts and a few acres of cotton added in the south. Dairying, poultry and swine are the principal sources of farm income from animal husbandry and have become increasingly so in recent years.

## NOTE

This paper is not the result of a research project but, is presented solely for the purpose of explaining a few ideas which might be applicable to any of the southeastern states. Information, other than the present distribution and abundance of game species, was obtained from a special report, VIRGINIA'S RESOURCE AREAS, prepared at Virginia Polytechnic Institute and other material was gathered from the United States Census of Agriculture.